

# Fiscal Year 2016-17 Information Technology Request

## Colorado State University — Pueblo

*Campus Information Technology Upgrades and Security*

### PROGRAM PLAN STATUS and OIT BEST PRACTICES

2017-013

Approved Program Plan?  Date Approved:

The university's program plan was evaluated and approved by the Colorado State University (CSU) Board of Governors on August 7, 2015.

CSU-Pueblo says that it strives to model its information security plan after the plan established by OIT.

### PRIORITY NUMBERS

Prioritized By	Priority
DeptInst	NP of 1
OSPB	NP of 46

### PRIOR APPROPRIATION AND REQUEST INFORMATION

Fund Source	Prior Approp.	FY 2016-17	FY 2017-18	Future Requests	Total Cost
GF	\$0	\$3,944,430	\$0	\$0	\$3,944,430
<b>Total</b>	<b>\$0</b>	<b>\$3,944,430</b>	<b>\$0</b>	<b>\$0</b>	<b>\$3,944,430</b>

### ITEMIZED COST INFORMATION

Cost Item	Prior Approp.	FY 2016-17	FY 2017-18	Future Requests	Total Cost
Land Acquisition	\$0	\$0	\$0	\$0	\$0
Professional Services	\$0	\$150,000	\$0	\$0	\$150,000
Construction	\$0	\$300,000	\$0	\$0	\$300,000
Equipment	\$0	\$2,723,000	\$0	\$0	\$2,723,000
Miscellaneous	\$0	\$0	\$0	\$0	\$0
Contingency	\$0	\$187,830	\$0	\$0	\$187,830
Software Acquisition	\$0	\$583,600	\$0	\$0	\$583,600
<b>Total</b>	<b>\$0</b>	<b>\$3,944,430</b>	<b>\$0</b>	<b>\$0</b>	<b>\$3,944,430</b>

### PROJECT STATUS

This is a new, never-before requested project. An associated primary modular data center project was funded in FY 2015-16.

### PROJECT DESCRIPTION / SCOPE OF WORK

Colorado State University - Pueblo (CSU-Pueblo) is requesting state funds to replace and upgrade multiple elements of its campus information technology systems. This includes:

- replacing its redundant data center (\$985,000);
- upgrading network system security software (\$355,000);
- performing digital technology upgrades to classrooms (\$1,384,500);
- implementing a unified messaging system throughout campus (\$902,100); and
- purchasing a new fiber optic splicing and repair truck (\$130,000).

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The redundant data center portion of the project is associated with the primary modular data center project that was funded in FY 2015-16. The university says the project will provide a mirror image of the primary data center in a geographically different location on campus to provide failover for maintenance or disaster recovery in case of an issue in the primary data center. Existing equipment will be split between the primary and redundant data centers to provide a one-to-one system for operation. No new networking or server systems are required as the current systems were designed with this intended configuration.

The remainder of the project is a new request for funding to address other technological needs of the university, including:

- campus network and system security upgrades, to install software that provides systems and tools that follow the Critical Security Controls for Effective Cyber Defense set forth by the Council on Cyber Security (known as the CSC 20 rules);
- digital technology for all 130 campus classrooms, to integrate learning technologies such as computers, specialized software, audience response technology, assistive listening devices, networking, and audio/visual capabilities;
- an integrated messaging system for the campus, to integrate telephone systems with other communications media such as e-mail, fax, and video messaging, into a single interface, accessible from a variety of different devices; and
- a new fiber optic truck, to repair and maintain Colorado Department of Transportation (CDOT) fiber optic cables that are used by CSU-Pueblo as part of a Memorandum of Understanding (MOU) with CDOT.

### PROJECT JUSTIFICATION

The university says these technological upgrades are necessary to accommodate the growing technology and security needs of the university and to replace outdated equipment that is close to the end of its useful life. CSU-Pueblo says that the current redundant data center is housed in an administrative building with inadequate cooling and electrical power capabilities, and renovating the administrative building to meet the environmental and power needs of the ever-increasing demands of the current data center is cost prohibitive. It states that the existing redundant data center must be replaced because the existing secondary data center could not adequately handle a complete failover of the primary system during maintenance or disaster recovery.

CSU-Pueblo states that its students, staff, and faculty are connected to more systems outside of the university than ever before, which means a heightened risk of security breaches and a need for robust information security programs and tools to combat these cyber security threats. The university says that the Office of Information Technology (OIT) has provided guidance and leadership in combating these threats, and that CSU-Pueblo wishes to align its information security plan with that of OIT. To do this, CSU-Pueblo wants to install systems and tools that follow CSC 20 rules and address common security needs, such as:

- limitation and control of network ports, protocols, and services with validated business needs and host-based firewalls or port filtering tools on end systems;
- maintenance, monitoring, and analysis of audit logs with software to aggregate machine data and identify anomalies;
- and configurations for hardware and software on mobile devices, laptops, workstations, and servers to allow point-in-time auditing of the security status of the campus.

The academic requirements of the school have vastly outpaced the technology required to support essential learning needs, says CSU-Pueblo. The university says that it has 130 classrooms that are each outfitted with a desktop computer, an analog controller, and at least one projector. It explains that these systems have analog connections that do not support new technologies which have digital inputs. This means that presentations and teaching must be conducted via whiteboards or the primary classroom computer, limiting the ability of teachers and students to present and interact with each other. CSU-Pueblo says that it plans to upgrade the teaching podiums to a standard digital system that would allow the use of independent devices, and that digital classrooms will also be equipped with ceiling-mounted projectors and projection screens, laptop and desktop connectivity, enhanced sound systems, touchscreen controls, telecommunications, and video recording capabilities.

According to the university, current campus communications systems consist of a Fujitsu XL 9600 PBX phone system, Microsoft Exchange for email, and various standalone implementations of video conferencing. The

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phone system is 15 years old, is not Voice over IP (VoIP) capable, and has not been supported by the manufacturer for five years. CSU-Pueblo says that reliable operation of the system is at risk if critical components need to be replaced, and implementation of a unified communication system will reduce long distance costs as it will be able to make use of the campus wide area network (WAN) connection. The new system will also improve video teleconferencing capability via the ability to use the university's local area network (LAN).

CSU-Pueblo says that it also needs to purchase a new fiber optic truck to replace its 22-year old truck. The truck is a converted ambulance and it is not set up for winter use. CSU-Pueblo has an MOU with CDOT to maintain CDOT fiber optic cables in southern Colorado in exchange for the use of the fiber optic lines to connect campuses across the state. The university says that the truck and its equipment are constantly in demand for campus telecommunications and fiber optic splicing needs in both emergency and non-emergency situations. If the truck is not replaced, CSU-Pueblo believes that it will have to contract out to have the work performed, which will have to be paid for through its operating budget. Based on the amount that the truck is used, the university believes that the return on investment of the new truck will be two years.

**Project alternatives.** For the redundant modular data center, the university considered replacing the current Administration Building's HVAC system. According to the university, this alternative would cost \$400,000 to only upgrade the existing cooling system, thereby greatly increasing the project cost. Additional work for the electrical system, raised floor system, and flood mitigation would be required. The redundant containerized data center allows for the upgrade of all systems while allowing existing space to be reused.

Instead of digital classroom upgrades, the university says that it considered using more traditional non-internet and technology-based teaching as an alternative approach, but that it has seen an increase in the number of instructors in recent years who wish to provide hybrid classes for their students, and that recent research by Rutgers University has shown that a mixture of digital delivery and face-to-face interaction are preferred by both faculty and staff.

For its unified messaging system, CSU-Pueblo says that it considered continuing to use existing systems or looking for a third party or hosted solution for VoIP telephone services. The cost of a hosted messaging solution was deemed too high, and travel and messaging cost savings reported by other state agencies that had implemented unified messaging led the university to determine that such a system was the best choice.

CSU-Pueblo explored contracting fiber optic maintenance and repair services out to a vendor as an alternative to purchasing a new fiber optic truck. It says that this alternative is not cost efficient and would lead to it having to pay about \$120,000 per year for fiber repair, while a new truck only costs \$130,000.

The university states that it could find no alternatives for the needed network and systems security upgrades it is requesting under the project.

### PROGRAM INFORMATION AND IMPLEMENTATION PLAN

The university's Strategic Plan 2015-2020 contains technology and technology-related goals that guide the work of its Information Technology Services (ITS) department and technology decisions across campus. The plan identifies four major goals of the university, each of which requires development and support of campus technology. Goal 4 directly addresses the technology needs of the campus, directing CSU-Pueblo to provide modern and relevant campus facilities and technology.

For its information technology upgrades and security project, CSU-Pueblo plans to start work and ordering of necessary equipment and professional services immediately upon receiving state funds. Its goal is to encumber all state funds within six months of project approval, and to complete all aspects of the project within three years.

For its redundant containerized data center, the university plans to hire an architect to work with a data center design firm to create the project drawings and scope. The project will include a concrete floor slab to house the data center as well as electrical connections to the existing power supply and generator currently on campus. The data center will be custom built off-campus and delivered to campus upon completion. CSU-Pueblo plans to complete the data center project in nine months. This includes three months to hire an architect and design the project, and six months for data center construction and installation.

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CSU-Pueblo's campus network and system security plan involves working with OIT's Office of Information Security to ensure the software it installs works in conjunction with the services provided by OIT. The university plans to complete its security upgrades in 24 months. This includes three months to work with OIT and vendors on a project design, and 18 months for training, deployment, and documentation of software and procedures.

For the digital classrooms aspect of its project, CSU-Pueblo's ITS department will work with vendors to design, purchase, and install the digital upgrades. It plans to complete this within 12 months, with three months to work with vendors on project specifications and procurement, and nine months for installation, deployment, documentation, and training.

CSU-Pueblo's implementation plan for the unified messaging system is to engage with a unified messaging specialist to determine the project requirements, implementation time, and scope. The university plans to implement this aspect of the project so as to prevent disruption of business operations and communications on campus. It believes this can be done in 12 months, with three months to hire a specialist and design the project, and nine months for installation, deployment, documentation, and training.

The university plans to purchase and outfit the new fiber splice truck in three months, which includes time for procurement, configuration, and delivery.

### **COST SAVINGS / IMPROVED PERFORMANCE OUTCOMES**

The university says that a new redundant data center will decrease network downtime, prolong equipment life, and provide real time backup and disaster recovery. The redundant data center will also provide cooling, power, and a significant reduction in risk of hazards such as flooding, as it will not be housed within a building envelope. CSU-Pueblo made cost calculations using its annual operating budget of \$45 million to approximate that each minute of campus downtime has a theoretical cost of \$85.60, which equates to \$5,137 per hour or \$123,288 per day. It justifies the cost of the redundant data center based upon these cost avoidances of lost productivity and loss of instructional time.

CSU-Pueblo says that the proposed network and security system is based completely on the cost avoidance of security breaches. It says that this aspect of the project is needed to align campus security with OIT's goal of having all new systems evaluated and monitored in real time.

The university states that providing digital technology to all classrooms will give students access to multiple forms of instructional delivery and to distance learning, and provide them with experiences and qualifications that match the needs of the state's employers.

CSU-Pueblo believes that a new unified messaging system will reduce the need for travel, increase the availability of messaging to multiple devices, and aggregate multiple forms of campus communication into one platform.

According to the university, the new fiber splice truck will be configured so that it will be able to operate safely in areas containing high volumes of traffic and in inclement weather, unlike the current truck. In addition, if the current fiber truck fails, CSU-Pueblo will need to contract with a vendor for fiber splices and repairs. The university states that buying the new truck will avoid vendor costs of approximately \$120,000 per year, based on an average cost of a fiber splice or repair of \$2,500, and the current fiber truck being used on average four times per month.

### **SECURITY AND BACKUP / DISASTER RECOVERY**

The university says that security, backup, and disaster recovery capabilities will be enhanced on campus by the installation of the new redundant containerized data center, which will also provide necessary cooling functions and electrical connectivity to the campus' emergency generator in case of power outages or surges. CSU-Pueblo says that the container will be monitored by closed circuit cameras and will have environmental and security monitors to track data center conditions. The redundant data center will provide the campus with a second, fully-operational data center that will be able to assume campus operations in case of a failure of the primary containerized data center.

The campus network and system security upgrade will install systems and tools that follow CSC 20 rules, which is the framework that OIT's Office of Information Security has implemented to minimize cyber security threats.

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For the remaining aspects of the project, CSU-Pueblo says that security and disaster recovery will be provided by existing IT systems and that implementation will closely follow security guidelines set forth in CSC 20 rules. The university also says that the fiber splice truck will be stored in a secure location on campus.

#### BUSINESS PROCESS ANALYSIS

For its FY 2016-17 request, CSU-Pueblo says that it started by evaluating the campus systems that had the greatest impact on technological infrastructure, and which could potentially cause:

- prolonged business outages or loss of system use;
- monetary losses due to failure, data breach, or other factors; and
- impact to strategic goals set forth by the state, campus, the CSU system, OIT, and Colorado Department of Higher Education.

According to CSU-Pueblo, the systems determined to be critical on campus were then evaluated by campus leadership and various IT stakeholders to develop the request so that deficiencies could be corrected and equipment could be upgraded to allow the university to meet the needs of its various stakeholders. The project request was developed into a program plan that was evaluated and approved by the CSU Board of Governors on August 7, 2015.

#### PROJECT SCHEDULE

	Start Date	Completion Date
Redundant Data Center	July 2016	June 2017
Network and System Security	July 2016	June 2018
Digital Classroom Technology	July 2016	June 2017
Unified Messaging System	July 2016	June 2017
New Fiber Truck	July 2016	October 2016

#### OPERATING BUDGET

Operating expenses are paid from institutional sources. According to the college, there will be no impact on the operating budget.

#### STAFF QUESTIONS AND ISSUES

1. Have there been any campus network hacks, security breaches, or suspicious/malicious activity? If so, please explain.

*Like most large organizations, the CSU-Pueblo Information Technology Department has hundreds of attempts per day to access the university network from non-authorized sources (campus network hacks, security breaches and suspicious/malicious activity from outside). The request is to improve the ability to track potential malicious activity and to prevent any damage from happening. To date, the attempts have not resulted in significant adverse consequences to the university. However, this funding proposal would improve the university's ability to stop these unwanted attempts to access the university's network from non-authorized sources.*

2. Why didn't CSU-Pueblo indicate the need for a redundant data center when it requested funds for the Modular Data Center project in FY 2015-16?

*Currently, Colorado State University - Pueblo has two datacenters to provide network capabilities on campus. Both datacenters are located in spaces without the appropriate HVAC and circulation necessary to accommodate heat*

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*loads produced by the equipment. Colorado State University - Pueblo was very fortunate to receive funding for the Modular Data Center project in FY 2015-16. When submitting the requests, the University was viewing the projects as independent projects that were individually improving the two different networking environments.*

3. Has CSU-Pueblo considered installing its own fiber backbone, rather than relying on the CDOT fiber system? Are other fiber options available to CSU-Pueblo other than using the CDOT fiber system? Is the current fiber truck meeting all of the responsibilities of the MOU with CDOT?

*Colorado State University - Pueblo did consider installing its own fiber backbone, but due to the large cost it was more beneficial for the two state agencies to create a cooperative agreement with CDOT. Installation of the fiber can cost more than \$100,000 per mile and would require multiple easements and rights of way. There are other entities that commercially sell fiber systems, but they are very costly and the end user does not have the control required to manage a network system the size of the one on the CSU - Pueblo campus.*

*The fiber truck is currently meeting all of the requirements of the MOU with CDOT. The truck is now 22 years old and will need to be replaced soon.*

4. Moving the datacenter outside a physical building increases risks to the data being stored. What risks did you consider when deciding upon a containerized datacenter solution?

*The new datacenter would include a datacenter infrastructure management (DCIM) system. The system would include video surveillance, physical access alerting, temperature and fire monitoring and alerting, and much improved security over the current datacenters. The datacenter would be above grade to minimize the risks of flooding whereas the current datacenter is located directly below a janitorial closet and water damage has occurred in the past. The current datacenter does not have a DCIM in place.*

5. Who quoted the \$400,000 cost for HVAC renovation?

*University staff creating the estimated cost working with a datacenter design specialist working with mechanical and electrical contractors for installation.*