

AUDIT AND ADVISORY SERVICES

IT Architecture Audit Project No. 13-601

October 17, 2013

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October 17, 2013

Larry Conrad
Associate Vice Chancellor & Chief Information Officer

Lyle Nevels
Deputy Chief Information Officer

Chief Information Officer Conrad and Assistant Vice Chancellor Nevels:

We have completed our audit of the process for managing our campus information technology (IT) architecture as per our annual audit plan in accordance with the Institute of Internal Auditors' *Standards for the Professional Practice of Internal Auditing* and the University of California Internal Audit Charter.

Our observations with management action plans are expounded upon in the accompanying report. Please destroy all copies of draft reports and related documents. Thank you to the Office of the CIO and Information Services and Technology staff for their cooperative efforts throughout the audit process. Please do not hesitate to call on Audit and Advisory Services if we can be of further assistance in this or other matters.

Respectfully reported,

Wanda Lynn Riley
Chief Audit Executive

cc: Executive Vice Chancellor & Provost George Breslauer
Vice Chancellor Administration & Finance John Wilton
Senior Vice President Sheryl Vacca
Associate Chancellor Linda Morris Williams
Assistant Vice Chancellor and Controller Delphine Regalia

University of California, Berkeley
Audit and Advisory Services
IT Architecture

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OVERVIEW

Executive Summary

The state of managing our campus IT architecture has not changed significantly since we conducted a preliminary survey and risk assessment on the subject two years ago and concluded with the then Chief Information Officer (CIO) that further work was not warranted.

- Architectural processes are localized and informal;
- The Director of Architecture, Platform, and Integration, serving as the campus de facto head architect, has limited visibility into potentially important architecture decisions;
- The Information Technology Architecture Committee (ITAC) and Campus Technology Council are not currently functioning; and
- IT Governance Operational Excellence initiative, which we understood would have included governance over IT architecture, was postponed in late 2012 pending the hire of a new campus CIO.

In the absence of a functioning architecture board and a head architect that has sufficient enterprise-wide authority, insight, and input into architecture decisions, we observe the potential for the following types of risks with architectural decisions:

- Lack of common frameworks and methodologies for providing architectural services;
- Decisions being made at the unit level without sufficient consideration to enterprise priorities and needs;
- Decisions that result in duplicative applications and data redundancy across units;
- Confusion over who is responsible and accountable for architectural issues;
- Selection of sub-optimal architectures that hinder future campus needs;
- Decisions being made without input and approval by the campus head architect and architecture board;
- Decisions being made by individuals without sufficient experience or knowledge; and
- Dissatisfaction among business and IT leadership with the cost of solutions delivered.

With the advent of a new CIO (Larry Conrad), we observe that the campus and the CIO organization has an opportunity to review its current approach to campus IT architecture and decide whether the previously existing elements should be revived or redesigned in another form to better ensure that long-term campus architecture objectives are met.

Source, Purpose and Scope of the Audit

The objective of this audit was to evaluate the adequacy and effectiveness of internal controls for managing our campus IT architecture. The scope of the audit covered the use of principles, policies, frameworks, and processes for governing, managing, and controlling our IT architecture. The campus departments we interacted with during this audit are the Office of the CIO and Information Services and Technology departments, specifically Architecture, Platforms, and Integration; Enterprise Data; and Enterprise Application Services.

We approached this audit by interviewing management and inspecting documentation, where available, concerning the design of internal controls and better practices for governing, managing, and controlling our architecture and analyzing the effectiveness and efficiency of the design of our internal controls.

Background Information

In spring 2011, Audit & Advisory Services conducted a preliminary survey as part of a planned FY2011 audit of campus IT architecture. Based upon the results of the preliminary survey and after discussions with then CIO Shelton Waggener, we concluded that further detailed testing or fieldwork was not warranted and would consider this topic for inclusion in future audit plans. As a result, this project was included as part of the FY2013 audit plan.

Summary Conclusion

The state of managing our campus IT architecture has not changed significantly since we conducted a preliminary survey and risk assessment on the subject two years ago and concluded with the CIO that further work was not warranted. The conditions that we noted at that time and reason for not proceeding ahead with a full audit were: (1) there had not been a campus Chief Technology Architect since 2008; (2) informal architecture processes, and (3) the Operational Excellence initiative was expected to result in redesigning campus IT governance, including governance related to IT architecture.

Since then we observe that (1) the Information Technology Architecture Committee (ITAC) and Campus Technology Council are not currently functioning and (2) the IT Governance Operational Excellence initiative, which we understood would have included governance over IT architecture, was postponed in late 2012 pending the hire of a new campus CIO.

In addition, we observe that the Director of Architecture, Platforms, and Integration (i.e., Director of AP&I), who serves as the campus de facto head architect, has limited visibility into potentially important enterprise architecture decisions being made in other areas of campus, both in central and individual units, by staff that do not have a reporting relationship and are not accountable to him.

In the absence of a functioning architecture board and a head architect that has sufficient enterprise-wide authority, insight, and input into architecture decisions, we observe the potential for the following types of risks with architectural decisions:

- Lack of common frameworks and methodologies for providing architectural services;

- Decisions being made at the unit level without sufficient consideration to enterprise priorities and needs;
- Decisions that result in duplicative applications and data redundancy across units;
- Confusion over who is responsible and accountable for architectural issues;
- Selection of sub-optimal architectures that hinder future campus needs;
- Decisions being made without input and approval by the campus head architect and architecture board;
- Decisions being made by individuals without sufficient experience or knowledge; and
- Dissatisfaction among business and IT leadership with the cost of the solutions delivered.

With the advent of a new CIO (Larry Conrad), we observe that the campus and the CIO organization has an opportunity to review its current approach to campus IT architecture and decide whether the previously existing elements should be revived or redesigned in another form to better ensure that long-term campus architecture objectives are met.

Management Response and Action Plan

It's clear that work needs to be done to improve the overall strategic approach to architecture across the campus.

As a starting point, it is critical to establish a clear set of architecture guiding principles. Architecture principles are used to identify how the University will operate and deploy IT resources and assets as it relates to architecture decisions. These principles must be:

1. **Understandable:** the underlying tenets can be quickly grasped and understood by individuals throughout the University. The intention of the principle is clear and unambiguous, so that violations, whether intentional or not, are minimized.
2. **Robust:** enable good quality decisions about architectures and plans to be made, and enforceable policies and standards to be created. Each principle should be sufficiently definitive and precise to support consistent decision-making in complex, potentially controversial situations.
3. **Complete:** every potentially important principle governing the management of information and technology for the University should be defined. The principles look to cover every situation imaginable.
4. **Consistent:** strict adherence to one principle may require a loose interpretation of another principle. The set of principles must be expressed in a way that allows a balance of interpretations. Principles should not be contradictory to the point where adhering to one principle would violate the spirit of another. Every word in a principle statement should be carefully chosen to allow consistent yet flexible interpretation.
5. **Stable:** principles should be enduring, yet able to accommodate changes. An amendment process should be established for adding, removing, or altering principles after they are ratified initially.

The architecture guiding principles will be defined by January 2014.

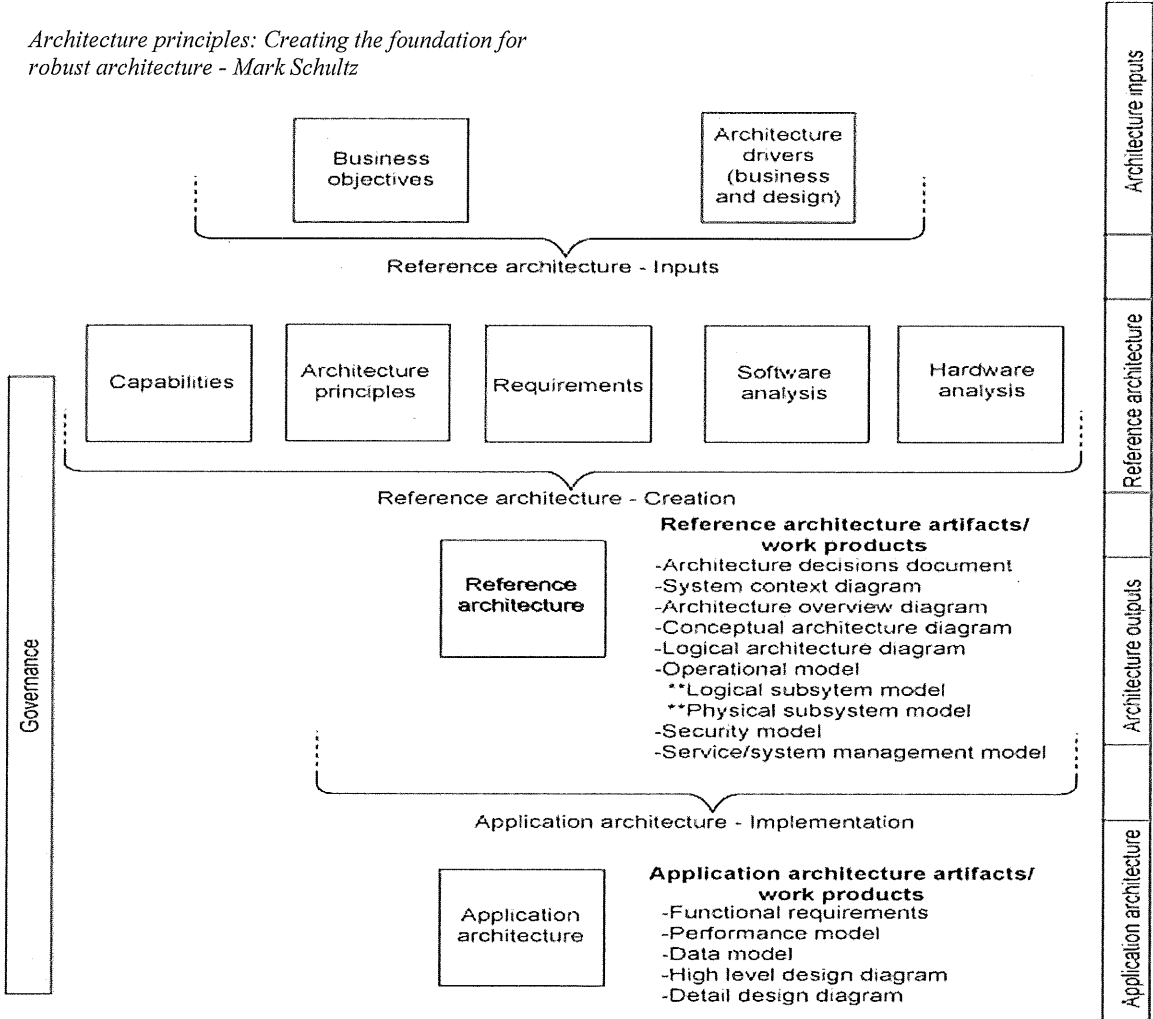
The principles will provide a framework for the University to make conscious decisions about IT, help establish relevant evaluation criteria, thus exerting influence on the selection of solutions and solution architectures in managing compliance to the IT architecture standards. They are also important for providing input to assessing both existing IT systems and future strategic portfolio for compliance with the defined architectures. This will provide valuable insights into the transition activities needed to implement architecture in support of University goals and priorities.

Architecture principles focus on two main areas. They are used to govern the process of:

- Developing the architecture. Architecture principles are needed to guide the development, maintenance, and use of the enterprise architecture.
- Implementing the architecture. This means establishing the tenets and related guidance for designing and developing an IT system.

The following diagram is an example of where we are headed in terms of the components of our architecture model. Our principles must be created from business objectives and architecture drivers (business and design) and are used as the foundation for governance over the development of the architecture and the implementation of the architecture.

Architecture principles: Creating the foundation for robust architecture - Mark Schultz



The IT organization has undergone significant change over the past 15 months which has hampered our ability as an organization to make significant progress in establishing the overarching strategic approach to architecture as described above. These challenges include:

- Departure of long standing CIO from the University and the hiring of a new CIO and Deputy CIO.
- IT Organizational changes including the creation of the Associate CIO program whereby distributed IT Directors now have dual reporting relationships with their functional leader as well as the Campus CIO.
- Approval from campus leadership to replace the current Student Information Systems (SIS) with a vendor provided product whereby moving away from the ninety plus outdated systems that are in place today. This decision will have a significant impact on our overall architecture strategy as our new SIS will in some ways establish some architecture decisions and require us to focus heavy on API's (application program interfaces).
- Internal IST organizational changes that created inability of the IT Leadership to focus on key architecture efforts due to other pressing organizational challenges added to his responsibilities.
- Lack of a defined governance model and the decision to place the development of a new model on hold until the new CIO was on board.

As the findings point out, we have the opportunity with the hiring of the new CIO and the new Deputy CIO to align our priorities, reexamine our organization structure, assess our financial model, establish a clear governance process including an IT Executive Committee and establish the necessary IT architecture standards and governance bodies in support of our overall strategic direction.

This work is well underway:

- We look to provide a governance framework to the campus at the start of the Fall semester.
- The rationalization of the organization where IT architecture sits today is underway and we expect decisions / changes to take shape at the beginning of the Spring semester. Our goal is to better align our team and resources so that IT architecture receives the proper focus and attention that is warranted.
- The process of assessing our financial model and organizational structure is underway with internal expertise within Finance and outside consultants. This is needed in order to determine the health of our financials, which has an impact on our funding capabilities for IT architecture efforts and other key IT areas.
- Student Information Systems replacement project is being kicked off in late July and our architecture team is engaged with Student Affairs IT leadership and the project team to provide guidance and direction as we make go forward decisions on this critical project.

The outcome of these efforts will help establish a new baseline for the organization and place us in a position whereby the attention on IT architecture and governance can be and will be supported by our strategic direction.