Sourcing, multi cloud environments and a changed environment for central IT

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Abstract

Many users at universities already use cloud services from various providers to achieve their goals in research and teaching better. The reasons are manifold, from functionality and the convenience to share work and collaborate with peers to quick availability. On the other hand, universities as well as the users themselves need to keep control of their data, for their own vital interests as well as for legal requirements. However, to withhold users from cloud usage will only strengthen "shadow IT", so Central IT has to find a way to manage multi cloud environments and thus pave the way for a structured usage of these offering. With this it is possible to make clear the necessity and value of local IT services.

This can be done by emphasizing existing and implementing new values to services or by adding public cloud services into the service portfolio while providing a secure and integrated framework.

1 Introduction

How does a user, e.g. a teacher or researcher, choose a service? Usual criteria like accessibility and location (to avoid network latencies) are no longer valid, as IT gets more and more virtualized in the sense of technical resources and sourcing: Since a vast majority of services are accessed via network anyway, the user will not recognize where a service runs as long as they do not care.

The consequence is an inevitable change which is taking place concerning the usage of cloud services. As the *Flexera 2021 State of the Cloud Report* indicates, 97% of the respondent businesses use at least one public cloud service whereas only 2% have a private cloud only usage. This development also influences the way IT is used in higher education institutions, as a survey within German research and HEI shows: cloud services in the second highest ranked topic in 2022, right after information security.

As IT is "just a tool" to fulfil the user's main aim, doing research and teaching, users choose the service which is most convenient, may it be because of the best feature set, good documentation or a hype in the community. But what does that mean for IT in a university?

As we see it, University's central IT is no longer the sole provider for many services but finds itself in a competition with readily available cloud services, at least for a subset of its services. So why keep a central IT at all and do not go all the way to a cloud-only strategy? For many services, Central IT **is** the sole provider for very good reasons where the competition with public cloud providers cannot be won for others. So, what is the necessary contribution of IT even in a cloud

environment? What is the differentiation that makes Central IT an essential ingredient of IT services?

All these questions and our subsequent thoughts assume a Central IT that plays an integral role within its university, aims at bringing forward the university's core processes and regards the academics as colleagues and stakeholders as well.

From an organizational perspective, IT and the university as an organization are interested in offering their users services "under their control", mainly to protect users (and therefore the university) from risks. These may be data loss, violating of existing laws (e.g. GDPR), depending on one vendor or being the victim of a hacker attack. All of these risks apply to existing services as well, but are silently being managed by Central IT. In the meanwhile, users need to keep track of them independently while using external services.

From a user's point of view distinctive features beyond technical parameters are process integration which can be the user's workflow as well as Authentication and authorization infrastructure for seamless access, trust and providing a secure organizational framework.

2 Role of University's central IT

IT has to find a balance between the section of the necessary monopoly and the sections where multi-sourcing has become reality while adding the feature mentioned above as an additional value to cloud services.

Among the services that "naturally" are kept in a local monopoly we have Student life cycle management. This area of IT is inseparably interwoven with teaching as one of a University's core processes, with direct ties to identity management (role "student") and content provisioning systems.

On the other hand, there are services like collaboration platforms where most people need to connect to others from outside their organization anyway. Consequently, there is no inherent benefit from keeping this type of service local.

In order to provide solutions central IT has to adjust their services as well as their role within the university's IT landscape. One ingredient is to emphasize existing and to add new values to services or by adding public cloud services into the service portfolio while providing a secure and integrated framework.

In the following we show two examples of how this could be achieved.

2.1 Improving the management of local resources

Simply due to size, any University's IT cannot compete with a public cloud provider concerning their set of features or the number of services, but by adding value to the existing services special use cases can be supported and local infrastructure can be used in terms of an exit or multi-vendor strategy.

So, it's the differentiating factors that are important for the University rather than competing in the area of highly scalable, standardized services.

Benefits for users do not only lie within the infrastructure only services (IaaS), but within more integrated or ready-to-use services. These advantages maybe

- avoiding unnecessary network traffic regarding services with a highly internal communication. Since network traffic costs with most of the cloud vendors this is not only a matter of speed but also a matter of cost
- automated integration into technical infrastructure, e.g. an automatic backup to local infrastructure, certificate management, or basic monitoring implementation

The balance between the workload placed on the central IT and the benefit for the user has to be maintained through automation and integration in local organizational processes like user management for access to resources.

While many aspects of cloud-based services cannot easily be replicated be central IT, there is one main advantage of cloud services compared to traditional IT services, namely their flexibility, scalability and fast provisioning processes, like how easy it is to get a new virtual server. These advantages can also be transferred to the local infrastructure:

- to gain flexibility and scalability local and remote resources can be combined to a hybrid cloud model. Most private cloud vendors as well as infrastructure providers (like. VMware and others) provide solutions to integrate off-premise infrastructure into the local management structure, in a way that the transition is seamless. This allows a scale out for use cases such as the beginning of a semester or online examination periods as well as flexible adaptation of new requirements.
- provisioning processes need to be “cloud like”, in terms of ease and speed of provisioning resources to users. This implies a high degree of automation in all corresponding parts: software deployment, network, user management.

2.2 Multi Cloud environments

Why is “multi cloud” necessary? As mentioned above, users choose the service which is most convenient, either because of users’ knowledge, costs, habits of research communities or functionality / availability of a particular API. There is only little value to offer access to only one public cloud offering since other users will continue to circumvent the narrow path.
One of the aims of a multi cloud strategy from the user’s perspective is choosing the best service out of many vendors, regarding the specific needs.

From the organizational point of view there is the advantage of “process scalability”: once you have the processes to manage one public cloud offering and the directory services for AAI, it’s the same for the next provider. This scalability also applies for the value added by the IT department:

- regulations for billing and accounting. Ideally framework contracts (e.g. provided by GÉANT) are used to offer a wide range of vendors.
- Integration into local Identity and Access Management (IAM) structures. This may be providing a single sign on mechanism (so existing passwords can be used; no new support processes have to be established) or existing roles within the university for approval and accounting processes.
- Providing security guidance: assistance with data classification (ideally by automatic recognition)

Multi cloud management is not about providing a tool to manage multiple cloud vendors, but about providing similar processes and guidelines.

3 What needs to be changed?

Taking all of the suggested changes and adjustments into account, the university’s IT has to change in a technical, but even more in an organizational way to define its new role .

Where in the past users were used to manually orchestrate their IT demands across various compute and data resources, collect input from co-workers etc. expectation nowadays asks for seamlessly "pluggable" components, all with single sign on, consistent work group membership, direct access to data and flexible provisioning. To achieve this, central IT has to provide process core components like cross-university AAI including group and group membership management.
As side-effect of users interacting among others and with infrastructure and services outside the control of central IT also sets new requirements in terms of security. As the users reach out for external services, security measurements have to be extended and changed as well since, e.g., a perimeter protection gets perforated by design. This brings implications for technical aspects like network security (e.g. firewalling in the cloud) or security models like "zero trust" as well as organizational steps to increase the user's awareness.

The main expertise that needs to be provided is no longer technical implementation, but knowledge or even consulting: giving advice to users like researchers how to integrate IT services from various sources into their own workflow. This needs skills in IT, but in a broad and profound way at the same time. As we stated last year (Thomas Eifert, 2021), it is no longer sufficient to advise the users with their IT questions but help them starting from their needs and then find an appropriate combination of IT services. In the former model, IT steps in only after users map their demands onto IT by themselves.

Also, the support processes have to be adopted: the current state mostly does not scale with the number of aspired services, because there is too much interaction needed in the way existing services are provided.
What support can a university provide to its users when the service is offered by someone else? How to guide the user when they do not even recognize (or care about) the difference between a local and a cloud service?
One possible answer is similar to the way suggested above: provide similar process and support them. Support in terms of content has to be done in another level, e.g. by the provided consulting or by interacting with external suppliers.
All this said, it imposes serious changes to central IT: The necessary integration of IT services (connectivity, servers, storage, platforms, ...) and a support that does not stop at the borders of specific services is not compatible with the traditional bailiwicks found in many central IT department. Even more, the task of integrating services – local, from partner sites and from various public cloud providers – demands a skill set very different from that of system-oriented specialists. So, to cope with these demands, either the organization of central IT as well as the skill management needs to move on.

4 Conclusion

Following the current changes, the future clearly lies in a multi sourcing strategy for IT services in a university. We have shown what strategies an IT department can follow to not only go with this change but create recognizable values for researchers and teachers.

If Central IT does not follow this way we see the danger that sooner or later it is regarded as an obligation, something that an organization "has to have" in contrast to a value-generating unit, which then can spiral down to the question whether this "has to have" still is true.

5 References / Citations

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6 Author biographies

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Dr. Thomas Eifert, received his doctoral degree in solid state chemistry. Since 2013 he has held the role of the CTO and is thus responsible for the technological strategy of the IT Center. His particular interests are the mutual dependencies of researchers' requirements and appropriate technical solutions.