



University of Colorado System Information Technology Assessment

Current State Assessment and Benchmarking Report – Executive Summary

March 3rd, 2020

Draft – For Discussion Purposes Only

Agenda

Introduction and Process

Executive Summary

Appendix



INTRODUCTION AND PROCESS

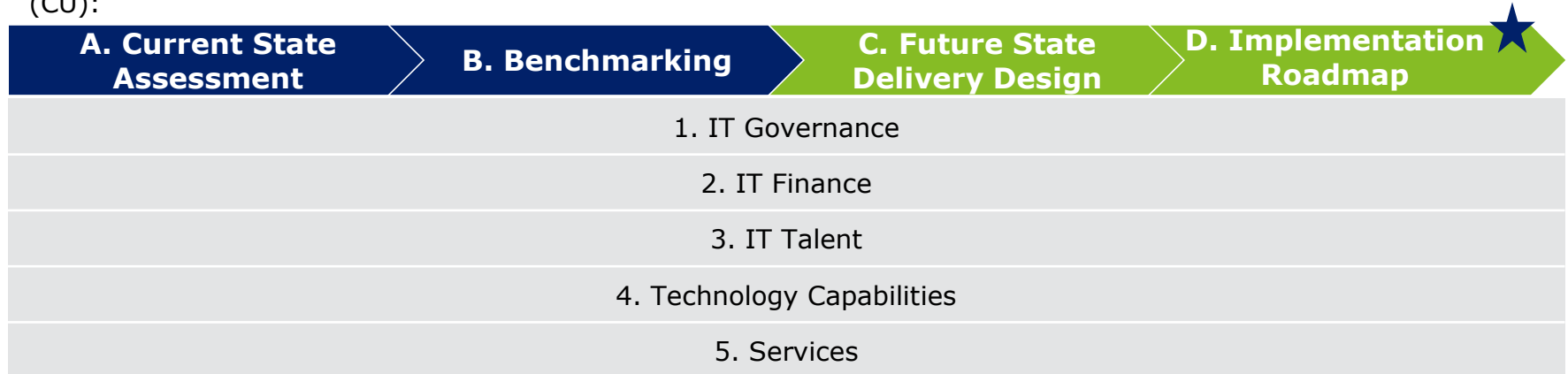
IT Assessment Objectives

-  Assess the current state of technology
-  Meet with key IT stakeholders across all campuses
-  Benchmark performance against peer institutions in higher education
-  Make recommendations to achieve a future state vision for IT
-  Define a roadmap for prioritizing and implementing recommendations

Approach and Status

Project Approach

Focus on each area in scope across four primary project phases and for each entity of the University of Colorado (CU):



Complete

On Track



= We are here

Assessment Inputs



Data Collection



Stakeholder Interviews



IT Effectiveness Questionnaire



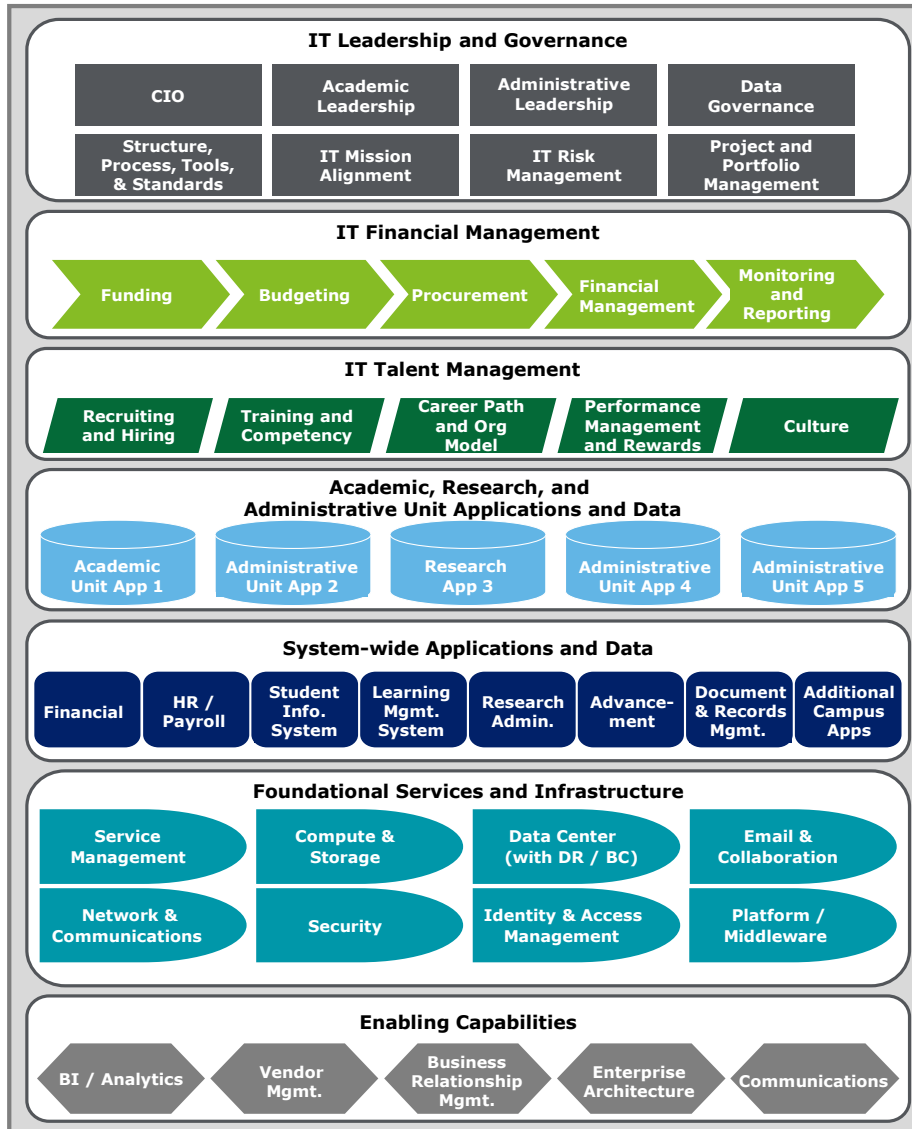
Future State Input from CIOs and CISO

Current State Accomplishments

- Interviewed **130+** stakeholders through **88** separate interviews.
- Collected, reviewed, and analyzed **over 150+** governance, finance, talent, infrastructure, applications, and services data documents.
- Conducted **20+** follow up deep dives with domain-area SMEs to validate data and understanding.
- **4 feedback and review cycles** with CIOs and CISO on deliverables to date.



Application of the IT Transformation Framework



IT Governance



IT Finance



IT Talent*



Technology and Services

- Infrastructure
- Applications**
- Data
- Service Management
- Security
- Innovation

* Full talent management assessment out of scope based on CU request

**Applications defined as software (both custom developed and packages), including but not limited to: enterprise resource planning software, customer relationship management software, graphics software, productivity software (e-mail, word processing, collaboration tools), job applicant tracking software, or learning management software





EXECUTIVE SUMMARY

One University, Four Campuses



Advancement

"assist benefactors in discovering how their passions create lasting support for the university"



System Office

"brings together administrative departments and services centers that provide guidance and services to all of CU's campuses"



University of Colorado
Colorado Springs

"a comprehensive baccalaureate university with selective admission standards ... offering liberal arts and sciences, business, engineering, health sciences, and teacher preparation undergraduate degree programs, and a selected number of masters and doctoral degree programs."

- 6 schools and colleges
- Over 10,000 students enrolled
- \$8 million in sponsored research in 2019



University of Colorado **Denver**
CU IN THE CITY

"a diverse teaching and learning community that creates, discovers and applies knowledge to improve the health and well-being of Colorado and the world."

- 8 schools and colleges
- Almost 15,000 students enrolled
- \$25 million in sponsored research annually



University of Colorado
Anschutz Medical Campus

- 6 health professional schools
- Over 6,000 students enrolled
- 2 of the top hospitals in the U.S.
- Robust research and innovation environment
- \$526 million in sponsored research annually



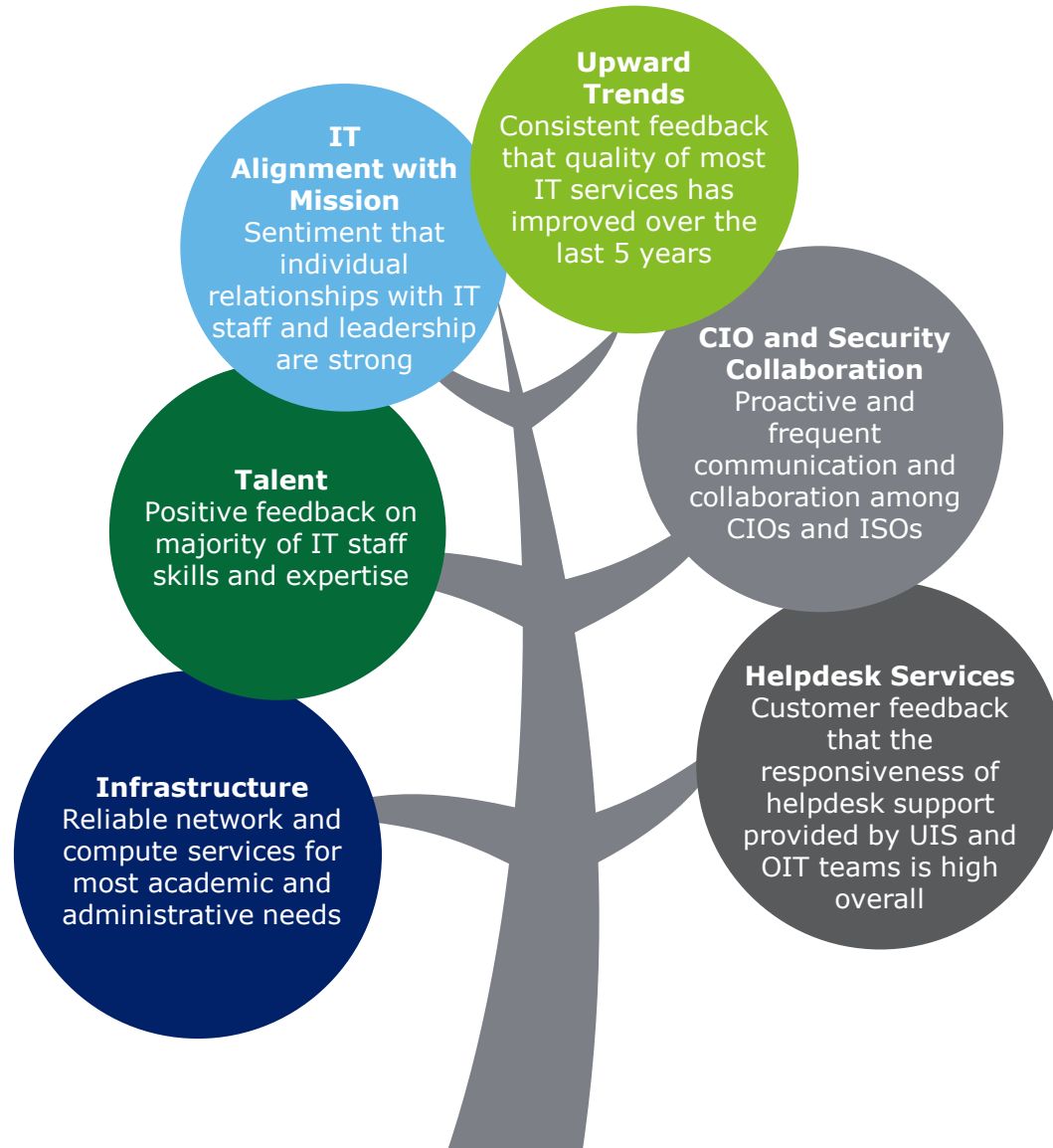
University of Colorado **Boulder**

"the comprehensive graduate research university with selective admissions standards ... offering a comprehensive array of undergraduate, graduate, and doctoral degrees."

- 9 schools and colleges
- Over 31,000 students enrolled
- \$631 million in research funding in 2019
- 75 research centers



Existing Strengths of IT at CU



Stakeholder Perception of IT at CU

IT Effectiveness Assessment Questions

Average Stakeholder Perception

Business IT Alignment

- Level of understanding of CU's strategic priorities?
- Quality of relationship with academic/administrative units?

IT Governance

- Clarity of IT governance groups?
- Effectiveness of IT governance at CU?
- Ability to successfully deliver projects on time and budget?

IT Optimization

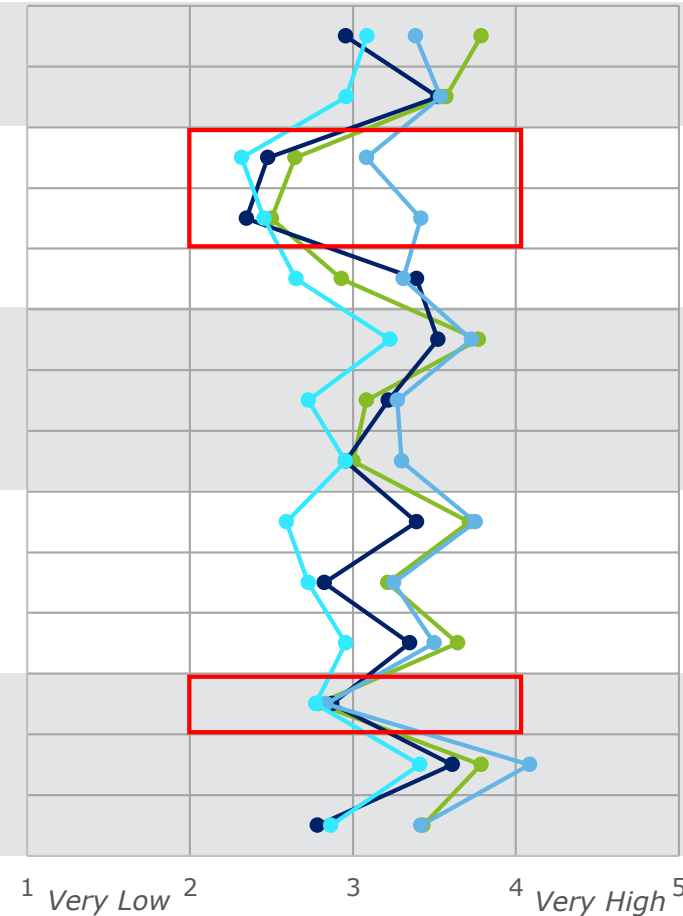
- Quality of infrastructure services?
- Quality of application services?
- Effectiveness of enterprise architecture and standards at CU?

IT Service Management

- Level of customer satisfaction with services?
- Clarity of services offered?
- Value of services offered?

IT Organization Model

- Perception of sufficiency of personnel?
- Perception of quality of personnel?
- Effectiveness of organizational structure?



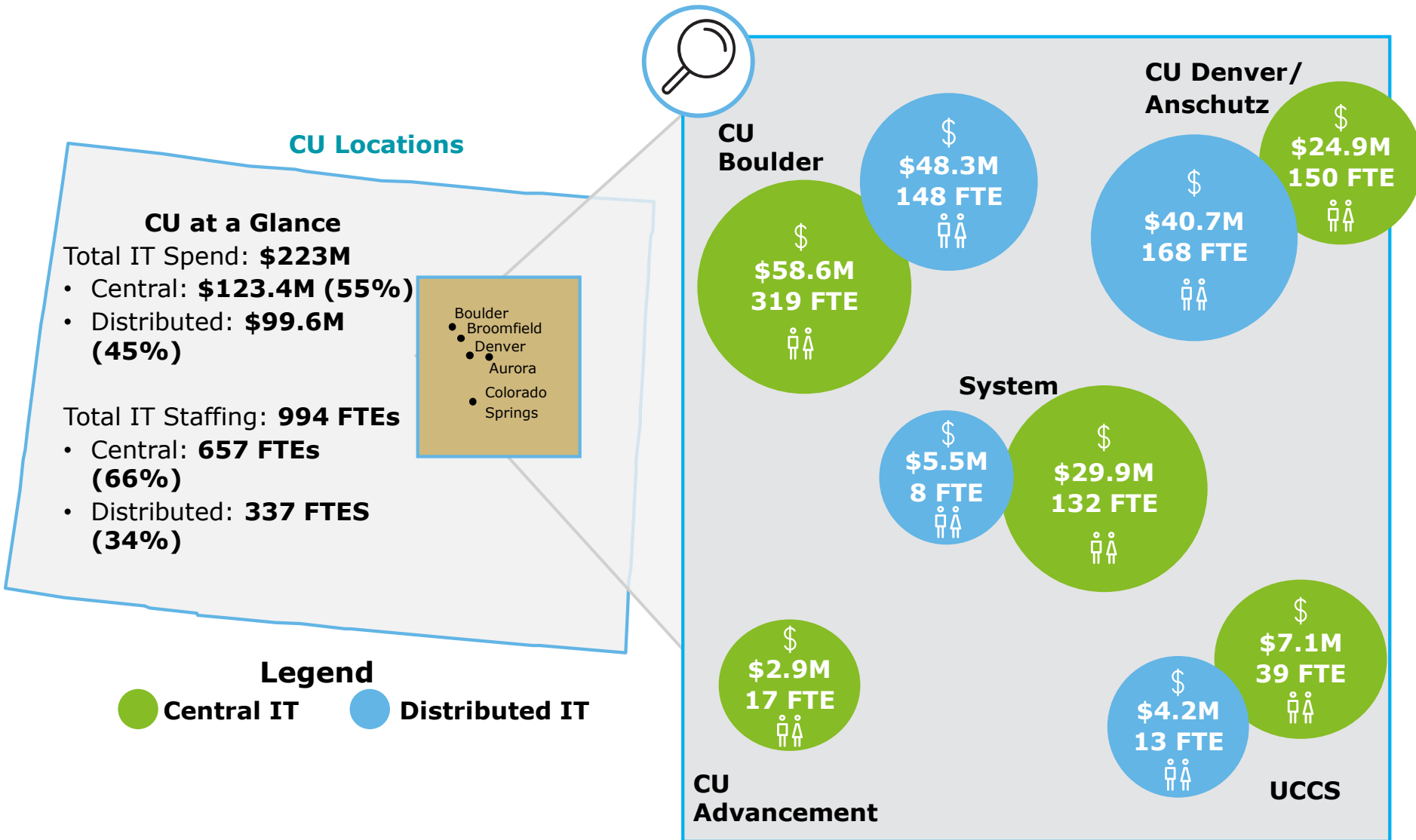
Note: N = 73 survey respondents as of 1/14/2020

□ = Area of focus across majority of responses

— CU Boulder
— UCCS

— CU System
— CU Denver/Anschutz

System and Campus Snapshots



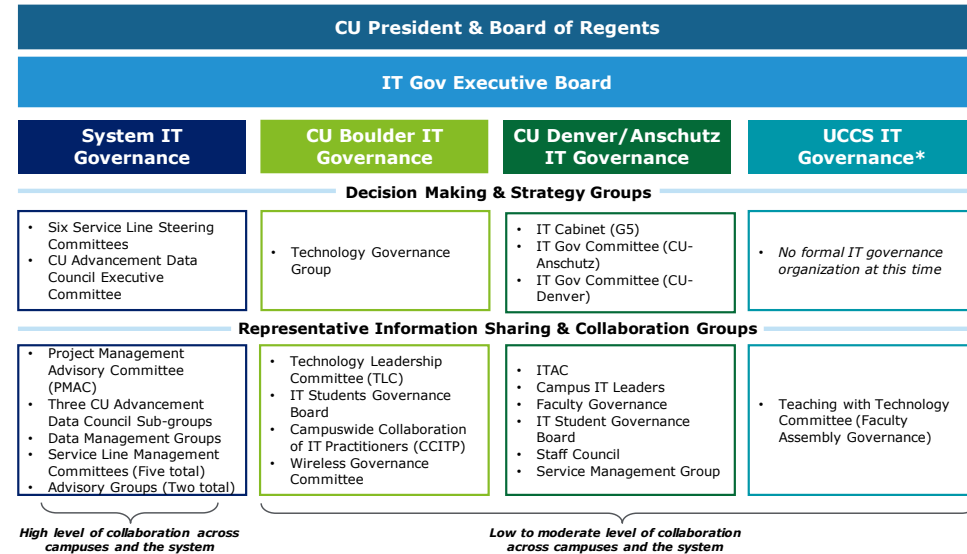
IT Governance



Key Findings

- A lack of a cross-campus IT strategic plan creates challenges in aligning to shared objectives, collaboration, and coordinated investments in IT across the system and the four campuses.
- The mandate for UIS is not clear.
- The functional alignment of IT from an organizational perspective is not standard across CU
- Roles and responsibilities of various IT governance bodies are not clearly defined resulting in a lack of accountability for decision-making.

Overview of Current Governance Model

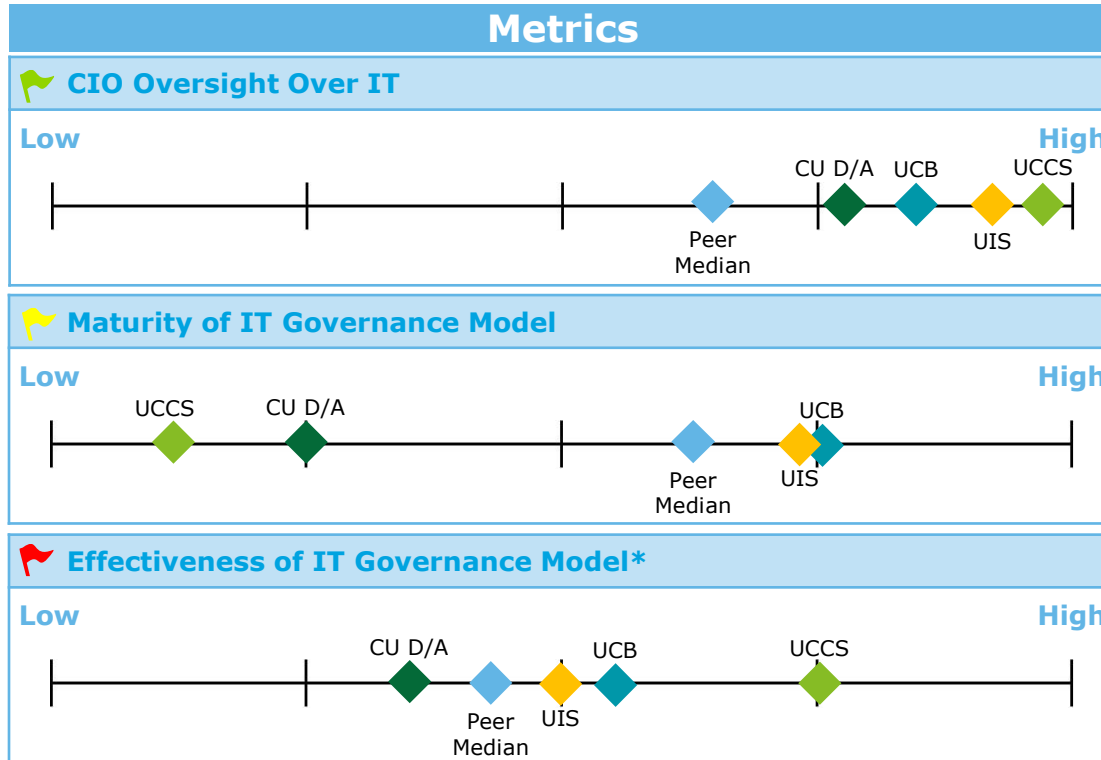


Overview of IT Reporting Relationships

CU IT Institution	CIO Reports To
UIS	Vice President Employee and Information Systems
CU Advancement IT	(Interim VP of Advancement) President and Chief Executive Officer CU Foundation and System Chief Operating Officer
CU Boulder OIT	Vice Chancellor and Chief Operating Officer
CU Denver/Anschutz OIT	Chancellors, CU Denver and CU Anschutz
UCCS OIT	Chancellor, UCCS



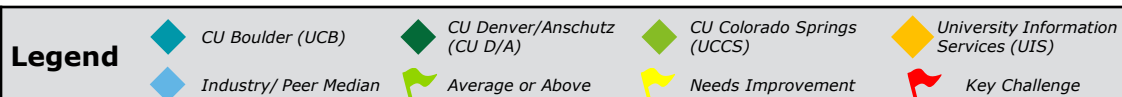
IT Governance: Benchmarking



*Based on CU stakeholder feedback

Key Observations

- IT leadership at each institution varies, reflecting in part the varying degrees of decentralization at each institution and also the degree of oversight each CIO has over IT.
- The distribution in IT governance maturity reflects the varying robustness of processes used to make IT decisions in coordination with campus units.
- Governance effectiveness varies at each institution; the greater centralization in IT operations at UCCS enables more streamlined decision making; the updated governance model at CU Denver/Anschutz has not been fully implemented, in turn providing less clarity on who is making IT decisions and how.



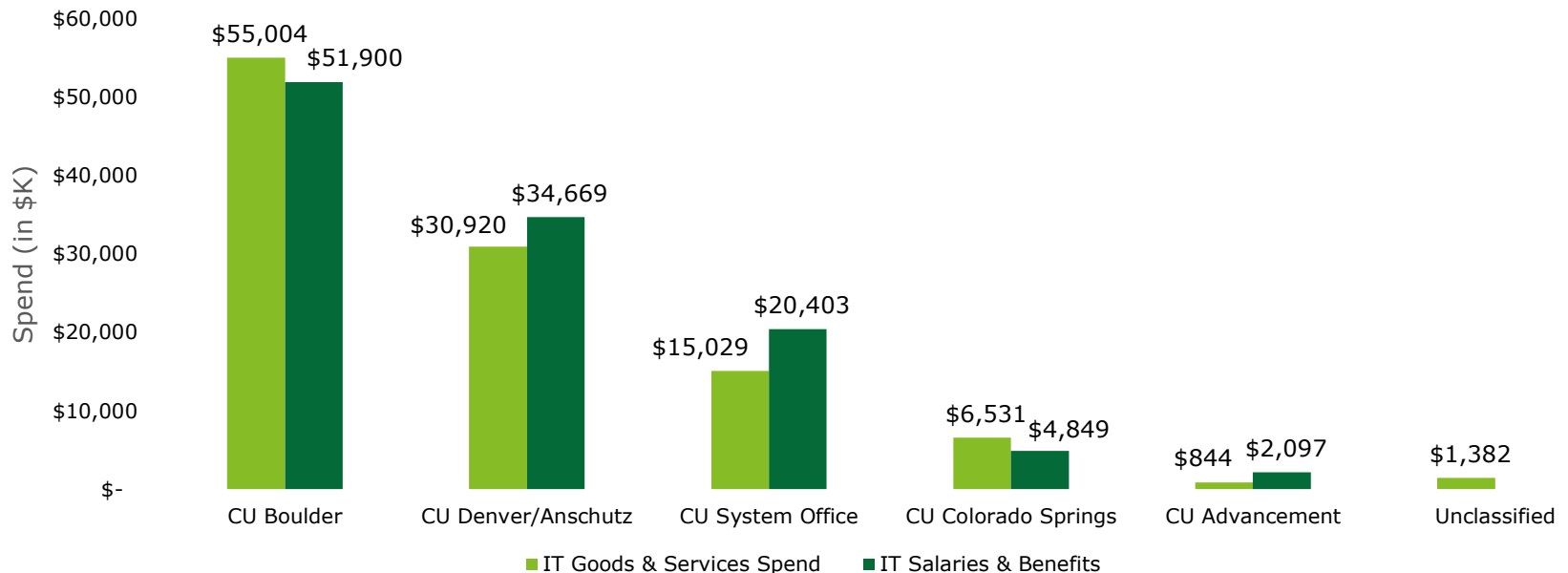
IT Finance



Key Findings

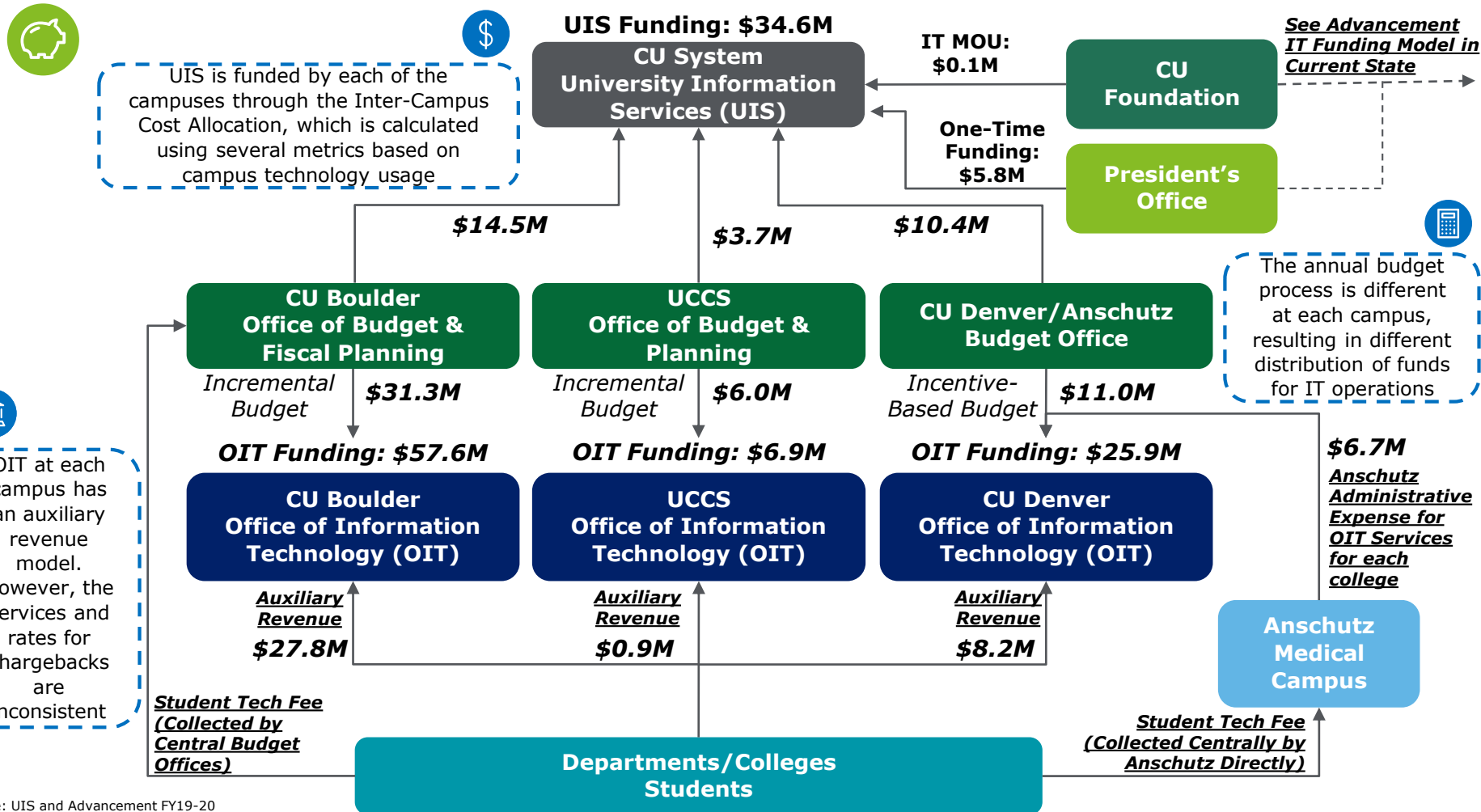
- CU spent more than \$223M on IT in FY19, of which 55% was by UIS, Advancement IT, or campus OIT groups.
- CU is challenged in collaborative financial planning for IT operations owing to the inconsistency in funding and budgeting processes across campuses.
- CU's current monitoring and reporting tools lack the capability to track and analyze IT spend and budgets effectively.

Enterprise FY19 IT Spend (in \$K)



IT Finance: Current State Funding Model

CU Current State Funding Model

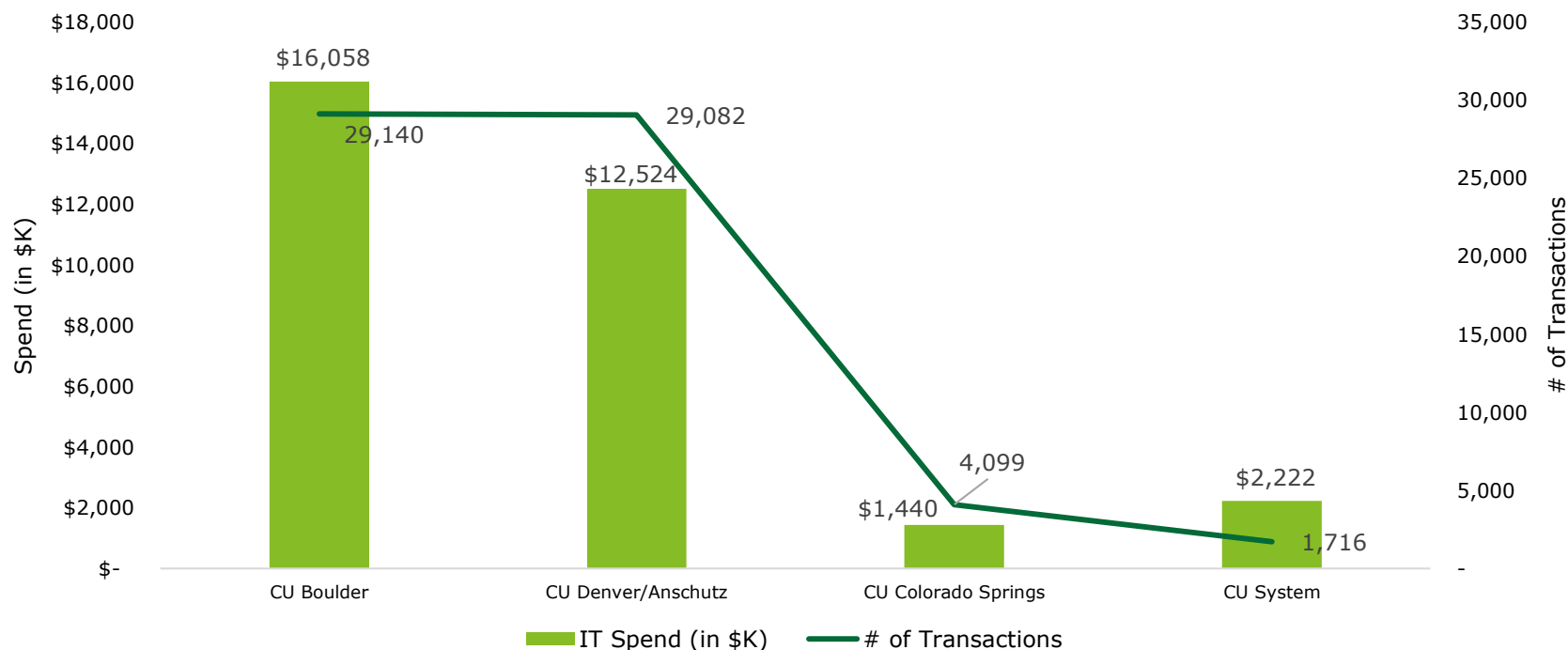


Source: UIS and Advancement FY19-20 Budgets, Campus IT Revenue And Budget FY20, Boulder – FY20 Aux Estimated Revenue OIT, Email from Denver OIT and Boulder OIT

Inconsistent budgeting models makes it difficult for leadership to make decisions and fund IT activities at CU

IT Finance: Purchasing and Supplier Management

FY19 Single Transaction IT Spend Under \$10K



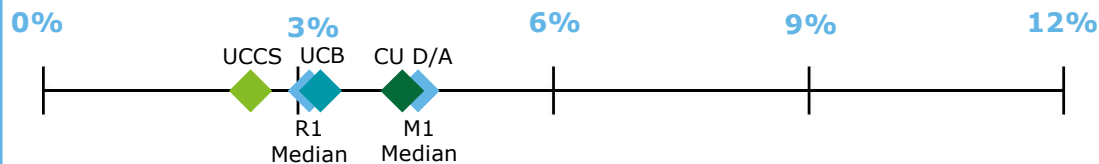
Key Observations

- 29% of total IT spend on goods and services falls under procurement \$10K single transaction approval workflow, without review by campus OIT, UIS, or Procurement.
- While CU Boulder had the highest spend under \$10K, CU Denver/Anschutz had the largest proportion of spend under \$10K compared to total spend.
- Of the \$30.9M in IT spend, 40% of IT spend at CU Denver/Anschutz was for single transaction purchases under \$10K.

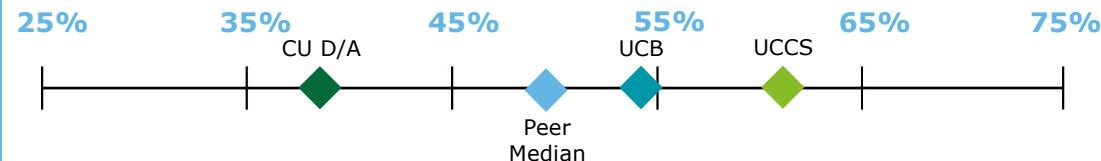
IT Finance: Benchmarking

Metrics

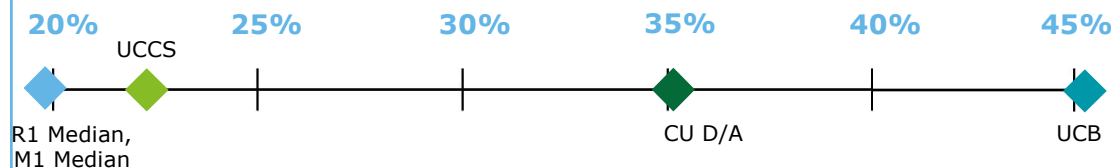
Central IT Spend as a Percent of Total Operating Budget



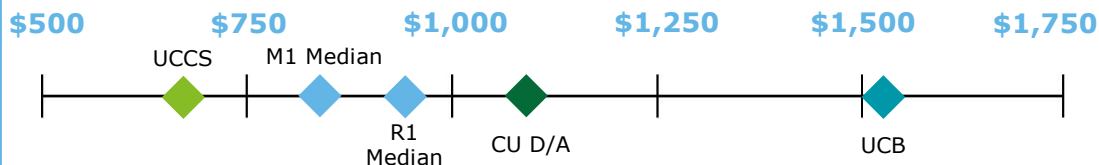
IT Spend Managed Centrally



Percent of Central IT Funding from Sales/ Services (Chargebacks)



Central IT Spend per Institutional FTE (Students, Faculty, Staff)



Legend



Key Observations

- Each CU campus appears to be aligned with industry medians for IT spend as a percentage of total operating budget.
- CU Boulder has spend metrics higher than average, which is expected due to its position as the flagship campus.
- UCCS has spend metrics lower than average, which is partly due to its smaller size but also represents an under-investment in IT.
- Conclusions cannot be drawn solely from the financial benchmark analysis for CU Denver/Anschutz since the combination of a traditional campus along with the decentralized IT operations of a medical campus does not allow for a reasonable 1 to 1 comparison.
- There are pros/cons to an IT chargeback model. Some peers are moving towards greater chargeback while others are moving away from it. However, the underlying methodology in IT funding and expense models needs to have greater rigor and transparency across all campuses.



IT Talent



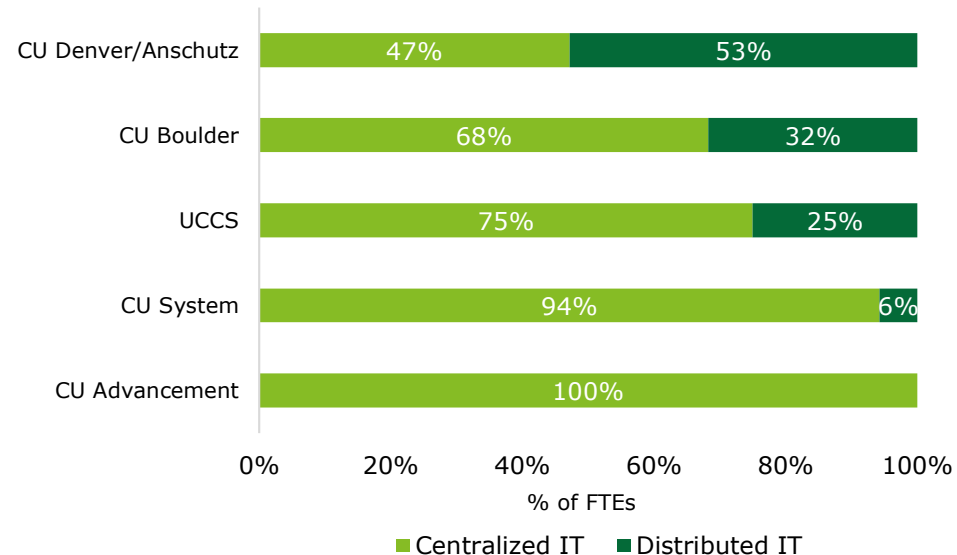
Key Findings

- CU has at least 994 IT FTEs across the system and four campuses.
- 66% of IT staff are centralized in either the UIS office, Central Advancement or a campus OIT unit.
- There are at least 719 unique IT staff position titles* across the organization.
- Average IT staff salaries across CU are approximately \$20K less than the regional benchmark for comparable IT talent.

IT Staff Counts

No. Total Employee FTE	994
CU Boulder	467
CU Denver/Anschutz	318
CU System	140
UCCS	52
CU Advancement	17

IT Staff Distribution



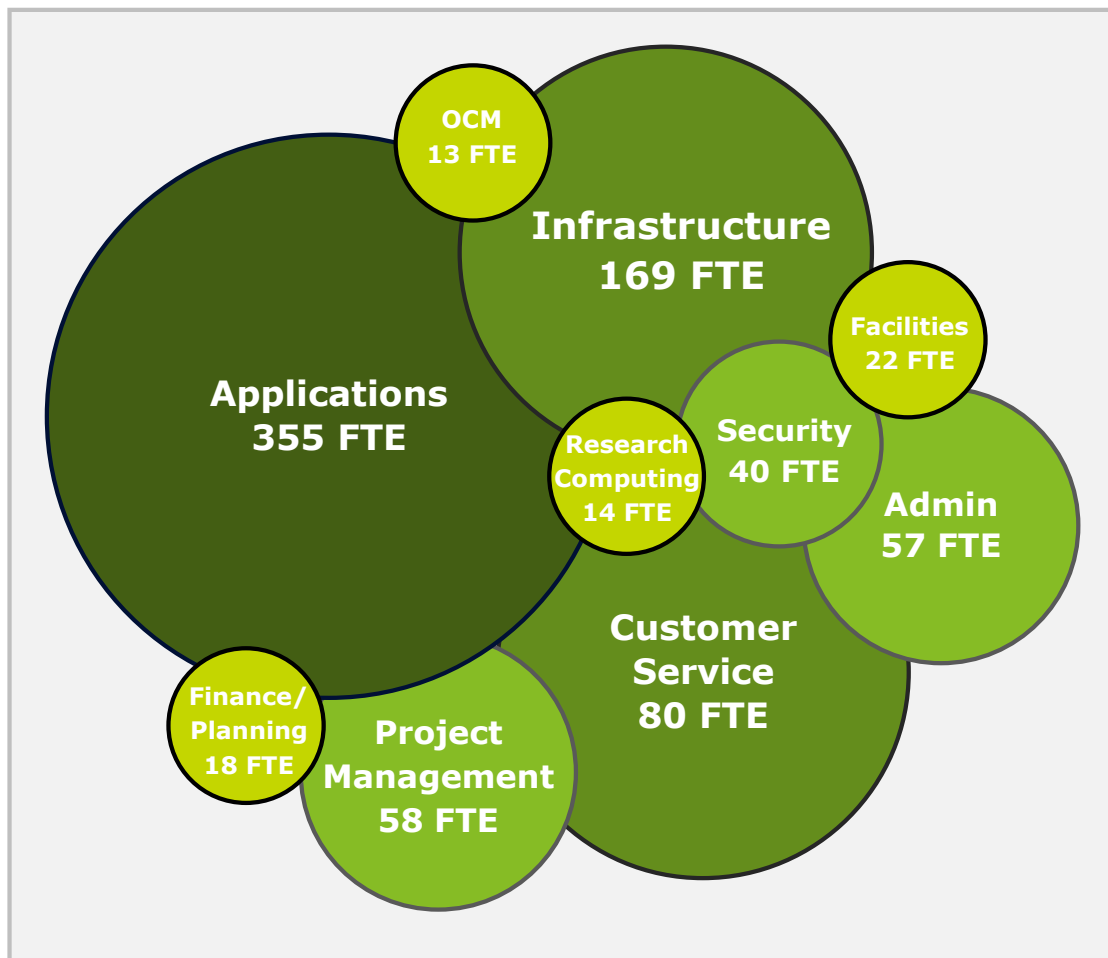
* 719 position titles correspond to 52 unique job titles

IT Talent: Distribution of IT Staff by Function

Observations

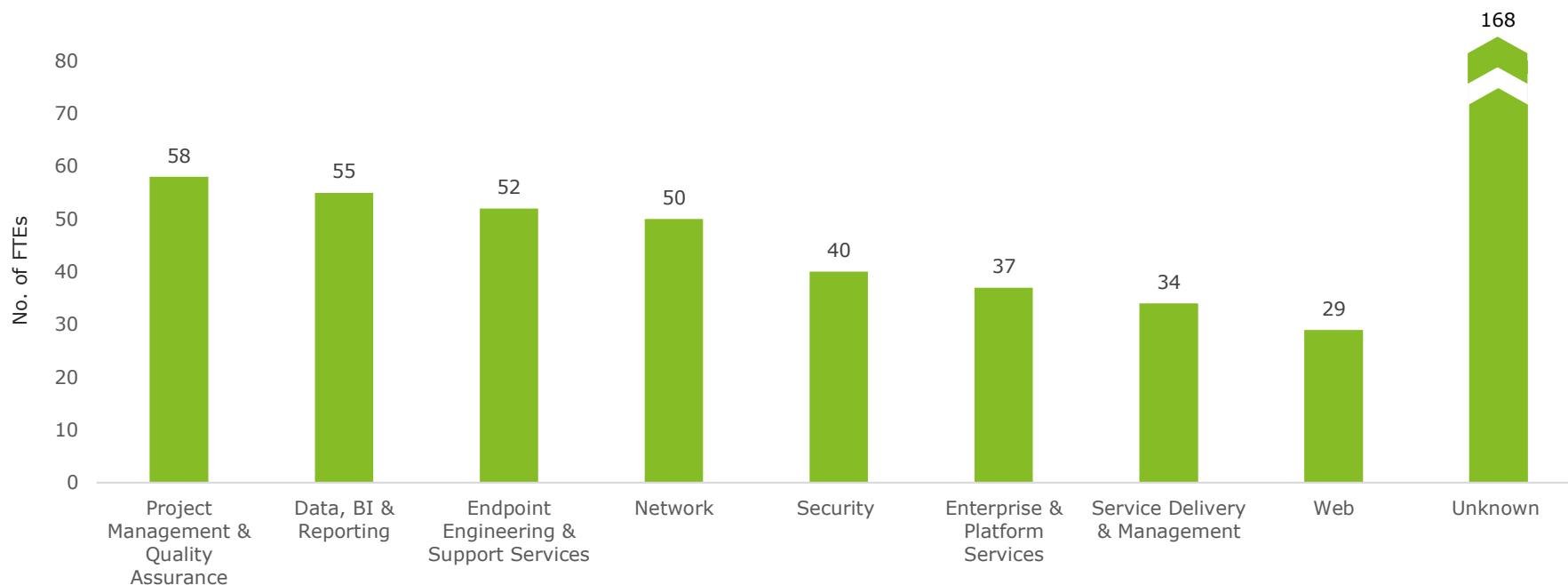
- Across CU, there are 994 FTEs working in IT
- CU's IT workforce has at least 719 position titles.
- The largest group of IT staff across CU work primarily in the applications function (355), followed by infrastructure (169), and customer service (80)
- Due to the significant number of unique position titles, there are 168 roles that could not be mapped to a discrete function and were marked as unknown

IT Staff Distribution by Function



IT Talent: Distribution of IT Staff by Sub-Functional Group

Total FTE Counts Across CU by Sub-Functional Group

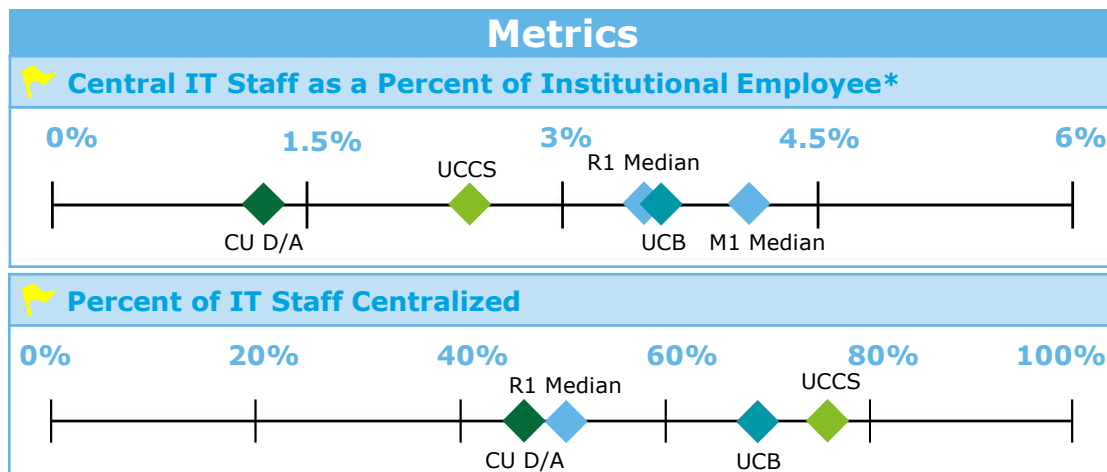


Observations

- Increased collaboration across CU in commodity IT services such as infrastructure services, enterprise services, and business systems may free-up resources to focus on high-demand IT requests and transformative initiatives.
- Additional validation and analysis of data is required due to the high number of 'Unknown' titles in the data analyzed.

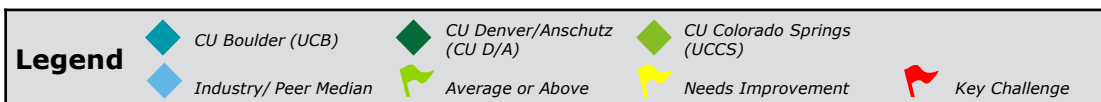
Note: Not all sub-functional groups listed; based on data provided to Deloitte as of 2/14

IT Talent: Benchmarking



Key Observations

- The amount of central IT staff as a percent of institutional employees is lower than the median for all campuses, reflecting potential underinvestment in resourcing for central IT (e.g., UCCS) or greater distributed IT staff servicing the needs of faculty and staff at some campuses (e.g., based on interviews with CU Denver/Anschutz stakeholders).
- Each of the CU campuses is in line or above the higher education median benchmark for percent of IT staff centralized.



*Faculty and Staff

Note: Benchmarking for talent limited given completeness of talent data and that full talent management assessment out of scope per CU request

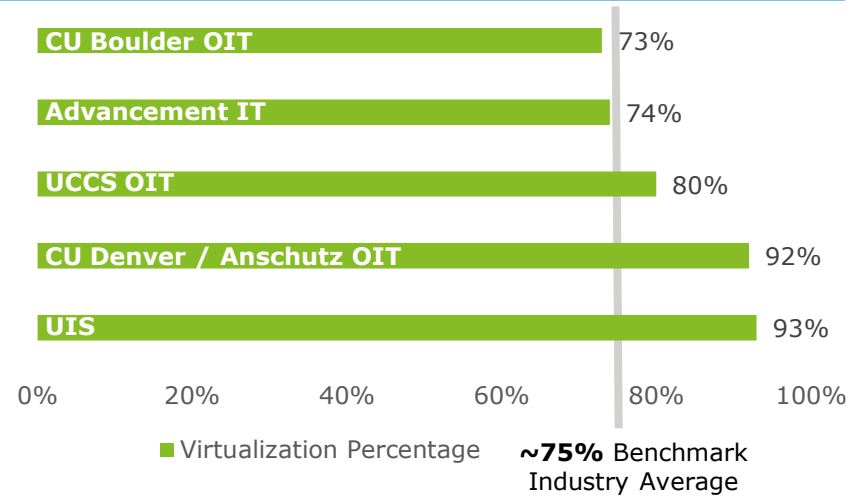
Technology: Infrastructure



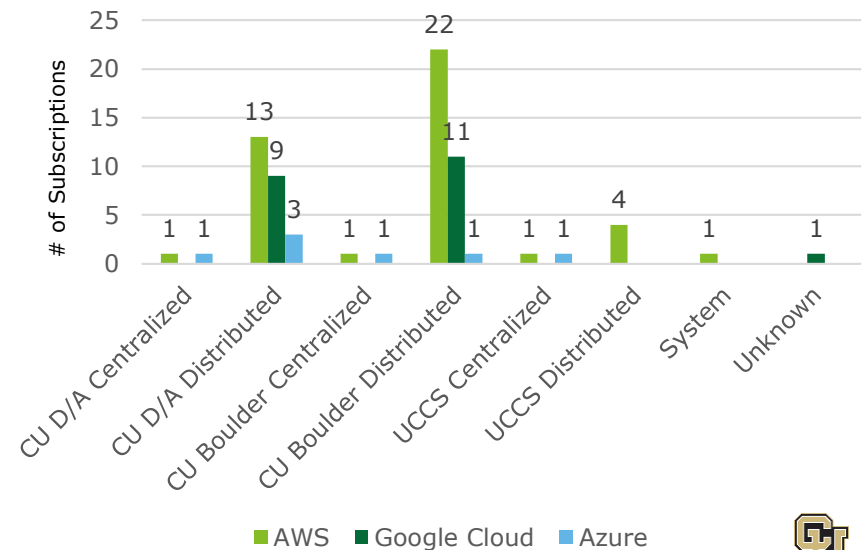
Key Findings

- Infrastructure and network performance and availability has been rated as positive across CU.
- Centralized IT operates 13 data centers across CU. However, infrastructure sprawl is evident at the distributed IT level with an unknown number of data centers, server closets and cloud instances that exist.
- No Tier 3 facilities exist across CU.
- Disparate networks and multiple collaboration tools (Skype, Microsoft Teams, Slack etc.) across the system increase difficulty in cross-department and cross-campus communication.

Server Virtualization*



Cloud Subscriptions by IT Organization



Technology: Security



Key Findings

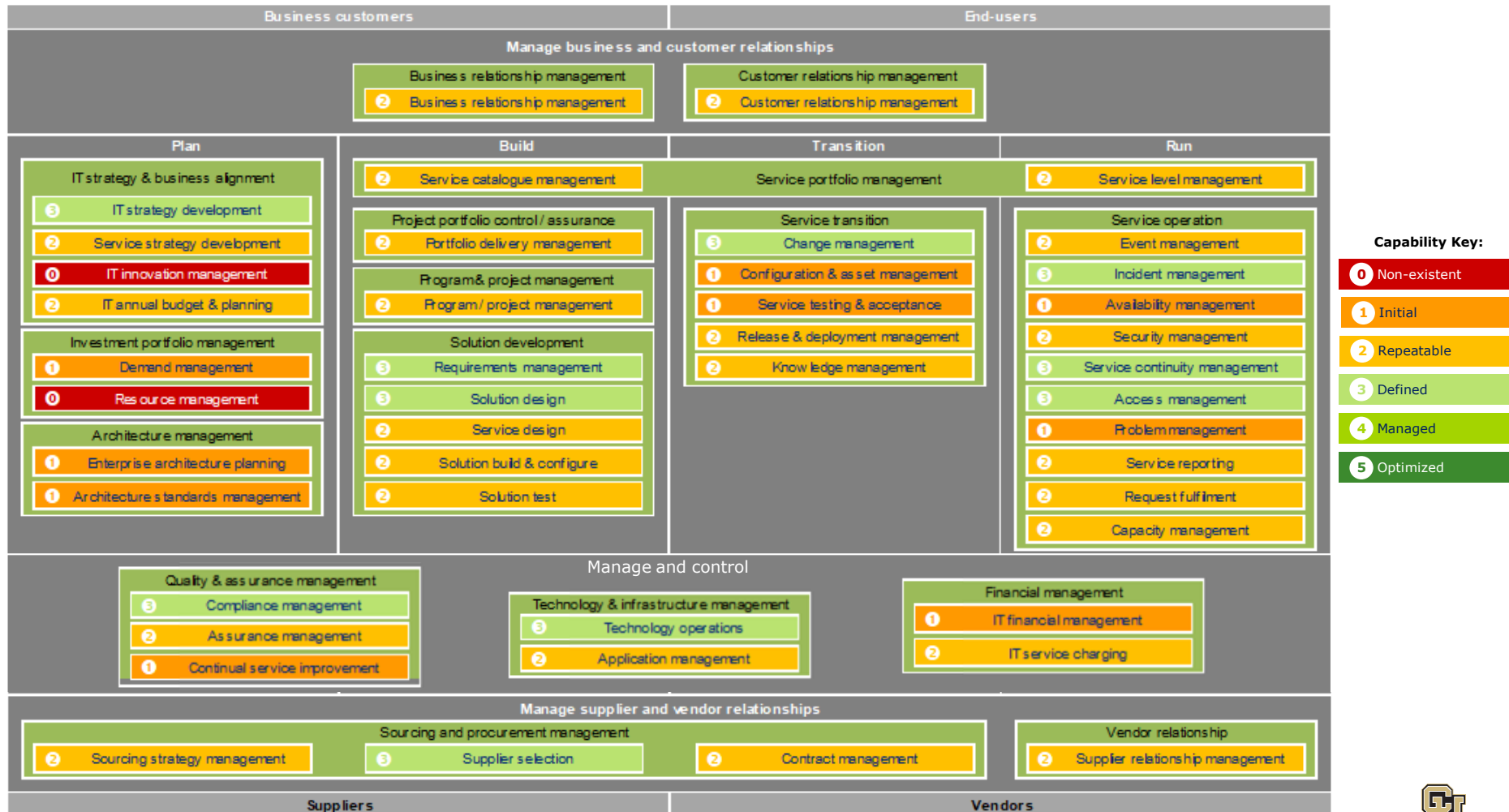
- CU Chief Information Security Officer and campus information security officers do not have full visibility across the enterprise to assess risks and inform effective enterprise security risk mitigation strategies.
- Annual reviews and update process for security policies are not followed due to competing priorities and resource constraints.
- CU System utilizes a combination of 39 different security tools across its four campuses and different categories to secure its network infrastructure, which leads to gaps associated with enterprise reporting and delivering an enterprise security operations.
- Implementing NIST 800-171 security assessments as resources allow and to meet federal compliance requirements.

Technology: Service Management

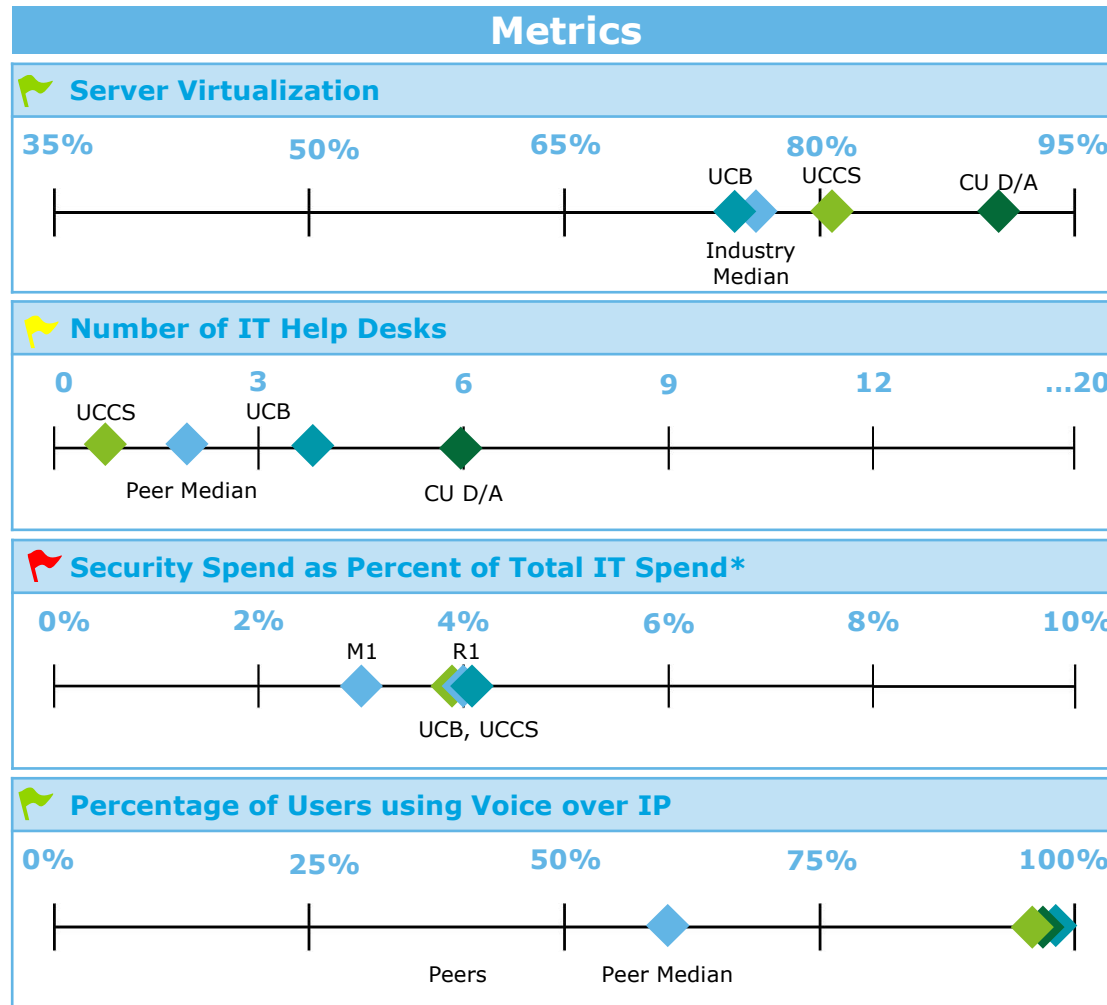


Key Findings

- CU-wide averages show a wide range of maturity across capabilities and processes highlighting areas for improvement.

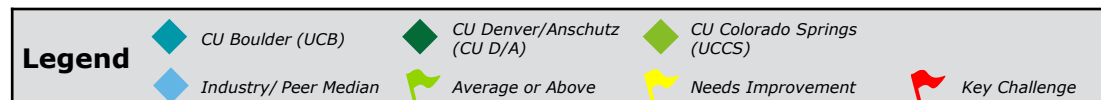


Technology: Infrastructure, Services, and Security Benchmarking



Key Observations

- CU campuses have made great progress on server virtualization relative to peers.
- The analysis identified 11 helpdesks across the campuses. Interview data indicated that more help desks exist at the distributed IT level.
- On average, CU Campuses are spending 4% of total IT expenditures on IT security*, falling in line with typical R1 institutions. However, interview data suggests a need for greater investment in security capabilities.
- The campuses have standardized on Cisco phones enabled with VoIP/Unified Communications, representing a higher maturity relative to peers and high availability and reliability of the underlying network.



* Data pulled from self reported 2019 Educause analysis; CU Denver/Anschutz data not available

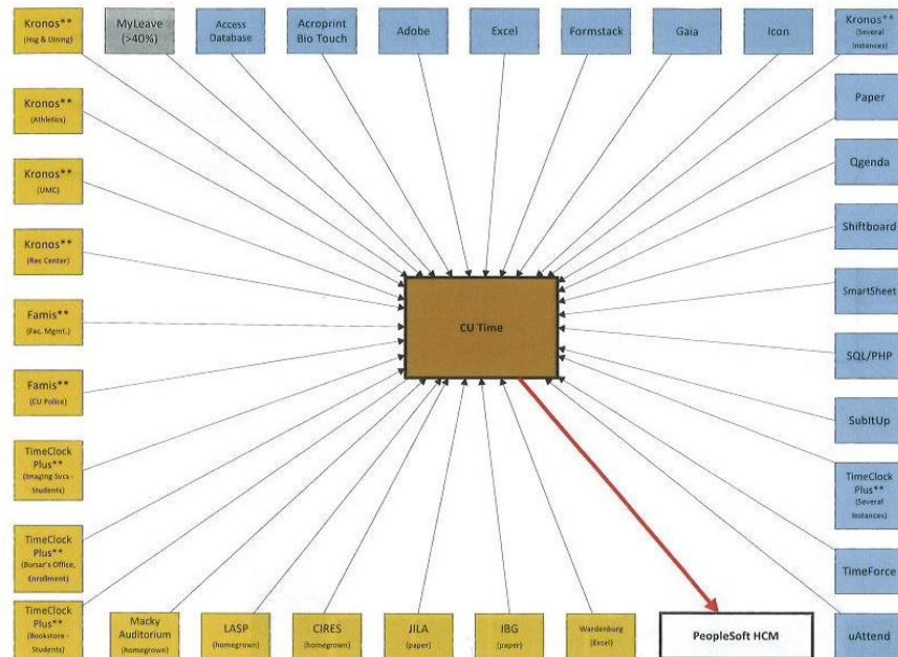
Technology: Applications



Key Findings

- 271+ applications reported across CU.
- Multiple instances of similar functioning tools exist across CU (e.g., time tracking, helpdesk, CRM, collaboration).
- Current HCM tools do not allow for accurate processing of decentralized data entry, which results in most actions being entered retroactively and requiring cleanup – in 2019, nearly 15k job actions were entered with effective dates at least one month prior to the action date (46% of those were terminations).
- CU is spending \$1.37M on CRM licenses and fees across the system and four campuses for all 12 known CRM instances.

CU Payroll Time Gathering Applications



Time Gathering Application	CU Boulder	CU Denver/ Anschutz
Kronos*	4	Several
TimeClock Plus*	3	Several
Homegrown	3	2
Famis	2	-
Paper	2	1
Excel	1	1

Technology: Applications - CRM Landscape

CRM Higher Education Functionality								Key
	Ellucian Advance*	SalesForce	Starfish	Fire Engine RED	PeopleSoft CRM	Slate	EAB Navigate	
Recruiting & Admissions		○		○ ○		○ ○		○ CU Boulder ○ CU Denver / Anschutz ○ UCCS ○ System/eCOM ○ Advancement
Enrollment Management								
Academic Advising		○	○					
Faculty/Staff Engagement		○			○			
Student Engagement		○ ○					○	
Alumni Relations	○	○ ○ ○						
Fundraising	○							
# of Known Instances**	1	4	1	2	1	2	1	
Key Observations								

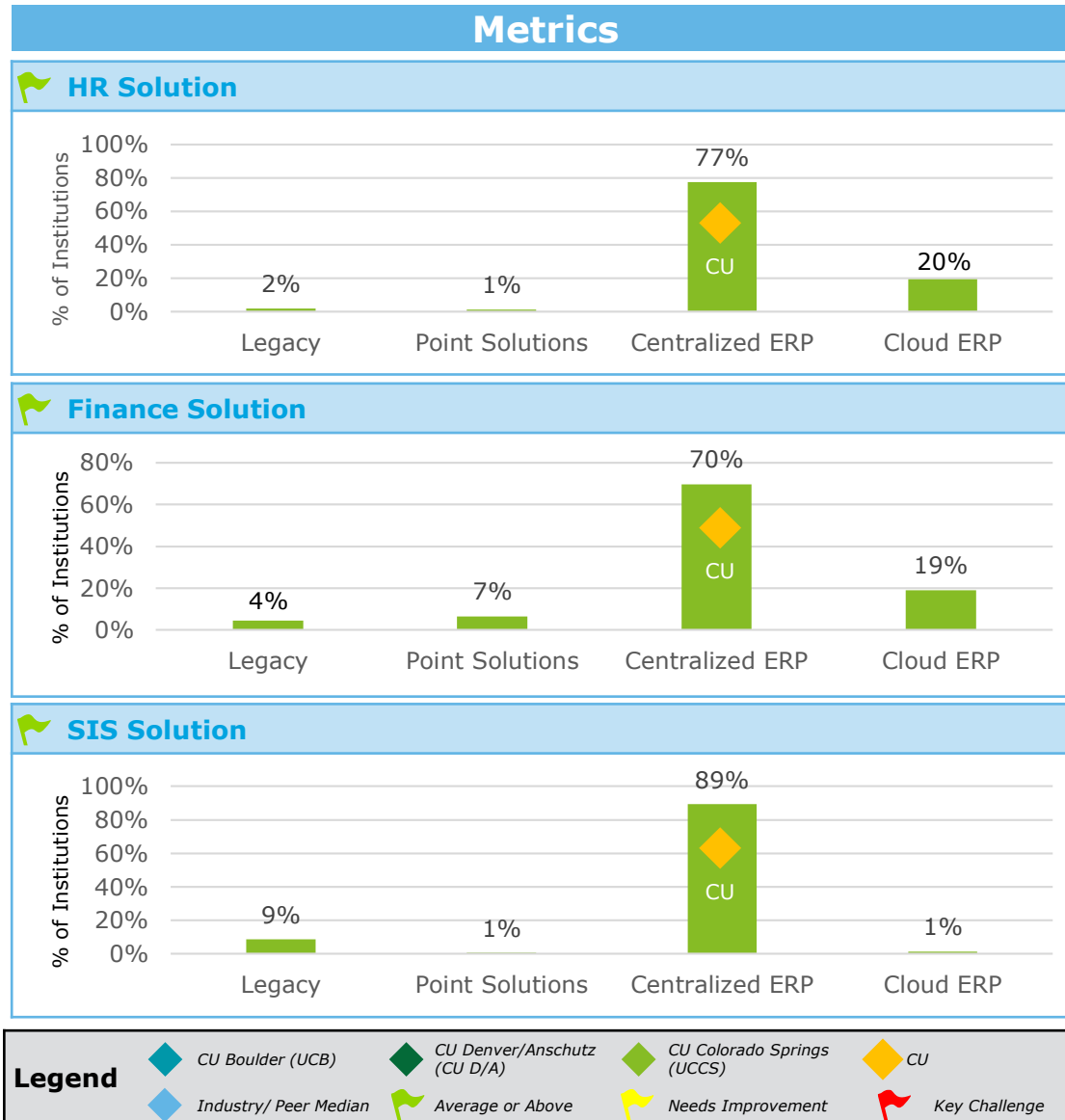
- There are 10 known instances of CRM software applications** across CU.
- CU is spending \$1.37M on CRM licenses*** and fees across the system.
- The initial implementation of the CoE CRM failed to meet the needs of CU and the current CRM funding model is too expensive for UCCS and CU-Denver/Anschutz, leading to disparate and duplicative CRM tools across CU.
- In addition to the OIT and System Office owned instances of CRM-software, spend data also suggests that schools, units and departments are procuring CRM tools such as SalesForce, Insightly CRM, and Maximizer CRM.

*Ellucian Advance is the legacy CRM application used by Central Advancement; the NextGen Salesforce instance will eventually replace Ellucian Advance

**Asset inventories were collected UIS and each of the four campuses. All application information from individual schools not supported by OIT has not been accounted for. Actual application count is most likely higher due to non-reporting from these schools.

***Source from spend analysis. Ellucian Advance and Starfish could not be identified in provided spend data for FY19.

Technology: Applications Benchmarks



- | Key Observations |
|--|
| <ul style="list-style-type: none"> CU falls within the majority of institutions that have implemented centralized ERP solutions for HR, Finance, and SIS While more institutions are moving towards cloud ERP for HR and finance, the adoption for cloud ERP for SIS is still immature due to lack of mature cloud SIS products in the market Many of CU's peers at both campus and system levels have begun early planning for migration to a Cloud ERP platform for HR and Finance before the product vendor mandates the migration |

Note: N = 159 for ERP solutions assessment

Technology: Data



Key Findings



Data Governance

- Data governance varies by campus, leading to inconsistencies across CU
- Limited data policies and standards currently in place (e.g., no enterprise-wide policies around data use or sharing)



Data Integration

- UIS maintains 480+ integrations between 20+ systems, with differing levels of customization



Process

- OIT groups cited velocity of data (24-48 hours) as a key pain point with the Central Information Warehouse, leading to the creation of campus data marts



Data Quality

- Difficulty in getting accurate student data challenges the ability to report accurately for accreditation purposes, in turn requiring the use of shadow systems to more easily and accurately report



Reporting & Applications

- Multiple tools for front end reporting are in place, including Power BI, Tableau, and Cognos



Organization

- Information from interviews suggests there is no clear definition of responsibilities around data between UIS and OIT groups

Technology: Student Success

 Area	Key Findings
Student Success Strategy 	• Campus groups reported limited coordination and knowledge sharing on student success initiatives
Organizational Readiness 	• OIT at CU Boulder is actively engaged in student success pilots at the School of Engineering, leveraging a Civitas solution to support modeling, measurement and analysis • Conversations at CU Denver/Anschutz and UCCS reflect varying levels of IT engagement in supporting student success programs
Technology Readiness 	• Variances in academic advising platforms, CRM solutions, access to student data and BI/Analytics tools can hinder the ability to uniformly track, report, and support student success
Supporting Data Quality & Data Access 	• A collective system-definition and subsequent campus-specific definitions of student success and supporting data elements does not currently exist and are not tracked - campuses report the process of providing retention and graduation metrics as being inefficient and duplicative

Technology: Innovation



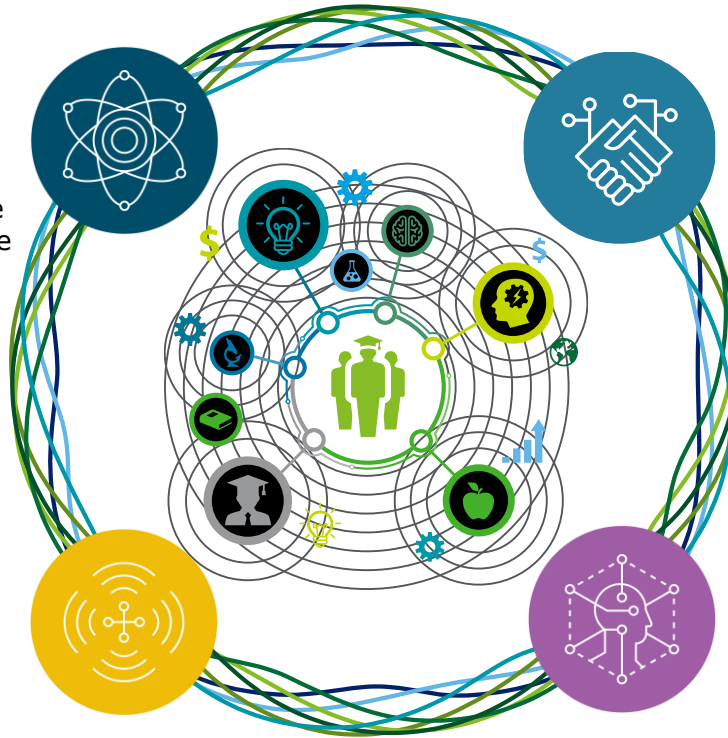
Key Findings

Internet of Things

The Internet of Things (IoT) is creating new opportunities to rethink business processes through data shared across networks. Some stakeholders cited a potential to use IoT applications to better understand how finances moves through the institution.

Connectivity of Tomorrow

Networks and connectivity capabilities are rapidly advancing on the verge of 5G technology. Some CU stakeholders expressed a need to invest in a stronger, more secure, and more reliable network to support the needs of researchers, faculty, staff, and students.



Blockchain: Trust Economy

Blockchain is assuming a new role as a “gatekeeper for digital assets, identities, and smart contracts.” The topic of adopting blockchain to support the functions of the Registrar and Contract Services arose in several conversations

Artificial Intelligence

Machine learning and bot solutions are beginning to automate manual tasks across several functional areas. Interviewees cited opportunities to leverage artificial intelligence solutions to streamline HR, Finance, and Desktop Support processes and improve data analytics capabilities on campus.

The Imperative for Change



1

Clarify Roles and Responsibilities

CU's primary focus must be on establishing clear mandates of responsibility for the system and the campuses through effective IT governance that fosters collaboration and consistency



2

Strengthen the Core

Building upon defined roles and responsibilities, CU's focus must be on maintaining the delivery of reliable, secure, and cost-effective core technology services and data access



3

Foster Innovation and Effectiveness

Ultimately, IT at CU needs to focus on becoming a strategic partner to the units by fostering innovations like automation, artificial intelligence and analytics to advance the mission



APPENDIX

Peer Set

Institutions included in the peers sets for qualitative comparisons or where a comprehensive industry composite was unavailable.

Institutions

American University	Mississippi State University
Arizona State University	Montana State University, Bozeman
Auburn University	New Jersey Institute of Technology
Baylor College of Medicine	New Mexico State University
Boise State University	New York University
Boston College	North Carolina State University
Boston University	North Dakota State University
Brandeis University	Northeast Private Research University
Brown University	Northwestern University
California Institute of Technology	Ohio State University
Carnegie Mellon University	Oklahoma State University, Stillwater
Case Western Reserve University	Old Dominion University
Clemson University	Oregon State University
Cleveland State University	✓ Pennsylvania State University
College of William and Mary and Virginia Institute of Marine Science	Pennsylvania State University, University Park and Hershey Medical Center
Colorado State University, Fort Collins	Princeton University
Columbia University in the City of New York	✓ Purdue University
Cornell University	Purdue University, West Lafayette
CUNY, City College	Rensselaer Polytechnic Institute
Dartmouth College	Rice University
Drexel University	Rutgers, State University New Jersey, New Brunswick
Duke University	San Diego State University
East Carolina University	Scripps Research Institute
Emory University	Stanford University
Florida International University	SUNY, Polytechnic Institute
Florida State University	SUNY, Stony Brook University
George Mason University	SUNY, University Albany
George Washington University	SUNY, University Buffalo
Georgetown University	Syracuse University
Georgia Institute of Technology	Temple University
Georgia State University	Texas A&M University, College Station and Health Science Center
Harvard University	Texas Tech University
Icahn School of Medicine at Mt. Sinai	Thomas Jefferson University
✓ Indiana University, Bloomington	Tufts University
Iowa State University	Tulane University
Johns Hopkins University	University of Alabama, Birmingham
Kansas State University	University of Alabama, Huntsville
Kent State University	University of Alabama, Tuscaloosa
Louisiana State University, Baton Rouge	University of Alaska, Fairbanks
Loyola University of Maryland	✓ University of Arizona
Loyola University, Chicago	University of Arkansas for Medical Sciences
Massachusetts Institute of Technology	University of Arkansas, Fayetteville
Medical College Wisconsin	
Michigan State University	
Mid-Atlantic R1 University	

✓ - Peer self identified within Chronicle of Higher Education

Peer Set

Institutions included in the peers sets for qualitative comparisons or where a comprehensive industry composite was unavailable.

Institutions

- | | |
|---|---|
| <ul style="list-style-type: none"> ✓ University of California, Berkeley University of California, Davis ✓ University of California, Irvine University of California, Los Angeles University of California, Merced University of California, Riverside University of California, San Diego University of California, San Francisco University of California, Santa Barbara University of California, Santa Cruz University of Central Florida University of Chicago University of Cincinnati University of Connecticut University of Delaware ✓ University of Florida University of Georgia University of Hawaii, Manoa University of Houston University of Idaho University of Illinois, Chicago ✓ University of Illinois, Urbana-Champaign University of Iowa University of Kansas University of Kentucky University of Louisville University of Maine University of Maryland, Baltimore University of Maryland, Baltimore County University of Maryland, College Park University of Massachusetts, Amherst University of Memphis University of Miami University of Michigan, Ann Arbor ✓ University of Michigan, Dearborn ✓ University of Minnesota University of Minnesota, Twin Cities University of Mississippi University of Missouri, Columbia University of Nebraska, Lincoln University of Nebraska, Medical Center | <ul style="list-style-type: none"> University of Nevada, Las Vegas University of Nevada, Reno University of New Hampshire ✓ University of New Mexico University of North Carolina, Chapel Hill University of North Carolina, Asheville University of Notre Dame University of Notre Dame ✓ University of Oregon University of Pennsylvania University of Pittsburgh, Pittsburgh University of Rochester University of South Carolina, Columbia University of South Florida, Tampa University of Southern California University of Southern California University of Tennessee, Health Science Center University of Tennessee, Knoxville University of Texas Health Science Center, San Antonio University of Texas M. D. Anderson Cancer Center University of Texas Medical Branch University of Texas Southwestern Medical Center University of Texas, Austin ✓ University of Texas, El Paso ✓ University of Utah University of Vermont ✓ University of Virginia University of Virginia, Charlottesville University of Washington, Seattle University of Wisconsin-Madison Utah State University Vanderbilt University Virginia Polytechnic Institute and State University Wake Forest University Washington State University Washington State University Washington University, Saint Louis Wayne State University West Virginia University Yale University Yeshiva University |
|---|---|