University of Massachusetts – Boston
Information Technology Enterprise Architecture (ITEA)

Phase 2 – Plan Development Executive Summary

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1. Introduction

Over the past fourteen months (September 2010 through November 2011) Vantage has worked with UMB Information Technology Services Division (ITSD) and the various Information Technology (IT) groups to develop a robust information technology enterprise architecture and to determine alternatives for addressing the IT challenges that UMB will face over the next several years. This document is the Phase 2 Report on Plan Development based on Vantage Technology Consulting Group’s (Vantage) activities at the University of Massachusetts – Boston (UMB) to date.

Phase 1 of this project put forth technical options and Vantage’s recommendations for UMB to address a range of IT issues – industry issues (unified communications, cloud computing, and changes in today’s work styles) as well as UMB campus issues (substructure demolition, new construction, data center relocation, etc.). UMB accepted the recommendations contained in Vantage’s Phase 1 report and is moving forward with various aspects of implementation. The Phase 2 report:

- Puts forth plans for addressing related issues such as governance and ITSD organization,
- Provides strategies for phasing in Vantage’s recommendations over the available time frame, and
- Suggests an approach for finalizing the overall IT Enterprise Architecture.

A few of the items that are key in this report and that deserve special attention are as follows:

- Special transition staffing is required in order for UMB to successfully implement the necessary infrastructure projects. Any one of the numerous projects would be a challenge for an IT organization, especially one already resource strapped. As a whole, this is a huge undertaking and cannot be completed successfully with only existing resources. Even if the existing staff were to have the time to address these projects in addition to their already demanding day-to-day operational activities, there are specialized skills, experience, processes, and tools that do not exist in-house. (Page 10)
- The CIO should not report to either the academic or administrative side of the house, but directly to the Chancellor. (Page 7)
- Change management must become a part of the UMB IT governance structure. (Page 5)
- There is a need for a predictable and controllable IT cost recovery and funding model. (Page 6)
- UMB needs to create a new position(s) for Business Analysts. These Business Analysts will be dedicated to meeting with all of the departments/stakeholders about new project intake, pent-up demands, and consultative design for complex projects. (Page 8)
- Regarding information and data security, UMB needs to create a “security culture”
The requirements for research support are difficult to define and change constantly. Consequently, the underlying technology to support research required both skilled staff and a flexible infrastructure. The plan for research computing support must incorporate a mix of solutions, approaches, and technologies that match with and adapt to the research needs of the faculty. (Page 9)

The bottom line is that the median cost for the ITEA project as described in Phase 1 is:

- One time: $17.9M
- Additional operational costs (excluding personnel): $1.5M per year
- Additional personnel costs: $0.6M per year

Issues and the recommendations that Vantage considers most significant are in the sections that follow. Please see the complete report for additional details and further explanations.

2. Methodology

Vantage’s methodology for this portion of the work consisted of four tasks:

- Select ITEA approaches based on Vantage’s Phase 1 recommendations.
- Perform a gap analysis to determine how to get from where UMB is to where UMB wants to be. (See Attachment 1 of the Phase 2 Report.)
- Develop ITEA plans for governance, organizational changes, and transition to new solutions.
- Deliver, revise, and present this report.

3. Summary: Phase 1 Report and Subsequent Changes

In Phase 1 of this report Vantage presented UMB with a series of ITEA infrastructure options and recommendations covering a wide range of technology infrastructure issues. In a dynamic environment like that at UMass Boston, nothing stands still for very long. Since Vantage’s Phase 1 report in May 2011, ITSD has continued to make changes and improvements and to upgrade and replace older equipment. Many of these changes are a result of and in accordance with Vantage’s Phase 1 recommendations.

These changes represent incremental improvements in IT at UMB and move the institution closer to the objectives of a unified IT enterprise architecture. However, the majority of these projects represent improvements only on the technical side. While these improvements are important and necessary, they are, in fact, the easiest part of change. The non-technical improvements -- vision, customer service orientation, partnership with the user base, and positioning IT as a strategic
resource within the University community – are harder but significantly more valuable in the long run.

4. Phase 2 Discussion Topics

As part of the Scope of Work and as a result of our Phase 1 recommendations, Vantage was asked to address specific topics related development of the IT Enterprise Architecture. These include:

Governance

Information Technology Governance (ITG) is defined by The EDUCAUSE Center for Applied Research (ECAR) in “Process and Politics: IT Governance in Higher Education” as: “Specifying the decision rights and accountability framework to encourage desirable behavior in using IT.” The ECAR study then goes on to say: “More informally IT governance describes who makes which decisions, who provides input and analyzes the issues, who sets priorities, and who settles disputes when there is no clear consensus.”

While Vantage generally concurs with this definition of IT Governance, we would go on to note that IT Governance isn’t just a committee or a series of committees; it is also a logical, well thought out, and participatory process. As with many processes in higher education, the value lies as much in facilitating the lines of communications as it does with the actual structure and functions of the governance organization.

At UMass Boston, IT Governance is primarily a function of the Information Technology Services Division (ITSD), with the CIO ultimately responsible for all decisions and delegating that responsibility down the ITSD hierarchy. The CIO is accountable to the Provost and Chancellor. For the most part, policies and procedures governing how IT services are planned, funded and performed are developed within ITSD with minimal formalized input or involvement by IT users and stakeholders in the development of the governing tenets. While potentially efficient, this approach isolates stakeholders from IT decisions and robs them of both direct involvement, and the opportunity to buy into ITSD planning.

The diagram below represents the recommended IT Governance structure for UMB.

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1 "Process and Politics: IT Governance in Higher Education", Ronald Yanosky and Jack McCredie, ECAR Research Study vol 5, 2008, p.22. The study was based on five research components: a quantitative online survey of 438 EDUCAUSE member CIOs; another online survey of non-IT participants in IT Governance; a literature review; interviews with IT executives; and case studies.
Change Management

Change Management is an approach for assessing, evaluating, and testing changes before implementing them and communicating to the rest of the community the impact the change might have. Change management is not a product that can be purchased, but a way of doing things integral to the culture analogous to a safety culture in a manufacturing environment or a customer service culture in a sales environment. At UMB there are few formalized change management procedures or policies nor are there development, testing, or “sandbox” environments.

As a result of the lack of formal policies for change management, communication of changes and their impact tends to be forgotten. This is often true within the ITSD organization as well as to and from the user community.
Toward this end, Vantage recommends:

- Change management must become a part of the UMB IT governance structure.
- Improved collaboration and communications within ITSD will in and of itself improve change management.
- Documentation should be kept up-to-date to reflect all changes with particular attention to security and disaster recovery.
- ITSD must reach out to the UMB community to establish trust and two-way communication. While it will be a long process to change the culture, it is absolutely imperative in order for the UMB community to see IT as a partner to be relied upon and not as an obstacle to be overcome or circumvent.

**Project Intake Process**

For simple projects, the tasks should be handled by the service management/help desk/work order system. When projects get more complex, the question of prioritization becomes a serious issue. How does one decide which projects get the resources of money, equipment, and personnel – and in what order?

Vantage has found that an equitable, effective, and efficient project intake process requires a governance process and a change management process as described above.

In general, departments or IT customers are looking to implement new systems or modify existing ones to meet their current needs. Discussions with IT about integration with existing systems on campus, support costs for the new implementation, and total cost of ownership can, without a fair and impartial intake process, easily become adversarial. This benefits no one.

The entire campus community benefits from the integration of systems and from uniformity of services such as single sign-on, and coherent interface design. But the way a new or changed service fits into an overall institutional architecture is often not even a secondary consideration for a department. ITSD, as the champion of coherence in planning of services, may be seen as a roadblock to departments’ “getting the job done.” Moreover, departments, quite reasonably, want their projects done now, and done with as little expense as possible. The global concerns of ITSD are almost certain to raise the cost of a project, so departments end up implementing systems themselves, making do, and/or harboring resentment toward ITSD.

The value of a coherent intake approach is that it provides a forum for policies to be developed, by and for UMB as a whole and binding on UMB as a whole. Here are some important objectives:

- Systems must be integrated so that users perceive them as a single environment. (This is an important overall goal for UMB.) Wherever feasible, systems and solutions should be enterprise-wide and the institution should embrace consolidation, uniformity, and sharing rather than continuing to foster the “mine and mine alone” departmental mindset that is often common in higher education.
- Empower the Change Management governance subcommittee to develop policy and
recommend tactics for improving the university’s suite of services.

- Develop a protocol for service owners and ITSD to follow together, before selecting and implementing any new software or service.

There are huge advantages in the project intake process being “owned” not by ITSD but by UMB through the representative nature of the governance structure proposed. The dynamic is no longer one of control by ITSD without consultation or ITSD as a barrier to improvement. Rather it becomes a mutual effort to find the best solution(s) for UMB.

To those who might object to a formalized project intake process on the grounds that such a detailed analysis, before deciding to commit to a project, is a waste of time for both ITSD and its customers, Vantage would suggest that more time and resources are wasted in abandoned ill-conceived initiatives, under-resourced projects, and supporting bad choices. Besides, initial analysis is not done in great detail. Assessment is iterative; as a project proceeds towards the front of the “intake queue,” more research is done, and the conclusions refined.

**IT Funding**

Perhaps one of the most significant benefits of this project and the technology planning that surrounds the campus-wide improvements at UMB is the opportunity to educate senior management and the campus community on what it really costs to deliver technology services and to firmly establish the value that technology has on campus.

Along these lines, an institution needs a consistent, holistic view of charging for technology services -- an algorithm that is fair across all services and all departments. Today’s economic challenges, changing revenue sources, and trends toward fiscal accountability necessitate a need to move away from outdated funding models, cross-subsidization, and unreliable one-time capital allocations and toward an approach based on the true cost of each service, differentiated service levels, and life-cycle funding. The need is for a predictable and controllable IT cost recovery and funding model that will:

- Keep pace with rising demands for technology services.
- Provide pricing/funding strategies that can scale to meet future needs.
- Support cost-effective IT operations.
- Provide a context for making IT decisions.
- Cover a wide range of clients and services.
- Be durable and agile under the pressure of changing demand and shifting services.
- Address the technology objectives in the university’s strategic plan.

An effective IT cost recovery/funding model becomes the framework for the on-going acquisition and management of new technologies and applications. Given that services and technologies will change, the income to support IT services has to adjust as services change. Since ITSD does not have unlimited resources, it cannot be everything to everyone.
Vantage suggests that the best way to look at IT funding is not so much in terms of an increase in the IT budget but rather in terms of the return on investment that will be obtained through improvements in the efficiency of every department at the University. Multiply that times all of the departments on campus and the return on investment is significant and benefits are campus-wide. IT funding must also be considered in the context of technology being a significant enabler that allows UMB to meet its mission.

Our conversations with ITSD management and financial management at UMB have yet to produce a consensus that this is a significant or solvable issue. However, there is an increasing demand for technology services and resources due to the increased role of information technology. Without significant thought to funding, IT will not be able to meet the long-term goals of the institution, implement new technologies, or even continue to adequately support the current technologies already on campus.

Even though UMB’s present budget structure does not allow for the future funding commitments, multi-year budget projections will go a long way toward giving UMB financial management the information they need to meet ITSD funding priorities.

**ITSD Organizational Issues**

**Chief Information Officer**

The issue of the reporting structure for the institutional Chief Information Officer (CIO) is not unique to UMB. The CIO leads the one organization that is critical for, and an integral part of, both the academic mission and the administration of the school. As much as the Chief Administrative Officer may support and even be cognizant of the importance of the academic mission, his/her focus must be on the administrative functions of the institution and s/he cannot value the contributions IT makes on the academic side. Similarly, the Chief Academic Officer cannot fully value the needs of the administrative side. Therefore, having the CIO report to only the academic or administrative side of the house places the CIO in an invidious position; to attempt to balance the needs of the two sides of the institution, while being judged/rewarded based essentially on only one side. Both reporting structures hamper the CIO from doing the best possible job for the school.

The solution – increasingly common in higher education and, in fact, business in general – is to acknowledge the importance of IT to the enterprise by having the CIO as a full “C-level” direct report to the CEO or President (in UMB’s case, of course, this would be the Chancellor). Vantage considers it outside its scope to define the position in the personnel hierarchy occupied by the CIO role, but does believe that the CIO should report directly to the Chancellor. The Chancellor is, after all, the only other chief executive whose role is tied to both the academic and administrative functions of the school.

Vantage understands that, in the past, the CIO did report to the Chancellor, but that considerations tied to the individuals involved led to the change, from the CIO reporting to the Chancellor to the CIO reporting to the Provost. However, Vantage understands that the circumstances which led to the change no longer apply and the Governance structure recommended here supports this reporting structure. Vantage therefore recommends that the CIO report directly to the Chancellor.
Organizational Structure

Most IT organizations (and in fact most organizations in general), lacking an internal or external force to the contrary, will reach a level of functional equilibrium where day-to-day requirements are being met but without much innovation, collaboration, or a customer-focused orientation. Each of these three traits requires both trust and risk-taking. Innovation means taking risks to improve outcomes, collaboration means trusting colleagues, and customer-focus means trusting customers and getting them to trust you. Collectively the presence or absence of these traits defines the “culture” of an organization. These are key to IT being seen by users as more than a necessary evil.

The fundamental organizational structure of ITSD is sound and Vantage's recommendations should be viewed in that context. Vantage would suggest that there are a number of changes to further foster a shared vision within ITSD, strengthen the culture of cooperation and collaboration, and focus on customer service.

- The introduction of a new (or upgraded) ticketing system should be used as an opportunity to emphasize customer service, and re-engage both staff and customers.
- Open positions are opportunities to review roles and responsibilities (and even job descriptions) to align them with the shared vision of IT and strengthen cooperation.
- Cross-training of key positions to provide additional depth of support as well as fostering an appreciation of the complexities and pressures of someone else’s job.
- Update ITSD job descriptions to better reflect present roles and responsibilities and review and update them as circumstances change.
- Establish ITSD mentoring programs and provide additional training and educational opportunities including conferences and trade shows.
- Provide an opportunity for staff to develop needed additional skill sets such as virtualization and storage area networks.
- Enforce job responsibilities and skill requirements. Even within the structure of the collective bargaining arrangements, there are processes for addressing workers who cannot or will not perform their jobs. No one feels special working for an organization that carries underperformers.

Business Analysts

One of the most important of Vantage’s recommendations is need for UMB to create a new position(s) for Business Analysts (or whatever title you might prefer to use). These Business Analysts will be dedicated to meeting with all of the departments/stakeholders about new project intake, pent-up demands, and consultative design for complex projects. Many of UMB's peers have similar positions in IT and Vantage sees this as a critical step for ITSD to start to better understand needs and make ITSD a trusted partner in meeting stakeholder needs.

Security

The importance of security in Higher Education IT has steadily risen, year by year. Consequently,
an important aspect of information security is to create a “security culture” – not only within those organizations responsible for information technology, but throughout the institution as a whole. This is accomplished through the continued implementation of security awareness programs as well as strict enforcement of institutional security policies. The fundamental value of IT security awareness programs is that they set the stage for training by bringing about a change in attitudes which change the organizational culture. Awareness, as originally defined in 1989 in NIST SP 500-172, “creates the [employee’s] sensitivity to the threats and vulnerabilities of computer systems and the recognition of the need to protect data, information, and the means of processing them.” The cultural change is the realization that IT security is critical because a security failure has potentially adverse consequences for everyone. Therefore, IT security is everyone’s job.\(^2\)

**Research Support**

ITSD currently provides support for teaching and learning at UMB, and for the administrative functions of the University. Increasing pressure on IT can be anticipated as a result of the emphasis that UMB is, and will continue to be placing, on funded research. ITSD must therefore consider the probable demands that will be made on it as an organization because of such research and how ITSD can be best positioned to support those research needs.

The requirements for research support are difficult to define and change constantly. Consequently, the underlying technology to support research required both skilled staff and a flexible infrastructure. The plan for research computing support must incorporate a mix of solutions, approaches, and technologies that match with and adapt to the research needs of the faculty.

In order to adequately meet the IT needs of research faculty, it is first necessary to understand those needs. Vantage recommends that ITSD hire a technical manager of research computing whose first task would be to gain an understanding of the pent up, current, and expected needs of UMB faculty. It is not an easy task to determine what technology resources might meet faculty needs – even if it is clear what faculty are trying to do. In addition, UMB should plan that additional technical staff to support research computing will be required. At this time, skilled graduate students will be the primary support resource; however, over time UMB will need to hire additional professional staff to lead research computing and support areas like High-Performance Computing (HPC).

**Help Desk/Desktop Support**

In the current ITSD organizational chart, the Director for two distinct directorates (Client Services and Educational Technology and Learning Commons) is filled by one person. It was therefore natural to consider whether UMB should hire an additional director to fill one of these slots. After discussions with the Director and his staff, Vantage does not recommend doing so.

The number of direct reports to the single Director could be reduced, and communication and level of expertise possibly improved, by the merger of Help Desk and Desktop Support into one group. This is not to say that there would not still be a two-tiered support system, but that bringing the desktop support technicians in closer contact with the students operating the Help Desk should help to raise the level of technical expertise at the Help Desk, improve ticket generation and assignment,

\(^2\) Adapted from NIST 800-16.
and increase first-contact resolution rates.

However, given that Help Desk issues were commonly mentioned in Vantage’s stakeholder interviews, UMB should consider outsourcing first level help desk functions especially those related to operating systems and Microsoft desktop applications like Outlook, Word, and Excel. This would not only improve customer service and resolve many issues in one phone call, it would also provide 24/7 help desk trouble ticketing without adding a second shift. There are a number of Boston area companies that offer these services. Investigating this option should not be difficult or time consuming. Furthermore, as ITSD is planning to replace/upgrade its trouble-ticketing system, this is an excellent opportunity to integrate with a service provider’s trouble-ticketing system or approach to exchanging information.

**Transition Staffing**

A review of the projects listed in Attachments 1 and 2 of the Phase 2 report clearly reveals the magnitude of the tasks facing ITSD arising from the UCRR project as well as the related Enterprise Architecture projects. These projects must be completed in a timely manner and must be carefully coordinated with one another, with other ITSD projects, and with University construction projects.

Any one of these projects would be a challenge for an IT organization but especially one already resource strapped. As a whole, this is a huge undertaking and cannot be completed successfully with only existing resources. Even if the existing staff were to have the time to address these projects in addition to their already demanding day-to-day operational activities, there are specialized skills, experience, processes, and tools that do not exist in-house.

For these reasons Vantage strongly recommends that additional resources are required during the transition period -- from January 2012 until six months after the data center relocation at a minimum. These transitional resources should include an ITEA Project Manager as well as on-demand access to other specialized, short-term resources such as network administrators, systems administrators, storage administrators, virtualization experts, move planners, ‘hands’ for racking & stacking, network and cabling technicians, technical documentation writers and others as needed.

These resources can be UMB employees (full-time/temporary staff), contracted resources, or a combination thereof. The advantage of in-house staff may be long-term lower cost, however, finding and keeping suitably skilled personnel can be a challenge as can creating and funding new positions. Contracted resources can be easier to acquire and may, in fact, consist of several people with complementary skill sets. A hybrid approach, such as an in-house ITSD Project Manager with access to contracted specialized resources may combine the best of both approaches.

In any case, it must be understood that attempting to conduct a series of very complex projects of this magnitude – any one of which would be demanding on in-house staff – without additional skilled resources, will be fraught with difficulty and will place both ITSD and the University at risk, both financially and operationally.

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3 Vantage is not necessarily recommending that ITSD outsource first level Help Desk functions, only that the option deserves careful consideration as an alternative approach to improving customer service.
5. Transition Plan and Estimated Costs

As part of Phase 1 of this project, Vantage put forward a series of projects that need to be performed over the next four plus years to allow ITSD to support the University’s short and long-range plans. Of all the questions this project is to address, perhaps the most valuable (and complex) is “How do we get there from here?”

Attachment 2 of the Phase 2 report addresses that question. This attachment contains the Transition Plan spreadsheet listing projects, areas impacted, dependencies, scheduling and, where known, costs.

UMB has also been provided an electronic version of the spreadsheet which can be modified, kept up to date, and sorted as required. Vantage determined that it made sense to separate transition plan costs from transition plan activities due to the fact that some activities didn’t have direct costs and some costs needed to be rolled-up to include multiple actions.

The bottom line is that the median cost for the ITEA project as described in Phase 1 is:

- One time: $17.9M
- Additional operational costs (excluding personnel): $1.5M per year
- Additional personnel costs: $0.6M per year

Given the fact that each cost item has a “confidence factor” ranging from +/-15% to +/- 100%, the costs could range from:

- One time: from $9.5M to $26.2M
- Additional operational costs (excluding personnel): $0.8M to $2.2M per year
- Additional personnel costs: $0.4M to $0.8M per year

However, given the fact that it is extremely unlikely that ALL costs will be at the high end or ALL cost will be at the low end, the median costs are quite reasonable in the aggregate.

It is important to note that a Transition Plan is not a step-by-step plan for implementation of each technology mentioned in the report. It is an overview of the projects, how they fit together, their dependencies and prerequisites, and the process that should be employed to ensure that projects get done when they need to. Each project will require its own detailed implementation plan, schedule, resources, and communication plan.

6. Conclusion and Next Steps

The University of Massachusetts – Boston has its share of both opportunities and challenges. While the renovation of the garages, the relocation of utilities, the redesign of roadways, and the new building construction projects will greatly complicate day-to-day IT operations, these projects also provide ITSD with unprecedented opportunities to replace systems, improve operations, and establish new directions and policies for IT moving forward. Vantage recommends that these
challenges be regarded as further opportunities.

As mentioned in the text of the report, a critical aspect of making dealing with the complexities of numerous inter-related simultaneous technical projects will be the addition of dedicated transition staff. These transitional resources must include an ITEA Project Manager as well as on-demand access to other specialized, short-term resources such as network administrators, systems administrators, storage administrators, virtualization experts, move planners, ‘hands’ for racking & stacking, cabling technicians, technical documentation writers, and others as needed. The criticality of this requirement cannot be understated.

In addition to the technical changes, ITSD must simultaneously undergo a cultural transformation. The department must become increasingly customer-focused, agile, responsive, and supportive. ITSD must be seen by the user community as an indispensible strategic asset, a partner, and the “go-to” people on the campus. ITSD must be seen as the advocates for technology at UMB, providing the technology infrastructure, support, and knowledge that enables UMB to meet its missions of teaching, learning, and research. Key aspects of this change include:

- Creating and articulating a vision for IT at UMB.
- Increasing customer service orientation especially with the client-facing organizations like the Help Desk and Desktop Support.
- Addition of the Business Analyst positions recommended by Vantage in Section 4.4.
- Creating the governance structure recommended in Section 4.1.
- Implementation of the Project Intake and Change Management processes recommended by Vantage in Sections 4.2 and 4.3.
- Creating an environment within ITSD where staff work together toward common goals and where value to the UMB community is the yardstick for measuring performance.

Few colleges and universities have the chance to make the kind of wholesale changes and improvements afforded to UMB. The decisions made as a result of the Phase 1 report established the framework and context for IT at UMB for the foreseeable future. It is not an opportunity that should be squandered or taken lightly. The challenges facing UMB regarding Information Technology may be significant but need not be overwhelming. This Phase 2 report and Transition Plan provide a focused, phased approach to managing the IT projects that will produce major benefits for the institution.

Vantage appreciates the opportunity we have to be a part of this exciting project and looks forward to assisting UMB in implementing these recommendations and making this Phase 2 report a reality.
## Executive Summary

**Costs** (in thousands)

<table>
<thead>
<tr>
<th>Enterprise Architecture Element</th>
<th>Start Date</th>
<th>Duration</th>
<th>Interrelated Projects</th>
<th>Costs</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Center Design/Build/Deploy</td>
<td>11-4</td>
<td>90</td>
<td>UCRR, Data Core, Telephone System, New Utility Plant, Tri-gen Plant,</td>
<td>$50,000</td>
<td>Operational costs are net to present costs.</td>
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<tr>
<td>Telephone System</td>
<td>12-1</td>
<td>3-12-3</td>
<td>UCRR, Substructure demolition</td>
<td>$175</td>
<td>Do as soon as possible. Much can be done independently of DC and UCRR work; Operational costs are net to present costs or less.</td>
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<tr>
<td>Telephone System</td>
<td>12-1</td>
<td>3-12-2</td>
<td>UCRR</td>
<td>$322</td>
<td>Do as soon as possible. Much can be done independently of DC and UCRR work.</td>
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<tr>
<td>Telephone System</td>
<td>12-1</td>
<td>3-12-2</td>
<td>UCRR</td>
<td>$376</td>
<td>Do as soon as possible. Much can be done independently of DC and UCRR work.</td>
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<tr>
<td>Telephone System</td>
<td>12-3</td>
<td>6-12-5</td>
<td>UCRR</td>
<td>$427</td>
<td>Do as soon as possible. Much can be done independently of DC and UCRR work.</td>
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<tr>
<td>Internet and Wide Area Connections</td>
<td>11-4</td>
<td>ongoing</td>
<td>$200</td>
<td>Continuous monitoring and upgrade as necessary, most of the cost is for the rapid replacement cycle of the border network equipment.</td>
<td></td>
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<tr>
<td>Internet and Wide Area Connections</td>
<td>12-1</td>
<td>12-2</td>
<td>UCRR</td>
<td>$550</td>
<td>Investigate alternate carriers?</td>
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<tr>
<td>Campus Network</td>
<td>12-1</td>
<td>ongoing</td>
<td>$10</td>
<td>20% in process; Jamie?</td>
<td></td>
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<tr>
<td>Campus Network</td>
<td>11-4</td>
<td>12-4</td>
<td>Utility corridor fiber; data center and new core location (CC?) are fully operational, interim connectivity to existing core</td>
<td>$1,000</td>
<td>30% parallel build of core for phasing purposes. Cost includes the distribution layer replacement.</td>
</tr>
<tr>
<td>Wireless</td>
<td>11-4</td>
<td>2-12-1</td>
<td>$75</td>
<td>Assumes any device, anywhere is policy, may need to repeat every 3-5 years or so.</td>
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<td>Wireless</td>
<td>12-2</td>
<td>6-12-4</td>
<td>$2,000</td>
<td>75% 3.5 year replacement cycle not included in Annual costs.</td>
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<td>Wireless</td>
<td>12-2</td>
<td>6-12-4</td>
<td>$400</td>
<td>75% 3.5 year replacement cycle not included in Annual costs.</td>
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<tr>
<td>Network Management</td>
<td>12-1</td>
<td>12-3</td>
<td>New quad and UCRR</td>
<td>$1,000</td>
<td>50% Highly dependent on major construction projects such as the rebuilding of the quad. 3.5 year replacement cycle not included in Annual costs.</td>
</tr>
<tr>
<td>Network Management</td>
<td>11-4</td>
<td>12-3</td>
<td>$55</td>
<td>30% this is deceptively complicated.</td>
<td></td>
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<tr>
<td>Network Management</td>
<td>12-1</td>
<td>12-4</td>
<td>$13</td>
<td>5%</td>
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<td>Network Management</td>
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</tr>
<tr>
<td>CATV</td>
<td>14-1</td>
<td>6-12-4</td>
<td>$100</td>
<td>Gillis Comcast pays for this at which point the cost will be zero.</td>
<td></td>
</tr>
<tr>
<td>Cellular Telephone</td>
<td>13-1</td>
<td>12-15-2</td>
<td>$2,000</td>
<td>100% May be revenue producing depending on arrangements that can be made with DAS provider.</td>
<td></td>
</tr>
<tr>
<td>Computer Systems and Servers</td>
<td>11-4</td>
<td>ongoing</td>
<td>$20</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Computer Systems and Servers</td>
<td>12-1</td>
<td>12-4</td>
<td>$250</td>
<td>50% 4 year replacement cycle.</td>
<td></td>
</tr>
<tr>
<td>Governance</td>
<td>new</td>
<td>ongoing</td>
<td>$100</td>
<td>20% Expert assistance for setting up ITSC.</td>
<td></td>
</tr>
<tr>
<td>Project Management</td>
<td>12-1</td>
<td>6-12-4</td>
<td>$100</td>
<td>20% Add $100k if contracted; Separate from TEA Coordinator.</td>
<td></td>
</tr>
<tr>
<td>Research Computing</td>
<td>11-4</td>
<td>ongoing</td>
<td>Governance P&amp;P</td>
<td>$65</td>
<td>50% Position is currently advertised.</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>Timeframe</td>
<td>Cost</td>
<td>Project Cost</td>
<td>Notes</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----------</td>
<td>----------</td>
<td>----------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Research Computing</td>
<td>Select and implement research data storage solution(s)</td>
<td>12-1 ongoing</td>
<td>$200</td>
<td>$100 50%</td>
<td>Project currently in process related to new HPC procurement.</td>
</tr>
<tr>
<td>Help Desk/Desktop Support</td>
<td>Improve/outsource front line support</td>
<td>12-2</td>
<td>$150</td>
<td>$60 66%</td>
<td>If UMB elects not to implement an outsourced solution, this number might be significantly reduced.</td>
</tr>
<tr>
<td>Help Desk/Desktop Support</td>
<td>Add additional shifts as appropriate for new campus hours</td>
<td>12-2</td>
<td>$100</td>
<td>$50 50%</td>
<td>Assumes 2 - 3 people</td>
</tr>
<tr>
<td>Physical Infrastructure</td>
<td>Fiber optic ring</td>
<td>12-2</td>
<td>$600</td>
<td>$200 20%</td>
<td>Phased with construction of UCRR</td>
</tr>
<tr>
<td>Physical Infrastructure</td>
<td>Copper</td>
<td>12-2</td>
<td>$600</td>
<td>$200 20%</td>
<td>Phased with construction of UCRR</td>
</tr>
<tr>
<td>Physical Infrastructure</td>
<td>BDF Upgrades</td>
<td>12-2</td>
<td>$40</td>
<td>$20 20%</td>
<td>No key BDFs and IDF's</td>
</tr>
<tr>
<td>Physical Security of IT Spaces</td>
<td>Correct inadequacies in security of IT spaces</td>
<td>ASAP</td>
<td>$50</td>
<td>$40 40%</td>
<td>Shrewsbury or leased space</td>
</tr>
<tr>
<td>Disaster Recovery/Business Continuity (DR/BC)</td>
<td>Disaster recovery/business continuity plan</td>
<td>ASAP</td>
<td>$100</td>
<td>$80 80%</td>
<td>HR consultant</td>
</tr>
<tr>
<td>Disaster Recovery/Business Continuity (DR/BC)</td>
<td>Disaster recovery data center and equipment</td>
<td>ASAP</td>
<td>$200</td>
<td>$160 80%</td>
<td>Should be a focus as new hires are made</td>
</tr>
<tr>
<td>ITD Reorganization</td>
<td>Update ITD job descriptions</td>
<td>12-1</td>
<td>$100</td>
<td>$80 80%</td>
<td>Should be a focus as new hires are made</td>
</tr>
<tr>
<td>ITD Reorganization</td>
<td>Increase skill-set for virtualization</td>
<td>12-1</td>
<td>$25</td>
<td>$20 80%</td>
<td>Should be a focus as new hires are made</td>
</tr>
<tr>
<td>ITD Reorganization</td>
<td>Increase skill-set for storage area networks</td>
<td>12-1</td>
<td>$25</td>
<td>$20 80%</td>
<td>Should be a focus as new hires are made</td>
</tr>
<tr>
<td>Customer Service Improvement</td>
<td>Add IT Business Analyst(s)</td>
<td>12-2</td>
<td>$300</td>
<td>$180 60%</td>
<td>Assumes 2 people</td>
</tr>
<tr>
<td>ITEA Implementation</td>
<td>ITEA planning</td>
<td>12-1</td>
<td>$1,200</td>
<td>$400 25%</td>
<td>Cost is for consulting assistance in ITEA planning and implementation. Cost is $300K per year for four years (6 months post data center migration)</td>
</tr>
<tr>
<td>ITEA Implementation</td>
<td>Contractor assistance and backfill (Network admin, systems admin, telecom technicians, wiring contractors, etc. as required from time to time)</td>
<td>12-1</td>
<td>$1,800</td>
<td>$583 40%</td>
<td>For various contractors required to implement the transition either for staff augmentation or specialized skillset. Cost is $450K per year for four years (6 months post data center migration).</td>
</tr>
</tbody>
</table>