Intel IT's Open Cloud

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Agenda

Our Cloud Journey

ISTCC Relevance to my day job…

Summary

http://preview.tinyurl.com/IntelITOpenCloud

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Intel IT Vital Statistics

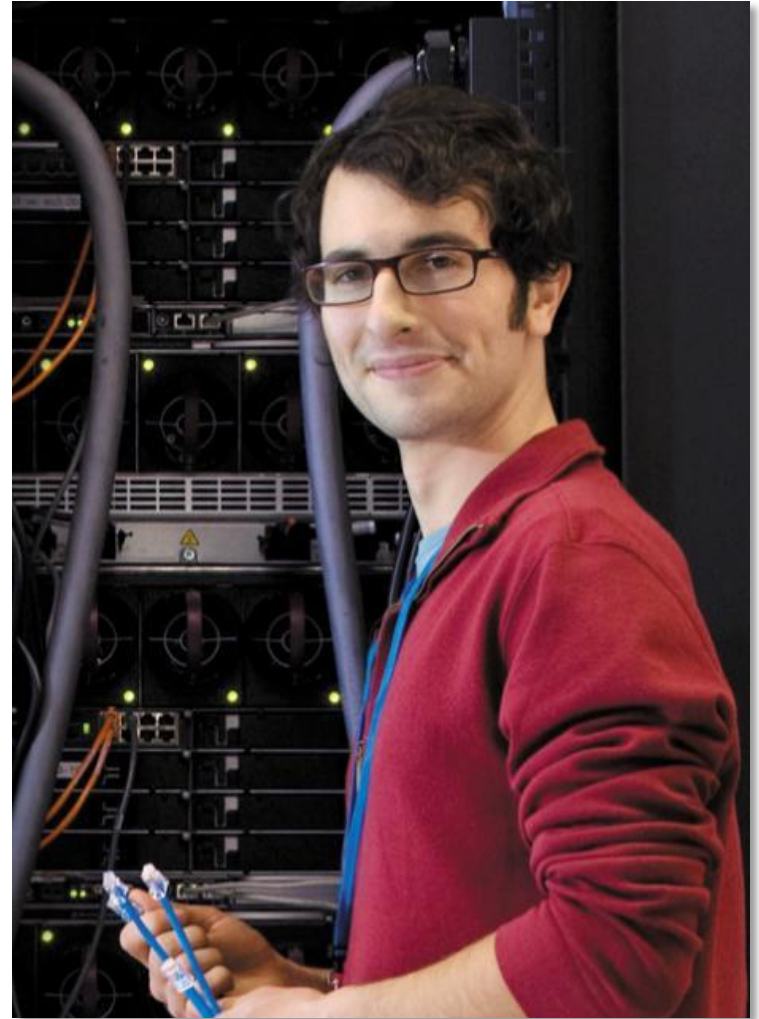## 6,400 IT employees
- 54 global sites

91,500 Intel employees†
- 164 sites, 62 countries

59 Data Centers
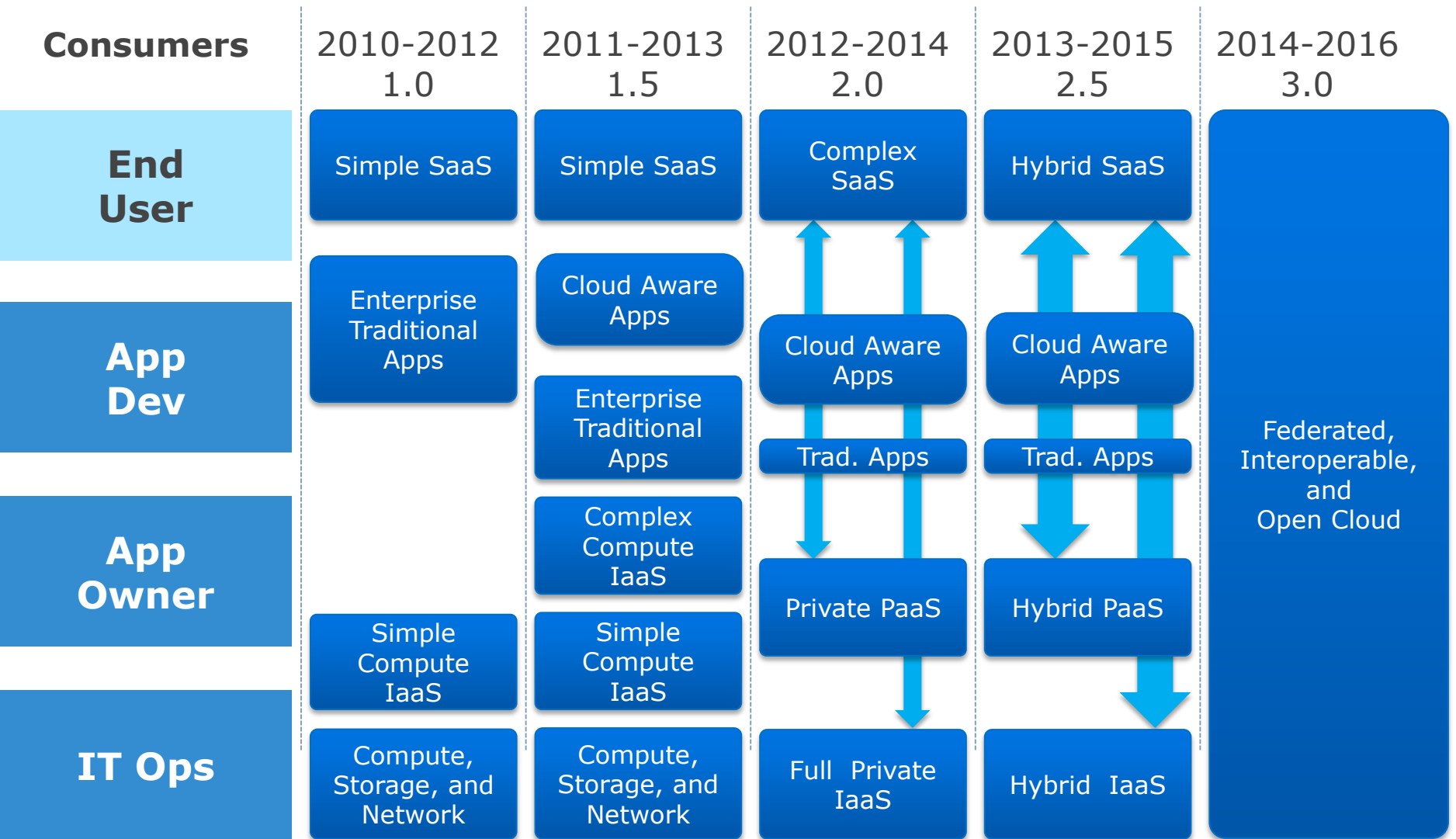- ~75,000 servers

>138,000 Devices
- >109K PCs (80%+ mobile)
- >38,000 Handhelds (60% BYO)

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Enterprise Cloud Maturity Model (CMM)

Consumers	2010-2012 1.0	2011-2013 1.5	2012-2014 2.0	2013-2015 2.5	2014-2016 3.0
End User	Simple SaaS	Simple SaaS	Complex SaaS	Hybrid SaaS	Federated, Interoperable, and Open Cloud
App Dev	Enterprise Traditional Apps	Cloud Aware Apps	Cloud Aware Apps	Cloud Aware Apps	
		Enterprise Traditional Apps	Trad. Apps	Trad. Apps	
App Owner		Complex Compute IaaS			
	Simple Compute IaaS	Simple Compute IaaS	Private PaaS	Hybrid PaaS	
IT Ops	Compute, Storage, and Network	Compute, Storage, and Network	Full Private IaaS	Hybrid IaaS	

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Open Perspective and Philosophy

Linux + XEN/KVM

OpenStack & Open Cirrus

Open Farming Open Robots

Many Public Cloud Services

Federated Clouds

Star Trek?

New Innovations

More Open Source

Innovations go Open

New Innovation

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Demand Drivers Comparison

Traditional Drivers	Cloud Aware Drivers
1. Incremental Velocity Increase • <3hrs "good enough" • 70 day app release • Bureaucracy normal	**1. Significant Velocity Increase** • Grow/shrink 20x in hours/minutes • Need to release apps in days/weeks • No patience for bureaucracy
2. More Lifecycle Automation • Reduce Downtime costs • Reduce Ops labor time	**2. All Components need Automation** • Expect APIs for all IT Services • Manual is not an option
3. Incremental Reliability Increase • 99.7% • Downtimes are normal and expected	**3. Significant Reliability Increase** • 99.99% • Consumers expect always on
4. Growth is linear • Linear employee growth • Linear Data Growth	**4. Growth is *potentially* exponential** • Consumers can grow without warning • Massive increase in connected devices
5. Cost of Platform acceptable	**5. Cost of Platform can impact Profit**

Traditional IT incremental improvements
Cloud Aware requiring exponential improvements

Key Technical Concepts

Abstract users from underlying Cloud providers

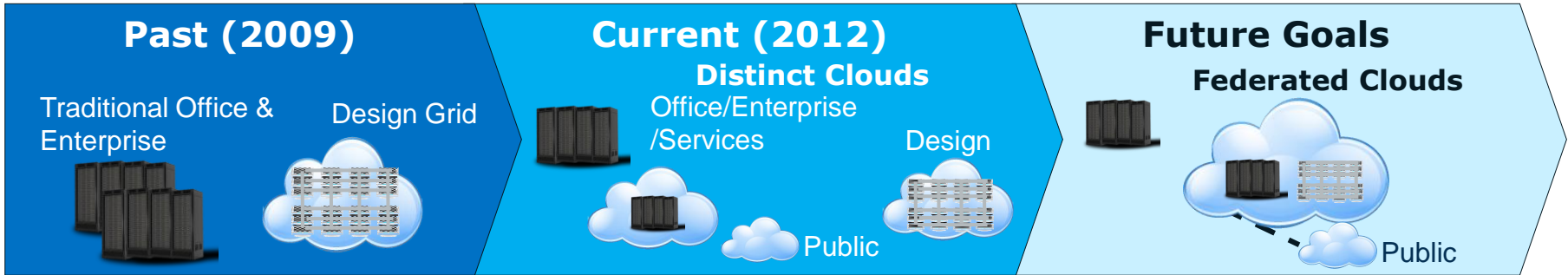Support multiple cloud providers, both private and public

Common identity and entitlement services across interfaces

Open Source first, minimize proprietary API lock-in

Minimize internal technical debt, utilize the community to scale

Stay pragmatic, as we scale – not always 100% greenfield

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Key Business Focus Areas

Past (2009)	Current (2012) Distinct Clouds	Future Goals Federated Clouds
Traditional Office & Enterprise Design Grid	Office/Enterprise /Services Design Public	Public

80% Effective Asset Utilization

- Pervasive virtualization (75%)
- Larger pools in fewer data centers

Velocity for Service Provisioning

- On-demand self-service the norm
- Innovative idea to production <day
- External Cloud for burst demand
- Automated sourcing decisions

Zero Business Impact

- Application design for failure
- Increase availability
- Automated, end-to-end service-managed Cloud
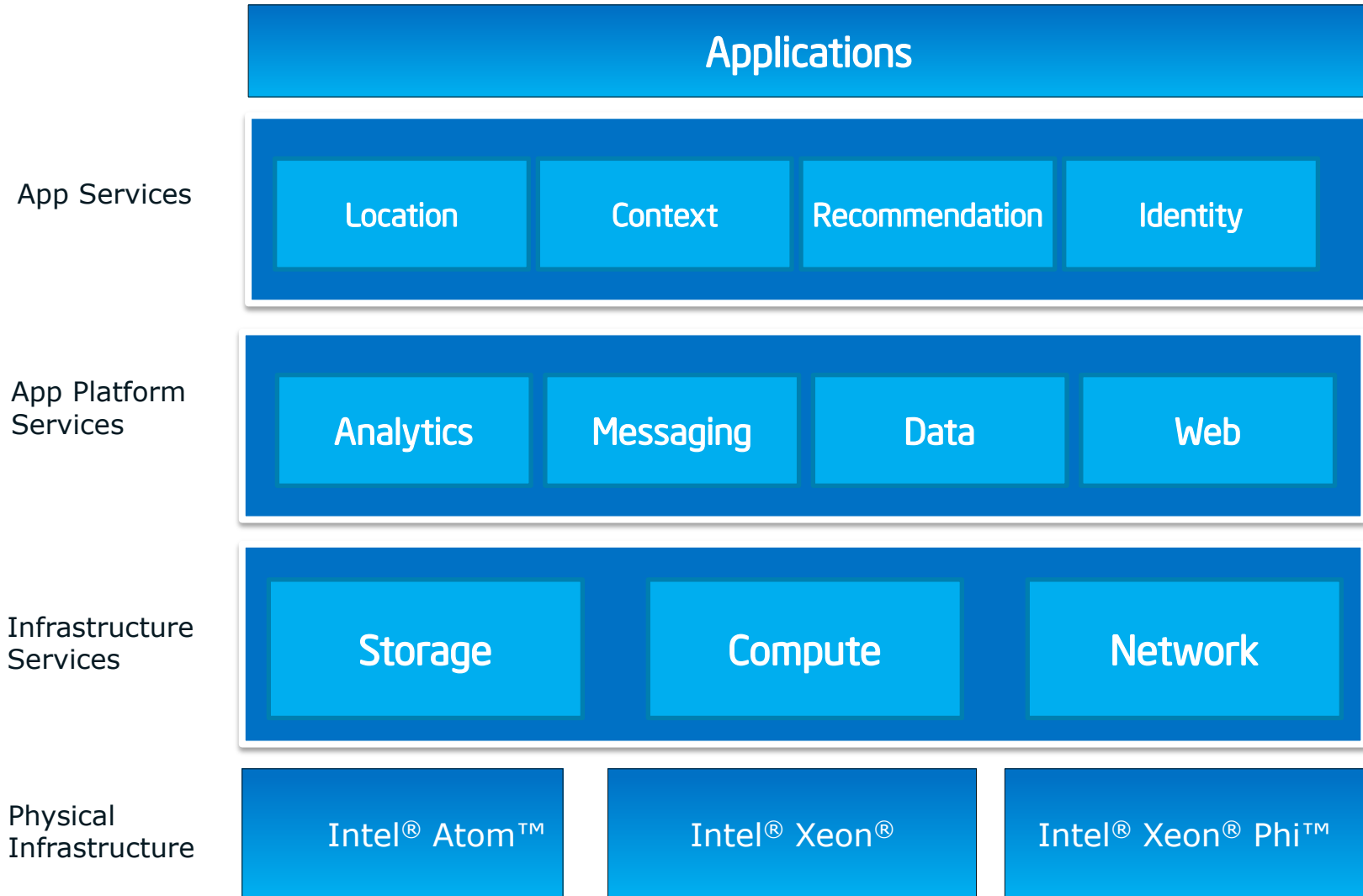
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Specialized Platforms

Intel IT Cloud Future

End User

Applications

App Services
- Location
- Context
- Recommendation
- Identity

App Platform Services
- Analytics
- Messaging
- Data
- Web

Infrastructure Services
- Storage
- Compute
- Network

Physical Infrastructure
- Intel® Atom™
- Intel® Xeon®
- Intel® Xeon® Phi™

Reusable Services empowering our end users
Specialized platforms powering the services

Challenges of Specialized Platforms

Capacity Utilization/Performance Analytics

- Significant multi-tenant sharing (flatten out peaks/valleys of usage)

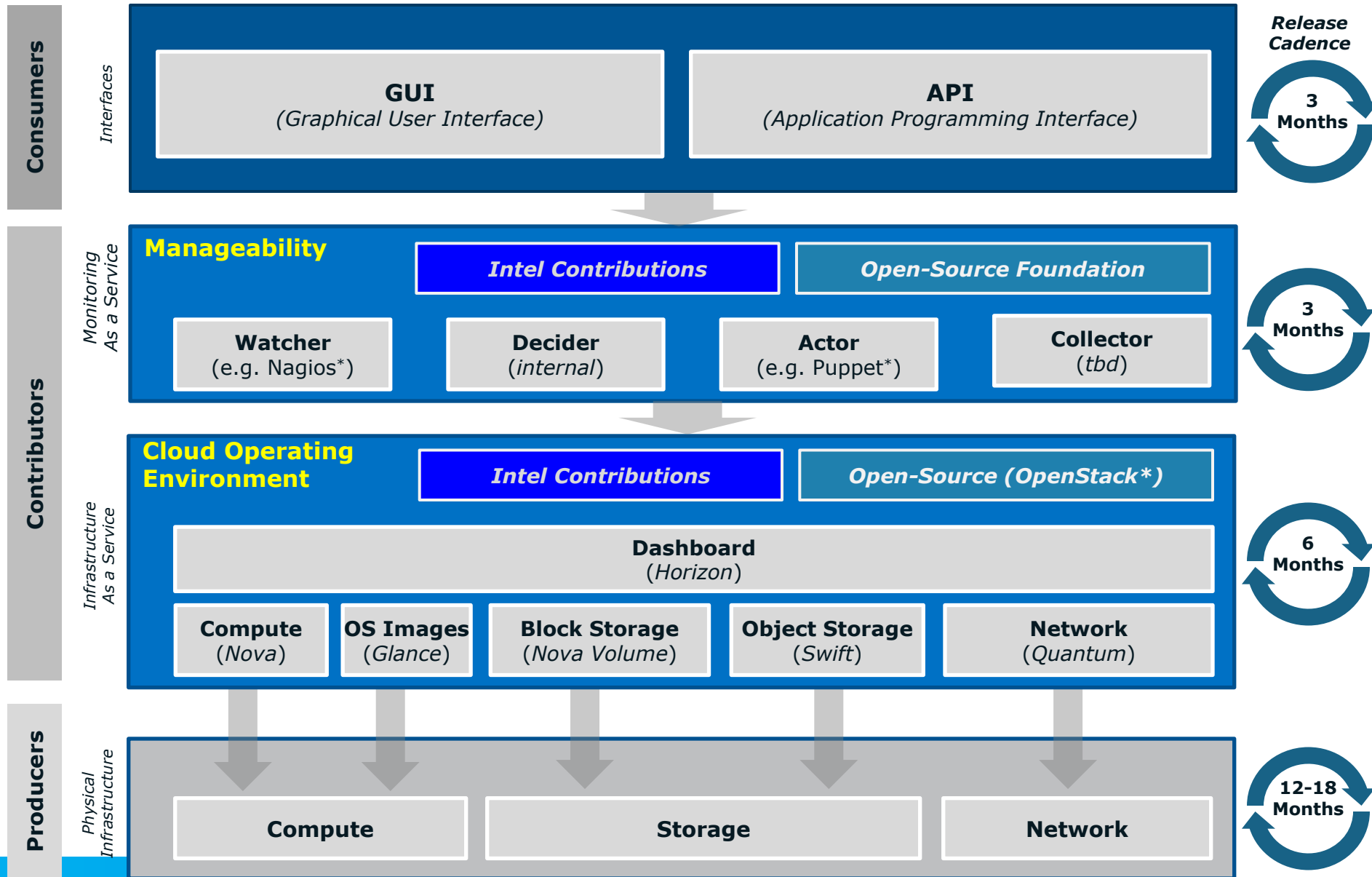- Most SW developers oblivious to HW below them

Manageability/Automation

- Homogenous resources are "easier" to manage at scale

- Most IT shops are trying to simplify

VM Movement

- VM solutions require lowest common denominator approach for workload movement (use the most basic platform)

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Intel® IT Open Cloud IaaS Platform Solution Stack

Consumers

Interfaces

GUI
(Graphical User Interface)

API
(Application Programming Interface)

Release Cadence

3 Months

Contributors

Monitoring As a Service

Manageability

Intel Contributions

Open-Source Foundation

Watcher
(e.g. Nagios*)

Decider
(*internal*)

Actor
(e.g. Puppet*)

Collector
(*tbd*)

3 Months

Infrastructure As a Service

Cloud Operating Environment

Intel Contributions

Open-Source (OpenStack*)

Dashboard
(*Horizon*)

Compute
(*Nova*)

OS Images
(*Glance*)

Block Storage
(*Nova Volume*)

Object Storage
(*Swift*)

Network
(*Quantum*)

6 Months

Producers

Physical Infrastructure

Compute

Storage

Network

12-18 Months

Automation

Automation Values for Intel IT

More complexity is the norm – HyperEvolution of Technology

Less people in infrastructure core:
Go from 1 sysadmin per 100 servers to at least 5-10x

Less Errors in running environment:
Remove human mistakes from deployment, manageability
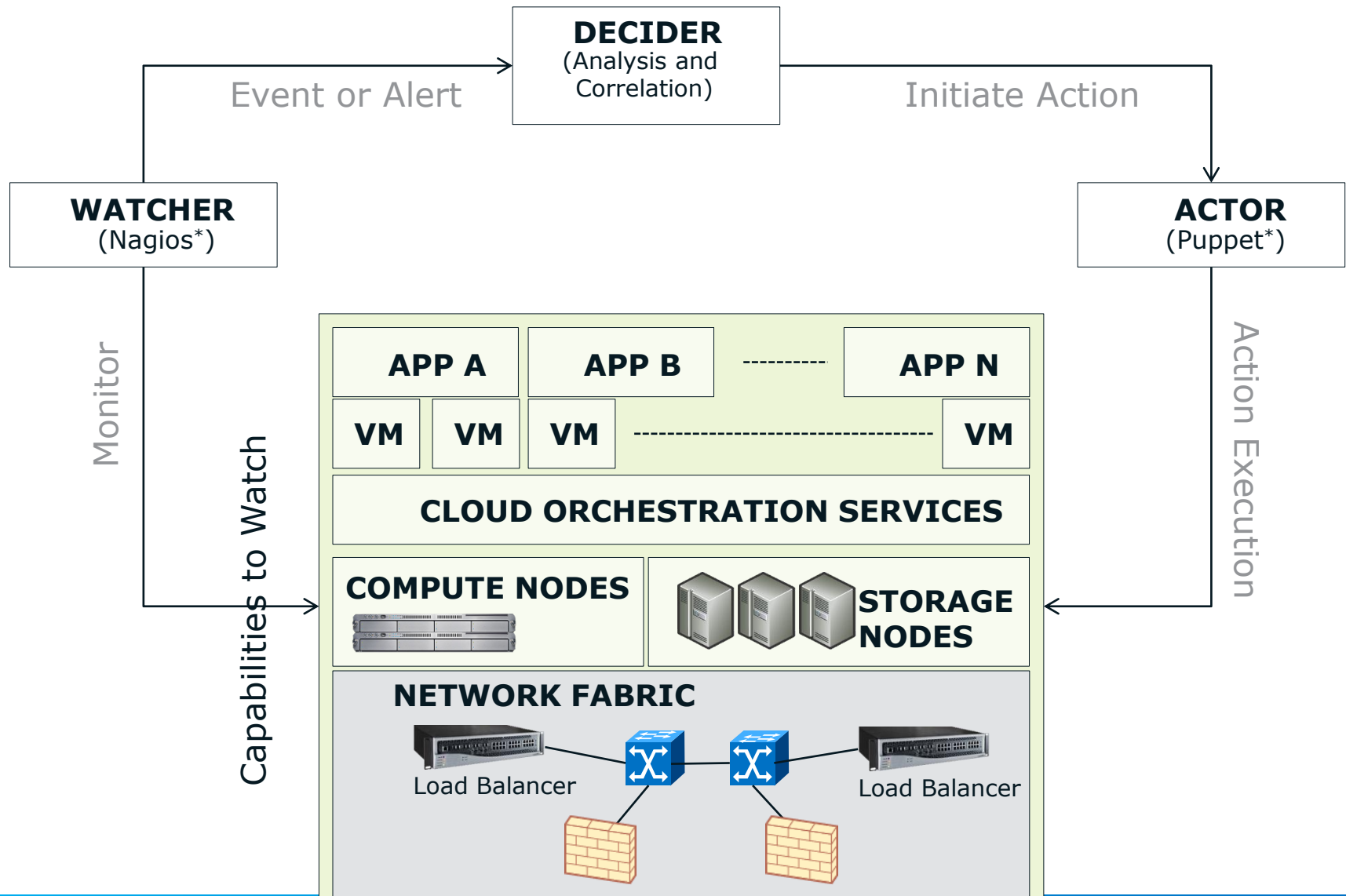
Always on applications:
Ensure constant uptime for application services

Better real time decisions with massive data:
Increase utilization/performance /w predictive placement

But…. Cascading automation failures are really really bad

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Self Remediation Framework – for 99.99%

DECIDER
(Analysis and Correlation)

Event or Alert

Initiate Action

WATCHER
(Nagios*)

ACTOR
(Puppet*)

Monitor

Capabilities to Watch

Action Execution

APP A

APP B

APP N

VM **VM** **VM** ------------------------------------ **VM**

CLOUD ORCHESTRATION SERVICES

COMPUTE NODES

STORAGE NODES

NETWORK FABRIC

Load Balancer

Load Balancer

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Wrap Up

Our Direction- Federated, Interoperable and Open Cloud

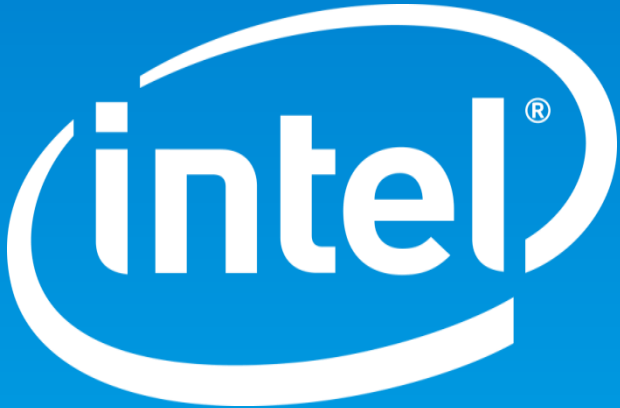Transforming Data Center to Open APIs

- Exposing Specialized HW through Open APIs

True Autonomics possible – making the Decider brilliant

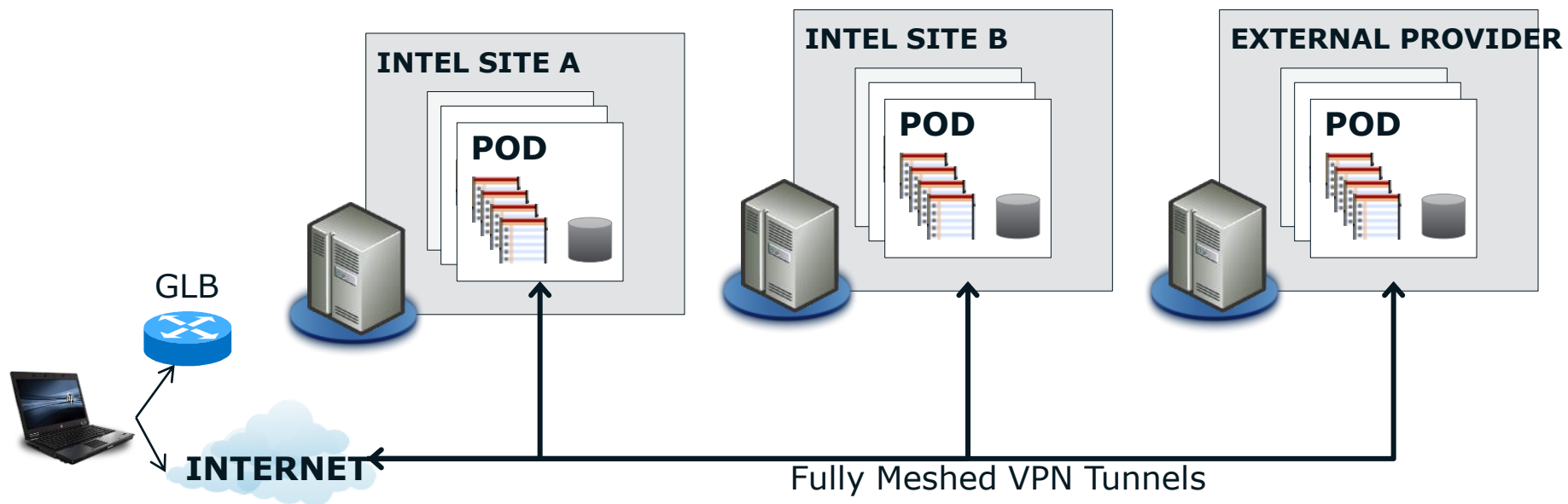Enterprise IT will change massively in next 2-5 years

Have questions on Intel IT environment?
das@intel.com and @dkamhout

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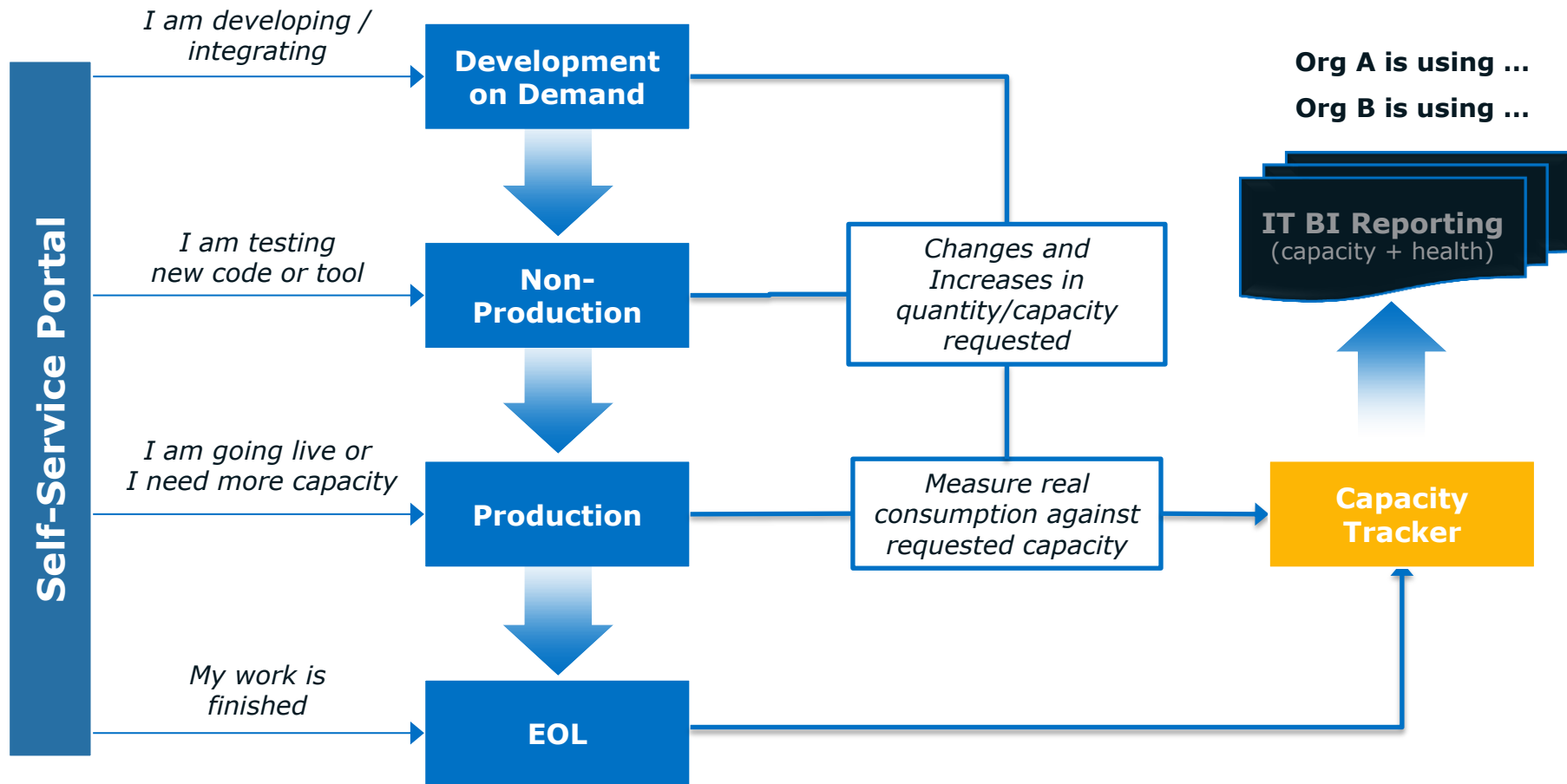
Backup

Intel IT Hybrid Cloud

Focus Area	Key Aspects
Technical	Active/Active App Design – Software Design for Failure
	Unified Monitoring/Manageability/Authentication
	IT Service broker handling cloud on-boarding internal and external
Operational	IT handling basic IaaS container levels externally, covering all IaaS internally
Business	Single contract with Intel IT funding and showback to BUs
	Liability/Indemnification at acceptable levels for associated risk

Benefits of Integrated Capacity Management

Hosting Automation, Measured Services, Life Cycle Management

I am developing / integrating

Development on Demand

I am testing new code or tool

Non-Production

I am going live or I need more capacity

Production

My work is finished

EOL

Self-Service Portal

Changes and Increases in quantity/capacity requested

Measure real consumption against requested capacity

Capacity Tracker

Org A is using ...

Org B is using ...

IT BI Reporting (capacity + health)

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