

# The Future of Cloud Computing in Ten Years

Nth Generation Technical Symposium  
6<sup>th</sup> August 2009

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## 🕒 **Lessons from the Past**

- ▶ Waterwheel to Power Grid
- ▶ Evolution of Telecom Networks

## 🕒 **The Present**

- ▶ Why the present is not sustainable
- ▶ What must happen for progress

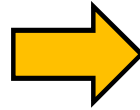
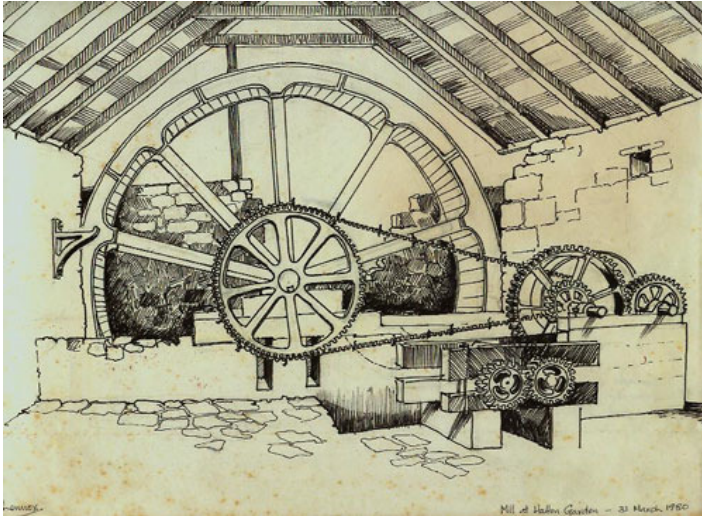
## 🕒 **The Future**

- ▶ Clouds and On-Demand Computing
- ▶ What it means for innovation

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# Lessons from the Past

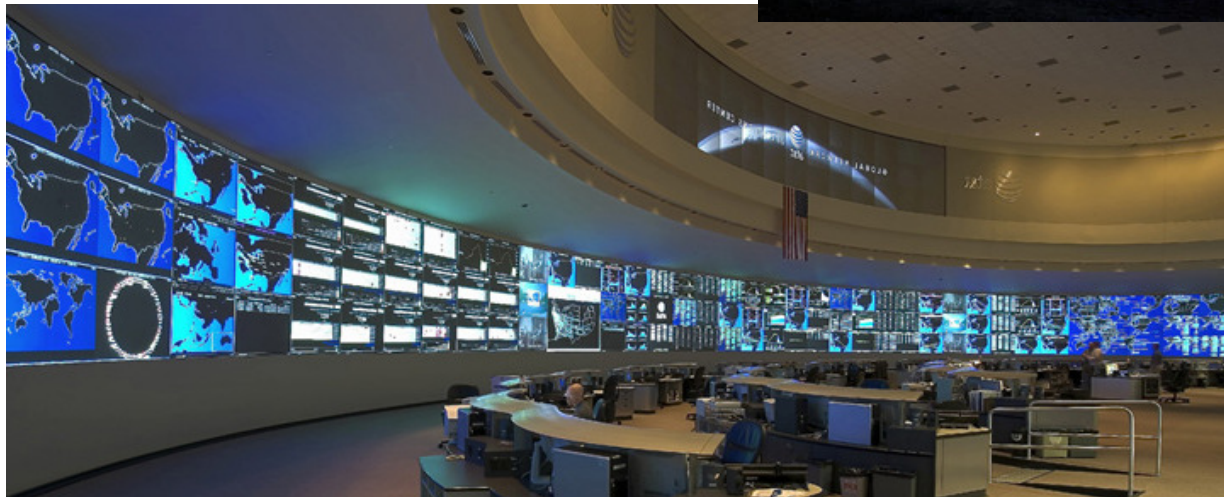
### Early Power Generation -The Waterwheel



### The Modern Power Grid



### The Telecom Network



	Local Power Generation	Modern Power Grids	Telecom Network
<b>Control</b>	Local Control	Centralized Supply	Global Interoperability
<b>Access</b>	Local	Ubiquitous	Ubiquitous
<b>Economics</b>	High Capital/Fixed costs	Commodity with Economies of Scale	Commodity with Economies of Scale
<b>Efficiency</b>	Difficult to scale up or down; unable to address over capacity or under capacity; Redundant Expenditure; Inefficient overall	Greater Productivity and Innovation fueled through efficiencies	Managed Resources. Achieved Innovation and efficiencies through full automation

**Lesson: Enterprises can not afford 2-5% of revenue spending on IT**

- 🕒 History shows Commoditization of Computing is inevitable
- 🕒 Disproportionate amount (2%-5% revenue) spent on technology rather than business will drastically reduce
- 🕒 Existing Management Complexity is not Sustainable and an architectural transformation will occur
- 🕒 Current Large Technology Incumbents will evolve or new players will emerge to address end-to-end optimization
- 🕒 **Universal Access = GDP growth**

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# The Present

# IT UNDERWORLD

by Phil Johnson



1



## Unexpected Demands created by Web 2.0 Consumer and Internet Applications

Explosion of social networking has created wildly fluctuating demand straining the ability of IT infrastructure to scale

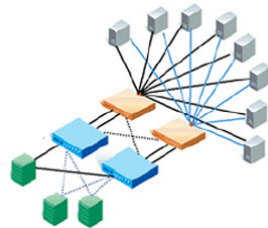
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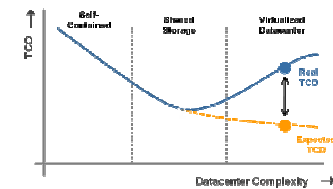
## Explosion of Digitized Records and Content and growth of mobile devices

Where we store everything ?  
 How do we retrieve it reliably ?  
 How do we secure it ?  
 How do we delete it ?

3



Rising Datacenter complexity



Rising TCO / Lower ROI

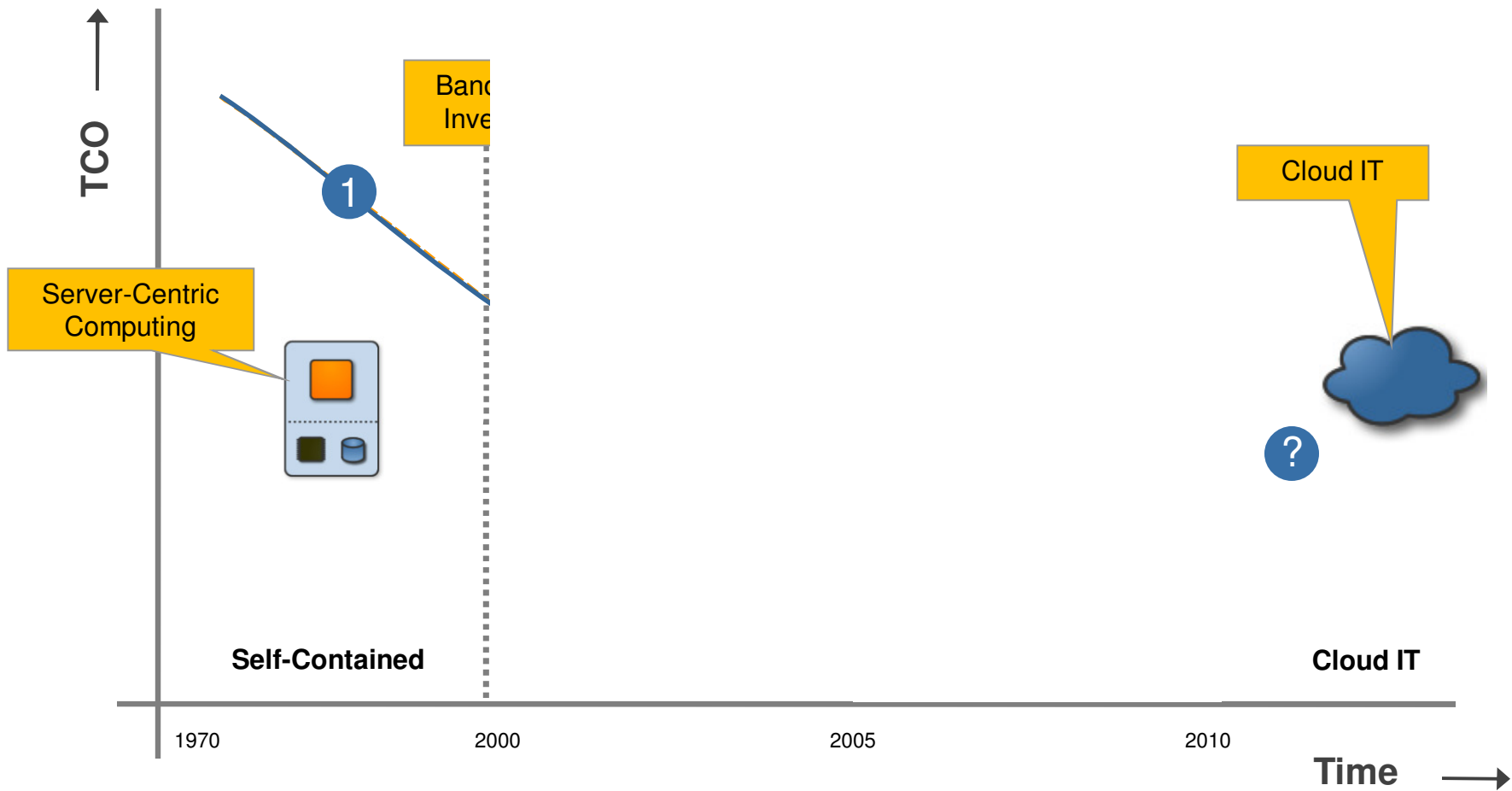
## Ever escalating cost of improving ROI and lowering TCO (including utility costs) in the Datacenter and demand for higher efficiency

SAN, NAS, Virtualization  
 HA/DR, Performance Optimization,  
 Security

# The Cloud must help reset complexity; TCO is getting out of Control

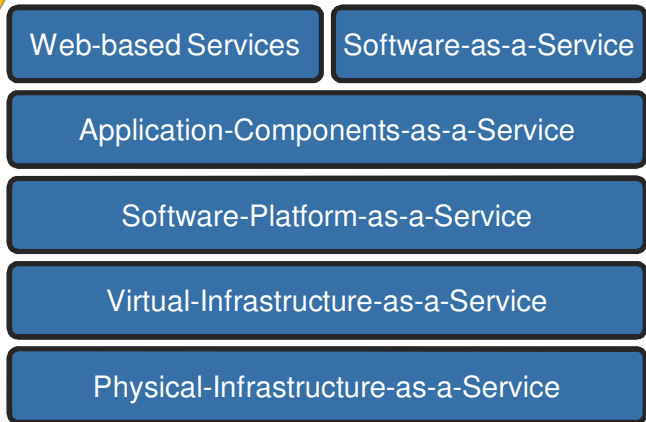


Actual TCO —  
Expected TCO - - -

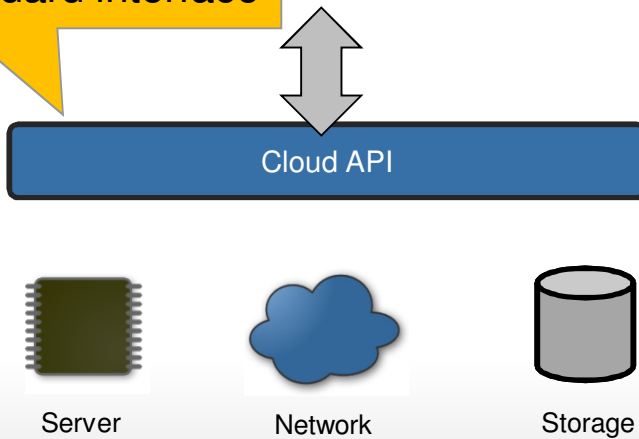


# Cloud Computing as it is defined today...

A XaaS stack...



..provides a standard interface



...enables Economies of Scale

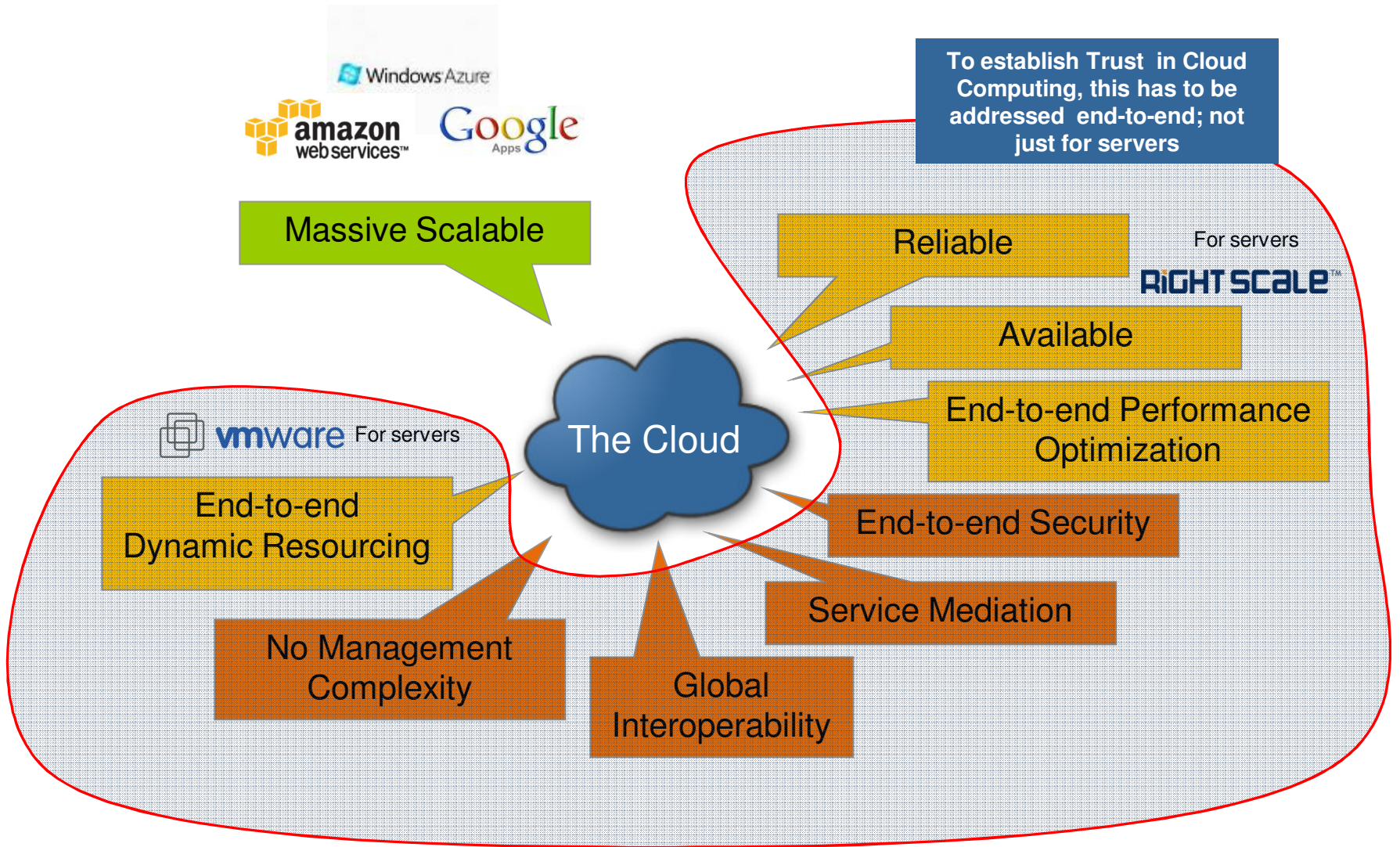


End-to-end Dynamic Resourcing

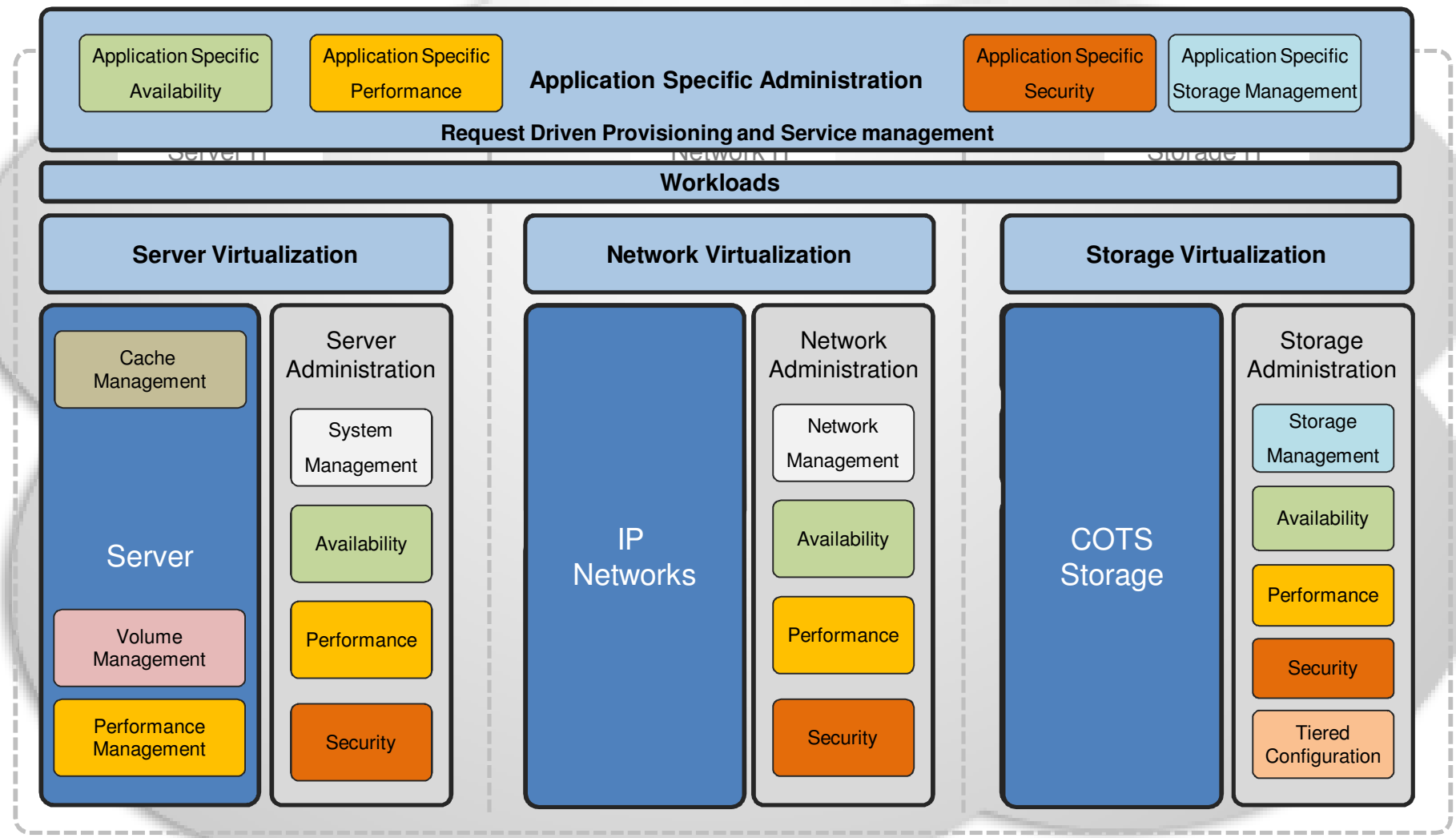
...On-Demand Computing

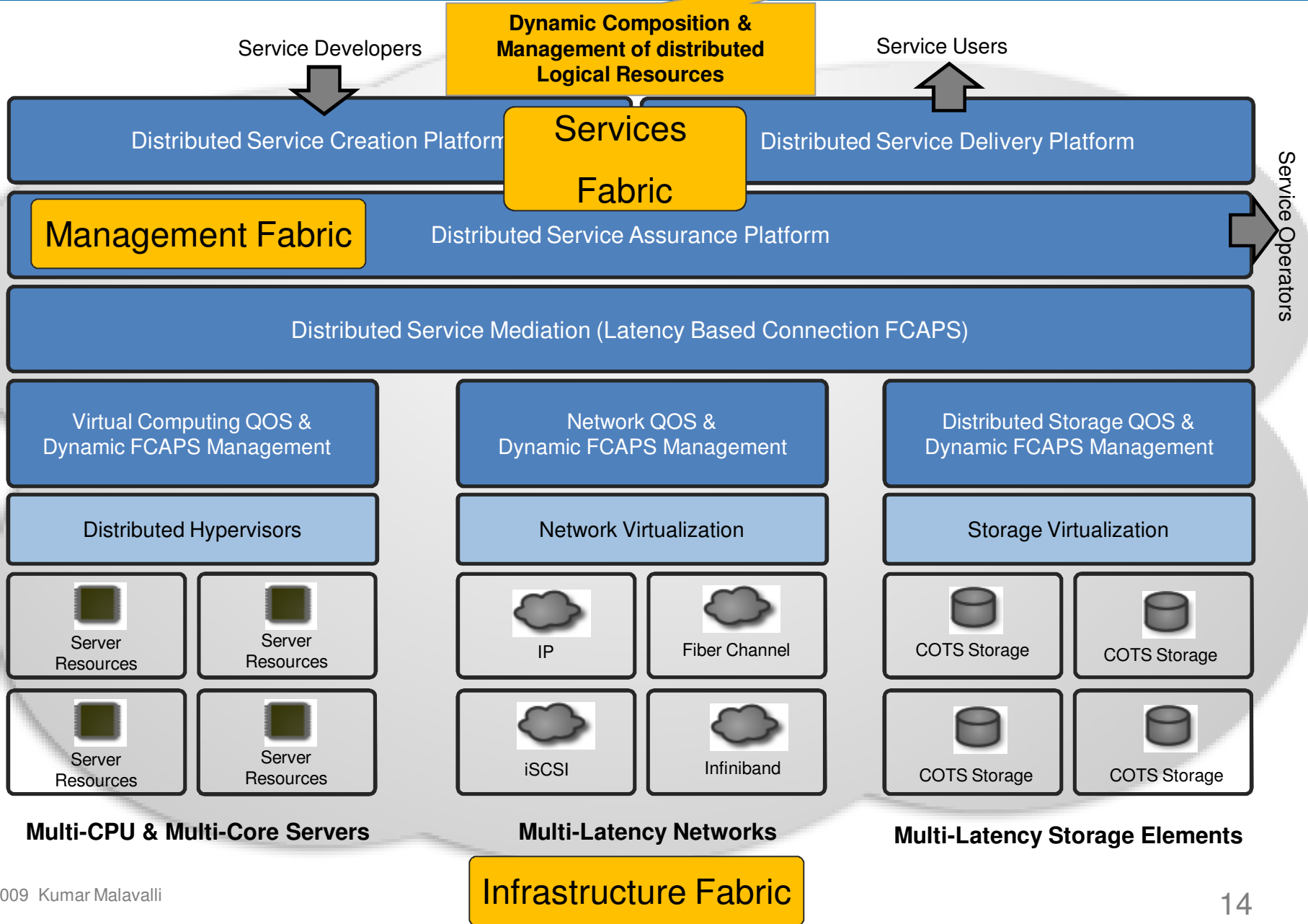
**Disruptive new paradigm  
But....What Is Lacking?**

# The State of Clouds Today and What is Missing



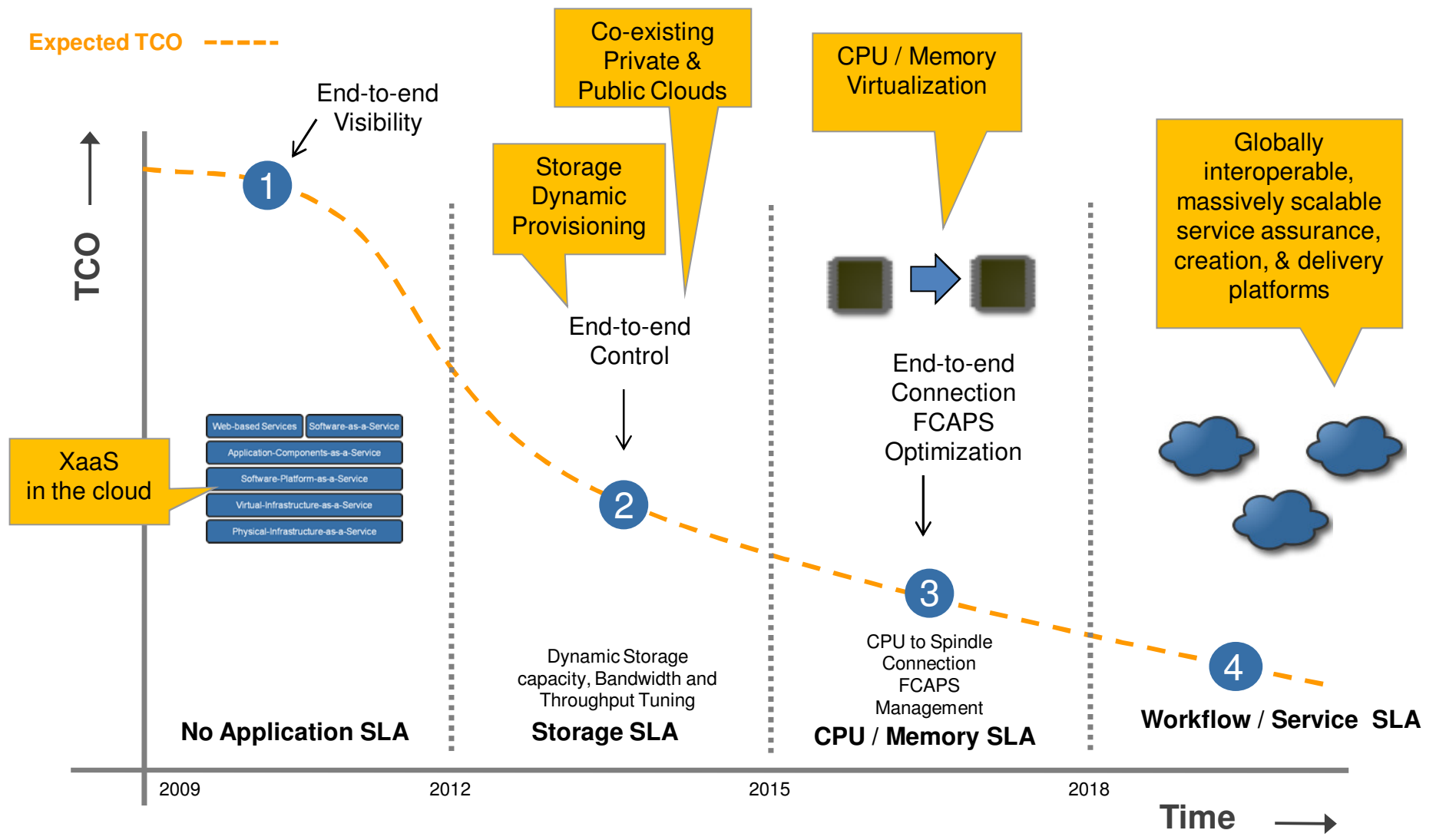
# Existing Cloud Infrastructure Silos and Inefficiencies





▶ What the Future  
Holds ..given past  
experiences

# Cloud Computing Predictions for the next 10 Years



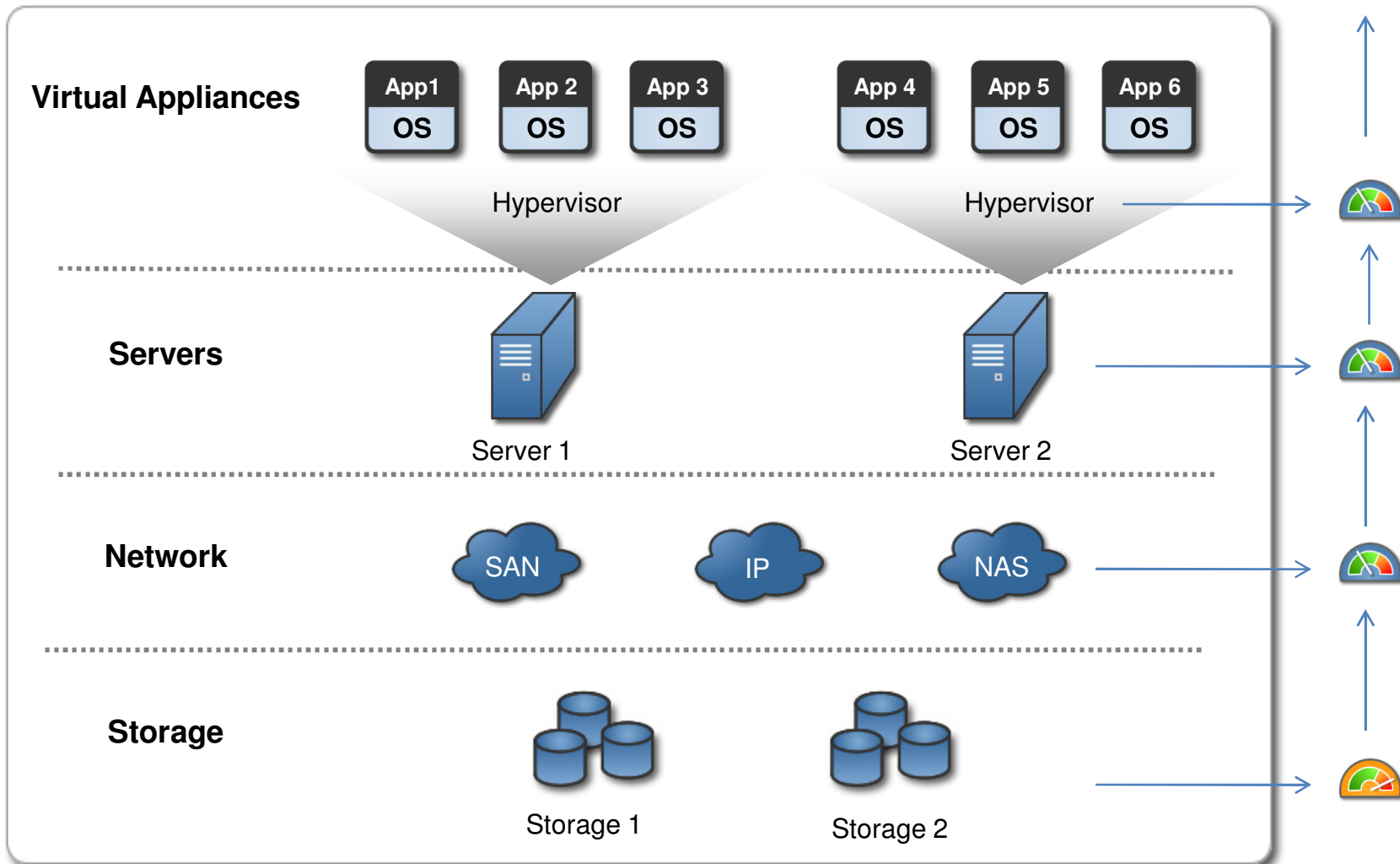
“  
*I don't care who provides my infrastructure even for my mission critical applications as long as I have visibility into the cloud and have control of my application response time, I/O, throughput, availability, latency, security ...and I have the ability to adjust it based on my business priority and changing workloads*”

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- IT Business Alignment Manager at a Large Energy Company that is actively re-architecting their datacenter around clouds

# What does Enabling End-to-End Visibility Mean?

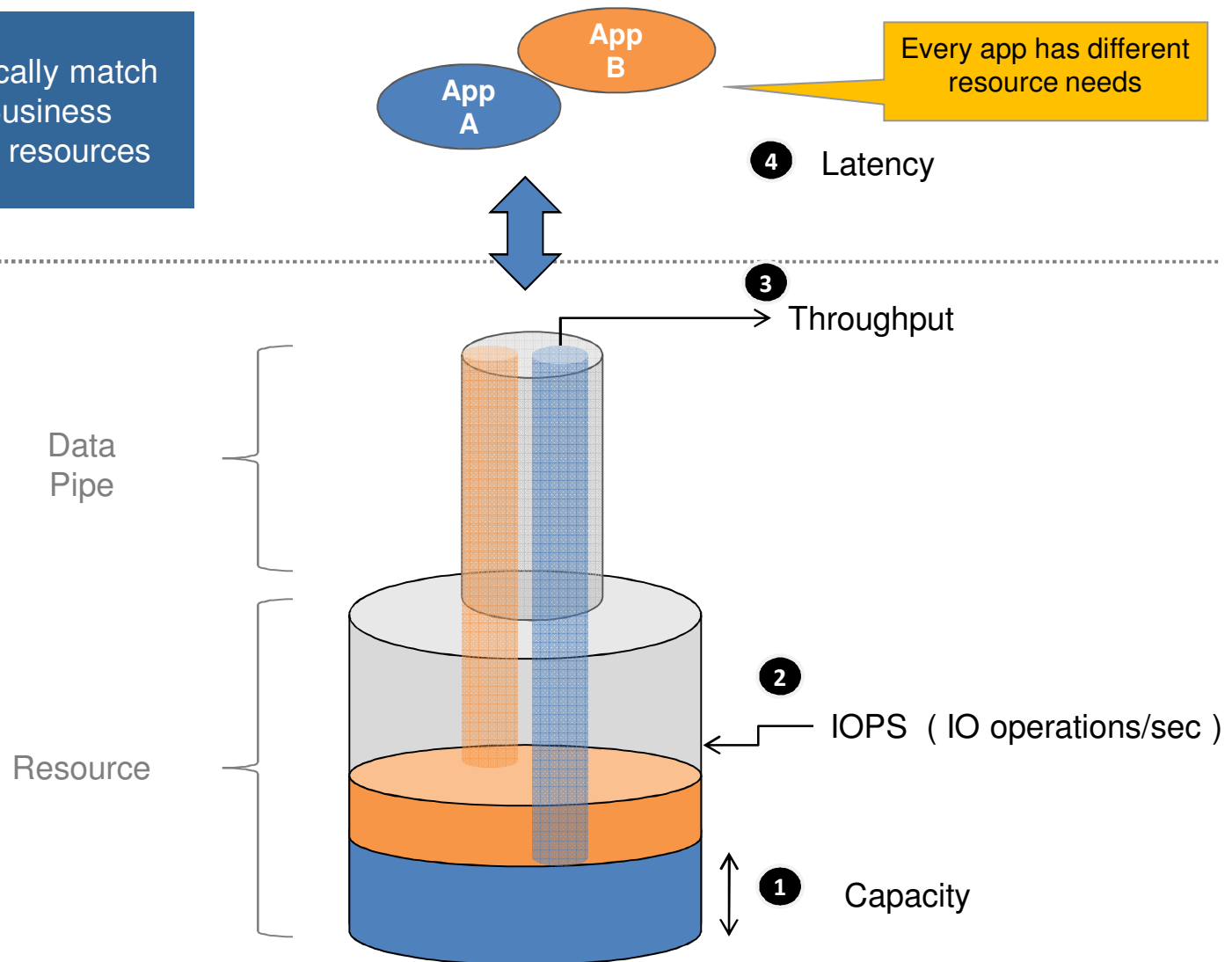
Application-Centric Visibility



# What does Enabling End-to-End Control Mean?

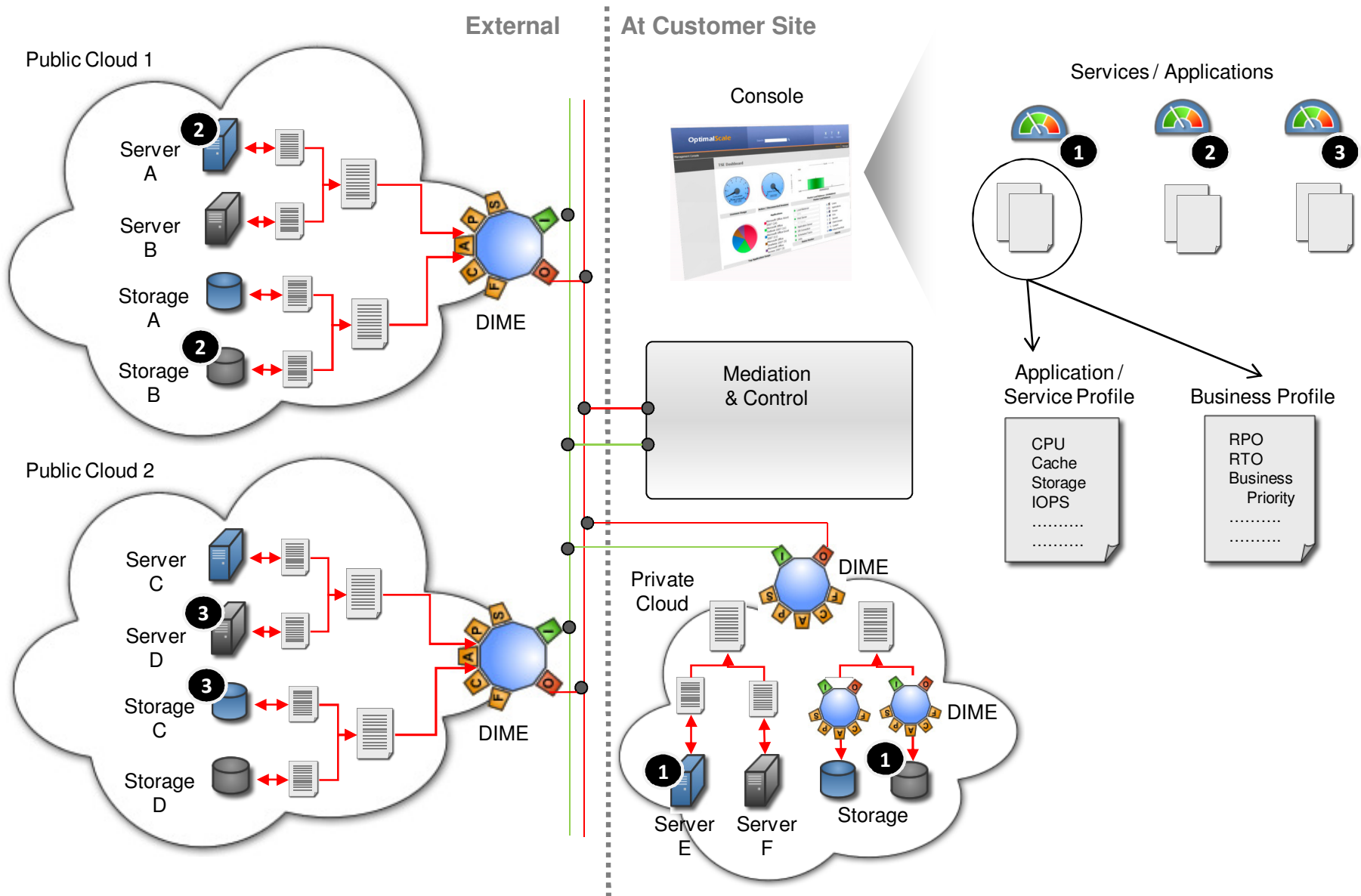


Need to dynamically match Application/Business requirements to resources

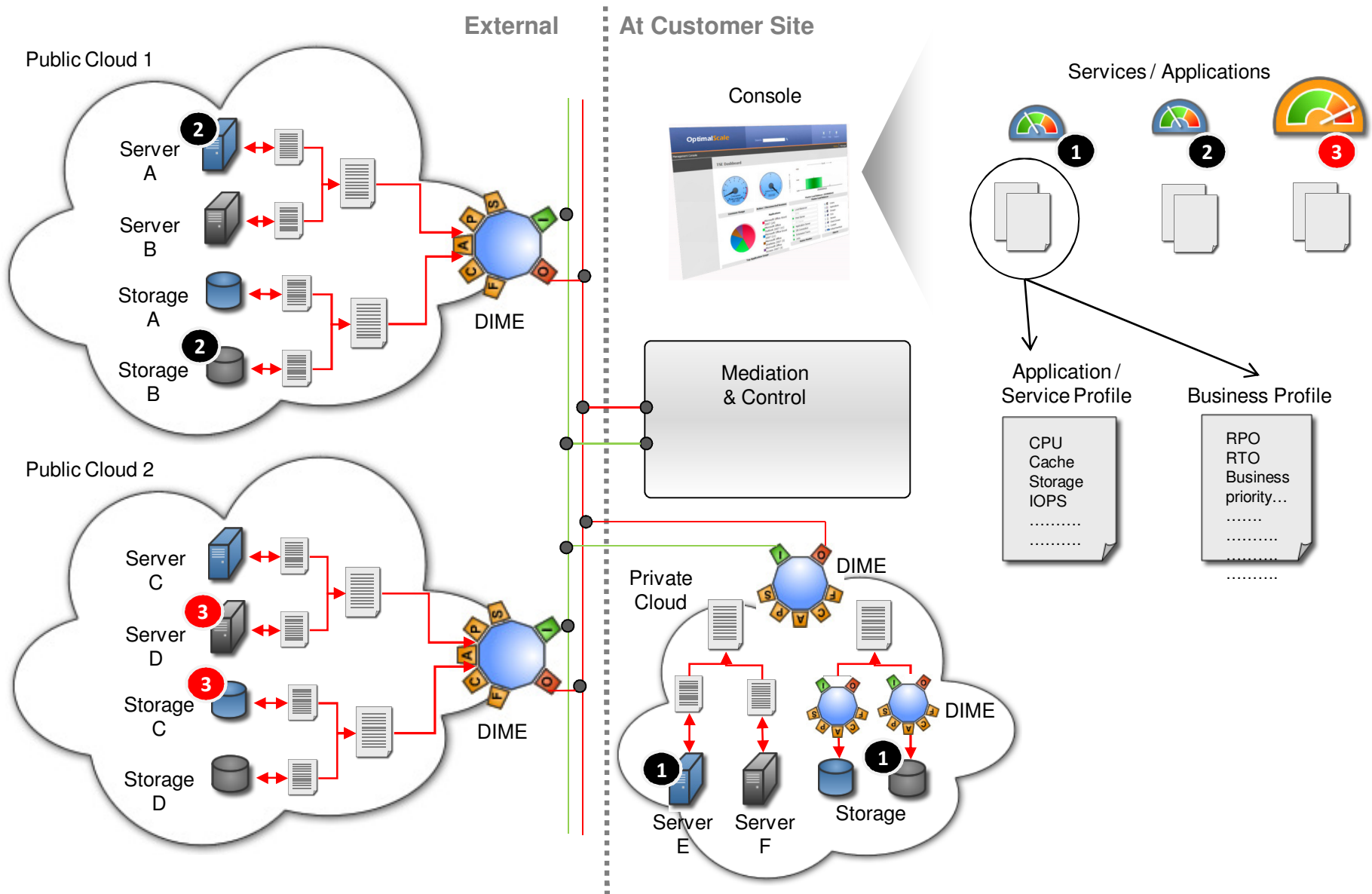


Dynamic connection between Applications and resources (Storage, Bandwidth, etc.) on demand. Each connection is attached With QOS based on DIME architecture with FCAPS attributes

# Coexistence of Private & Public Clouds



# Coexistence of Private & Public Clouds



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# Conclusion

# Need for Open Standards, Global interoperability and Massive Scaling

Power Distribution Grids



Scale: Billions of consumers



Standards/Regulatory Bodies

**ANSI** **IEEE**  
**ASME** **FERC**

Telecom Networks



Scale: Billions of users



Standards Body

**ITU**

Internet



Scale: Billions of devices



Standards Body

**IETF**

Cloud Computing



Scale: Trillions of services



Standards Body

**???**

# Thank You!

{ Questions }