

Higher Education and The Cloud



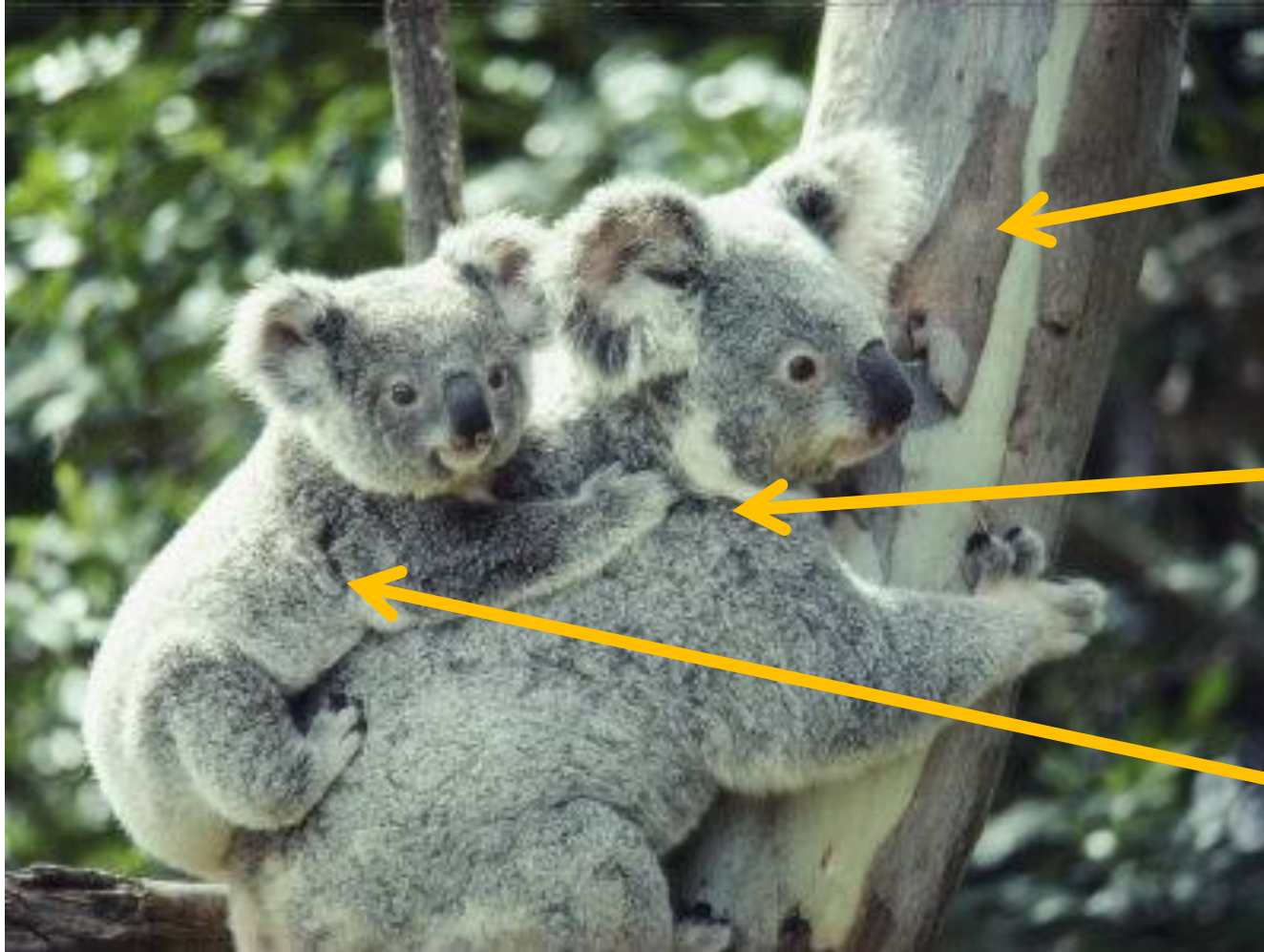
Vince Kellen

CIO, University of Kentucky

Vince.Kellen@uky.edu

December 14, 2011

First, some IT facts of life



Server

**Server
Hugger**

**Server
Hugger
Trainee**

What is this about cloud?

■ The new outsourcing

- Cloud represents a new way of integrating technologies (and business processes) so that the institution relies on external vendors for basic services
- Cloud is very real, very big and will transform IT
- Morgan Stanley May 2011 analysis expects adoption to be about 51% of organizations and about 22% of the IT workloads run in the cloud in three years. On premise growth in servers is expected to be flat or shrink
- All major vendors are committing >\$1 billion each in cloud technology

■ What makes cloud computing unique?

- Widely used, well understood and generic components
- Quick provisioning and de-provisioning
- Flexible contracting and procurement

Cloud vernacular

■ Software as a service (SaaS)

- Software hosted elsewhere. Higher education has been steadily adopting SaaS
- Examples: Hobson's CRM, Digital Measures, ServiceNow IT support

■ Infrastructure as a service (IaaS)

- Infrastructure hosted elsewhere. Higher education has NOT yet adopted this technology. General purpose server computing can be hosted with a vendor or consortium
- Amazon's elastic computing and storage solutions are examples of 'generic' cloud
- Large vendors are bringing custom, enterprise cloud solutions forward now

■ Platform as a service (PaaS)

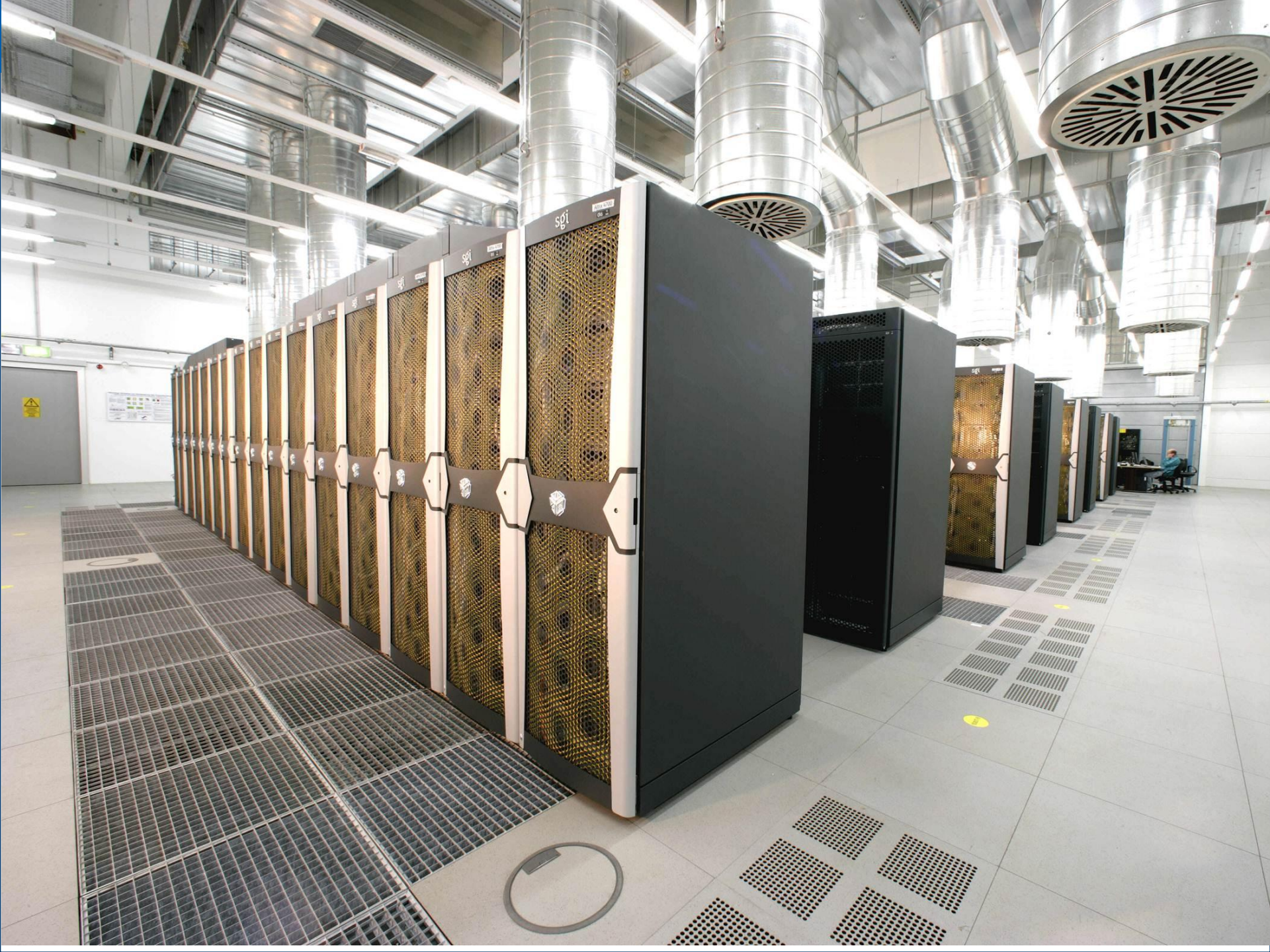
- This includes tools to create applications in the cloud
- Examples include Microsoft Azure, Force.com

■ High performance computing (HPC) as a service may be coming

- National labs have long since been an 'outsourced' provider of HPC
- Expect more HPC university consortiums, offerings by large vendors
- Cost of electricity, generic workloads make HPC as a service attractive

So, what does this mean for data centers?

First, let's look at an institution's data center of the present...



Now let's look at an institution's data center of the future...



What does this future look like to our server hugger?

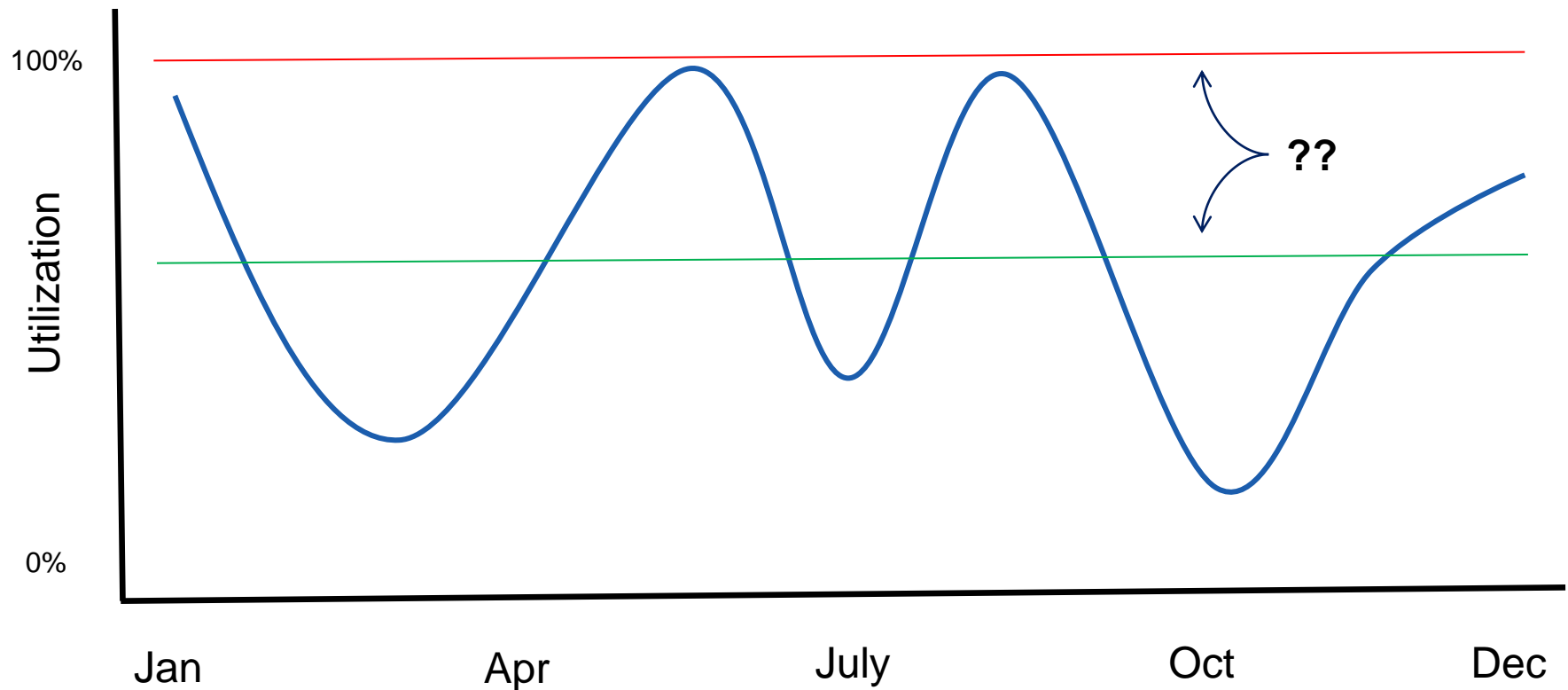






Sizing capacity

Instead of sizing on-premise computing at 100% of potential usage, size at some amount lower and 'burst' out to cloud providers for 'overflow.' This can save costs



Types of workloads

- Virtual desktops for student access to academic software
 - Peak usage in midterm and final weeks
 - Low usage during breaks
- SAP processes
 - Peak usage during enrollment periods
 - Testing and development of new SAP functionality
- Storage
 - Take very large amounts of data, infrequently accessed to large-scale, low-cost providers
- Disaster recovery
 - Instead of maintaining a hot/warm site, secure contracts for quickly expanded processing

All forms of cloud will be useful

- Software as a service will continue to be important
 - Enforce real-time data integration for quick user account provisioning and same-day data analysis
 - Review contracts for legal gotchas and security holes
- Infrastructure as a service will become the center of attention
 - Select multiple vendors to encourage both diversity of supply and competition
 - Match workload characteristics to vendor strengths
- Key challenges for the immediate future
 - Strong 'cloud orchestration' tools to help IT manage on/off premise computing with multiple vendors
 - Flexible contracting and pricing models, especially in the area of software licensing

Examples

■ In use today @ UK

- Google and Microsoft email (SaaS)
- Digital Measures (SaaS)
- Hobsons CRM (SaaS)
- Xytracs – Accreditation software (SaaS)

■ In use tomorrow?

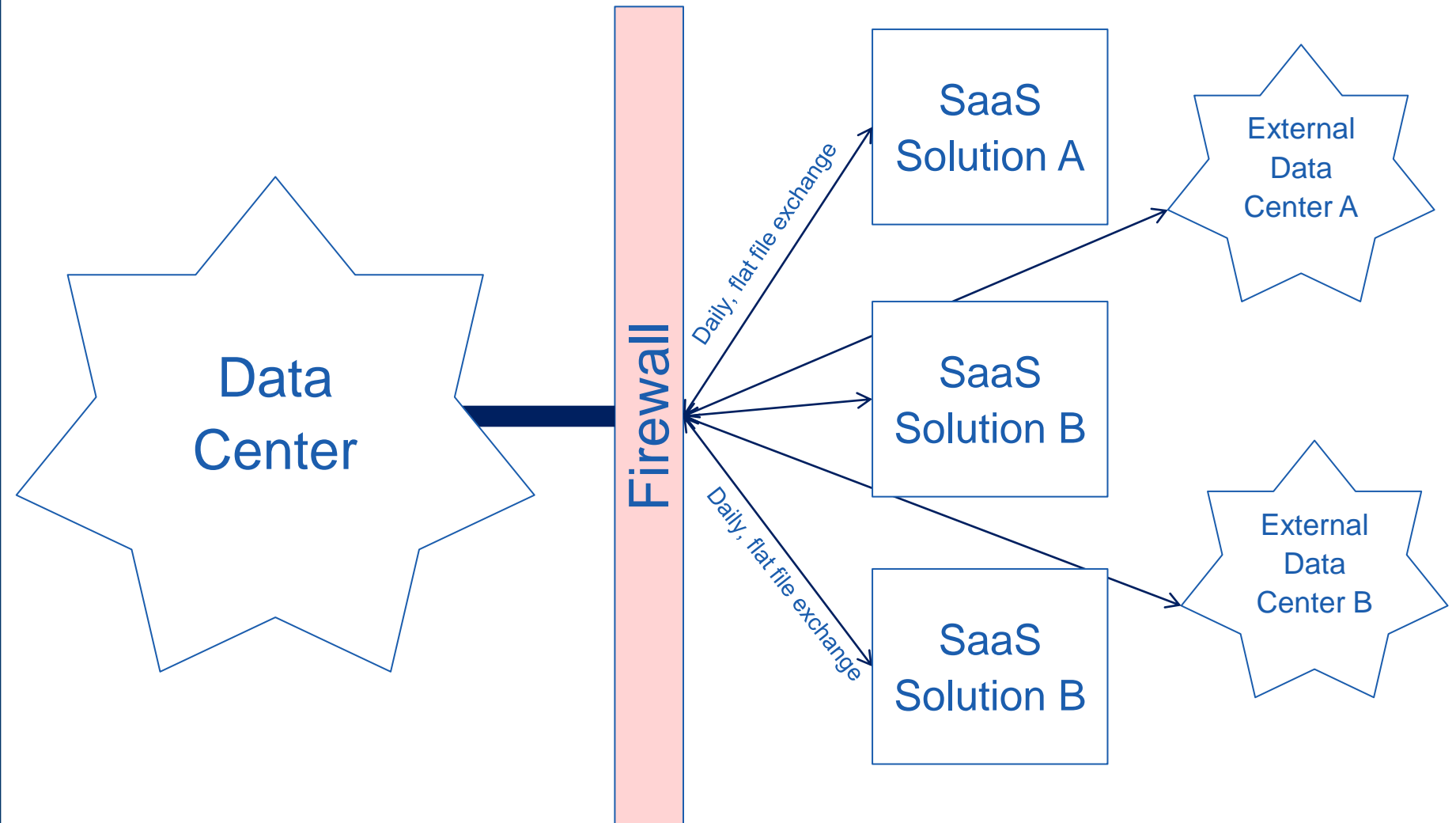
- Business intelligence and analytics in the cloud?
- Learning management systems in the cloud?
- Supercomputing in the cloud?
- e-Textbooks in the cloud?

Will everything be in the cloud?

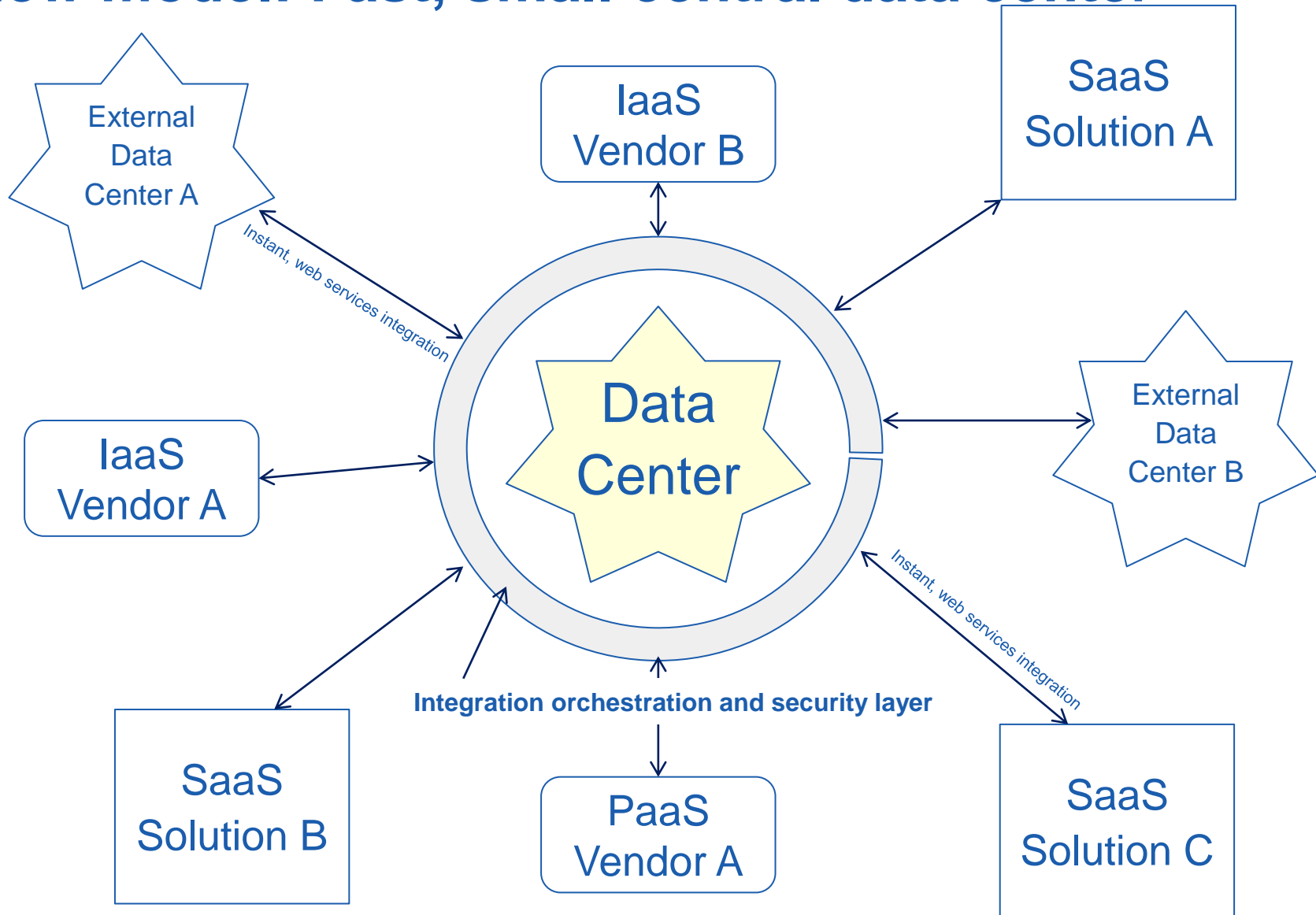
- Not for the foreseeable future (4-8 years)
 - Costs. We can save costs by running dedicated workloads locally (this may change!)
 - Risk. We need some ability to be immune to vendor supply chain disruption (other industries get by without any local production!) or the cloud market is emerging and still not mature
 - Cost of data computing versus cost of data transmission. Some workloads will just be cheaper to process locally than transmit the data across a network (think very large files, super rich medical imaging)
 - Some software isn't technically capable of running in the cloud (True!)
 - Some software vendors can't figure out how to price their software in the cloud (True!)

- For all these reasons, a hybrid cloud strategy is important

Current model: Slow, big central data center



New model: Fast, small central data center



Moving from ‘anticipate slowly’ to ‘react quickly’

- Since the beginning, IT has planned capacity in either 30 year chunks or 5-10 year chunks
 - 30 years for the design and use of a data center
 - 5-10 years for the selection and use of servers and storage
 - Moore’s Law and incremental capacity increases provide the rest

- In a ‘pull’ approach, IT services are provisioned much more quickly. Using self-service cloud approaches both on- and off-premise this can be in minutes
 - No lead time in provisioning, no ‘shelf time’ as equipment sits in storage rooms, automated provisioning
 - Virtual servers, operating systems, application installation, database loading, network provisioning, security policies

- If the entire system moves faster with far fewer manual steps, what happens?

What business benefit does 'Pull' really create?

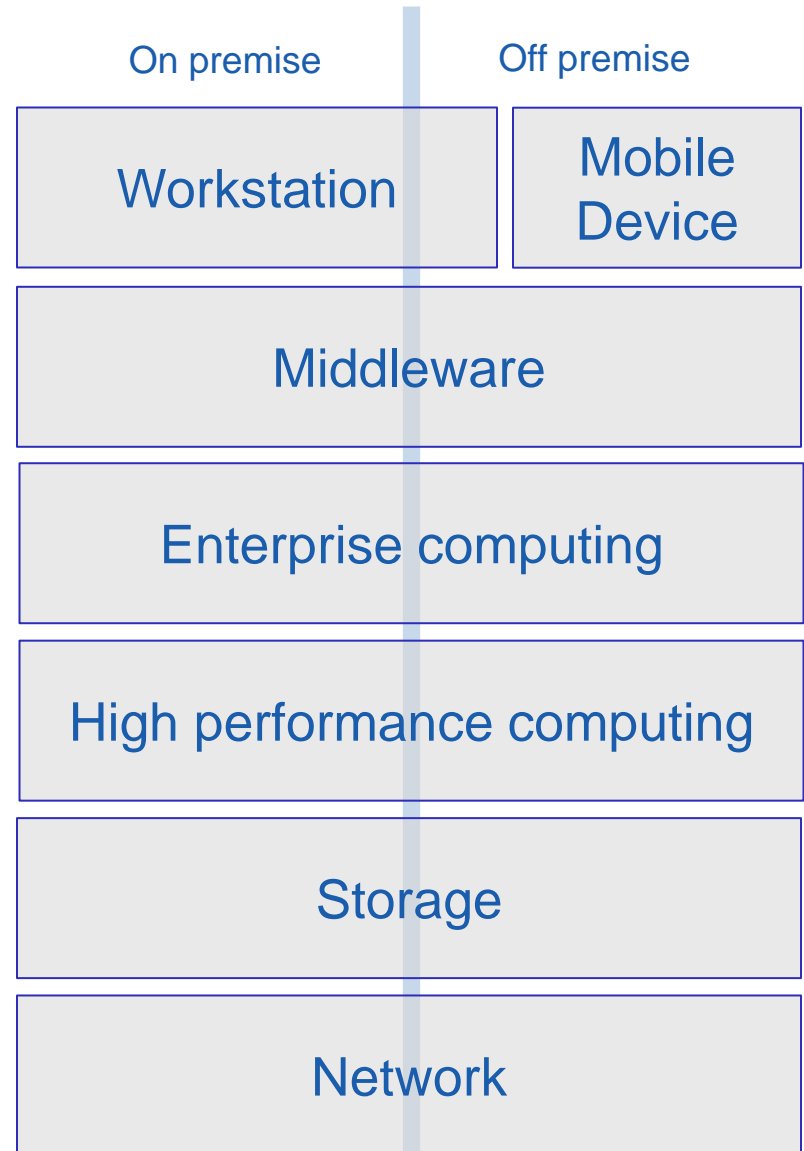
- Organizations can turn a new idea or change into action much quicker
 - This can allow for faster delivery and it can allow for faster failing!
 - Can organizational decision making keep up?
 - To borrow from True Lean, eliminating waste (time) can save effort/cost

- IT shifts its focus from mundane provisioning and support activities to:
 - Assisting in the design of ideas
 - Managing suppliers
 - Optimizing IT costs
 - Review of the effectiveness of ideas implemented

- Does this mean IT staff will no longer be needed?
 - No!
 - We have more demand for new work than we can keep up with. We can shift people to new roles that are needed to contribute to new work

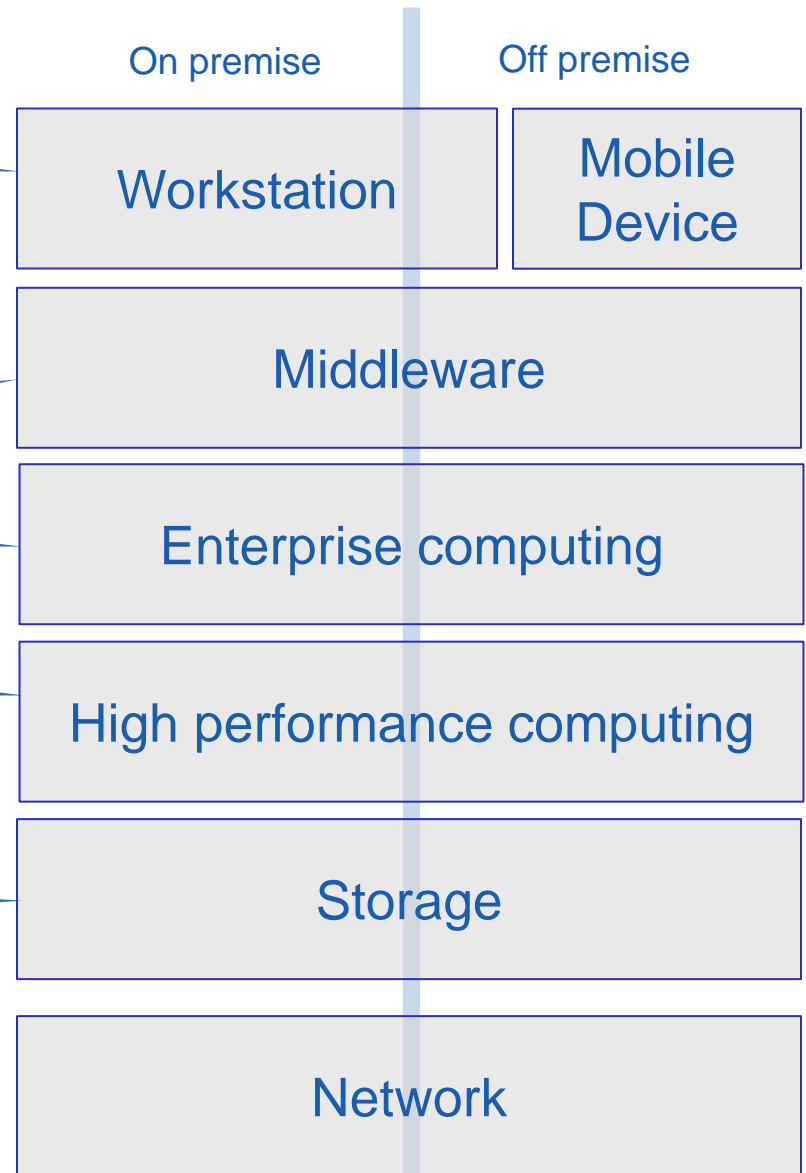
UKIT Virtual/Cloud Architectural Approach

- Easily switch between on-premise and off-premise computing
- Incrementally take advantage of superior infrastructure
- Remove waste – provisioning and change latency; computing process management, pull versus push
- Be free from physicality: access to resources anywhere, anytime
- Adopt and encourage widespread industry standards
- Maintain control of integration points



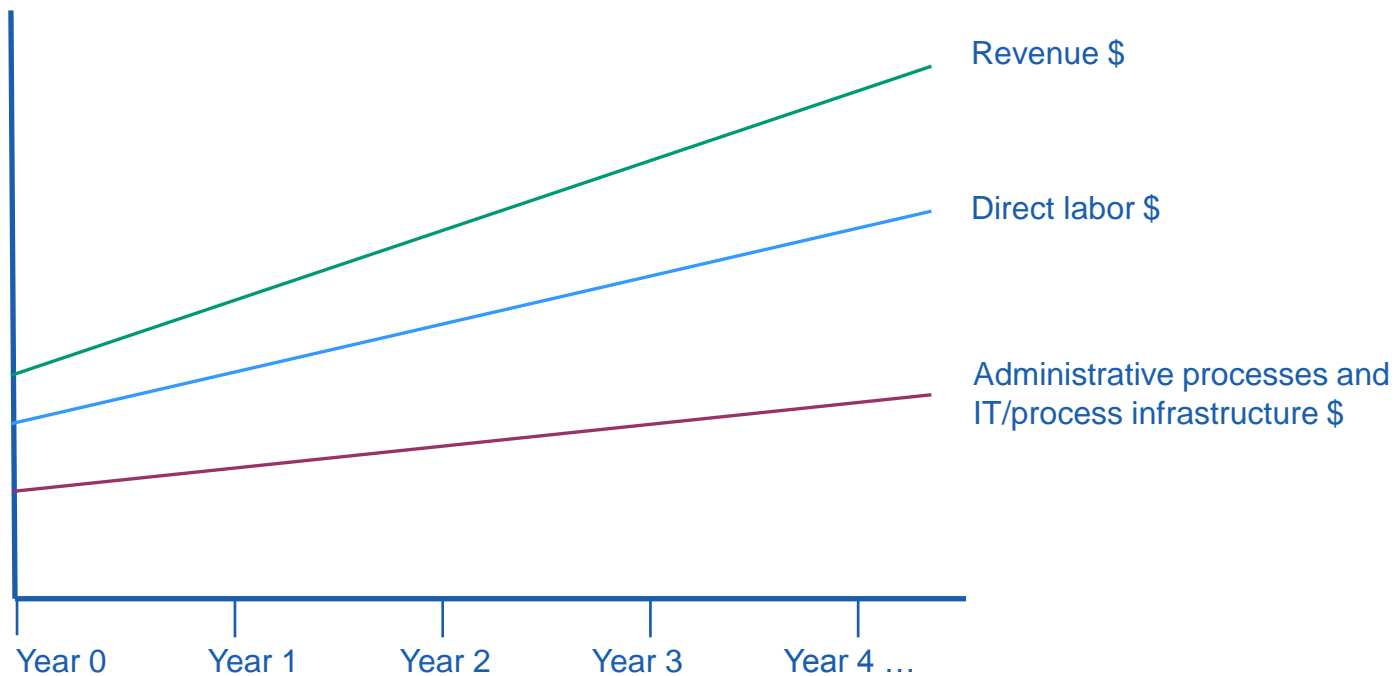
UKIT Virtual/Cloud Architectural Approach

- Easily switch between on-premise and off-premise computing
 - Desktop Virtualization Project** Complete
- Incremental advantage of superior infrastructure
- Remove barriers to signing and change management, pain versus push
 - SAP Cloud POC** POC done Decision
- Be free from physicality: access to resources anywhere, anytime
 - HPC Cloud POC** POC
- Adopt and encourage widespread industry standards
 - Research Data Repository Project** Initiating
- Maintain control of integration points



What should this mean for university operations?

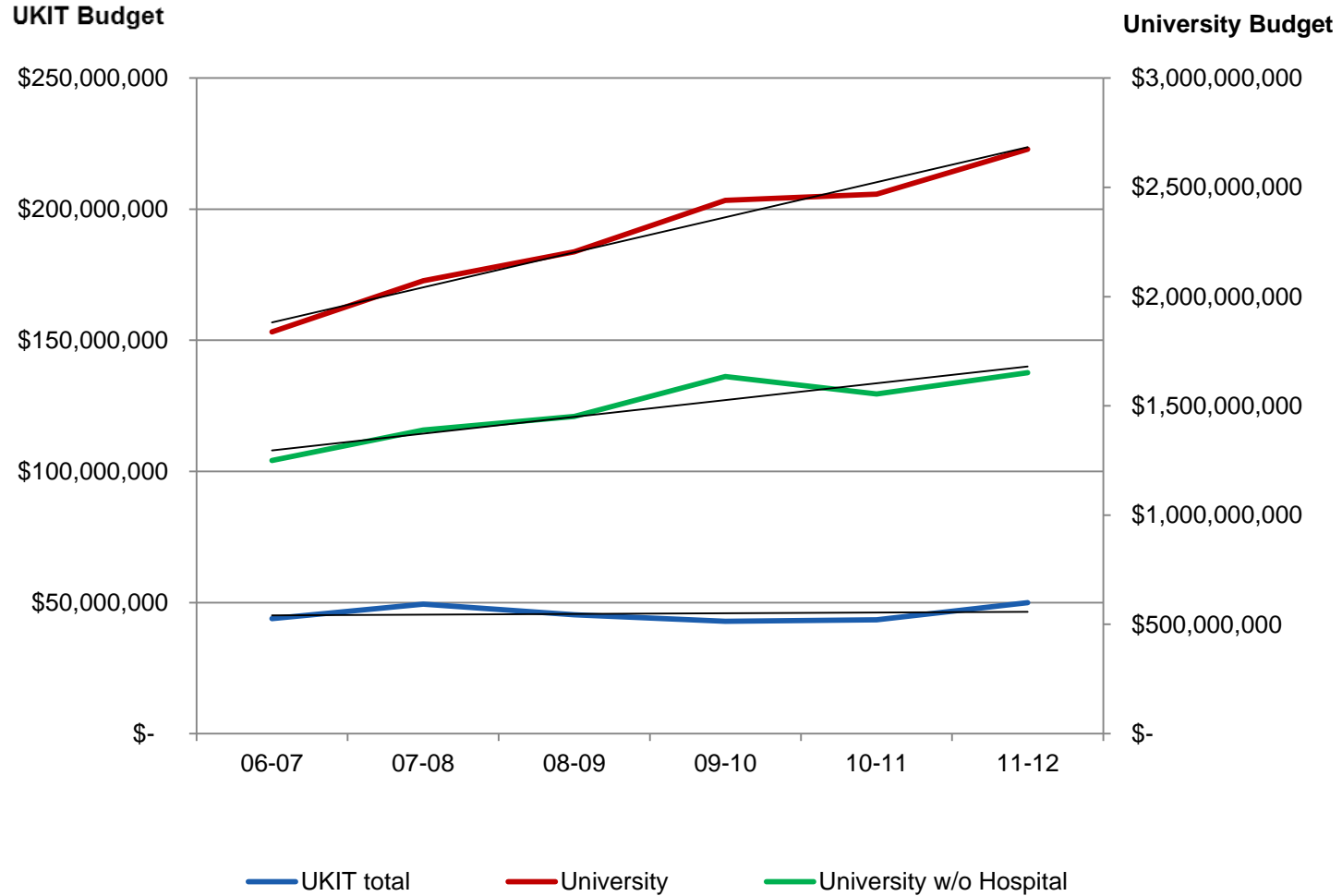
- IT should be directed to:
 - Measurably, over time, lower the cost of IT relative to revenue
 - Enable improved outcomes for both learning and research
 - Accelerate the development of business insight for both cost savings & growth
- IT should be a scalable infrastructure to help the institution find reallocations and new revenue while maintaining quality



How have IT costs fared at UK?

UKIT costs versus UK total budget

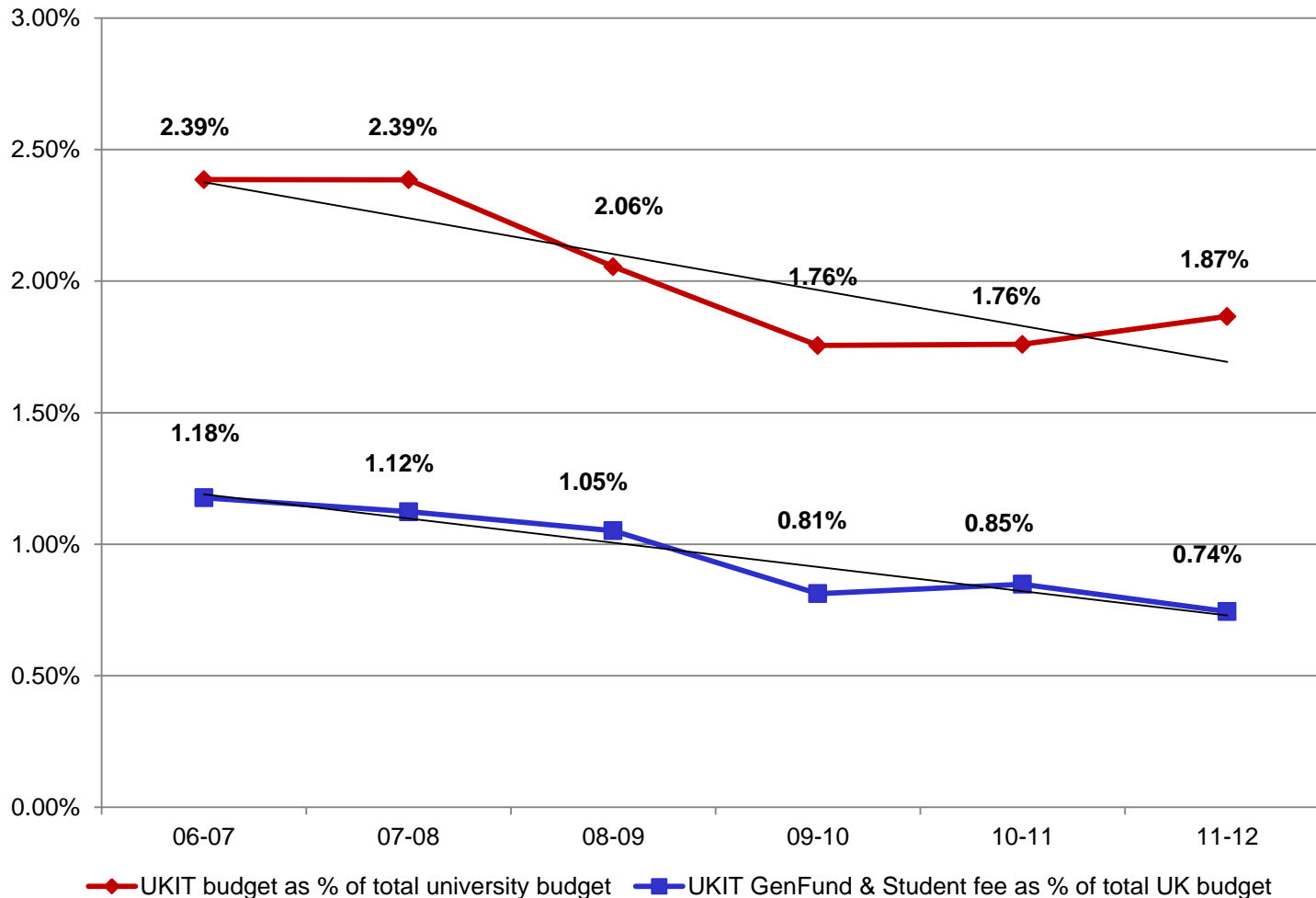
These costs include the integration of TASC and ATG in 2010 and 2011



How have IT costs fared at UK?

UKIT costs total and general fund

UKIT costs as % of UK total budget



How will we make this transition? Together!

