University of Colorado

Boulder | Colorado Springs | Denver | Anschutz Medical Campus

Innovation & Entrepreneurship

AT THE

University of Colorado System

FINDINGS, CHALLENGES, AND OPPORTUNITIES

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PART 1:

INNOVATION & ENTREPRENEURSHIP STRATEGIC RECOMMENDATIONS AND EXECUTIVE SUMMARY

BACKGROUND

Innovation and entrepreneurship ("I&E") is an engine which increasingly powers student success, recruits top talent, attracts major donations, and heightens the impact of faculty researchers. Many individuals across the University of Colorado system, particularly in recent decades, have embraced new ventures and entrepreneurial thinking as ways to unleash the university's potential to translate its best insights into favorable social and economic impact for Colorado, the nation, and the world.

During the 2021-2022 academic year, CU system launched an initiative to catalog existing innovation and entrepreneurship assets across the CU system and explore possible avenues forward.[1] Over the past year, our team interviewed a total of 67 faculty, staff, and students. An additional 165+ hours of observations were conducted. Tentative findings were presented at a June 2022 Roundtable Discussion with 31 entrepreneurial leaders and administrators from across the four campuses and a virtual discussion with 25 entrepreneurial leaders and administrators across the four campuses.

To build on this work, we recommended a CU system investment of an additional year long commitment to support three meaningful I&E initiatives and, similar to other large university systems, support tracking and reporting system-level I&E progress. This investment allows CU system leadership time to evaluate whether I&E should be a longer term strategic imperative. In August 2022, the President's Office approved this recommendation.

The following section includes 4 parts:

- Part A: Five Key Takeaways
- Part B: Foundational Observations
- Part C: Summary of Findings
- Part D: Next Phase of Project

[1]Research team: Alicia Sepulveda, a Research Fellow for Innovation & Entrepreneurship, and Brad Bernthal, Associate Professor of Law & Interim Executive Director, Silicon Flatirons Center for Law, Technology and Entrepreneurship. Special thanks to Michael Lightner, Associate Vice President for Academic Affairs at University of Colorado system, for substantive input and guidance throughout the project. We also want to recognize the contributions from faculty, staff, and students who participated in interviews and roundtables throughout the year. Special thanks to the IOS Creative Team, specifically Jacey Brunsen and Sarah Vadaj for design expertise and work on the final report. We also want to recognize and thank community members and local entrepreneurs David Brown, Jason Mendelson, and Eyal Kaplan for feedback and conversations on the report.

PART A: FIVE KEY TAKEAWAYS

#1. The CU system, with a sustained commitment to innovation and entrepreneurship, is uniquely positioned to stake out a reputation as one of the United States' leading public entrepreneurial university systems. If CU leaders desire to pursue this goal, the CU system leadership should soon articulate I&E as a strategic priority. The report serves as a draft blueprint toward establishing the CU system campuses as among the nation's leading public entrepreneurial universities. A long-term commitment to I&E would support the comparative strengths of each campus, facilitate collaboration between campuses and community, and heighten public awareness about CU's favorable economic impact upon the State of Colorado.

#2. For the coming year (AY 22-23), we recommend CU system support to accomplish three initiatives.. A range of long-term strategic options are available to the CU system, as outlined in the report. An additional year commitment would launch a CU system-wide I&E showcase, create a community of practice oriented around teaching entrepreneurship, and support a full time hire who would facilitate coordination across campuses and monitor progress in strategic execution. Moreover, this one-year commitment would allow CU system leadership time to evaluate whether I&E should be a strategic imperative, including what that would mean in terms of "buy in" across the CU campuses, financial projections associated with I&E-related donations, and prospective returns from companies associated with CU system technologies.

#3. Currently, the four campuses offer 140+ classes and 80+ programs related to I&E. Many within the CU community recognize the importance of the entrepreneurial mindset and innovation-related skills, irrespective of a student's major or discipline.[2] Even when students do not pursue entrepreneurship after they graduate, by participating in I&E, students develop 21st century skills required to thrive in the workforce now and in the future.[3] Authors describe the entrepreneurial mindset as "relevant and perhaps critical for all students."[4] A more concerted effort should be made to expose all students to I&E opportunities at an early stage during their university experience.

#4. Technology transfer offices within the CU system have impressively evolved from a license-heavy approach to a more flexible strategy that supports formation and growth of new companies. Recent results underscore the economic impact of the strategies adopted by CU's technology transfer offices. CU Innovations (which serves CU Anschutz Medical Campus and Medical CU Denver Innovations) and Venture Partners (which serves CU Boulder, CU Denver, and UCCS campuses) have each built out more robust support for new companies which take CU technologies to market. In 2019-2020, CU Innovations startups raised $170 million and

[2]For example, CU Boulder's College of Music has an entrepreneurship center. And CU Denver's Design Horizons includes work with Arts and Sciences students to develop entrepreneurship and leadership skills.

[3]Ghafar, A. (2020). Convergence between 21st century skills and entrepreneurship education in higher education institutes. International Journal of Higher Education, 9(1), 218-229. https://doi.org/10.5430/ijhe.v9n1p218

[4]Nadelson, L. S., Palmer, A. D. N., Benton, T., Basnet, R., Bissonnette, M., Cantwell, L., ... & Lanci, S. (2018). Developing next generation of innovators: Teaching entrepreneurial mindset elements across disciplines. International Journal of Higher Education, 7(5), 114-126.

had 50+ industry deals.[5] Meanwhile, in 2021, Venture Partners, had a record breaking year with 20 new startups, $2.1 billion in capital raised by spinout companies, and $3.7 billion in exits.[6] The Association of Public and Land-grant Universities awarded CU Boulder with an Innovation & Economic Prosperity award in 2021.

#5. The CU system operates in a region where startup and entrepreneurial communities flourish. Colorado's Front Range is one of the nation's most fertile locations to start and grow emerging companies.[7] The CU system both benefits from and contributes to this regional advantage. Particularly if the CU system commits to I&E as a strategic imperative, then CU could do more to leverage the competitive geographic advantage of its campuses.[8]

CU INNOVATIONS

2019-2020

$170M FUNDING RAISED BY CU STARTUPS

50+ INDUSTRY DEALS

VENTURE PARTNERS

2021

$2.1B CAPITAL RAISED BY SPINOUT COMPANIES

$3.7B EXITS BY OUR STARTUPS

20 NEW STARTUPS

[5]CU Innovations (2020). Faces of Innovation, 2020 Annual Report. Retrieved from https://www.cuanschutz.edu/cu-innovations/cu-innovations/annual-report/2020-annual-report

[6]Venture Partners (2021). 2021 Venture Partners Annual Report, Translating Innovation: Record-Breaking Results. Retrieved from https://www.colorado.edu/venturepartners/about-us/2021-venture-partners-annual-report

[7]Boulder, Denver, and Colorado Springs regularly rank among the best locations in the United States to launch and grow a startup in various surveys and reports. Denver and Boulder rank among the best regions globally, too. See, e.g., Startup Genome, The Global Startup Ecosystem Report 2022 (ranking Denver / Boulder #24 region in the world to start a business), available at 2022 https://startupgenome.com/es/article/global-startup-ecosystem-ranking-2022-top-30-plus-runners-up

[8] For example, a major donation of $10M funded CU Denver's Jake Jabs Center and CU Boulder, with the help of Dan and Cindy Caruso, recently built new building space that now bridges the Leeds School of Business and the College of Engineering. For 15 years, venture capitalist Brad Feld and Amy Bachelor, along with Caruso, have prominently funded one of CU Boulder's leading entrepreneurship competitions, the New Venture Challenge.. Former Techstars CEO David Brown now teaches at CU Boulder, area venture capitalist Jason Mendelson co-taught for over a decade, and a long list of community leaders mentor students across the four CU campuses through I&E activities.

PART B: FOUNDATIONAL OBSERVATIONS

Three broad observations, summarized below, provide foundation for why the CU system should explore whether to make I&E a strategic imperative in the coming year. First, while grassroots efforts by professors, staff and students are crucial to entrepreneurship, a system-level commitment is required to cement CU's recent gains, track progress, and accelerate entrepreneurial achievements in the coming decade. Second, evidence suggests that meaningful engagement with university I&E experiences favorably affects a wide range of student outcomes. Third, a vibrant scene which turns university invention (i.e., creation of a new idea) into innovation (i.e., making a product or service available to a broader group) offers powerful social and economic benefits for the CU system and the State of Colorado.

#1: System level collaboration, commitment, and strategy is warranted to support and elevate innovation and entrepreneurship at individual campuses.

Decentralized decision-making and leadership is powerful for innovation and entrepreneurship. Local discretion empowers faculty and staff to launch new programs, dynamically adapt, and run experiments. There is, nonetheless, a compelling case that greater coordination, data collection, and resource sharing would help the CU system to become an I&E powerhouse. Commitment at the system level would provide strategic direction while continuing to support the autonomy of each campus to determine appropriate programs and tactics. We find that greater connection and expanded collaboration would have a powerful impact.

If the CU system wishes to make I&E national and international leadership a priority, an I&E "facilitator" would help CU realize the benefits of a confederated approach. It is important that the individual in this role work closely with I&E leaders from each campus.

#2: Teaching entrepreneurial skills and mindset are central to the present and future of higher education.

CU students will craft future careers in professional and social contexts that are drastically different than today.[9] The majority of students work outside of their field of study[10] and, further, future graduates are likely to have multiple careers during their lifetime. Amid a world of rising complexity, automation, and uncertainty engendered by rapid change, "CU must prepare all students—from those majoring in the humanities to the sciences—for a future where students must adapt to repeated changes to their jobs and careers."[11]

The CU system's beachhead of entrepreneurial education is a promising start. The following report catalogs 140+ classes and 80+ active I&E programs across the four CU campuses. Students who take advantage of I&E opportunities develop competencies that align with the top ten skills needed for the future.[12]

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[9]Stebleton, M. (2021). New Spaces & Roles for Student Affairs: An Ongoing Column of JCC Connexions. The Future of Work Just Got More Uncertain: The Role of Student Affairs Educations. https://www.naspa.org/blog/the-future-of-work-just-got-more-uncertain-the-role-of-student-affairs-educators

[10]Abel, J. R., & Deitz, R. (2015). Agglomeration and job matching among college graduates. Regional Science and Urban Economics, 51, 14-24. https://doi.org/10.1016/j.regsciurbeco.2014.12.001

[11]Vihstadt, J. (2017). Building a Great Entrepreneurial University. Silicon Flatirons Report. https://siliconflatirons.org/wp-content/uploads/2017/07/2017-07-11-Entrepreneurial-University.pdf ("Notably, to thrive in today's world of accelerated technological change, students, faculty, and staff need to develop a set of core competencies, including grit, resilience, adaptability, collaboration, creativity, a willingness to take initiative, trial and error, and problem solving.").

[12]Ten skills needed for the future: analytical thinking and innovation; active learning and learning strategies; complex problem-solving; critical thinking and analysis; creativity, originality and initiative; leadership and social influence; technology use, monitoring, and control; technology design and programming; resilience, stress, and tolerance; and reasoning, problem-solving and ideation. See also World Economic Forum. (2020) Future of Jobs Report. https://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf

I&E + Skills of the Future[13]

Problem Solving	Self-Management
Customer Discovery Iteration Creativity Persistence Resilience Opportunity Recognition	Goal Setting Uncertainty Delayed Gratification Bias Toward Action Learning from Failure Trial and Error
Working with People	**Technology Use & Development**
Communication Interdisciplinary Teamwork Conflict Management Influence Leadership	Prototyping New Technologies Marketing Product Development

Entrepreneurial education emphasizes tools to understand a problem, design a novel solution, test the solution, and iterate. Students build belief that they can take meaningful action in the world. In practice, teams use entrepreneurial methodologies to address an array of issues, including social challenges, commercial opportunities, bureaucratic inertia, and navigating uncertain environments. This may take the form of a startup, a non-profit, or innovation within a larger organization.[14]

Some argue that a university degree should focus on critical thinking and disciplinary depth, not entrepreneurship. We find that entrepreneurial education does not shift focus away from critical thinking; rather, it builds upon it. Teaching I&E is best understood as a complement to the specialized rigor of a traditional major. I&E pedagogy broadens a student's applied learning while maintaining the depth of an academic discipline. Additionally, complex problems are often interdisciplinary in nature. Students who have expertise in one area, but who also have the ability to work across disciplines, are considered to be "T-shaped."[15] Such individuals are better able to communicate with others outside of their field because they possess the cognitive range required to work with others from different disciplines.[16]

Finally, entrepreneurial education promises to help CU's campuses untangle some bedeviling problems. The future of higher education is increasingly personalized, interdisciplinary, and supports 1-1 connections (such as mentorship). The experiential nature of entrepreneurial education, which attracts expert community mentors, checks these boxes. Moreover, students who have a valuable relationship with staff or faculty on campus are more likely to persist, have confidence in their abilities, and - ultimately - graduate.[17] This suggests that broader entrepreneurial engagement early in college is a strategy that could improve retention and graduation rates of students. Finally, campus I&E engagement has the potential to increase upward mobility for people from economically disadvantaged and underrepresented backgrounds. I&E prepares individuals for desirable jobs. Research shows that having an entrepreneurial mindset boosts educational attainment and performance, is crucial for creating new businesses, and is

[13]Adapted from (2020) Future of Jobs Report. https://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf

[14]Research shows that students who participate in entrepreneurship education learn how to build their network, feel empowered and build confidence in themselves, think creatively, develop leadership skills, learn how to receive feedback, and develop curiosity Ghafar, A. (2020). Convergence between 21st century skills and entrepreneurship education in higher education institutes. International Journal of Higher Education, 9(1), 218-229. https://doi.org/10.5430/ijhe.v9n1p218

[15]Brown, T. (2009). Change By Design: How Design Thinking Transforms Organizations and Inspires Innovation.

[16]Murphy, M. (2014). Boundary Jumping: Understanding the Value of Modest Anarchy in Entrepreneurial Networks. Silicon Flatirons, University of Colorado Boulder. https://siliconflatirons.org/documents/publications/report/201401BoundaryJumpingReport.pdf

[17]Schreiner, L.A., Noel, P., Anderson, E., & Cantwell, L. (2011). The Impact of Faculty and Staff on High-Risk College Student Persistence. Journal of College Student Development 52(3), 321-338. doi:10.1353/csd.2011.0044.

valued by employers.[18] Additionally, I&E embeds students within the informal community social networks which power entrepreneurial communities.

THE CASE FOR ENTREPRENEURSHIP

- **Entrepreneurial Mindset**
- **Teaches Skills Needed for the Future**
- **Supports Retention and Student Success**
- **Increases Value of Higher Education**
- **Provides Mentorship**

#3: Innovation & Entrepreneurship at CU system supports each campus to play to their comparative strengths and partner with the flourishing entrepreneurial communities in the region.

The CU system is geographically proximate to a world class startup community in the Front Range. When it comes to entrepreneurship, geography matters. Despite higher real estate costs and greater competition for employee talent, startups nonetheless collocate in geographic areas such as Silicon Valley, Boston, Denver, and other locations with high entrepreneurial density.[19] Geographic advantages of the Front Range includes expert mentorship, wealth creation associated with emerging companies, and attractive employment opportunities for students.

The CU system could more self-consciously benefit from and contribute to this regional advantage. When faculty and students create companies, they frequently operate in the state of Colorado and bring back revenue to the universities. In the coming years, CU system innovations across several industries have large market potential. These include, but are not limited to, developments in quantum technologies, biomedical technologies, pharmaceuticals, medical devices, therapeutics, energy/clean tech, artificial intelligence, advanced materials, aerospace, medical diagnostics, and software. Public awareness about CU's favorable economic impact upon the State of Colorado could be heightened for potential donors, legislators, and advancement.

[18]Network for Teaching Entrepreneurship. (2017). Entrepreneurial Mindset: On Ramp to Opportunity. Retrieved from https://www.nfte.com/wp-content/uploads/2020/04/NFTE-Whitepaper-Entrepreneurial-Mindset-On-Ramp-to-Opportunity-December-2017.pdf

[19]See, e.g., AnnaLee Saxenian, Inside-Out: Regional Networks and Industrial Adaptation in Silicon Valley and Route 128, 2 CITISCAPE: J. POL'Y DEV. & RES. 41 (1996). Open innovation practices help explain the benefits of concentration. Open innovation allows external sources to generate the ideas that are then commercialized internally by a firm, while internal ideas can be commercialized by external start-up companies and entrepreneurs. "The boundary between a firm and its surrounding environment is more porous, enabling innovation to move easily between the two." BRUCE KATZ & JULIE WAGNER, THE RISE OF INNOVATION DISTRICTS: A NEW GEOGRAPHY OF INNOVATION IN AMERICA 8 (Brookings Inst., May 2014), http://www.brookings.edu/~/media/Programs/metro/Images/Innovation/InnovationDistricts1.pdf.

PART C: SUMMARY OF FINDINGS

We sort the research findings into six sections. Each section is described briefly below, highlighting major themes within each. See the report for more details on each section.

Education in Entrepreneurial Methods

Launching New Ventures

Campus, Community, and Industrial Partnerships

Awareness of Innovation and Entrepreneurship

Academic and Institutional Incentives

Sustainability and Scalability

Section 1: Education in Entrepreneurial Methods

Many courses are offered to support student development in entrepreneurial methods. In addition to the classroom, events, workshops, and programs are available. Most students discover I&E related opportunities while in the classroom. Key findings include:

» Design thinking and experiential learning are the primary and foundational methods of practice when teaching the entrepreneurial mindset. Experiential learning opportunities serve as an extension of, and contributor to, the local entrepreneurial community.

» I&E coursework helps students develop an innovative mindset and transferable skills needed for the future of work. A common pedagogy used in the classroom involves formations of student teams to create a new venture. The company launch, however, is often a means to a greater end. The primary goal is to teach students methodologies and mindsets associated with innovation and entrepreneurship.

» Some students are hesitant to become a founder of an entrepreneurial venture because they are uncomfortable with the associated risks and uncertainty of a startup. Yet many of these students are, nonetheless, interested in working within I&E spaces. For example, they would welcome the chance to support entrepreneurs and innovators, be familiar with entrepreneurial methodologies, and take employment positions within emerging, innovative companies.

Section 2: Launching New Ventures

Students and faculty have several ways to participate in opportunities to launch new ventures and commercialize new technologies. Workshop series, events, and competitions help students and faculty move their ideas forward into a business. The technology transfer offices are located on two campuses: CU Anschutz Medical Campus (called CU Innovations) and CU Boulder (called Venture Partners). Venture Partners also supports the CU Denver and UCCS campuses. Over the last decade, tech transfer leaders bolstered resources which have increased successful commercialization outcomes and spurred new company launches. Key findings include:

» Five common methods support new venture launches and the commercialization of technologies: the classroom, competitions, incubators, accelerators, and funding mechanisms.

» There is typically a gap between faculty expertise in academic matters (high) and faculty business acumen (not so high). The role of technology transfer offices is to support faculty/researcher goals, serve as connectors, and - where appropriate - help provide business resources to support commercialization efforts.

» Across the CU system there is a growing emphasis on starting new technology-focused ventures. There is opportunity, however, to expand conceptions of entrepreneurship. A more capacious notion of entrepreneurship would be inclusive of nonprofits, small business, and novel initiatives which target social problems.

Section 3: Campus, Community, and Industry Partnerships

Campus, community, and industry partnerships create win-win scenarios that elevate the entire entrepreneurial community. CU system faculty and staff already have strong industry partnerships. Partnerships are, however, often managed locally by individuals. It is not uncommon that a company or prospective CU partner receives overtures from individuals across different schools, often without advance collaboration on the CU side. A common strategy with respect to key industry partners would likely enhance these relationships. Key findings include:

» CU is a massive local convener for the world class startup community in the Front Range. The CU community and entrepreneurial community mutually encourage attendance at events; but awareness of such events are happenstance.

» Personalized support, feedback, and mentorship from community members are critical to the ongoing success of student and faculty ventures.

» CU has to be responsive and agile in order to initially develop and manage strong partnerships with industry. A coordinated strategy is missing to develop industry partnerships within individual campuses and between them. Partnership stories are not well known, and could be an opportunity to better share CU successes.

Section 4: Awareness of Innovation and Entrepreneurship

Awareness within the I&E community at CU (CU system) and beyond the I&E community (those outside of existing I&E) have many opportunities for improvement. It is perceived that many students and faculty are unaware of existing I&E opportunities, though this varies by discipline (some disciplines are commonly engaged in I&E; others less so). Marketing efforts are resource constrained and rely heavily on existing I&E marketing channels such as email listservs, classes, and related events. Participants emphasize the need to increase awareness, participation in, and improve entrepreneurial experiences for underrepresented groups, such as women, racial minority groups, socio-economic groups, and LGBTQ groups. Key findings include:

» The Innovation and Entrepreneurship with the CU system is strong, but disconnected. Opportunities to participate are initially difficult to find, especially for people less familiar with I&E. There are densely networked systems and opportunities are highly visible once the initial steps are taken.

» CU has a huge opportunity to tell our story, specifically the impact CU entrepreneurship has within Colorado and the world. The majority of the student and faculty population are unaware of innovation and entrepreneurship opportunities on their campus. The classroom currently appears to be the best place to market such events for students.

» Students and faculty may not identify with the term entrepreneur or being entrepreneurial. Views differ about how to address this challenge. Some advocate for a better explanation about what

entrepreneurship is and why it is broadly relevant. Others prefer to reach individuals using different terminology. In any event, there is agreement that in order for innovation and entrepreneurship efforts to successfully grow, a larger, more diverse pipeline is needed for aspiring first-time entrepreneurs and innovators.

Section 5: Academic and Institutional Incentives

Academic and Institutional Incentives are focused on real and perceived processes that support or hinder innovation and entrepreneurial activities. Key findings include:

- Several successful programs work outside of fixed funding and classroom credits. The CU system will need to consider if it is worthwhile to institutionalize programs which have proven success. In the absence of regular funding in a line-item budget, faculty and staff have often raised their own funding to support nascent programs.

- The CU system should consider exploring ways and aligning resources to incentivize students, faculty, staff, and community to engage in innovation and entrepreneurship activities. Small frictions within the university can have outsized negative effects. For example, parking on campus can make it challenging and expensive to bring experts to campus and build the startup community.

- Existing Advancement approaches limit the fundraising capacity for people in I&E.

Section 6: Sustainability and Scalability

Sustainability refers to whether or not a program has the support needed to maintain current efforts each year. Sustainability includes understanding what is necessary to maintain and upgrade infrastructure, resources, and embeddedness within the university system. Scalability refers to understanding the potential capacity for a program to increase its impact, expand support to additional groups, and potentially create new offerings.
Key findings include:

- Supporting more infrastructure would increase sustainability of I&E programs to capture knowledge, processes, key relationships, and ensure the ongoing viability of the program.

- Success builds upon success. Programs-specifically workshops and programs outside of the classroom-start small, prove success, and ask for the investment. Finding these investments is not always easy. It is particularly challenging to find sustainable funding for students and student ventures.

- The CU system has a plethora of opportunities to scale I&E. Program directors vary in their capacity and bandwidth and concerns will need to be addressed in order to scale.

- Dedicated tenure lines and curriculum supports sustainability.

Summary

Innovation and entrepreneurship activities across the CU system impacts the lives of students, faculty, and people in the State of Colorado. Salutary aspects of the student experience includes community mentorship and partnership, experiential and practical learning, personal development and transferable skills, and relationships and sense of belonging. Multiple opportunities are available to expand upon today's I&E efforts to create a culture where every student, faculty, and staff has the opportunity to practice innovation and create new ventures that align with the greater mission of the CU system. In addition to report findings, two sessions were held to gather feedback on findings and proposed initiatives with I&E leaders across the CU system. One session was held at the University of Colorado Anschutz Medical campus in June 2022 and the second session was held virtually in August 2022. Discussion points and additional recommendations are located in Appendix F.

PART D: NEXT PHASE OF PROJECT

For the next phase of the project, CU system will support a full time hire of a system level facilitator who would lead three initiatives and, similar to other large university systems, monitor progress toward overall goals.[20] A year-long I&E investment allows CU system leadership time to evaluate whether I&E should be a longer term strategic imperative in the coming years, as well as facilitate financial projections associated with I&E-related investments.

NEXT PHASE OF PROJECT

INITIATIVE #1:
Build a Community of Practice for I&E across the CU System

- Gather annually in person; quarterly via zoom to collaborate and support I&E across the CU system
- Convene I&E leadership group to serve as the voice for campuses
- Develop Open Education Resources (OER) and Coursera for Entrepreneurial Education and Mindset

INITIATIVE #2:
Host 1st Annual CU System-Wide Showcase

- Showcase the best and the brightest to the greater community
- Sent invitations to legislators, Board of Regents, and donors in Colorado
- Celebrate innovators within the CU system

INITIATIVE #3:
Coordinate I&E Efforts and Improve Marketing

- Process for Marketing and Communications - Elevate success stories from individual campuses to the broader CU system and Colorado community.
- Identify and Collect Data - Invest in technologies that aggregate all data through the system into a dashboard, which can be useful in national surveys and year-over-year benchmarking.

The first initiative is to Create and Build a Cross-Campus Community of Practice. In particular, an I&E Open Educational Resources (OER) initiative would support the collection of educational materials and collaboration between faculty across the CU system. This initiative would regularly convene campus I&E teachers and leaders on each campus together to collaborate, share resources, and discuss curricular development in teaching innovation and entrepreneurship mindsets. Faculty who teach I&E include adjunct, full-time professors (sometimes teaching in team configurations). A successful OER initiative would create access to materials (such as a Coursera course), teaching methods, and overall support to current and future I&E faculty and students.

The second I&E initiative is an Annual CU system Wide Showcase. Each campus already has its own competitions for companies to pitch their business plan, startups, and their ideas. An annual event hosted by CU system would aggregate the best and the brightest across the CU system. A Denver event budget would be roughly $25K (the cost to host a similar event with professional production support in Boulder, the New Venture Challenge, is in the $15-20K range). A Denver showcase event should be of interest to key stakeholders, possibly including legislators, Regents, and entrepreneurial donors and businesspeople. The event could also recognize and award innovators and entrepreneurs at each campus, community mentors, and partners.

Finally, the third I&E initiative is to aggregate key I&E information for system use. This would include development of a process for marketing and communications which elevates success stories from individual campuses to the broader CU system and Colorado community. Additionally, this would also include collection of data at the system level by leasing (not creating) available technology to collect and

[20]University of California system https://www.ucop.edu/innovation-entrepreneurship/

organize the data using a dashboard. Data support would also help the national narrative of the CU system as an entrepreneurial campus. For example, in a recent rankings of technology transfer offices, CU system was excluded because data was unclear.[21] Current data collection methods happen within individual campuses. CU system could invest in technologies that aggregate all data throughout the system into a dashboard, which can be useful in national surveys, year-over-year benchmarking, and for individual campuses. The combination of storytelling and data may be used to support fundraising efforts and highlight our collective impact in Colorado.

[21]Feldman, M., Gates, M., & Ratnatunga, M. (2022). Research to Renewal: Advancing University Tech Transfer. Heartland Forward: An Institute for Economic Renewal. https://heartlandforward.org/wp-content/uploads/2022/05/ResearchToRenewal.pdf

02

PART 2:
BACKGROUND AND METHODOLOGY

The ability to think creatively and generate new ideas allows the University of Colorado's best minds to move the frontiers of knowledge. Invention, problem solving, and deep engagement in critical thinking is foundational to a world class university. In this sense, innovation oriented activity is nothing new since innovation *writ broad* is ubiquitous across the CU system.

A narrower conception of innovation, however, focuses not just upon creation of new ideas, but upon application of ideas in ways that have real world impact. Today several initiatives support efforts to turn university invention (i.e., creation of a new idea) into innovation (i.e., making a product or service available to a broader group). Moreover, professors and adjunct faculty have dramatically expanded teaching about entrepreneurial methods and mindsets through classes and co-curricular experiential programs. Overall, in recent decades, many individuals across the CU system have embraced new ventures and entrepreneurial thinking as ways to unleash the university's potential to translate its best insights into favorable social and economic impact for Colorado, the nation, and the world.

To date, while programs and initiatives have proliferated, the CU system has yet to map its entrepreneurial and innovation-related assets. Relevant resources include academic programs, co-curricular opportunities, infrastructure to support commercialization efforts, initiatives to launch new ventures, and faculty, staff and student leaders in these areas. The Innovation and Entrepreneurship ("I&E") Research Project officially launched in September of 2021.

The I&E Project catalogs innovation and entrepreneurial assets and, moreover, identifies challenges and opportunities to strengthen the CU I&E ecosystem. The I&E Project examines the University of Colorado, a public research university spanning multiple campuses, including the University of Colorado, Boulder, University of Colorado, Denver, University of Colorado Anschutz Medical Campus, and University of Colorado, Colorado Springs (the "CU system"). Partnership programs at Western Colorado University and Colorado Mesa University were also included in the study.[22]

I&E-related initiatives help respond to a range of dynamics affecting higher education. These include calls to meet the State of Colorado's workforce preparedness needs, demand for more experiential learning opportunities, market and employment trends, and public pressures for higher education to generate and quantify its economic impact. Further, issues of college affordability, Covid-19,[23] declining number of high school graduates, and an increase of underrepresented students[24] make recruitment, admissions, and retention[25] efforts ever more urgent for the University of Colorado's institutions.

I&E across the CU system, with respect to teaching, is best understood as an overlay whereby programs typically complement the specialized rigor of a traditional major. I&E pedagogy broadens a student's applied learning experience while maintaining the depth of an academic discipline. I&E programs teach a common vocabulary that allows participants from different disciplines to be cognitively proximate to one another,

[22]Law of the Regents (2010). Mission, Guiding Principles and Vision Statement. Mission, Guiding Principles and Vision Statement | University of Colorado (cu.edu)

[23]Nietzel, M. (2021). Updated Report Shows "Unprecedented" Decline In High School Graduates Enrolling In College Last Fall. Forbes. https://www.forbes.com/sites/michaeltnietzel/2021/03/25/updated-report-shows-unprecedented-decline-in-high-school-graduates-enrolling-in-college-last-fall/?sh=70c55a8368b1

[24]Western Interstate Commission for Higher Education. (2016). Number of High School Graduates Across America Leveling Off; Minority Grads Rising, to be Near Majority Soon. https://www.wiche.edu/resources/number-of-high-school-graduates-across-america-leveling-off-minority-grads-rising-to-be-near-majority-soon-2/

[25]Retention refers to the percentage of students who return the Fall semester after their first year attending that same college. Usually refers to first-year, first-time students

enabling collaboration between people with different functional specialties on projects and problems.[26] The leaders of tomorrow need to be creative problem solvers, work well with others across functional specialties, be responsive to new technologies, and engage in life-long learning to navigate industrial shifts during their lifetimes.[27] I&E offerings also immerse students in entrepreneurial methodologies and skills that are valued - and indeed often required - within 21st Century workplaces.

[26]"Cognitive proximity determines whether people involved in an interaction can understand, process, and use the information exchanged across industry and intellectual boundaries." See Boundary Jumping: Understanding the Value of Modest Anarchy in Entrepreneurial Networks (Silicon Flatirons Report, January 2014). Available at https://siliconflatirons.org/publications/boundary-jumping-understanding-the-value-of-modest-anarchy-in-entrepreneurial-networks-2/

[27]Whiting, 2020. What are the top 10 job skills of tomorrow – and how long it takes to learn them. From the Future of Jobs Report, World Economic Forum. Retrieved from https://www.weforum.org/agenda/2020/10/top-10-work-skills-of-tomorrow-how-long-it-takes-to-learn-them/

THE VALUE OF INNOVATION AND ENTREPRENEURSHIP FOR COLORADO AND THE FUTURE OF HIGHER EDUCATION

The University of Colorado system is a major contributor of entrepreneurs, innovators, and new business creation within the state of Colorado. Universities, staff and faculty, students, the greater community, and local industries benefit from innovation and entrepreneurship coming out of CU system. CU system also benefits from participating in the entrepreneurial activities situated in the region. The relationships between these groups and the people within these systems are our greatest asset.

Value of I&E to Students: Supporting Retention and Preparing an Innovative Workforce for the Future

Twenty-four hour news cycles, social media, and the internet have made local, state, federal, and global problems more visible than ever before. Universities across the globe are investing in entrepreneurial education because of the diverse skill set and mindset it provides students to solve complex problems. The experiential nature inherent in entrepreneurial education offers practical learning experiences for students with the primary goal of skill development.[28] Research has shown students who participate in entrepreneurship education learn how to build their network, feel empowered and build confidence in themselves, think outside the box, develop leadership skills, learn how to receive feedback, and develop curiosity.[29] Although many students are afraid of failure and financial risk[30], participating in entrepreneurship education helps them better assess uncertainty, make informed decisions, and take risks where appropriate.

THE CASE FOR ENTREPRENEURSHIP

- **Entrepreneurial Mindset**
- **Teaches Skills Needed for the Future**
- **Supports Retention and Student Success**
- **Increases Value of Higher Education**
- **Provides Mentorship**

I&E education also helps students learn how to identify and work towards solving a worthwhile problem, giving them hope for a better world in the process. One study showed student entrepreneurial motivations were rooted in having autonomy and helping others in the community, which is contradictory to public perceptions that people pursue entrepreneurship for financial gain.[31] The skillset and mindset developed through

[28]Eesley, Charles E., and Yong Suk Lee. "Do university entrepreneurship programs promote entrepreneurship?" Strategic Management Journal 42, no. 4 (2021): 833-861. https://doi.org/10.1002/smj.3246

[29]Ghafar, A. (2020). Convergence between 21st century skills and entrepreneurship education in higher education institutes. International Journal of Higher Education, 9(1), 218-229. https://doi.org/10.5430/ijhe.v9n1p218

[30]Nabi, G., Walmsley, A., Liñán, F., Akhtar, I., & Neame, C. (2018). Does entrepreneurship education in the first year of higher education develop entrepreneurial intentions? The role of learning and inspiration. Studies in Higher Education, 43(3), 452-467. https://doi.org/10.1080/03075079.2016.1177716

[31]Ruth, A., Beresford, M., & Cantú, E. A. (2020). Community and Autonomy: Motivations for Entrepreneurship among Arizona Community College Students. Human Organization, 79(3), 237-246. https://doi.org/10.17730/1938-3525-79.3.237

entrepreneurial education goes beyond "being a tech-savvy product developer[32]" and must be interdisciplinary, crossing traditional boundaries of existing disciplines to solve complex problems. One research study concluded that broad entrepreneurship education that goes beyond traditional tech startups may be better at reducing students' uncertainty with entrepreneurial ability.[33]

Entrepreneurship education early in college may improve retention and graduation rates of students. Research shows that an entrepreneurial mindset boosts educational attainment and performance, is crucial for creating new businesses, and is valued by employers.[34] For example, students exposed to I&E early in their academic career have shown benefits in helping students build personal awareness, develop socially, improve cognitive abilities associated with innovation, connect learning with career development and interests, and help students gain self-efficacy that they are capable of being an innovator.[35] One longitudinal study examined how students become innovators. Researchers found that the biggest predictor of being an innovator was related to what students participated in throughout college, as opposed to inherent skills or characteristics.[36] When students participate in innovation and entrepreneurship, they learn valuable skills and mindsets that help them build confidence in themselves and their goals, create a sense of belonging, and build self-awareness to know when and how to ask for help - all of which are critical to student retention and graduation[37-38].

Even when students do not pursue entrepreneurship after they graduate, by participating in these experiences, students develop 21st century skills needed for the workforce now and in the future.[39] Students may pursue entrepreneurship later in life and they can use the I&E skill set and mindset to innovate within existing organizations.[40]Authors describe this skill set and mindset as "being relevant and perhaps critical for all students"[41] regardless of their major or interests. CU system has a talented pipeline of future leaders who have to be prepared for today's workforce, and tomorrow's problems. Innovation and entrepreneurship can help develop future leaders.

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[32]Selznick, B. S., & Mayhew, M. J. (2019). Developing first-year students' innovation capacities. The Review of Higher Education, 42(4), 1607-1634. DOI 10.1353/rhe.2019.0077

[33] Eesley, Charles E., and Yong Suk Lee. "Do university entrepreneurship programs promote entrepreneurship?" Strategic Management Journal 42, no. 4 (2021): 833-861. https://doi.org/10.1002/smj.3246

[34]Network for Teaching Entrepreneurship. (2017). Entrepreneurial Mindset: On Ramp to Opportunity. Retrieved from https://www.nfte.com/wp-content/uploads/2020/04/NFTE-Whitepaper-Entrepreneurial-Mindset-On-Ramp-to-Opportunity-December-2017.pdf

[35]Selznick, B. S., & Mayhew, M. J. (2019). Developing first-year students' innovation capacities. The Review of Higher Education, 42(4), 1607-1634. DOI 10.1353/rhe.2019.0077

[36]Selznick, B. S., & Mayhew, M. J. (2019). Developing first-year students' innovation capacities. The Review of Higher Education, 42(4), 1607-1634. DOI 10.1353/rhe.2019.0077

[37]Gillen-O'Neel, C. Sense of Belonging and Student Engagement: A Daily Study of First- and Continuing-Generation College Students. Res High Educ 62, 45–71 (2021). https://doi.org/10.1007/s11162-019-09570-y

[38]Maunder, R.E. (2018). Students' peer relationships and their contribution to university adjustment: the need to belong in the university community, Journal of Further and Higher Education, 42:6, 756-768, DOI: 10.1080/0309877X.2017.1311996

[39] Ghafar, A. (2020). Convergence between 21st century skills and entrepreneurship education in higher education institutes. International Journal of Higher Education, 9(1), 218-229. https://doi.org/10.5430/ijhe.v9n1p218

[40] Killingberg, N. M., Kubberød, E., & Pettersen, I. B. (2022). Exploring the Transition to Working Life of Entrepreneurship Education Graduates: A Longitudinal Study. Entrepreneurship Education and Pedagogy. https://doi.org/10.1177/25151274221108354

[41]Nadelson, L. S., Palmer, A. D. N., Benton, T., Basnet, R., Bissonnette, M., Cantwell, L., ... & Lanci, S. (2018). Developing next generation of innovators: Teaching entrepreneurial mindset elements across disciplines. International Journal of Higher Education, 7(5), 114-126.

Value of I&E to Faculty and Researchers

Faculty and staff who participate in entrepreneurship and innovation also experience great benefits, bring back revenue to the university, and support the local economy. The technology transfer offices within the system, Venture Partners and CU Innovations, support faculty and researchers as they innovate and develop new technologies, products, and services. Workshops, training, individualized support, mentor networks, and funding are provided to facilitate the individual and business development of these innovators. Innovations that have market potential spin out of the university and greatly contribute to the Colorado economy.

Faculty and researchers who participate in I&E programs, independent of commercialization outcomes, experience positive benefits. One study found that faculty who participated in I-Corps, a program available to anyone connected to the CU system, understood commercialization as an academic activity, learned from others, and collaborated with other innovative faculty. Participants also had a shift in their mindset in how to problem solve, were more open to change, and even approached both research and teaching in new ways.[42]

Value of I&E to the University System and Campus Culture: The Future of Higher Education

The University of Colorado system has the capability to not only lead globally in entrepreneurship and innovation, but also to innovate within higher education. Beyond teaching I&E to students, providing the skill set and mindset of innovation to staff will help develop new ways of generating revenue, support innovative ways of learning, and better prepare students for the future of work.[43] Trends such as automation, artificial intelligence, digitization, in combination with the need to frequently re-skill and upskill in the future, has the potential to drastically change the current paradigm of higher education.[44] Research shows that a strong entrepreneurial ecosystem and university culture consists of supportive cultural attitudes, willingness to invest, willingness to take risks, supportive of views towards failure, access to experienced entrepreneurs and talent, access to venture finance, openness and the availability of mentors and role models, state-run programs, an attractive regulatory environment, research, intellectual and property spillovers, physical infrastructure, space for growing ventures, communications and transportation systems, music and art scenes, the general quality of life in a locality, ability of ventures to access markets beyond the specific location.[45]

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[42]Duval-Couetil, N., Huang-Saad, A., & Wheadon, M. (2021). Training Faculty in Entrepreneurship and Innovation: An Evaluation of the National Science Foundation Innovation-CorpsTM Program. Entrepreneurship Education and Pedagogy, 4(4), 583–608. https://doi.org/10.1177/2515127420929383

[43] Klofsten, M., Fayolle, A., Guerrero, M., Mian, S., Urbano, D., & Wright, M. (2019). The entrepreneurial university as driver for economic growth and social change-Key strategic challenges. Technological Forecasting and Social Change, 141, 149-158. https://doi.org/10.1016/j.techfore.2018.12.004

[44]Whiting, 2020. What are the top 10 job skills of tomorrow – and how long it takes to learn them. From the Future of Jobs Report, World Economic Forum. Retrieved from https://www.weforum.org/agenda/2020/10/top-10-work-skills-of-tomorrow-how-long-it-takes-to-learn-them/

[45]Bedő, Z., Erdős, K., & Pittaway, L. (2020). University-centered entrepreneurial ecosystems in resource-constrained contexts. Journal of Small Business and Enterprise Development. https://doi.org/10.1108/JSBED-02-2020-0060

Value of I&E to the State of Colorado and Greater Entrepreneurial Ecosystem

CU system provides resources to support faculty in licensing new technologies and creating new businesses in several industries including quantum technologies, biomedical technologies, pharmaceuticals, medical devices, therapeutics, energy/clean tech, artificial intelligence, advanced materials, aerospace, medical diagnostics, and software, among others. Faculty and students who create companies within the CU system tend to continue working on their startup or other startups in the State of Colorado. These innovations and individuals create invaluable and long-lasting economic and societal impact to the region and faculty who participate perceive that these endeavors are meaningful, both personally and professionally.[46]

Partnerships between the universities, community, and industry provide value to everyone involved and decrease risks and resources needed for each entity to innovate on their own.[47] Companies benefit when they get access to innovations coming out of the university and researchers often partner with industry to make stronger technologies and innovations. These relationships often create win-win scenarios for all involved and make a bigger impact in the world.

Objections to I&E

Objection #1: Entrepreneurial education does not provide enough depth in one area and should be focused within one discipline.

Response: Complex problems do not manifest within individual disciplines, and are interdisciplinary in nature. To solve complex problems of the future, graduates must be prepared to learn various fields, quickly upskill, and adjust. Additionally, research shows that the majority of students work outside of their field of study[48] and future graduates are likely to have multiple careers during their lifetime.

Objection #2: The liberal arts degree should focus on critical thinking, not building companies.

Response: Entrepreneurial education does not shift focus away from critical thinking, but builds upon it using practical, experiential learning methodologies. While entrepreneurship education may appear to focus on building a company, professors emphasis the learning outcomes of building a company such as teamwork, learning from failure, receiving feedback, leveraging resources, working toward a goal, curiosity, thinking outside the box, and perseverance.[49]

Objection #3: Faculty and researchers should focus on teaching, not commercializing technologies or building companies.

Response: Innovation is inherent in the setting of higher education. Many professors already participate in creating innovative research methodologies, research problems in new ways, and engaging in participatory research within the community. Entrepreneurship should be viewed as an extension of, rather than separate from, the existing work faculty already participate in. Entrepreneurship and commercialization can take the findings or discoveries from research and make a greater social and economic impact.

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[46]Bouwma-Gearhart, J., Carter, R. & Mundorff, K. (2021) A Call For Promoting Faculty Innovation and Entrepreneurship, Change: The Magazine of Higher Learning, 53:2, 18-24, DOI: 10.1080/00091383.2021.1883973

[47]Brailsford & Dunlavey. (2017). A guide to higher ed public-private partnerships. P3 Resource Center. https://p3resourcecenter.com/wp-content/uploads/2018/07/A-Guide-to-Higher-Ed-Public-Private-Partnerships.pdf

[48]Abel, J. R., & Deitz, R. (2015). Agglomeration and job matching among college graduates. Regional Science and Urban Economics, 51, 14-24. https://doi.org/10.1016/j.regsciurbeco.2014.12.001

[49]Ghafar, A. (2020). Convergence between 21st century skills and entrepreneurship education in higher education institutes. International Journal of Higher Education, 9(1), 218-229. https://doi.org/10.5430/ijhe.v9n1p218

Objection #4: Higher education should stay true to its original purpose and focus on educating students.

Response: Higher education should continue to focus on educating students, with important considerations given to the societal context in which it operates. Researchers, trends, and thought leaders project the future of work, learning, and higher education will look drastically different in the upcoming years.[50] How we educate students must evolve in order to keep pace with technology, automation, and competitors who can provide quality education quicker, easier, and more affordable. Entrepreneurship education and an innovation culture provides students, faculty, and staff with the necessary skills and mindset needed to not only succeed in the present, but also in the future.

[50]Stebleton, M. (2021). New Spaces & Roles for Student Affairs: An Ongoing Column of JCC Connexions. The Future of Work Just Got More Uncertain: The Role of Student Affairs Educations. https://www.naspa.org/blog/the-future-of-work-just-got-more-uncertain-the-role-of-student-affairs-educators

REPORT SCOPE AND KEY CONCEPTS

A threshold issue for this report is a question of scope. After all, at some level, innovation - broadly understood in the form of novel ideas and creativity - is ideally infused throughout the CU system. Yet this investigation's charge is to study a smaller subset of university activities. A challenge is how to articulate this scope.

In order to narrow the report's aperture, we adopt a flexible, but workable, conception of entrepreneurship and innovation.[51] Our investigation focuses upon assets which generally fit three criteria. Namely, we examine activities which teach or assist individuals and teams as they (i) identify and understand a meaningful problem, (ii) pursue solutions within uncertain environments, and (iii) search for and implement a scalable, repeatable, and applied solution within the world.[52] As a result, this report generally excludes work that generates new knowledge, foundational to innovation, but nonetheless does not fit the criteria above. We do not claim that this is the definitive definition of innovation and entrepreneurship. Rather our claim is more modest; namely, that this is a useful definition for purposes of this investigation.

Moreover, key terms are repeatedly used within innovation and entrepreneurship discussions. While the same terminology is often used, terms often go under-defined or undefined. This jargon frustrates understanding and analysis, particularly for newcomers to innovation and entrepreneurship. Moreover, at times it emerges that different people within entrepreneurial circles, even as they use the same word, mean different things.

Below are brief definitions of key concepts that are commonly used to describe university activities related to innovation and entrepreneurship. This report aims to minimize confusion by defining key terms and, where possible, use the terms consistently throughout the analysis.[53]

Critical thinking: The process of analyzing information in order to make a logical decision about the extent to which you believe something to be true or false.[54] For example, before launching a new business, an entrepreneur may engage in critical thinking by way of speaking to multiple potential customers to test a hypothesis that an idea is worth pursuing.

Entrepreneurship: A new venture, created to identify a scalable solution to a problem, which navigates conditions of uncertainty to bring a new product or service into the world. For example, in 2012, CU Boulder Professors Sehee Lee and Conrad Stoldt started a company, Solid Power, arising from their academic research, targeting problems around batteries. They teamed with

[51]In individual interviews, we asked interviewees about their conception of "innovation" and "entrepreneurship," and how they define these terms. Interviewees, not surprisingly, provided a range of responses.

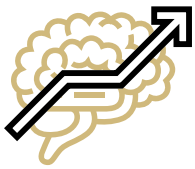
[52]A long intellectual history in entrepreneurship focuses upon unique aspects of highly uncertain environments. In this context, "uncertainty" is understood as involving circumstances in which so many factors are unknown that it is difficult to project likely outcomes into meaningful probabilistic form. Uncertainty is often put in contrast to "risk." Risk involves unsettled outcomes, however, there is sufficient information in risk analysis to project outcomes in meaningful probabilistic form. See Frank H. Knight, Risk, Uncertainty, and Profit (1921).

[53]One exception is where interviewees are quoted verbatim in Part 3. Interviewees use terminology without necessarily tracking the definitions provided here.

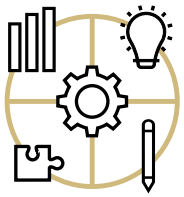
[54]Oxford Advanced Learner's Dictionary. Retrieved in 2022 from https://www.oxfordlearnersdictionaries.com/us/definition/english/critical-thinking

others, including CEO Doug Campbell, to develop a scalable, solid state battery solution which involves a more efficient cathode.

Entrepreneurship also targets social problems and may occur in non-profit contexts. “Social entrepreneurship” and “impact entrepreneurship” are terms which refer to new ventures which prioritize non-pecuniary objectives through the entrepreneurial form.

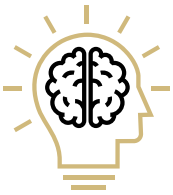


Entrepreneurial mindset: A way of thinking which emphasizes recognition of new opportunities, empathy and understanding problems, the ability to make decisions under conditions of uncertainty, flexibility and iteration, and resiliency in the face of setbacks.[55]



Entrepreneurial methodologies: Methods commonly used by individuals and teams in entrepreneurial environments. These methods include design thinking, human-centered design, lean startup, the business model canvas, design innovation, and other sets of processes which assist creation of new companies, as well as novel products and services. Each entrepreneurial methodology typically has its own vocabulary which helps team members communicate and collaborate.

Invention: The creation of a new idea. For example, a research team in a lab identifies a new, breakthrough molecule which promises to give rise to new drug therapies.



Innovation: A new idea that is brought into the world in an applied context. UCCS defines innovation as the transformation of ideas to impact. Innovation occurs, for example, when a large company licenses a lab’s invention of a breakthrough molecule, and then brings a new drug therapy to the market.

Relatedly, when innovation involving a novel product or process improvement occurs within an existing company, rather than a new venture, this is sometimes referred to as “intrapreneurship.”

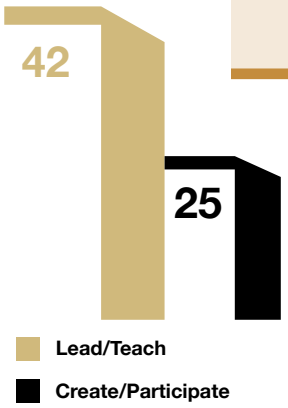
Problem solving: Tools to solve problems that include collecting information, understanding context, determining options, and exercising judgment that does not necessarily require a new solution. For example, a food business places an order for their new product. Upon receiving the shipment, team members notice the nutritional information on the packaging is wrong. The team must problem solve in order to move forward.

[55]Network for Teaching Entrepreneurship (2021). Entrepreneurial Mindset. Retrieved from https://www.nfte.com/entrepreneurial-mindset/

RESEARCH METHODOLOGY

The I&E Project surveys the current state of the CU system's assets and efforts during the 2021-2022 academic year. Efforts that preceded this investigation started in 2020. Sharon Matusik, Dean of the Leeds School of Business at CU Boulder, convened a meeting on September 30, 2020 involving CU system leadership and several individuals involved in I&E. The authors reviewed meeting notes at the outset of this investigation. The authors also reviewed other existing literature and available I&E-related reports. The authors analyzed campus and system level strategic plans in order to understand existing campus characteristics and aspirational goals.

Our investigation uses a descriptive case study methodology (Merriam, 1998). Purposive sampling was used to recruit participants to the research study. Snowball sampling was used to recruit additional faculty, staff, and students involved with I&E across the four campuses. This study was submitted and approved by the Institutional Review Board (Protocol Number 21-0441). In total, 56 faculty and staff were invited to participate in interviews - meaning participants either teach I&E related coursework or serve as program directors leading I&E efforts on one of the campuses. We invited a total of 31 students and faculty who are involved in a new venture themselves. We completed a total of 67 semi-structured interviews with students, faculty, and staff about the programs they run, experiences within those programs, challenges, and opportunities for growth. **Out of the 67 participants interviewed, 42 lead I&E programs or teach I&E and 25 are creating new ventures and/or participating in I&E offerings as a student or faculty member.** Interviews lasted between 20 minutes to one hour, with an average length of 40 minutes. Interviews were transcribed verbatim.



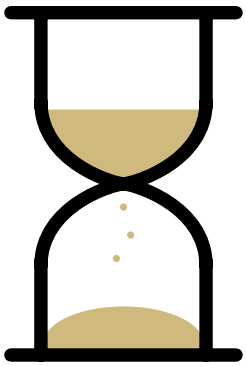
Our first step towards gaining a better understanding of I&E opportunities across the CU system is to create a catalog and interview all people involved in helping students, staff, and faculty to create entrepreneurial ventures. Interviews prompted interviewees to address the following four research questions:

1. **What are common innovation and entrepreneurship opportunities available to students, staff, and faculty across the campuses?**
2. **What new or emergent strategies are being used to encourage and support innovation and entrepreneurial experiences in a higher education system?**[56]
3. **What challenges exist when engaging innovation and entrepreneurial experiences in a higher education system?**
4. **What are the experiences of students and faculty who participate in opportunities related to innovation and entrepreneurship?**

[56]Research question modified from Griffiths, et al. (2012). A dialogue with William J. Baumol: Insights on entrepreneurship theory and education. Entrepreneurship Theory and Practice, 36(4), 611-625. https://doi.org/10.1111/j.1540-6520.2012.00510.x

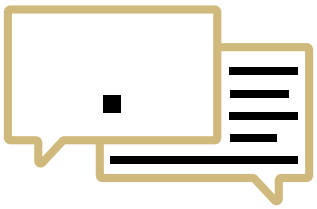
Interviewees broadly shared a range of insights about I&E, including their vision for I&E on campus, identification of best practices, stories of successes and failure, and opportunities for growth. In qualitative research studies, an ethical practice is to find quotes that highlight many participants' experiences, and to note when a single participant experiences something uniquely. The research team discussed themes at length, challenging one another to fully represent the participants' experiences. Quotes from participants are showcased throughout the presentation of findings to increase trustworthiness and rigor of the study.[57] Overall, in order to provide a more complete picture of I&E activity, as a default we credit quotes to the speakers. To protect participants, however, we anonymize responses when sensitive remarks are recorded.

In addition to interviews, a total of 165 hours of observation took place over the course of the year. Observations include university events and public community events to understand the existing I&E community within CU and in the greater entrepreneurial communities outside of the university system. Attending these events provided exposure and insight into the existing entrepreneurial culture. The constant comparative method and category construction was used to analyze the data from interviews and observations.[58] Additionally, two sessions where held to gather feedback on findings and proposed initiatives with I&E leaders across the CU system.



165
HOURS
OF OBSERVATION

67



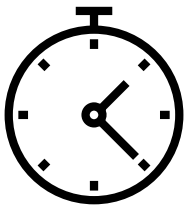
PARTICIPANTS INTERVIEWED

OF THOSE INTERVIEWED

63%
Lead or Teach I&E

37%
Create or Participate in I&E as a Student or Faculty Member

40



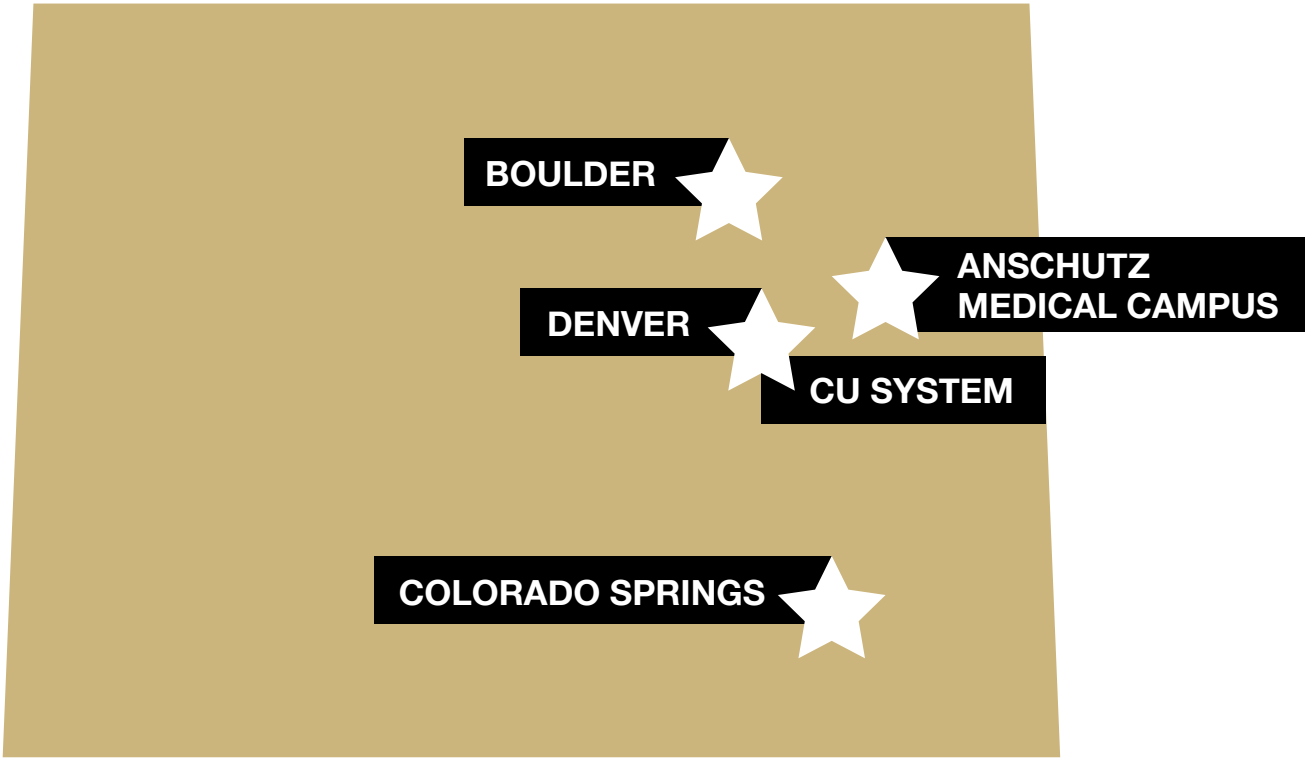
MINUTES
AVERAGE LENGTH OF INTERVIEWS

[57]The range of openness of interviewees varied. Some individuals expressed concerns about the possible consequences of critical, honest feedback. For example, before interviewing, one participant asked who would have access to the recordings, in an effort to gauge how much they should share. Other interviewees spoke freely. For example, another participant shared how they could care less who listened to their interview.

[58]Glaser, B., & Strauss, A. (1967). The Discovery of Grounded Theory: Strategies for Qualitative Research. Mill Valley, CA: Sociology Press.

HOW I&E ALIGNS WITH STRATEGIC PLANS ACROSS THE CU SYSTEM

Campuses within the University of Colorado system bring unique characteristics and contributions to the overall system and within the State of Colorado. In this section, we highlight campus characteristics related to innovation and entrepreneurship. Programs mentioned within this section are just examples and are not comprehensive. Additionally, we include key components of the strategic plans of each campus that align with I&E.



LOCATIONS OF THE 4 CU CAMPUSES & CU SYSTEM

University of Colorado
Anschutz Medical Campus

Mission & Vision: "With innovation, agility, and excellence, we improve humanity by preventing illness, saving lives, educating health professionals and scientists, advancing science, and serving our communities."

Nexus to I&E: One of the five initiatives from the Anschutz campus strategic plan is to build a Healthcare Innovative Institute to create new partnerships, support cross-discipline collaboration, and accelerate research discoveries.

Initiatives: Anschutz broadly emphasizes patient impact. Offices such as CU Innovations, the Colorado Clinical and Translational Sciences Institute, the Mental Health Innovation Center, and Mobile Health are leading efforts to improve health outcomes and partner with the community. The Anschutz Medical Campus has their own ecosystem map, several funding mechanisms to support entrepreneurial ventures (Spark/Reach, Chancellor's Innovation Fund), and many powerful industry partnerships which support I&E. Anschutz Medical Campus has a physical makerspace called InWorks, dedicated to support prototypes and collaborations in computational design, digital fabrication, and clinical biology. In the year 2019-2020, CU Innovations startups raised $170 million and had 50+ industry deals.[59]

[59]CU Innovations (2020). Faces of Innovation, 2020 Annual Report. Retrieved from https://www.cuanschutz.edu/cu-innovations/cu-innovations/annual-report/2020-annual-report

University of Colorado Boulder

Mission & Vision: Boulder's vision is "to be a leader in addressing the humanitarian, social and technological challenges of the 21st century."

Nexus to I&E: The strategic imperatives of the university are: "to shape tomorrow's leaders, be the top university for innovation, and positively impact humanity."

Initiatives: A cross-campus I&E initiative was formally launched in 2015 to focus specifically on the student experience. The I&E community on the Boulder campus meets monthly, in a "Co-Conspirators Group" to discuss campus events, host speakers, and build awareness about activities across the campus. Events, workshops, and panels are commonplace and easily accessible once students are aware of the I&E event website, which is updated regularly and in collaboration with campus partners. A platform and competition which supports new startups on campus, CU Boulder's New Venture Challenge (NVC), is nationally ranked No. 13 on the Top 20 U.S. University Entrepreneurship Competitions list.

In 2021, Venture Partners, the Boulder tech transfer office, had a record breaking year with 20 new startups, $2.1 billion in capital raised by spinout companies, and $3.7 billion in exits.[60] Their team supported companies in raising more capital and exits than ever before. Most recently, the Association of Public and Land-grant Universities awarded CU Boulder with an Innovation & Economic Prosperity award in 2021 and the Deming Center for Entrepreneurship at Leeds School of Business won the Exceptional Activities in Entrepreneurship Across Disciplines award from the Global Consortium of Entrepreneurship Centers in 2021.

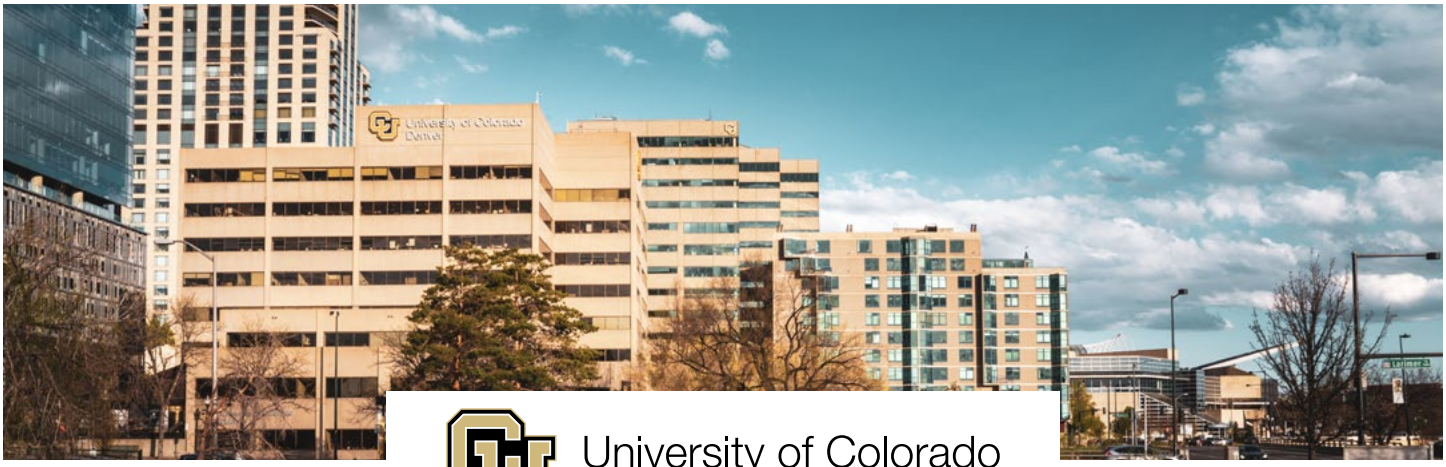
[60]Venture Partners (2021). 2021 Venture Partners Annual Report, Translating Innovation: Record-Breaking Results. Retrieved from https://www.colorado.edu/venturepartners/about-us/2021-venture-partners-annual-report

University of Colorado
Colorado Springs

Mission & Vision: "The Colorado Springs campus of the University of Colorado shall be a comprehensive baccalaureate university with selective admission standards. The Colorado Springs campus shall offer liberal arts and sciences, business, engineering, health sciences, and teacher preparation undergraduate degree programs, and a selected number of masters and doctoral degree programs. UCCS, a premier comprehensive undergraduate and specialized graduate research university, provides students with academically rigorous and life-enriching experiences in a vibrant university community. We advance knowledge, integrate student learning with the spirit of discovery, and broaden access to higher education for the benefit of southern Colorado, the state, nation and world."

Nexus to I&E: In the UCCS Strategic Plan 2030, innovation and the entrepreneurial spirit are listed as foundational core values.

Initiatives: Colorado Springs offers a Center for Entrepreneurship in the College of Business, a Bachelor of Innovation ("BI"), and the Garage, an entrepreneurship center to help students develop and execute business ideas. The BI is the first and only Bachelor of Innovation Family of Degrees in the world and multi-disciplinary coursework is foundational to the degree. Students build innovation and entrepreneurship skills during their BI coursework, and major in one of 21 areas. The world's first Venture Attractor™ partners with UCCS, bringing together resources and mentorship with the goal for startups to relocate to the local area and drive economic impact in the region.



University of Colorado Denver

Purpose & Vision: “Make a CU Denver education work for all — to transform lives, expand economies, and uplift communities.” The vision for 2030 at CU Denver: “We are building a radically inclusive model for higher education based on the simple idea that everyone deserves access to an excellent education and a fulfilled life of their design.”

Nexus to I&E: Innovation is one of the five goals listed in Denver’s strategic plan. One goal is to create a center in downtown Denver to fuel inclusive innovation, collaboration, sustainability, and economic growth for Denver and Colorado.

Initiatives: The Jake Jabs Center for Entrepreneurship supports students in the development of business ideas through the annual CLIMB Pitch competition, the Flash Accelerator, and the Jump Incubator. Design Horizons is an interdisciplinary entrepreneurial fellows program in partnership with the College of Arts & Media; the College of Engineering, Design and Computing; and the Business School. Additionally the InWorks Makerspace is accessible for both staff, faculty, students, and the community. An industry sponsored office called the Comcast Technology Media Center applies Design Innovation methods to solve problems within the community.

University of Colorado
Boulder | Colorado Springs | Denver | Anschutz Medical Campus

CU System

Vision & Mission: "The University of Colorado will be a premier, accessible and transformative public university that provides a quality and affordable education with outstanding teaching, learning, research, service, and health care. Through collaboration, innovation, technology and entrepreneurship, CU will expand student success, diversity and the economic foundation of the State of Colorado." The mission is "The University of Colorado is a public research university with multiple campuses serving Colorado, the nation, and the world through leadership in high-quality education and professional training, public service, advancing research and knowledge, and state-of-the-art health care."

Nexus to I&E: CU system is leading efforts to create a CU Next Academic Innovation Fund and looking to create industry partnerships to increase discoveries and impact. The AB Nexus also enhances collaboration between CU Boulder and CU Anschutz to generate knowledge, to improve well-being, to spur innovation and economic development.

Initiatives: The four strategic pillars of the CU system are affordability & student success; discovery & impact; diversity, inclusion, equity, & access; and fiscal strength.

In addition to the 4- campus system, two additional partnerships are held by the CU Boulder campus. CU Boulder's College of Engineering and Applied Science has an academic partnership program with Western Colorado University and Colorado Mesa University.

03

PART 3:
FINDINGS

Our findings are broken into the six major categories listed below. Each category details several observations. Each observation has a short description with illustrative examples from the data to provide evidence of the observation as well as counterexamples. At the end of each section, challenges and additional considerations will be offered to provide additional nuance and insight into the overall theme. It is worth noting that some quotes or observations are relevant to multiple sections. Efforts were made to organize the findings in a way that makes sense to the reader and aligns with the data collected. Additionally, programs may be highlighted throughout each section. A full list of programs across the University of Colorado system are listed in Appendix A. The main themes are organized as follows:

Education in Entrepreneurial Methods

Launching New Ventures

Campus, Community, and Industrial Partnerships

Awareness of Innovation and Entrepreneurship

Academic and Institutional Incentives

Sustainability and Scalability

Broadly, our interviews underscore that faculty and staff champions for I&E are passionate, persistent, and well-connected. They are also full of hope: they believe their efforts matter and that they make a difference. They believe that teaching entrepreneurial skills and mindsets is valuable during a student's educational journey and, further, even more valuable after graduation. They believe faculty create products, services, processes, and technologies that have the capacity to power new ventures. They also believe that entrepreneurship has the power to transform communities and improve the world.

I&E leaders operate under limited time and resources. Participants expressed frustrations, specifically in how the system and each university can feel siloed and overly bureaucratic, slowing down the potential for innovation. I&E leaders vary in their ideal budget structure. Some prefer to raise their own funding, instead of relying on a budget line item, either through donors, fundraising, or generating their own revenue to be self-sustaining. Others prefer to operate within a reliable budget so they can plan accordingly.

It is also worth noting the importance of the Covid-19 Pandemic during the time of our interviews (October 2021-March 2022). Nearly every participant made note of how the Covid-19 pandemic continues to impact their efforts to progress in one way or another. For example, many, if not all events were canceled or adjusted to meet local requirements. Participants express funding concerns and staff turnover in most offices (though, not all). Because of turnover, the pandemic, and the siloes, staff expressed feelings of loneliness, isolation, and feeling like a "misfit" while doing this work.

Student engagement with I&E varies. On one side of the spectrum are students whose only participation in I&E is a student innovation group on campus, and who have no interest in being an entrepreneur. On the other side, you have students who do it all – they take multiple classes related to I&E, participate in several competitions, go through a university accelerator program, and work for a startup. Notably, most students who were interviewed have previous entrepreneurial exposure, meaning they have either started a business, work/ed at a startup, or have family members who are entrepreneurs. Students even express doing research prior to applying to colleges and are attracted to innovation and entrepreneurship at the various campuses. Students are driven by impact and want to learn the process of creating something new. Students share stories, experiences, skills they develop, and offer several recommendations to improve I&E. Pseudonyms are used for all students throughout the report.

SECTION 1: EDUCATION IN ENTREPRENEURIAL METHODS

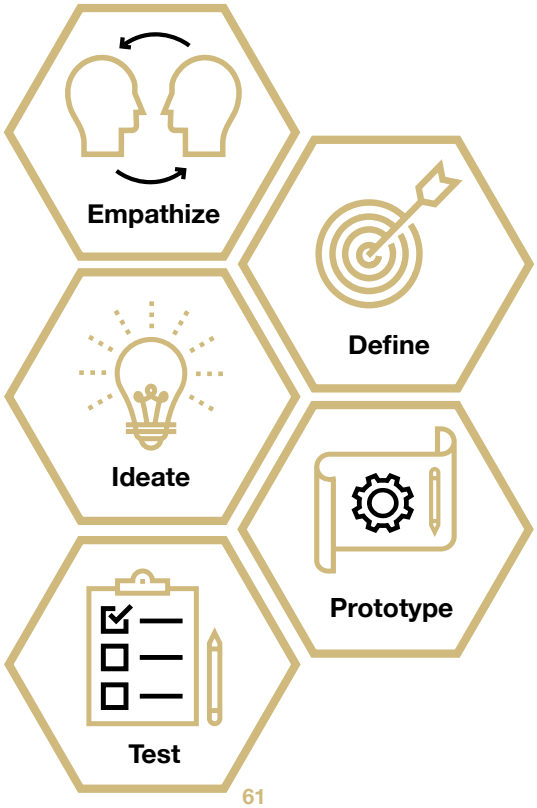
Entrepreneurial methods and practice of teaching across the campuses are discussed in this section. Observations in this section include methods within the classroom and co-curricular education of innovation and entrepreneurship. Events, workshops, and programs are offered beyond the classroom setting because not every student has access or interest in coursework related to entrepreneurship. At the same time, most students find out about these opportunities while in the classroom and choose to continue to participate in co-curricular once their class is completed. In the classroom, students discuss the juxtaposition between faculty who have entrepreneurial experiences and faculty who have less exposure to real world applications. Students consistently expressed how important it was that what they are learning in the classroom is relevant to their lives now and in the future.

Observations Shared in this Section:

- 1.1 Design thinking and experiential learning are the primary and foundational methods of practice when teaching entrepreneurial mindset.
- 1.2 I&E coursework helps students develop an innovative mindset and transferable skills needed for the future of work. Although it is heavily emphasized, the goal for students is not necessarily to create a new venture.
- 1.3 Some students are hesitant to participate in entrepreneurship activities because of the associated risks and uncertainty of starting a new company. However, they are interested in working within I&E and would like to be exposed to it early in college.
- 1.4 CU offers experiential learning opportunities that serve as an extension of and contributor to the local entrepreneurial ecosystem.
- 1.5 Interdisciplinary collaboration is perceived to be a magical ingredient to success in I&E (and after college), but a lot of effort is needed to overcome barriers within the institution.
- 1.6 The I&E student community creates shared experiences and a sense of belonging.

OBSERVATION 1.1:
Design thinking and experiential learning are the primary and foundational methods of practice when teaching entrepreneurial mindset.

Design thinking not only offers a strategic process to follow, but it creates common language for students and faculty. This is particularly helpful for those with less exposure to entrepreneurship. These methods provide flexibility, autonomy, creativity and customization to support different types of entrepreneurial endeavors. For example, design thinking includes 5 phases: (1) empathize - to understand the problem one is trying to solve; (2) define the problem; (3) ideate - generate ideas to solve the problem; (4) prototype - create an example of the solution, either as a physical product, a storyboard, etc.; and (5) test the prototype.



[61]

Phases are not necessarily linear and can be used to teach innovation within an organization, as well as entrepreneurship. Throughout each phase, professors, classmates and sometimes community mentors provide feedback to adjust, iterate, and improve upon their solution. Many courses are co-taught by a faculty member and industry partner. Guest speakers from the community, such as local business owners, entrepreneurs, and founders are incorporated into the curriculum.

The design thinking process teaches the entrepreneurship and innovation mindset and helps students learn by doing. The ongoing feedback required from faculty to support the design-thinking process (among other methods) can be time-consuming. Small class sizes are perceived as ideal to facilitate an environment where students and teams can receive individualized advice and guidance. While participants often went beyond these methods (i.e., Design Innovation, Stanford Bio Design Model, Lean Startup), design thinking and human-centered design were the only two explicitly named several times by participants across the four campuses. Design thinking and human-centered design are dominant frameworks within the broader field of entrepreneurship today. The design thinking process referenced in each of the examples below are used within and beyond the classroom to support the innovation and entrepreneurial process for both students and faculty.

Illustrative Examples:
Don, a faculty member, “Some of the students… It’s just the confidence to deal with failure, and to believe that their ideas are worth pursuing. I’ve seen that in a lot of different students. Some of them come in wanting to make a difference, but they have no idea how. After learning design thinking and working in teams, they begin to develop some confidence.”

[61]Based on Brown, T. 2008. Design thinking. Harvard Business Review 86 (6):84–92.

Stan, a program director, shared, "The key way to develop that innovative and entrepreneurial mindset within our students is to have them actually go through the process. One event we host is only three hours long. It takes them all the way through… what are problems and where are possible solutions? Now how do we start looking at who's the end user and really use the design thinking process to come up with a venture."

Kelsey, a program director, shared a story about how they used the design thinking process to generate revenue for the university and have a positive impact on the community. "We just ended a community partnership with the Common Sense Institute about homelessness. We interviewed a lot of homelessness providers, individuals experiencing homelessness, and individuals who previously experienced homelessness. We put together this report with recommendations based on the design thinking process. So what were those leverage points that we found that if you use these, you could make big impacts? Whereas maybe some other smaller leverage points you wouldn't have as big of an impact."

Adam, a student, explained, "I have to acknowledge Brad Werner's capstone class. One of the things he brings to the table, I mean, in all honesty, he's just tough on you. And it's not easy. And he's real. And that's how you set people up for success. Tying the education to practicality, I think is missing from other professors. There's this huge spectrum of how helpful different faculty members are. And the ones that are helpful are more helpful than a dozen of the other ones."

Jen, a student shared, "Being forced to think on your feet was one of the things that I found very challenging and working together with teams that are very different from you. Sometimes you need to learn how to fail gracefully. And when you're in a school environment with pressure to get good grades, then the odds of teaching a student through failure, and the student still has a positive outcome can sometimes clash together."

Terry, a professor, explained, "Part of the way we designed the program to make it scale, was we use community members to leverage our teaching. And community members bring real world experience into the classroom that faculty don't have. Everything is co-taught. From the beginning, that was our design. We teach slightly larger classes. Our normal classes are at 40 and you have a university instructor and a community instructor."

Kim, a student explained, "The structure and the discipline required to do a class or an incubator was helpful in keeping us consistent, because it required deliverables every week. And that discipline really helped us get things started."

Jamie, a student explained, "We were exploring different entrepreneurship ideas and I wanted to find a way to have someone guide me through that process. Trying to do it on your own, you don't even know where to begin. The class helped me take the project from end to end and I got professional advice on my ideas. It's been awesome. I feel much more capable of doing an investor pitch and thinking through ideas strategically."

OBSERVATION 1.2:
I&E coursework helps students develop an innovative mindset and transferable skills needed for the future of work. Although it is heavily emphasized, the goal for students is not necessarily to create a new venture.

The majority of coursework involves teamwork, scaffolding course material, modules as opposed to a textbook, and focused on practical, real world applications. Class often culminates in a pitch competition at the end of the semester, which sometimes includes funding to support student ideas and ventures. A surprising number of educational opportunities occur in co-curricular settings. Often, faculty share community and CU events to encourage student participation outside the classroom and in the greater community.

Coursework includes planning, sometimes launching a business, and teaching the entrepreneurial mindset. The entrepreneurial mindset is a set of skills that enable people to identify and make the most of opportunities, overcome and learn from setbacks, and succeed in a variety of settings. Research shows that an entrepreneurial mindset is valued by employers, boosts educational attainment and performance, and is crucial for creating new businesses.[62] The entrepreneurial mindset is useful in many contexts beyond business/ venture development. While it is unrealistic to expect that every student is interested in creating a new venture themselves, every student should graduate from CU prepared to be innovative as future leaders. Faculty and program directors express interest in the learning experience and helping students to develop an entrepreneurial mindset. However, in practice, there appears to be a heavy emphasis on creating a new venture. This may be due to the focus of the study (entrepreneurship as opposed to innovation). While innovation is often mentioned within these spaces, it is less emphasized and not as frequently marketed when compared to entrepreneurship. Perhaps it is the act of entrepreneurship that makes it a bit more tangible to discuss, let alone teach. There is potential to explore more opportunities that explicitly focus on innovation or impact because it focuses on a skillset with less perceived risk and uncertainty than entrepreneurship. The language used when marketing I&E courses could be expanded beyond building a new venture.

Exposure to I&E appears to benefit students early in college, either through coursework or co-curricular. Participating in courses shifted a students' mindset, helping students think differently about the world, and how they could approach the rest of their college experience. I&E helped students think like an innovator and act as an entrepreneur. Innovation and entrepreneurship experiences help students develop critical problem solving skills and be better prepared for the future of work[63]. These experiences help students develop skills to work with entrepreneurs, for local startups, and to think innovatively about how to solve global challenges within and beyond existing companies. However, few marketing efforts focused on these experiences or how entrepreneurially and innovative skills translate to the workforce.

Students developed several skills by participating in I&E including: stepping out of their comfort zone; public speaking, storytelling, communicating ideas (written and verbal); goal setting, time management, and staying on top of things; communicating with investors; the importance of mentorship; leadership; business models; FDA approval processes; the ability to justify their thinking and how to provide value when working on teams; how to position themselves and their work; how to navigate imposter syndrome; awareness of transferable skills; built confidence in self that they can learn new skills or ways of doing things; learning when to commit, pivot, or quit a business; how to be social again after Covid-19; how to be creative and innovative; the due diligence process when managing a venture fund; navigating ambiguity; and managing failure. These entrepreneurial skills are transferable to their personal and future lives. The mindset and skills taught within I&E help students in building resilience, pivoting when things do not go as planned, learning how to successfully fail, building autonomy and confidence in themselves, and learning how to recognize they need help and actually ask for it - all of which support student retention and graduation. *Students not only wanted to be changemakers, but because of their experiences in I&E, they actually felt like they could be changemakers.* Findings related

[62]Network for Teaching Entrepreneurship. (2017). Entrepreneurial Mindset: On Ramp to Opportunity. Retrieved from https://www.nfte.com/wp-content/uploads/2020/04/NFTE-Whitepaper-Entrepreneurial-Mindset-On-Ramp-to-Opportunity-December-2017.pdf

[63]Whiting, 2020. What are the top 10 job skills of tomorrow – and how long it takes to learn them. From the Future of Jobs Report, World Economic Forum. Retrieved from https://www.weforum.org/agenda/2020/10/top-10-work-skills-of-tomorrow-how-long-it-takes-to-learn-them/

to the mindset and skills developed through I&E experiences are listed in Appendix B and are mapped to the skills needed for the future of work.

TOP 10 SKILLS OF THE FUTURE - 2025 [64]

- **Analytical Thinking and Innovation**
- **Active Learning and Learning Strategies**
- **Complex Problem-Solving**
- **Critical Thinking and Analysis**
- **Creativity, Originality, and Initiative**
- **Leadership and Social Influence**
- **Technology Use, Monitoring, and Control**
- **Technology Design and Programming**
- **Resilience, Stress Tolerance, and Flexibility**
- **Reasoning, Problem-Solving, and Ideation**

Illustrative Examples:
Jeff shared, "Entrepreneurship is the overarching theme. It speaks directly to transferable skills. What you've learned as a music student is not just applicable to music. You've learned a lot of really valuable skills. And let's talk about how those can be deployed in other ways. And I think entrepreneurship is the way to do that."

Terry explained, "Every one of our courses is team oriented. In terms of scaling that is one of the issues, just because it's taxing."

Jordan, a student shared, "I think just the overall theme is making sure that what students are doing is practical to the job market."

Corey, a student shared, "The most rewarding part is being able to take myself out of my comfort zone and get used to talking with strangers. And being able to strike up conversations with anyone."

Carolyn explained how students at UCCS get early exposure to innovation and entrepreneurship. She shared, "I teach INOV1010 and ENTP1000. Both are entry level courses. You do not have to be a Bachelor of Innovation major to take those courses. And those courses typically have a lot of freshmen in them because they also meet the UCCS Compass requirements." The UCCS Compass requirements are part of the generation education required by all students.

Kelsey creates experiences for students to challenge the mindset that there is one right answer and to think outside the box. She shared "Students either think they are creative or they don't. Students really struggle to tap into that inner creativity."

Chris shared "It may not fit in the category of students becoming an entrepreneur. We have to recraft the way we think about the student experience so that they can be innovators."

> **"I'd love to see more innovation and entrepreneurship offerings within Arts & Sciences ("A&S"). These are buzzwords in education and in business these days. A&S students don't necessarily know that they have desirable skills in these areas—mostly because they aren't really exposed to it. Many of our faculty are doing innovative work in the classroom and in their research—we need to help faculty amplify that innovative work so that our A&S students are better able to articulate those skills and way of thinking."**
>
> **- Kathy**

[64]World Economic Forum. (2020). The Future of Jobs Report. Retrieved from https://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf

Terry shared a story about a students' experience. The student shared, "One of the freshman classes so transformed how I view the world. I had to become a BI student." Terry continued, "Because you're changing how they view the world. And it's changing how they view the rest of their college career as well." The student shared, "Now I know what I want to do with my life. I'm going to choose my courses differently."

Jeff shared, "The goal of my job is not to create new ventures through my classes. We are an educational institution, we're not an incubator. Although I adopt that framework a lot of times in my classes, I think it's a really bad goal for a university to have to create new ventures. We want to encourage people to create good ventures, not just create new ventures. And we want to encourage people that do create these ventures, to teach them how to succeed."

Carolyn shared, "Students need to have this interaction with people who are in it, and who are doing it. And provide some opportunities very intentionally, so that they can start to engage with this work and understand what that looks like early on in their career as an undergraduate. Let's not save that for graduate work. Our freshmen have the capacity to think very deeply and to create these connections. And if we start then, they may also be able to create that connection and have a much clearer path for their undergrad work. And know where they're going to land post graduation. So they can see one, what is possible. And two, how is it being actualized? And then they can start to create those connections beyond what is currently available at the university."

Terri shared, "I think innovation and entrepreneurship needs to be integrated into whatever discipline people are in. And it's not about starting a company and making money. It's about a mindset. And approaching things that way. And I think that's the place we have not scaled yet. And to be honest, I can't think of a campus in the US that has. Maybe there's a couple, but they are usually small private schools and it's just a different animal altogether."

Stan explained, "We're tasked at providing educational experiences for our students. That's really what this is about. How do we allow our students to dip their toe in that entrepreneurial world, maybe develop that entrepreneurial mindset, and learn how to work with people collaboratively? There is a lot of learning that comes out of the NVC."

Ryan, a student, shared, "The Bachelor of Innovation classes were extremely hands-on. Instead of teaching you about entrepreneurship, you're actively building a business, and you're learning from failing."

> **"My perspective has changed. How I see starting a business in my mind, used to be much smaller. I thought it was simpler, quicker, and easier. And likely to succeed. I think that my perspective has become much richer. There's much more complexity to my perspective now. I had this acknowledgment and humility around what it takes to be successful at this and that it takes years."**
>
> **- Randall, student**

Janet, a student, shared, "I learned all the different avenues you can take. I think a lot of times you think it's a one way track. Like I'm going to become a doctor and that's my only option. And there's just so many different ways to make your career yours and differentiate yourself. So that's been a big takeaway for me."

Barry, a student explained, "At InWorks, I've learned how to be innovative. The creativity that's in that lab, it's amazing. These are the best minds that are coming together, the people that have this insane amount of knowledge in the world."

In contrast to the prevailing approach across the system, which focuses first on creating new ventures, is the Bachelor of Innovation at UCCS. In the Bachelor of Innovation, coursework explicitly places greater emphasis on innovation, while teaching entrepreneurship in freshman and senior years. The program presents entrepreneurship as one way to innovate in practice.

> **"I learned the skills with business and seeing how the values of creating something can tie to how I can do what I love. Before I knew anything about entrepreneurship, I could easily say, I want to do this project. But I could not say that this is a project that people will actually enjoy, there's value to it, and this is how I can pull the money in, and how I can delegate all the different tasks to different people on the team, and manage the process of putting it together. Having this skill set really lets me do what I want to do and make it possible, instead of a child's dream."**
>
> **- Sara, student**

Gabriella, a student, shared, "Entrepreneurship gave me more agency in being a musician. When you learn how to brand yourself, you learn how to write better bios, how you present yourself, how to set goals, and everything else in the industry. It helped me see all these other jobs, and I don't have to be a performer. And so I really felt agency in having this other path. Because entrepreneurship is really blurry. No one really teaches you about it. My dad is an entrepreneur, but is an engineer. I knew what it was and that you could run your own business, but there were no tangibles. The experience really gave me tangibles, which was huge. To be able to put it all together and see pathways was a skill that I needed."

Jamie, a student, shared a story about real world application in the classroom. He shared, "I think it was a 10-minute memorized presentation for the final. And then that day, the professor said, can you condense that in half? And so you're cutting stuff from your presentation on the fly. And he said, this is stuff that's really happened to me when pitching my business. You have to be resilient, and you have to be thick skinned and adaptable."

Janet, a student explained, "When I think about the scientific process, it's very analytical, very detailed and step oriented. You go through every step and we try to control for all those variables. But when we're talking about business models, there's so many variables that you can't control. So opening your mind to thinking about, how can we get from here to here, when we don't know if these three things can happen. I think it's a hard jump for my mind. As opposed to science, we know that this plus this, equals this. Going straight from a lecture on electrocardiograms to sitting down and talking about business models is a pretty hard switch in my brain. I like it a lot because it's a different way of thinking that is challenging, to take a step back and look at problems with a business perspective, as opposed to a scientist's perspective. That's really hard and I like it a lot. But it's definitely the most challenging part for me."

During the course of the year, several competitions were observed. Every single one focused on starting a new venture, specifically a business and not an innovation. This was reiterated in not only the pitches (by faculty and student participants), but also in the questions asked by judges. While there may be interest in focusing on innovation, the emphasis is distinctly and most commonly focused on starting a new venture.

OBSERVATION 1.3:
Some students are hesitant to participate in entrepreneurship activities because of the associated risks and uncertainty of starting a new company. However, they are interested in working within I&E and would like to be exposed to it early in college.

Students are interested in being strong problem solvers and working to create change in the world. However, many students are not interested in starting a business right after college because of the risk and uncertainty involved. These students can gain valuable experience from participating in I&E coursework early on in their college journey. By participating in I&E early in their college career, students have more time to build confidence and skills needed to transform their ideas into impact and improve their personal lives.

There is likely an opportunity to expand innovation experiences because it focuses on a skillset with less perceived risk and uncertainty than entrepreneurship. Coupled with the ongoing mental health crisis, risk and uncertainty likely need to be addressed to encourage students to participate particularly in entrepreneurship. This may be even more important for students from traditionally underrepresented backgrounds. In the classroom, there are innovation efforts focused on students partnering with businesses and nonprofits, acting as consultants within the class curriculum. Outside the classroom, students can seek out opportunities to work within a startup. The experiences allow students an opportunity to participate in I&E without the need to take on the risk and uncertainty themselves. By doing so, students may develop confidence to become entrepreneurs and innovators later in life.

Faculty have relationships with existing partners in the community who are excited to work with students and continually build partnerships. Alumni sometimes bring ideas to previous professors and ask that students work on their idea, as a prototype or problem to solve within the community. There are fewer courses focused on innovation with the exception of the Bachelor of Innovation program at UCCS and a limited number at Boulder and Denver.

Illustrative Examples:
Benjamin stated, “A majority of students don’t immediately start their own businesses. They go to work for big companies or organizations. But the feedback we’ve gotten is that they think differently than their colleagues. They’re the ones that are charged with being project leaders or presenting a new idea because they’re accustomed to thinking that way. They go in with the mindset of not, let me find what’s broken. But let me find what we can do better.”

Jeff shared an example where students will say, “I don’t want to be an entrepreneur. York is making us do this stuff.” However, Jeff responds with, “If you want to solve our renewable energy problems, you’ve got to think entrepreneurially.”

Daria explained, “Many students have already had people they know or friends who weren’t paid on an internship at a small startup, who have seen the other side of it when things fail. And they’re not willing to take the risk to do that because of upbringing and what their parents talked to them about… There’s a lot of opting out from the word entrepreneurship. The other one is this question of, am I the entrepreneur? Or am I working for an entrepreneur? There’s a lot of them that have zero desire to take the risk.”

Jen, a student shared, “One of the things that I’ve learned is that starting a startup is not quite right for me. Being a founder is not necessarily what excites me. I’m much happier when I don’t necessarily have to decide what to do all the time. And that I can instead help others and work with others.”

Alex, a student shared, “I think it would help to connect entrepreneurs in the local ecosystem with students who want to work at startups.

People are excited about it and there are plenty of those opportunities. I'm not sure how many were facilitated by CU though. I do think that there were a handful of MBA grads who really wanted to work at a local startup and didn't know how to facilitate those introductions."

Kevin was an international student. His senior year, he searched every entrepreneurship professor on campus and was encouraged to go to the Entrepreneurship Center. There, he met Erick Mueller, who encouraged him to attend some of the upcoming I&E events. The very next day, he showed up. During the meeting, he said, "I wish I would have known about this earlier."

Gabriella, a student explained, "I think teaching students earlier the value and importance of networking can help them understand how to participate within those spaces. I could have built those connections better. And I think creating more touch points within and outside of the program. Like how can you get involved in innovation and entrepreneurship earlier?"

Janet, a student shared, "It almost seems like entrepreneurship and practicing clinical medicine are two opposite ends of the spectrum. You can get your MD, and then you can go into industry and be an entrepreneur or you can practice clinical medicine. I don't think a lot of my peers and myself really understood the overlap and how much overlap there can be. So definitely just more exposure for students to it and then just more opportunities to participate in classes."

Barry, a student shared, "A lot of freshman and sophomore students don't want to join a new startup. They want to go and join a big company. And I think that colleges should be encouraging students to create the new Apple and the new Microsoft. It's a lot riskier, and it also has a lot higher payoff. And this is the time they can do it. I think the college could encourage students to participate in startups and clubs and get involved more."

Randall, a student explained, "I feel like it was pretty easy to get involved. I think it might be different if you're not a white male engineer. I just got on a mailing list and went to events. And most of the events were the kind of thing where, if you put yourself out there, and you listen, you learn. So it was pretty accessible for me to get involved."

Andrew, a student shared, "I truly understand and can apply these concepts, methods, and practices in what I'm trying to do. I think every student should have an experience in innovation and entrepreneurship to help them."

OBSERVATION 1.4:
CU offers experiential learning opportunities that serve as an extension of and contributor to the local entrepreneurial ecosystem.

The connection between each campus and the local entrepreneurial ecosystem is critical to the success of I&E. The university system serves as a major extension of, and contributor to the local entrepreneurial community. These programs provide a win-win scenario for the university system and greater entrepreneurial ecosystem in Colorado. Not only do these programs serve as practical, real world learning educational opportunities for students, they also meet the needs of the greater entrepreneurial community. These programs strengthen our connection to the community and provide a greater impact in the Colorado economy. It is worth noting that additional experiential learning opportunities such as these, happen within the classroom environment. There is an opportunity to expand upon existing programs, create new programs to meet additional needs, and to highlight their impact.

Illustrative Examples:
The Entrepreneurial Law Clinic ("ELC") at CU Boulder provides free legal help to campus entrepreneurs, and members of the local startup community, who generally lack resources for legal services. The ELC conducts

legal work, ranging from corporate formation to patent protection, for over 30 companies per year. It also conducts outreach presentations which reaches over 100 more entrepreneurs annually.

InWorks offers two state-of-the-art laboratories at CU Denver and Anschutz. They offer several interdisciplinary courses and partner with community members and students to create amazing products.

The Fellows Program for Licensing at CU Anschutz provides students with practical research and licensing experiences while also serving faculty in commercializing their research.

Colorado Springs offers the Venture Attractor, which serves as an accelerator with the goal to attract international startups related to sports and outdoors, health innovation, and human performance and drive regional economic development.

The Leeds Consulting Group at CU Boulder provides students with practical consulting experiences while also serving local businesses, non-profit organizations, and start ups. The Group works on projects ranging from market research to competitive analysis to social media audits and more.

Matt Vogl from the Mental Health Innovation Center shared, “We mostly work with small startups to help them develop, refine, improve, and evaluate products that they’re developing to address mental health, in one way or another. Whether that’s prevention, treatment or post-vention.”

Alex, a student shared, “I wanted all the experiences that were offered that were not traditional because frankly I don’t think the classroom is all that helpful to me. I’ve worked in business for 10 years. I think that that’s what CU does really well, is offer a lot of applied opportunities. The classes basically provided structure to a very unstructured environment.”

Jen, a student explained, “The Bachelor of Innovation is set up to encourage students to get experience from startups and from companies. I found a mix of that to be very beneficial. I took a team development course, where we were paired together with small startup companies in the Colorado area. That gave us real world experience where we had to create a project proposal as a team, figure out how to work well together, navigate complicated team dynamics, and help a local startup.”

Sara, a student shared, “In one class, we were presented with the problem of people not getting mental health help in an underdeveloped country. We were in person, and we had a team and we worked together and talked to the clients. At the end of the night, it was like 2-3 hours. We did a pitch, and we had a flier because one of our teammates was an artist. So that was really neat because we met people from different programs, and we had a real problem to solve.”

OBSERVATION 1.5:
Interdisciplinary collaboration is perceived to be a magical ingredient to success in I&E (and after college), but a lot of effort is needed to overcome barriers within the institution.

Interdisciplinary is perceived to be a magical ingredient to success in I&E. Participants used words like ‘requires’, ‘magic’, and ‘necessity’ when referring to interdisciplinary collaborations. However, implementing coursework that is interdisciplinary was a challenge within existing infrastructures. The perception is that students will have a richer learning experience and are more likely to create better ideas when they partner with students from diverse backgrounds. Notably, students really enjoy

Interdisciplinary is perceived to be a magical ingredient to success in I&E

working with people outside of their major, and this came up in interviews often without being prompted.

Structurally, this is difficult to achieve in practice due to curriculum constraints and the structure of funding. On one hand, it may be preferable to have existing coursework housed within a traditionally business-oriented field, making it available to any student. On the other hand, this model may limit students outside of the college because of access and student perception. Coursework is complicated for several reasons: First, it's difficult to access (the logistics of applying, enrolling, and getting the coursework to fit within students curriculum); Second, there is a large emphasis on business, and students do not see the value or connection to entrepreneurship; Third, students perceive it to be inaccessible; or lastly, it is only available to students in that department and students do not have access. Because of accessibility issues, program directors create co-curricular opportunities, often in the form of workshops, panels, guest speakers, pitch competitions, accelerators, or incubators (see Section 2 of Findings). The value of proximity concept has the potential to accelerate collaboration, progress, and impact. In the context of I&E, value proximity refers to creative collisions that happen as a result from shared physical spaces. Shared physical spaces were a critical factor in interdisciplinary work, collaboration, and ideation. Shared physical spaces generate opportunities for creative collisions that allow people to share best practices, strategies, challenges, and successes with one another. However, silos prevent greater interdisciplinary collaborations and hinder innovation (see Section 5 of Findings).

Illustrative Examples:
Robin shared, "It's pretty simple. You bring in law students, you bring in business students, bioengineering, clinicians, and there you go. Suddenly, magic happens." At Robin's lab, interdisciplinary is viewed as a necessity and embedded into the infrastructure.

Jeff explained, "I don't think there are any particular barriers to it, other than assumptions students often hold about the business school or about taking a class in the business school. Students don't think they can take it or they think it's not for them."

> **"We have general education courses. How hard would it be to make an entrepreneurship or an innovation course an absolute requirement for everybody, no matter what degree you're in?**
>
> **- Ryan, student**

Ryan continued, I think something like that would be massively beneficial just to show people there's another option out there. And I don't know how realistic that is or easy to do. But if you can force people to take Geology, why can't you force them to take innovation? We've been trained since kindergarten to be stuck within the structure of… You do this, you get this grade, you get this job, you then retire at 65. The ability to dream has been lost. And so I think to reignite that in people. When you don't know that door exists, you can't close it, you can't open it."

Design Horizons is an interdisciplinary example created at CU Denver in a collaboration between the Jake Jabs Entrepreneurship Center, the CU Denver Business School, InWorks, the College of Arts, Media, and Design, and the College of Engineering, Design, and Computing. Design Horizons is an interdisciplinary, team-based student experience to create a new venture. For example, in early 2022 when the group launched a new cohort, there were not enough applicants to make each team interdisciplinary. Instead of continuing forward, the leadership team focused on finding more students who fit the criteria they were missing. In other words, interdisciplinary was viewed as a necessity, not an add-on.

Benjamin, the Director and faculty within the Bachelor of Innovation shared, "That new thinking and working with others who share a desire to make a difference. Having different backgrounds and fields of expertise is a bit of a melting pot for new ideas."

Nathan shared, "I think it would be a great thing for us to have something complimentary where students in CMCI[65] and Engineering, for instance, could explore becoming co-founders in the New Venture Challenge together. We could support them from our end and they get the engineering support from their end. I think those skill sets are really complementary."

In reference to the Venture Capital course taught in the Law School at CU Boulder, Brad explained "We start with the assumption that this is an area in which understanding one discipline is not enough to really understand how venture capital works. I teach it from the perspective that a complete view of entrepreneurial finance requires some understanding of the law, some understanding of business, and some understanding of sociology."

Jeff, a faculty member explained, "We struggle like hell to get cross disciplinary teams already."

Jamie, a student suggested, "I think if there was an entrepreneurship focused MS degree that would allow you to really dive into small business and startups. Because the MBA, it's broad across different respects, but focuses on how big businesses and corporations operate. Startups and small businesses operate in such a different way than a big corporation. You only get to take four electives. You could build a whole 30 credit hour degree around that and then be able to increase that ecosystem."

Andrew, a student, shared, "After talking with the other students and everyone else's background, I was really interested to see how we're going to collaborate, since we have such different disciplines and how we see things."

Noah, a student, shared, "I expected something heavily geared towards business. But it was more along the lines of, you're all these different types of people, so we are going to gear it towards everybody. We all are on the same kind of level playing field, and we're going into this to find our roles. I really like interacting with all these different people from different colleges. Because we don't interact with people from the College of Arts and Media. It's interesting to see their perspective on something that is neither of our fields."

Sam, a student shared, "I think promoting systems thinking within innovation and entrepreneurship would be great. If you want to develop some program, you need a programmer. You need somebody who has a good eye for design. You need a good businessperson to push all that out. That's what we learned in Startup Summer. But you don't have the poets hearing that or you don't have some engineers hearing that, knowing that they can connect with business people. There's not a bridge. I think having more fluidity. There seems to be some really rigid, invisible walls between the different colleges, like Law, and Business, and Arts and Sciences, and Engineering. When in fact, the combination of the four makes the business. I want campus to create places where people can connect, that breaks down that barrier and make it less rigid and more fluid where ideas can be shared more."

Students work to break down silos and some have succeeded. Sara, a student shared, "I'm talking with PhD students on potentially creating a course for musicians to learn more about anatomy and its relevance. I don't know if that will fly, but it's worth trying. I'm also reaching out to the dance department to see if we can do a performance between the violin and the dancers. And do some writing. And I see that a lot of things are not just confined to what is defined already. At a violin recital, you play it in a recital hall, but what if I can do it with a dancer? And it checks all the boxes for

[65] College of Media, Communication, and Information

my degree requirements. So, could that work? And CU is so open. None of them have said no yet."

OBSERVATION 1.6:
The I&E student community creates shared experiences and a sense of belonging.

I&E leaders cultivate experiences for students, but who they are matters most to students. Students expressed a deep appreciation for the I&E leaders on campus, who directly mentor them and help students through the decision process when navigating business and life decisions. I&E leaders invite students to participate, help them get to the right place, and follow up with students to see how they are doing. They create spaces where students can be in community and have a sense of belonging. Students want more opportunities to connect with other students and staff who are interested in I&E, and perhaps even find co-founders or teammates. They also wanted to meet students who are studying different disciplines and wanted to collaborate informally with other startups who were in similar phases of the process.

Students expressed a deep appreciation for the I&E leaders on campus who directly mentor them and help students through the decision process when navigating business and life decisions.

Illustrative Examples:
Randall, a student, shared, "Feeling like I have that community was probably the most rewarding part. Because whatever happens with this company I'm working on now, I know people will always be around and willing to help. And these relationships aren't going anywhere. But finding co-founders with other students and dealing with people is the hardest part."

Jordan, a student shared, "Jeff Nytch was very much supportive, and he is incentivizing music students to broaden your horizons. He was very pragmatic and realistic, but not depressing about the future, which was cool."

Kevin, a student explained, "I actually met a guest instructor from industry. I got more from them because they helped me learn what industry looks like. Like how do you get a job? What does it look like? It was very rare for me to hear that from academic professors."

Jen, a student shared, "I think what stands out most to me is the people. And how the people chose to structure it. There is a heavy focus on how you spin the story behind your work, understanding who your audience is when writing or when you're creating a pitch deck. Or understanding that you can have the best system skills, but if you can't communicate them, that's going to artificially limit you. And that's a learning that I don't think I would have gotten if I just went to an ordinary computer science degree."

Barry, a student, explained, "What I lack is the engineering background. I want to make it easy to connect with people who have similarities and commonalities. And maybe having opportunities to talk with one another and have deep conversations to figure out if this is a good idea."

Sam, a student explained, "What stands out from Startup Summer is the way that people went about accomplishing the same goals. I think one of the most impactful things is learning from other teams in the process. Our team was working and then talking to other teams. And this guy says, I'm just using Photoshop to create a prototype. I'm going to make the video for the presentation and I'm going to Photoshop all the other buttons. So they're not real, but the one that I'm going to demonstrate is the one that's going to work. And our team was like, that's so much easier!

So he worked really smart, and we worked really hard trying to make an entire prototype. But usually, the teams never talk. So it was really interesting to have that happen."

Kim, a student shared, "It doesn't have to be such a structured program, but you could enter a cohort of people who are in the actual development phase of a startup. If the university could support some type of community or cohort, where you have peers that are going through similar experiences with you and you could be put in contact with different community members that might be experts in different silos of actually building your business phase of the startup versus the pre-planning stage. I think that would be super helpful. Because it was so exciting. You get some funding, and then it's like, now you need to do something. I think just rounding it out so it could be a three phase thing could be really helpful."

Janet, a student shared, "The most rewarding part of the class has been connecting with different faculty as well as students who have the same interests. I didn't really expect to have that. And just the networking opportunities that the class has presented. And to know that I can carry that throughout medical school and continue making those connections and collaborations."

Andrew, a student explained, "I really liked working with highly motivated students. That's been another really positive experience about this. Normally, people are selected to be part of these things. There's just a different level of intensity and effort that I really appreciate."

Adam, a student, explained, "What does a community mean? It means that I don't have to ask to be at the table. There's an opportunity for me just to be there. That's where I have the faith to keep going. It's like a breath of fresh air when you are talking to somebody else doing this. It's like, *I'm not the only one.* So making it more about a collective journey than an individual journey. Every day there's a point in my day where I'm like, I could do anything. There's also a point where I feel like everything I'm doing is wrong. And I think the answer to it is community. And next steps. And it's like taking one step at a time, don't stress about it. I'd like to be able to connect with people who are my peers that I can actually build something with."

> **"I wish I had been more willing to put myself out there like freshman or sophomore year or something so I could have been in the community a little longer."**
>
> **- Corey, student**

Jen, a student shared, "I think that one thing that I found was lacking, that I could have benefited from, is a bit more camaraderie. I lived off campus, I commuted to campus every day. I didn't really hang out with people from my class, other than to do projects. You see people but you don't really get to build long lasting connections that way. And so having more students interacting and students being able to have opportunities for extra-curricular stuff together might be helpful."

Barry, a student shared, "We were all thrown out of whack because of Covid-19. I spent a lot of time where I was secluded and isolated and I did not know how to talk to people when I came back. It was awkward."

Challenges and Additional Considerations: Education in Entrepreneurial Methods

Opportunities to engage in educational experiences are abundant across the university system. This section provides additional considerations and challenges to provide a more comprehensive understanding of entrepreneurial methods in education.

Students consistently favored in person events over hybrid or virtual. However, having a variety of options may be better to support

more students. If hybrid opportunities continue, I&E leaders must be mindful to make the experience strong for both the in person and virtual participants. Sara, a student shared, "I went to some hybrid events in the fall, and it's not the solution. But maybe like three out of five events are on campus and two are virtual. Completely virtual. Because hybrid is weird if you have several people in the room that you just have one camera pointing to them. In class, having a TA read some text and chat with students and facilitate breakout rooms was helpful, if it is hybrid." Andrew, a student, shared, "I would like to have more events in person. I like to be around a group of people, because a group of people online, it's hard to convey stuff. I don't know why, but you can get a better feel for everything in person. And everyone's just more engaged, everyone's in this working space and feeding off that same energy of, we're here to do something. We're trying to do something great."

Students had several areas and skills that they wanted to develop. The following are a list of skills that students wanted to learn, but didn't or haven't yet because they either (1) didn't know about opportunities; (2) didn't know they needed it until their business was at a certain stage, or became relevant; (3) just realized they needed to learn it (becoming more self-aware): sales; leadership, management, and building a good team culture; basic technology skills such as photoshop, how to build a website or landing page; who to talk to based on the type of product/business; help with actually making a minimum viable product; finding vendors; how to hire people and build a team; how to inspire people to join your mission/company; managing difficult conversations; the best way to convey information; soft skills; how to manage and develop interpersonal relationships; delivering and receiving feedback; project management.

Faculty found it particularly challenging to find business partners. One professor shared, "It would be really helpful for those of us in medicine, desiring to bring our products to market, to have as much help as possible finding the right CEO. I don't know how to groom those people or how to groom me, or introduce me to people who are ready and willing to take on a company. That's been a real challenge to find the right CEO."

Participants found it challenging to teach courses across disciplines. The bureaucracy is difficult to maneuver and often, a workaround is created to work across disciplines to teach I&E and collaborate more generally. Daria explained, "We have created things that job code silo people. They silo faculty. We have no clean way to go ahead and say Ralph, I need you to come over from Writing and Rhetoric and talk to my students about genre, because they don't get it. I can't. Because I can't pay Ralph to do it because of the way our structures are set up."

Students typically find out about co-curricular entrepreneurial workshops by first, enrolling in an I&E related course. However, one variation to this finding is the situation where a student seeks out these experiences because they are already interested in I&E and looking for ways to get involved. The data showed this is more prevalent among students who have previous exposure, experience, or interest in I&E.

Exposure to technology may make teaching I&E more challenging as the Digital Divide[66] continues to grow. While most students have access to the internet, at least on campus, there is great variation related to the exposure and experience - both with entrepreneurship and technology. Angus, an entrepreneur in residence at UCCS, explained that some students will come in with zero exposure to technologies, while others have

[66]Vogels, A. (2021). Some digital divides persist between rural, urban and suburban America. Pew Research Center. Retrieved from https://www.pewresearch.org/fact-tank/2021/08/19/some-digital-divides-persist-between-rural-urban-and-suburban-america/

been programming Arduino's[67] since middle school. Arduino's were brought up by students during one of the class observations. Students, even those outside technology-related majors, boasted about how much they enjoyed learning how to use Arduino's. One student shared how he purchased one himself to use outside of class so he could continue learning how to use it because it was a practical way to innovate.

Participants perceived the emergence of micro-credentialing, a form of credentialing to demonstrate specific competencies, as a promising way to increase accessibility and expand I&E to students. However, implementation has yet to happen. Three participants mentioned micro-credentialing as one way to expand I&E exposure and education. For example, Don, a faculty member in A&S at Boulder, shared, "There is growing interest in micro-credentials. I think the University recently made it possible to offer those. I've been toying with the idea of offering one credit micro-credential courses taught by people outside the university that would focus on a specific topic like how to approach venture capitalists, how to work across public and private sectors, and how to advertise." Additionally, recent graduates who participated in interviews shared ways in which they would still like to develop beyond their undergraduate experience such as understanding startup taxes in a week, attending a workshop to know when it is appropriate to bring in a lawyer, etc.

[67]"Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online." Arduino (2018). What is Arduino? Retrieved from https://www.arduino.cc/en/Guide/Introduction

SECTION 2: LAUNCHING NEW VENTURES

Students and faculty have many opportunities to launch new ventures and commercialize new technologies. Workshop series, events, and competitions help students and faculty move their ideas forward into a business. Co-curricular opportunities for students increase access and exposure to I&E. However, because events are outside of the existing curriculum, student engagement varies drastically because it requires students to be aware of them at the exact point they are ready to participate. More often than not, students who are already aware of co-curricular opportunities become aware of them in the classroom.

The technology transfer offices are located on two campuses: CU Anschutz Medical Campus (called “CU Innovations”) and CU Boulder (called “Venture Partners”). Venture Partners also supports the CU Denver and UCCS campuses and CU Innovations supports Medical CU Denver innovations. Many of the pitch competitions, accelerators, and funding mechanisms mentioned throughout this section are housed within these offices. The technology transfer offices provide opportunities for faculty, researchers, and graduate students to take their inventions outside of the university system. Specifically, these offices manage invention disclosures, intellectual property, patents, copyright, licensing of inventions, and conducting various assessments to determine market potential, patentability, etc. This process involves the faculty or researcher first disclosing the invention or discovery through the office. Next, a person from the office will reach out to the inventor and learn more about their goals and vision they have for the invention. Discoveries (1) make the transition outside of the university and into an entrepreneurial endeavor; (2) are licensed by the university to an existing organization; or (3) are disclosed and do not forward. The decision is ultimately made by the faculty or researcher.

Below are the list of observations that relate to helping students and faculty launch new ventures and commercialize new technologies. Some observations focus more heavily on the student experience, others focus on faculty, and some focus on both.

Observations Shared in this Section:

- 2.1 Five common methods support new venture launches and the commercialization of technologies.
- 2.2 There is less emphasis upon ideation, particularly for faculty, as compared to other phases of starting a company.
- 2.3 Gaps exist between faculty experiences in academia and business acumen.
- 2.4 Technology transfer offices support faculty/researcher goals and serve as connectors.
- 2.5 Persistence is key for faculty and staff ventures to succeed.
- 2.6 Leaders engage in educational entrepreneurship to help programs persist, expand, and become self-sustaining.
- 2.7 There is a large emphasis on starting new technology-focused ventures and an opportunity to expand beyond the traditional startup model/ technology creation in the lab.

OBSERVATION 2.1:
Five common methods support new venture launches and the commercialization of technologies.

The 5 most common methods that support launching new ventures are the classroom, competitions, incubators, accelerators, and funding mechanisms. It is important to note that while one example may be listed under 'competitions,' this same example could have been listed in other areas as well (such as funding mechanisms). There is also a list of additional opportunities to develop and test entrepreneurial ideas.

Classroom

Competitions

Incubators

Accelerators

Funding Mechanisms

2.1.1 Class - Class is often the starting point for students to gain exposure and get support needed to launch a new venture. Faculty share workshops, pitch competitions, etc. within class to encourage student involvement outside the classroom. For example, a student may take a course related to entrepreneurship, then decide to try out a prototyping facility or participate in a pitch competition, which then leads them to apply to an accelerator (either within the campus community or outside of CU). In class, pitch decks are highly emphasized to help students articulate their business ideas to an audience. The process helps students get clear on what they are creating and develop skills such as public speaking to get support for their ideas. A list of classes within the CU system are available in Appendix C.

Illustrative Examples:
Terry explained the introduction to innovation courses at UCCS when he described, "We're trying to teach them about innovation as a process. We talk about actual innovations in the process and the way things happen. But focus on the impact of the world. We look at helping disadvantaged populations and sustainability, looking at some of the wicked problems."

Becky explained, "I think a lot of people learn about the Idea Forge through, number one, class."

In a more advanced course called the New Venture Launch at CU Boulder, students must already have teams and have made progress on their business prior to enrolling in the course. The course serves similar to that of an accelerator, but for course credit. Jeff, the professor for the New Venture Launch class shared, "These are usually ventures that have gone through some kind of educational process. They've got a little bit of polish on them. It's beyond an idea on the back of a napkin. They have a team. They've created an entity. And their presentation is not very compelling. And it's not clear if the thing can succeed. By the end of the class, I will say they absolutely will have a compelling presentation."

Daria explained, "I'm finding more and more throughout my career, anything that's voluntary or a club is hard to sustain. And these shining stars will get things started, but it always ebbs and flows. It's very cyclical when it's club oriented. At the end of the day, if you have a job or a class, it's always going to trump it. Always. I think there's more space in our courses and for us to think more innovatively."

Jordan, a student, shared, "The business minor directly helped me in creating my first business

after I left college. Learning about the different facets of business one block at a time was really crucial for me. It helped me understand marketing and branding and advertising a little bit. I got a little exposure to accounting and business formation, instructional organization, and finance."

Kim, a student shared, "The whole point of the course was to create a submission for the competition. So that was a really cool real-world application. We were working on the business to actually pitch and get potential funding."

2.1.2 Competitions - In addition to coursework, competitions are common in the process of developing new ventures. Competitions range from pitching very early concepts and ideas (business plans, ideas for a business) to competitions that include students, faculty, and staff building real companies (already generating revenue, has a prototype, etc.). While some competitions may be inclusive of both students and faculty, the list provided here is broken up into which audience is more heavily emphasized. For students, competitions include the Climb (Denver), New Venture Challenge (Boulder), Map the System (Boulder), Lion's Den Pitch Night (UCCS), and Get in the Ring (UCCS). No student-focused competitions were found at CU Anschutz, though many students participate in competitions alongside faculty/researchers. For faculty, competitions include SPARK|REACH (Anschutz), digiSpark (Anschutz), Gates Grubstake (Anschutz), and Lab Venture Challenge (CU Boulder). No faculty-focused competitions were found at UCCS or Denver. It was unclear to what degree faculty from Denver and UCCS engage with technology transfer and the entrepreneurial process.

Illustrative Examples:
Climb (Denver) - Since 2001, THE CLIMB | Jake Jabs Business Plan Competition has supported the growth of collegiate startups and the entrepreneurial community across the Front Range. THE CLIMB is an annual event series and pitch competition that helps students and future business owners transform concepts into viable companies through mentorship, education, financial support, and real-world industry exchanges. Sarah Engel shared: "THE CLIMB is designed for early concepts, so individuals or teams need to apply with a business idea less than two years old that cannot have any seed funding, angel funding, or venture funding and cannot have sales and revenue over $100,000. We try to keep everybody on the same plane."

New Venture Challenge ("NVC") (Boulder) - The NVC is building the business leaders of tomorrow by connecting the CU Boulder campus with the Boulder community to develop and fund innovative ideas. Participants attend year-round events, network and collaborate with mentors to refine their ideas and form startup teams to pitch for funding (more than $100,000) at the NVC Championships.

SPARK|REACH (Anschutz) - The SPARK|REACH Program is focused on commercialization with major emphasis on product development and technology transfer activities. As the flagship commercialization funding mechanism, SPARK provides education, access to industry expertise, a culture of innovation, and project funding. SPARK Awards support CU Anschutz faculty and students developing therapeutics, medical devices, and diagnostics to address unmet medical needs.

The Lion's Den (UCCS) - The Pitch Night features student teams from various educational institutions in Colorado Springs. Entrepreneurs have five minutes to pitch deals to a panel of entrepreneurs/investors. The panel will then provide feedback to presenters, ask tough business questions, and the winner will be awarded a cash prize.

2.1.3 Incubators - The Garage (UCCS), Startup Colorado (Boulder), ASSET Innovation Incubator (Boulder); The Entrepreneurship Center for Music (Boulder); Design Horizons (Denver); and Jump Incubator (Denver)

Illustrative Examples:
The Garage (UCCS) - The Garage is a student entrepreneurship center helping students develop and execute business ideas. Student teams apply to participate and gain access to a physical co-working space on campus, 1:1 mentorship, and give a progress pitch monthly for feedback.

The Arts and Sciences Support of Education Through Technology ("ASSETT") team at the Boulder campus integrates technology with pedagogy to promote impactful learning. Over a three-year period, the ASSETT Innovation Incubator pilot supported four interdisciplinary teams of faculty, staff, and students from the College of Arts & Sciences to grow their innovative ideas for teaching and learning with technology. The goal of the innovation incubator, which is anticipated to run for a second cycle starting in January 2023, is to improve the undergraduate experience by getting students engaged in active learning.

Startup Colorado is a statewide, rural outreach program, housed within the Silicon Flatirons Center at CU Boulder. Startup Colorado has over 1000 rural entrepreneurs who are active within its network. Startup Colorado supports rural entrepreneurs by offering a free peer-to-peer entrepreneur network, scholarships, and event programming, and collaboration with local business support organizations.

Design Horizons (Denver) - Design Horizons is an entrepreneurial fellows program that provides an immersive learning journey for students passionate about entrepreneurship, innovation, design, and all forms of creativity. With a heavy emphasis on interdisciplinary teams, Design Horizons is a partnership between the College of Arts & Media; the College of Engineering, Design and Computing; the Business School, and Jake Jabs Center for Entrepreneurship. This program provides students an unparalleled opportunity to develop a new creative venture, establish professional networks, and build leadership skills.

Jump Incubator (Denver) -The JUMP Incubator is a summer program designed for student startups in need of resources and guidance to take their concept beyond the ideation stage. Each week consists of a two-hour workshop led by an expert guest speaker and a one-hour meeting with a team mentor. Over the course of seven weeks, teams receive a stipend, free workspace, and equity-free membership while they participate in weekly workshops, coaching, leadership development, peer-to-peer accountability, networking opportunities, and exclusive demo days.

2.1.4 Accelerators - I-Corps (Anschutz and Boulder), Catalyze CU (Boulder), Flash Accelerator (Denver); Startup Summer (Boulder), Ascent Deep Tech Accelerator (Boulder); EPIIC Venture Attractor™ (UCCS).

Illustrative Examples:
I-Corps (Anschutz and Boulder) - I-Corps at Anschutz Medical Campus is housed within the Colorado Clinical and Translational Sciences Institute and at Boulder, is housed within the Research and Innovation Office through Venture Partners. I-Corps programming is designed to reduce the time and risk associated with translating promising ideas and technologies from the laboratory to the marketplace. I-Corps uses experiential learning of customer and industry discovery, coupled with first-hand investigation of industrial processes, to quickly assess the translational potential of deep tech inventions. I-Corps serves as a validator for faculty who have ideas, but are uncertain about market potential. While students and staff can participate, it appears to be mostly marketed to faculty.

Catalyze CU (Boulder) - Catalyze CU is a summer-long startup accelerator program designed for CU Boulder ventures created by students, faculty and staff. It combines world class mentorship, funding and a dedicated co-working space to help the most promising ventures from across campus reach escape velocity—without taking any equity.

EPIIC Venture Attractor™ (UCCS) - The Venture Attractor™ is focused on cultivating early stage startups in sports and outdoors; health innovation; and human performance. The cohort learns foundational business practices through a 16-week virtual course with 1-1 mentoring for each team. The goal is to encourage high-potential startups to move to Colorado Springs and support economic growth in the region.

Ascent Deep Tech Accelerator (Boulder) - Ascent is a new accelerator for deep tech startups coming out of the University of Colorado campuses in Boulder, Colorado Springs and Denver. Deep tech startups, or new companies focused on science and/or engineering, face unique challenges because of their disruptive nature, intensive research and development, and significant capital requirements. Leveraging ecosystem experts, a mentor network, and Venture Partners staff, early-stage companies accelerate their viability and traction over four months.

2.1.5 Funding Mechanisms

- Destination Startup (Boulder/ Regional); Rutt Bridges Venture Fund (Denver); Buff Venture Fund (Boulder); Chancellor's Discovery and Innovation Fund (Anschutz); Startup Toolbox (Anschutz); Get Seed Funding (Boulder); Torch Grants (UCCS), Spark/Reach (Anschutz); Gates Grubstake Fund (Anschutz); Deming Center Venture Fund (Boulder); CU Healthcare Innovation Fund (Anschutz)

The range of funding can vary drastically from ~$500 to $1 Million+ when outside investors participate. Every funding opportunity requires an application or participation in a competition to be eligible, which also provides the staff with information to determine if they have appropriate resources and expertise to support that business. Feedback is often part of the process - either from judges at competitions or by way of written feedback from the application. Additionally, many of the pitch competitions listed earlier in the report offer funding to winners of each competition. Regardless of the amount of funding, the psychological benefits of investing in faculty and student projects cannot be overstated. It is worth noting that additional funding mechanisms are available through state and federal programs. Technology transfer offices are very familiar with these opportunities and support faculty entrepreneurs in the application process to compete for state and national awards.

Illustrative Examples:

Delaney from Startup Colorado shared their funding strategy for rural entrepreneurs. Delaney explained, "They're small rewards at this time but a little bit can make a big difference. And I think that's something we forget, $500 or $2,000. It's still another cost that entrepreneurs aren't worried about. Whether that's helping them with new photography for a website, or little things. And that's the stage they're at. Of course, everybody needs more money and that's not to overshadow that at all. The thing that I found fascinating was that I feel like in some way we're making a philosophical statement to them, that they have a very important job as a function of the economy today. And we're basically valuing that job for the risk they're taking to even work on their idea."

> **"A lot of times, it's not the money that allows them to continue. It's validation that this idea could work. The team will keep working on it and persevere."**
>
> **- Stan**

> **Spark was a really good way to have an organized method of figuring out how to go forward. The spark program itself educationally was pretty helpful. I had really no background in this. I had an idea. I have the knowledge of what I do as a surgeon, and a need. But learning how to take that idea and get it to where it is today has been absolutely incredible."**
>
> **- Medical Professional at Anschutz**

A faculty entrepreneur at Anschutz shared, "There needs to be a way for faculty to apply for NIH or NSF funding through the SBIR mechanism, without barriers that currently exist. You need to be more than 50% on this SBIR grant. But once you go more than 50%, you lose your benefits at CU. It's a very practical problem that people have, which really restricts the ability to innovate. Increasingly, we are losing out on well supported funding mechanisms from the NIH because faculty can't practically make that work."

Dipika shared, "There is an application process. We vet the applications that are coming in and that's really to make sure that teams are ready, and that we have the right resources for that particular team. Anyone can apply, and our feedback is always free."

Destination Startup (Boulder/Regional) - Destination Startup® is a collaboration among leading research universities and federal laboratories across the Intermountain West to showcase the best companies from our innovation ecosystem to venture, angel, and strategic investors worldwide. It is organized and led administratively by the University of Colorado, Boulder. Destination Startup® helps innovative researchers and faculty ready themselves for the process of fundraising and the commercialization of their technology.

Gates Grubstake Fund (Anschutz) - The Fund is focused on accelerating basic, clinical, and translational research related to the field of regenerative medicine.

Get Seed Funding (Boulder) - Get Seed Funding is a micro-funding opportunity for CU Boulder undergraduate and graduate students that provides up to $500 in funding for entrepreneurial ideas in the making and is led by the Innovation Action Team. The Innovation Action Team is a group made up of students from a variety of disciplines and backgrounds who bring voices to the Innovation & Entrepreneurship Initiative, act as role models, and lead innovative efforts for the student body.

Chancellor's Discovery and Innovation Fund (Anschutz) - The CDI Fund focuses on supporting healthcare technologies that are addressing unmet clinical needs with translational gap funding. The funds are deployed to support specific milestone-based objectives with the intention of unlocking future development or commercial opportunities.

OBSERVATION 2.2:
There is less emphasis upon ideation, particularly for faculty, as compared to other phases of starting a company.

The entrepreneurial process includes a variety of phases that an entrepreneur participates in. For example, in the design thinking process there are 5 phases: empathize, define, ideate, prototype, test, and later scale. Many faculty already have created a technology, but are unclear if there is market potential. Entrepreneurship is an iterative, non-linear process as a product or service is developed. Please reference Five Stages in the Design Thinking process if you are not familiar.[68] A person or team must first ideate and explore what topic or problem they want to work on before engaging in the design thinking process to solve a problem. In the

[68]Dam, R.F. (2021). Five Stages in the Design Thinking Process. Interaction Design Foundation. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process

early phases of the entrepreneurial process, validation that an idea is worth exploring and perhaps pursuing can make the difference in whether or not a student or faculty engages in the process at all. Specifically, getting started can be incredibly challenging, and even intimidating if you are attracted to I&E but are not quite sure what you want to work on, how you might contribute to a team project, or how to get started. Opportunities for students and faculty to engage in ideation/brainstorming and exploration of various ideas are limited.

Ideation workshops are available for rural entrepreneurs through Startup Colorado and for students on some campuses. For example, three workshops were offered throughout this year - two to prepare for pitch competitions (the Climb at Denver and New Venture Challenge at Boulder) and the Ideation workshop in the Demystifying Entrepreneurship Series (Boulder). Prototyping facilities such as the Idea Forge (Boulder) and InWorks (Anschutz and Denver) support opportunities to create new inventions and physical products, but it is unclear if students and faculty already have an idea before participating in the facilities. Currently, faculty and students do not have many opportunities to explore or ideate on their entrepreneurial ideas outside of the classroom experience, specifically at the earlier phases of the entrepreneurial journey (i.e. I might have an idea, but where do I start? Or, I want to engage in entrepreneurship, but do not have an idea yet).

This is a challenge for people with less exposure to entrepreneurship, specifically those who have historically been underrepresented such as students who identify as low-income, first-generation, minority, or immigrants. This is also a challenge for students who are outside of disciplines viewed as entrepreneurial, such as business and engineering, or students who may not be interested in startup type businesses.

Illustrative Examples:
Susan shared, "I like the I-Corps program for its ability to cross train across different types of innovations and different groups on campus, to help people think through everything that goes past, I have a good idea. To figure out what you do with that good idea and how you assemble your team, different types of funding sources, how to identify who your target market is, how to do customer discovery, and how to articulate a value proposition. The I-Corps program offers training on campus that I don't think is available anywhere else from an innovation perspective."

> **"If we're going to keep feeding the end engine of CU Innovations, an area that's going to have to expand will be early ideas. There needs to be a way for people to understand that they have a good idea, and if they do, how to make it happen."**
> **- Faculty Entrepreneur from Anschutz**

Demetria explained, "What I see happen quite often with folks that have discoveries, is their ability to be open and to uncover what the market really needs. And this is not exclusive to academic campuses. This can be anywhere in business. But typically people are so committed to what they have, and they think because it's been NIH funded, or they've gotten 3 million dollars in funding, that somehow it is *the thing* from a commercial perspective. And that doesn't always translate."

Becky shared "The thing that has sometimes been lacking is the actual support and actually coming up with ideas. Things that are really, really nascent. Like how do you even start? How do you even come up with an idea? How do you get from 0 to 50% so that you can actually be part of the New Venture Challenge?"

Randall, a student shared, "I went to this idea validator workshop and we went through the idea. Like, how do we come up with an idea? How do we validate an idea? How do we help students to determine whether or not their idea is worth pursuing? That was really helpful."

OBSERVATION 2.3:
Gaps exist between faculty experiences in academia and business acumen.

Faculty entrepreneurs engage in educational workshops that focus on customer discovery, business development, and more. Most of the educational workshops are hosted through the two technology transfer offices: CU Innovation (Anschutz Medical Campus) and Venture Partners (Boulder). Denver and UCCS have access to I&E educational opportunities available through Venture Partners, however there seems to be limited awareness and participation.

While faculty are brilliant within their disciplines, a large gap exists between faculty expertise and their familiarity and exposure to business acumen and processes. Transitioning from expert to learner may present a challenge when working with faculty. Business terminology is a barrier for faculty to learn more about how to make their ideas reality. Additionally, faculty who are already familiar with and who identify as an entrepreneur or innovator, are more likely to participate in these educational experiences. Still, not every faculty is interested in learning the business side of things and they prefer to hire someone else to run the business.

Faculty traditionally present their research at conferences where the lexicon is familiar and discipline specific. However, some faculty and graduate students may have a difficult time communicating their ideas and new technologies to external investors and stakeholders who are often outside of their discipline. Clearly communicating the problem and solution are key components to obtain funding for new ventures. Helping researchers and faculty with this communication takes time and ongoing development. When researchers are able to effectively communicate their ideas and ventures, it benefits their innovations and marketing their work within and beyond CU.

Illustrative Examples:
Stephen explained "Faculty are used to being the focal point and they're used to always being smart, always being right, and rarely having their ideas challenged. It's a challenge when you bring business concepts to them and try to educate them in a new way."

> **"I think we underestimate how little our faculty know about what it means to be innovative, and more importantly, an entrepreneur. I think we assume, because everybody is so smart, and they are incredible. But for the most part, they don't know squat about business. We have to recognize the barriers to entry are high for so many faculty. And some of it is just access to information and language barriers."**
>
> **- Cathy**

Bruce explained "Researchers have so many opportunities to get up and talk about their project. But being able to explain that same information to somebody who studies something totally different or is outside the field, they don't have a lot of those opportunities."

Heather shared "One of the reasons the Startup Toolbox came into being was because we felt like faculty were great clinicians, great scientists, but nobody ever talked to them about corporate formation and just all the different pieces that go around starting a new venture."

A faculty entrepreneur from Boulder explained, "My profession didn't teach a lot of business background. Not even the basics. And that was a big challenge for me to learn how to run a business. And there were gaping holes in what I needed to do."

A faculty entrepreneur from Boulder explained, "I have no formal business training. A lot of it's just learning to understand the language and

speak the language. And that takes time and you've got to surround yourself with mentors and just constantly learn."

A faculty entrepreneur at Anschutz shared, "All my past training or expertise is focused on science and clinical things, but never on the business side. We didn't have any idea how to run a business. The Spark program definitely helped us to really move this forward. I think the most beneficial thing from the Spark program are the training courses they provided and the network they set us up with. And I was very lucky through those networks to identify a world class mentor. He was a role model. I think that completely opened a different door for me."

Another faculty entrepreneur at Anschutz shared, "I don't have a business mind, and I'm not a negotiator. One of my attributes that's been helpful is that I recognize where I'm limited. I've learned to trust my business partner and he's learned to trust me. And he has a huge network of contacts in industry, banking, finance, legal representation. And I just rely on him on that end. I don't have any interest in learning the business side."

OBSERVATION 2.4:
Technology transfer offices ("TTO") have evolved over the past decade to better connect with CU system faculty and researchers and, where appropriate, assist them in launching companies.

Historically, traditional technology transfer offices have relied heavily on completion of licensing agreements and have been transactional in nature. CU Innovations (Anschutz) and Venture Partners (Boulder) have played a substantial role in expanding services, engagement, and providing individualized support needed to take ideas, technologies, and discoveries, and translate them into real world and economic impact. These offices not only oversee incubators and accelerators, but they also refer often to the greater entrepreneurial community as appropriate. TTO staff have extensive networks and connect faculty members with business leaders to support the launch of products or services. The majority of faculty find the people and programs incredibly helpful for their entrepreneurial journey.

The perception of the transactional and inflexible model continues to linger in the greater CU community. Faculty are not quite sure what these offices can do to support them and some even believe they disincentivize entrepreneurship and innovation. Faculty want more flexibility and transparency about the process.

Practically, once a faculty member, researcher, or graduate student discloses their inventions to one of the technology transfer offices, a staff member will reach out to help them determine their next step. Once connected with the tech transfer offices, staff will individualize their support, recommend funding opportunities, and connect them to mentors and resources. While relationships have been overwhelmingly positive, faculty would like more opportunities to engage with staff in these offices. A case management approach may be taken, but sometimes, faculty felt like they were not sure what to do next, and then would hear about an opportunity that would really help their business through a listserv or colleague, rather than their main contact within the TTO office. There could also be more opportunities for entrepreneurial faculty to meet others, in order to facilitate more community building.

Illustrative Examples:
Dipika described, "When the faculty member shares, I want to create this thing or I have already created something, we talk to them about what their aspirations are. Is it setting up a company? Is it partnering with an existing company? Is it just licensing straight up to another company?"

Heather described, "The whole point of it is to figure out, how do we get that out to help patients or improve healthcare more broadly?

We're always thinking, what help do they need? Who can help them? What are those resources? And eventually that gets to either a new venture or licensing to an existing one."

A professor at Boulder described, "I think that entrepreneurs are a certain type of person. You don't work within all the boundaries that most people love to work within. For me, I'm a creative person. I've always been into invention and innovation. I've gotten so used to hearing people go, that won't work, or that's weird, or you're weird. I would imagine that entrepreneurs, as a group, have all heard variations on that theme. Our minds are not satisfied. Entrepreneurship solved this big question mark in my life of, what is wrong with me? It gave me a definition for what I do well, which is to think, create, invent. And then turn it into a business."

A professor at Anschutz explained, "I got introduced to a guy who helped me start my company. That would have never happened had it not been for the Spark program."

One program director explained, "The traditional tech transfer models created a disincentive for people to be entrepreneurial. Because why would I bother if I have to give back most of what I make to the university? And so there are a lot of people that just say, I'm just going to ride this out. And I'm going to leave. And once my non-compete is up, I'll just start my own thing. Or I'll just do something else. And it made it harder for universities to attract people to come work for us, who are truly entrepreneurial. I think we need to find ways where the university can still benefit from individual success, but also allow people the freedom to do their work as entrepreneurs."

Bryn explained, "It's required under federal law actually and conditions of their grant funding and university policy. We try not to emphasize that part. We want to emphasize why you would want to work with us and why we're helpful, and a resource. A resource that can help you achieve your goals. But there is this sense of professional and legal obligation to do it as well."

A professor at Anschutz explained, "I've always had a person of contact that's worked with my group. And they've been perfectly wonderful, extremely available in terms of time and guidance. I've had fantastic relationships because they are one-on-one relationship. They're very good at telling you, at which point you need more help, and at which point you need to be applying for grants. I didn't find it as challenging because I had somebody there telling me what to do and opportunities I should go for."

Gali shared, "Expectation management is important. A lot of the projects that you hear about in the news or things that get funded are the successes that have come out of Innovations… Or the big flashy wins. Faculty members come expecting that it will be easier than it is. But the challenges of actually advancing ideas all the way to market impact takes a lot longer, requires a lot more blood, sweat, and tears than many expect upfront. That tends to be a frequent challenge for any faculty member looking to commercialize or take their technologies out into industry."

Susan described "I like the work that CU Innovations is doing to go beyond your traditional tech transfer office into something much more visionary. I think that's pretty impressive."

Angus, a professor from UCCS shared, "Faculty are not aware. I've never had anyone outside someone in the Bachelor of Innovation ever mention the tech transfer office."

Matt recommended, "In many ways, the university can benefit more by taking true equity in companies. Not just revenue share. Because the real money doesn't come from revenue sharing on the sales of products. The real money comes when a company gets sold and acquired. I think that universities can take that risk, or should take that risk. CU needs to take that risk more and say, Go for it. We're going to be an owner. We're going to take a board seat in your company. But we're going to let you do your work. And if you sell this thing

for 100 million, and we own 10% of it, then everybody wins in that scenario."

Dipika explained, "We definitely incentivize our researchers, our innovators to innovate. And so, a large portion of that revenue goes back to the researchers, personally and also to the lead researcher's lab."

One faculty shared "If there could be a system that would be more dynamic and could adjust. So it's not, you came up with this invention or this new concept. You need to sign here, here, and here and you'll get this percentage. And here's how this will work. Because the person who comes up with that idea often, I think there's pushback, and rightfully so. Like, wait a minute. Why does that have to be the deal for me? Could there be more flexibility in the tech transfer office to create deals that are more based on the individual, maybe more based on the campus, and maybe ones that are customizable so that everybody gets more of what they want."

OBSERVATION 2.5:
Persistence is key for faculty and student ventures to succeed.

Persistence is often stated as a critical piece of entrepreneurial success. When students or faculty are persistent, it pays off. Students and faculty can pitch their ideas in multiple venues, get critical feedback by judges and mentors from the community, apply for multiple funding opportunities, and many continue to do so until the business can stand on its own. At the same time, when faculty or students go through this process multiple times, sometimes they realize they need to completely pivot or close a business altogether. However, they rarely 'quit' thinking or doing entrepreneurship. Rather, they have built confidence in the process, and in themselves to start a new project, bringing everything they learned with them along the way. Practically speaking, teams may participate in a competition for 2 or 3 years before winning or obtaining funding.

Illustrative Examples:
In reference to ASSETT, the Innovation Incubator at Boulder, Blair shared, "It's really exciting to work with this team because they get frustrated. But they just keep moving forward… and they're challenging the infrastructure."

Tom shared, "One of the unique things that we've invented in the Garage is the Progress Pitch. Every 30 days, teams have to give an update on the progress of their venture. And this is the way that we hold them accountable to continue to make progress. They do, usually at the end ask for help in some way. Usually they're not asking for capital resources but they're asking for somebody that knows how to build an app or somebody that can join the team as a chief marketing officer and those kinds of things."

A faculty entrepreneur at Boulder described how he participated in an event four times. He explained, "It is all upside. We've never received funding directly from the program, but we've made relationships. And it's all a network. It's a small world. So those opportunities I think are really important."

Kris explained, "There's so much technology that doesn't see the light of day. Some shouldn't. On the other hand, there's some that we don't see just because we don't have the ability to quickly turn it over into a venture. So we get intellectual property done, and then we don't have ways of really turning it out into ventures."

A faculty entrepreneur at Anschutz shared, "At one point, I realized the product I created would never work. I had to pivot and come up with another idea. And I came up with a better way to do it. That was a pivotal moment because if I hadn't been able to generate a new way, there's no way I would have gone forward."

Dipika explained, "When people apply in the first year, they tend to not make it to the finals. And that's really because they haven't had the right coaching, they haven't done customer

discovery. But then going into the following year, they do know what they're supposed to do to write up a good application. And so most of the time, it just happens that they didn't win the first year, the second year they are a finalist and they win. Or they at least get to the finals and in the third year they win for sure."

Angus shared, "We have a startup that left UCCS and is a full business called Lot Spot. In short, they use sensors and algorithms to help parking lots make more money. And they first tested that in the INOV1010 class. Obviously, they are gifted students. And they just kept going."

Bryn explained the technology transfer process and the leadership and perseverance needed for success. "Faculty submit an invention disclosure, which tells us all about the invention, ownership, funding, intellectual property, target markets. Their vision, their goals, their collaborators. And we will work with them over a period of months or years to determine, are they disclosing this because they're obligated and that's it? Or are they really serious about translating this? Because it can be a lengthy and very challenging process."

> **"In operations, they talk about success at aggregate. Any one thing could fail. But statistically over time, if you roll the dice, the chances of you getting a 6 with enough rolls, not only is it possible, but it's almost impossible for it not to happen. I think that mentality needs to be brought into entrepreneurship. Look at the data in a bigger picture and realize that the strategic decision isn't about what you're doing now, it's about your mentality. And that's how I think you can carve out success."**
>
> **- Adam, Student**

OBSERVATION 2.6:
Leaders engage in educational entrepreneurship to help programs persist, expand, and become self-sustaining.

Leaders supporting entrepreneurs and innovators act as educational entrepreneurs within the CU system. Practically, this means running the I&E operation as a non-profit/business. Many participants work in centers/offices that are self-sustaining, meaning they generate enough funding to support their services through multiple revenue streams. Other participants aspired to be self-sustaining and expressed a desire to have ownership in the process. Still, others appreciated or desired a line-item budget for their programs. To become self-sustaining, participants needed support roles such as industry liaisons, better support from advancement, business development, or approval from the university.

Illustrative Examples:
Daria shared "You run your own business within the university to be able to make all this work. We have finance people, an industry liaison. These partnerships were originally built 30 years ago and started with eight. Over time, this program got larger. I had to have a dedicated industry liaison to help me with the relationship building." She also explained, "So it's about a half million of sponsorship from companies that are coming in."

Jeff from the Entrepreneurship Center for Music explained the CU Gigs educational entrepreneurship as "CU serves as a matchmaking kind of service. But the students have to negotiate the terms of the contract with the client. They're responsible for showing up and making sure that they deliver. Wouldn't it be cool if we scaled up CU Gigs, we scale up the Lullaby Project, to have this sort of umbrella of community engagement, outward facing, student-run enterprise?"

Gali shared, "At many institutions, tech transfers are cost centers versus revenue

generators. What we've been trying to do is really diversify our programming and activities to create different streams of revenue coming in. The Health Innovation Fund provides a management fee which offsets a lot of costs. Philanthropy is another avenue to generate additional positive revenues. Different kinds of deals on business development, co-development and validation studies around clinical trials is a different way of creating revenue streams that are outside the traditional licensing model. We've slowly been diversifying our revenue streams… to a more blended approach."

Heather described "We're working hard to make sure we're really diversified around, how does revenue flow. Right now we are sustainable. The goal is to stay that way. Some of that is due to it taking a while for something to progress enough to really bring in significant revenues. The revenues that are really supporting us right now are from things quite a while ago. It's up to us to build that for the future. But that's something we look at all the time. And that's why there are all these different ways that we are trying to both benefit healthcare and at the same time find different paths of revenues coming back to support us."

Matt shared at the Mental Health Innovation Center, "Our financial model, in part, ties our success to theirs. We take equity and part ownership in those companies. So in essence, we're investors. We're not bringing money to the table, we're bringing people, talent, and the university resources. And then we take anywhere from half a percent to 6% equity in those companies. If they sell, we get that payout, same as they do. That money gets rolled back into the center to enable us to sustain our efforts and grow and expand our reach."

OBSERVATION 2.7:
There is opportunity to expand beyond the traditional startup model/ technology creation in the lab.

Currently, the focus of technology transfer offices is heavily geared to technologies coming out of research labs, as referenced in the name of the office. However, translating research into a potential commercialization opportunity is less prevalent, particularly in disciplines that are not rooted in technology or as familiar with the translation of research to practice. There is an opportunity for the expansion of I&E beyond technology in creating non-profits or translating research into practice or community impact. While technology startups are heavily publicized, the majority of students and faculty do not have the interest and/or the skills to develop such technologies. To increase faculty and student access, technology needs to be more accessible for those outside of mainstream technology-related fields, and there should be increased exposure to different types of business/startup approaches.

Authors Levine and MacBride from the *New Builders*[69] found that people from historically underrepresented groups are often underrepresented in I&E. However, this demographic trend is shifting to include more women and specifically black women as the largest growing group of entrepreneurs.

> **"Increasingly, our next generation of entrepreneurs are Black, brown, female, and over 40. They are more likely to be building a business on Main Street than in Silicon Valley. They typically start businesses based on their passions and rooted in their communities."**

[69]Levine, S. & MacBride, E. (2021). The New Builders: Face to Face with the True Future of Business.

Expanding entrepreneurship beyond the traditional tech start up may better support diverse faculty and students interested in alternative startup models. This trend is also in alignment with Gen Z, who want and believe they can find meaningful work and make a difference in the world.[70] Students and faculty are heavily driven by impact.

Students and faculty are also drawn to creating a small business, being a solopreneur, leveraging their expertise as a consultant, raising awareness or educating around social issues, or starting a non-profit. While there are some areas supporting and incentivizing social impact companies (At CU Denver's the Climb pitch competition, there was a mission-driven award and CU Boulder NVC supported a Climate Change Prize), it can be difficult to compete at any entrepreneurial competitions whose judges often emphasize feasibility, scalability, and potential for revenue generation. For faculty, this may show up in a drug discovery that has limited market potential because not enough people have the issue to make it a financially sound and worthwhile investment. For students, this may show up in a non-profit organization competing against for-profit business models.

Illustrative Examples:
Angus shared, "Social Innovation is something that we've been focused on more and more. Students seem to have a pretty big appetite for social innovation. In one of our classes, we do innovation with very 'difficult to solve' problems, i.e. no one solves them. But that is inherently interesting. We make it localized for people. We ask, how can you help Pueblo Chile farmers with their issues, given that we're running out of water?"

A faculty entrepreneur at Boulder explained, "It's really all about impact. You only have so many years to make a contribution to society. A lot of what I think we've been able to do in the lab is great, like training students, teaching students, writing papers, publishing, getting patents out. But a lot of that just goes into the ether. And some of it is directly tied to patient and physician impact. I work in the medical device landscape and it is ultra-competitive. And it's heavily if not entirely driven by intellectual property. And so, there's some things that can be published. But when you have secret sauce, you're going to be the one who has to take it the distance, or it's never going to get to the patient."

Thomas shared, "That's the ultimate thing for what we're doing. To see our ideas translated into something that impacts people in some way. And that's on a medical campus. But I think that same concept would hold true for all of our disciplines across the system."

> **"Very few people understood what I wanted to do and I couldn't convince anyone in industry to work on this area. The only way I could actually get this to be relevant to patients, was to take a very proactive role and work to start a company. Because I have always wanted to develop things that had patient impact."**
>
> **- Faculty Entrepreneur at Anschutz**

Theo shared, "We're seeing everything from well being and health outcomes, to things like the Great Resignation. And there are entrepreneurial implications of this when you disaggregate the data. You look at who's starting ventures and why. It is not, by and large, your unicorn hockey stick crowd. It is people who are trying to solve problems in their own communities that may look, in some ways, from a motivational standpoint, more like social innovation and social entrepreneurship."

A faculty entrepreneur at Boulder shared, "It's about really creating something that will make

[70]EY. (2021). Gen Z is Poised to Reframe the future, but are business and education ready? https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/corporate-responsibility/ey-ja-gen-z-is-poised-to-reframe-the-future_v3.pdf

the world better. Finding the people to do that with me is critical."

Jeff explained, "I think the research I'm doing specifically is about how to solve environmental problems through entrepreneurship. And more recently my research has been turning more towards what helps those entrepreneurs succeed. And has lessons for entrepreneurs. Whether or not they get those lessons is really doubtful. Because we publish our research in top academic journals. And I do work to translate that research. For example, I'm working with the CU media office now to take the research we just published, which looks at the survival of environmental entrepreneurs in the green building industry. We are translating that into a press release and into a news article and Op Ed piece to try to get that out. But I don't think that really reaches that many people either."

Nathan, a faculty member, explained, "Tech transfer is not very much on my mind. I want as little commercial IP as possible. I don't sign NDA's. My view is that as a public employee, my job is to create public goods, not private profit."

Kathy shared, "Social innovation matters to students in Arts & Sciences. Our students care about people. They have the interest and skills to do more social innovation work—we should provide those opportunities for them. I'd like to see more students involved with I&E overall. And to do that you need to, ironically, think differently and outside the box. If CU offered a really robust opportunity and coaching for students interested in these areas, it would be a much easier sell to our students. The intent of the New Venture Challenge is to fund money-making ideas—social innovation might make money, and it might be more non-profit related. I'd love to see opportunities to help those groups apply for and get grant funding."

Theo explained, "If we're just looking at entrepreneurship as a venture startup model, it really misses the point that entrepreneurial venture exists within an ecosystem and how are we building the ecosystems around it. That's where I think the big innovation opportunity is right now… is thinking about ecosystem development differently."

Terry explained, "There needs to be focus on the impact of the world, looking at some of the wicked problems. And whether or not we can solve them, get students to see that innovation is a way of trying to make that kind of impact. And this is really important for the students who are not focused on money, which is a decent share of our population."

> **"I want to change the world and solve world problems."**
> **- Andrew, Student**

Barry, a student, explained, "I want to change the entire world. And there's always two things super crucial to growing a business. And that's people and capital. Both of which are hard to get in the nonprofit realm. That's why I'm so adamant to stay on campus and I keep coming back. Because the campus has people, and Denver has money. And if I just keep shaking hands, I know I'm racking up the karma points and eventually, that breakthrough will come."

Barry, a student, continued sharing, "It's kind of tricky being a nonprofit. I'm really debating on changing. I think everybody deserves access to healthy food. But there's not a ton of incubators that will take a nonprofit, at least in the last few years. They think we don't make any money because we're nonprofits. And we do make money, we just give back all the profits to those in need."

Janet, a student, shared, "I learned so much more about the good sides of business in healthcare and how you can actually use that to make real differences."

Gabriella, a student shared, "I definitely wish I would have learned more about non-profits. I thought of non-profits as less lucrative and less sustainable than it really is. There are a

lot of opportunities and a lot more than what people give it credit for. I wish I had learned that sooner. We touched on it, we talked about it, but it's so much bigger of a world than I realized at the time. Almost all arts organizations are non-profits and there are all of these jobs. I do development now, and I didn't know that was a thing until I went to graduate school."

Challenges and Additional Considerations: Launching New Ventures

Students and faculty have multiple opportunities to engage in launching a new venture or commercializing their technologies with the university system. This section provides additional considerations and challenges to launch new ventures.

Staff do not commonly participate in I&E educational opportunities, unless they are directly connected to an I&E program in the CU system. An innovative and entrepreneurial mindset for staff will likely be critical to innovate within the CU system. Staff were only mentioned as an afterthought, likely because of limited capacity.

Technology transfer offices may consider supporting students through the IP process, without taking ownership. In regards to students creating IP, Kelsey shared, "That would be the next big thing that I think would push InWorks a lot further along. Because you haven't seen a ton of products come out of InWorks just because students don't know what to do after creation."

CU could consider what they choose to invest in. Cathy suggested, "They can't put half a million dollars into a product that's only going to net $40,000 or $50,000. Yet that technology might save someone's life. So we've got to get smarter about what and how we think about entrepreneurship and innovation as academics."

Assessment of I&E programs are limited. This is due in part because many of these programs are fairly new or have not had the infrastructure built to create consistent assessment efforts. Participants shared that they do keep track of the number of startups created, number of students/faculty attended, and amount of funding raised. CU Innovations and Venture Partners publish yearly reports on these metrics. Some programs publish reports for the broader public while others are shared with internal stakeholders.

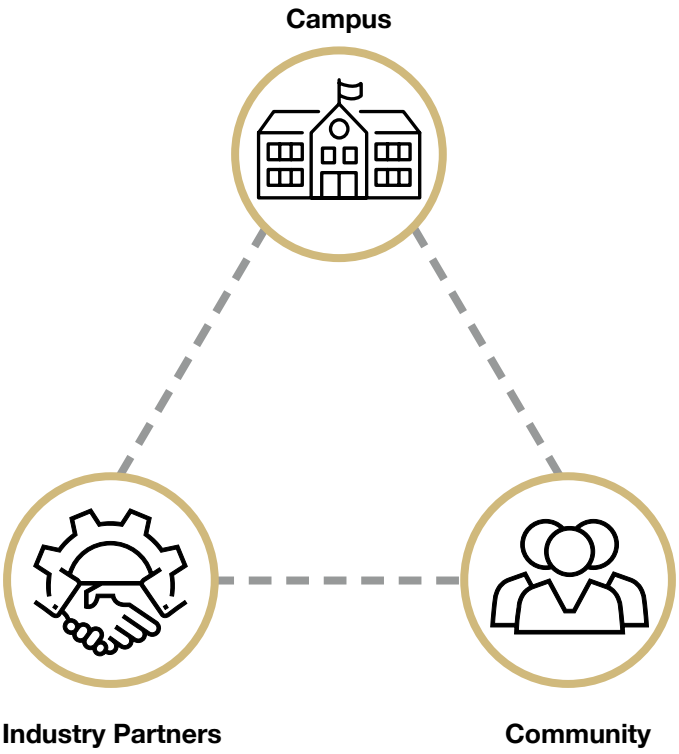
CU Boulder has partnership programs with Colorado Mesa University and Western Colorado University. Both view entrepreneurship as an economic necessity. However, their I&E support structures vary drastically. WCU has an engaged and vibrant I&E community while CMU needs additional support to embed entrepreneurship, at least in the Boulder Engineering partnership program. Jeni explained, "We push entrepreneurship because we don't have that many jobs for our students. So if our students want to stay here, a lot of them have to have that entrepreneurial mindset in order to figure out how to stay here. Because we just don't have an abundance of jobs."

The number of engagement opportunities and funding varies drastically between the campuses. For example, CU Boulder and Anschutz Medical Campus have access to many funding and programmatic mechanisms to support new ventures for faculty. Boulder has a strong support mechanism for students, but lacks consistent student funding and support across colleges. Denver and Colorado Springs tend to be less aware of new venture support for faculty, but do have ways for students to get involved in I&E. It is difficult to determine if the range of opportunities and funding are due to interest, awareness, campus size, or campus characteristics.

SECTION 3: CAMPUS, COMMUNITY, AND INDUSTRY PARTNERSHIPS

Section Three focuses on partnerships developed between the campus, community and industry. Campus refers to the individual campuses within the CU system. Community partnerships refers to collaborations between the campus and community. An example of a community partnership would be the collaboration between the Fitzsimons Innovation Community and CU Anschutz Medical Campus. The Fitzsimons Innovation Community hosts a large research community, supports university spinouts, and partners with CU Innovations to improve health care. Industry partnerships refers to collaborations between campus and industry, often related to the work being done within the university and can take on several forms. First, industry partners may directly support a university or program within the university monetarily. Second, industry partners may sponsor student projects. This provides experiential education for students and gives organizations an opportunity to meet and recruit potential job candidates. Lastly, industry partners provide mentorship and expertise based on their industry experience. For example, a partner in the aerospace industry may help a faculty entrepreneur with validation or consultation for a new technology.

Campus, community, and industry partnerships create win-win scenarios that elevate the entire entrepreneurial community. The industry partnerships that CU system faculty and staff have developed are abundant. However, partnerships are currently piecemealed together and often lack infrastructure. If these passionate, engaged directors and faculty in the system leave, those partnerships are likely to leave with them, limiting sustainability and long-term impact. For example, CU may have three liaisons at the same company because of individual relationships. These relationships are beneficial and often happen organically at events and by participating in the entrepreneurial ecosystem themselves. But the fragmented approach can present obvious challenges. Ownership of these relationships are vague, and therefore difficult to maintain when people transition or attempt to fundraise.



Once students and faculty attend a few events, the I&E ecosystem within CU and in the greater community is incredibly welcoming. Attending these events also helps students and faculty to figure out which places make the most sense for where they are at in their own entrepreneurial journey. Joining the community may be initially intimidating. Once people have the opportunity to interact with the entrepreneurial ecosystems, they find incredible people who are excited about what

they are working on, and ready to help however they can, as per the Boulder entrepreneurial philosophy to 'Give First'.

Observations Shared in this Section:

- 3.1 The CU system, government, and industry/community have mutual goals that support I&E and positively impact the regional economy.
- 3.2 Personalized support, feedback, and mentorship from community members are critical to the ongoing success of student and faculty ventures.
- 3.3 The CU community and entrepreneurial community mutually encourage attendance at events; but awareness of such events are happenstance.
- 3.4 CU leverages the power of a world class startup community while also contributing to it, serving as a massive local convener.
- 3.5 Practical I&E experiences with community partners and industry sponsored projects help students build a network, learn valuable skills, and get hired.
- 3.6 CU has to be responsive and agile in order to initially develop and manage strong partnerships with industry.
- 3.7 A coordinated strategy is missing to develop industry partnerships within individual campuses and between them.
- 3.8 Partnership stories are not well known, and could be an opportunity to better share CU successes.

OBSERVATION 3.1:
The CU system, government, and industry/community have mutual goals that support I&E and positively impact the regional economy.

Strong innovation ecosystems are created when there is integration between university systems, government and industry/community, described by researchers as the Triple Helix.[71] A recent model includes the addition of societal members and refers to this as the Quadruple Helix.[72] Each of these systems operate individually and together - reinforcing entrepreneurship and innovation as a whole. For example, the CU system generates economic growth for the state of Colorado by helping students and faculty launch their ventures in Colorado. At the same time, the state of Colorado invests in Colorado universities, which supports the development of new ventures (e.g Office of Economic Development and International Trade partnerships with CU Innovation and Venture Partners). Faculty and researchers from CU create business ventures and IP which typically gets sold within the Colorado community.

CU also develops and prepares students, adding to the talent pipeline for Colorado industries. When resources and revenue are shared, there is greater opportunity for impact. Additionally, CU supports the community by offering events, workshops, and educational opportunities around design thinking, innovation, and entrepreneurship to support the growth of the community. Many participants expressed it is an ethical imperative of the CU system to serve the community and solve local problems.

Illustrative Partnership Examples:
Gali explained, "As we transition out of the Reach program probably in two more years, the sustainable mechanism will be up for renewal

[71]Pique, J.; Berbegal-Mirabent, J.; Etzkowwitz, H. (2020). The role of universities in shaping the evolution of Silicon Valley's ecosystem of innovation. Triple Helix Journal 7(2-3), p. 277-321. DOI 10.1163/21971927-bja10009

[72]Yun, J. J., & Liu, Z. (2019). Micro-and macro-dynamics of open innovation with a quadruple-helix model. Sustainability, 11(12), 3301.

with the state OEDIT[73] office. They're up for renewal in 2024. The successes we're getting out of the Spark program… we're trying to identify projects that meet their state goals for job creation, economic development, to help argue for a renewal of the state program."

Bryn explained, "We're selling newly created business ventures and intellectual property assets to investors, to corporate partners and to the business community who might want to acquire those companies."

Kris explained, "We are in interesting times. Entrepreneurship, and ventures that support it are going to be needed to support communities."

Matt explained, "We really do want them to be commercially successful. And we want that for two reasons. One is that if they are successful at launching and selling products that will help people's mental health, then that helps us fulfill our mission, which is to help people. So people have access to new tools that are higher quality than they would have if we weren't working with those companies. We believe that very often we're saving them from bringing junk to market. The other outcome is frankly financial. And that's for the company and for us."

Kelsie shared, "We bring Human Centered Design or design thinking out into the corporate world or government and help them work through a project that they really want to work on."

Tom explained, "The mission of EPIIC (El Pomar Institute for Innovation and Commercialization) includes economic developments of community activities."

Startup Colorado has developed and maintained strong community partnerships with business support agents[74] to lead a network of rural entrepreneurs in Colorado. They provide scholarships and sponsorships, support community leaders, host programs, and create assets and resources for rural entrepreneurs. Staff focused first on understanding the needs of rural entrepreneurs to then build Startup Colorado together.

Heather described how she maintains ongoing relationships. She shared, "Once there's a license in place, it's not, license it and forget them. You need to maintain that relationship to understand, are they moving your technology forward? Is there additional technology we have that they need to be more effective in moving forward? Are they having trouble? Do we need to connect them to someplace else?"

> **"I really believe that we have a strong ethical obligation to the communities in which we reside and where we draw students from. And to solve those problems. We need to change in such a way that we can harness all the amazing brain power that we have with these campuses to bring all of that to bear on solving these big problems, not just studying them."**
>
> **- Matt**

OBSERVATION 3.2:
Personalized support, feedback, and mentorship from community members are critical to the ongoing success of student and faculty ventures.

Community members have a wealth of knowledge and expertise that is valuable for students and faculty who create new ventures. Community members share their expertise by serving as mentors and judges, providing personalized, timely feedback to help validate, create, and grow new ventures within the CU

[73]Office of Economic Development and International Trade

[74]The term business support agents includes small business development centers, Chamber of Commerce, investors, accelerators, funders, and mentors.

system. These relationships are critical to the I&E ecosystem and program directors are very aware of this reality.

Some mentor relationships develop organically while others are paired with one another intentionally. Staff create many opportunities for students, faculty, and mentors to meet, network, and collaborate. CU staff not only get these community members involved, but the way they encourage involvement creates a sense of ownership in the process as well. Mentors feel a sense of commitment and are energized by participating in these opportunities.

Additionally, student and faculty entrepreneurs have learned a great deal from community members and express deep gratitude and respect for their mentors. Students have learned that they likely will not be successful on their own and that having a supportive community around them will elevate their ideas, impact, and success.

Illustrative Examples:
Sarah explained, "We build networking into every event that we have. We're not big on forced mentorship connections. I know there are a lot of mentor programs where they do the matching. We're not big on matching from our end. It needs to be an organic match. If we are doing a mentor event, it's promoted as a mentor event. The mentors know that there's an opportunity to network with these students and carry forward. But it's where the students are going to make that engagement and show the effort. That's what our mentors are looking for."

Blair explained, "We did an event sponsored by the House of Genius Manhattan. House of Genius actually started in Boulder. It's a pretty unique pitch-type forum where you're not pitching for funding. You're pitching for feedback. There's people from the community around the table but no one reveals what they do until the end."

> **"Being connected with advisors that are a perfect fit for me has been so valuable. Susan Strong has helped so much. She learned about me as a person and an entrepreneur. Many mentors have continued helping me, and I continue learning from them. That's been the most valuable thing, is knowing that when the program ends, you've been given a set of tools and outlines, so that you can continue following. You're not just alone again. The connections are so valuable."**
> **- Faculty Entrepreneur at Boulder**

Stephen shared, "I recruit the attorneys who teach faculty intellectual property, as it relates to patents, corporate, and business formation when they start to think about, do I want to do a startup? We pair them with experienced entrepreneurs that explain, these are the things you're going to need to do to create a successful startup."

Dipika explained, "We don't judge any of the Lab Venture Challenge applications or pitches. We have industry partners and investors that we lean on to do the judging and scoring for us."

Stan shared, "The community is a wealth of knowledge, and they can add to those experiential learning opportunities for our students by participating in the New Venture Challenge. We have mentors, judges, or volunteers interacting with our students. They are helping our students broaden their understanding, broaden their network, and deepen their learning. Number one, it's about learning. Number two, it's about building that entrepreneurial, innovative community. It takes everyone from students to the faculty, the staff, to alumni, to the entrepreneurial community within Boulder and Front Range, to really come together to address, what are some things that we can look at in our society that are problems, pain points? How do we solve them? Let's create a company around that."

Brad explained, “Silicon Flatirons has an advisory board populated with community leaders, people connected to starting businesses and real entrepreneurs. I think with respect to getting the word out within the startup community, that advisory board became our leading marketers for a lot of stuff that we did. For example, Brad Feld was on it. We would post that we’re doing an upcoming conference on science fiction and entrepreneurship and Brad would post it on his blog.”

Stephen explained, “We have an independent group of judges, separate from the university. We have legitimate investors and entrepreneurs who have lived the life of taking a company from the bench or the lab, into the real world.”

> **“There’s so many outlets and people willing to help. I got connected to so many people. And it’s really the network and the people. I have been a student at two other universities. None of them had the kind of acceptance and flexibility compared with what I see here at CU in terms of the professors. Faculty are open-minded. Even at the College of Music, somebody that’s not teaching the entrepreneurship classes would be willing to stay, oh, that sounds interesting. Let’s see what I can do to help you. This is really important that CU can just keep up. It’s not like it needs to change. I think that is the most important thing in my experience. Because if you can do a class in a way that matters to you, you will start to think… can I maybe do this? Where can I get resources to make that happen? To me, that’s where entrepreneurship comes in.”**
>
> **- Sara, Student**

Kim, a student shared, “At the Jump Incubator, every week we were talking to a different type of mentor, someone who’s had success in this area, another person who has had success in this area. People who work at investment firms, people who are entrepreneurs themselves. Getting that consistent feedback from different players was super helpful. Before that, my co-founder and I were brainstorming together and trying to ask our friends to give us feedback. But getting that interaction and mentorship from people who have lived the entrepreneurship journey was really valuable.”

> **“What was cool, was being able to talk to people that have really done stuff. You talk to somebody who made 80 million for their business. And they’re like, you can do sales. I have faith in you. That little moment of faith goes a long way. Having qualified people tell you what you need to change, what you need to do, that was by far the most important thing that I got from college.”**
>
> **- Adam, Student**

Barry, a student shared, “Getting the feedback when pitching and building up the confidence, and having mentors say you did well, but you can improve. Being in an open environment to portray this idea out to the world has been huge. Being able to draw the vision out to the world, verbally and visually, is so crucial.”

Randall, a student explained, “I met with a mentor and we worked through the business step by step. He asked questions that I wouldn’t have asked myself, which was super valuable. He challenged me to go out and talk to people. I learned how to do interviews, and early stage market research. It was really, really cool and it was the beginning of my entrepreneurship curriculum at CU. It was a great way to start. I was thrown out of my comfort zone. And he made it a point to follow up and say, let’s meet in a few weeks. I have some other things I want to show you about

financial modeling. Him being like, let's meet for coffee in a month, and saying, I want to know how far you came. It was super valuable."

Adam, a student shared, "The people who are judges are awesome people in the community, but more or less have no idea what the industry specifics are. I would get feedback on my pitch and other pitches that were just completely wrong. And it's not because these people aren't trying hard, it's that they're simply not qualified to be judges for understanding where this is going. I saw that across different startups that I worked with, where they got disheartened or they felt as if their advice was wrong. And I was like, does this person, who has a bunch of money in hedge funds understand what it takes to create a feminine product or whatever your industry might be? And the answer is very likely no."

Sara, a student shared, "What stood out the most to me is definitely the NVC (New Venture Challenge). There was so much mentorship during that time. It was amazing that this program exists for all the different views. Anybody can join. I think it's the real education here. I learned how the world actually works, in a sense. I have a friend who was telling me she has a small business with three founders, and they did not have a founders agreement. We have to do one for NVC as the first step. And these are so important. But my friend who went to business school with me didn't learn that." (Sara earned her MBA before attending CU Boulder as a graduate student).

Jen, a student shared, "Working with Terry especially, but also being part of the BI has this way of sort of pulling you into a larger thing. Instead of me being alone at the library, I would be sitting in spaces, overhearing conversation about some large academic conference. I would wander over and ask what people were talking about and then eventually I would find myself doing my own research. And then learning how to give talks at that same conference a couple years down the line."

Randall, a student, explained, "There is this kind of a warmth in the whole community. People are quick to help and learn about your idea. I don't really have a lot of experience in other entrepreneurial ecosystems. I've heard about Silicon Valley and I've had some friends tell stories about it over there. It sounds very different from my experiences here. It's all about who can make the most money. It's very political and they don't want to help you if it could threaten their position. Whereas here, people want to help more than it's needed. It's unsolicited help just coming in all directions. And you have to have a filter to process the information and the feedback that you're getting so that you don't just feel overwhelmed."

> **"Regardless, we would have tried to create a business. But I don't think we would have known as much the avenues to get funding, the kind of connections in the Denver Startup community and small business communities. It's a burgeoning ecosystem. And the class ties you into a lot of that. I don't think we would have ever discovered those, and we would have been working on ideas in a vacuum with no feedback. I want to be a forever student tied into the local university community because it is such a great way to get embedded with the ecosystem.**
>
> **- Jamie, Student**

Andrew, a student, shared, "I think for me the coolest part is that I've been interacting with industry experts and even executives of companies. The Climb was in person, and that was a really awesome experience. I loved being around people. I got to hang out with some of my classmates who also came. And there was food."

OBSERVATION 3.3:
The CU community and entrepreneurial community mutually encourage attendance at events; but awareness of such events are happenstance.

The CU community and greater entrepreneurial community have many events throughout the year. Attendance and engagement are often reciprocated between the two communities, often blurring the lines, creating a symbiotic relationship between them. There is a sense of reciprocity and shared ownership of the whole ecosystem creating a win-win scenario for the entire I&E community. Practically, public events are shared with the university and university events are often open to the greater public. I&E events appeal to the community when they are invited, welcomed, and encouraged to participate.

I&E leaders within CU are active in the greater community by attending events, serving as mentors or research experts, and building relationships with potential partners. Participants speak about 'showing up' within the community not because they had to, but because it was something they viewed as mutually beneficial and interesting. By showing up to external events, CU leaders are situated as experts and become better known in the I&E community. Interestingly, people not only want other people to succeed, they help them do it. The spaces are incredibly welcoming and the energy is palpable. There is a collaborative, energizing nature at events.

People not only want other people to succeed, they help them do it.

Events are often shared via 'word of mouth', meaning you have to first show up at an event to find out about others. There is no cohesive website that hosts all I&E related events for CU system or within the greater entrepreneurial community. More details related to awareness and exposure to I&E are offered in Section 4.

Illustrative Examples:
Brad explained, "I've been a Techstars mentor, I go to Techstars events. I go to demo days, I try to get out in the community for people. If I expect them to come to events at the university, I probably should go to some of theirs. And that is something that most people on campus don't understand, which, there needs to be reciprocity."

Erick shared, "Our Startups to Sandwiches program, a lot of times we will have community members who learn about the event and ask if they can pop in. I'm like, sure. If we had more resources we could have a deliberate marketing effort. I would just put an Asterix there and say I'd like to pilot that and see if it's good. Because it may be that students think, who are these creepy community members here? Or vice versa."

Susan explained, "Some of it is word of mouth. Some of it is putting yourself out there in the context of active business development so that companies can find you. Whether that's through more traditional conferences or going to a trade show or maintaining a presence."

Sarah explained, "For Denver Startup Week, it's really important for us that we promote that. It is something that our students can walk to, we're going to promote that."

Matt explained, "We don't do any formal marketing to attract partners. We are fortunate that they find us. Up until the pandemic, we worked hard to build our brand as an organization by being present at, presenting at, and talking at every health tech conference and meeting that we can worldwide. That involves talks that we've done in China, Taiwan, Europe and all over the US, making strong partnerships with other universities where there are tech hubs."

Tom expressed, "EPIIC invests in community building events on campus and attracts people to campus events. All these people

that we bring in and all these events are about innovation and innovators and entrepreneurs, and people that are making things happen and changing the world."

Stephen explained, "We have other programming that we do to connect with the community and our faculty. The program is an outreach to all the mentors and innovators in the community. And those people come to join us out in the community."

While the entrepreneurial community at large is open and reputation often prevents people from stealing ideas or technologies, a counterexample is related to sensitive intellectual property issues, specifically within the health field. For example, Dennis explained how the Gates Grubstake Fund pitch competitions are not open. He shared, "It's not advertised as being open. Everybody on the committee is under NDA. If it was open to the public, investigators wouldn't feel comfortable presenting their best data. We try to respect that and make sure that they're not giving away anything."

Sara, a student shared, "I went to a luncheon at the business school. And one of the cofounders of Techstars came to talk about his experience. I think there are more connections between the community. I got the feeling that the community is willing to help each other. And I think some of the faculties at CU also go out to those incubators and help out."

OBSERVATION 3.4:
CU leverages the power of a world class startup community while also contributing to it, serving as a massive local convener.

The CU system serves as a local, physical gathering place to bring together thought leaders across the globe to discuss problems and solutions. Accelerators and incubators that serve both CU and the greater community are physically housed on campus. Industry partners and organizations may also reserve the facilities to host an event. Gatherings create networks and bring industry leaders to convene around topics of interest. Participants also express interest in creating a physical space to better serve local communities.

Participants who supported industry partnerships create annual events or gatherings to bring together people with shared interest and strengthen their field of expertise. CU staff create and lead these communities, often situating them as leaders in their field. Often on-campus events happen 'after hours' yet the costs and logistics of parking for community members and industry partners remain an issue.

Illustrative Examples:
Becky explained, "A lot of engineering projects that we support are industry sponsored. We want to provide a place for industry people to see what students are doing as well as provide nicer meeting rooms for industry people or people from the community. There's a new tech meetup that meets here and uses our facilities."

Benjamin explained, "The local accelerator called Exponential Impact ("XI") is a partner of UCCS. The University owns the building and Exponential Impact is housed there. They do cohorts of startup companies from around the country. We work closely with them in terms of programming, encouraging our students to go from here to there with their ideas that they develop in class. They also mentor them and work with them on special projects."

Bruce explained, "We had a PhD student who was one of the leaders for the Academic Industry Alliance. Through a Brews and Biotech happy hour, she got connected with someone working at a company, did an informational interview to learn more about the company. She formed enough of a relationship there, that when she applied for a position, the woman said, send me your materials, I'll pass them on to make sure they get to the right person. She

now works for that company. She didn't get the job because of that connection, but she found out about that opportunity."

Alejandro explained, "We have office space and for startups, that's one of the best ways that they can be leveraged and they can start to grow, is if they have free office space and a place to workshop their ideas."

Don explained, "Most maker spaces have had technology as their focus. I'm experimenting with the possibility that maybe we can also put some of these social issues at the center of these maker spaces. And the little conference I had was successful, but it's an uphill battle. People are really pressed for time and it's a new concept. And people are used to addressing problems in a pretty conventional way, where there's kind of a competition among organizations as to who owns a problem, who gets to be seen as the expert on it. And that's not conducive to the kind of collaborative approach that maker spaces are known for. So that was the impetus behind that. I think we could have some kind of laboratory setting for students who are interested in Social Innovation outside of Boulder. I really think it's important to get them outside the bubble and to engage people at the community level."

Matt helped to create TIN, the Tech Innovation Network, a formalized network of diverse clinical and community partners that functions as a test bed through which new technological solutions can be rapidly developed, iterated, tested and validated. This type of network situates the Mental Health Innovation Center as a thought leader and expert for startups focused on solutions related to mental health.

Silicon Flatirons' Entrepreneurship Initiative, located on the CU Boulder campus, builds the entrepreneurial community and stimulates student and faculty interest in innovation. The Entrepreneurship Initiative annually presents 10-15 public events which (in pre-pandemic years) attracts thousands of attendees to CU Boulder. Programs include the Entrepreneurs Unplugged series (interviews with entrepreneurs), the Crash Course series (workshops about building emerging companies), Roundtables (deep dive discussions with members of the startup community), and an annual conference on entrepreneurship. Brad shared, "It's what the university does well, bringing together ideas, putting it into an attractive package… I think we've done a terrific job of connecting to the startup community and bringing together people who have different disciplinary aspects in their professional areas of genius to the table. So we do have people who are hardcore coders and technologists, we do have investors, we do have people who do sales. In that way, we've done a great job of it." Roundtables often lead to reports that capture new ideas and provide thoughtful analysis that continues long after the event itself.

> **"There's a huge gap between where lots of entrepreneurs are and what it takes to be admitted to an incubator. They don't even know the basics of what they're doing. And there's nothing wrong with those people. They have just never had the education. Now they're out in the world, and where do they go to get the education? We're trying to fill that gap and then use that as a way of leveraging it to help our community and educate people."**
>
> **- Terry**

Jeff shared, "I keep thinking to myself, similar to that student run umbrella kind of organization that I was telling you about, with community facing things at CU. Why isn't that based out of a space in Broomfield or Superior? And it's co-run by CU Denver and CU Boulder to serve the whole greater metro area. And again, student led, student run. Maybe it's done through internships or course credit that they can take. Maybe it's completely extracurricular. And it's housed in, I don't know, the Bank One Center there on 36. I mean just something like that could be so cool. It's just like, how would you

do it and who's gonna pay for it? And where do the credit hours go? And you know all that kind of crap. But none of that is unsolvable. It just takes the will to do it."

Parking has come up in several informal conversations with groups on campus. The costs and logistics of parking continue to be a pain point for I&E events and will need to be addressed to have a more welcoming space for community members.

> **"It's a small thing but parking is a real challenge associated with that. And it's something that we need to be doing in facilities that make it as frictionless for the startup community to come here as possible. And I understand that runs up against some challenges that we have across campus but it's just a small thing. But if we're going to be opening up the campus in a way that's inviting, that's just a little thing we want to make sure that we're solving for."**
>
> **- Brad**

OBSERVATION 3.5:
Practical I&E experiences with community partners and industry sponsored projects help students build a network, learn valuable skills, and get hired.

Practical experiences related to I&E include working on a venture fund (Rutt Bridges Fund), at a community clinic (the Entrepreneurial Law Clinic), internships, sponsored class projects that are innovative, student projects for a community organization (Comcast Media Technical Center), etc. Students gain practical experiences, develop skills, and build their network. These opportunities are not only beneficial for students. Businesses and organizations get the chance to work with students before hiring them.

When students participate in competitions, mentors from the community provide feedback and also help students make the connection to take their venture outside of the university. During these experiences, mentors also encourage students to meet others participating in the I&E community. The participation is also cyclical - as students graduate and become alumni, they then return, supporting and mentoring students within the university system.

Illustrative Examples:
Sarah explained, "The Rutt Bridges Fund is actually partnered with the Denver Angels. Students go to the Denver Angels events. They also get to see all of the pitches that the Denver Angels are looking at and they get to invest in with the angels."

Chris shared, "The community is obviously a key stakeholder because of the partnership of us developing a talent pipeline of our students to go to the community. And the community nurturing students is huge."

Alejandro explained, "I think the best path forward is to get companies to pay our students to develop in the ways that they want to develop."

One professor shared, "I do think we need to do more to formally tie and help teams transition out of the CU ecosystem into the Boulder, Front Range, and national entrepreneurial system. I feel like we have this assumption that if teams can get through the New Venture Challenge, they somehow find their way into an accelerator program. And that might be true for the top one or two teams, but it's not always the case. I think we need some other mechanisms besides the New Venture Challenge. That's by definition a weeding out competition. And I think a lot of times it doesn't help everybody, it only helps the winners."

Robin shared, "From an industry perspective, we have strategic connections with industry, less so on the entrepreneurial side. More on the pipeline, training, they want to hire our students

or they want to do a project with us. We just did a completed project where we did a bunch of testing for some devices. There are things like that but not so much on the entrepreneurial side."

Startups 2 Students has gained increasing interest from both students and startups. Dylan described how "a lot of people were finding that traditional recruiting methods weren't serving startups and entrepreneurial students. And they wanted a different kind of format for how startups might be able to recruit. They have startups pitch their open positions to students. It's kind of a networking event, instead of a formal career fair. It was really successful."

Nathan explained, "We work with outside collaborators whenever we can. And at every turn, we make it very clear to collaborators that we're centering the students' experience. We'd love to work with you, but students are a priority. But generally, every project we're doing involves collaborations outside of the university."

Sam, a student, explained, "Startup Summer was my first exposure into the professional world. The culture was so jarring, I was unaccustomed to it. And just the aura of being professional."

OBSERVATION 3.6:
CU has to be responsive and agile in order to initially develop and manage strong partnerships with industry.

Industry partnerships often happen organically and over time as people build relationships and find mutual interests. Initial partnerships have to be formed, and then maintained by people within the system to have continued impact. Businesses may reach out to potential partners as they experience a challenge where expertise could be leveraged from the university system (mHealth, Mental Health Innovation Network). Frequently, these partnerships rely on quick, responsive action to move a project forward. Therefore, some offices have dedicated support staff to adequately respond. For example, a legal representative, business development, and industry liaisons may be staffed within departments or certain projects may get fast tracked through the IRB (Institutional Review Board) process. Offices who do not have dedicated staff are limited in industry partnerships and have lost contracts because of the bureaucratic nature and slower pace of the university system.

Illustrative Examples:
The mHealth Impact Lab is an incubator for innovative, health technology and disease management initiatives based in the Colorado School of Public Health. They work with various researchers, clinicians, and enterprises to validate and test digital health solutions within communities.

One program director explained, "For legal, we have dedicated legal resources that sit within our office to help us evaluate contracts and deals relatively quickly. And I think the challenge has been really carving out portions of these different entities of these groups to focus on innovation activities that help us move at an industry pace. If we don't have the industry pace or speed, we will lose opportunities to other institutions just because of the bureaucracy of the system. That is a challenge across many different innovation groups in terms of getting things through."

One program director explained, "It's key to be administratively agile and that's something we're working really hard at CU Denver. They're aware. There are a couple offices you have to work with when you're doing grants. And it's the Office of Contracts and Grants. And they really struggle meeting our needs. The other part is IT infrastructure. If we get an NSF grant, they have a lot of requirements for how their data needs to be stored and managed. And we're not exactly all set to go in that. There's still a lot of accommodations that need to be made on our campus."

A researcher entrepreneur from Anschutz shared, "I wouldn't say that it's super easy to work with industry partners. For research studies, there were a lot of hoops to go through to be able to use their platforms. Shared data became very labor intensive. It took us almost six months to go through the process of getting everything set up to actually be able to implement the research study."

One professor and researcher shared, "I have had conversations with some large companies about this idea, because a lot of them are recognizing that internally, they're not innovation engines. They're losing that capacity. And there are a lot of interesting ideas being generated at academic campuses. But there are lots of legal challenges with that domain. A big company comes to us and says that they should own all the intellectual property. When I talked to the Chancellor about that, he's like yeah, no."

Bryn explained, "Early and regular outreach is the theme. We have a dedicated role that we call a Business Development Executive. That's her main function and she builds hundreds of contacts every quarter. And those are specific targets for companies that are working in the industries and verticals that we're working in."

A researcher entrepreneur from Anschutz shared, "I wanted to create my own mobile application. I went to these companies to try and develop an app exactly the way that I wanted. It was going to cost half a million dollars, so that wasn't an option. So how do we still create a good product, but it's not exactly what you want it to be. The hurdles of actually getting them on board as a vendor were substantial. That was a very labor-intensive process."

Dennis explained, "One of my colleagues had maybe 35 meetings with companies where she took a slide deck to introduce them to all of the technologies within the Gates Center. She's doing some matchmaking out of that. She's very much the mover and shaker that goes out and comes back with potentially good matches for certain projects."

One program director expressed, "I think that these models need to be more mainstream. In terms of how we approach funding and how we approach staffing and executing our work. But more importantly, I really believe that universities generally, not just CU. The university is, by and large, still for the most part, engaged in solving societal level problems in the wrong way. And I think we miss a lot of opportunities because we're awfully self-serving. And again I'm saying we, meaning higher ed in general."

One program director shared "Legal is a disaster. No offense to any attorneys that we have. Everything is slow. We have the same fights over the same issues. Every single contract that we go through goes back and forth about indemnification and location of conflict resolution. And we always come to the exact same resolution, which is changing language and our agreements to go match theirs. Why aren't we doing that in the first place? Why don't we start there with contracts? CU Innovations has been successful in speeding up the IRB approval process, which is paralyzing slow. And when we have a company that says, we're ready to do the study, we need to do an IRB submission and we'll be back in touch in three months. And they're like, we can't wait. We're ready to do this now. And we've got to move this product along. Frankly we've lost contracts because of the slow pace with IRB approval."

OBSERVATION 3.7:
A coordinated strategy is missing to develop industry partnerships within individual campuses and between them.

There is no coordinated strategy to develop industry partnerships across the CU system or within individual campuses. While one office or department may maintain a list of industry partners, no organized list or customer

relationship management system (CRM) exists to keep track of all partnerships across the CU system. Having no real, cohesive agenda minimizes the impact that these partnerships can have and may weaken over time as staff turn over. Participants perceive they are missing out on financial and partnership opportunities that could have a positive impact on students.

Additionally, as stated earlier, partnerships are created organically and then developed with intention. However, these seem quite disconnected from Advancement. More details on the I&E relationship with Advancement in Section 5. There is also an opportunity to leverage existing intellectual and social capital on campus. It can be very challenging for people to find expertise and partners to collaborate within the CU system. For community partners, it can be even more challenging.

Illustrative Examples:
Chris explained, "We have relationships individually with industry. We all have our individual touch points, but I don't think we have a great strategy. For example, here's the top three accelerators that we're going to work with. I think we have a lot of work to do. We could have a simple contact management plan for our key people. We have several organizations listed on our mountain chart, but do we have a relationship with each of those people? Someone does. But how do we get them into this repetitive list to share opportunities with community members in a co-working space, an accelerator, or venture capitalists. We could invite them to attend events. We all have our relationships, but a coordinated strategy isn't there yet."

A researcher entrepreneur shared, "It is challenging to identify an industry partner. MHealth Lab is getting better at this as we are learning more about system developers, we're learning more about hiring grad students who know how to code and can create a small mobile app for us, versus something that needs to be large and integrated and speak with our patient portal. I think we're getting better at trying to figure out who you can go to. But as a junior investigator trying to develop something as part of my career, it was really hard to find someone to partner with and do that work."

Don explained, "I've been approached by maybe two or three people, largely as individuals. But we don't have any real industry contacts. Aside from the internship opportunities we set up for students. Those are about the only ones. But we could really improve by building stronger ties to nonprofits and groups in the public sector. We just don't have that yet."

A faculty entrepreneur explained, "I do some consulting work if it gets written into an NIH grant. If it was an industry partner coming to me asking for consulting, I wouldn't know the process. I would love to do that."

Referring to a Design Innovation framework[75], Kris shared, "An aspiration I have is that we connect much deeper with external partners. Our program is meant to be an external partner program. In my former place, because of the way we set it up, we had over 120 partners, public and private, also NGO. And it has that potential here in the Colorado region, and has the potential as we spread it across the US." He continued later in our conversation sharing, "I've found in my career, for every 10 touch points that you're doing to network, one usually takes off. But you've got to do the 10. And that means if you want partnerships of 100 you've got to do 1000 touch points. And that takes time and resources to do that."

Bruce explained, "We have a lot of intellectual capital on this campus. There's a lot of job-need out in the surrounding community. So how can we be Matchmaker for those two entities so that students and early career scientists who are thinking about transitioning

[75]Lauff, Carlye & Hui, Wee & Teo, Kenneth & Png, Sabrina & Swee, Amanda & Collopy, Arianne & Vargas, Brandon & Wood, Kristin. (2021). Design Innovation (DI) Methodology Handbook - Embedding Design in Organizations ISBN: 978-981-18-1207-1.

to industry, are in a position to really identify those opportunities, build those professional networks, and establish those strong connections between our campus in the Colorado bio science community."

Dylan suggested, "I think there's much more opportunity to engage startups in general. Traditionally startups have thought of career services as being stuffy or universities as being stuffy or being too bureaucratic and too many levels to be able to consistently engage and effectively recruit and navigate. On campus, as a whole, I'd love to see more engagement of our startup community and our existing business ecosystem outside of CU, within the startup culture and entrepreneurial culture and innovation culture at CU."

Stan described, "I think we're missing the mark connecting to industry. I just recently had a conversation with our advancement person about this. And that's what they do really well. We're not tapping into industry at all. And if you think about the workforce pipeline shortage, you can't find people to work. And when businesses are looking for people, they're looking for problem solvers, the entrepreneurs, the hard workers, the go-getters, And that's exactly what an NVC student is. We should be talking to those companies and asking them to sponsor our events and then put them in front of our students."

OBSERVATION 3.8:
Partnership stories are not well known, and could be an opportunity to better share CU successes. Below are a few examples.

Incredible partnership stories were shared by participants during the interviews. Below are just a few of those stories highlighted. Increasing awareness will be discussed in detail in section 4 of findings.

Illustrative Examples:
Susan described, "We work with industry partners and community partners who might also have needs that they need to have tested and they're looking for somebody to help conduct effective and rigorous evaluations. And that ties in pretty closely to some of the work that we do with CU Innovations and with the Care Innovation Center. In some cases, we will help conduct feasibility testing or user acceptance testing. We will help design research projects for those teams, and implement trials, with the idea of looking at initial advocacy and also working towards bringing solutions to scale."

Susan described another example of a community partnership: "An example of a community partner is with True Community Care in the Boulder Valley area - their hospice service. Pre-pandemic, they had this vision for integrating telehealth services into their hospice care delivery. The timing was really quite amazing because we finished the project before the pandemic began. We worked with them on helping to figure out how to evaluate the project that they wanted to do. They wanted to use telehealth and video services, tablet-based and mobile technology to facilitate better hospice care for people, which includes some people in fairly rural areas."

Kelsie shared, "We did Design Sprint's with citizens of Westminster. They were empowered by the city manager's office. Their whole goal was to improve and develop the city's strategic plan. We had them interview other citizens, and we made them take their ideas and get feedback from the citizens. So that was fascinating."

Kelsie shared, "We just ended a community partnership with the Common Sense Institute about homelessness. We got to interview homelessness providers, individuals experiencing homelessness, and individuals who previously experienced homelessness. We put together this report with recommendations based on the design thinking process. What were those leverage points that we found that if you use these, you could make big impacts? Whereas maybe some other smaller leverage points you wouldn't have as big of an impact."

Matt shared, “When we started engaging with this company, they had a line of business using virtual reality to treat a variety of conditions, mostly anxiety disorders and phobias. We helped them develop content and figure out, if you want to treat fear of heights, here’s what it should look like. And then they would build it and film it and do all those things to create the VR experience. We advised them that might not be the best space to be in for a couple of reasons. One is that it’s important for the people that have those conditions, but from the standpoint of payers, policymakers, and providers, if you’re afraid of heights just don’t stand on the edge of a parking garage. Because we have people with serious mental illness, bipolar and suicide - those are issues that we need to attend to. The second reason is that there’s a number of VR companies that are getting into that space and there is a lot of competition. And we really think that there’s a need to address some of the more pressing issues with mental health. Specifically with waitlists for people who want to make an appointment to see a therapist, but they end up having to be on a waitlist for 2, 3, 4, 5 months because nobody has openings. And that’s a long standing problem in the field and it’s gotten a lot worse as a result of the pandemic. They completely pivoted away from VR and developed a Cognitive Behavioral therapy based app that has a chat bot and things integrated into it, aimed at late adolescence, and eventually early adulthood. We helped them develop and create the content for that and helped them do their early trials. They could get preliminary data to help them with their fundraising. We met with a number of venture capitalist’s. When they were pitching this, we would fly out to the Bay Area and meet with them and the VCs, so that we can show those VCs that they were actually engaging with subject matter experts in the university who were going to give the investors more confidence in their ability to succeed. They then decided to go that route of the FDA approval process. And so we’re helping them do that.”

Theo Edmonds, the Associate Dean for Transdisciplinary Research & Innovation for the College of Arts & Media at CU Denver partnered with Energize Colorado and others on a project to develop and validate the Small Business Resilience Index (“SBRI”). The SBRI helps understand the social and business challenges small business owners face and to increase the capacity of small businesses and the state of Colorado to thrive in the face of environmental and cultural shocks and shifts, such as the COVID-19 pandemic.[76]

[76]Energize Colorado. (2021, December 8). Small Business Resilience Index. Retrieved April 29, 2022, from https://energizecolorado.com/sbri/

Additional Considerations and Challenges: Campus, Community, and Industry Partnerships

Retain innovative faculty. Faculty innovators find it challenging to prove that innovation is valued from a broader campus and cultural perspective. One faculty shared, "I know industry is very interested in what we do. And we have interest there. You keep wondering why you are hitting your head against the wall. So I think the university is a wonderful space to be innovative. But if more people don't realize the value of what we're doing, within our own departments, it gets challenging to keep that up."

Students are not always clear about the value of mentorship or attending events with community members. Adam, a student shared, "It took me a long time to know that I needed mentors. Everyone says it. But what does that actually mean? You don't know what you don't know." Another student, Gabriella, explained, "I wish more people would have come in and shared their stories outside of class. But I also don't know that I would have gone. I think if I had had a clearer idea of what I wanted to do and why these things were relevant, tying it into pathways would have helped me contextualize different options. When I was 18, 19, 20, if it wasn't tangible, I just didn't understand it yet."

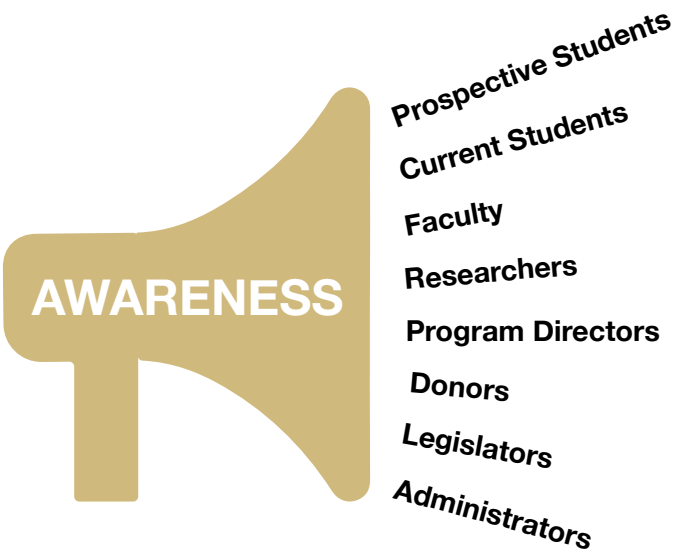
CU has the potential to incubate new entities that serve people off campus. Brad shared two examples connected to Silicon Flatirons at Boulder, specifically with Startup Colorado and the Blackstone Entrepreneurship Network (which was initially created as a private-public partnership between the state of Colorado and private donors). Brad shared "The university can be a catalyst for attracting money that can support new efforts. With BEN Colorado we were a catalyst for that because we could convene the people in Colorado and the Blackstone Foundation wanted to make sure people were around the table. The university can be a convener and can be attractive for a foundation or a grant making entity. In addition to the convener function, there's a legitimacy function the university can provide. We put some reputational capital on the line and that can be attractive. We can lower the costs of a new venture because we have certain infrastructure here that it can ride on. We're already a nonprofit. Silicon Flatirons has certain functions already in place and this can be really win-win. There's economies of scope that once you're incubating something like BEN Colorado, you know staff members that are there can be helpful in other parts of university entrepreneurship, and it really does increase our connectivity to the campus in some important respects."

CU aligns with greater entrepreneurial ethos. I&E leaders, faculty, staff, and students connect one another to opportunities if they are aware of other resources/people that could benefit a student or faculty business. Jeff explained, "One of the things I love about our ecosystem here on campus is that if somebody walks into Brad's office and says, hey. I've got this Arts kind of thing. Brad will be like, you should go talk to Jeff Nytch."

CU could gain sponsorships to fund time limited initiatives. Alejandro shared the Comcast Media Technical Center was a partnership developed to provide soft funding for the center, with the goal to eventually be self-funded once they generate enough revenue.

SECTION 4: AWARENESS OF INNOVATION AND ENTREPRENEURSHIP

Section Four includes findings related to awareness, marketing, communication, and storytelling within innovation and entrepreneurship. Awareness is discussed throughout this section, specifically referring to the knowledge of I&E programs, which can vary based on audiences. Various audiences include prospective students, current students (undergraduate, graduate), faculty, researchers, program directors, donors, legislators, and administrators.



There are more opportunities to enhance awareness of I&E within the CU system and beyond the I&E community (those outside of existing I&E). It is common that students and faculty are unaware of existing I&E opportunities, though this varies by discipline (some disciplines were more aware and commonly engaged, more so than others). Marketing efforts are often dependent on capacity and rely heavily on existing I&E marketing channels such as email listservs, classes, and related events.

Participants specifically highlighted opportunities to increase awareness, participation in, and improve entrepreneurial experiences for underrepresented groups, such as women, racial minority groups, socio-economic groups, LGBTQ groups, and first-time in college groups. These underrepresented groups, among others such as first time entrepreneurs, may not identify with the terminology of 'entrepreneur' or even 'innovator' and should be taken into consideration to improve future marketing and communication efforts.

CU startups help the Colorado economy by creating jobs, bringing in financial investors, and solving problems. There is an incredible opportunity for better storytelling regarding the impact that I&E students and faculty have in Colorado and beyond. Most people within CU and outside of the CU system are unaware of the incredible successes of CU startups. Below are the main sub themes of Awareness of Innovation and Entrepreneurship.

Observations Shared in this Section:

- 4.1 The majority of the student and faculty population are unaware of innovation and entrepreneurship opportunities on their campus. The classroom currently appears to be the best place to market such events for students.
- 4.2 For innovation and entrepreneurship efforts to continue, a larger pipeline is needed for aspiring first-time entrepreneurs and innovators.
- 4.3 Marketing outside of existing I&E communities requires additional bandwidth; most marketing efforts are focused within existing I&E.
- 4.4 Am I in the right place? Opportunities to participate are initially difficult to find, especially for people less familiar with I&E. There are densely networked systems and opportunities are highly visible once the initial steps are taken.
- 4.5 Innovation and Entrepreneurship within the CU system is strong, but disconnected.
- 4.6 CU has an opportunity to support more diverse student and faculty entrepreneurs.
- 4.7 Students and faculty may not identify with the term entrepreneur or being entrepreneurial.
- 4.8 CU has a huge opportunity to tell our story, specifically the impact CU entrepreneurship has within Colorado and the world.

OBSERVATION 4.1:

The majority of the student and faculty population are unaware of innovation and entrepreneurship opportunities on their campus. The classroom appears to be the best place to market such events for students.

Participants commonly perceive that the majority of students and faculty are unaware of I&E opportunities to engage on their campus. This presents a challenge to increase the pipeline of potential innovators looking to take their ideas forward and is part of a greater challenge to make a large campus system feel small. Broadly speaking, overall student engagement has decreased since the Covid-19 pandemic and student engagement will likely be a challenge moving forward. For students, the classroom was a common place to find out about opportunities. It was unclear how these opportunities were marketed in classes, which classes were marketed to, and how these were initiated (it seems there is no intentional strategy and that these tend to happen randomly based on individual relationships). Those who do find out about I&E courses often find out late in their college journey, often in their Junior or Senior year. Findings showed the most common methods for students finding out about I&E were classes, word of mouth (referral from someone on campus or flier), email, or having a personal invitation from a friend.

In addition to the classroom, academic advisors were found to play a role in marketing I&E coursework to students who may be interested, but unaware that such coursework exists. However, this is heavily reliant on advisors being aware of such opportunities. Sometimes, advisors may need to articulate the value to students or help students connect their interests to innovation and entrepreneurship when there is alignment.

It is also important to note that awareness of I&E opportunities for faculty are stronger in certain departments. There is also a disconnect or little awareness of Venture Partners at UCCS

(there was not enough data collected at CU Denver). Faculty awareness not only impacts the student experience (connecting students to I&E) but also in how faculty might benefit from these resources.

Illustrative Examples:
Cathy explained, "We're quite embedded, but the average faculty doesn't know that any of this stuff exists. Our messaging is poor. And I'm saying that writ large CU, whatever campus you're on."

> **"My initial exposure to entrepreneurship was frankly just luck. The professor I worked with during my master's was very in tune with patents and startups and innovations."**
>
> **- Faculty Member at Anschutz**

Stan shared, "The communications part I think is the crux. The New Venture Challenge is in its 15th year. And yet, a very small portion of the university, especially the students, even know it exists. And there's $150,000 dollars in prizes. It's a big deal. But very few people know about it."

A faculty entrepreneur at Anschutz explained how they initially learned about CU Innovations. She shared, "Someone came and gave a talk at one of our faculty meetings. They said, if you think you have something, or if you want to run something by us, don't just assume this is not of value. Here are the steps. Fill out this form, share an idea and then go through this. We have a faculty meeting every month. Having somebody come in and give a talk like that, I think it would be very, very valuable. It gets people to think, maybe this is something I could be involved with. So many professors and researchers feel like patents are beyond them or it's not in their immediate grasp."

Benjamin explained, "Students learn about the Bachelor of Innovation from a friend or family member, an online search, or a community event." He goes on to describe the relationship between students and advising. He shared, "If you're a student who doesn't get as much advising, you're less likely to come into our program. Because you need to be more aware of it. We're one of a kind and it requires some degree of education or sort of training on what we offer and why that might be a good choice for them."

Bryn explained, "There's a fairly strong culture amongst our faculty to know that we are the campus unit to work with and that varies by department. In some departments, it's very strong. We work with just about all the faculty in mechanical engineering, for example. And other departments, we really have to work to make sure that our resources are known. I think that's an opportunity actually."

Don explained, "My sense is that most students learn about the social innovation certificate through advisors. If advisors aren't well informed about your certificate, students likely won't find out about it. My guess is that advisors play a really critical role in getting the word out. We have a website that students can kind of accidentally stumble upon. But I think advisors are the real gatekeepers."

A faculty entrepreneur from Anschutz explained, "I think that unless you seek CU Innovations out, you don't know very much about it."

Delaney shared, "I think looking at building out CU's own ecosystem map that we can all look at to see who's doing what, where, and why and how, with our own bios, which would help make sense of things. And bring people together in terms of a one day event, who are across campus, who are working on these things and go through the design thinking process so that we start to answer questions for each other and problem solve together

around what can be done better. That would be really fun. And it would put those people leading things through some of the very things that they deliver and support themselves, which is great to go back to once in a while."

Carolyn explained, "I think that there is a way for the college to expand and provide some mini grants and opportunities for students to say, I came up with this idea. I started to work with a team in class. I want to pursue it. When they take our course, they want to keep going with their idea. But, how do I do it?"

Brad shared, "With respect to the student side, I don't think there's any way around it, get it into classes. Ideally, get professors to give you five minutes to make an announcement and encourage people to come to an event. Explain to students why they should be there, what might happen and just make sure they feel invited. That is, to my knowledge, still the most powerful way to get students to come."

Dipika shared, "One challenge is people knowing that we exist. And people not knowing, or realizing that there are resources on campus that could help them flush out their ideas more."

Becky explained, "I met with one of the Chemistry faculty yesterday about trying to figure out how to get STEM students more exposed to what we do here. And literally, their chemistry lab is two doors down from our entrance. They share a space and I don't think we see many of their students wander in almost ever. There are these barriers."

Noah, a student shared, "I literally just saw the email invitation that was sent out for Design Horizons. It looked interesting because they're not looking for business students, they're looking for people from different colleges. I want to at least use it as a learning opportunity." This student had not heard about any other I&E opportunity on campus, outside of that single email invitation. He was attracted to it specifically because they were looking for students outside of business.

Adam, a student, shared, "The professors were probably the most common way I became aware of innovation and entrepreneurship outside of class."

Sam, a student explained, "I got an email in my inbox that was titled Entrepreneurial Startup or something. It sounded interesting. I bet these people know some stuff."

Jamie, a student shared, "I got connected to the Rutt Bridges Fund through an email distribution as an MBA student. I'm interested in entrepreneurship, and I was like oh my God, this is amazing. This is exactly what I want."

Janet, a student taking a Bioentrepreneurship course, shared, "I was really shocked that we even had this opportunity and I feel like a lot of my peers didn't even understand what it was or understand why they should take an elective like that. Because if you don't have any entrepreneurial background you'd be like, why? How is that relevant to my future as a doctor?"

OBSERVATION 4.2:
For innovation and entrepreneurship efforts to continue, a larger pipeline is needed for aspiring first-time entrepreneurs and innovators.

In order for I&E to have a greater impact - economically and socially - a larger pipeline of aspiring entrepreneurs and innovators is needed. According to CU Facts and Figures[77] CU system supports a total of 66,872 students and over 4,000 tenure-track faculty. However, only a small fraction of students and faculty are aware of, and/or choose to engage in entrepreneurial or innovative activities. There is a need to build a foundation where students

[77]CU system (2012). CU Facts and Figures https://www.cu.edu/cu-facts-and-figures#:~:text=In%20fall%202020%2C%20the%20total,the%202019%2D20%20fiscal%20year.

and faculty have easy access and exposure to what is offered across the CU system.

As I&E builds awareness and there is a larger pipeline of aspiring entrepreneurs and innovators, new and existing programs, as well as funding will be needed to support the expansion efforts. However, as a larger number of faculty companies form, CU will have greater likelihood of a return on their investment. Additionally, both technology transfer offices currently operate in the black, or are seen as profitable. The teams at the technology transfer offices are strong and have proven success, making investment in faculty and researcher entrepreneurship less risky for the institution. As the pipeline increases, more support will be needed to develop faculty and students who may be engaging in entrepreneurship for the first time.

Illustrative Examples:
Cathy shared "I think everybody would much rather jump to that next level, which is more fun. But I think we need to build a foundation first. And help support people, particularly women and underrepresented groups that really don't even see entrepreneurship as an option."

Terry shared "You need to have a very fat pipeline. And the Bachelor of Innovation feeds a lot of that pipeline."

During a class observation, one of the researchers asked several students what interested them in taking a course focused on innovation. While there were a couple standard answers (I needed to take it for my major/ minor), most students shared that they wanted to learn how to make positive change. For example, one student shared an idea that he had, but admitted that he did not really know the resources on campus to move the idea forward, even though he was participating in an innovation-specific class. Though the faculty member may discuss these opportunities towards the end of the class, it shows how important it is to share opportunities (sometimes multiple times) so that students can know what options they have to validate their ideas and take them forward.

Nathan explained, "I think more relationship building is needed. A lot of people are coming from the humanities or social sciences or an artistic perspective. And they're not used to thinking in entrepreneurial terms for good reason. We don't need everybody to do it. But at the same time there are people in my college who have been doing research on accelerators and who have been building their own businesses on the side out of their research work. There are certainly students who are interested in this stuff, who want to go deeper and would be great candidates for the New Venture Challenge. But they're just not getting the encouragement to do that. And those are the kinds of cases where it's making sure that the exposure is there, and the relationships are there. And people know who to go to."

Demetria explained, "What would help is having a very clear connection or liaison whose responsibility is to build the relationship with all the respective schools and departments, as well as all of the CCTSI[78] affiliates. And the CCTSI program goes beyond CU. So those people are partners with our CCTSI on campus, which makes them eligible to participate in the I-Corps program."

> **"Awareness is the first issue and that can be solved more easily. There probably needs to be outreach from the system to the branch campuses saying people in Boulder know more about this area, and these resources are available to you. And here's how you can get started or here's where to turn."**
>
> **- Benjamin**

[78]Colorado Clinical and Translational Sciences Institute at Anschutz Medical Campus

Brad shared, “The 3-week sprint idea is in the same bucket as a startup weekend, where it’s a meaningful experience, very time limited. I think those are things at the top of the funnel we should look for to provide meaningful, hands-on engagement and experiences that get people aware that if they want to go further, here’s what else we have. But that helps solve the problem of making people aware that they are in a community, and on a campus where there’s a pretty rich set of resources and opportunities available.”

Cathy suggested, “We only have a handful of people on each campus in our tech transfer offices. And we have thousands of faculty.”

> **“I definitely would be very interested in getting involved in more programs. But I don’t know of any.**
>
> **- Janet, Student**

OBSERVATION 4.3:
Marketing outside of existing I&E communities requires additional bandwidth; most marketing efforts are focused within existing I&E.

Marketing I&E opportunities is more strategic when there is a role dedicated to these efforts. In these cases, consistent branding, messaging, and redundancy (multiple emails and reminders) were leveraged. Capacity and bandwidth to market was limited, and sometimes even a frustration among participants because it was beyond the scope or expertise of their role. Marketing efforts often happened within existing I&E circles, meaning I&E events/opportunities were marketed to people who are already participating in the ecosystem. While this may make sense in some scenarios, they do little to introduce and engage new students and faculty into the community. A better, consistent, and collaborative marketing approach may not only improve new student and faculty participation in I&E, but also fundraising and advancement efforts.

Illustrative Examples:
Karen explained, “I promote the hell out of it. I just run around like crazy. And any email list I can get on. Any classes, I guest speak at classes. NVC is a very good advertisement channel.”

Sarah shared, “We repeat everything. Anytime we’re promoting something we repeat it so many times. Not everybody’s in one place and it’s that repetition and redundancy that I think gets the message across the most.

Benjamin explained, “Could we advertise more in traditional media? The answer is yes. Do we do much of it? No. One of the challenges is that we don’t have a whole lot of extra bandwidth. So if we were to increase enrollment 20% in the spring or the fall, we really wouldn’t have enough people to teach the classes, or even the space to teach the classes in. This is sort of related to the broader vision of, if we had a school, if we had a building, it would allow for the growth we want to initiate. But what comes first? Do you grow and burst at the seams or do you try to plan for the growth and do it in more of a responsible way? Or is it all the above?”

Becky shared, “We often think that we have a marketing problem, that people don’t even know that we exist. And we try to work on it. But we also don’t have that much capacity to actually build that.”

Luke shared, “It would be great if the Venture Attractor had the resources to scale and expand its marketing. The program is intended to work with international ventures in human performance, health innovation in sports and outdoor clusters. And I do not have any experience in international marketing, other than the one class I took in college. I would really like help scaling to reach that international audience so we can bring them to Colorado Springs.”

Jeff explained, “We promote our events through multiple channels. Through the RIO office, through the New Venture Challenge, to Silicon Flatirons, to the Deming Center. Those are really our channels for promoting the class. And then I go and pitch it to a lot of different classes.”

Chris shared, “We need to be the umbrella that makes sure there’s consistency in brand delivery, in advancement, and in fundraising. And we’re not quite there yet.”

Dennis explained for the Gates Grubstake Awards, “They advertise in different ways. We send out announcements through emails, there are posters on campus, there are deadlines for submitting proposals, etc. As a result of that, we’ve had many more people apply now that CU Innovations has partnered with us and made everyone in this area aware.”

Dylan shared how he encourages student participation in Startups 2 Students. He shared, “I do small marketing to business and engineering, and it just gets out really quickly. But in arts and sciences, I do heavy intentional marketing and it’s still hard to bring those students in. I have a variety of marketing methods that I use for every kind of program. I&E uses all their marketing channels, whether that’s a newsletter or website, or email blast, whatever they have. They advertise it at events, too, to NVC students. And then I also get it out through newsletters on campus. So Arts and Sciences has a newsletter that I’ve gotten it through, engineering has channels, business has channels. I leverage all my relationships on campus to get the word out to students.”

Luke explained, “I want to use social media and networking events through the community to highlight some of these businesses in the Garage. We actually just met with a local news channel and they’re going to do a weekend spotlight on some of our businesses.”

Kelsie shared, “I think resources for marketing are always strapped. It tends to be a last thought because you have so many other things that you’re trying to get to. Our biggest driver has been word of mouth. Like one hundred percent, students telling other students. And what we saw after coming back after Covid is that none of our students are here anymore. They all graduated. Now we’re having to re-engage the population because we don’t have that kind of word of mouth anymore.” Kelsie continued, “students tell me they don’t check their email. So you send out mass emails, but they don’t read them… Marketing is really hard.”

OBSERVATION 4.4:
Am I in the right place? Opportunities to participate are initially difficult to find, especially for people less familiar with I&E. There are densely networked systems and opportunities are highly visible once the initial steps are taken.

The CU system has a strong ecosystem. However, events are scattered among different departments and are difficult to find, even when specifically seeking out I&E opportunities. It is challenging for students and faculty to figure out where to start, if they are in the right place, or which opportunities are for them, based on where they are at in their entrepreneurial journey. Participants relied on ‘word of mouth’, meaning students and faculty will talk about their experiences and share with their peers, along with presentations and traditional marketing efforts.

However, students and faculty seek out roadmaps or pathways to take their idea and make it a reality. While sometimes known to the I&E program directors, this is often not communicated to participants or gets lost in translation. Students and faculty want an exact pathway to show them the steps they need to take toward a successful venture. While these steps are often ambiguous and individual to each company/entrepreneur, having sample pathways may help improve entrepreneur confidence and sense of direction along the way.

Once students and faculty become involved in the ecosystem, opportunities are more apparent. There is a palpable energy and community feel within the ecosystem once breaking into it. Even when students or faculty find themselves in the 'wrong' place, they are usually directed on where they can go that would be most appropriate. Those who are already embedded within the community help newer people acclimate and navigate where they can go to develop their business or idea.

Students who are more attracted to entrepreneurship are often those who have already been exposed. This was not only a perception by directors, but also confirmed when interviewing students. In fact, several students who interviewed had family members who were entrepreneurs and disclosed this without being asked. Similarly, faculty creating new ventures were more often than not, working on their second or third (or more) business.

Students who are already familiar with I&E are easily persuaded to attend such events, once they become aware of them. These students already see the value that innovation and entrepreneurship can bring to them. Students without prior knowledge or exposure to I&E are less likely to participate in voluntary workshops outside of their major coursework because they do not relate to or identify with the language of innovation, entrepreneurship, or business. These same students may even find some of these spaces intimidating. Language and identity are important considerations when marketing and offering courses and co-curricular opportunities. Perceptions related to entrepreneurial identity from both the student and faculty entrepreneurs varied drastically. More details related to the entrepreneurial identity are offered in Section 4.6 of Findings.

> **I thought, *It's not for me."***
> **- Faculty Member at Boulder**

Illustrative Examples:
Researcher Observation: Researchers combed many websites and search engines throughout the year to find offices, departments, people, and events related to I&E. Even though the researchers were both familiar with higher education and I&E, these were often difficult to find. Since we found it challenging to find relevant I&E resources, students and faculty seeking those resources may also feel similar. CU Boulder is a notable exception, as the I&E cross-campus initiative has a website that lists each I&E event across the entire campus, regardless of which department or group is hosting the event. A cross-campus events page allows outsiders to easily find ways to participate and engage in I&E on campus.

Demetria explained, "I think our campus understands and is willing to invest in innovation. When we talk about the infrastructure, I think the ability to ensure that it is a streamlined process and that everyone has access to that process, that's where we absolutely could benefit from a lift. Oftentimes, when folks have ideas for innovation, the story that I hear time and time again is they sort of found the people that they needed to connect with by accident. They really don't know who to go to if they have an idea. That's not to say that those folks are not in place, because they are. But the accessibility, and just everyone being aware of not only that they are there, but what they do, is where we absolutely can do a better job."

Janet, a student shared, "I understand the majority of the concepts we're talking about in class. But how do you take those forward? And what are the actual steps, like physical steps, that if you have this great idea, where do I start right now?"

A faculty member at Boulder explained, "The website said the program was focused in engineering, and medicine, or something. I thought, *It's not for me.* And then getting the

nerve up to call one of the directors there and say, do you think they'd let me in? And then the director said, of course. Yes, we need you. There are all these support systems in the university, and you don't know about them. Finding Venture Partners has been this perfect fit. I didn't know these things existed. I thought when you started a business you're just out there spinning around on your own and it's not that way. There's a support system. I remember thinking, this is too good to be true."

A faculty member at Anschutz shared, "My first meeting with CU Innovations was pretty introductory. I had almost no idea what I was getting into. It gave me a sense of pathways that I would need to go down, the first one being to look at whether the university would take on the IP to support it or not."

> **"This is too good to be true."**
> **- Faculty Member at Boulder**

A team of physicians at CU Anschutz participated in customer discovery to understand how innovation is cultivated among surgeons, medical students, and bioengineers. In the early phases of their research, they found that there is a need to widen the on-ramp to support surgeons in the innovation process, that there was little knowledge of innovation resources on campus, and that it was difficult to navigate.

A faculty entrepreneur explained, "When I was first accepted into the tech transfer program, I wish someone said, here's what can happen down the road. After you get your patent, there are programs to help you get your company set up and you can join other programs. That could have helped a lot. For a while it was just me thinking, well, what do I do now? And then stumbling around a bit until I heard about another program."

Daria explained coursework and language within the Engineering department by sharing, "When we had entrepreneurship as part of the course title, the numbers were super low." The department later adjusted to 'Engineering for Social Innovations" to increase the number of students registered for the course. Participants continually grappled with which language would be best to engage diverse students and students who had little or no experience with entrepreneurship.

A faculty entrepreneur from Anschutz shared, "We are working on building a pathway for faculty and trainees to show that there's an early stage, a middle stage, a later stage, and then there's commercialization. Each one of those stages requires different types of skills and different data generation and different understanding of certain milestones to move to the next stage. And it's like any project. If you start over here, and you see something in the distance, unless you understand how to get there, stepwise, it seems overwhelming. But it really is a series of steps that you go through to move yourself further along."

A student from the Bachelor of Innovation described, "I met this other student and I was telling him about my business. And he invited me to come check out the Garage Open House. I was like, what is that? Never heard of it before. I showed up and immediately was starry-eyed. Like I need this program."

Carolyn said, "What I would really like to see is some way to create this pathway. A pathway to help students understand what this looks like, and what different skills are involved with innovating in this field, as well as being a social entrepreneur. And then creating a program that could also be open to the public. I do believe that there would be a lot of benefit to that both internally as well as externally within our community."

Gali shared, "There's two main categories of faculty members. There's faculty or researchers or students who know what kinds of questions they want answered, the lingo, and what they're looking for. They can find something quickly on the website. And there's faculty members or students that don't know what questions to

ask. And don't even know where to start. So, a navigator that helps them understand what they are trying to do and puts them in the right direction."

Luke explained the student path at UCCS, where students may start at the Entrepreneurship Club and end up in the Garage, which requires an application process and students get to work more closely with experienced entrepreneurs. He said, "Anybody interested is welcome to join the Entrepreneurship Club. We want to use this club as a way to help students form their ideas and get them to a point where they can then apply for the Garage and be accepted."

Researcher Observation: One researcher attended an introductory session for the Ascent Deep Tech Accelerator in Boulder. A faculty participant asked, "Am I in the right place?" Because this particular faculty member was already known by the facilitator, the facilitator could quickly answer yes - they were in the right place. However, the participant was not sure and had to ask during the session to confirm.

Becky explained, "We get these random inquiries here and there from the Communications department or from an English professor. They found out about us through some kind of grape vine of people."

Susan explained, "Mostly people learn about the program either through traditional word of mouth or presentations. People find us because they're looking for help in this specific topic area. It's something that they're interested in getting into. And they don't know how or if they need help with it. And so they start searching for resources and our website pops up."

Dylan explained, "In person experience, especially for the startup and entrepreneurship community is important. And networking with people in person is important. The informality, excitement, and inspiration of startup events in person is really important. You feel like you leave the events so hyped. The virtual events are still great, but not quite as strong."

Benjamin explained, "I do the incoming freshman orientation. I'll speak to students about why innovation is important and how it's a way for them to change the course of their life."

Dennis explained, "When it comes to the CU system, anything that is related to informatics in any way is a barrier to entry. There's a lot of different spaces on campus that are doing something with some form of informatics. And sometimes people get confused about what that means and where to go."

Thomas explained, "I think the biggest opportunity is to get more people thinking about this. And making it sort of okay and encouraged that you could be a strong academic minded person and still do entrepreneurship. Those things are not mutually exclusive."

> **"I think an element that is required is a navigation system to help people figure out, at what point do they need to answer certain questions and get to certain resources. We need some kind of chat bot tool or some interactive way to help people guide them to that end point."**
>
> **- Gali**

In reference to the Idea Forge, Becky shared, "If you're a student who is not at all exposed through your coursework or anything, there's no emphasis. Or your past experiences don't align with any kind of workshop, using tools, building things. I would think that we can be an intimidating place, if you literally don't know what to do or where to start."

Jeff explained, "Informally it is mostly students who will come to me and want my guidance on a number of things. Everywhere from, I've got

this entrepreneurial idea, and I don't know how to get started or I don't know what resources the campus has. And then I pull up the long list of things that we have."

Dipika shared, "During faculty orientation, at least in the past we used to do a little blurb on orientation day. We'll talk about what Venture Partners is. Pretty much every year we try to hold intro sessions with all of the main departments on campus. And then it's also word of mouth. The people who have been here a long time, the department chairs. We are pretty closely connected with all the department chairs."

Kevin, a student explained, "Sophomore and freshman year are the most important time for you to start building your resume. But a lot of students don't know what they want to do. I think the only solution is to help students who are confused and encourage students to reach out to those opportunities. Once they try that once and they step out of their comfort zone, they see the benefits. They are passionate and they will just keep going and search out internships and experiences. I think the first step is the most difficult one."

Sam, a student explained, "The most rewarding part of Startup Summer is the people that I've met and the experience that I had with them. It's very fulfilling to do that. The Director was very stern and tough, and that really helped me. She told you exactly what you needed and then you just had to deliver. And that was nice, especially being a beginner in innovation and entrepreneurship. It's hard to figure out where to go. It was really helpful to be pointed in the right direction."

Gabriella, a student explained, "Teaching us how to figure out next steps was a big part of the curriculum in the Entrepreneurship Music Center. For example, how to look for information, how to piece things together, how to set goals and then go after them. I gained so much confidence from that. Being able to piece different things together and finding all of the pieces that were missing, built my confidence every time."

> **"I think that the school needs to do a better job of connecting people to resources and spaces. I had the ecosystem map on my wall. But what am I going to do? It takes a lot of steps for me to decide on something to try, feel confident, show up in the place, have that conversation, and then a good portion of the time I walk away from it realizing that's the wrong step. Innovation and entrepreneurship need to be centralized. It needs to be about paths you can take and having people who can navigate you to these different things. There's all these resources. But then you're like, what do I do?"**
>
> **- Adam, Student**

> **"I think the first step is the most difficult one."**
>
> **- Kevin, Student**

OBSERVATION 4.5:
Innovation and Entrepreneurship within the CU system is strong, but disconnected.

An overwhelming majority of participants shared that anyone within the CU system could apply and/or participate in most I&E experiences.[79] However, when funding is attached to programs, they can become more restrictive or niche (i.e. Gates Grubstake Fund focuses exclusively on regenerative medicine) and is more competitive. Participants were less likely to know about what other campuses in the CU system were doing, as it relates to I&E.

[79]Exceptions are due to limited capacity and/or resources related to staff support or funding.

Participants were also eager to learn what other campuses were doing to support I&E. They were looking to be in community with one another and develop stronger partnerships. They also wanted a better way to recognize the work that faculty and students were doing and share that within the greater entrepreneurial community. Developing these partnerships are difficult because of silo's and sometimes even a sense of competition because of limited resources or duplication of services (similar programs created in another department at the same college). More details on silos and competition are detailed in Section 5.

Lastly, as students and faculty make progress with their ventures, they are often referred to other opportunities which may include people or programs within their university, within the CU system (when aware of these opportunities), or within the greater entrepreneurial community. However this referral process is limited to awareness of other programs in the CU system and in the community.

Illustrative Examples:
Sara, a student explained, "I have gone to events at the business school, at the engineering school and I&E has its own set of events and workshops. To date, I have not found one website or list that would include everything. I know I&E includes a lot, and sometimes it also includes the stuff at the business school. But I get emails from different lists. I wonder if an email or a chart or an excel sheet could include every department, and every contact in order to do certain advertising for events. But I'm hesitant because I get all of them. But I think there are some students who will skip one or two listservs and then they will not find out about events."

Heather explained, "I think that having more community building around innovation and entrepreneurship would be helpful. Heather continued, "I know people are crazy busy, so you can't overwhelm them with another meeting. I don't know if there's a support group for entrepreneurs, or a pitch night for entrepreneurs. And I know some of that gets done. There are little bits and pieces here and there. But I don't know if there's one that's a little bit bigger and energizing, too. I think when people are seeing faculty and others who are doing this, and they are celebrated, respected, and admired, I think it helps people feel more comfortable when they come up with something, that this is something CU system, CU as a whole really does support and values. I don't know if we do enough of that in all the ways that we could do it. And for everybody. So having some that are women and some that are traditional therapeutics, but some that are really untraditional kinds of things. And just, I think maybe, I think something in there is just to kind of coalesce it a little bit more would be good."

Alejandro explained, "I used to work for the CFO at UCCS. She had a great network with the other CFO's. I would like to see a position like Anthony Graves[80] at each campus, so that they could work together in the state."

> **"There has been an emphasis on translational research and trying to bring talent between the two campuses or maybe even three campuses together to try to solve more difficult problems. But I've never seen that coalesce into a unified summary document or place. For example, there must be programs in the Arts and Sciences that are looking for not only, perhaps medical device related projects, but maybe even in the humanities, looking to approach some topics and medicine that are timely such as transgender matters. I just give this as an example because it's not all medical devices. It's trying to solve societal problems and issues and informing the campuses to collaborate."**
>
> **- Faculty Entrepreneur from Anschutz**

[80]Anthony E. Graves is CU Denver's inaugural Managing Director of Partnerships and Innovation and a member of the Cabinet.

Don shared, “I think at a minimum, if administrators could help me bring together our four campuses to talk about creating a collaborative community space and how we might pull some of our talent and resources in addressing these kinds of problems, I think that would be a good step forward. I’m working with some people at Anschutz along those lines. But if we really are four campuses in one, this strikes me as a golden opportunity for us to really make a difference as a state university. And come together to address these real problems. I think that’s the first thing that comes to my mind.”

> **“It is fascinating because even within our ecosystem we don’t talk. It’s hard. We’re not good about talking across campus but then you talk to other campuses. And that’s what I would love. I would love to have a conference or something. And get these brilliant people together to talk to each other about how we are approaching different things.”**
>
> **- Daria**

Angus shared his interest in expanding upon existing ideas that are currently sitting within technology transfer offices. He explained, “It could start off with some people who are in charge of putting together the Google of all of our stuff or a page that connects everything. And then, incentivizing people.”

A medical professional at Anschutz explained, “Somehow I got introduced to a professor at CU Boulder in Engineering. I sent an email looking for partners for the Anschutz campus. The initial collaboration happened randomly but has been valuable for both product development and experiential learning for students.”

One program director explained, “Part of the reason why it’s valuable for us to be at a university, not just out as a regular for-profit is that we need to be able to really easily and efficiently work with, not only entities on our campus like psychiatry, and primary care and public health. But for the kind of work that we’re doing to engage with the computer science program up in Boulder, to access health economists and marketing experts at the Leeds School of Business and the School of Business downtown. To be able to tap into the film school downtown. There’s people who develop virtual reality and develop these experiences and create apps. And people who are actors who can do voiceovers for meditation products, a lot cheaper than union actors in LA where the company might be located. And we can make those partnerships but it’s really hard right now. Because there’s no mechanism to facilitate or really encourage that kind of institutional level thinking that’s not just partnering on our campus. But, I mean, the campuses compete with each other. Those partnerships happen, but they’re hard to set up and they are too few and far between.”

> **“I keep thinking about how fun it would be to do something with CU Denver. And we don’t collaborate on anything. I think it’s partly because I’m not even sure how we would go about doing it.”**
>
> **- Jeff**

One participant shared, “I don’t mean this in a sad way, but this is the loneliest I’ve been in a job. I haven’t been able to create a professional network.”

Erick explained, “I just got an email from Anschutz. A PhD student out of Anschutz said, we don’t know what the hell we’re doing on the business side. Can you help? And the answer is yes. They can attend our current programming but more specific programming, we’re just beyond our bandwidth. So that’s an easy one. I say no to more cross-collaboration opportunities than I want. It keeps me up at night sometimes.”

Dipika shared, “Fostering and enhancing collaborations between all of CU campuses. So Boulder for example is a big engineering school. Anschutz is a medical research campus. How can our engineers work with clinicians on that campus to take technologies forward? There’s a real synergy there. We’re definitely doing more than we used to, to take advantage of that synergy. I think more could be done there. More communication, more collaborations with our other campuses. AB Nexus was implemented to increase the collaboration between the Boulder campus PI’s[81] and the Anschutz campus PI’s. Funding is the driver here. So with that program, there’s funding involved. Anytime there’s funding involved people figure out ways to collaborate. And so that’s one example of what the university system is doing to close that gap.”

Bryn explained, “I do think that there can be a lack of coordination, sharing and communication. We are a big campus. We are also a big university system. And it’s just really hard to know all the different pockets. There’s so many groups involved in innovation and entrepreneurship. And I’ve been at the university a long time. But I still feel like there’s a lot of stuff going on that I don’t really know about. And I know that there’s a lot of stuff that we do that not everybody knows about.”

> **“I would love to engage with other entities at the universities because I think that we can figure out better ways to fund our work, better ways to execute our work, and better ways to solve problems with people who need help right now.”**
>
> **- Matt**

Erick shared, “How cool would it be to get three or four cross campus units, collaborating to elevate the entrepreneurial mindset.”

Delaney explained, “There hasn’t been a ton of awareness about Startup Colorado. We do use CU interns and we have relationships. But there isn’t a broad awareness of our work. I just had a long call with outreach and engagement so that they know that we exist.” She continued with, “One of the things that’s important, is we’ve continued to learn and increase our reputation and our reach across the state to make sure that CU does know about us. How many times has the last president gone out on a listening tour in rural areas and we find out about it because our partners are calling us, and they have gone and met the president at some event. And they’re always like, I told him about Startup Colorado. And we’re like, he probably doesn’t know, but we should probably make sure that that happens.”

One program director shared, “There is a lack of sharing, communication, and connection that has developed some provinciality and territoriality around everybody’s own little area. And is this other area of innovation or entrepreneurship at the University a threat to me? And that kind of fear mindset is a challenge. And it really is a huge lost opportunity. Because I think one could easily, at least conceptually see that bringing these groups together could be a huge synergistic opportunity.”

> **“It’s almost like there isn’t a way to communicate with other campuses easily.”**
>
> **- Sarah**

Sarah continued, “It comes down to, if I’ve built a relationship with them, then I can just email one of them. There’s no process or procedure for us to do that from the entrepreneurship and innovation side of things. I know Boulder built out this massive pathway and ecosystem. And if we had something like that system wise, it would be really interesting. Or even creating some sort of conversation where each campus

[81] Refers to Principal Investigator

is brought together and we're just having that conversation. But the biggest one is the system piece. Because we're supposed to all be one, but we're all separate and we all have different funding, processes, and procedures."

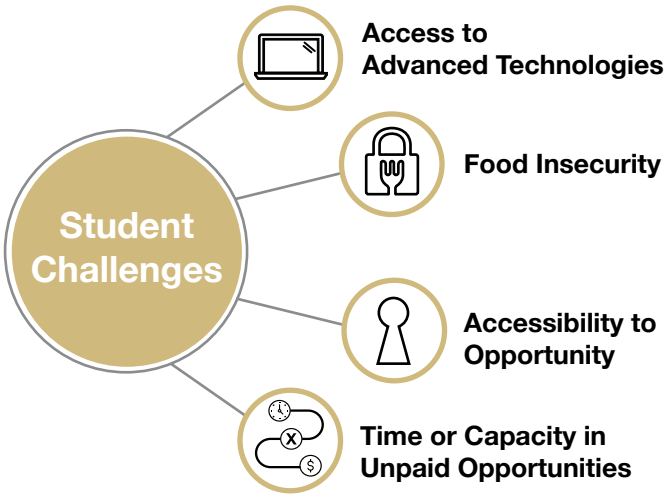
Angus, a professor at UCCS shared, "I'm wondering, certainly in the future, if there is a social innovation working group or anything. We would be madly interested in being part of it. It would be great to start system-wide tie-ins with even just discussions about social innovation and cross pollinate ideas, share challenges, that kind of stuff."

Chris explained, "I don't know what's happening at the other campuses."

Angus explained, "Boulder is so much better at relaying what they're up to, at least from an external perspective. I don't know from the students' perspective. There is stuff that seems to be going out of Boulder all the time. And I have no idea, other than The Communicate, which I don't think anyone even opens. But that's not as important as at least the vibe. I also feel the vibe at Boulder is a lot more inherently collaborative than UCCS. I don't know if it is, it feels that way."

OBSERVATION 4.6:
CU has an opportunity to support more diverse student and faculty entrepreneurs.

Participants talked about improving awareness and access for varying identities related to race, gender, and socio-economic backgrounds. Participants also discussed their interest in more interdisciplinary groups to engage in entrepreneurship. Student challenges included getting students access to advanced (or even basic) technologies, food insecurity, and accessibility to opportunity, as some students do not have time or capacity to engage in unpaid opportunities. Faculty challenges included increasing awareness and engagement from underrepresented groups who may have had less exposure to entrepreneurship.



The data showed that participants were wanting to and figuring out how they can increase participation of underrepresented groups in I&E. Participants believed that having a diverse team and business would help make any company or startup more successful and impactful. This finding aligns with previous research which shows a correlation between diverse leadership (identity and discipline) and profitability.[82] Participants also viewed entrepreneurship as a way for people from lower socioeconomic and other underrepresented groups to be able to generate wealth for themselves and their communities.

Illustrative Examples:
Bryn explained, "With our DEI, our diversity, equity, and inclusivity. I think that that is intimately tied with innovation and entrepreneurship. People from different backgrounds have different ideas about what scholarship is, and have different levels of engagement. I think that innovation and entrepreneurship are critical parts of making good on social and economic mobility. And

[82]Hunt,V., Layton, D., & Prince, S. (2015). Why Diversity Matters. McKinsey&Company. Retrieved from https://www.mckinsey.com/business-functions/people-and-organizational-performance/our-insights/why-diversity-matters

people's ability to generate for themselves more wealth equity. These are complicated systems. But that is also intimately tied with systemic and historical oppression of certain people. I think as the university improves its DEI, it will be improving its innovation and entrepreneurship at the same time."

A program director shared, "The campus sees innovation and entrepreneurship as white, affluent, and connected to engineering or business. At some point we have to realize that the health of the community is what lifts everyone up—I would argue that social innovation should be the first priority because it can help give more people access to opportunities like NVC."

Heather shared, "One of our team members, she's now our DEI officer. She's figured out that in doing a study of some of our data, women are under-represented compared to men, compared to the overall numbers of women at Anschutz. And so they are specifically underrepresented in the innovation path, numbers of patents or startups or whatever it may be. And so really, we want to figure out what is going on there. And how do we make sure that that's rectified. Like that's crazy. And it's not just women. Women was a really obvious one, but in the data for other groups. There are just fewer members of each group, so it was less clear. But certainly, the indications are. And it just needs to be a big, wide goal. That's something that we're really working through as a DEI team and just CU Innovations as a whole is focused on that."

Susan explained, "We would like to not see solutions come out of our lab that have issues, like with the iPhone facial recognition not being able to determine skin color. Those are what we all saw on the news a little while back. We'd like to help avoid and think through those things and engage communities of color, aging people and engage the broader population of the world. Not just affluent white people."

Nathan shared, "When I first started working on entrepreneurship, Dean Bergen really encouraged the approach that I've been taking, which is to help make sure that CMCI's voice is in the campus entrepreneur ecosystem is centered on what we call inclusive excellence, or a kind of social justice approach."

> **"How can we not simply mirror the outside entrepreneurial world, but how can we help to change it and make sure it serves some of the deeper needs in our society? I think we have a real opportunity around issues of employee ownership and shared ownership. And building an ecosystem that is more just and that shares wealth more equitably."**
>
> **- Nathan**

Theo explained, "If you are LGBT in the southeast United States, your lived experiences have probably given you, coming in and out of dominant cultures and skills you develop to just get your life done. You've developed cognitive flexibility and some muscles that others probably haven't. Which means that you probably see different questions that could be asked, different things that could be done. So that's a combination of skills that you've acquired, your motivations for the things you've been trying to get done in your life, and the resources that you have available to do those things."

Karen shared, "I think our students, especially some of our underserved students, don't see themselves being able to be in this space." She went on to recommend, "I think having a universal First Year Experience, I hope, I hypothesize, would give everybody a little bit more confidence that everybody's starting off on the same footing.

Angus shared, "There is a lack of exposure to things like augmented reality, virtual reality, computers with decent graphics, maybe even

fast phones. All of that creates a super class of people who have access to all that." He continued sharing, "Many entrepreneurs had advantageous positions to start. And they have lots to fall back on. I'm just concerned that we, at least at UCCS, don't have a ton of those students. And so how can we be surprised that we don't have a ton of startups coming, and a ton of entrepreneurship ventures? If you can't get the money together for food, you're definitely not buying the graphics card that you might need or whatever."

Delaney explained, "We want to make sure it's a level playing field for everybody that comes to the table. Because a lot of the risks and the hunger for entrepreneurship are the same. And so to create that equal value. And then, creativity is at the core of what we're hungry for, especially as people come into their adult lives and want to pursue their creative agency and also their agency to build personal and community wealth."

In regards to InWorks at CU Anschutz and Denver, Kelsie explained, "It was really meant to be, and it still is, an open access resource. We think that's highly important to be able to foster innovation and entrepreneurship. But we want to make sure that we remain open to every student and even community members. You can come in here, as an alumni, as a Denver community member. We try to keep it as low a barrier to access as possible."

Erick shared, "We're uniquely positioned and have unique expertise in elevating disadvantaged communities. That's been a core of what we do at the Deming Center. Whether it's rural communities who don't have access, native communities. We're piloting a program with incarcerated communities and formerly incarcerated communities, LGBTQ communities and racial diversity. Less than 1% of black founders get access to funding. We could do a Venture Capital boot camp and Brad could obviously partner because he teaches the course. We could have a co-teacher with that. And I think we have a duty as an organization."

> **"We need to help support people, particular women and underrepresented groups that really don't even see it as an option. That's a problem."**
>
> **- Cathy**

Kris explained, "I'm a believer in opportunities as opposed to problems. When we come together that way, I think the chance to succeed is great. And doing it in a very inclusive way, a very user-centered way. It's not about us. It's about the community coming together, where we can hopefully be enablers and empowerers to do that. It is also clear from entrepreneurship, when you bring a diverse group together. This is the Medici effect, which is a really, really well known book that discusses this. When you bring a diverse group together, your ability to innovate and then get that out in people's hands for entrepreneurship goes up."

Demetria shared, "Diversity is almost an expected trickle-down outcome. When you look at the traditional academic setting, and the lack of diversity across faculty, it only makes sense that if you're having discoveries and innovations coming from that exact same environment, that they would also not be as diverse, just by sheer environment and exposure and what is part of the system already. So when you think about expanding and looking at what diversity, equity, and inclusion looks like in an innovation space, if you are talking about it in an academic setting, you cannot have that conversation without looking at the totality of the composition of the faculty that's there."

Sarah explained the importance of funding for internship opportunities. She shared, "It seems like a cop out to say funding, but it's just true. For CU Denver students, they can't do things for free. Most of them are working and supporting families."

OBSERVATION 4.7:
Am I an entrepreneur? I don't do that: Students and faculty may not identify with the term entrepreneur or being entrepreneurial, but are attracted to making a difference.

The word 'entrepreneur' has many connotations and definitions. Participants shared how the word 'entrepreneur' can turn people away from engaging in I&E activities. Students may rule themselves out of participating in events that are aligned with their interests.

Students who have participated in I&E described their initial perceptions and feelings as 'intimidating', 'nerve wracking', 'confused', and 'hard to put yourself out there'.

Students and faculty may compare themselves to entrepreneurs who are highlighted in the media and some may question if they have what it takes to be an entrepreneur. Increasing student and faculty confidence can help, but also will take more resources to guide people less familiar with the process. Sharing pathways and stories are likely to support new venture development. When marketing to students and faculty, consider whether entrepreneurship is the most appropriate word to use, or when it would be best to use entrepreneur, innovator, or something else entirely. It may be helpful to differentiate thinking/doing like an entrepreneur (skills, habits, mindsets or intrapreneur) as opposed to being an entrepreneur. Overtime, students and faculty built up their confidence, not only personally, but as an entrepreneur. They transitioned from full entrepreneurial student (or faculty as student) to an entrepreneur that could take feedback, but also decide not to use that feedback and have more autonomy in their business.

Illustrative Examples:
Thomas shared, "I was visiting someone else's lab, maybe three years ago. And the drug had a significant response. This would be a new indication for that drug. I knew enough to say, well that's interesting. There's probably some intellectual property around that. And the person said, What are you talking about? And they said something like, well I don't do that. I said, You don't do what? Try to get things to the clinic? They said, Well, no. Start companies. I said, Well then don't start a company but you should put your stake down. And I interacted with that person a couple years later and they said, Thanks for mentioning that. I think a little differently about things. I told it to one of my collaborators and we've been inventing. I think we might patent this thing. It was a pretty loose conversation but just that small little mention planted that seed. And she'd spread to somebody else too. To me, one of those great hurdles in our complex, busy lives is just to have people think this way."

> **"With students, I think a lot of what we're doing is getting them comfortable with the idea that they can create and build something."**
> **- Becky**

Ben explained, "One perceived boundary is capability. Am I capable of being an entrepreneur or an innovator? Am I good enough? And that almost becomes like a capability or psychological barrier, to some extent. I think that some people question whether they've got the right stuff. They see people like Elon Musk on Twitter and Social Media and he seems like Iron Man in some ways, like he's a Marvel character. And students are like well, I can't do that because I'm not Iron Man. So that's an area that I'm very much interested in because if you don't overcome that perceived barrier, even with all the time

> **"Am I capable of being an entrepreneur or an innovator?"**
> **- Ben**

and money in the world, you may not get there. Because you've got to have that belief in yourself. And you've got to have the grit to persevere when times get tough. Because things will get tough as an entrepreneur."

Stan explained, "I think that word entrepreneur scares off a lot of people. Especially in A&S, music, or even in engineering. Students think starting a company is for the business school. But they say, I don't do that. But A&S students are going to be working in the world of business."

Chris shared, "I was speaking to a class a few weeks ago about innovation, entrepreneurship and my own story of starting a construction company. And one student raised his hand and he said, I'm an English major. Can I be an entrepreneur? It's like, yes you can. That's another persona of students who are creative. They want to do stuff. They're problem solvers. But they don't totally understand the word entrepreneur. No one has been to their class to say, you can do this."

Carolyn explained, "Students want to do something real, essentially. They want to be able to see something that's tangible and connect it to what it is that they've experienced. When you think about what they've experienced throughout their whole school career, they've been met with a lot of shifting paradigms. I don't know that the University has necessarily kept pace with that. Students want to be actively engaged and understand how they can make a difference. And I would say that that is more important now to the college student than perhaps it was in the past."

> **"Students want to be actively engaged and understand how they can make a difference."**
>
> **- Carolyn**

Daria shared her experience working with students in Engineering. She shared, "Once you realize this is a live and real barrier for them, it becomes clearer and clearer that they might dip their toes, but only so far. If mom and dad catch wind and they are adamantly against this, that is a huge barrier for them. And the other one is the risk that goes with it. There's that risk side. There's this identity side of, Am I an entrepreneur? Because here's my mental model of what an entrepreneur is and that's not me. And I think another barrier is everyone thinking they need to be the next new big thing. You have to be the next Sphero. You have to be the next Google. The next one, like they think that that is how big it has to be for success."

Corey, a student in the College of Arts and Sciences explained, "I don't know if I would identify myself as an entrepreneur quite yet. Maybe not in a traditional sense. I would say I identify with innovator. So many people are entrepreneurs, and they just don't really realize it, I think, whether it is people in the art building who don't realize that trying to start a business by selling their art is being an entrepreneur, versus just being an artist. And I think it has a lot to do with vocabulary and how we've grown up. It can be hard to put yourself out there in a networking atmosphere. But once you're there, it's a very friendly atmosphere and it's not too formal, which I think is good for students like me or who are new to the innovation, entrepreneurship spectrum."

Jordan, a student, explained, "I've had a lot of imposter syndrome. Just very confused. Like what am I? I think I'm good at these things and I'll get praise from the outside looking in, but from the inside looking out, I can be very self-conscious or scared of what I'm doing. I think some of the business and entrepreneurship classes really helped me. Knowing that that was a possibility and very much a reality for a lot of entrepreneurs."

Corey, a student explained, "I think a lot of freshmen are intimidated because entrepreneurship is a really packed word and it comes off very formal. We're lacking in very informal meetings. It can be kind of

intimidating to someone. And I think there is a startup club but a lot of freshmen don't really have access to that information. There should be better access to very informal innovation or entrepreneurship meetings. We have a lot of opportunities for students to get mentorship opportunities or get funding. But for someone who wants to be involved in the entrepreneurship realm, it can be kind of hard to just jump in and start. I feel like we're lacking on the very informal introduction to it."

> **"I was nervous as heck to get started in innovation and entrepreneurship. I didn't have a lot of confidence. I felt a lot of imposter syndrome when I was starting out. But then a funny thing happens where you realize that everyone is sort of going through their own version of that. And it was a big confidence boost because it felt by the middle of the project when things were starting to click together, and you see how you had a role in it. You build your confidence as a student."**
>
> **- Jen, Student**

Sara, a student, explained, "When I had to make the decision about whether I was going to continue on with my business idea. And I did talk to a few people about how I could go forward. I talked to Jeff Nytch, Chris, my NVC mentor. And they respected my priorities and made it clear that you can still go back to this idea, once you have time for it and it's not the end of the world. I grew up in a household where, if I don't get married now or if I don't have kids now, it's the end of the world. And so I appreciated the support from everybody. I felt that I was really heard. It was really difficult, because I never had an idea that ended up going to a competition and winning prizes. And I was doubting myself. Like, really, is it a good idea? Can I pull this off? And people actually trusted me and they thought I could do it. But the problem was that I could do it, but I needed more time."

Alex, a student explained, "You have to be really self-motivated, driven, and autonomous if you're pursuing the whole entrepreneurship thing. I think there are some more traditional paths where you can sit back. But entrepreneurship, you have to be driven. And I think there are so many resources out there you can take advantage of. But it requires a certain level of autonomy and confidence and desire to take advantage of everything."

Randall, a student explained, "There was a transition for me, going from a position of being a student. And taking all the feedback and information, taking it at face value and taking it very literally and just following instructions. To then saying, I appreciate your input. But I need to make the decision. I'm the expert here. I know my company better than anyone. So I'm not going to do exactly what you tell me, but I will take that into account."

Andrew, a student shared, "After trying to run my own business, and learning the difficulties, it's really not for everyone. And I wouldn't even still say it's for me, per se. But I've gone through enough trial and error, and I feel like I've put an investment and commitment into this. So this is who I am now."

OBSERVATION 4.8:
There is a missed opportunity for storytelling, specifically regarding the positive impact CU entrepreneurship has within Colorado and the world.

The amount of revenue, number of patents, number of startups, etc. are impactful statistics, but only share part of the story. Students and faculty within the CU system are having a positive impact in the world and in our communities. They create products, medical devices, therapeutics, and services to better our world. By sharing our stories with the general public and the state, there is a potential to improve our fundraising efforts, recruit faculty, staff, and students. People in recruitment, admissions, government relations, industry relations, and advancement could

benefit by having easily accessible stories of student/faculty entrepreneurs.

Related with marketing to students, marketing within existing channels seems common. For example, I&E stories are shared within CU system email listservs. Marketing these entrepreneurial wins to the general public - within our communities, the state, and internationally, can help situate the CU system as a global leader in I&E, improve admissions, andhelp recruit faculty and staff innovators. Several students who are heavily involved in I&E expressed that they intentionally sought out universities that were innovative and entrepreneurial. For example, both students who were interviewed from UCCS shared that they applied to UCCS because of the Bachelor of Innovation program. Leveraging this opportunity, among others related to I&E may support admissions across the CU system.

Students and faculty within the CU system are having a positive impact in the world and in our communities. They create products, medical devices, therapeutics, and services to better our world.

Illustrative Examples:
Gali explained, "We're starting to look more at these patient focused metrics, which is really what the motivator is for a lot of us to come to the office. Patent numbers are great and revenue is great. But, it really is the patient impact and the stories that we're trying to affect."

A faculty entrepreneur from Anschutz shared, "I think that the system would benefit from telling these stories more often. I think there's a reluctance to do it because of historical concerns over conflict of interest, etc. But those stories of the drug device and digital development that are impacting patient care are compelling stories. And you don't see them a lot."

Bruce explained, "I would say from an institutional level, the better we can communicate the importance of the work that we do, the easier time we have engaging public private partnerships, donors, and alumni. Anybody who comes through our doors should be able to sing the praises of the importance of the work that we do."

A student of the Bachelor of Innovation program at UCCS explained, "I became aware of their bachelor of innovation program, and that it was the only one in the country. It just immediately grabbed my attention."

Delaney explained, "Having the massive business support agents and the relationships we have certainly helps. We also do a lot in terms of marketing and messaging. We also have a podcast. We do a lot of work to help capture the stories of rural entrepreneurs in their voice. So rurals speak on behalf of rurals. And it's about giving voice to and visibility to, we're all entrepreneurs. So that's been a huge benefit and attracted more interest to us. And it just really works between word of mouth and the marketing piece."

Thomas shared, "I think the biggest thing that we could have an impact on in five years is to have enough positive stories and positive examples about innovation and entrepreneurship." He continued with "Part of the problem about messaging these things externally is that reluctance to promote ideas in process or in incubation."

Erick explained, "There's the depth and the breadth. I think stories are the depth and that's how I talk to people. Storytelling on the depth side I think would be super important. As an organization you should have at any time, 50 really great stories you can reference."

Bryn continued, "I think that at CU Boulder, which is what I know more about, but possibly the university system, I think we're under-selling. And likely that's a lack of awareness rather than somebody saying, I don't think this would be a good idea to promote."

> **We are not great at telling our success stories. There are some aspects of innovation and entrepreneurship that are well known and well promoted, magnified, and amplified by the university. Compared to other universities, we hide and keep our successes secret."**
>
> **- Bryn**

Barry, a student, explained, "CU Denver was super awesome with the Jake Jabs Center. And we're competing in the Elon Musk carbon capturing X Prize. That's why I came back to school, because of things like the Jake Jabs Center and InWorks."

Alex, a student shared, "I came to CU for entrepreneurship in the MBA. When I was looking at the entrepreneurship ecosystem, I knew that I wanted to be on the investment side of things, rather than the operating side of things."

Additional Considerations: Awareness of Innovation and Entrepreneurship

Branded programs are easier to find and reference (meaning programs with a name). For example, Scale to a Million is the pre-accelerator education program for startups at UCCS. Having a name for each program, service, or group makes it easier to share, market, build awareness, google search, and recognize overtime. Some programs did not have a name, and this was challenging to document, find, and refer back to. While reaching out to a single contact may be helpful in the short term, when that contact transitions, it may be hard for new people to engage and find the correct resource.

Storytelling and finding timely information related to I&E with ease can help with fundraising efforts. Terri explained, "These things always come up and you rarely have time to prepare. Somehow you're talking to someone and I've got to quickly have that story on the top of my head. So I go to the innovation and entrepreneurship web page and I look for stories there. And that's one thing with RIO and our web pages, I've had people put more stuff because I need to be able to prepare because it's midnight and I just found out that tomorrow morning, I've got to meet with someone. So for me, having that so it's just in time, I don't need to ask anybody and the information is there, I think is really key."

When students and faculty hear from their peers, they are more likely to see themselves as an entrepreneur. Stephen explained, "When they see their peers walking that path and talking about how they've been successful, that's what is impactful. It doesn't matter what I say. It's them seeing their peers. And we invite them to 'Lunch and Learns' featuring their peers."

There is a potential interest in stronger communications. Jeni from Colorado Western University[83] asked "What else is out there?" She also explained she wanted to get the word out to the CU system community for a potential partnership and to share what CWU is doing to support entrepreneurship.

Data collection and sharing efforts are segmented. Each department or center uses some data collection methods. Many offices create their own report (i.e. CU Venture Partners, CU Innovations, and Deming Center) and these are often marketed within existing I&E circles at CU, with people in the entrepreneurial community connected to CU, and less so outside of I&E communities. Some departments (often smaller ones) do not have the capacity to create such reports, let alone market them to external partners and potential donors.

[83]Colorado Western University and University of Colorado, Boulder have an academic partnership with the College of Engineering and Applied Science

SECTION 5: ACADEMIC AND INSTITUTIONAL INCENTIVES

Academic and Institutional Incentives include real and perceived processes that support or hinder innovation and entrepreneurial activities. While each of these observations are deeply connected, they are categorized to better understand each on its own. Additionally, many of the I&E programs and initiatives could be characterized as hacks. A hack is an alternative approach to create something, often with little or no resources in order to move a project forward. Multiple hacks lead to inefficient ways of working around the system and can present challenges to growth. For example, gaining approval required to provide course credit for a class can be controversial, time-consuming, and frustrating. A hack may include either modifying an existing course to 'fit' the vision, or turn to co-curricular offerings which require no approvals, but do not offer credit for students. Additionally, in the absence of regular funding in a line-item budget, faculty and staff have often raised their own funding to support nascent programs. The system will need to consider if it is worthwhile to institutionalize programs which have proven success.

Given the nature of comments critiquing the university and university system, names have been anonymized to protect participants.

Observations Shared in this Section:

- 5.1: The tenure process hinders faculty from fully participating in I&E until after tenured.
- 5.2: Leadership and culture largely influence the capacity for innovation and entrepreneurship within CU.
- 5.3: The System should consider exploring ways and aligning resources to incentivize students, faculty, and staff to engage in innovation and entrepreneurship activities.
- 5.4: Institutional barriers can inhibit new venture launches, the commercialization of technologies, and innovation within the CU system.
- 5.5: Existing Advancement approaches limit the fundraising capacity for people in I&E.

OBSERVATION 5.1:
The tenure process hinders faculty from fully participating in I&E until after tenured.

The tenure process is often based on teaching, scholarship, and service. Participants in the study perceived that the current tenure process does not reward the innovation and entrepreneurial efforts of faculty. While there may be some variations by department, faculty participants would agree that the tenure process does not value I&E and directly competes with tenure.

To be clear, it does not seem that people do not get tenure because they have created a company (i.e. someone creates a company and because of that, they do not get tenure). Instead, it seems that the activities related to I&E do not benefit faculty towards earning tenure, and therefore faculty must choose to not participate in I&E because of competing priorities. For example, a faculty member would choose to spend their time applying for grants, working on a publication, or supporting a university committee instead of an entrepreneurial effort such as filing patents, getting a license deal, or commercializing technologies.

Illustrative Examples:
In regards to tenure, a director at Anschutz shared, "We've got a very traditional process on all of our campuses, which makes it challenging. There are going to be people that are not going to like the idea of changing promotion criteria."

A faculty entrepreneur at Anschutz shared, "The promotion process has to integrate entrepreneurship into it, in a really fundamental way so that it's viewed as equal to other activities."

A program director at Boulder explained, "I think that the promotion and tenure system at the university could be drastically improved by being more holistic to include broader impacts like innovation, entrepreneurship, social impact or things besides some of the traditional interpretations of scholarship, which are typically academic papers, and funding and teaching. These are great and should never be diminished. But there could be room for more broad interpretations there. I think that would align incentives a lot better and help the university to modernize its promotion and tenure structure, like some of our leading peers and the universities that people point to and say these are the leaders in this domain."

A professor at Denver shared, "The whole risk and reward system of a university is built around tenure track. And so, how do you create a third space where the same pressures that come along with tenure and tenure track are able to be cognitively offloaded from a person, so they can have more capacity to think differently."

> **"When I sit in front of my chair for my evaluations, there's such a big disconnect. All they really care about is RO1's. It doesn't matter that I have the Spark grants, or I have this company or I have all this great innovation interest. In my one-on-one's for a tenure track professor like me who is going for tenure, it's going to be, how many NIH grants do you have? And that is very discouraging. And it's not just discouraging, it makes you rethink your career. We do all this fantastic work, but it's so siloed. CU Innovations is probably very happy with me, but nobody else is. We know that what we're doing is truly cutting edge and innovative. But if that doesn't translate into an RO1, it's meaningless for me in my career. And ultimately, sadly, all of the stuff that's happening with innovations and patents doesn't translate to my career on this side, which is my path. You're almost forced to make a choice, which you don't want to. Because the disconnect is huge."**
>
> **- Entrepreneurial Professor**

An administrator at Anschutz shared, "I've asked people, give me some examples of someone you think that's really affected their tenure because that's a serious thing. And I can't say, it seemed like it may have been a factor. I don't know. I've gone through the whole process and I was doing this stuff for years, decades. So I don't know if that's real or perceived. And even if it's quote unquote not real. In other words, we can't find examples or the places where they're doing that stuff. That's not academic, they are not going to get tenure. Even if we can't find something like that where

it's even the perception, it's probably an issue. But honestly I'm hard pressed with that. A lot of this will happen at the department level. I think the people I know that are doing the most on campus and are most active in this area, are all full professors with tenure at this point. And they've been doing it for a long time."

An innovative researcher, who does not identify as an entrepreneur explained, "I've been very lucky that I have a career development award that pays for me to do this work. I don't think the tenure process hinders me being able to do this work. Well maybe it does. I'm planning to apply for a bunch of SBIR's and STTR's. And I don't know how well received that's going to be for promotion and tenure. But I also don't know if I care. I just want to move the work forward. I think for people who don't have a career development award, I don't know how on earth you would have the time to actually do all you need for tenure and also pursue innovation and entrepreneurship."

A program director at Anschutz explained, "You could change tenure so faculty actually get credit for doing it. When you've got industry connections, you've got patents, you've got licensing deals coming in, it doesn't count for them. I actually think that's probably one of the biggest reasons why we lose women in the process. Historically, they're often multitasking and have got so much responsibility at home and everywhere else, they have to make smart choices. A smart choice for them is not to do it when they get no credit for their career from doing this. And that's terrible because there's also the body of literature that's really clear, that the better mix you have of startups, all the way to big companies, if you've got a mixed group, it's not just all men, or all of anything. It's men and women working together, they're much more successful. But if women are feeling disincentivized, even more than men are, I mean obviously that impacts men too." She continued explaining, "I've actually had faculty tell me, I can't apply to the Grubstake Award because I have to write an RO1. The only thing that matters is getting RO1. Or I bring them a company that would like to work with them and do a sponsored research agreement, and they're like, I can't do that. I have to write an RO1. That's all that matters."

A tenured faculty at Anschutz shared, "I counsel our junior faculty. I don't encourage them to do entrepreneurship pre-tenure because it's very risky. And I mean, I was at an NIH workshop around entrepreneurship. And again, similar kinds of discussions. And certainly really important if you are an underrepresented person. If you're a female faculty member in engineering, if you're under-represented, you are very risk averse. You want to get tenure. Then you can do these different things. But if you go down an entrepreneurial pathway and you start up companies and they don't work, what have you got to show for it? This is a challenge."

A faculty entrepreneur explained, "I wasn't tenured before starting the company. I think it's a little risky to try to start a company before you get tenure. If I started a company and it was wildly successful, I don't really think that has any bearing on whether I should have tenure or not. I think that would help me, because it adds more validity to what I do and I think it would make me more successful from an instructional and a research standpoint on campus, as well as reputation. And I think all those things can feed into tenure. But I don't know that the actual success of the company should be tied to my personal tenure directly by any means. It's very risky. It's just a high stakes game if you're going up for tenure."

One faculty member at Anschutz described, "There is one other person in my department who is a very prolific inventor. So he gets it. And so he's been the biggest proponent of saying patents should matter and patents count. Innovation counts towards tenure. But he's a lone voice."

OBSERVATION 5.2:
Leadership and culture largely influence the capacity for innovation and entrepreneurship within CU.

I&E leaders are critical in making entrepreneurship happen across the CU system and are in essence *hope generators.* They spark ideas, explore possibilities, support engagement, spread the word, inspire hope, and create spaces for students and faculty to learn about entrepreneurship.

Leaders have a direct impact on the culture of campuses. Cultivating a culture that supports innovation and entrepreneurship is, and will continue to be challenging. As it currently stands, there are strong I&E efforts happening within certain spaces of the university system. However, participants largely felt that the system could do better at leading, cultivating, and supporting an entrepreneurial and innovative spirit and mindset within CU culture. Specifically, participants wanted administrators to not only verbally talk about the importance of I&E, but to also invest more resources. It is important to note that many leaders have already played a crucial role in supporting a culture of innovation and entrepreneurship. During interviews, several leaders were mentioned by name in reference to their inspiration and being champions of I&E. However, there is no overarching CU system strategy related to I&E and it can be difficult to determine what is missing or needed to better support the CU and community ecosystem. Awareness, for example, is everyone's job tangentially and therefore faculty and students randomly find out about I&E opportunities, if at all.

To support an I&E culture, leaders need to address the skepticism and fear that can hinder participation. The mentality of 'We can't do that because it won't work' or 'It's always been this way' must be challenged. Administrators (and some faculty) are perceived as being less risk averse, and therefore, less supportive of innovation and entrepreneurship. This can result in staff and faculty stifling new ideas from students or colleagues in the system and making changes. There is a large opportunity to support upper level leaders and staff in being more innovative within their current roles.

Entrepreneurship and innovation also needs to be viewed as an extension of the pursuit of knowledge, translating the new knowledge into real world impact, as opposed to being a completely separate endeavor. This not only benefits individual employees and the university, but it also benefits students. Institutions have intense pressure to better prepare students (faculty and staff) for the future, and the I&E skillset will be needed. Creating a culture where students, faculty, and staff can be innovative will take time, intentionality, support from leadership, and resources. Additionally, participants explained that the system cannot expect faculty, staff, and students to already know how to be innovative and entrepreneurial. Teaching people how to be innovative and entrepreneurial will need to be prioritized and experts can be easily identified within the system.

Illustrative Examples:
Barry, a student shared, "The world needs more people that will say, how can we change the world? Especially in this uncertain time. We need people to not be afraid, to be bold and step up. And that's what we need to be teaching in college. The school system is not currently working, and we need to encourage students to have a different mindset."

A director at UCCS explained, "There's a lot of overlap between hope and innovation. Because innovators have to be hopeful people because they're trying to do something new, which means they haven't given up on the world yet. And then I think that the world needs innovation because there's so many problems. People solving problems gives others hope.

People look for innovators in the midst of despair. Hope and innovation are not only good for the innovators, and not only good for all the stakeholders in the companies and organizations they create, but it's just generally healthy for society. Because if you lose hope, you lose a lot of other motivation to achieve and to even live for that matter."

A director at Boulder explained, "We say that we want to be leaders in innovation, and we are—but if the campus leadership made a dedicated push that this is a serious priority, then all of the colleges and schools would be doing more in the areas of I&E."

A professor at Anschutz explained, "I think innovation is a very cultural thing. It's your education, it's your mentor. And there are many silos. If you happen to be in a silo where innovation is completely what people are after, I was surprised that my peers didn't have the same aggressive attitude towards patents. I was shocked actually. That's all we talked about for so many years, was innovation and patents. Even now, the training sticks. In my own lab, we have a culture where we are going after innovation pretty aggressively."

A program director at Anschutz explained, "I know that there are various courses now in graduate school efforts to make sure people are trained, to some extent, around entrepreneurship and innovation. But I would say let's take a look and make sure we're really doing a good job of that. Should there be cross training with the business school? What should that look like? Not everybody has to do it, but there's something that's part of the curriculum that maybe they do have to do because that is the way the future is going."

A professor at Anschutz explained, "The culture and the campus need to embrace innovation and entrepreneurship. The idea at Stanford is that every faculty member, part of their responsibility is to innovate in ways that lead to patient impact. And that is through every one of their types of research, ranging from health care policy, practice, digital health, drugs, diagnostics. But that is part of their responsibility to their field, to have areas that really have potential for patient impact and then to figure out how to do that in an optimal way. Their best people stay because they can continue those activities.

A program director at Anschutz shared, "Culture is the barrier for everyone to become an entrepreneur, and that's what I have found since I've been doing all of this." She continues, "We have to recognize that if we want this entrepreneurial spirit to flourish, we have to help people be able to do it."

A professor at Anschutz explained, "CU doesn't try to hold the IP developed at the university and I would say that benefits CU. They are encouraging innovation and the teaching of innovation, which is nice to see."

A program director at Boulder explained, "I think there's perceptions that in higher ed… either real or perceived hierarchies that I kind of stand a bit outside of, that might make faculty even feel like, well we can't. And there's old infrastructure. There's certainly bureaucracies that are set up that make it harder to actualize those ideals."

> **"People solving problems gives others hope."**
>
> **- Director at UCCS**

A program director at Anschutz shared, "I think Don Elliman, the Chancellor, has been a real supporter of the Gates Center and for what we're trying to do. I think his mindset and having these things come down from the top is critical."

A program director at Boulder explained, "We are highly encouraging the folks that we're working with to leverage resources outside Venture Partners at CU, but also in the community. We want to make sure that if it's not in the community, we've got something for

them. All of our programs are designed to fill a gap in the ecosystem. And we're not interested in creating programs and running programs that are redundant in the ecosystem."

A program director at Boulder shared, "How do we help CU as a whole become innovative? How can we influence things like tenure requirements? How can we help staff to feel like they can be bold in their jobs and creative with problem solving? Those things also ladder up into how we are viewed as an Innovation University by rankings and other folks. With those audiences, the staff audience probably ends up being the least of my least focus. It might be a five or 10% focus. I try to keep a pulse on what's going on."

A program director at Denver shared, "It also helps that our faculty director, who's our Executive Director, is really involved. And that makes a big difference for us." She continued, "We just don't have a lot of buy in outside of the business school. And we're lucky that CU Denver wants to focus on innovation. And our new Chancellor Michelle Marks has met with us and she sees our mission, our vision, and that is a huge plus."

A program director at Boulder explained, "When a project gets big enough and it's showing true signs of success, you need more than one leadership champion. As someone who's fairly new to academia, I'm realizing that again, there's barriers to accessing leadership. It's a big deal to get them in the room."

A program director at Boulder explained, "Everyone's on the same page with the need for experiential learning. We need to be innovators. We need to create these problem solving mindsets. But I think it gets into, from my perspective, there's a very limited top-down mandate that needs to happen. And top-down funding. So when I've worked for corporations it's been, you've got to get this done or you're going to lose your job. Or we're going to lose these customers. I think we say, let's be the innovative university. But we don't always have the carrot and the stick behind it. So the scalability I think gets really hard when it's just a lot of different experiments, but I think that's the only way we can do it."

A program director at Boulder shared, "Attracting the best talent and keeping it, just like in any other profession, any other industry, is so critical. And it sounds like a cliche, but it's not. The people are what drive it and when we have people like Brad Bernthal, and his history in our institution, and being the pioneer of something like a New Venture Challenge. The fact that we still have Brad, and he hasn't been spirited away to another institution, is pretty awesome. The fact that we have someone like Terri, and not just because she's our boss but who's an electrical engineer by education and training. She gets it. She's not just a traditional academic. She's lived the life. And she's leading research and innovation. It's so critical to retain people like that. People like that drive it and are what make everything so successful. If we're going to be successful, we've got to retain those amazing people. And then continue to attract new ones. That's what keeps it going. I mean, anyone's replaceable. But the combination of talent, experience, and enthusiasm. I mean to have the enthusiasm of people like that, that's the key."

A faculty member at UCCS shared, "What I see may be holding back innovation and entrepreneurship is, we see good ideas coming from nursing students, dance majors, people here on basketball scholarships. And the fact that in many classes those ideas seem to be systematically shut out is disturbing. But I'm not a traditional academic."

A faculty member at Boulder shared, "I know that administrators tend to be risk averse. There's an article in The New York Times by Molly Worthen talking about this, but I didn't expect it to be so risk averse at CU Boulder. CU Boulder has this reputation, rightly earned or not, of being very innovative. I think the city is known to be very innovative, but the university is not so much. I wish administrators would be more innovative and more willing to try new things."

A researcher at Anschutz explained, "There is some confusion about the understanding that projects related to innovation and innovation development are valid research. That it is an area of potential for academic industry partnership, and that it is an area where faculty can grow their own research interests and programs into things that are sustainable beyond the life of the grant. There is some deep skepticism and I would say reticence and even fear among faculty about going down that path and figuring out ways to support people in that regard can only improve innovation uptick."

A program director at Anschutz explained, "I think the biggest challenge I see for innovation and entrepreneurship is that we hold on to these old views. And I'm saying this from the perspective of being at Anschutz Medical Campus focused on research. What we're doing here is for increasing the body of knowledge, it's increasing our understanding, it's for the greater good. And so people are supposed to put in the time and hours because that's the noble calling for things. When we talk about entrepreneurship, we don't talk about how it relates to those things. And you need to have that entrepreneurial mindset to drive science forward, to drive medicine forward. We talk about it as a separate thing. We talk about commercialization of products as a separate thing from innovation. And so I say, well I'm not interested in getting involved in commercialization. I'm not doing it to make money. I'm doing it because I want to increase knowledge. And so the biggest challenge is that we treat it as if those are separate things. But to do the most innovative science you need to have an entrepreneurial mindset. You need to be thinking about venture and about innovation. You need to be thinking about those things because that is going to move your science forward. Companies don't invest in things that aren't going to be successful. You don't want to put forward something that's not going to be successful and tested (referring to a drug/health solution). But I think we separate innovation and entrepreneurship from traditional, typical research rather than saying this should be part of that. And I think if we did that, it would change people's approach in support for both innovation and entrepreneurship."

A professor at Anschutz explained, "I think we can really intermix the desire for patient impact and commercialization. And sometimes people think they're the same thing. But they are kind of two separate processes which have to come together. I think there's a negative connotation with a lot of faculty. They don't want to be seen as tainted by business. But they do want to develop things that have patient impact."

A program director at Boulder shared, "Buy in can sometimes be hard too. I think innovation and entrepreneurship by definition says we're changing things up. A lot of people don't like change. And that's a challenge on campuses, even getting people to accept that they want change beyond all the bureaucratic hoops and stuff that people get stuck in. It's like, do you actually want to see the university change its way out of its foundational ways of educating students? A lot of people disagree with that and won't do it, either for personal reasons, like they don't want to change what they do and they're used to their own system, or because they have views on the University of being in one place. And innovation and entrepreneurship says we should shake that up, and that doesn't always feel great."

OBSERVATION 5.3:
The system should consider exploring ways and aligning resources to incentivize students, faculty, and staff to engage in innovation and entrepreneurship activities.

Incentives may come in the form of financial (with highly successful patents, licensure, or company), accolades/recognition (if people find out about it and market it), and/or promotion. Incentives connect largely to the previous observation regarding the influence of leadership and culture. While some investments in I&E have certainly been made in the past, this particular observation focuses more heavily on the need to incentivize and invest in

I&E to expand upon existing work. Generally, participants did not perceive I&E efforts to be rewarded by their institutions or the CU system as a whole. This was evidenced by the perception that there has been little to no alignment of resources in relation to improving I&E efforts.

Illustrative Examples:
A faculty member at Anschutz shared, "By the time that money comes back around to you, you're getting 25% on the IP. That's pretty minimal money unless you have a mega drug. The payoff is either money or its promotion, accolades. But we don't do anything. I don't see a hall of entrepreneurs anywhere. I don't walk in the library and see pictures of the best entrepreneurs on campus. I see a lot of white guys hanging up in different rooms when I go across campus. But I don't see pictures of people who have made discoveries that are helping the world."

A program director at Boulder explained, "It doesn't seem that all of the incentives and rewards at a traditional university like ours, actually encourages people to do these things or rewards people for doing innovation and entrepreneurship related things."

A faculty member at Boulder explained, "It can be kind of a lonely enterprise. The university talks a lot about wanting to be a top innovation university but unless I missed it, it's not investing a lot, especially in A&S.[84] And I've had to just use some of my own money to keep these programs afloat. That's been a big hurdle."

A faculty entrepreneur at Anschutz explained, "I think they should incentivize people with a larger stake for their ideas. I think that the split is a little punitive. And for people that understand how it goes, it can be an impediment to innovation."

A program director at Anschutz shared, "We also have to provide opportunities for entrepreneurs to get investment within the university. Universities need to create really, really big… I'm not talking 50 million or 100 million dollar funds but billion dollar funds, where they can invest in their own entrepreneurs on campus. We like this idea, and we're going to write you a big huge check. And we're going to share that risk in it."

A program director at Boulder shared, "Funding seems to be a big limiting step with a lot of what we deal with. That's mainly because the funding that comes from the government, from federal agencies is mostly for basic sciences. When people are actually trying to translate that science into something applicable to the real world or taking innovations from lab to market, funding becomes a huge issue because of the early stage nature of a lot of what we deal with. We have to think about, what are some other sources of funding available that PI's can use to at least get their product to a point where it would be ready for partnering or licensing or acquisition."

A faculty member at Boulder explained, "There is resistance within the conservatory space, the College of Music, in regards to, how important should this be? How central should this be in the lives of our students? I think that I have won that battle for the most part, in terms of just sort of hearts and minds. But I haven't won that battle in terms of resources."

A faculty member at Boulder shared, "I think one challenge is to find ways to institutionalize, and to incentivize within the existing structures of CU, the most promising things that we've seen over the last, call it five to 15 years. Because lots of those things have been set up sort of outside the primary ways that we reward people within the system. Think about tenure credit… they often don't have class credits associated with them. They don't have hard money lines associated with them. And so taking a look at, if we value this, what ways can we institutionally reward it. That is something I think we should be taking a hard look at now."

[84]Arts & Sciences

OBSERVATION 5.4:
Institutional barriers can inhibit new venture launches, the commercialization of technologies, and innovation within the CU system.

For the purposes of this project, institutional barriers refer to policies or practices within the university system that inhibits or minimizes the innovation capacity of individuals or groups. This section is not inclusive of all institutional barriers found in this study. However, this section focuses on institutional barriers that have had a significant impact on whether or not I&E efforts are able to flourish. It is also important to note that the institutional barriers addressed in this section are symptoms of larger problems within the university system, and have a greater impact beyond innovation and entrepreneurship.

Observation 5.4.1: Consider ways to help innovative builders work within the system, rather than around the system to maximize innovation capacity. Each individual university and the system as a whole have functioned optimally due to policies and practices that have been put in place over many years. However, these same policies and practices often prohibit or limit the innovation capacity of staff and faculty. Policies are created and overtime, compound upon one another, challenging innovation. As a result, innovative and entrepreneurial faculty and staff often create workarounds to move their ideas forward. The workaround can be described as an alternative method or process to get to a result in a shorter, less bureaucratic manner. Participants attempt to create quicker, alternative paths to get things done. Students may also have to create workarounds - sometimes they are able to circumvent the system, and other students do not think it is worth the extra effort (or even realize it is possible).

Participants suggested some practical ways to simplify processes. First, create new job codes to better support (and pay) cross-disciplinary teaching. Because of the constraints within a given semester, get creative in how we offer opportunities for students to engage in I&E (among others) beyond the traditional timeline of a semester. Additional suggestions include speeding up or automating common processes among campuses, purchasing technologies as a system rather than by department, and getting rid of outdated policies and processes. Curriculum related to innovation and entrepreneurship have to not only be accessible to any student, but to also be sustainable within each campus.

Observation 5.4.2: Silos are common and decrease opportunities for interdisciplinary collaboration. Silos are common among large institutional systems. Silos refer to departments, colleges, and schools within academic affairs, student affairs, etc., which function separately, as independent entities. This often results in a duplication of efforts, inefficiencies, and underlying frustrations. Department X may use the same platform as Department Y, even serving the same function. However, Department X and Y each negotiate, pay, and customize platforms separately.

Silos also minimize accessibility to coursework related to innovation and entrepreneurship (among others). For example, entrepreneurship is typically housed within the business schools. While there have been efforts to advertise entrepreneurship for any major, and that every major needs these skills for the future, not every student has access or is interested in business. Co-curricular opportunities are created spaces that are interdisciplinary, requiring siloed marketing efforts to come together and then hope that students with different backgrounds participate. Colleges and even departments within the same college have varying levels of exposure, support, and access to participate in I&E.

It is well documented that interdisciplinary collaboration can make the difference in whether or not an innovation, a business, a team, or a project is successful. However, interdisciplinary collaboration is quite difficult

as the system is currently situated, due to overwhelming amounts of opportunities and information. By creating or purchasing an innovation for the CU system where students, faculty, and staff connect and collaborate based on interests, it would elevate our impact- not only for our institution, but for other large universities or systems across the US who could also benefit.

The combination of silos, limited resources, and how each institution/department is measured creates an underlying sense of competition within and between each institution. Generally, participants were excited and even yearned for greater collaborations between their colleagues and between the institutions within the system. At the same time, there was an underlying sense of competition for resources, particularly funding (see Observation 5.4) for programs and staff. Sometimes this can lead to groups competing for the same students or faculty participants. The sense of competition was not explicit, but there were actual frustrations shared when discussing how other departments functioned, how they offered similar services, and how they were resourced. Furthermore, each institution and each department/program are measured separately, which may unintentionally limit collaboration.

Illustrative Examples:
A professor at Boulder explained, "There's nothing for students who really aren't interested in doing an entire business minor but just want entrepreneurship. I think there is an opportunity for us to offer cross campus, entrepreneurship, and pure entrepreneurship offerings. I think there's a lot of people, and a lot of students across campus that would benefit from training in entrepreneurship but are totally turned off and not interested in learning about the business discipline for whatever reason."

A faculty entrepreneur from Anschutz explained, "I work at a different pace than the administration at the University. Things move incredibly slowly. There are many roadblocks, including the IRB, that frankly stifle innovation. It would be nice to try to get some of those roadblocks taken down to facilitate things."

A program director at Denver shared, "If you look at InWorks white paper, and I think it's on the website. It's fascinating. I highly recommend it. Our founder, John Bennett wrote it. He helped start Atlas at CU Boulder. This whole idea was really that post-secondary education has not changed. And the world has. The way that younger generations are engaging, the way that we learn is very different. There's so much on the internet. You can take boot camps now and get credentials. Higher education is kind of becoming this weird relic because it costs a lot of money. We know student loan debt is atrocious. Why should students still be coming to a post-secondary, a four year degree institution? His whole idea was we should be innovating on how we educate students. InWorks never wanted to be this semester-based schedule. We wanted to be really varied on that. We wanted community members, we wanted professionals. But we're highly limited by the way in which we can schedule those types of courses and limited on the way that tuition is charged. And John was a huge proponent of the boot camp tuition. You pay for 15 credits, but anything past that, it's just a set cap. You'll pay for no more and that really would encourage kids to take electives that they can't afford to otherwise. For me, that's been the hardest thing to come to terms with, we haven't changed the way that post-secondary education operates in a meaningful manner."

A faculty member at Boulder explained, "I found it very hard from within the university to create an outward serving organization. We have so many particular needs and priorities that inevitably kind of conflict with what startups need right now. I found it really necessary and useful to work with outside organizations. Let them hold that work. They can really prioritize the startups running through without having to worry about, for instance, when are these students' exams? Is that student going to be available to do something?"

A program director at Anschutz explained, "There are explicit rules, and then there are the implicit rules. And those of us that have been here a long time, we know our little work around. For example, just call so and so. She'll take care of that. But that's wrong. It shouldn't be that way."

A program director at Boulder shared, "We won't start it unless there's a structural way of us getting money. But also to propose a degree, you have to go through a college. And the college's want… if they control the degree, they get the money."

A professor who started a couple businesses at Anschutz explained, "Working within the university to try to do anything is extremely difficult. It's paralyzing actually. If you have to try to find a certain piece of equipment, or you need a supplier for equipment or materials to do any physical development, you have to get the contracts to prove it. And then they've got to go out and say well, how many of those materials did you get, or whatever little piece of equipment you might need. That process takes time and it wastes money. If I needed an NDA through CU, it took four people and three weeks back and forth. It would never have gotten out of the starting gate, because it's wholly inefficient. I don't think anyone could ever get as far as I got without figuring out a way to get out of the bureaucracy and get around the inefficiencies that are inherent to the system. The sooner you can get into a structure that allows you to bypass the bureaucracy for contracting, the better off you're going to be."

One faculty member suggested, "As a university system, could we create squads or units that can move very quickly to accomplish things that the market is demanding, or that help the university or help the community or help society, while still benefiting from the connection to the university? But also have the autonomy to make mistakes and fail and grow and potentially prosper, without having to go through all those institutional hurdles."

A program director at Denver shared, "Sometimes we hit roadblocks because we're not an MS program." The program offers a certificate, which decreases what they are able to accomplish, even though there is great interest in the program.

A program director at Boulder explained, "It can be really hard to work across disciplines. And I think that's the nature, to some extent, of where the money flows."

A faculty member at UCCS explained, "Both of those courses have been proposed, they've been developed. They're not part of the catalog yet. And that's a very long process."

> **"I think the deepest partnerships we can have is when they are really looked at from all lenses and all perspectives. And the need there is interdisciplinary. And bringing different groups together with those different perspectives and skills and mindsets. Universities aren't built that way. Universities are built the opposite. And that was intentional over time. It was to allow people to create a discipline and for a number of areas to have a profession. Innovation happens at those interfaces. And right now, we've created interfaces that are hard to breach. I think that that's a key part of creating partnerships."**
>
> **- Program Director at Denver**

A program director at Boulder explained, "One of the best things the system can do to support it, is allow for that huge range of activities, which it does now. Continuing to do that and realizing that one size doesn't fit all. What works with Jeff's team in the music school is different from what works with Arts and Sciences, and it's different from what works with Venture Partners. And so it's important to have the different things, the idea labs and the different entities. And just letting them run."

A program director at Boulder explained, “And then I think one of the extra challenges we have is that this is the most siloed campus that I’ve ever been on. And so people even probably at the sub department level are so siloed, and there’s kind of that mentality and it’s like, I think we’re opening some of that up. I’m seeing that opening up in a good way.”

A faculty member at Boulder explained, “But all around is the goal of creating a more democratic and accountable online economy. Getting this sort of thing going has been a challenge, especially just in that, we’re not fitting into the boxes of centers, which get administrative support or labs, which are generally in departments that provide that support. So I’ve had to pay students to do basic bookkeeping. I’ve had to do a lot of administrative stuff, which is fine. It’s a good learning experience. But it’s very clear that we’re working in relative isolation.”

A program director at Denver shared, “I think sometimes campus moves so slowly compared to innovation and entrepreneurship, and that can be a big frustration and barrier. If you want to implement a new innovative program, you’ve got to run it through seven layers of red tape before you can actually do it.”

A faculty member at Boulder shared, “We’re supposed to be one college and we’re also made up of lots of departments and that’s a challenge we’re wrestling with. Right now, some departments have much better arrangements for supporting research grants and that sort of thing than others.”

A faculty member at UCCS explained, “I have this vision I want to try and make it work here. I think the potential for doing things across the CU system is large. But I can’t figure out how to fix any of the structural problems. And it’s not clear it’s worth my time. Because every time I’ve tried to solve any of these structural problems, it doesn’t work.”

A faculty member at Boulder explained, “Arts and Media lives in four different colleges on this campus, in one shape or form. So how in the world do you create a comprehensive program for Arts, Media Design within that construct? It’s almost impossible right now on a curricular level. Co-curricular things you can kind of do. But it makes it very hard to integrate it in any kind of substantial way or scale it in a meaningful way because of institutional barriers. I really think the only way we’re going to crack that nut on CU is if we create a sort of Campus Wide Center for Entrepreneurship in all of its forms.”

A faculty member at Denver shared, “One challenge is 100 years of siloed discipline development is a very real thing that has people’s professional reputations and motivations, also built into it. So, if I’m in discipline X, and my peers in that same discipline have this view, what I’m doing is more important to me, then seeing how my discipline might find new questions, or even find itself questioning established precepts, because of what we’re finding in other disciplines… that’s real. Having a group of people who have that futurist kind of orientation and not wedded to those gatekeeper disciplines. I think it is important for this type of work to succeed.”

A program director at Boulder explained, “I believe very much in the interdisciplinary nature of what innovation is all about. You have to work with other people and you have to bring together different skill sets.”

A program director at Anschutz shared, “There’s certainly ways in which we can partner with faculty members and foster collaborations between different departments. Our office is really sort of measured on its IP output and the impact that we have here on campus. So we’re going to be focusing on technologies that have a health care angle or healthcare bent to them. But any of these programs are open to a partnered project, where there’s an engineer up on the Boulder campus that’s looking to work with a clinician on the Anschutz campus. We can do a clinical study or engagement on campus in some form or fashion. I don’t think

we're excluding anyone from being able to access these. As long as there's a connection to an Anschutz component to it. Boulder does have other similar programs. And so, there is a consideration that the funds from these programs come from activities on the Anschutz campus or philanthropy from Anschutz. So we do want to first and foremost support our faculty members."

A program director at Boulder explained, "It really is the system. The university is fairly siloed. And a lot of times people don't know what's going on in other colleges. And that's been a barrier. That was a surprising piece that I came to realize when I came into the university system. I thought it was going to be the university. And don't get me wrong, there's lots of collaboration and lots of cross functional work. But I was surprised at a number of systems that are in place that limit that. One example is the different instances of Salesforce within the university. Leeds has their own instance of Salesforce. And then there's campus Salesforce and it's not one Salesforce where I can jump on there and know who is talking to Ball across the university. For that point, Advancement has their own CRM. So there's not even a connection there. It's the systems that have been put in place within the colleges that don't necessarily mesh well together and it keeps people more siloed. I think there would be far more conversation about interaction with industry if everyone was on the same instance of Salesforce, and everyone knew who's talking to Ball."

A program director at UCCS shared, "As an entrepreneur, idea implementation is short circuited as much as possible. Whereas at a university, it tends to be ideas, discussion, more discussion, meetings, socializing to different constituencies on campus, incorporating objections. And do you lose that creativity or energy going through those institutional hoops? And I think the answer is often yes."

A faculty member at Boulder shared, "I think we have two main barriers for interdisciplinary work. We don't have job codes that will allow cross-departmental work on this campus. We have old structures in place at this university. We have created things that job code silo faculty. We have no clean way to ask faculty to come over from Writing and Rhetoric and talk to students about genre, because they don't get it. I can't pay someone to do it because of the way our structures are set up. Right now we are having to use a voluntary method for people to work together across campus. That is the only way to do it. There is not a way to pay each other back and forth because of the way the structures are for money. And for staffing. And I think that is one of our biggest opportunities for growth on this campus, to be able to do innovative pieces with entrepreneurship is when you can actually allow people to really meld together. No matter what, we're all still siloed by the old structures of job codes and the way funding works. And that is stopping us from collaborating. The reason we work with Deming is because we like working together, not because any of us get paid to do it."

A faculty member at Boulder shared, "We need to make sure that we can get cross disciplinary teams together so that people can get credit for this. We could create a section. What I would envision is actually having a section of this class in every school. No matter what your major is, you can take this class and get credit for it. And I would like to have instructors from every school teaching their own section of it. And all the sections can compete against each other."

A faculty member at Boulder explained, "One of the things I'm most excited about is for all of us to collaborate and raise money together. It's something that we've been working on. But quite honestly, I'm kinda over this competitive nature that we have. Like units competing against other units for money. But I don't have a solution."

A faculty member at Boulder explained, "More broadly, I can say that I'm incredibly fortunate to have colleagues across campus that absolutely want me at the table and

want everyone from all these disciplines. I felt that from the start. And that is not true everywhere. I speak to my colleagues, they are like, the business school doesn't want to talk to us because we use the "E" word and that's their word. We're not supposed to use entrepreneurship outside of the business. I'm really fortunate. But on the other hand, the big challenge here on this campus is because we are so siloed and we're so chopped up between all these different colleges."

Ryan, a student shared "When I transferred to UCCS, the school messed up my credits. They said I need to take some courses in order to graduate with a Bachelor of Innovation. They wanted me to do a whole fifth year in order to graduate. I transitioned back to a Bachelor of Science. And honestly, that was my fault. A faculty member offered to work with me to get my credits to work, and I just didn't follow through because it was during Covid. At that point I had already taken all the BI classes except for one, so I got all the education, I got to meet all the teachers, I'm friends with a lot of the teachers. It wasn't really worth the time to fight and get the couple extra credits. But I do wish I had the BI."

Alex, a student shared, "They didn't offer Venture Capital Law when we could take it in the MBA, which was a huge bummer because that's the number one class anyone in Venture Capital wants to take. But when I told the administration to figure something out, they did. It was great."

OBSERVATION 5.5:
Existing Advancement approaches limit the fundraising capacity for people in I&E.

Advancement offices historically have been responsible for fundraising efforts to supplement resources in higher education (among other responsibilities). Advancement typically represents the university in the greater community, making it necessary for them to be aware of various projects and initiatives. Professionals in Advancement need data points that resonate with potential donors such as number of interactions, amount of venture capital raised, number of patents, number of licenses, and success stories.

The goals of I&E and the goals of Advancement appear to be out of alignment. Within the CU system, fundraising is perceived to be decentralized/siloed, not collaborative, and set up to compete with one another. A Google search confirms there are no centralized fundraising efforts related to I&E on the Advancement and CU Foundation website.[85] Fundraising is highly encouraged by upper level administrators within the colleges, specifically to fundraise for their own initiatives. The model sets up colleges to compete, rather than to collaborate.

While reactions are not all negative, the current process within Advancement is not working to the fullest potential. There are rules and restrictions that are misunderstood, at best. At worst, these rules and restrictions are limiting the potential for greater investments within the CU system. Collaboration may lead to bigger investment opportunities, and therefore, greater impact for innovation and entrepreneurship. There is an appetite for community members and entrepreneurs to fund innovations for both students and faculty. Bottomline, I&E leaders are connected to wealthy community members who are eager to give back. However, people are resistant to giving back to the universities for unclear reasons. Cohesion is one potential hypothesis. Participants urge CU system to think innovatively in how we approach Advancement efforts moving forward.

Illustrative Examples:
A faculty member at Boulder shared, "It would be much better if we had alumni who were interested in this realm. The problem that I see with that, back to misaligned incentives, is

[85] https://giving.cu.edu/fund-search?field_fund_interests=983

advancement doesn't want to help us with that. Because that's not what their goals are. Their goals are, let's build a giant building and put your name on it. And they're wonderful people. I don't say that disparagingly, but they have different goals."

A faculty member at Denver explained, "I don't think philanthropy can be done as it's always been done. There's certain rules of thumb that I've noticed in the different philanthropic groups that I've been involved with. One of the rules is, you can't have multiple people talking to the same entity. Another one is you always have to wait for the big ask. And there's these rules. And there's some truth to them. On the other hand, I think they need to be broken. I think we need to be much more bold, and go excite people. The way you excite people is not just the Advancement people going out and making relationships, even though they're very good at it. You have to have the other people in the institution do the same thing. And then, entrepreneurship can grow much quicker because you have the resources, you have partners that are willing to invest in it. You can't hire an advancement group and expect them to do it all. And advancement groups are set with key performance indicators. KPIs with metrics that they have to achieve. And the incentives to do so. They're going to make lots of touch points, and they're going to try to win. But it can't be just that focus. It has to be about all of the constituencies. For example, we have over 20,000 people just in CU Denver. If you can engage that group, just do the math. We're going to do so much better. And universities typically don't do that."

A program director at UCCS shared, "To me, it seems the focus is on bringing in money and benefiting the University. It doesn't seem quite as important to the university that the overall community benefits, as long as there is a growth aspect that can be seen for UCCS. I think the university tries to win-win. But I don't think they always approach it in the best way. The intentions are there, but the approach is broken or off."

A faculty member at Boulder shared, "The impact is interesting. We've been tracking impact for a while, and we do it internally. We've impacted 10's of thousands of students and community members. We define it by one interaction with us. They came to an event, they took one of our courses, they were on demand mentoring programs, etc. When I mention that to donors, they are really intrigued by that. Wow, that's a huge reach that you have to a diverse group of stakeholders. I don't know how we would do that as an organization, as the University of Colorado. But that's probably been the most emotionally engaging one that I share with prospective donors."

A program director at UCCS shared, "There's definitely an appetite in terms of donors from my perspective in wanting to fund innovation. And partly that's a function of entrepreneurs who become successful and develop a lot of wealth. And when they have a lot of wealth they want to often give back. But they don't want to give back in a passive way. They don't want to just write checks. They want to say, what's the bang for my buck, or how can I measure the results of my investment? So it's not so much a donation as it is, an investment. And I think when we're pitching the idea of you're investing in innovation, and that's good for the community, that's good for the country. There's an appetite for that because they would like more people to be changing and improving things."

A faculty member at Boulder shared, "The more that we coordinate, the more you need money to support that coordination function. And that is the exception, rather than the rule in terms of the way that money works on campus. As far as I can tell, lots of fundraising goes through the individual schools and departments or centers in a very decentralized way. And in fact, deans of schools, directors of centers, get rewarded for how much money they directly bring in. That is at cross hairs, with the impulse that we should be collaborating and coordinating. It's difficult to do that substantively if you don't have money coming in to support those

efforts. I think the first challenge is to turn the traditional University fundraising approach a little bit on its head and support efforts that involve collaboration. And then push money that's raised centrally out to the schools and centers, rather than expecting schools and centers to do it themselves and then somehow want to do the coordination function. We all understand that entrepreneurship is a sport that requires extensive coordination, cross campus collaboration, interdisciplinary, etc. But it's really hard to do it when the primary fundraising incentives remain to do this solo."

A faculty member at Boulder shared, "An example is advancement. Their incentives, they're not aligned to collaborate. Nor are there incentives for faculty to really collaborate. So as an organization, if we can align incentives that'd be great. Because there's just a lot of empire building that just gets in the way of real growth."

A program director at Denver explained, "With Advancement, they're such key players. We have to work with them and through them. But that department needs to be strong. They need to have good networks and they need to be a mouthpiece for the projects we receive."

A program director at Boulder explained, "One of the big learning curves for me was understanding Advancement at CU Boulder specifically, but also at system. I came in also with a background in fundraising and development. I thought I was going to be doing this work. And then I started talking more and more with folks and advancement and learning about the ecosystem. I was like no. I'm a liaison, on behalf of the teams, and the incubator with advancement. I say that because I think those relationships that I've been able to build have been really critical for thinking about and like taking action on sustainability for our projects."

A program director at UCCS explained "I'm not going to step on your toes, Advancement. And I'm not in it for my gain at all. I am in it for the gain of the program and ultimately the gain of the university and the system. But I just know people especially out of state that could be really great donors and the most efficient and effective way for me to get them to donate is for me to have lunch with them, or me to call them. When I talk to successful entrepreneurs and venture capitalists, they immediately understand why this is important. And then it's just a question of saying, here's what bang you'll get for your buck or here's how much impact you can have."

A program director at Boulder explained, "We created this industry foundation relations. It dual reports to my office and to advancement. And the reason that's important is that all of our fundraising has been siloed. When we do siloed fundraising we miss the big opportunities. And we did a whole analysis and research. I pulled a ton of data as part of looking at where we were going, in terms of research and innovation, stuff like that. Most of the big funding opportunities are with foundations. But if you go in and you've got all these little silos, it's not going to sell. Here's the vision for the university, here's where we're going. And here's how you could help. And then aligning, just like with venture capitalist, you have to align with the right foundations, or companies. We put the four research areas that we're known for and strong for. And then, innovation, entrepreneurship is one of the fifth areas. So they have these theme areas. And so now it's at the campus level. It's looking at bigger opportunities and bigger challenges that pull in assets that we have across the campus. Now we have a structure where we can do fundraising for innovation and entrepreneurship."

Additional Considerations: Academic and Institutional Incentives

Recruit, hire, and support entrepreneurial and innovative faculty and staff. Use recognition and awards to encourage an innovative and entrepreneurial culture. A professor at Anschutz shared, "It's difficult for organizations to do it. And so it has to be individuals that push the boundaries. And organizations talk about innovation a lot. But again, I'm a skeptic about that kind of stuff. It's just very challenging. I think you can support entrepreneurial personalities on the faculty. And I think that's where a lot of institutions, in my experience at least, are moving to." A program director at Boulder explained, "I think that we need to specifically recruit faculty who are leaders in innovation and entrepreneurship. I think that has a very strong impact on the students that are then attracted and retained at the university. But I think that specifically going out and bringing in leaders in this field at the faculty level is something that other universities do that I, maybe it's just something I'm not informed about, but I've not seen that at CU Boulder."

Offer competitive salaries to retain current I&E staff. A program director at Boulder shared, "This is something that Venture Partners really struggles with, is salary competitiveness. But for other academic units that we work with, so I know it's not just Venture Partners, can be 20% to 40% below some of our university peers. It makes it harder to attract and retain top talent. And it also hurts DEI as well. Having to have background, financial security, and independence in order to work at CU Boulder is very harmful for our diversity."

Make it easier to invest financially in student ventures. It is currently difficult to give students small amounts of money within a classroom setting. A faculty member at Boulder explained, "It is almost impossible to ethically set up a class where you require students to sell something. As soon as they sell something they incur liability. Because many of them are dependent on their parents, their parents incur liability. That's really dangerous. I would love for the university legal office to figure out some way to set up liability protection for students in entrepreneurship classes. So that's one side of it. The other side is getting money to students. There's so many restrictions on ways you can transfer money to students to help them do these ventures. It is agonizing. And really kind of scary. So students have to become vendors of the university. That's the only way we can get money to them."

Further research may explore how entrepreneurs view investing in I&E and the CU system. For example, what areas are entrepreneurs looking to invest in? What would align with their interests?

Opportunity to leverage new technologies that could be used across the CU system. A program director at Anschutz explained, "We do have a database that's called Minuet. It's shared system wide, so you've probably heard of it. I am actively looking for a better platform that does this much better, more efficiently. I think it's desperately needed. I think we're at a point where we are ready to move to the next level and I think you either end up needing to hire more people to kind of keep track of all these different things in all these different ways. And you end up, this group who doesn't know what this group is doing because you're not all on the same platform." Additionally when observing the I-corps program at the Anschutz Medical campus, participants were trained to use InnovationWithin, a software platform used to record their Business Model Canvas and host customer discovery interviews (both a common practice when developing a business). Participants only had access to the platform for 3 months. There are multiple scenarios where investing in technology can not only support collaboration, but increase efficiency and data collection more broadly.

SECTION 6: SUSTAINABILITY AND SCALABILITY

This section includes components and factors related to the sustainability and scalability of programs. Sustainability refers to whether or not a program has the support needed to maintain current efforts each year. Sustainability includes understanding elements of infrastructure, resources, and embeddedness within the university system. Scalability refers to understanding the potential capacity for a program to increase its impact, expand support to additional groups, and potentially create new offerings. While they are separated for the reader, sustainability and scalability are inextricably linked.

Observations Shared in this Section:

- 6.1 Supporting more infrastructure would increase sustainability of I&E programs.
- 6.2 Success builds upon success. Co-curricular programs start small, prove success, and ask for the investment.
- 6.3 It is challenging to find sustainable funding for students and student ventures.
- 6.4 The CU system has a plethora of opportunities to scale I&E.
- 6.5 Program directors vary in their capacity and bandwidth.
- 6.6 Constraints, concerns, and caveats will need to be addressed in order to scale.
- 6.7 Dedicated tenure lines and curriculum supports sustainability.

OBSERVATION 6.1:
Supporting more infrastructure would increase sustainability of I&E programs.

In this context, infrastructure includes the people, process, funding and other resources needed to be sustainable. Having a consistent budget - specifically a budget line, consistent donors, or being aware when initial funding of an office will run out - helped when planning over several months and years.

Participants described that technologies and processes are often created adhoc. Infrastructure is needed to support programs, pass on institutional knowledge, share information between colleagues, and train new employees. Dedicated staff roles were found to be helpful, particularly when creating processes and procedures. The hiring of a coordinator to pull campus together was helpful in connecting various groups and making efforts a bit more sustainable.

Unique in Innovation and Entrepreneurship, program directors take on a sense of ownership regarding the sustainability of programs. These directors actively pursue outside support through fundraising, grant writing, etc. It is unclear if directors are trained in fundraising. While consistent funding would certainly help, participants believed in diversifying revenue streams.

Illustrative Examples:
Erick explained, “Really great, big personalities are carrying the world class entrepreneurial ecosystem. What happens when we’re gone? Let’s build a sustainable infrastructure that isn’t just trying to refill the gas tank every year.”

Alejandro explained, “Business wise, you want a little bit of everything. You want to be nice and diverse, so that you can adjust. The

workshops are really high money makers. The grants are great for publicity. They really get your name out there. You can brag about them, especially if you get something like NSF. That's really big funding. So sponsorships, naming the labs like Comcast Center. So the Comcast Center gift was very generous, but it's seven years old at this point. We could use a new naming sponsor. InWorks doesn't have one. They could use a naming sponsor. I would love to have everything up and running and running well so that when the next crisis hits, I could shift pretty easily."

Stan explained, "I think we have the infrastructure in place at Boulder. We have a good source of mentors and judges. We have funding that gets us going. The infrastructure has been a little bit ad hoc, if you will. I would like for us to implement a source where everything rests for our mentors. I want mentors to know exactly where to go, to ask a question. The platform could include all the teams I mentor, the calendar of events, that sort of thing. I think that would be helpful."

Ben explained, "I think that to have the Bachelor of Innovation really institutionalized and to be sustainable for the very long run, I think it could require a couple things. One, ideally it becomes its own school. It has to have its own Dean, and its own structure within the campus. I think the other thing that could help it is more secure financial resources. Not only from the university, but from the broader community or even the world. If it had an endowment or multiple endowments, that would make it more sustainable. And I also think that a School of Innovation is something that the CU system doesn't have, and could be very appealing."

Karen explained that Catalyze CU is sustainable and embedded. "And we're now collecting the content within Canvas, such that if something happens short notice, there's an easier transition period."

When asked about sustainability, Daria explained, "We built it that way. When I inherited it, there weren't structures that were sustainable in place, so we created structures to make it live beyond us. A lot of it ended up being staffing. Having my own financial person was everything. She does contracts and grants for us. She does everything legal for us. She does HR for us. And she does all of our finance." She continued, "So not only did I have the person, the processes. I also have a team of very systems-oriented people who could actually take a step back and realize that we don't have a system or a process over here. And we need it for this to be sustainable. So when this person walks away, this system still exists."

Heather stated, "We're exploring funding those five different programs with specific tracks. A pediatric track that will probably be funded and sponsored by Children's Hospital. Or we could do a specific Women's health track funded by the Women's Health Center. Or it could be an industry partner track where an industry partner comes in and provides that match. Each year we have to find a new matching entity. Some of them may become recurring over time. But we're using DigiSpark to experiment with that model of having outside funders coming in and support the program. I believe that is very much sustainable and renewable. The other programs don't have as much infrastructural support. Gates Grubstake, DigiSpark, or CDIF, for the management of the program.

Dipika shared, "I would say the sustainability of this particular program depends on money from the state, and also money through our Chancellor's Innovation Fund, which we kind of have some control over because the Chancellor's Innovation Fund was really a result of the licenses that Venture Partners does and the royalties that we received. Any revenue that my office receives from licensing, intellectual property that's owned by CU Boulder, it gets split in four quarters. And one fourth of that money goes to the chancellor's office. And that's how the Chancellor's Innovation Fund works. I would say as long as we continue to do licensing deals and we continue to bring in revenue through commercializing

University owned technologies, the Chancellor's Innovation Fund will only grow. So certainly sustainable. And then the other piece is obviously funding from the state. And the state's big mission is to create jobs in Colorado. Economic impact in Colorado, talent retention and all of that. So I really don't see this allocation going away."

Brad shared, "Many of these efforts are somewhere between five and 15 years old at CU and have been driven in many respects by personalities that have passion for this area, personalities that speak to people in the community, and through structures that are not credit-bearing within the university. And do not have hard regular money allocated in the budget to them. That is a precarious position to be in. Because if those individuals leave, or if they get tired of doing it, then there's really not the infrastructure."

Heather explained, "One of the challenges, and I think during the Great Resignation, is turnover of staff. There's a lot of institutional knowledge. I've been with the program now for six years. We've built up institutional knowledge of what's possible, what can the institutions handle in terms of conflicts of interest or pathways to get things through the system. And that understanding I think is very helpful to help guide people through the pathway. It's very difficult to completely train somebody up from scratch, into all the different programs and activities there are. So that's certainly one challenge. And it's not limited just to our office but also those that are coming to leverage our resources. This innovation mapping activity and navigator tool, I think will be helpful, not only for ourselves and understanding what's being offered, but also for faculty members to understand where the roadmaps or pathways that other faculty members have used."

> **"I think the thing that kind of helped us as a campus, was the investment from someone who could be the coordinator around campus and help to get things aligned. That was an important move for campus. That wasn't easy."**
>
> **- Terri**

Terri continued, "I mean what that took is first, getting the strategic imperatives. I really worked with leadership to get that defined because until we had that, it was going to be hard to push innovation on campus. And then getting leadership that could be this coordination thing, not having to do everything but really helped to kind of get everybody pulled together. So I think that's sustainable the way it is."

Kelsie described, "We need to become more sustainable, which I don't consider us a maker space by any shape, but we do have some maker space components with the open lab access. But I think all of those places struggle to really find the niche for keeping yourself sustainable. Tuition dollars are going to be one thing for us. Denver really is going to focus on these external programs and partnerships and how we can utilize our prototyping lab and our design thinking knowledge to bring in these types of revenue generating projects. And then Anschutz is really, I mean we're all focused on grant writing. But I think Anschutz, particularly because of the medical field, there's just a lot of great opportunities for grants. So we're not currently at the level where we are bringing back in what we cost. So we're a little bit shy of that. That's kind of been on our KPIs. Over the next three years, we need to be bringing in X amount of what we actually would cost."

Matt at the Mental Health Innovation Center shared, "When we're putting useful tools in people's hands, that's our primary indicator of success. Financial would be the second goal. Are we raising enough money to sustain our efforts to a point where we don't have to rely on philanthropic funding? That becomes a nice

to have, rather than a must have or traditional grant funding with foundations. There's always government grants. It's always great. But we need to be able to sustain our efforts in the long run. Ideally, just through revenue that we're generating with our work."

Kris shared, "Design Horizons right now is backed by the Deans of three schools or colleges. And for that to be sustainable in the long term, resources are definitely needed there. Our expectation, quite frankly, is that our job is to try to go get those resources. It's not just for the system to invest in it."

One participant explained, "I've gone from almost all of my budget cut, to then get that budget back, to then gone again. You can't build a sustainable organization without transparent economics and without real planning. I think the transparency of the economics has been challenging. As an organization, we are still really at the startup and product market fit stage. Where there's too much information it's insane. I should take some time to build more systems and processes so that when I'm gone, anybody can take the keys and keep going. What happens is when you're virtual, you don't have enough resources. You never actually reach the scale up phase, which is where, by definition, you can really scale your impact. You have to have all the systems and processes in place. You've got documentation, you've got protocols. You're now measuring metrics, you're doing all the things you need to do, to be able to scale your impact. And so the organization never has time to get to the scale up phase, where you can build infrastructure."

Bryn explained, "Ascent is funded through the Office of Economic Development and International Trade. That's the advanced industries program. Same thing with the Lab Venture Challenge. That's funded through OEDIT.[86] Destination Startup is funded by sponsors in the startup community. The Clean Tech Exec program is funded by I-into, which is a program out of Wells Fargo. And PHAST is funded by the EDA. So these are opportunistic initiatives. We're seeing a need. We have a need for an accelerator, we have a need for a seed funding program, we have a need to bring in mentors, whatever it is. And we're saying, how can we get creative and go for a grant, get a sponsorship, partner with an agency to do that."

Alejandro shared, "We've had program managers that work with us for a couple months, or do consulting, they do honorariums. And it's tough on a person like me to get short term hires through the university. It can be administratively really challenging."

Demetria explained, "Because if it's all relying on one person, if that one person leaves or the one person changes jobs or whatever, then what happens? That connector, if you will, sort of ends and so it's really ensuring that there is a clear, consistent connection and an ongoing relationship with affiliate sites, community, and departments."

Erick shared, "There's a huge opportunity for us, in terms of making data informed decisions. We do some of that with Salesforce. But still too much of it is my gut and my instinct. That speaks to the infrastructure well. If we could have some more data driven decisions, I think that'd be huge. And then the other infrastructure that comes to mind is a true collaboration infrastructure, whether it's a technology. And I mean, cooperation between the different units. The units within each college, then within each university - So Boulder to Denver to Anschutz, to Springs."

Adam, a student explained, "There's a program where you can get connected to lawyers in the law school, who will help you to start up. So we applied to it like three times with different businesses. I never got into it. I've had friends who got into it, who said it's incredibly valuable, but for the majority of people, I'm imagining 80% plus. Every time they have a law problem,

[86]Office of Economic Development and International Trade

they get pointed in that direction. But then they never get into it. And it's not that you should take away the program, it's just that in everyone's minds who is a mentor, they say that there is a solution to that problem. And so they point in that direction. But really, it's an empty loop for a lot of people. There needs to be a way for there to be an approachable angle for people at all levels, and then also keep those higher level things for the people who are qualified to work with them. Because we weren't qualified, but we still needed to figure out a way to get advice with law." While the Entrepreneurial Law Clinic is a great asset to students and the greater entrepreneurial community, they only have so much capacity.

OBSERVATION 6.2:
Success builds upon success. Co-curricular programs start small, prove success, and ask for the investment.

Participants described starting co-curricular pilot programs as an experiment to test the impact. Once an I&E director proves a program is 'successful', sometimes that program gets funded. However, getting those proof points and success stories can be challenging to college and articulate and funding is not guaranteed, even if proven successful.

Illustrative Examples:
Bryn shared, "Typically we do a small pilot scale that costs next to nothing and we have no funding for. Prove that out, take it to a funder or partner, get it funded and hopefully there is a strategic alignment that can lead to further-on funding. But it's an ongoing process. Right now I think this is probably true for everybody in every domain right. We're always thinking about how to keep things sustainably funded."

Chris explained, "I think the hard part of this job is that we have to do tiny experiments to show proof points to try and get attention. Then we can start to put resources and money behind it. I feel like we're in this perpetual state of experimentation. We try a lot and have to be super wise about how we capture our learnings, so we can gain more support and resources for the work."

Jeff explained, "Leeds can say, well here's the number of new ventures that have been created. Here's the amount of Venture Capital that our businesses have generated right? They have all these really great metrics, and I don't have that. So it's a very, very interesting thing when you… I know we're talking about scalability, but when you're making the case for the resources you need to scale. The first question that comes up is, well what's the impact? What is going to be the return on investment? And it's hard to articulate."

Dennis shared, "I think once members in the Gates Center found out that we actually did have the infrastructure to support this and we could really help a scientist go all the way through to commercialization, it became very popular. And our donor is very generous in putting up those funds. She commits them five years in advance. It's a very stable source of funding and so we always know we're going to at least have enough funds to award three."

OBSERVATION 6.3:
It is challenging to find sustainable funding for students and student ventures, and these can have a huge impact on the lives of students.

Technology transfer offices are often set up to (ideally) be self-sustaining, generating revenue from successful companies and returning that back into the university system. This model supports more opportunities for innovations and particularly for new faculty ventures. However, student focused I&E efforts appear to rely on direct budget lines from the university to staff directors. Student prize money is almost exclusively reliant on the fundraising efforts of program directors. While student prize money is limited, the impact it can have in the lives of students is immeasurable. There seems to be great community interest in supporting students in the entrepreneurial

process. However, raising funds can be particularly challenging, given the findings related to Advancement, presented in section 5.5.

Illustrative Examples:
Stan explained, "I'd love to get our prize to half a million dollars. We only have a handful of people that are contributing monetarily to the NVC. That's a priority. How do we build out the ask, and the people involved as partners for the NVC? As it is right now, I would say it's not sustainable. A good portion of my time is devoted to managing the funding part, as opposed to developing programs, involving students, working with mentors, working across campus, and doing all the things that can make the program better. A good part of my time is focused on, how do we get the next $10,000 for that prize? Ideally an endowment would be great. Thirty-five percent of teams get something and less than 10% are getting significant dollars. The rest are getting $1000 or under."

Tom shared, "El Pomar provides us with pretty good resources. Not enough to really get anything substantial going. But over the years, we've done things like the Garage. So the Garage is really one of the programs that comes out of the El Pomar Institute for innovation and commercialization. It's a very simple program where we entertain applications from students across the student body here on campus. And the application is just that… I would like to build a company. And I would like to get in the Garage to help me do that. And the Garage is a facility on campus."

Jeff shared, "We give out money. So we need that funding to maintain that same thing. I think that's something that corporations and foundations would be more than happy to get money for. I don't think that would be really that big of a challenge."

> **"I think access to capital and access to money is super important. Even small amounts of money, students can stretch that far."**
> **- Randall, Student**

Randall, continued, "I think a lot of times the hurdle for the majority of entrepreneurs is access to capital. If you're not coming from a place where, and I've been involved in startups where somebody's parents are like yeah, we will fund it. And will write a $10,000 check. And that's awesome. That also excludes so many people who have great ideas and great work ethic and are going to be great entrepreneurs. Making that capital available is awesome and should continue to grow and expand as much as possible."

Sara, a student shared, "The competition itself was hard for me because I got traction, I won something. I got people to be very excited about it. A lot of people were talking about how this business could be feasible, but I would need to invest a lot more time in it. And I am not ready to give up school. I came back to school for this degree. And to some people, if earning more money is the goal of going back to school, then yeah, that makes sense to quit school and continue the venture. But for me, the education itself, I had a goal, and I wanted to finish it. So I had to make the hard decision to put that business aside."

Alex, a student, shared, "I would encourage CU to keep being super innovative. The fact that you could secure funding and you could win money as part of the class, like that's really different. I think that's what really stands out."

Adam, a student, expressed, "Realistically the competition is not appropriate for all companies. One, you have to be venture backable and two, it's kind of free money. But most people who win already have traction and the teams who have won in the past were going to do their business either way. The competition ends up being something that they just ended

up doing. So it's kind of this illusion. And so it is projected that this is an opportunity for you to be able to get funding. But realistically, you're not going to get funding if that is your goal. And so I think the competition should be framed as an awesome networking opportunity, rather than the money side of it. I think these competitions need to be more specific, in order for it to be more useful. Which is against the mantra of entrepreneurs or the mindset of a company because we want everyone to be inclusive. But at the end of the day, it ends up being less valuable to anyone."

Randall, a student explained, "I thought Get Seed Funding was awesome because there was so little friction in getting involved. It didn't seem intimidating. But we had to give this five-minute pitch to the seed funding panel. That was a first for me. I remember that was so fun. That was such a rush presenting this concept. And even though it's a very small environment and a small scale thing, and I was very early on in knowing how any of this worked. It was still really exciting."

OBSERVATION 6.4:
The CU system has a plethora of opportunities to scale I&E.

The CU system has incredible I&E programs that are ready to scale. Not only are program directors ready to scale, but people who would likely benefit from these services are also ready. As a starting point, many workshops and speaker series have transitioned to hybrid or remote, due to the Covid-19 pandemic. For example, the "Ask the Expert" series are infinitely scalable, due to the remote modality. Competitions within the system have plenty of opportunity to scale without watering down the impact.

As students and faculty become more aware of existing resources, programs already in existence will need to scale to accommodate more innovators and entrepreneurs. As more students and faculty engage in I&E, more support will be needed. Investments may be needed to guide the earlier phases of the entrepreneurial process, as people with less exposure may need more support along the way.

Additionally, there are several scalable teaching methodologies that could support both innovation and entrepreneurship within and beyond the CU system. Multiple trainings have already been created by world renowned professors and can be translated to a wide variety of audiences to build the I&E mindset and skillset.

Illustrative Examples:
Erick, a professor at CU Boulder, teaches a model of entrepreneurship around the world. The methodology remains similar across various groups, but can be modified to accommodate different aspects of culture, identity, and experience. Sarah Engle (CU Denver) and Erick have discussed a potential partnership to create a program to train our large veteran population in the state of Colorado. However, due to time and resource constraints, this work has been challenging to create. He also explained opportunities to expand efforts for rural entrepreneurship. He shared, "The big feature that we could scale in such a bigger way is our rural Colorado workshop series. So this obviously is specifically for everybody outside of CU. And that's been a great program. We just completed our seventh year. But all of our programs outside of the classroom I truly believe could benefit from more resources and scale. And I'm a big fan of that. We built the engine, we just need more gas."

Heather explained, "The startup toolbox through Gates has been just for Regenerative Medicine because it's funded for Regenerative Medicine. It's actually got enough money now to really go out and advertise widely. And that's our plan. But it's taken a while to get to that point."

Kris at CU Denver partnered with several researchers to develop the Design Innovation

Methodology. This methodology helps organizations use design thinking and systems thinking as tools for strategic impact and organizational transformation.

Susan explained, "With sufficient resources, mHealth could scale. We are a soft funded department. We are a research shop. So everything is either on contracts or grants. And I'm not a tenured faculty. I'm a research faculty. So if you're not generating your own grants and projects like that, there's not as much in the way of stable resources to continue to employ, and develop and to grow faculty along those lines - faculty and staff. But it is certainly scalable, especially the more and more visibility that we have and the more and more work that there is available. And as this market area grows, I think we have a really great opportunity to potentially bring, whether it's to bring in more things through contracts or seek more grants, or if there were to be other opportunities for more infrastructure funding to improve foundational labs instruction and support. It's all a cascading system in that regard. What I could do with half a million dollars would be to triple the size of my program."

Brad shared, "The Entrepreneurial Law Clinic does not do trademark prosecution. And what that means is we are not yet authorized, and really don't have enough expertise, to file federal trademarks in front of the United States Patent and Trademark Office. We do some of this on the patent side; we do not do it on the trademark side. That's an area which the community, both companies on the campus and off, have quite a bit of need. That is an area in which we could open up a new clinic. It would take significant infrastructure including probably some money to fund a professor position there. But that's something that we could think about that could be valuable for companies at CU and off CU if you want to do that. And there's a regional office in Denver of the United States Patent and Trademark Office that I know would love to see us do that."

Stephen explained, "We are generating 40 startups a year at a CU and generating $4 billion in venture investment annually. I mean, you think about the magnitude that those kinds of things could do. And the reason I say that, we have that volume of innovation. So it's not that it doesn't exist. So it would be such a good investment, with such a great return. So you hate to say, because everyone always says, I need more money. Yeah, but it is true to some extent. It really is. And if there were two of me, or if we were dividing and conquering across a couple of different programs, we could do more."

Theo shared, "How do we take research across our system that might not see any type of entrepreneurial play and turn that into a very efficient place to test out and see if there is that non-incremental economic value creation opportunity from research that might not have ever found its way into a Business school. And if you think about it, like humanities. What are we missing in Humanities Research right now? Social Sciences Research right now could become entirely new industries or business models."

Chris shared, "If we could get a 2 million endowment for NVC, we could do more. We could offer a couple of different tracks for the New Venture Challenge. For example, there could be a freshman and sophomore track, and a junior and senior track. One track could be for folks who are just coming into their venture and are at the idea stage. They may need some more coaching and could just give a pitch. The varsity track could help participants get ready for a demo day to meet with venture capitalists."

Sarah described there is a growing interest in entrepreneurship, particularly online. She said, "We can see the leads for entrepreneurship. So I'll start with academics. We can see those leads, so we know that online is really interested in entrepreneurship. And so we have an opportunity to scale in that area. And we already have the curriculum built out. And we're current. We're always updating that.

So we don't have to dilute anything to make that happen. We really need an MS program, though."

Benjamin explained the idea of creating a Masters of Innovation degree at UCCS. He shared, "I believe there's a lane there for growing companies who want people who think more broadly than their particular discipline. And it's a degree that people from different disciplines could get as a graduate degree. And with innovation in the title I think it would make them attractive in the marketplace." There are also discussions about a cross-campus collaboration (Ben/UCCS, Sarah/Denver, & Chris/Boulder) to create a Master's of Innovation degree accessible by anyone in the system.

Stan shared, "NVC could be massive without watering anything down. When we think about the entrepreneurial mindset, it's an advantage for every single student. That mindset applies not just to the business world, nor their job. It also applies to daily life. For example, my car broke down. I've got a problem. How do I solve that problem? The entrepreneurial mindset helps students learn how to identify problems, solve problems, and come up with plans. That whole process is invaluable to every student in every major. And so is it advantageous for every student to have this experience? If we could have all 30,000 students go through this program in some way over the course of 4 years. Absolutely. I think that's not only ideal, it's doable. We need to get all of the colleges on board and have it as part of the curriculum. It could be huge."

Robin shared his recommendations to scale when he explained, "Usually, it's the regulation (in the medical device space) that's the pain point. It's the manufacturing, that's a pain point. You know its intellectual property and all the expertise you need. Regulatory expertise and quality expertise and manufacturing. All this, I mean like the number of standards in medical devices, it's just huge. And so if that expertise and resources are centralized in some way, let's say on a medical campus. Then I would say that will do a lot for scalability. And so you see companies that are private companies that help startups and medium sized companies do these things already. So they have as part of their manufacturing, they have a clean room. They have a manufacturing floor. They have these ways of working that leverage the expertise across multiple product lines, and so forth. I don't see why that cannot be reproduced on an academic campus."

Kelsie explained, "Definitely the classes for sure I think could scale. I think we want to still keep our class size small. I think it would involve bringing in more instructors. I think the curriculum that we've developed, the teaching tools, the workshops, that's all built. So we could scale that across multiple spaces as long as we have enough staff. Yeah, absolutely."

Sarah shared, "There's a lot of room to grow the CLIMB without watering anything down.

Stephen explained, "We are scaling Destination Startup. We started with just our Colorado institutions and national labs. And we continue to reach out to the national labs to try to get more. They do a lot of theoretical research and they don't do a lot of commercialization. So when we start getting things out of their labs that do have commercialization potential, it's really exciting. By bringing in the additional institutions, it raises the bar higher and higher. CU… between Anschutz and Boulder, had the lion's share of the applicants. And the lion's share of the teams that were selected. And keep in mind we don't select the teams, outsiders do on a secure platform that we have nothing to do with. The other thing that we're finding is, as the impact of this grows and as venture capital is invested the commercial interest in this increases. So, CU is not spending our own dollars on this program. It's sponsored through corporate contributions.

Jeff explained, "We need to have an undergrad certificate for all the creative units. And it's nothing that a little bit of money wouldn't solve right. It always comes back down to that. You know, could I teach my entrepreneurship class

to 50 students instead of 20?I think that would compromise the quality. One of the models that I am thinking about for this cross campus thing is if we created an asynchronous online course that has what I call the core concepts. The things that are going to be true, just as much for a musician as a visual artist. For example, the importance of networking, how to write a good grant, time management, intellectual property. But then the live, in person portion is breaking out of what I'm calling the lab section. So the musicians taking that class would have a lab session with me where we could talk about how the most important thing we're interested in intellectual property is copyrights. And let's have one of our grad students come in or however we want to deal with that but now that specifically, the folks that are over in theater can talk about issues around intellectual property that are unique to them. And visual artists can talk about, you know, etc. And all we need then are some adjuncts to lead those lab sections right. So when I think about scalability, the thing that's most interesting about it is that the program's themselves don't actually cost a lot of money to administer."

Brad explained, "I think without too onerous an effort that we could scale the community facing activities like Entrepreneurs Unplugged, like the Crash Course series and bundle them up with some other offerings across the campus, So that CU Boulder is one of the key places that the startup community wants to regularly plug into. And that's probably about a monthly cadence, maybe a twice monthly cadence. So that if you've got offerings, that if you're a CEO, or a founder of a company, you're a technologist who is looking for co-founders, you're an investor in the community. You've got some sort of functional specialty that you work with emerging companies. Maybe you're a finance person, marketing that you've got something at CU that you feel like speaks to you. We're doing some of that on a regular basis out of Silicon Flatirons. Deming is already doing some of that at the business school. And there are other events across campus. But we don't intentionally package that across the campus, in terms of the community series or something like that. Those are not events that take an enormous amount of work to put together. They're not super expensive, and it's probably more a matter of having someone, could be even a student fellow or a post grad fellow for $50 - $75,000 a year. Part of their job to make this an excellent series, market it properly. You don't want the university trying to own the startup community. But for CU to be an important part of the infrastructure in the startup community and opening up our doors, that is scalable."

OBSERVATION 6.5:
Program directors vary in their capacity and bandwidth.

Consistent energy is needed to support I&E efforts. Participants described how they wanted to do more for innovators and entrepreneurs, but were limited in their capacity and bandwidth. Participants would describe what they wish they could do, then explain how they have not had the capacity because of staffing or time. While capacity and bandwidth are connected to infrastructure, they were created as a separate theme due to how often it was mentioned during interviews. Capacity and bandwidth are also connected to both sustainability and scalability. For example, a program may be sustainable and want to do more, but are not able to do so within their current capacity.

Illustrative Examples:
Matt shared, "We need to do a better job of publishing, and putting stuff on our own website and creating our own library of white papers. Right now, we just do them as deliverables for the company's we partner with. That's one area that I want to improve upon. We just haven't had the staffing to be able to do that."

Robin said, "Entrepreneurship requires constant and significant input of energy. I mean it's not a resonant process. You can't just put one piece of energy and it suddenly just keeps going.

You've got to keep putting energy into the system."

Kelsie shared, "I think if we really started to find advancement sponsorships. Because I think at InWorks, we haven't been super great at finding people who believe in this idea and want to sponsor or help with our mission. I think it would be a great thing to fund and have in the Denver community. But it's just limited bandwidth."

Don explained, "I haven't had the resources where I really even allow myself to kind of think broadly about what would be possible. I really would hope that someone at the top will begin to invest in Arts and Sciences. And if the administrators won't do it, let someone else do it. Put the money in their account and let them run with it. There might be some administrators who are fearful of failing in this area. That's fine. I would just suggest, step aside and let some other people who are less fearful, do that kind of work. And another barrier is time. And it's kind of risky to do that. You're evaluated largely on your research and I'm able to keep that up. But to keep these things afloat seems to take more time and more innovation and creativity. So that is a barrier. The other professional programs at CU, they've been up and running for many years. They have many more resources and people. And I don't think they quite face those challenges. But that is the case in Arts and Sciences."

Heather shared, "It's hard to have the bandwidth to do everything we want to do. Scaling that interaction with faculty and researchers, their knowledge of what we do, how we do it. Their knowledge of, what do they need if they've got an invention. What is an invention? How to bring it to, whether it's a care pathway, whether it's copyright, whatever it is. Not just patentable, cool therapeutics, medical devices, diagnostics. But just everything and making sure that they know that there's a conduit and that we're here to help them. And that there are all these resources. So kind of scaling that as much as anything would be part of it."

OBSERVATION 6.6:
Constraints, concerns, and caveats to scaling I&E.

The good news is that most programs would be able to scale with some additional resources, staff, and agility. Participants were mindful that while scaling is possible in most settings, they would want to make sure that participants continued to receive individualized attention to support new ventures or innovations. Programs are facilitated by the directors, trainers, and community mentors who provide individualized feedback to teams. In addition to hosting training or workshops, participants have to manage administrative tasks, recruit faculty, students, and mentors, fundraise, and support individual entrepreneurs through case management.

Participants were challenged with, what comes first? Should teams try to increase faculty or student participants and grow beyond their capacity first, or should teams raise or advocate for programmatic funding first, then scale their program? This presents a challenge for the centers and institutes who have industry partnerships, for curriculum programming (certificates, degrees), and for directors who see a need, but are unable to meet that need because of resources.

Illustrative Examples:
Matt explained, "Yes we can scale with some caveats. We can't scale if we stay functioning within the university as we currently are. Just the bureaucracy, the state. Those problems become magnified if we just continue to grow at the university like we are now. The biggest challenge for anybody doing an innovation shop is when the master or parent organization hasn't changed the processes and it hasn't been innovative in their approach. That makes it really hard. And we're in that situation right now."

Chris shared, "It would be great to staff someone in A&S. This is our wish. And what if we had an I&E person in A&S and 50% of their

job was to help with the New Venture Challenge to support ideation and recruitment?"

Heather described, "SPARK|REACH is scalable to the extent that we have resources to pay for Project Managers. There's a lot of need with all these supporting mechanisms. And the mentors, advisors, and organizing the education. It's a heavy lift organizationally to create more of that. But the programming itself is scalable to many other innovators. And that's why the education programs are open to the campus."

Bryn shared, "When we run a program like Started Blocks which is part of I-corps, we'll have a cohort, a class, basically, a two week class of training. And doing it online helps. But we mentor those teams. Everything that we do has a personal touch. We're assigning mentors, we are giving hands on, one-on-one, guidance and coaching. And so if we want to scale the program, in this case, Starting Blocks, but I think it applies across, could be scaled. But it would require more resources to do it. So it's not massively scalable without really being scaled proportionally with additional personnel and planning."

Erick shared, "Our core competency and what we do better than anybody in the state and in this region is the teaching and research of entrepreneurship. Let's leverage the hell out of that. If we have three or four faculty members run a boot camp for Anschutz, it's like everybody's a winner. But obviously, it takes resources to be able to do that."

Don explained, "The other thing I'm on the verge of doing is getting approval for a graduate version of the Social Innovation certificate. That won't require any new instructors, but it does require a bit more time on the Directors part to verify people can take classes and so forth. That's maybe another challenge for sustainability that I face, but it's not unique to me. It's one of the plagues of all the certificate programs as those programs grow, it's really hard to verify. It just takes a lot of time to verify that students have completed all the requirements. The registrar's office doesn't really have a system set up right now that's really user friendly. And so it's a very time consuming and clumsy system. And especially when you have two certificate programs like I do, it can take a lot of time. So, you know, ideally it would be great to have someone just to do that kind of legwork."

Susan explained, "It's the sort of thing where you can be on the cusp of growth. But we can only take on as many projects as we can responsibly staff. And we can only responsibly hire staff when we have the resources to support them. It's an ongoing challenge. And of course during the pandemic with the pauses on the number of things. The work continued and grew but the ability to scale it did not continue to grow. So everybody was a little bit strained and stressed, I think. We have a really good team and really committed people. Unlike a lot of places that I hear on campus. And we didn't lose anyone during the entire thing. Which is really a testament to the strength of the team that I would like to continue to support and grow."

Terry shared, "The Bachelor of Innovation is about 650 now. We've actually been trying to decline because our budgets have not been supportive of the staffing needs and so we have been trying to keep up. We could be five times larger. We've told campus we can grow 10-15% in a year. We were growing at 35% a year for four years. And we can easily grow at that level for a while. And eventually we will be saturated because of the size of the campus. But there's a lot more interest. We have students from departments who refuse to afford a major who is interested. And I think we can have much more. But we'd have to have the staffing and support. And that's where campus has not been at all supportive. We have - staffing wise, we have less than one full time tenure track faculty associated with the program. And we have over 600 majors and teach >3400 student credit hours. Not a great student to tenure-track faculty ratio."

> **Design Horizons has the potential to grow, but we need more resources and there are some challenges with co-leads because everyone is strapped for time. It's a three-year commitment, so we can validate it and fundraise around it. The Jump Incubator and the Flash Accelerator are still pilot programs, but could slowly scale in the future. We need more resources but there's a lot of opportunity for growth."**
>
> **- Sarah**

Matt shared the following. "An example is when we talked to the CEO's when we're first setting this approach up. What we heard from them over and over again was, we don't want to work with universities because you're so slow and your answer for everything is a five-year randomized trial and you want to be able to publish papers to build individual academic careers. So we said cool. Our center is not going to be a place for people to build careers. I don't give a shit if somebody has a professorial track and their faculty appointment or not. It's great that there are centers like that, but if that's your interest and you want to be a professor go somewhere else because we're not, I'm not looking for opportunities for you to publish. And we said, well let's speed up. There's ways that we can bring rigorous science to bear on this work, that don't rely on long term randomized trials. And so that's great. We were able to figure out how we can go fast. But ultimately like for our contracts with these things, we still hit the state and the CU legal system. And that process then becomes just paralyzing. And so we've promised them that we're going to be fast, then we go to execute a contract and it's four months. You can't do that. And we can't scale when that's happening. I think that there's other universities that have figured out better models, including spinning centers like ours out as standalone nonprofits or for profits that are partially owned by the university so you maintain that affiliation. But that enables them to be really nimble to do their own legal to execute their own contracts, all under just a standing master agreement with the university. And then still be able to tap into the University for things like the IRB or using office space, connecting with other entities across the four campuses in our case and things like that. So if we're going to scale, I really think we're going to have to look at some of those options. And also things that allow us frankly to have lower overhead."

Karen shared, "So I think the only way that it could scale was, if we were able to coalesce genres. So six to eight teams which gives you 20 to 25 people. I can know each of their names. I can personally look at the products they're developing. I can help use mine and kind of our university's network to connect them with mentors. Beyond that, there's just not enough hours in the day. Or the week. So, in order to scale it, there would need to be another managing director."

Becky said, "I guess the idea of saying, the average Art and Science student wants to come and build something, or many of them do. We need to put new things in place to get them from, say, a ground zero up to, I can draw something up on CAD, so I can 3D print it. And to be honest, not every engineering student learns those things in their classes. It's really discipline specific... We have to train them from the ground up. And so I think it'd be great if we were able to serve more students, but I also think we probably then need more capacity to truly support them."

Bruce shared, "But I think if you tried to have the Academia Industry Alliance as one big system level organization, you would lose those individual relationships at the campus level, and you would gloss over… so we are very biomedical focused right. Boulder is very physical science focused. And so, there are very similar opportunities for everybody in Boulder, but it's going to be a slightly different flavor of career and bio science company and things like that. So I think you would want to

capitalize on the strengths of each organization, of each campus, but you could have the same structure that would work for all of them."

Delaney explained, "In regards to scaling the Startup Colorado network, whether that's insightful interns, people like that. And bridging more departments for that to become even a project for the right student or group could be interesting. Financial resources are always welcome. And really, financial resources for our team, one of the things that really helps a group like us, quite frankly, the most, is any percentage of operational capital. And that's never exciting. Everybody always wants to know that you're going to go do something new and start something new.

Terry explained, "And I think the limitations of the traditional University are an impediment to innovation, entrepreneurship. They all want to talk about entrepreneurial activities. But they won't actually structure them, so that you can do them. And that's I think by far the biggest thing. The question of scaling, we can figure all those things out. If you have the right structure and the right funding, we can scale."

OBSERVATION 6.7:
Dedicated tenured lines and embedding I&E into the curriculum supports sustainability and scalability.

Participants believed that the I&E skillset and mindset are crucial for the future. Classes offer structured support for students who may be less likely to engage in I&E voluntarily and will build confidence in students who are interested, but have no exposure. By placing I&E into the curriculum and supporting them with tenured line professors ensures programs are embedded into the fabric of the university.

Illustrative Examples:

> **"In some cases, a course can help with entrepreneurship, as it allows for ongoing support. And it allows for a frame in which someone who does know these structures can support the students across the semester to get them ready to work through their questions and concerns."**
> **- Nathan**

Nathan continued, "One off advising is a lot harder to do from our perspective. Except for grad students, we just don't have the interface or the capacity to support students one by one. So, for that kind of faculty support I think a class would be really useful. Some students might not want to do the class and would prefer to do it on their own and figure it out as they go. But I find a lot of our students are people who want to know the rules, and then learn to play by them. And so I think a kind of structured approach would be really valuable for a lot of them."

Jeff shared, "The fact that this is now a tenured line is huge from an embedded standpoint. It's like the Regents would have to vote to eliminate the position. So that's the good side. One of the courses that I teach which is the sort of baseline foundational music professional skills class is now required for all undergraduate performance majors. Which is just about 80% of our undergraduate students. So that's definitely an embedded piece because now it's in the degree plan."

Brad shared, "The clinic is sustainable because it has a hard money faculty line that supports it. Annual Conference is sustainable because it's sort of built into the Silicon Flatirons budget on a regular basis. To a certain degree, unplugged and the crash course are also fairly sustainable in that they're kind of baked into the Silicon Flatirons budget, and really not very expensive to run. And then in the concerns category, Startup summer is something for which the

outsized impact on the participants does not seem to have as much market support as we would expect at this point. And so in terms of fundraising around that. I don't feel like we've been able to raise money that covers the cost for startup summer in a way that just feels built for the long term."

Terri shared, "I think the piece we're missing is the embedded academic part of this. And so everything is… and it's low hanging fruit. Like let's do co curricular. It doesn't threaten anybody. The next thing is to embed it more into the curriculum. And there's some real challenges to doing that. That takes a ton of legwork and a lot of buy in. So that's the scaling piece that I don't see there yet. And I think the other part is getting Arts and Sciences to embrace it more. But really what we're talking about, all of these different units haven't embraced it. I don't think you want it all to be in the business school because it's not just a business school skill. And there are some students that just aren't going to go to the business school. And at some point, they might recognize oh, this is something I could learn more about if I did a business minor. But some of them will never get there. And so I guess from the CU Boulder point of view, whatever we can embed where they are. That's going to be so powerful."

> **"The next thing is to embed I&E more into the curriculum. And there's some real challenges to doing that."**
>
> **- Terri**

Daria shared, "Now the hard part is, then you overload the New Venture Challenge folks because you have all these people coming in. So you have to make sure the infrastructure is there on that side. But I think that was a great example of how you were able to make sure that the students were constantly mentored and connected. Because, again... Every time it becomes voluntary, things get lost in the mix. I don't think that we've thought creatively enough around course offerings."

Stan described "We have to break down all those silos. Really everything comes down to money. The hard part I think is many of the curricula within the colleges are so packed already. They say there is nowhere to add this. The next thing you know students are on the seven year plan and that doesn't work. And so, it would take a lot of work to figure out what falls off the plate. The various colleges allow this to come on, unless maybe it's woven into existing coursework that is already required, which again takes money."

Additional Considerations for Sustainability and Scalability

Technologies like Zoom and Coursera can help scale the impact of I&E. Jeff shared, "One of the things that so many of us learned during the pandemic is that Zoom is not always awful. Scalability is one of the perfect examples of that. You can serve a lot more people in a broader place if you can do it remotely. So one of the things I'm in the middle of working on right now are some Coursera courses through the Office of Academic Innovation to essentially take these classes that I teach here, and create non-academic credit courses for the public at large."

Physical space to scale was only a concern by one program. Becky explained that the Idea Forge could not scale to the community or CU system. She shared, "In that, the amount of people that we have, and the amount of equipment and tools. We are more or less at capacity. It's available to all CU students, faculty, and staff. I think it would be a big challenge simply because scaling for us would mean more people and more equipment which means more space. And space is certainly at a premium on campus."

The CU system could bridge the gap between community needs and experiential education. Terry explained, "Every semester we have between 40 and 50 clients. That's

the part that's hard to scale because you're always looking for clients. You've got to find these people. And what they do is they get an innovation team, between three and five students who are multidisciplinary. And we try not to take on projects that are just go build me an app, or go do this marketing project. We want them to be cross-disciplined. And then they help advance that. And the students have to work out their own scope of work. They actually have deliverables and schedules. They go through a whole bunch of project management processes, as well as learning what it takes to help solve that client. Learning how to deal with clients is a really important skill."

Common infrastructures across the system may support community mentors and industry partners. Chris shared, "Think about how we're scaling across the system those community partnerships. Because I think certain courses do it where professors might have linkages to industry. But like how do we have that engine over and over where students are getting that experience with the community. There's a ton more we could do with mentors in the community."

With the exception of one program, most programs were sustainable at least for the immediate foreseeable future (6 months to a year). Don explained how Map the System - needs $5000 to sustain that every year - "Yea it's just the funding. We have to pay the entry fee. And, unfortunately, it doesn't look like we're going to do it this year."

Scaling academic partnerships. Jeni, a CU Boulder employee from Western Colorado University explained, "I end up wearing a lot of hats. And a lot of them end up supporting Western and Gunnison, which is kind of interesting because I am a CU Boulder employee. But right now we are looking for 15 million to build out, on Western's campus, and maybe this is something that CU is ultimately interested in helping with. But actually creating, I'll say this very long-term. I don't know if this is what it would be called. But this is what it encompasses. It would be outdoor industry product manufacturing, like a co-op. because what's happening now, when you live in a small community, it's really hard to get things done. Specifically, prototyping. Now, if we are connected to that industry partner, we can help with the prototyping. But specifically, that first batch of production of product, meaning that 100 -1000. How do you get it out to Moosejaw's catalog, REI? They require several thousand of a product to be manufactured. And our folks just can't do that. I'm hoping we can identify some areas that we are actually able to do some light manufacturing here in Gunnison without having to send it out."Nathan, a CU Boulder employee at Colorado Mesa University explained that culturally, engineering students are not really interested in entrepreneurship. They also have a high percentage of first generation students and being an entrepreneur is perceived to be too big of a risk. Nathan explained that they would need more support in this area, particularly a faculty line to support an entrepreneurial culture.

There is an opportunity to fund rural entrepreneurs. Delaney explained, "The way that we've built our model, we've got four and a half staff, serving across the state. And we're doing it for $670,000 a year. So it's an incredible ROI for the kind of reach that we have. And while we have four and a half staff, that's pretty, pretty lean in terms of staffing for that kind of reach and the way we've built. So that's really exciting. And so a full 15% of our budget goes back into the entrepreneurs directly through those community sponsorships and scholarships and the award bucket. That's something else that always needs more funding, is how do we get more funding for these sponsorships and scholarships."

04

PART 4:

OPPORTUNITIES, CHALLENGES, AND THE PATH AHEAD

This final portion of the report provides a prescriptive perspective about I&E challenges and opportunities across the CU system. During interviews research study participants shared recommendations to improve I&E efforts. Our investigation augments those suggestions with further ideas based on observations, research, and analysis. Finally, Roundtable participants collectively shared insights on a working draft of this report on June 7, 2022, and the final report incorporates ideas from that discussion.

Part 4 proceeds in two subparts. Initially, we distill notable challenges across the CU system. Next, the primary thrust of Part 4 highlights recommendations and actionable ideas. In particular, the report proposes nine broad recommendations. For each recommendation, we include specific, actionable ideas as to how the recommendation could be implemented.

The I&E activity compilation in Part 3 underscores high levels of heterogeneity with respect to programs, successes, and failures across CU system institutions. While there is significant variation between the campuses, at least three common, prominent challenges are nonetheless identifiable across the system.

1

***First,* to date the CU system lacks a cohesive I&E strategy.** The strength of I&E programs is, typically, bottom up. Decentralized decision-making and on-the-ground leadership is powerful for innovation and entrepreneurship. Local discretion empowers faculty and staff to launch new programs, dynamically adapt, and quickly run experiments.

There is, nonetheless, a compelling case that a system-wide strategy which confederates I&E elements would help CU to become a powerhouse. In the absence of a strategy, it is unclear which goals and outcomes should be prioritized. Moreover, individual leaders lack incentive and resources to conduct big picture analyses. For example, there is little shared knowledge about best practices and performance of other public university systems. Relatedly, data collection and measurement of key outcomes is limited, which frustrates efforts to judge system wide - or even campus wide - performance.

Opportunities for collaboration are routinely missed. Interviews revealed that while some participants are aware of I&E at other campuses, participants rarely have meaningful insight about what other campuses are doing. Sometimes this results in duplicating efforts where assets could be shared. As more people become involved, funding is needed to increase staff, support new projects, and develop new ventures. In sum, a system-level strategy could yield greater coordination, data collection, funding availability, and resource sharing.

2

***Second,* awareness about I&E, on and off campus, does not yet reflect the impact of I&E activities.** Challenges to make I&E activities more visible are, in some respects, typical among university programs but necessary to inspire and motivate people to get involved.[87] After all, attracting attention is difficult amid the plethora of opportunities in the CU community which invite students, faculty, and staff to engage.

When it comes to I&E, however, there are unique challenges to consider associated with awareness and visibility. One issue is that the language of entrepreneurship is heavily business-centric, and therefore may discourage individuals who do not self-identify as an entrepreneur or innovator (think: a Sociology major in Arts and Sciences). A second difficulty is that, when it comes to I&E, finding the right point of entry can be hard for a student, staff or faculty member. The decentralized nature of I&E assets makes the offerings tricky to navigate. Various accelerators, incubators, workshops,

[87]Klofsten, M., Fayolle, A., Guerrero, M., Mian, S., Urbano, D., & Wright, M. (2019). The entrepreneurial university as a driver for economic growth and social change-Key strategic challenges. Technological Forecasting and Social Change, 141, 149-158. https://doi.org/10.1016/j.techfore.2018.12.004

programs, and events related to I&E are difficult to find, even if you are an I&E leader working at one of the universities.

Most students are first exposed to I&E in the classroom and this typically happens late in their college experience (often in their junior or senior year). This model limits access to those who are seeking the experience, rather than those who may benefit from learning the I&E mindset and skillset. Students who have historically been underrepresented in higher education such as first generation and minority students, may be less likely to actively seek out I&E experiences even though they could greatly benefit. Efforts are needed to increase the diversity of students and faculty who participate in I&E.

More broadly, I&E marketing efforts mostly target audiences within the CU system, as compared to reaching audiences outside of the CU system. Success stories and meaningful data about I&E is not easily accessible, especially for those not already connected to I&E. Our interviews strongly suggest that details about the breadth, scope and impact of I&E efforts at CU do not appear directly tied to support student recruitment, advancement efforts, government relations, or legislative agendas. This is a missed opportunity.

3

***Third,* campus institutional structures impede critical I&E efforts, such as sharing resources across disciplinary boundaries and expanding industry partnerships.** Individuals at different schools and departments stand up I&E efforts. The availability of many I&E offerings, especially in the classroom, are uneven. Some programs operate exceptionally well; others have had limited I&E success. There is a compelling opportunity for greater resource sharing across schools and departments, yet bureaucratic challenges - ranging from where tuition dollars are paid, to credits for classes toward a degree - can be problematic. More fundamentally, much I&E work involves cross-functional teams. To date there are limited offerings for interdisciplinary I&E classes where, for example, a business, engineering, and arts & sciences student team works on a common project.

Further, several groups across the CU system have strong industry partnerships, dedicated donors, and community relationships. In fact, some programs bring in industry partners to create better products and services for the community, while also generating revenue for the university. Bureaucratic processes, however, can be slow. Industry partners and startups may lose interest or get frustrated and therefore choose not to work within the higher education context. The IRB process, drafting or negotiating contracts, and hiring people to support new projects can be time consuming. These processes are indicative of challenges within the greater CU system.

Below we propose nine recommendations. For each recommendation, we identify actionable ideas. Each actionable proposal is tagged with respect to the perceived level of resources (high, medium, or low) required to implement the idea.

△ High level investments - Would require large amounts of funding and/or staff resources to implement.

○ Medium level investments - Would require either additionally funding or staff to implement.

▽ Low level investments - Would require limited funding or staffing to implement and would likely require someone already in a position within the CU system/individual campus to lead.

#1 - Increase Awareness, Visibility and Marketing of I&E Stories.

The CU system should claim and champion its I&E successes and build awareness about I&E opportunities across campuses. There is a disconnect between impactful I&E activities and the CU system's messaging efforts to key constituencies, ranging from the legislature to prospective donors to the general public. I&E stories across the CU system should be more routinely surfaced and packaged in a manner easily usable by CU Advancement, legislative lead liaisons, and CU Administrators. Stories would also be useful for prospective students, current students, and faculty (recruitment and retention).

Constituents such as prospective students, the greater community, and government officials are questioning the value of a higher education degree. The value of a degree also came up spontaneously in several interviews with participants, but was out of the scope of the current study. As members of the higher education community, we are charged with making sure that a college degree from CU is worth the time and money of students. The mindset, skillset, and experiential nature of I&E directly prepares students for the future, making a degree worth their while. There is an opportunity to leverage and market how I&E impacts the preparation of tomorrow's leaders.

Findings showed that each campus operates separately and feels disconnected from the CU system, as well as from other campuses within the system. Most participants were also unaware of I&E opportunities on other campuses. Connecting with others across campuses will help spread awareness of programs and services, energize the I&E community, and share best practices. As a result, people may feel more connected to the CU system and to one another.

Students and faculty often find out about I&E programs by random chance, if at all. More resources and marketing efforts could be supported to bring awareness to I&E opportunities for students and faculty. Staff outside of those leading I&E programs are likely unaware of opportunities to develop innovations or entrepreneurial ideas.

Practical ways to increase awareness, visibility, and market I&E:

- Create opportunities for inter-campus connections and collaborations. Bring I&E program directors and faculty together on a yearly basis to better understand, connect, and share best practices to strengthen the CU entrepreneurial ecosystem.
- Link everything on websites related to I&E and CU.[88] For example, when looking at one entrepreneurial website that refers to another event, program, or office, a link could be directly embedded. This could also be used in other areas outside of I&E and encouraged by individual website managers to create these connections over time.
- Market to students and faculty who are currently outside of I&E to increase access and diversity of innovators and entrepreneurs. Hire marketing staff or train current staff in marketing within and beyond CU system.
- Create a single events website to view all of the I&E events and opportunities across the system, and perhaps even the greater entrepreneurial community. There is no single websites or places for entrepreneurs to go and find out about local events. The website would need ongoing maintenance and updating.

[88]Kevin Kelly's, The Inevitable, Understanding the 12 Technological Forces that Will Shape Our Future, explains that in the future, everything will be directly linked on the web.

- Create a leadership position within CU system to connect the campuses and surface the impact and stories of the great work already happening, serving as a conduit between each campus and the CU system. Intentionally market the stories to external constituents within the state of Colorado and internationally to increase CU system rankings in I&E.

- Create/purchase technology for the CU system to better connect and collaborate with one another.

- Make a documentary to tell the story of innovators and entrepreneurs on the various campuses.

- Continue creating a welcoming environment for aspiring or new innovators. For example, before/after each event, moderators may say, "If you are new to the innovation and entrepreneurship space, we welcome you and are excited you are here. We are looking for more people like you who want to try out these opportunities and see if they align with your interests. This is the best way to get started if you aren't sure where to start, you have an idea, or just want to be involved in I&E in some way."

#2 - Develop New Fundraising Models and Create More Industry Partnerships for Win-Win Scenarios.

Fundraising presents a sizable opportunity for the I&E CU system. Yet I&E fundraising primarily occurs at either the decanal level (i.e., the Dean of a respective school seeks funding for the school's programs) or the program level (i.e., faculty or staff seek funding for an individual initiative). Rarely does I&E advancement occur with respect to activities that touch multiple schools across a campus. And it is even more unusual for I&E advancement to occur at the system level. Notable shifts, however, would be required in order to make this a reality. Current efforts are the responsibility of Advancement personnel. However, Advancement often does not have the personal relationships with entrepreneurs, as do the people leading I&E in the CU system.

CU already has strong community and industry partnerships. However, there are plenty of opportunities that have yet to be explored and could be expanded upon in regards to partnerships and fundraising. CU could leverage their expertise in niche areas where researchers, students, and staff can share expertise and create win-win scenarios (i.e. Mental Health Innovation Center at CU Anschutz). While current websites do exist to find CU experts,[89] it is unclear how community and industry partners find researchers, experts, or potential research collaborators.

A broader challenge for the university to address is speed of decision-making between industry and campus. Emerging companies and industry partners often move fast in response to market forces; meanwhile, universities tend to require careful processes and approvals. This can create mismatches in terms of time to take action. Mechanisms to address these challenges should be considered.

Practical ways to strategically and authentically cultivate community partnerships for win-win scenarios:

- Train I&E program leaders who are interested in building community partnerships and fundraising efforts. Participants are very well connected to generous entrepreneurs and the I&E CU system could greatly benefit from their contributions and support.

- Hire staff to meet the needs of the office - for example, internal lawyers who can balance the needs of the college with the needs (and speed) of industry partners.

[89]CU system Researcher Database: https://www.cu.edu/ab-nexus/resources

- Leverage our collective brainpower. Create a platform for community members and other researchers where people can find experts, partners, or consultants to support startups and innovations within Colorado.
- Create an annual problem solving event where anyone in Colorado who is working towards improving a particular problem is invited to participate and work towards local solutions.
- Increase the speed of the IRB process or train more people to be able to support the process.
- Build partnerships with the Office of the Future of Work[90] for Colorado.
- Conduct a customer discovery project to interview industry partners, startups, and entrepreneurs in the region to understand how the CU system can be better partners and leverage all of our expertise.

#3 - Maintain, Build and Invest in Relationships with Community Leaders and Entrepreneurs.

Faculty and student entrepreneurs, as well as the overall CU entrepreneurial ecosystem benefit greatly from the time, expertise, and generosity of community leaders and entrepreneurs. The data showed that community leaders and entrepreneurs are critical in having sustainable and scalable I&E programs. Students and faculty who were interviewed showed considerable appreciation and gratitude for the mentors they were partnered with. Students and faculty expressed great benefit having courses taught or co-taught by people who were entrepreneurs in the community.

Practical ways to maintain, build, and invest in relationships with community leaders and entrepreneurs:

- Develop mentor-of-the-year awards to celebrate the time, expertise and generosity of mentors.
- Create more opportunities for entrepreneurs and community leaders to co-teach with existing faculty.
- Find creative ways to thank mentors who support student and faculty innovations.

#4 - Lower the Barriers to Entry. Create Ways for all CU Students to Engage in I&E Early in College. Create Ways for Faculty to Explore Ways to be Innovative and Entrepreneurial Without the Need to First Disclose an Invention.

A concerted effort should be made to expose students to I&E opportunities, ideally through coursework, at an early stage during their time at the university. A common student lament is that students find I&E after some time on campus and, in turn, wish they had known about opportunities earlier during their time at the university. Earlier involvement would allow students to go deeper in I&E-related activities.

Each university should offer a highly visible touch point which serves as an I&E concierge, helping campus and community members identify relevant I&E resources and opportunities on campus. Mentoring and coaching are critical components needed to support first-time entrepreneurs.[91] Interviews across the CU system underscore that opportunities to participate are initially difficult to find, especially for individuals who are unfamiliar with I&E. Yet once the initial steps

[90]Colorado Department of Labor and Employment. (2022). Office of the Future of Work. https://cdle.colorado.gov/future-of-work

[91]Klofsten, M., Fayolle, A., Guerrero, M., Mian, S., Urbano, D., & Wright, M. (2019). The entrepreneurial university as a driver for economic growth and social change-Key strategic challenges. Technological Forecasting and Social Change, 141, 149-158. https://doi.org/10.1016/j.techfore.2018.12.004

are taken to participate, individuals discover densely networked systems and other attractive opportunities.

Faculty may be working on innovations within their discipline without realizing or identifying with the language of entrepreneur or innovator. Faculty may not be aware that discoveries could have commercial potential. Faculty exposure to I&E broadly may help them understand ways to get involved with Tech Transfer Offices and eventually commercialize.

Practical ways to lower the barrier to entry for faculty and staff:

- Increase early exposure to I&E coursework for students to participate in. By teaching innovation and entrepreneurship skills their first year, students will be able to use their skills and mindset, which may increase retention.
- Complete a customer discovery project by stakeholder (faculty and students) at each campus
- Support branding and marketing efforts with Admissions to increase the enrollment of new students (ie. being prepared for life after college). There is a huge opportunity to capitalize on the Bachelor of Innovation at UCCS, among others.
- Create a concierge service at each institution for students and faculty who have little or no exposure previously to I&E. Offer coursework and workshops dedicated to innovative thinking and problem solving within organizations.
- Create a 'get started' or first step for aspiring and new innovators and entrepreneurs on every campus. Make sure every I&E leader knows about it and markets this at each I&E event and class that they are involved in.
- A best practice is to share opportunities at each event. However, this did not happen at many events the researchers observed. Many students do not know what to do after they finish a competition or participate in a workshop. Keep inviting students and share upcoming opportunities. Many students continued their entrepreneurial ideas because of I&E leaders - whether through a personal invitation or a general email, *some* students do still check their emails.
- Share stories and paths that students and faculty can learn from. While they are aware that every business and individual are unique, seeing different pathways help students see beyond where they are currently at in their entrepreneurial/innovator identity and path.
- Create easily accessible communities for people in each phase of the process (ideation, planning, and actual startup).
- Support different entrepreneurial pathways for students and faculty to participate in[92] such a small business, lifestyle entrepreneur, non-profit, etc.

#5 - Create a Cohesive Strategy and Culture to Expand I&E.

This report is an important step toward identifying ways that campuses within the CU system can share ideas, create a culture of innovation, and collaborate to share resources where appropriate. A cohesive strategy would help to identify and fill in gaps that are needed

[92]Klofsten, M., Fayolle, A., Guerrero, M., Mian, S., Urbano, D., & Wright, M. (2019). The entrepreneurial university as driver for economic growth and social change-Key strategic challenges. Technological Forecasting and Social Change, 141, 149-158.

within the CU system, and prepare for growth as I&E efforts expand. For example, CU Innovations (Anschutz) and Venture Partners (Boulder) have capacity for a finite number of innovators/entrepreneurs and will need more personnel if they are to support more faculty innovations.

Administrators and leaders across the CU system can evaluate whether to institutionalize and scale CU's most successful I&E programs. A wave of novel I&E offerings proliferated across the CU system over the past 15 years. Several I&E programs emerged outside of the CU system's traditional support mechanisms, such as year-over-year budget line items and credit-bearing opportunities for students. Faculty and staff often raise their own funding to support nascent programs. Improvisation is laudable, however, there are concerns about whether programs that lack traditional support mechanisms are sustainable over the long term. Moreover, opportunities exist across the CU system to scale impactful I&E offerings with the muscle of institutional support such as enhanced funding, staff support, and professional rewards.

Each campus has some aspect of I&E within their strategic planning. Practically, leaders make all the difference in creating an innovative and entrepreneurial culture. Speaking out about the importance of I&E and incentivizing I&E to flourish will be critical. Administration and staff often have little or no experience with I&E, and therefore, will need to be trained on how they can be innovative and entrepreneurial within higher education. For those with less exposure to I&E, more support will be needed to help them develop and grow.

Practical ways to create a cohesive strategy and culture to expand I&E:

- Retain great I&E leaders. They are invested in student and faculty success. Who they are, matters just as much, if not more than what they do. Students and faculty could not say enough positive things about their relationships with leaders at each campus and many explicitly named several people who have had an impact on their lives.
- Provide funding and staff to programs that need support to be sustainable and programs that are ready to scale (and perhaps even generate funding back to the universities).
- CU system leaders, as well as campus leaders can attend more events to support the work being done on campus.
- Build upon this report and create a strategic, 10-year road map with goals and action items to expand I&E so every student can participate in I&E and be better prepared for the future.
- Provide professional development and training for upper level administrators in innovative and entrepreneurial thinking, along with how they might support their teams in thinking this way.
- Offer innovation workshops for staff to learn how to be innovative within the CU system.
- Create an expectation at CU - We expect students, faculty, and staff to innovate, be entrepreneurial and think differently, regardless of your role. Every onboarding experience for students, faculty, and staff across the CU system incorporates the expectation to think innovatively.
- Create an ecosystem map for CU system and/or each campus to visually represent I&E opportunities - perhaps one for students and one for faculty and staff. The map must be comprehensive and easy to navigate for people unfamiliar with I&E.

- Create a SkunkWorks-like group to get things done quickly and respond to community and society needs.
- Host a CU system-Wide event for student and faculty ventures to either showcase or compete.
- Explicitly include innovation and entrepreneurship activities as an extension of tenure requirements. Upper level administration must message I&E as part of research in action (not separate from) so faculty feel supported to engage in I&E prior to and after tenure.

#6 - Increase Diversity and Expand Access to Entrepreneurship and Innovation Opportunities: Beyond Tech Startups, Beyond Business Students, Beyond Traditional Commercialization, Beyond the University System.

Early outreach and exposure would help I&E leaders reach out to populations that are underrepresented in the emerging company community, including BIPOC, low income, and first generation students. Existing I&E opportunities overly emphasize technology based companies with the goal of obtaining venture funding, even though less than 3% of all startups are funded by venture capital in Colorado as of 2020.[93] While a technology based startup has the most potential to generate revenue for the university, there are many opportunities to expose students and faculty to alternative business models and funding mechanisms. Students and faculty would benefit from learning opportunities to take research to practice, create non-profit organizations, or start small businesses.

Many of the students and faculty interviewed for this study were driven to focus on impact. They deeply care about global challenges, solving problems, and having an impact. Even though students and faculty are literally creating solutions to improve our world, many do not identify with the language of entrepreneur or innovator. Much investment is needed to support people to identify as entrepreneurs and innovators.

Given the expertise that CU system has, there are many opportunities to teach innovation and entrepreneurship mindset beyond the CU system and in communities. These teachings are already happening by some faculty members, but there is an opportunity to scale these offerings.

Practical ways to increase diversity and expand access to entrepreneurship and innovation opportunities:

- Rebrand and expand I&E to emphasize innovation, creativity, and social impact.
- Create a Social Innovation Center on one of the campuses that focuses on developing the innovation skills outside of a traditional startup business. One participant suggested instead of a makerspace for technologies or products, create a makerspace to solve social problems.
- Hire new staff to help students and faculty connect with opportunities that align with their interests.
- Take a case management approach for student ventures so students can get individualized support from staff on each campus. This model would help staff understand the needs of students, as well as help them navigate the various opportunities they can participate on campus.
- Create programs or services to support students and faculty in understanding the various types of business structures that align with their own values, interests, and skills.

[93] https://oedit.colorado.gov/sites/coedit/files/documents/Access%20Ventures%20the%20State%20of%20VC%20Colorado%20Report%202020.pdf

- Prioritize and/or support marketing efforts to groups such as TRIO, McNair Scholars programs and other groups that support students who have been historically underrepresented.
- Create pathways so students and faculty can see different ways of approaching business and commercialization.
- Create programs that have lower barriers to entry and support innovative thinking instead of entrepreneurship. For example, have opportunities for students to pitch their ideas outside of a competition. UCCS calls these 'progress pitches' where student ventures share their progress, challenges, and get feedback on their business in a positive, supportive environment.
- Conduct a customer discovery project with faculty from departments that are not represented in the tech transfer offices. Understand what faculty know about innovation and entrepreneurship and how tech transfer offices can gain exposure, interest, and support faculty.
- Create a Techstars-like accelerator through the CU system to generate revenue from companies outside of the university, or for students who have built a business during college and are recently graduated. The CU system could invest a small amount of funds for each company, take a small amount of equity, and support the ventures, leveraging the expertise of CU faculty and staff.
- Use our own expertise. Create open education resources (OER's) or training programs that are easily customizable to various groups. Faculty are already leading these efforts but could use more support to expand these types of programs.[94]

#7 - Connect I&E Skills to the Future of Work and Learning.

According to the World Economic Forum, 50% of all employees will need reskilling by 2025.[95] All of the top ten job skills needed by 2025 are valuable skills that students are likely to develop participating in I&E opportunities. The CU system has the expertise and social capital to ensure that every student graduates with the mindset and skill set needed for the future of work. In addition to these skills, there is an opportunity to focus more on the personal and psycho-social development of entrepreneurs specifically in regards to leadership management.

I&E offers experiential engagement and teaches skills that help students work across functional areas and develop leadership capacities. Students report powerful benefits when participating in I&E coursework and co-curricular experiences engagements. Moreover, the experiential engagement of I&E offerings combines skillset and mindset that may help CU in student recruitment efforts as well as promote student retention.

The CU system has a unique opportunity to upskill and reskill those interested in entrepreneurship and developing technologies later in life. In alignment with I&E, the future of work, and the needs of the campuses, there is a big opportunity to teach technology skills outside of the context of a student earning a computer science or related tech degree. Because of the need to regularly reskill, CU also has the opportunity to meet those needs by providing accessible training to community members within and beyond I&E.

People who are working in I&E, creating new ventures, and innovating within the system can

[94] Erick Mueller at CU Boulder has developed a training curriculum that could be repurposed for a variety of audiences.

[95] Whiting, 2020. What are the top 10 job skills of tomorrow – and how long it takes to learn them. From the Future of Jobs Report, World Economic Forum. Retrieved from https://www.weforum.org/agenda/2020/10/top-10-work-skills-of-tomorrow-how-long-it-takes-to-learn-them/

also be viewed as hope generators. They not only see a problem, but they proactively create a process, strategy, product, service, or new technology to address it. They see possibility and then act on it, generating hope for those around them. The energy and excitement at these events are undeniable and contagious.

Practical ways to connect I&E skills to the future of work and learning:

- Explicitly talk about how participating in I&E can prepare students for life after college.
- In class, directly connect learning outcomes and assignments to practical skills students need in the future.
- Create new class(es) or co-curricular opportunities for students to learn the psycho-social aspects of being an entrepreneur or innovator, such as leadership, influence, managing a team, conflict, belief in self/abilities, etc.
- Create simple ways for community members to learn, gain credentials, and reskill in opportunities related to I&E and beyond.
- Train academic advisors on the value of innovation and entrepreneurship skills and mindsets and make sure they are aware of the I&E resources that students can get involved with on each campus.
- Connect I&E to the skill of being a hope generator. As students, faculty, and program directors work on I&E, they are generating hope for the community and for students who want to see change in the world but are not sure how to make that change.

#8 - Incentivize Collaborative Entrepreneurial and Innovative Efforts.

The CU system should consider exploring ways to align resources and incentivize students, faculty, staff, and community to engage in I&E activities. Faculty tenure cases are a significant - if tricky - issue for universities to consider. Interdisciplinarity is often a crucial ingredient in innovation and successful entrepreneurial efforts. Yet university silos create challenges to teaching and taking courses across departments and schools. Further, even small frictions within the university can have outsized negative effects. For example, parking fees - whether imposed directly upon community members or paid by campus entrepreneurial centers - chill crucial startup community engagements. Parking challenges make it more difficult to bring expert mentors to campus and, more broadly, makes it unduly expensive for centers and programs to host regular events which bring the startup community and industry partners to campus.

Practical ways to create opportunities for interdisciplinary connections:

- Create opportunities for creative collisions. Theo Edmonds called this concept ‘a third space’ where faculty of all levels, and perhaps students and staff can collaboratively work on problems and cognitively offload their identities and increase the capacity to think differently.
- Create a community space where CU system and community members come together to solve local problems.
- Make it easy to collaborate with people at other institutions and in other disciplines. Host problem solving events where we bring experts from different areas/campuses to work together on an issue. Industry partners and community members may also be interested in joining.

- Small frictions within the university can have outsized negative effects. Make it easy and convenient for community leaders and entrepreneurs to access campus. For example, parking on campus can make it challenging and expensive to bring experts to campus. Offer free parking after 5pm.

#9 - Become a Thought Leader in Entrepreneurial and Innovative Universities

The CU system is well-positioned to craft an I&E strategy to firmly establish its institutions among the leading entrepreneurial universities on a national and international stage. Among all institutions in the world, the University of Colorado system was Ranked 29th by Reuter's in the World's Most Innovative Universities in 2017[96] and 33rd in 2019.[97] With some intentionality, strategy, collaboration, and leadership, the CU system can improve these rankings. Methodologies are based on the following: number of patents, number of publications, perception of university/system of other colleges, number of startup ventures created, funding raised by companies, etc. However, there is an opportunity to expand upon what success looks like and lead efforts to define what it means to be an innovative university.

Notably, the CU system is geographically proximate to a world class startup community in the Front Range. Geographic advantages of the Front Range includes mentorship, wealth creation associated with emerging companies, and attractive employment opportunities for students. These can be effectively leveraged as the CU system translates its best insights into social and economic impact upon Colorado, the nation, and the world.

Practical ways to increase university system and individual rankings in I&E:

- Invest in technologies that pull together all data throughout the system and into one platform for high level impact.
- Hire staff to bridge the gap between student and faculty entrepreneurs on the campuses to CU system communications and marketing. Create structure to submit and share stories of the impact being made across the CU system and in Colorado.
- Increase access and engagement of faculty and student entrepreneurs and innovators (see above).
- Create a database of all student ventures, similar to that of CU Innovations and Venture Partners. This database will help I&E leaders keep track of student ventures, follow up when appropriate, and understand gaps in engagement for future students.

[96] University of Colorado system a global leader in innovation

[97] PRNewswire (2019). Stanford, MIT and Harvard top the fifth annual Reuters Top 100 ranking of the most innovative universities. Reuters. https://www.prnewswire.com/news-releases/stanford-mit-and-harvard-top-the-fifth-annual-reuters-top-100-ranking-of-the-most-innovative-universities-300943569.html

THE COLLECTIVE IMPACT OF INNOVATION AND ENTREPRENEURSHIP WITHIN THE CU SYSTEM

The innovation and entrepreneurship community within the CU system is having an incredible impact in the lives of students, faculty, and in the state of Colorado. The next phase of innovation and entrepreneurship will require more synchronization and collaboration in teaching and co-curricular opportunities that span majors and colleges across the campus. It will also require expanding support and resources for current programming, and increasing the innovation capacity within and between each campus. While our collective impact is strong, multiple opportunities are available to expand upon the existing efforts. Specifically, there are opportunities for increasing awareness of I&E within and beyond the CU community, increasing diversity of participation in I&E programs, expanding industry, community and government partnerships, and creating a culture where every student, faculty, and staff has the opportunity to practice innovation and create new ventures that align with the greater mission of the CU system.

APPENDIX A: LIST OF CAMPUS PROGRAMS AND OPPORTUNITIES

Anschutz Medical Campus

Academia Industry Alliance - The Academia Industry Alliance is a student-run organization that aims to connect entrepreneurs, scientists, technology workers and businesses. The organization welcomes all CU affiliates who are interested in expanding their networks in life science and biotechnology industries.

CCTSI - Colorado Clinical and Translational Sciences Institute - The CCTSI helps build research teams of the future, speed the development of new treatments and improve human health.

» NIH I-Corps Program - I-Corps is an entrepreneurial training program at select Institutions across the country to accelerate the translation of innovations from the lab to clinical practice. The NIH selected the CCTSI to bring the I-Corps program to biomedical and translational researchers. Innovation Corps (I-Corps™) uses proven customer-discovery methodologies for startups. It was developed for academic researchers by serial entrepreneurs working with the National Science Foundation. I-Corps@CCTSI is a team-based short course designed for faculty, staff and students. The program guides teams through the early stages of customer discovery where they can test the business model hypotheses for their technology or idea.

» Ask the Expert Series - Ask the Expert is a collaboration between the CCTSI, Venture Partners at CU Boulder, CSU Ventures and the NIH Research Evaluation and Commercialization Hubs (REACH) grant at CU Anschutz. The new initiative is part of CCTSI's Innovation Ecosystem program. This lunchtime series is for researchers and academics who are interested in entrepreneurship, device and technology development and innovation. Every month, academics and innovators will engage in a lively and provocative interview with an expert, followed by a Q&A session. Experts are sourced from each campus and nationally, by the Ask the Expert committee.

CU Innovations - CU Innovations brings together industry partners, entrepreneurs, and investors to help CU Researchers create biomedical technology that improves the quality of life worldwide. With expertise in patents, copyrights, and licensing, CU Innovations translates discovery into impact through transparent, flexible, best practice intellectual property management services.

» SparkIReach Program - The SPARK|REACH Program is focused on commercialization with major emphasis is on product development and technology transfer activities. As the flagship commercialization funding mechanism, SPARK provides education, access to industry expertise, a culture of innovation, and project funding. SPARK Awards support CU Anschutz faculty and students developing therapeutics, medical devices, and diagnostics to address unmet medical needs.

» Startup Toolbox - Startup Toolbox supports CU researchers and empowers Anschutz entrepreneurs as they develop new therapies and change the world. Developing a cutting edge therapeutic or novel healthcare technology is challenging and requires a different skillset from academic research. The Toolbox provides

guidance, services, and resources to help you develop your discoveries and improve patients' lives.

» DigiSpark - A funding mechanism to enable further use of digital health technology to improve both patient outcomes and health system operational efficiency through pilot study funding.

» Chancellor's Discovery and Innovation Fund - The CDI Fund focuses on supporting healthcare technologies that are addressing unmet clinical needs with translational gap funding. The funds are deployed to support specific milestone-based objectives with the intention of unlocking future development or commercial opportunities.

» CU Healthcare Innovation Fund - The CU Healthcare Innovation Fund is a strategic healthcare fund affiliated with the University of Colorado Anschutz Medical Campus that invests in ventures across the healthcare spectrum (healthcare IT, tech enabled services, and selectively in high-potential medical device and pharmaceutical technologies).

» CU Innovations Fellows Program - Fellows assist in evaluation and decision making around patenting, intellectual property protection, and licensing opportunities. They evaluate invention disclosures and review the technologies for their commercial and scientific opportunities.

» Licensing Support - CU Innovations works directly with campus investigators to protect and license the intellectual property generated on campus.

Gates Grubstake Award - The Fund is focused on accelerating basic, clinical, and translational research related to the field of regenerative medicine.

Jacobson InWorks Innovation Initiative and Lab - We conduct research at the intersection of computational design, digital fabrication, and clinical biology allows us to directly apply this knowledge to design across scales from the cellular scale to the building scale. The mission is to enhance the relationship between cutting-edge design and clinical environments by achieving high degrees of design customization and versatility. We want to establish new forms of design and novel processes of design practice at the intersection that blur the boundaries between computer science, material engineering, biology, and physiology. This integration of multiple disciplines in the design and creation of specialized tools for clinicians can be applied to many broad applications across multiple scales.

Map the System Competition - A global competition to promote a systems-thinking approach to tackling social and/or environmental challenges. The competition is run by the Skoll Centre for Social Entrepreneurship at the Saïd Business School at University of Oxford.

MHealth Impact Lab - The mHealth Impact Laboratory is an incubator for innovative, health technology and disease management initiatives based in the Colorado School of Public Health. The offer concept and model development, pilot testing, content testing, and proposal support for collaborative projects.

Mental Health Innovation Center - The Mental Health Innovation Center aims to address stubborn problems in the field of mental health and fuel user-driven development and adoption of technologies to improve mental health and mental health care.

» Crazed Podcast - On the podcast, hosts discuss bold new ideas in mental health care, and interview the fascinating innovators working to make those ideas a reality.

» Tech Innovation Network - TIN is a formalized network of diverse clinical and community partners that functions as a test bed through which new technological solutions can be rapidly developed, iterated, tested, and validated.

Shandas Lab for Bioinnovation - The mission of the lab is to translate engineering ideas and inventions into clinical use. The Shandas lab works translationally with clinicians and researchers from across the Anschutz Medical Campus, and integrates with engineering professionals in industry. Projects include new medical technologies, bioengineering applied to heart disease, novel ultrasound imaging to evaluate hemodynamics, shape memory polymers for minimally invasive medical devices, and 3D printing for surgical planning.

The CARE Innovation Center - The CARE Innovation Center at UCHealth, located on the University of Colorado Anschutz Medical Campus, offers a comprehensive suite of resources and services designed to revolutionize health care with leading industry and start-up partners.

Boulder Campus

Arts and Sciences Support of Education Through Technology Innovation Incubator - The ASSETT team at the Boulder campus integrates technology with pedagogy to promote impactful learning. Over a three-year period, the innovation incubator pilot supported four interdisciplinary teams of faculty, staff, and students from the College of Arts & Sciences to grow their innovative ideas for teaching and learning with technology. The goal of the innovation incubator is to improve the undergraduate experience by getting students engaged in active learning.

ATLAS Institute - ATLAS is an interdisciplinary institute for radical creativity and invention. ATLAS inspires research, experimentation and critical thinking that turns ingenious ideas into reality. The institute's labs and academic programs encourage out-of-the-box thinking and creative exploration, attracting technology visionaries and virtuosos who reach beyond convention, take risks and innovate. The synthesis of design and technology amplifies innovation in engineering and the arts.

» Blow Things Up (BTU) Lab - The ATLAS BTU Lab is a hackerspace and maker community operated by the ATLAS Institute and it is open to all CU Boulder students, regardless of department or field of study.

Catalyze CU - Catalyze CU is a summer-long startup accelerator program designed for CU Boulder ventures created by students, faculty and staff. It combines world class mentorship, funding and a dedicated co-working space to help the most promising ventures from across campus reach escape velocity—without taking any equity.

Center for Translational Research - The Center for Translational Research is a campus-wide resource within the Research and Innovation Office for faculty, researchers and staff who are seeking non-dilutive funding, including SBIR/STTR awards, to translate their university inventions into a startup company. The Center for Translational Research advises teams on best practices for seeking non-dilutive capital for their startup companies, provides market research and industry analysis, and offers proposal editing and critique. The goal of the Center for Translational Research is to secure funding for the translation of university technologies, thereby bolstering the impact of the inventions made on our campus.

» SBIR/STTR Week - Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grants make up one of the key ways that university spinouts and innovation firms fund early-development and commercialization of their technologies. To highlight the strategic use of this program, Venture Partners has partnered with CU Boulder's Center for Translational Research to host a dynamic, week-long conference featuring experts across the Colorado and national innovation ecosystem in the summer.

Core Facilities and Shared Instrumentation Network - is a resource within the Research and Innovation Office that enables fundamental and applied research, and promotes interdisciplinary collaboration across many departments, institutes, and centers. Entrepreneurs can access unique research capabilities and expertise in the Core Facilities to accelerate commercialization of their innovations, effectively avoiding capital expenditures and shortening time to market. Entrepreneurs can partner with researchers on the Boulder campus to develop new innovations.

Deming Center for Entrepreneurship - Through experiential learning, research and community engagement, the Deming Center provides a toolkit to help students build what they envision. The Deming Center connects students with opportunities to engage with other like-minded students and entrepreneurs through case competitions, access to grants and immersive experiences.

» Buffs with a Brand - Buffs with a Brand is a comprehensive program specifically designed for current CU student-athletes. The program focuses on three foundational pillars: brand management, entrepreneurship, and financial literacy. Buffs with a Brand gives student-athletes hands-on, real-world experience led by renowned industry experts. Successful completion of the program includes student-athletes creating a mock venture and pitching the idea at the end of the year, developing a brand and marketing plan to use in their future career, and understanding the basics of financial management.

» CoVenture Forward - CoVenture Forward provides quality guidance and education to entrepreneurs and small businesses in the community through mentors, insights from faculty, and through student support on projects through the micro-internship program.

» Creative Distillation Podcast - A podcast that distills academic research on entrepreneurship into actionable insights.

» Deming Center Venture Fund - Through a two year experiential program, students have the opportunity to learn by doing. DCVF provides hands-on due diligence, interaction with entrepreneurs, presentations to advisory board members, direct participation in investment decisions, and ongoing monitoring and analysis of investments. The objective is to make sound investment decisions based on comprehensive due diligence and investment analysis with the intent to extend the life of the fund.

» Demystifying Entrepreneurship Workshop Series - The student workshop series brings in experts in the field in topics such as prototyping and marketing. The workshop series teaches skills that students need for entrepreneurship.

- Demystifying Native Entrepreneurship Workshop

- Demystifying Entrepreneurship: Rural Colorado Workshop Series - The Rural Colorado Workshop Series (RCWS) takes a pragmatic approach to entrepreneurship using a highly interactive setting and flexible, scalable sessions. The result: Small businesses, start-ups and local governments in rural Colorado gain the tools they need to solve business and organizational challenges through an entrepreneurial mindset.

» Entrepreneurial Solutions - Entrepreneurial Solutions, LLC is committed to the continuation of a highly respected, CU MBA operated consulting firm. Capitalizing on the experience, knowledge and expertise of the involved consultants, ES serves the Colorado business community.

» High Growth Venture Fellowship - The fellowship is a two-year program that immerses a select group of MBA candidates in academic and experiential learning unique to growth-stage companies. This MBA honors experience will provide knowledge, skills and relationships that will enable you to join any startup or growing company and help them scale. The highly competitive program offers financial support in addition to master classes, exclusive networking opportunities, and career support.

» Leeds Entrepreneurs and Partners - LEAP is a network of MBA students devoted to connecting new talent with the Colorado startup community.

» Now What? - Now What? Provides an opportunity for students from all disciplines the chance to sit down one-on-one with a legal or business expert.

» Startups & Sandwiches - A series that brings seasoned entrepreneurs, venture capitalists, and tech leaders together with students.

» Venture Capital Investment Competition- Global VCIC is the world's largest venture capital competition with over 70 universities competing. VCIC is the only place where students get to be VCs for the day.

Entrepreneurship Center for Music - The ECM is a national leader in professional development for musicians, equipping today's music students with the skills and tools they need to create sustainable careers in the arts. As one of the first such programs in the country, the ECM is an entrepreneurial endeavor, developing new paradigms for education, leadership and advocacy in the emerging field of arts entrepreneurship. The ECM offers degree programs, weekly workshops with industry experts, guest residences with entrepreneurial artists, and one-on-one mentoring.

Innovation & Entrepreneurship Initiative - A cross-campus Innovation & Entrepreneurship Initiative which connects, elevates and grows CU Boulder's vast innovation and entrepreneurial resources to help students, faculty and staff turn ideas to impactful ventures.

» I&E Jamboree - A cross-campus event with the goal to get students and the CU community inspired, plugged into the innovation ecosystem and to find support throughout the entrepreneurial journey.

» New Venture Challenge - The NVC is building the business leaders of tomorrow by connecting the CU Boulder campus with the Boulder community to develop and fund innovative ideas. Participants attend year-round events, network and collaborate with mentors to refine their ideas and form startup teams to pitch for funding (more than $100,000) at the NVC Championships.

» Student Innovation Action Team - Students from a variety of disciplines and backgrounds who provide guidance to the Innovation & Entrepreneurship Initiative, act as role models, and lead innovative efforts for the student body.

» Get Seed Funding - Get Seed Funding is a micro-funding opportunity for CU Boulder undergraduate and graduate students that provides up to $500 in funding for entrepreneurial ideas in the making and is led by the Innovation Action Team. The Innovation Action Team is a group made up of students from a variety of disciplines and backgrounds who bring voices to the Innovation & Entrepreneurship Initiative, act as role models, and lead innovative efforts for the student body.

Idea Forge - The Idea Forge is a prototyping facility focused on design and innovation. It is a flexible, cross-disciplinary collaborative space where students can imagine, design, create, and test products and solutions to meet a range of societal and customer needs. The space includes Design Center Colorado and supports student teams working on invention and innovation as part of courses, as well as design and development driven by entrepreneurial-minded individuals and service-oriented groups. The Idea Forge boosts student learning through collaborative, hands-on experience, while supporting industry interaction through scheduled programming as well as spontaneous exchanges.

Leeds Consulting Group - Leeds Consulting Group is a highly selective student-run organization at the University of Colorado Boulder, leveraging the unique experiences of individuals across majors and disciplines to solve real-world business problems for a wide range of clientele including start-ups, non-profits, and Fortune 500 companies.

Map the System Competition - A global competition to promote a systems-thinking approach to tackling social and/or environmental challenges. The competition

is run by the Skoll Centre for Social Entrepreneurship at the Saïd Business School at University of Oxford.

Venture Partners - Venture Partners at CU Boulder translates groundbreaking research into new solutions, businesses and partnerships that address the world's greatest challenges.

» Ascent Deep Tech Accelerator - Ascent is a new accelerator for deep tech startups coming out of the University of Colorado campuses in Boulder, Colorado Springs and Denver. Deep tech startups, or new companies focused on science and/or engineering, face unique challenges because of their disruptive nature, intensive research and development, and significant capital requirements. Leveraging ecosystem experts, a mentor network, and Venture Partners staff, early-stage companies accelerate their viability and traction over four months.

» Buff Venture Fund - The Buff Venture Fund is a private venture capital fund that invests in startup companies connected to CU Boulder. Venture Partners has a formal partnership with the Buff Venture Fund to collaboratively grow startup companies and identify investment opportunities. We connect our startups to the fund for strategic guidance, mentorship and potential investment. The Buff Venture Fund makes investments at all stages, beginning with seed stage, and makes approximately five investments per year. The fund is not part of the University of Colorado, nor is the fund managed, operated, or controlled by the university. However, Buff Venture Fund has a formal partnership with Venture Partners at CU Boulder.

» Destination Startup - Destination Startup® is a collaboration among leading research universities and federal laboratories across the Intermountain West to showcase the best companies from our innovation ecosystem to venture, angel, and strategic investors worldwide. It is organized and led administratively by the University of Colorado, Boulder. Destination Startup® helps innovative researchers and faculty ready themselves for the process of fundraising and the commercialization of their technology.

» First Look - First Look matches researchers with industry partners to provide early feedback, mentorship, and advice on their technologies.

» Lab Venture Challenge - The Lab Venture Challenge Program is a collaboration between Venture Partners and the Colorado Office of Economic Development and International Trade (through the Advanced Industry Program) to fund the university's top innovations that address a commercial need, have a clear path to a compelling market and strong scientific support.

» Licensing & Industry Partnerships - Provides a long-term partnership that aligns the university's and business partner's interests through commercializing innovation developed at the university. Venture Partners initiates commercialization by licensing university intellectual property (IP) to startups and industry partners. At Venture Partners, we have established leading practices for both startup-friendly and business-friendly licensing.

» Lunch-and-Learn Sessions - Monthly events where high-tech founders, entrepreneurs and experts share their industry experience and insight.

» Mentor Network (collaboration with campus I&E) - Venture Partners connects the dynamic and dedicated innovation community to university researchers who are commercializing groundbreaking new inventions. The mentor network is powered by some of the most successful entrepreneurs, investors, and business

leaders from Colorado—and around the world—who contribute their experience and wisdom both in person and virtually to help advance the most promising discoveries. The mentor network also provides mentors and advisors to student startups and may serve as a judge for various competitions. Interested mentors can sign up using an interest form.

» NSF I-Corps Program - I-Corps at Boulder is housed within the Research and Innovation Office through Venture Partners. I-Corps programming is designed to reduce the time and risk associated with translating promising ideas and technologies from the laboratory to the marketplace. I-Corps uses experiential learning of customer and industry discovery, coupled with first-hand investigation of industrial processes, to quickly assess the translational potential of deep tech inventions. I-Corps serves as a validator for faculty who have ideas, but are uncertain about market potential. While undergraduate students and staff can participate, the target audience includes faculty, researchers, and graduate students.

  - Starting Blocks - Starting Blocks supports the beginning phases of commercializing technology. The program is a 3-day workshop with customer interviews designed to help scientists and engineers of all types find a market for their innovations. The core concept encourages inventors to get out of the lab and talk to industry decision-makers to find out what problem the industry needs their product to solve. This is the shortest, "introductory" version of the National Science Foundation's I-Corps™ methodology.

  - Research 2 Market (R2M) - A 3-week program that teaches scientific and engineering inventors and teams the process of customer discovery and how to find a market for their technology by getting out of the lab. Derived from the National Science Foundation's I-Corps™ program, R2M leverages the nationally-recognized Lean LaunchPad and Business Model Canvas methodologies specifically designed for university researchers commercializing their inventions.

Startups2Students - Hosted by Innovation & Entrepreneurship and Career Services, Startups2Students is a mini job fair that brings entrepreneurially-minded CU Boulder students and local Front Range startups together with a twist. Rather than students seeking out a potential employer, each startup pitches their company—and any available project-based, internship or full-time job opportunities—directly to students.

Startup Mill - Startup Mill is a student-led program designed to provide another option to startups looking for assistance during their growth and expansion. Students and entrepreneurs will receive first-hand VC and entrepreneurial experience through a 12-week program that pairs CU Boulder students with established local startups as interns, providing both learning opportunities through mentorship and scheduled programming.

Silicon Flatirons Entrepreneurship Initiative - Silicon Flatirons catalyzes connections across the CU Boulder campus and the Colorado Front Range startup community to provide opportunities to exchange ideas and learn about what's happening next.

» Crash Course Series - The Crash Course series examines legal and business topics that entrepreneurs confront when launching new ventures. Attendees gain a working knowledge of specific topics that pertain to navigating the startup world.

» Entrepreneurial Law Clinic - The Entrepreneurial Law Clinic (ELC or the Clinic) provides law students with practical experience in transactional law while

offering valuable legal services without charge to local startup businesses lacking access to legal resources.

» Entrepreneurs Unplugged - Entrepreneurs Unplugged attracts star entrepreneurs who share candid stories and insights in an engaging and informal setting. The unplugged series serves as a meeting place for campus and community members to gather and learn about entrepreneurship through the experiences of a successful entrepreneur.

» Entrepreneurship Conference - The annual Entrepreneurship Conference brings members of the Front Range's regional entrepreneurial ecosystem together with academia and other thought leaders to explore the latest trends, policy, and other factors impacting the startup community.

» Startup Colorado - A statewide, rural outreach program, housed within the Silicon Flatirons Center at CU Boulder. Startup Colorado has over 1000 rural entrepreneurs who are active within its network. Startup Colorado supports rural entrepreneurs by offering a free peer-to-peer entrepreneur network, scholarships, and event programming, and collaboration with local business support organizations.

» Startup Summer - Startup Summer provides an energetic, high caliber boost to emerging company internships. This annual program surfaces students who are ready to enter the world of startups, innovation, and emerging companies. Interns at innovative companies across the Front Range and beyond gather weekly for entrepreneurial programming led by successful Colorado founders and C-level execs. Participants receive a curated tour of the startup ideation and creation process, build a venture with a team of their peers, and compete in an end-of-summer pitch contest for cash prizes.

» Startup Variety Show - The Startup Variety Show convenes multiple dimensions of the startup community by showcasing companies, highlighting ideas, and reinitiating in-person interactions across campus and within the emerging company community. The Variety Show will feature: Startups; an intriguing, and potentially disruptive, research idea from CU; an ongoing project at a large incumbent company in the Front Range; an investor's corner, featuring a fund and/or an active investor' potpourri (tech and the arts, legal or policy issues, or other community items of interest); audience Q&A

Colorado Springs Campus

Bachelor of Innovation - The Bachelor of Innovation™ (BI) is an internationally unique interdisciplinary undergraduate program, similar to a Bachelor of Science (BS) or a Bachelor of Arts (BA), that combines the traditional degree curriculum with practical coursework, teamwork, innovation and entrepreneurship training. The Bachelor of Innovation offers more than twenty undergraduate majors designed to equip students with the skills, knowledge, experience, and education necessary to succeed in the modern workplace. Our program makes a difference—from the corporate world to social entrepreneurship, the non-profit sector to high-tech entrepreneurship, and small businesses to start-ups.

» Innovation Teams for Client Companies - Companies may apply to work with a student consulting team within the BI program. In the past, BI clients hailed from throughout the United States as well as multiple international clients. Companies partner with multi-disciplinary teams that are uniquely suited to meet complex client needs. The BI Client Selection Team entertains applications from a variety of clients, including for profit, non-profit, start-ups, and established entities.

El Pomar Institute for Innovation and Commercialization - EPIIC facilitates the early development of new ideas and products and aids people in taking their ideas to market. EPIIC connects academia with the business community and with the local, state, and federal government to provide short- and long-term benefits to Colorado Springs and the surrounding area. EPIIC operates as a mediation point to establish a relationship among high-tech companies, entrepreneurs, community leaders, the University of Colorado, and the El Pomar Foundation.

» The Garage - The Garage is a student entrepreneurship center that helps UCCS students develop and execute business venture ideas. Student teams apply to participate and gain access to a physical co-working space on campus, 1:1 mentorship, and give a progress pitch monthly for feedback. Progress Pitch Nights offer students the opportunity to gain valuable feedback, ask for support, and improve their venture.

» Venture Attractor™ - The Venture Attractor™ is focused on cultivating early stage startups in sports and outdoors; health innovation; and human performance with a mission to drive regional economic development and strengthen the startup ecosystem in Colorado Springs. A cohort of early-stage startups learn foundational business practices through a 16-week virtual course. The goal is to encourage high-potential startups to move to Colorado Springs and support economic growth in the region.

» Lions Den Pitch Competition - This Pitch Night event features student teams from various educational institutions in Colorado Springs. Entrepreneurs have five minutes to pitch deals to a panel of entrepreneurs/investors. The panel will then provide feedback to presenters, ask tough business questions, and the winner will be awarded a cash prize.

Center for Entrepreneurship - The Center for Entrepreneurship is dedicated to promoting entrepreneurship, venture creation and economic development in the Southern Colorado region. The Center's curriculum features a minor in entrepreneurship that is open to all students at UCCS.

Denver Campus

Design Horizons - An entrepreneurial fellows program that provides an immersive learning journey for students passionate about entrepreneurship, innovation, design, and all forms of creativity. With a heavy emphasis on interdisciplinary teams, Design Horizons is a partnership between the College of Arts & Media; the College of Engineering, Design and Computing; the Business School, and Jake Jabs Center for Entrepreneurship. This program provides students an unparalleled opportunity to develop a new creative venture, establish professional networks, and build leadership skills.

Jake Jabs Center for Entrepreneurship - The Jake Jabs Center for Entrepreneurship is an entrepreneurship-focused resource center at the University of Colorado Denver Business School. Emphasizing real-world experience and learning, the JJCE is dedicated to educating and empowering undergraduate and graduate students to think and act entrepreneurially. Through the Center's undergraduate, graduate and certification programs, students learn and apply modern business practices in an open and diverse environment. The Center's relationships with local business leaders and successful entrepreneurs provide opportunities and support services for students, whether they choose to launch their own startup or join an existing organization.

» The Climb Business Plan Pitch Competition - Since 2001, THE CLIMB | Jake Jabs Business Plan Competition has supported the growth of collegiate startups and the entrepreneurial community across the Front Range. THE CLIMB is an annual event series and pitch competition that helps students and future business owners transform concepts into viable companies through mentorship, education, financial support, and real-world industry exchanges.

» Entrepreneurship Club - The Collegiate Entrepreneurs Organization is a student entrepreneurship club at the Jake Jabs Center and the Business School. The group connects its members to a strong network of entrepreneurial-minded individuals within CU Denver and the greater Denver area. The organization is open to all students, both undergraduate and graduate, interested in growing their ideas and professional network regardless of major or academic interests.

» Flash Accelerator - The Flash Accelerator is a virtual summer program offered by CU Denver's Jake Jabs Center for Entrepreneurship and exclusively for CU Denver students, faculty, and staff members looking for the resources and guidance to take a startup beyond the ideation stage and to the next level. It is an interactive, 13-week summer program.

» Jump Incubator - The JUMP Incubator is a summer program designed for student startups in need of resources and guidance to take their concept beyond the ideation stage. Each week consists of a two-hour workshop led by an expert guest speaker and a one-hour meeting with a team mentor. Over the course of seven weeks, teams receive a stipend, free workspace, and equity-free membership while they participate in weekly workshops, coaching, leadership development, peer-to-peer accountability, networking opportunities, and exclusive demo days.

» Rutt Bridges Venture Fund - The Rutt Bridges Venture Fund (RBVF) is an early stage, micro investment fund operated by a cross-disciplinary team of students. Under the supervision of faculty members and professional advisors, the Fund invests real money in real companies of the Denver community.

Imaginator Academy - The Imaginator Academy is a cultural analytics, strategy and futurist innovation hub for industry-university research partnerships focused on inclusive, interdisciplinary talent development across the lifespan. Imaginator Academy connects a global network of entrepreneurs, companies, scientists, artists, creatives, innovators, and change-makers of all kinds. The goal is to transform research and creative insights into cultural intelligence for solving challenges centered on the human experience in the places we work, learn, heal and explore.

Inworks Innovation Lab - Inworks is an innovation initiative offering a home for creators, thinkers, designers, and makers. Inworks is a collaborative community of learners and leaders committed to solving humanity's most pressing problems. Inworks teaches Human-Centered Design and Innovation and offers a broad, interdisciplinary perspective that integrates design thinking with collaborative problem solving.

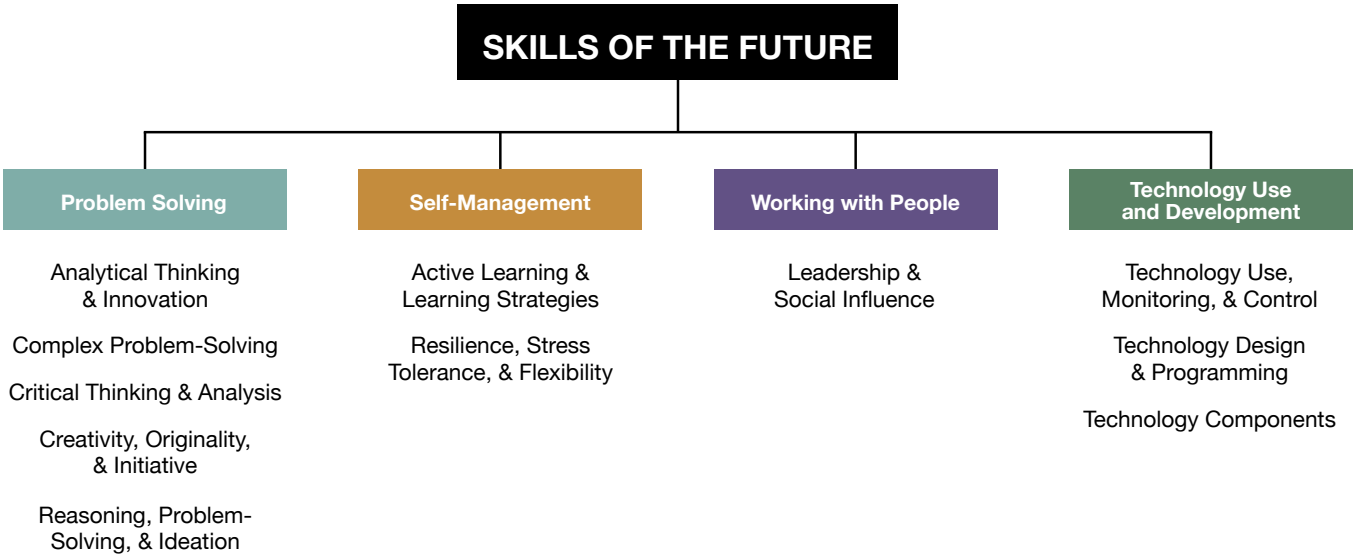
Comcast Media and Technology Center- CMTC is a place where people come to activate meaningful scholarly pursuits, train and develop, realize creative visions, all with the intent of making a positive difference in the world today. This state-of-the-art facility is a uniquely adaptable research and learning environment for the artist, designer, engineer, and entrepreneur in each of us. The Center becomes our entry point in visualizing, incubating, and inspiring how we will live, work, play, and communicate in the century to come with our signature programs rooted in Design Innovation: DI@Denver, DI Professional Workshops and Boot Campus, DI Guidance, & Incubation, Intrapreneurship, and Entrepreneurship.

The University of Colorado System

AB Nexus - AB Nexus Research Collaboration Grant Program brings together interdisciplinary teams that expand and strengthen areas of research collaboration between the CU Anschutz and CU Boulder campuses. The program aims to support innovative research involving basic, translational and clinical approaches.

CU Innovation & Efficiency Awards - CU employees have good ideas that they put into practice every day, saving the University time, money, and hassles. The awards program recognizes employees who improve CU business processes.

APPENDIX B: INNOVATION AND ENTREPRENEURSHIP SKILLS, KNOWLEDGE, AND MINDSET



Innovation & entrepreneurship skills, knowledge, and mindsets identified by participants in the study.

Skills

Brainstorm Solutions
Curiosity
Customer Discovery
Creativity
Iteration
Identifying Resources
Opportunity Recognition
Risk-Assessment
Problem Identification
Agility
Ask for help
Goal-Setting
Knowing When to Pivot
Navigating Ambiguity
Receive & Give Feedback
Building relationships
Conflict management
Communication (Verbal, Written)
Effective storytelling
Empathy
Leadership
Problem Identification
Soft Skills
Teamwork & Collaboration
Vision, Articulate that Vision
Arduino's
Web Development
Data Management

Knowledge

Customer Discovery
Identify Market Trends & Potential Identify Needs
Legal
Identify Strengths & Weaknesses
Marketing
Technical Skills
Branding Business
Branding Myself
Building Influence
Fundraising
Interdisciplinary
Sales
Selling Your Idea
Venture Capital
Prototype
New Technologies
Marketing
Product Development

Mindset

Checking Ego
Embrace Life-Long Learning
Mental Flexibility & Adaptability
Persistence & Resilience
Belief in Self & Capabilities
Bias Toward Action
Delayed Gratification
Learning from Failure
Navigating Uncertainty
Personal Motivations
Purpose
Trial & Error
Willingness to Ask for Help
Hope & Optimism for Future
Using Resources

APPENDIX C: LIST OF ALL COURSEWORK IN THE YEAR OF 2021-2022

Anschutz

COURSE	CLASS/PROGRAM
Regulatory Affairs	BIOE5054
Biomedical Device Design and Entrepreneurship	BIOE5420
Biomedical Entrepreneurship	BSBT6801
Internship - Technology and Innovation	BSBT6939

Boulder

CLASS/PROGRAM	COURSE	COLLEGE
Design for Social Innovation	APRD 4501	CMCI
Intro for Designing for Entrepreneurism	APRD 5006	CMCI
Access to Tools for Entrepreneurism by Design	APRD 5008	CMCI
Studio 3: Capstone in Architecture	ARCH 4100	Environmental Design
Architectural Engineering	AREN 4318/4319	Engineering
Gateway to Space	ASEN 1400	Engineering
Aerospace Engineering Sciences	ASEN 4018/4028	Engineering
Designing for Defense	ASEN 5519, COEN 5550, CYBR 5550, CSCI 5550	Engineering
Case Studies in Social Impact	ATLS 5230	CMCI
Professional Seminar: Business of Creativity	ATLS 5420	CMCI
Advanced Special Topics in Creative Technology and Design: B2B Entrepreneurship	ATLS 5519	CMCI
Business Law	BCOR 2301	Business
Strategic & Entrepreneurial Thinking	BCOR 2304	Business
Entrepreneurship, International Business and Technology Management	BPOL 7560	Business
Innovation & Entrepreneurship 1	BUSM 3010	Business
Innovation & Entrepreneurship 2	BUSM 3011	Business
Prof Business Plan Development	BUSM 4010	Business
Business Solutions for the Developing World: Learning through Service	CESR 4005	Business
Computer Science (industry)	CSCI 4308/4318	Engineering
Civil Engineering	CVEN 4899	Engineering
Electrical, Computer and Energy Engineering	ECEN 4610/4620	Engineering
Economics of Entrepreneurship	ECON 4717	Arts & Sciences
Engineering and Entrepreneurship for the Developing World	EMEN 4200	Engineering
Technology Ventures and Marketing	EMEN 4800	Engineering
New Venture Creation	EMEN 4825	Engineering
Entrepreneurship for Engineers	EMEN 5094	Engineering
Social Innovation and Sustainable Cities	ENVM 5050	Environmental Design
Capstone Innovation Lab 1	ENVM 6001	Environmental Design
Human Centered Design and Entrepreneurship Strategies	EPOD 3105	Environmental Design
Introduction to Entrepreneurship	ESBM 3100	Business
Entrepreneurial Environments	ESBM 3700	Business
Entrepreneurial Finance	ESBM 4570	Business
Special Topics in Entrepreneurship	ESBM 4820	Business
Experimental Seminar	ESBM 4825	Business

CLASS/PROGRAM	COURSE	COLLEGE
Exp. Sem-Social Entrepreneurship: Designing a Better World	ESBM 4826	Business
New Venture Creation	ESBM 4830	Business
Projects in Entrepreneurial Companies	ESBM 4900	Business
Environmental Engineering	EVEN 4434	Engineering
Engineering Projects	GEEN 1400	Engineering
Engineering Projects for the Community	GEEN 2400	Engineering
Invention and Innovation	GEEN 3400	Engineering
Entrepreneurship & Empowerment in South Africa	INBU 4925	Business
Funding Journalism in the 21st Century	JRNL 5211	CMCI
The Practice of Entrepreneurial Journalism	JRNL 5221	CMCI
Agency, Partnership, and the LLC	LAWS 6201	Law
Corporations	LAWS 6211	Law
Introduction to Intellectual Property Law	LAWS 6301	Law
Deals: Engineering Financial Transactions	LAWS 7101	Law
Venture Capital and Private Equity	LAWS 7271	Law
Copyright	LAWS 7301	Law
Patent Law	LAWS 7311	Law
Trademark and Unfair Competition Law	LAWS 7341	Law
Entrepreneurship	MBAX 6101/6100	Business
Entrepreneurial Finance	MBAX 6110	Business
Social Entrepreneurship in Emerging Markets	MBAX 6140	Business
Entrepreneurship: High Growth Companies	MBAX 6160	Business
New Venture Creation	MBAX 6170	Business
New Venture Launch	MBAX 6180	Business
Special Topics in Entrepreneurship	MBAX 6195	Business
Entrepreneurship Valuation and Investment Seminar 2	MBAX 6281	Business
Entrepreneurship Valuation and Investment Seminar 3	MBAX 6282	Business
Ind Study Entrepreneur	MBAX 6961	Business
Mechanical Engineering (industry)	MCEN 4045/4085	Engineering
Disruptive Entrepreneurship	MDST 2011	CMCI
Managing Growth: Entrepreneurship and High Growth Ventures	MGMT 4160	Business
Music Entrepreneurship Certificate Capstone	MUSC 4998	Music
The Entrepreneurial Artist	MUSC 5988	Music
Doctoral Seminar: Macro Aspects of Entrepreneurship	ORMG 7320	Business
Real Estate Technology	REAL 4200	Business
Designing Social Innovations	SOCY 4160	Arts & Sciences
Executing Social Innovations	SOCY 4161	Arts & Sciences
Internship in Social Innovation	SOCY 4935	Arts & Sciences
Special Studies Omnibus (Experiential Capstone)	TMUS 4493	Music

Colorado Springs

CLASS/PROGRAM	COURSE	DEPARTMENT
Principles of Entrepreneurship	ENTP 3000	Center for Entrepreneurship
Entrepreneurial Law & Capital	ENTP 3100	Center for Entrepreneurship
The Business Plan	ENTP 4000	Center for Entrepreneurship
Introduction to Entrepreneurship	ENTP 1000	Bachelor of Innovation
The Innovation Process	INOV 1010	Bachelor of Innovation
Business and Intellectual Property Law	BLAW 2010	Bachelor of Innovation
Technical Writing, Proposals, and Presentations	INOV 2100	Bachelor of Innovation
Innovation Team: Analyze and Report	INOV 2010	Bachelor of Innovation
Innovation Team: Research and Execute	INOV 3010	Bachelor of Innovation
Innovation Team: Design and Lead	INOV 4010	Bachelor of Innovation
Entrepreneurship and Strategy	ENTP 4500	Bachelor of Innovation

Denver

COURSE	CLASS/PROGRAM
Principles of Entrepreneurship	ENTP3000
Essentials in Entrepreneurship	ENTP3200
Lean Startup Fundamentals	ENTP3201
Small Business Accounting and Finance	ENTP3230
Developing Dynamic Concepts	ENTP3240
High Impact Sales for Entrepreneurs	ENTP3260
Business Model Development and Planning	ENTP3299
Ethics: Formula for Succcess	ENTP3420
Global Study Topics	ENTP4028
Entrepreneurship Independent Study	ENTP4840
Digital Disruption	ENTP5022
New Venture Operations and Project Management	ENTP5620
Business Model Development and Planning	ENTP6020
Digital Disruption	ENTP6022
Global Study Topics	ENTP6028
Entrepreneurship in Emerging Industries	ENTP6030
Digital Advertising for Entrepreneurs	ENTP6100
Innovation in Fintech	ENTP6110
New Venture Operations and Project Management	ENTP6620
Impactful Social Innovation	ENTP6644
Special Topics in Entrepreneurship	ENTP6800
Building Biotechnology	ENTP6801
Regulatory Environment of Life Science Innovation	ENTP6802
Entrepreneurial Financial Management	ENTP6824
International Entrepreneurship	ENTP6826
Lean Marketing	ENTP6834
Independent Study: ENTP	ENTP6840
New Concept Development	ENTP6842
Human-Centered Design, Innovation and Prototyping	IWKS 2100
Fundamentals of Computational Innovation	IWKS 2300
3D Design, Computation and Prototyping	IWKS 3100
Inworks: Choose Your Own Adventure: Experiences in Design, Innovation and Prototyping	IWKS 3180
Data Science for Innovators	IWKS 3200
NAND to Tetris: Foundations of Computer Systems	IWKS 3300
Game Design and Development I	IWKS 3400

COURSE	CLASS/PROGRAM
Synthetic Biology for Innovators	IWKS 3540
Innovation Law and Policy	IWKS 3550
Innovating for the Developing World	IWKS 3600
Mobile App Development	IWKS 3620
Innovation and Society	IWKS 3700
Product Design	IWKS 3850
Advanced Human-Centered Design and Prototyping	IWKS 4100
IoT: The Internet of Things	IWKS 4120
Game Design and Development II	IWKS 4450
Bio-Design and Innovation	IWKS 4500
Design for Healthful Human Longevity	IWKS 4520
Innovating for the Developing World	IWKS 4650
Case Studies in Design	IWKS 4680
Unconventional Design for Online Learners	IWKS 4700
StartUp: Creating a New Venture from Scratch	IWKS 4800
Undergraduate Capstone	IWKS 4900
Special Topics in Human Centered Design and Innovation	IWKS 4930
Independent Study in Human Centered Design and Innovation	IWKS 4970

APPENDIX D: POWERFUL STUDENT AND FACULTY STORIES

Jeff Nytch explained, “And then when I got tenure, I was the first person to get tenure in Arts entrepreneurship at any institution. So those are some firsts that we like to remind people of. So, in bringing me in as a faculty member I think was really pivotal because now all of a sudden, I’m dealing with these curmudgeonly colleagues as a colleague, and not as the staff person being below you. You know how that is academia, you know. And I hate that. But it is a reality.”

Robin Shandas explained, “It’s like this parallel world that I don’t know much about, which is very business oriented, but still is making the substantial impact, right? I mean it is, you know, as opposed to me having to spend five years going through all these clinical trials. Suddenly this company took it on, and using their expertise and knowledge was able to bring it to market very, very quickly. So that was like a lightbulb moment for me. It was like, okay. If I have an idea, if I take a more business oriented or really an entrepreneurial pathway, I could at least, I could increase my chances of making the impact, of bringing that product to market.” He went on to share a particular experience, collaborating with a surgeon and cardiologist. “The guy in the office next to me was the Chief of Cardiac Surgery. The person on the other side was a Chief of Interventional Cardiology and we were talking about the problems that we have as professionals. And the surgeon was like, I operated on this kid and there was this particular kind of problem, this particular condition that I ran into. And as an engineer I like to solve problems. So it’s sort of like, well, how would I approach that? And is there something that I can contribute? And so that’s how I felt. I started finding the key issues that I, as a biomedical engineer, could help solve. And that really kind of set the stage.”

Benjamin shared, “There’s a student in my current class that, before he came to UCCS, he was a welder. And he went to a technical school to become a welder. And his skills are still very much in demand. I think he’s probably making a better income than some of the starting professors here, doing welding. In the class, he said between 20% and 40% of long term welders developed lung cancer because of the fumes when they’re welding. And he said they wear a welding mask, but it just protects their eyes. It doesn’t protect the lungs. And there’s very expensive solutions with air filtration systems that elite welders can use. But most quote unquote regular welders don’t have that filtration equipment and they’re just filling their lungs with harmful chemicals, welding and doing their jobs. So he’s like, I want to create a lower cost mask that incorporates the eye protection but also includes just basic, like N-95 protection for the lungs. And he’s like there’s a huge market. And he said I’ve talked to the technical schools. They’re like, we would love to have that for our students because we’d save their lungs while they’re learning here. But that type of thing I think would be very appealing to the community. So if he were pitching that in front of the community. People in the community would respond to that… they would be like, hey here’s somebody who’s not only coming up with a business to make money and I might be able to make money by investing in them. But we’re also potentially saving lives. And that’s really cool.”

Benjamin shared another, “He had just finished an active tour duty in the Army, and was getting his college degree with the GI Bill, I believe. So super smart guy. From Ohio. African American family. And his family hadn’t had a lot of degrees in their past. So I don’t know if he was first generation. He may be first generation to

finish the degree, but super smart guy. And as we were looking at problems, he approached me and said, one of the things I grew up doing is hunting and fishing. And he said, we didn't have really our own land to hunt and fish on. So he said what his friends and his siblings would do is they would go to, you know, rural land and find cabins or homes and literally knock on people's doors and say,… Would you mind if we hunt or fish on your land? And they were very charming. And a lot of people said yes, but some people said no or some people wouldn't answer the door. So he said that's not only a problem for him. Like where do you find room to hunt and fish if your family doesn't own the land? So he said, I'd like to develop an app that is almost like Airbnb, that would link land owners and hunters and fishers so that the hunters and fishers can hunt and fish in a safe environment. That isn't on public lands and the private land owners can get some compensation for the use of their land. And have this all structured so that there's insurance and there's background checks and it's all done in a very transactional way but a safe way and a smart way. So he said, What do you think of the idea? And I said you know, I think it could have legs. I said, I'm not a big, you know, customer in that particular market. But I said I don't see why it wouldn't work if you look at the number of hunters and fishers in America. I mean it's massive. It's 10s of millions. And the people who own small ranches and farms, who, you know, aren't monetizing that asset, other than living there or growing crops or raising cattle. Like it's another way for them to monetize it. There seems to me there's a two sided market there that would make a lot of sense. So I helped him write a patent application on the method and system for doing this. He then filed a patent application on his own. But then he went to the accelerator at XI on my recommendation. Graduated there at the top of his class. And now he's in conversations to raise money for the company, $500,000. And has had offers from accredited investors. And he still hasn't finished the program yet.."

Chris shared, "I'm thinking of this student who was at Leeds. She had a handbag ideation concept where she loved Italian leather bags. She created her own with a new design and style and had an amazing brand name. She showed up at NVC and no one had ever heard about her. She gave this incredible pitch. Just amazing. She had her pitch down. She did not make it to the finals. A few of us reached out to her to see if she would speak about her experience and we wanted to know how she was doing with her idea. She just disappeared. My guess is that she either didn't have the academic course support or a mentor who was at CU. I think it's really important to have a faculty or staff mentor versus community. That helps to keep students engaged with their college experience."

Alicia taught the Executing Social Innovations class in Spring 2022 for the Social Innovation certificate in the College of Arts and Sciences at Boulder. When asked what they learned in the course. They said: "I became aware of social problems that I didn't realize existed."; "It takes a lot of time to really think through and develop an idea."; "I learned about funding.", "I am in a depressing major. It was nice to get a different side to things."; "We talked about finding solutions to problems instead of just the problem."; "The guest speakers were really eye-opening and made me feel like I can do this."; "Before I hated business. Now I am more open to it."; "Innovation is really hard."; and "It's ok to put yourself out there."

Angus shared, "So we've had students who have used water sensors. And the scenario was, my dad spent two hours a day on our ranch in the winter, driving to the livestock watering holes. And with the sensor I made, I connected a water sensor to a cheap phone card. And then in the morning, my dad wakes up, and he just looks at the water levels in each of the bins, and then only drives to the ones where he needs to turn on the water. And so to me, the victory is… here is the son of a

rancher from eastern Colorado, maybe even an undeclared major. And within two and a half hours, they have transformed an idea into actual impact."

Tom shared a story regarding a Boulder alumni who is participating in the Venture Attractor at UCCS. He explained, "John Eckhart's got a new company that he's building. He's an enthusiast of farmers markets, and he realizes that they have a very clumsy system for managing Farmers Market events. And so he's creating an end to end system to help the managers of farmers markets to manage inventory, manage registrations, manage parking, and everything else that is involved in having the Farmers market."

Randall, a student explained, "I think the most intimidating thing for me was going out and challenging ideas. Because I came into the program thinking, you have an idea, and of course people want it. It's just a matter of figuring out, how do you build it? How do you market it? How do you sell it? How do you get investments? And when I was being hammered with, slow down and think about whether anybody wants what you're building. And to do that, you have to go talk to people. I'm a pretty outgoing guy, but just doing a cold interview... I stood on Pearl Street and just grabbed people and was like hey. Can I talk to you? And once I started doing that process, it obviously became easier. And I think that was what kind of broke the ice for me. And being held accountable by my mentors."

APPENDIX E: CONTRIBUTIONS

University of Colorado System thanks the following contributors who shared their time, wisdom, and insights about innovation and entrepreneurship. We would like to say a special thank you to students and faculty who shared their experiences participating in innovation and entrepreneurship across the CU system.

Thomas Aicher, Assoc. Professor, College of Business, UCCS

Gali Baler, Director of Investments, CU Innovations; Co -Director of SPARK, CU Anschutz

Christina Beck, Program Director of Outreach and Engagement, CU system

Brad Bernthal, Assoc. Professor of Law, Interim Executive Director of Silicon Flatirons, CU Boulder

Jenifer Blacklock, Director, RADY Program, Colorado Western University partnership with CU Boulder

Mackendy Blanc, I-Corps Program Coordinator, Venture Partners, CU Boulder

Elyze Blazevich, President and CEO at Colorado BioScience Association

Cathy Bodine, Assoc. Professor, CCTSI, Director of Innovation Ecosystem, CU Anschutz

Joleen Bohnen, Managing Director of of Finance & Administration CU Anschutz

Terry Boult, Professor in Bachelor of Innovation, El Pomar Chair, Director of VAST, UCCS

David Brown, Adjunct Professor at CU Boulder, Founder of Techstars, Partner at Zintinus

Heather Callahan, Director of Licensing, CU Innovations; Entrepreneur in Residence, CU Anschutz

Angus Chassels, Entrepreneur in Residence, Bachelor of Innovation, UCCS

Karen Crofton, Stephen M. Dunn Director of Eng. Entrepreneurship & ESCEND®, CU Boulder

Alejandro De Jesus, Assoc. Director of Business Services, Comcast Media & Tech Center, Denver

Luke Doster, El Pomar Institute for Innovation & Commercialization (EPIIC) Program and Outreach Administrator, UCCS

Tom Duening, Assoc. Professor, Center for Entrepreneurship; El Pomar Chair of Business and Entrepreneurship, Venture Attractor, UCCS

Theo Edmonds, Research Associate Professor and Director/Co-Founder Imaginator Academy

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Terri Fiez, Office of Research and Innovation, CU Boulder

Thomas Flaig, Vice Chancellor for Research, CU Anschutz

Carolyn Gery, Instructor, Bachelor of Innovation, UCCS

April Giles, Fitzsimmons Innovation Community, CU Anschutz

Don Grant, Director, Social Innovation Certificate, CU Boulder

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Stan Hickory, Program Director, New Venture Challenge, CU Boulder

Eyal Kaplan, Chairman of the Board at Peri on Network, Chairman of the Board at Medial EarylSign,Board Member, Technion Council (Va'ad Menahel)

Delaney Keating, Executive Director of Startup Colorado, CU Boulder

Emily Klein, Director of Venture Development, Venture Partners, CU, Boulder

Becky Komarek, Assistant Director of Idea Forge, CU Boulder

Daria Kotys, Director of Idea Forge, CU Boulder

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Michael Lightner, Vice President of Academic Affairs, CU system

Bruce Mandt, Academia Industry Alliance, CU Anschutz

Dylan Mark, Startups2Students, Career Services, CU Boulder

Sharon Matusik, Dean of Leeds School of Business, CU Boulder

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Kim Muller, Executive Director of CU Innovations, CU Anschutz

Rod Nairn, Executive Vice Chancellor for Academic and Student Affairs, CU Anschutz

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Kathy Noonan, Director of Community Engagement, Arts and Sciences, CU Boulder

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Madhavan Parthasarathy, Director of Jake Jabs Center for Entrepreneurship, Professor, CU Denver

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Dennis Roop, Director of the Gates Center, CU Anschutz

Massimo Ruzzene, Acting Vice Chancellor for Research & Innovation, CU Boulder

Nathan Schneider, Assistant Professor of Media Studies, CU Boulder

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Monika Wittig, Assistant Professor, Assoc Director, InWorks Innovation Initiative, CU Anschutz

Kristin Wood, Senior Associate Dean of Innovation & Engagement; Executive Director of Inworks, CU Denver

Jeff York, Assoc. Professor of Strategy and Entrepreneurship, Research Director of Deming Center for Entrepreneurship, CU Boulder

Blair Young, Innovation Catalyst, ASSETT Innovation Incubator, CU Boulder

Marta Zgagacz, Director of Licensing, Venture Partners, CU Boulder

APPENDIX F: ADDITIONAL RECOMMENDATIONS

A concerted effort should be made to expose students to I&E opportunities, ideally including coursework, at an early stage during their time at the university. Students report powerful experiences related to their entrepreneurial engagements. A common student lament, however, is that students wish they had known about opportunities earlier during their time at the university. I&E offers experiential engagement, teaches skills that help students work across functional areas, and develops leadership capacities. Earlier intervention which exposes students to entrepreneurship promises salutary benefits related to student outcomes. This includes increased student engagement and, potentially, a tool to promote student retention. It would also help I&E leaders reach out to populations that are underrepresented in the emerging company community, including BIPOC, low income, and first generation students. Relatedly, widely available I&E programs may be a tool to buoy student recruitment efforts.

Administrators and leaders across the CU system should evaluate whether to institutionalize and scale CU's most successful I&E programs. A wave of novel I&E offerings proliferated across the CU system over the past 15 years. These programs should be evaluated for sustainability and scalability. One, related to sustainability, several I&E programs emerged outside of the CU system's traditional support mechanisms. Faculty and staff, for example, often raised their own funding to support nascent programs, and many I&E offerings are co-curricular (i.e., not credit bearing classes). Improvisation is laudable and sometimes necessary to launch something novel within the university. Yet there are concerns about whether programs that lack formal institutional support, such as year-over-year budget lines and credit-bearing opportunities for students and faculty, are sustainable over the long term. Two, as to scalability, among the I&E offerings that have emerged, it should be considered whether a larger impact is possible. The best programs, if scalable, warrant the muscle of institutional support such as enhanced funding, staff support, and professional rewards.

The CU system should consider how institutional incentives - big and small - contribute to, or in some instances frustrate, a shared culture of innovation. For example, whether and how engagement with I&E activities weighs within a faculty member's tenure case is a significant, yet tricky, issue for universities to consider. Further, interdisciplinarity is often a crucial ingredient in innovation and successful entrepreneurial efforts. Yet university silos create challenges to teaching and taking courses across departments and schools. Even small frictions within the university can have outsized negative effects. For example, parking constraints and fees - whether imposed directly upon community members or paid by campus organizations that host entrepreneurship events - make it more difficult to bring expert mentors to campus and, more broadly, makes it unduly expensive for centers and programs to host regular events which bring the startup community and industry partners to campus. This chills crucial startup community engagements.

Each university within the CU system should offer a highly visible touch point which serves as an I&E concierge, helping campus and community members identify relevant I&E resources and opportunities on campus. Interviews across the CU system underscore that opportunities to participate and events are initially difficult to find, especially for individuals who are unfamiliar with I&E. Yet once the initial steps are taken to participate, individuals discover densely networked systems and other attractive opportunities. A broader

challenge for the university to address is speed of decision-making and support between industry and campus. Emerging companies and industry partners often move fast in response to market forces; meanwhile, universities tend to require careful processes and approvals. This can create mismatches in terms of time to take action. Mechanisms to address these challenges, such as a campus I&E concierge who could prod along campus decision-making, should be considered.

In addition to report findings, two sessions were held to gather feedback on findings and proposed initiatives with I&E leaders across the CU system. One session was held at the University of Colorado Anschutz Medical campus in June 2022 and the second session was held virtually in August 2022. The following represents key discussion points that need to be taken into consideration with future I&E initiatives.

» There is a great opportunity to celebrate individual campus successes and amplify their impact. The group agreed that there is a need and opportunity to share stories, successes, and highlight I&E. Participants viewed this as a win-win for individual campuses, the CU system, and for the innovators themselves. External and internal stakeholders will see the value of I&E and may increase investments within I&E.

» There is an interest in challenging and changing promotion and tenure to be more inclusive of I&E efforts. Participants discussed that while I&E should not be a requirement for promotion and tenure, faculty should get credit for engaging in I&E, regardless of the outcome of the business itself. While participants were aware that this effort would be a huge undertaking, they were persistent that it needed to be, and was worth addressing.

» There are concerns around initiatives being slowed down or managed at CU system. There were specific concerns from technology transfer offices, given that TTO's used to be housed within the CU system. There have been tremendous strides since the TTO's have transitioned to CU Innovations and Venture Partners. While it was repeated that the system strategy would not control or command individual campuses, participants still expressed concern. Future initiatives must be collaborative and handled with care.

» There is a need to align incentives for collaboration within each campus and across campuses. It was encouraged to identify one another's strengths and visually understand existing relationships between the various I&E nodes in the CU system. Existing funding models and procedures can place unnecessary barriers to collaborate between departments and colleges.

» The group emphasized the need to help faculty, researchers, and students better understand innovation and entrepreneurship and make it easier to get started. Participants explained the need to help various audiences understand what innovation and entrepreneurship means. Entry points must be clear to refer students, faculty, and others to resources. Notably, it was quite difficult for the research team to find I&E related events (with the exception of CU Boulder, which has a single website for all I&E events) to observe.

» There is a need to highlight more of the roadblocks and structural impediments that hinder innovation within each institution and new business creation. While challenges and barriers were addressed in the report, there was a request to make these more prominent, as they hinder innovation and entrepreneurship capacity.

» The group agreed with the need to communicate and coordinate between campuses. Participants were happy to see other system folks at the meetings and

were looking to meet others doing similar roles across the campuses.

» There is a large divide between the needs and interests of Technology Transfer Offices and I&E Education. The two groups serve a different audience and purpose. In future gatherings, communications, and coordination, considerations should be made to involve both groups, while making sure the needs of both groups are being met.

» Make I&E part of the infrastructure. Concerns were expressed that when leadership changes, so do the priorities and funding. There was a push to put a stake in the ground and solidify I&E as a priority, regardless of leadership changes.

» Innovation and entrepreneurship, and creativity transcends all fields and disciplines - teaching students I&E skills and mindset are critical for the future. There was an interest to improve teaching methodologies for students, and to expand I&E efforts to be available for students pursuing any degree.