

This paper is the third in a series on [Preparing the IT Organization for the Cloud](#) from the ECAR-CLOUD Working Group. For institutions that have decided to adopt cloud services, transitioning to the cloud presents both opportunities and challenges. This series provides guidance to help institutions effectively prepare to address these challenges. More information can be found at the ECAR working groups [website](#).

Introduction

Cloud computing provides a unique opportunity to consider how we create, develop, manage, and adapt IT organizations to address this evolving landscape.¹ This paper addresses the impact that cloud computing is making in the evolution of the changing roles of IT staff in higher education. As cloud computing becomes more prevalent, we are seeing traditional IT roles change in a way we haven't seen in many years. IT decisions to adopt cloud solutions are being made across the campus, often outside IT organizations, thereby missing the opportunity to leverage IT organizations in those decisions. For many institutions, this represents a significant shift, often requiring a change in the way IT organizations work within, across, and outside the institution. Cloud computing can be complex and often requires new roles and new skill sets: How are we to transform our current IT organizations and make them cloud ready? What skills/competencies, roles, positions, and teams are needed to best support the institution and address business needs in the move to the cloud?

Complete Series List

1. An Introduction
2. Developing Cloud-Aware Governance
- 3. Transforming the IT Organization**
4. Building a Migration Plan
5. Operationalizing the Cloud
6. Managing Risk
7. Supporting Users

This paper considers these key questions:

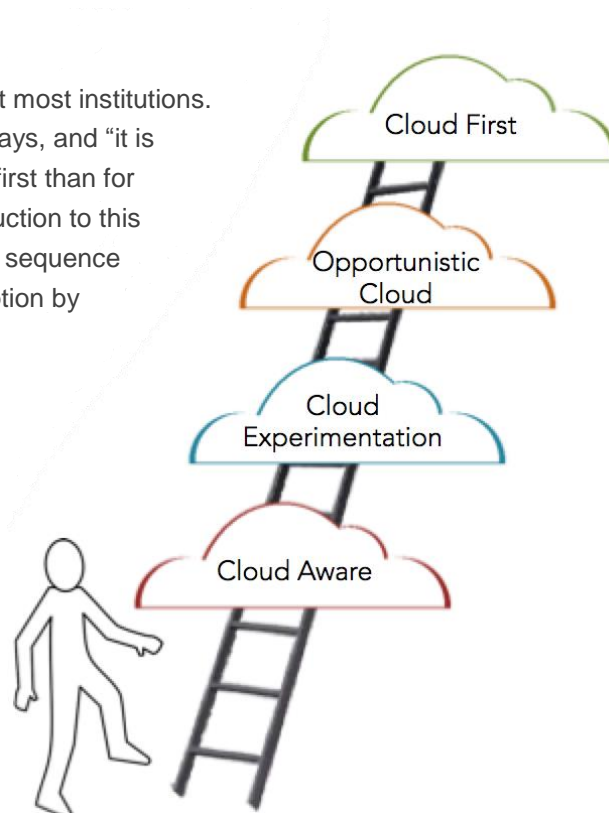
- What cloud strategies are needed to evolve the IT organization structure to meet the cloud computing opportunities and challenges?
- How do we prepare and organize our IT workforce to embrace the culture change of working with cloud-centric tools, services, and environments?
- How do we create an IT organizational culture that partners with other institutional stakeholders and vendor partners to embrace the emerging cloud ecosystem?
- What new roles and skills may be required to successfully integrate cloud computing into campus technology environments?

The previous paper in this series proposed an agile, cloud-aware IT governance process. As institutions mature their approaches to cloud computing, the task of developing cloud-aware IT governance will go hand in hand with the task of transforming IT organizations. Neither task will succeed without the other. If colleges and universities are to take advantage of the enormous opportunities that cloud computing brings, then we will need to address the challenges cloud computing can present to the IT organization and identify ways to transform the organization to meet those challenges.

Cloud Strategy

Cloud strategy development is an evolutionary process at most institutions. Institutions often find cloud computing arriving in many ways, and “it is more common for the cloud to ‘sneak’ into institutions at first than for institutions to go to the cloud,” as discussed in the introduction to this series.² The introduction further outlines a likely adoption sequence for cloud computing based on the following phases: adoption by individuals, adoption by business units, adoption by the institution, and mature cloud. Generally, though, IT departments begin experimenting with the cloud (either intentionally or driven by a service need) and move toward adopting cloud services on a case-by-case basis as opportunity arises or circumstances compel.

Adopting a cloud strategy requires careful coordination among a variety of stakeholders, including IT and information security staff, legal teams, compliance experts, procurement specialists, and institutional leadership. Once an institutional cloud strategy is adopted, the implementation of those strategies requires transformation in the IT organization.



Some common approaches and stages to developing an institution-wide cloud strategy include:

- **Cloud Aware:** Institutional users and IT staff are aware of broad cloud trends but are not yet prepared to adopt public-cloud solutions. These institutions may choose to build on-premises solutions in a way that prepares them for an eventual move to the public cloud.
- **Cloud Experimentation:** The IT organization begins to learn about the various cloud services available to them in the forms of SaaS, PaaS and IaaS.³ The organization may begin deploying some common SaaS solutions (such as e-mail and collaboration tools), which sometimes grows into testing IaaS deployments (e.g., building experimental servers for learning purposes).
- **Opportunistic Cloud:** The IT organization begins to actively seek out cloud solutions that meet new business requirements. New services may remain as traditional on-premises deployments, but cloud solutions are considered and deployed when reliability, scalability, or other benefits are perceived.
- **Cloud First:**⁴ This strategy places cloud at the top of the decision-making chain. The default assumption within the institution is that cloud services will fulfill the majority of the institution’s computing needs. After institutions adopt a cloud-first strategy for existing services, they may implement a migration plan to move legacy services to the cloud.

Some institutions will go through all of these stages and ultimately adopt a cloud-first strategy that prioritizes the adoption of cloud services to meet new business requirements and may include migration targets for legacy services. Other institutions may find that one of the other stages is a better fit for their institution's objectives. Very large decentralized institutions may find that the various academic and business units are at different stages of adoption.⁵

Transforming the IT Organization to Create a Cloud Culture

The adoption of various cloud strategies causes a paradigm shift that impacts both the IT organization and IT staff members. Academic and business units are increasingly driving the selection and adoption of cloud IT solutions, and in doing so they may bypass the IT units.⁶ Institutions will achieve the best outcomes when their IT organizations serve as enablers, simplifying and accelerating academic and business units' adoption of cloud services. In order to evolve into the role of cloud enabler, IT units must carefully consider the value they bring with regard to cloud service adoption, such as:

- Procurement, evaluation, and selection support (including assistance with understanding, negotiating, and monitoring SLAs)
- Integration with campus services
- Migration of existing on-premises systems
- Project and product management
- Security, compliance, and risk management

Now more than ever, IT units must clearly understand the evolving needs of business and academic units and be prepared to help them assess the full range of possible solutions to their technology needs. Successful IT organizations will find ways to simplify and accelerate cloud adoption by reducing the barriers their campus partners face and by helping their institutions avoid potential pitfalls.

IT organizations must develop competencies with cloud technologies and services even as those services evolve and change. Practically, this means that staff must have time to explore new technologies and that organizations may need to increase their investment in IT staff training. IT organizations that fail to provide sufficient time for training and exploration will likely find themselves unable to contribute meaningfully to the campus technology conversation. Business units will not wait. They will simply bypass IT organizations unable to meet their needs. Change management practices and IT governance processes need to become agile and rapidly responsive to the needs of users, while still assessing risks to the organization.

As the culture of an institution shifts to embrace the pace of change that cloud computing brings, IT staff members may feel anxious about their roles and positions as they realize that a different set of skills is needed for the support of cloud solutions. The IT organization will have choices to make: Will it retrain its IT staff? Will there be staffing reductions or expansions? Will the organization need to adjust its internal structure? To prepare for changes in roles or staffing, the IT organization should engage staff in discussions about the impact of changing organizational needs.

IT staff are not only implementers but also influencers. If the impact of cloud computing on IT staff is managed well, these staff members can lead the transformation of the culture to one that supports and benefits from the adoption of cloud services. For IT staff to embrace the changes that cloud computing brings, they need to understand the risks and benefits of these solutions. Many technical staff are eager to explore and implement current and emerging cloud services and may need help identifying the associated risks and opportunities. At other times, technical staff may be more cautious and may need help to understand the business case and advantages for a cloud solution.

Building enthusiasm and buy-in requires the organization to include IT staff in the evaluation and decision-making process around the selection of cloud services. When academic or business units drive the adoption of a cloud solution, care should be taken to share the business case for the choice and to include IT teams in the evaluation. At times, IT staff will propose and drive the adoption of a cloud solution. If the institution has an IT governance process, staff can be encouraged to use it to develop buy-in for their proposals. As influencers, IT staff can lead the adoption of cloud services and help the organization understand and embrace the associated changes. The ultimate goal of these campus partnerships is that functional units will recognize the value that IT brings to the cloud conversation and invite them into projects as willing partners, rather than have IT force itself into the conversation.

Developing Campus and Vendor Partnerships

IT staff must adjust to the loss of end-to-end control of an IT solution. The relationship between support staff and end users changes because what IT staff can do to change or fix functionality is more limited. To create a positive culture, the IT organization should maintain clear communication with end users and set expectations about the realities of using a cloud solution (pace of change, options for feature requests, support response time, etc.). A culture of communication and partnership can compensate for frustrations resulting from the loss of control.

Campus Partners

The successful adoption, deployment, and ongoing use of cloud services require building and maintaining effective partnerships with campus offices and stakeholders external to the IT organization. IT must cooperate with campus partners to help shape their expectations and achieve better overall outcomes. Without a strong partnership with legal, policy, security, purchasing, and data stewards, each new cloud engagement is an uphill battle for both the IT organization and those interested in acquiring a cloud service. The IT organization must develop a transparent process so that the campus stakeholders are aware of existing service agreements, what services are represented, who can leverage the services, etc. This saves the institution considerable time and money in productivity, and out-of-band contracts can be avoided. For example, with cloud computing, the service-level agreements (SLAs) we formerly monitored in the data center are now part of a contract that may be managed by academic and business units; what abilities—which might have previously been within the purview of an operations area—do those units need to develop to monitor the SLA? In addition, the contractually managed relationship that cloud services entail necessitates effective partnerships with an institution's attorneys, who may provide insight and advice regarding specific cloud contract clauses and their impact on the institution's regulatory compliance.

In addition, the ease with which cloud services can be purchased, often by simply providing a credit card number, can make it challenging to identify when faculty or staff begin using cloud services. A strong partnership with an institution's procurement office presents an opportunity to identify such purchases, sometimes before they occur, to ensure they are properly vetted and aligned with the institution's security requirements before proceeding. Some of the new risks that moving to the cloud presents, especially those related to data security and breaches, may be offset by the acquisition of appropriate cyber-risk/liability insurance. An institution's insurance and risk management office may be able to provide insight into what type of insurance should be acquired—by the cloud provider, the institution, or both—to provide sufficient protection.

In all cases it is beneficial for the IT organization to be viewed as a valuable guide and partner by any business process owner considering cloud services. If that relationship exists, the business process owner will be more likely to come to IT for advice before deploying the cloud service, ideally resulting in a more thoughtful and well-planned deployment. Other campus partners include distributed IT shops that directly support their end users. Their needs often lead them to consider leveraging or buying a cloud service. When they do so, they can be pulled out of the direct service ownership role when a service goes to the cloud to be managed by central IT. Strong partnership and open communications between central and distributed IT are important for maintaining proper balance and strong relationships. Individual end users, students, faculty, and staff are often drivers of change, either through their use of popular commercial cloud offerings, their demand for solutions to common needs, or even their lack of adoption of solutions provided by central IT. To ensure the success and maximum value of cloud investments, the IT organization needs to engage all of these campus partners either as part of the formal IT governance process or through direct outreach.⁷

Vendor Partners

In the past, business units would typically have to call IT to help with new technical solutions, but with the growing availability of cloud services, business units and IT service and solution providers are now more likely to communicate directly. The result is that relationships with cloud vendors have quickly become a critical part of the higher education technology partner portfolio. Cloud vendors come in many sizes and shapes, ranging from the mass-market appeal of services like e-mail and storage to more narrowly targeted niche products. The relationship that IT has with vendors is different from what it was in the past, so it is important to determine what role the IT organization should play in provisioning and supporting these services. Below are some significant factors to consider.

- **Deployment Time.** The speed with which cloud services may be accessed and deployed has significantly shortened the amount of time that IT departments have to research, evaluate, assess, and test new vendors and products (what previously may have taken months or years may now take only days and weeks, depending on the service). For example, a business unit may engage a cloud service vendor directly first and then ask IT for integration and authentication, sometimes even after a contract has been executed.
- **Scalability.** The speed with which cloud services can be provisioned and deprovisioned has significantly shortened the amount of time that IT departments have to “stand up” servers to increase storage to meet increased demand or cyclical needs (e.g., enrollment, virtual labs, etc.). Furthermore, organizations only pay for the resources they need at the time they are needed.

- **Mass Market Appeal.** Many individuals use cloud solutions personally as consumers using services for products like e-mail, storage, computer backups, and online banking. The result is that many institutional stakeholders and end users feel familiar and comfortable with cloud technologies, even though the risk scenario for personal data is very different from that of institutional data. Cloud vendors may capitalize on this comfort and go directly to the business managers rather than through IT. As a result, IT's role may change from IT owner to IT partner, requiring new collaboration, communication, and negotiation skills.
- **An App for That.** Technology users today are typically comfortable with going to a variety of sources to get a solution. Instead of managing a limited number of relationships for products deliberately selected to serve the community, IT departments may be expected to support dozens or hundreds of cloud products providing services to a campus. As a result, IT needs to reassess traditional partner management practices to find more innovative ways to manage vendor partnerships and products. For example, instead of having only a few product managers on staff, there may be a need for many more vendor or product managers, as well as an internal customer relationship management solution to track vendor engagement. Such tracking mechanisms may also help when business units look to implement solutions that may already be operational in another area on campus.
- **Cloud Providers Everywhere.** Nearly every technology vendor today provides some sort of cloud solution, whether it is a private cloud, public cloud, or hybrid cloud solution. New IT roles like business analyst and solutions consultant help both the business unit and IT research, assess, evaluate, and manage cloud vendors and solutions. The rise of roles such as these that help bridge the business and technical requirements can help organizations react quickly and speed time to adoption when new cloud solutions need to be evaluated.

As the organization develops a culture that embraces the cloud, IT staff at all levels must become conversant in the business needs and processes of the functional units. This allows the IT organization not only to respond to the units' needs but also to anticipate potential solutions and start conversations about them before projects are started. By developing these relationships, functional units will recognize the value that IT brings to the cloud conversation and invite them into projects as willing partners.

Changing Roles and Skills

In order for IT staff to function as change agents supporting current and emerging cloud technologies, their buy-in for the use and integration of these technologies is needed.⁸ For this, staff need three things:

- An understanding of their roles and of any changes to their current position
- Time and resources to explore the technologies
- An understanding of the business case for the technologies

IT staff may be involved in developing the business case, or it could come from a business unit or management.

At each evolutionary phase during the history of the IT industry, the most notable industry changes are often marked by the changes to staff roles. During the transition from mainframes to the client/server model, the role of the computer operator largely disappeared, replaced by the system administrator. When the age of virtualization arrived, the requirement for individuals working with physical servers diminished, replaced with a need

“More than four in five institutions have moved at least one service to the cloud. CIOs project that cloud-based services will continue to expand widely over the next 10 years.”

—*IT Service Delivery in Higher Education: Current Methods and Future Directions*

for virtualization specialists. Similarly, as institutions shift to cloud computing, roles will likely change again. For example, data center specialists might be replaced with cloud financial analysts. Even in cases where IT job titles have not changed, the daily work roles have evolved significantly.

Cloud computing has brought about a radical change to the way colleges and universities can consume IT services and requires IT organizations to rethink how its IT units are staffed. As IDC noted as far back as 2012, “IT managers who are hiring for cloud-related jobs find that understanding the relationship between cloud computing and other activities, such as service management, business continuity, and even the business value of cloud, is as important as understanding the specific technologies being leveraged.”⁹ The 2014 EDUCAUSE Top 10 Issues list identified “Developing an IT staffing and organizational model to accommodate the changing IT environment and facilitate openness and agility” as number 4.¹⁰ We fundamentally understand that changes are necessary. The question remains, however: *How* might we change our IT organizations?

Following are some of the core and evolving roles that should be considered as part of a cloud-centric IT matrix organization. Not all institutions will need all these roles, and not all IT organizations will separate them (that is, one person may play multiple roles). In addition, many of these roles will have existed in the IT organization previously, but they may take on new traits, become more central, or change otherwise as a result of new processes required by working with the cloud.¹¹ The roles can be roughly organized into business, vendor-management, technical, and data functions:

Business Roles

- **Business Analyst:** IT will need a larger proportion of business analysts because with cloud computing, the lack of customizability of many services means that there must be a greater emphasis on collecting user requirements before selecting a cloud service and on understanding in advance how the cloud applications can be integrated into institutional business processes.
- **IT Liaison:** For years, functional users from business areas or departments worked with IT to ensure that their needs were met—or at least that they had a voice with IT—when decisions were made that affected their business unit. The introduction of SaaS cloud services has dramatically flipped this role to the point where IT must now proactively request to be included in the discussions surrounding product or service decisions taking place within business units on campus. Establishing the new role of IT liaison may help ensure that IT units not only stay informed but also serve as strategic partners when various cloud-based services are being considered. Additionally, this role can help coordinate activities of units from around campus; demand can be better aggregated, and unnecessary proliferation of solutions can be minimized.
- **Product Manager:** Product managers serve as the liaisons between users, technical staff, and vendors, ensuring that services delivered by the IT organization and vendor partners meet customer needs and serving as the customer advocate. The growing use of SaaS services makes this role increasingly important in the institution.¹²
- **Project Manager:** For IT organizations to move toward a cloud-centric services environment, they must rely on project management skills that can help ensure that the systems being adopted have been thoroughly vetted and implemented to meet the needs of the institution. Many IT organizations have long histories of tweaking and customizing locally provided services to meet the nuances of institutional needs. Cloud services, particularly SaaS solutions, often trade customization for best practices and predefined approaches. While project management may not actually change with increased cloud adoption, the approaches themselves become even more valuable across the IT organization. As one example, through project management, institutional needs and expectations can

be articulated and validated early and compared with the cloud offering and specific functionality, identifying discrepancies and proactively outlining resolution and mitigation strategies.

Vendor-Management Roles

- **IT Strategic Sourcing Manager:** The acquisition, or “buying,” of cloud computing services is very different from traditional procurement. Key differences manifest themselves in areas such as cost models, product comparison, contractual protections, SLAs, and the ongoing nature of the client/supplier relationship, to name a few examples. Due to these differences, it is essential that any organization planning to expand its use of cloud computing services have dedicated IT strategic sourcing staff resources who are qualified and experienced in the unique nature of cloud computing contracts and risk mitigation. The traditional IT purchase category closest to cloud services would be software licensing, so those may be good resources to build on when moving to the cloud.
- **Vendor Manager:** Adopting a cloud service entails an ongoing relationship between the cloud consumer and the cloud provider, which necessitates a role that owns this relationship. This role will need to coordinate other roles in connection with that relationship, but it will be the one role that remains part of the process from initial investigation through contract negotiation, ongoing use of the service to ensure rights and responsibilities in the contract continue to be met, and end-of-life and transition to a replacement solution. Each cloud service engagement will need someone on point in such a role. A single vendor manager can be on point for more than one cloud provider relationship, but there is a limit on how many relationships one person in this role can effectively manage.

Technical Roles

- **Application Administrator:** SaaS deployments increase the need for application administrators who handle the configuration, management, and access control for IT services. Depending on the scope of the service and the technical complexity of the configuration, this role may rest with an individual in IT or with a functional office.
- **Cloud Architect:** As institutions begin transitioning to cloud-enabled IT environments, defining at least one technical role to analyze and sometimes predict issues surrounding various cloud integrations will become vital for IT organizations as they build new systems. A cloud architect is an expert-level position that designs solutions that integrate multiple cloud (IaaS, PaaS, SaaS) and virtualization platforms, including on-premises services and solutions and data sources. A position of this nature is involved in developing enterprise architecture, is responsible for process automation, and manages network security related to cloud services.
- **Emerging Technologies Analyst:** This role, increasingly residing toward the leadership side of IT organizations, may prove to be one of the most important as institutions move toward rapid adoption of SaaS. Having someone within IT who provides research insights into future academic and administrative technology trends and who is empowered to push the institution into experimenting with various emerging technologies that may become strategic might help the institution achieve previously unexplored competitive advantages.
- **Integration Specialist:** Integration specialists are responsible for understanding business structures and needs and developing integration requirements and processes to integrate cloud services with on-premises solutions and/or other cloud services. This role would also be responsible for architecture and design (including practices and policies of integrations) and for the implementation of the integrations. Responsibilities of the integration specialist will also include ongoing operational support, such as monitoring, maintenance, and updates of the integrations. These application and data integrations include areas such as identity management, middleware, security and auditing, and business system integration.

Data Roles

- **Data Custodian:** This is an IT-centric role, with primary focus on the security and management around how institutional data resides and is used in the cloud. Data custodians may be technology units and personnel responsible for the network, the data center, systems administration, information security, research, etc.¹³
- **Information Security Analyst:** This role is responsible for information security standards and requirements, third-party risk assessments, and mitigations plans. Cloud services bring new security considerations, from risk assessments to technical decisions about integration with on-premises solutions. Certifications in cloud security may be desirable, such as the vendor-neutral Certificate of Cloud Security Knowledge.¹⁴

Conclusion: The Continuing Evolution of the IT Organization

The explosion of cloud-based tools and services has forever altered the way traditional IT organizations deliver services to their constituents. These changes to the traditional IT service delivery model might seem dramatic and disruptive, when in fact IT organizations may have been simply “too successful”¹⁵ in the delivery of core infrastructure services while institutions shifted toward more academic- and business-focused needs. IT organizations have quickly realized that to remain relevant, they must evolve and implement sound IT decision-making processes that help shape shared visions for embracing cloud strategies for the entire institutional community. Transforming the IT organization, redefining the skills and roles of IT staff, and developing partnerships with both on-campus constituents and the external vendor community are necessary steps to successfully embracing cloud services.

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Notes

1. EDUCAUSE Library, [Cloud Computing](#).
2. See the [Preparing the IT Organization for the Cloud](#) series.
3. These cloud service models—service as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS)—are defined in the introductory paper in [this series](#).
4. Asbed Bedrossian et al., [Cloud Strategy for Higher Education: Building a Common Solution](#), research bulletin (Louisville, CO: ECAR, November 2014).
5. More on platform migration will be discussed in the next two papers in [this series](#), focusing on building a migration plan and operationalizing the cloud.
6. To learn more, see the introductory paper to [this series](#), particularly the section on “How Does Cloud Arrive at Your Institution?” It discusses adoption by individuals, business units, and the institution as a whole, and it looks at what is meant by “mature cloud.” The second paper in the series focuses on developing cloud-aware IT governance and the importance of involving the IT organization in cloud adoption,
7. See the second paper in [this series](#), *Preparing Your IT Organization for the Cloud: Developing Cloud-Aware Governance*.
8. To learn more, see Thomas Dugas, *Resource and Staffing for Cloud Computing: Evolving Your Workforce to Meet New Needs*, part of the [Internet2 NET+ CloudProud Webinar Series](#).
9. Cushing Anderson and John F. Gantz, “[Climate Change: Cloud’s Impact on IT Organizations and Staffing](#),” ICD White Paper, November 2012.
10. Susan Grajek and the 2013–2014 EDUCAUSE IT Issues Panel, “[Top-Ten IT Issues, 2014: Be the Change You See](#),” *EDUCAUSE Review* 49, no. 2 (March/April 2014).
11. The impact of these new or evolving roles will be discussed in an upcoming paper within this series, *Operationalizing the Cloud*. To learn more see the introduction to [this series](#), where a brief description of that paper can be found.
12. Chas Grundy, “[User Advocate: Product Management in Higher Ed](#),” *EDUCAUSE Review*, May 11, 2015.
13. To learn more about the data custodian and other data stewardship roles, see the upcoming work of the ECAR Data Stewardship Working Group; a project proposal is available [here](#).
14. See [slide 2](#) of Top 10 Cloud Computing Certifications, and Cloud Security Alliance, [Certificate of Cloud Security Knowledge](#).
15. Michael Cato, “[The CIO Minute: We’ve Been Too Successful!](#),” *EDUCAUSE Review*, July 6, 2015.