# High speed networking in the cloud

## Speed, Agility. Cost Containment

**Andrew Bach**, Chief Architect for Financial Services, Juniper Networks 04 APR 2016

# Agenda

- The need for speed, agility, and cost containment
- **Building blocks supporting the journey to the cloud**
- Cloud Trends
- Cloud Adoption

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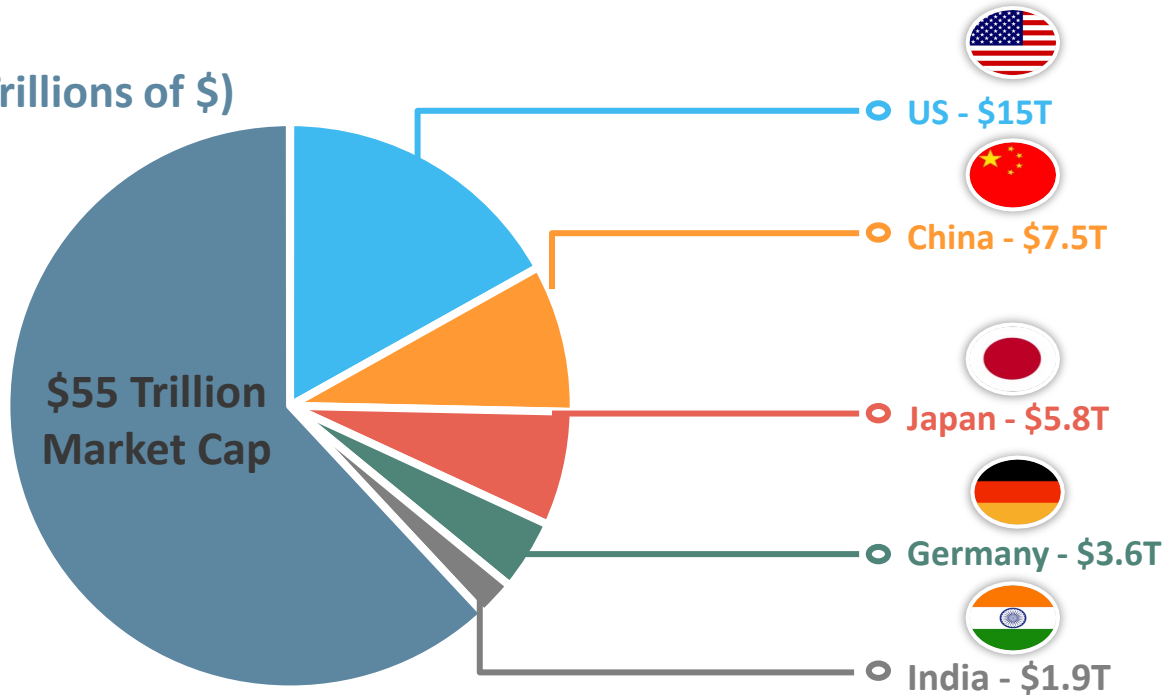
# Scale of the business

**THE TOTAL MARKET CAP OF ALL LISTED COMPANIES IS OVER $55 TRILLION….**
**…COMPARED TO COUNTRY GDPS, THAT WOULD MAKE THE SECTOR THE LARGEST ECONOMY IN THE WORLD.**

## Largest Economies by GDP (in Trillions of $)

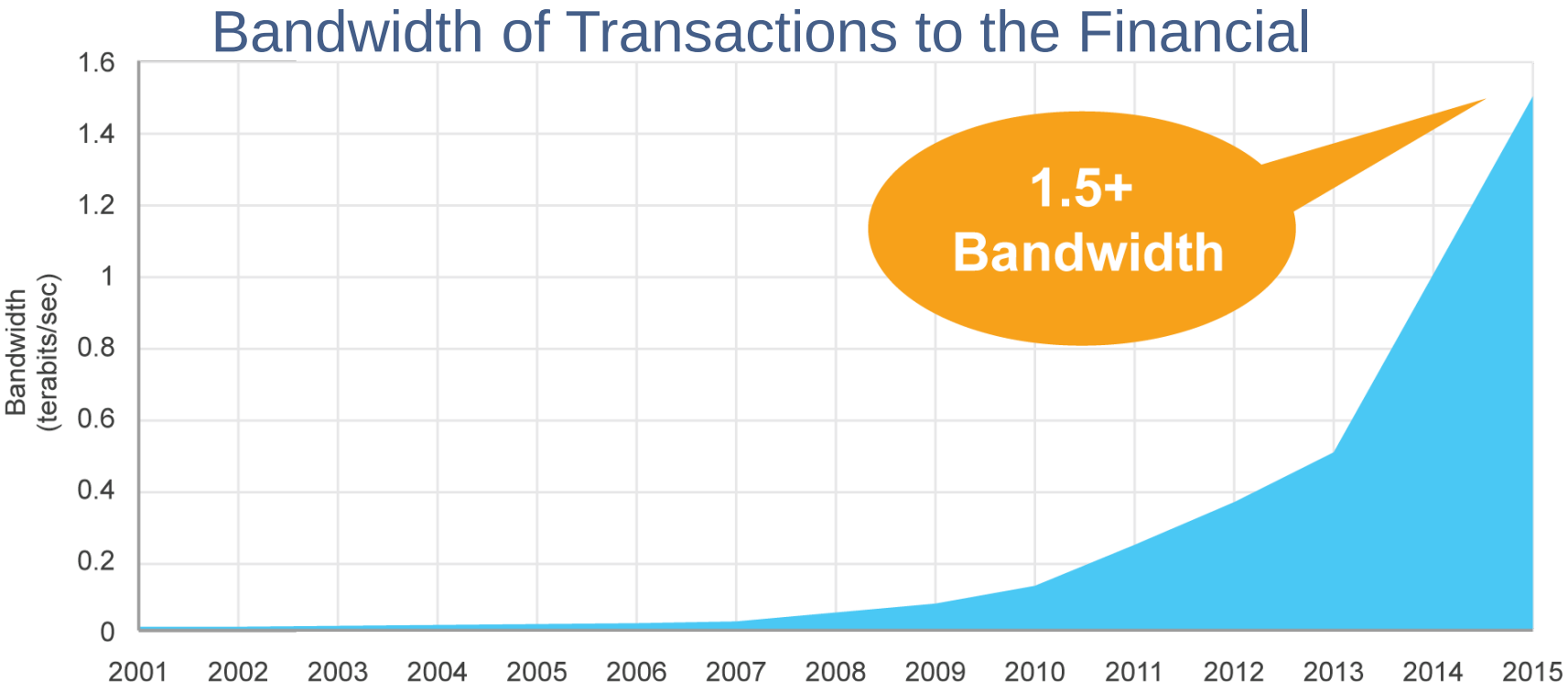


# 400+ Years of Rapid Technology Adoption

And a rich history of technology innovation in markets

- First stock ticker to disseminate data (1867)
- First  telephones on the trading floors (1878)
- First electronic ticker display board (1966)
- Wireless handheld devices on Trading floors 15 years before iPad invented (1995)
- Industry’s first private network offering global connectivity
- Industry’s private network exceeds 1TbS

# Transactions become bandwidth



# Financial Services Sector (FSS) Challenges

## Regulatory Model is Driving Change

- Requirement for long term retention of data
- Requirement to archive meta data
- Real time risk management is now required
- Requirement for precision timing
- Increasing focus on cyber security

## FSS is Evolving to a Commodity Industry

- Time to market must be faster
- Product life time is shorting
- Margins are driving OPEX reduction
- Regulation is increasing the cost of business

## Technology Adoption is Accelerating to Meet Accelerating Business Needs

- Technology is a strategic weapon
- Fueling the race to the triple crown of technology (0 cost, 0 latency, 0 time to market)
- Bandwidth demand continues to grow at 30% - 50% per year
- Rate of data growth is also increasing

## Business Model Continues to Evolve

- Exchange trading floors continue to fade away
- Machine assisted trading dominates
- Heuristic trading based on hyper-contextual information is growing
- Risk assessment is now routinely based on massive near real time data bases
- Shared public/private cloud solutions

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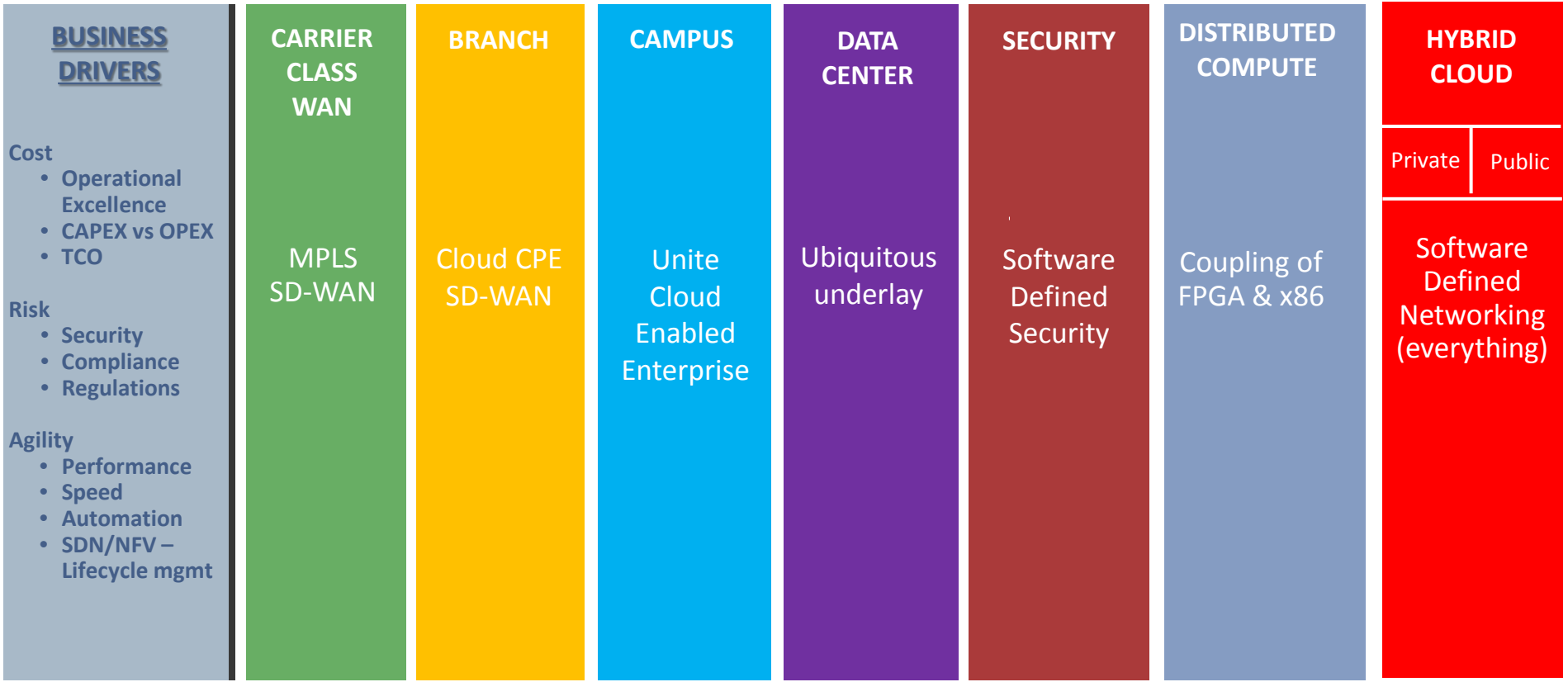
# Building blocks to the hybrid cloud



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# What is “Cloud”?

Cloud is utility based computing.

**Applications, Hosting, Infrastructure**

**SaaS:**

**Restaurant**

Salesforce.com

**PaaS:**

**Ready meals**

Azure Websites

**IaaS:**

**Supermarket**

AWS EC2

**Buy** **Deploy** **Build**



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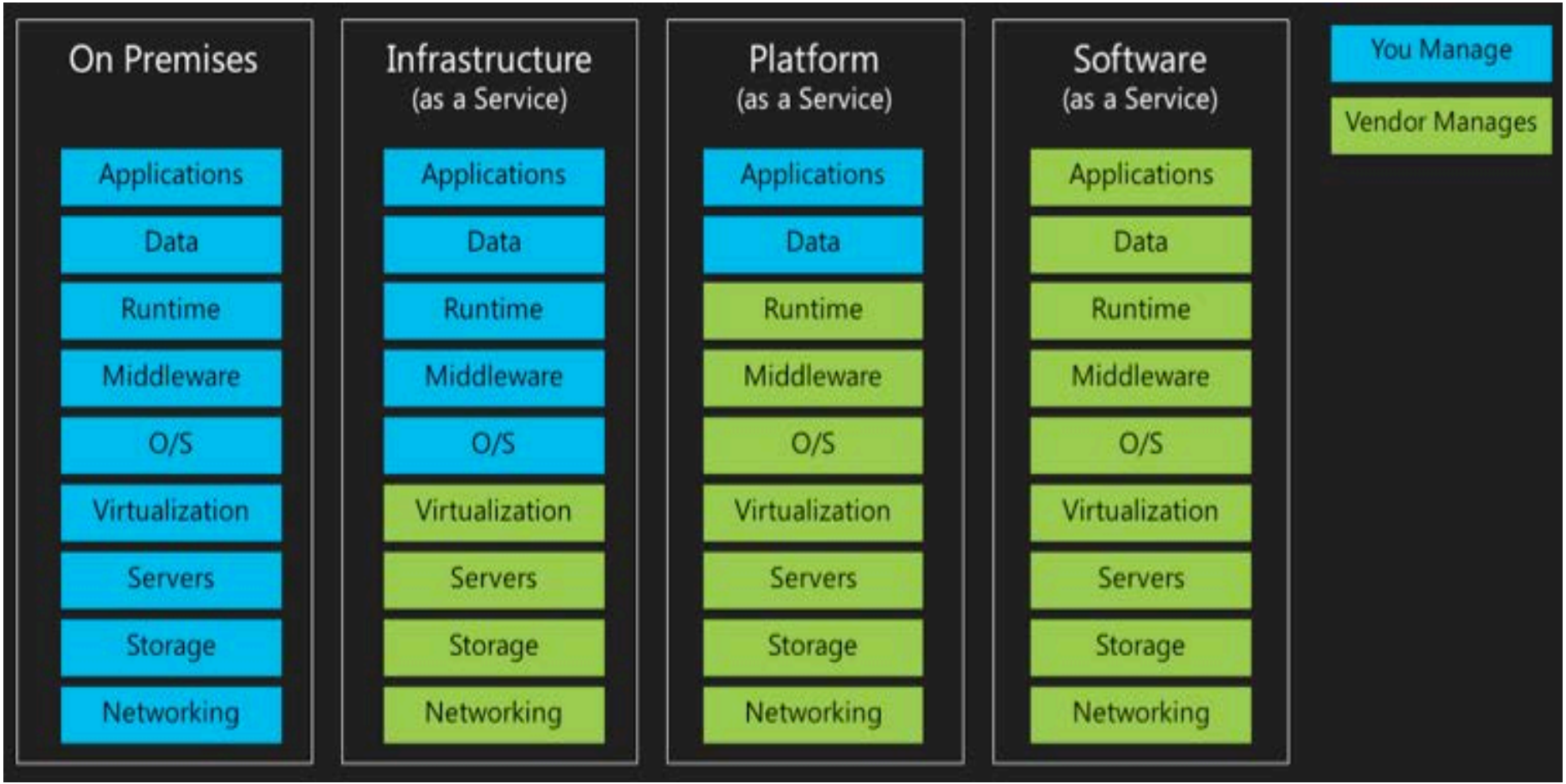
# CLOUD DEPLOYMENT MODELS



# Cloud Models

**Private Cloud**

Operated solely for one organization , typically within the firewall.

**RETAIN CONTROL**

**Hybrid Cloud**

Controlled use by IT; use Cloud Provider resources to satisfy selected demands.

**CONTROLED BURST**

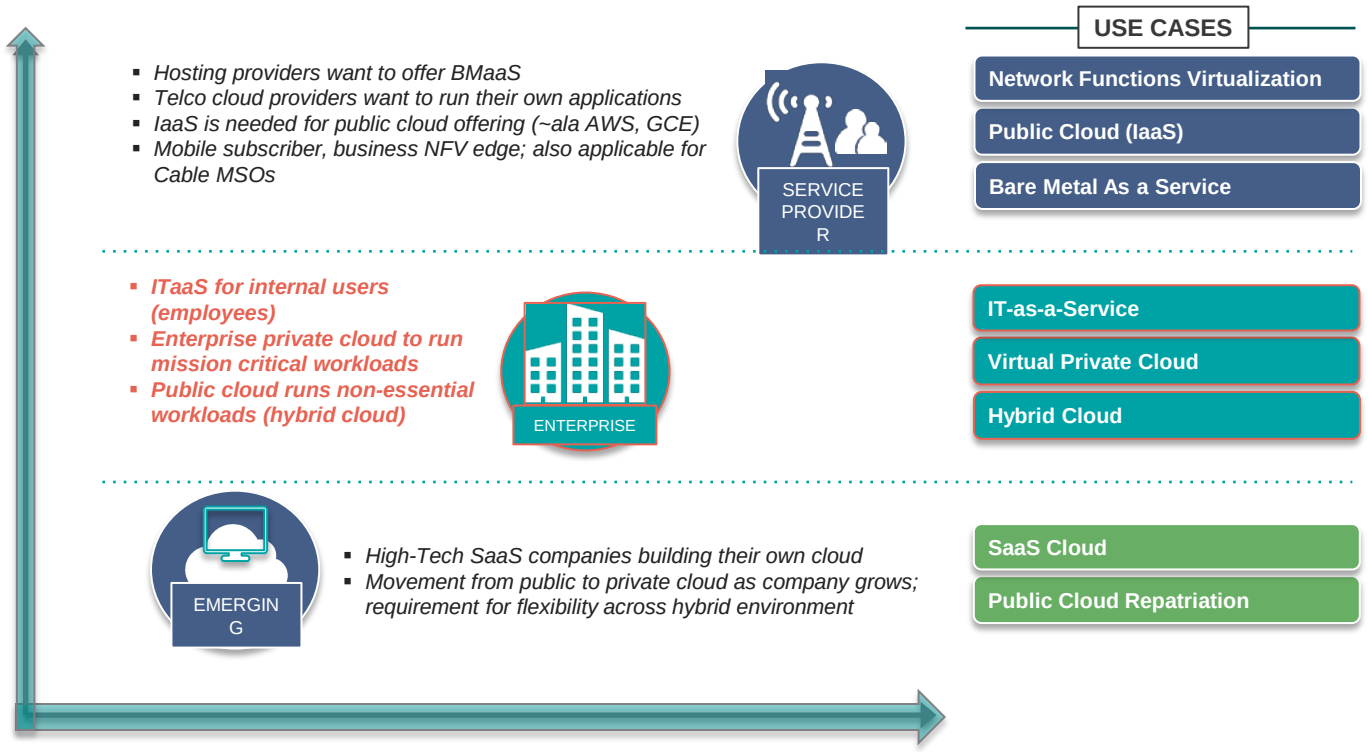
**Public Cloud**

Opertated by partner providers; Typical initial usage will be "long-tail" enterprise apps, not sensitive data.

**FLEXIBILITY**

Source: RightScale 2015

# INDUSTRY MOVEMENT



# ITaaS

## HOW THE NEW IT DEPT.

## ADDS & ACCELERATES VALUE TO THE BUSINESS

SCALE DYNAMIC APPLICATIONS

DEVOPS TO AUTOMATE & CONVERGE

CLOUDIFY INFRASTRUCTURE

# Desired Outcomes

## Increase Agility

Rapidly deploy apps

Provide elastic scale

Remove resource silos

## Reduce Costs

Lower OPEX

Increase ROI

Improve efficiency

## Enhance Experience

Accelerate response time

Increase uptime

Automated response

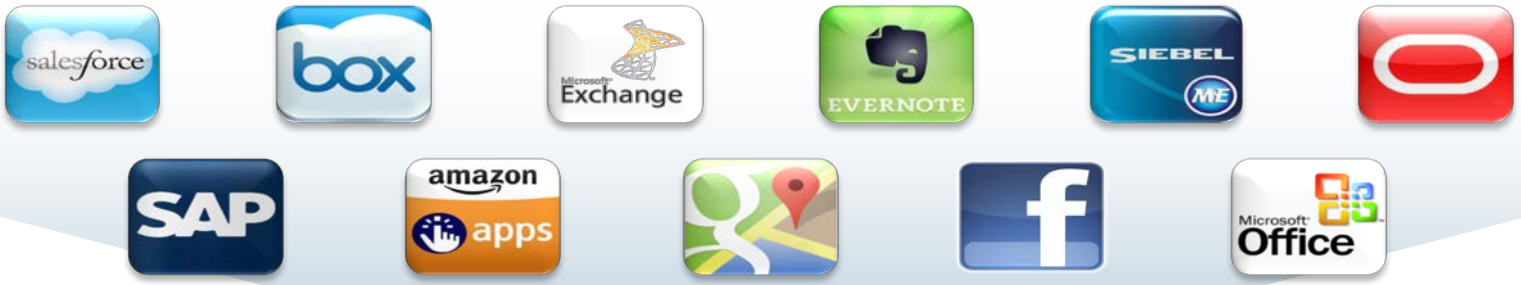
## Reduce Risk

Protect digital assets

Thwart advanced threats

Ensure compliance

# Applications are driving IT transformation



Virtualization

Clouds

SDN

# Applications Driving Design Change

## Modern App Flows

### ATTRIBUTES

- Increased Machine to Machine
- East-West traffic

### REQUIREMENTS

- Flatter Topology
- High performance and consistent

## Network Virtualization

### ATTRIBUTES

- Virtualized with Bare metal
- Introduction of Network Overlays

### REQUIREMENTS

- Physical to Virtual (P2V) integration
- Overlay visualization & management

## Everything “As-a-Service”

### ATTRIBUTES

- Scale-out
- On-demand

### REQUIREMENTS

- Multi-tenancy
- Simple to operate, easy to scale

# NEW ENTERPRISE APPS - NEW ARCHITECTURE

Technology architectures must better support increasingly dynamic operational and business processes

| | SILOS | SCALE UP | SCALE OUT |
|---|---|---|---|
| APPLICATIONS | Tightly coupled<br>Client/server | Web enablement<br>App performance | Big data, real-time analytics<br>Self-service |
| COMPUTE | Specialized hardware | Virtualization, automation | Large & dynamic workloads,<br>VM mobility |
| STORAGE | SAN, NAS<br>Storage networks | SAN/NAS<br>Converged Network | Distributed storage (DBS, DFS, DDB) |
| NETWORK | Hierarchical,<br>Traffic 80% north-south<br>$$$/port | DC fabric<br>$$/port | Dynamic network, Automation, x-domain virtualization |

# CLOUD is an IMPERATIVE for ENTERPRISE

- HARDWARE CENTRIC
- DEDICATED HARDWARE
- LENGTHY SERVICE CHANGES
- MANUAL PROCESSES
- LIMITED EXPENSIVE SCALE & HA
- STATIC WORKLOADS/OPERATION

- SOFTWARE CENTRIC & VIRTUALIZED
- FLEXIBLE INFRASTRUCTURE
- DYNAMIC & AGILE ORCHESTRATION
- AUTOMATED IT WORKFLOWS
- INNATELY RESILIENT & SCALABLE
- DYNAMIC WORKLOAD MODELS

- SOFTWARE CENTRIC CONTROL
- SOFTWARE OVERLAYS
- DYNAMIC & AGILE ORCHESTRATION
- AUTOMATED IT WORKFLOWS
- INNATELY RESILIENT & SCALABLE
- DYNAMIC CONFIG & OPERATION

**SDN is an IMPERATIVE for CLOUD**

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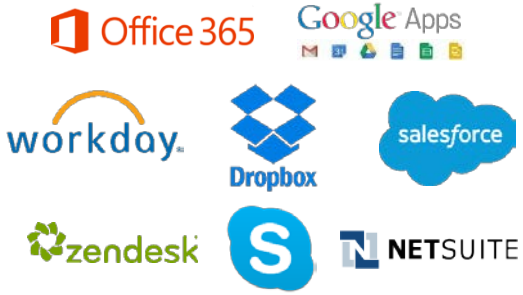
# Cloud Adoption

# Business Challenges

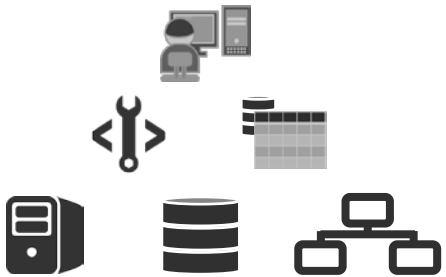
- How should I embrace the cloud?
  - Public vs. Private
  - Risk vs. Reward
- How do I make my internal customers more efficient?
  - Automation vs. SDN
  - Security and Compliance
- How do I grow, without disrupting my business?
  - Greenfield vs. Brownfield
  - Investment protection

## FROM DATA CENTERS

## TO SERVICE CENTERS




## FROM SPECIALIZED SILOS



## TO CONVERGED DEVOPS

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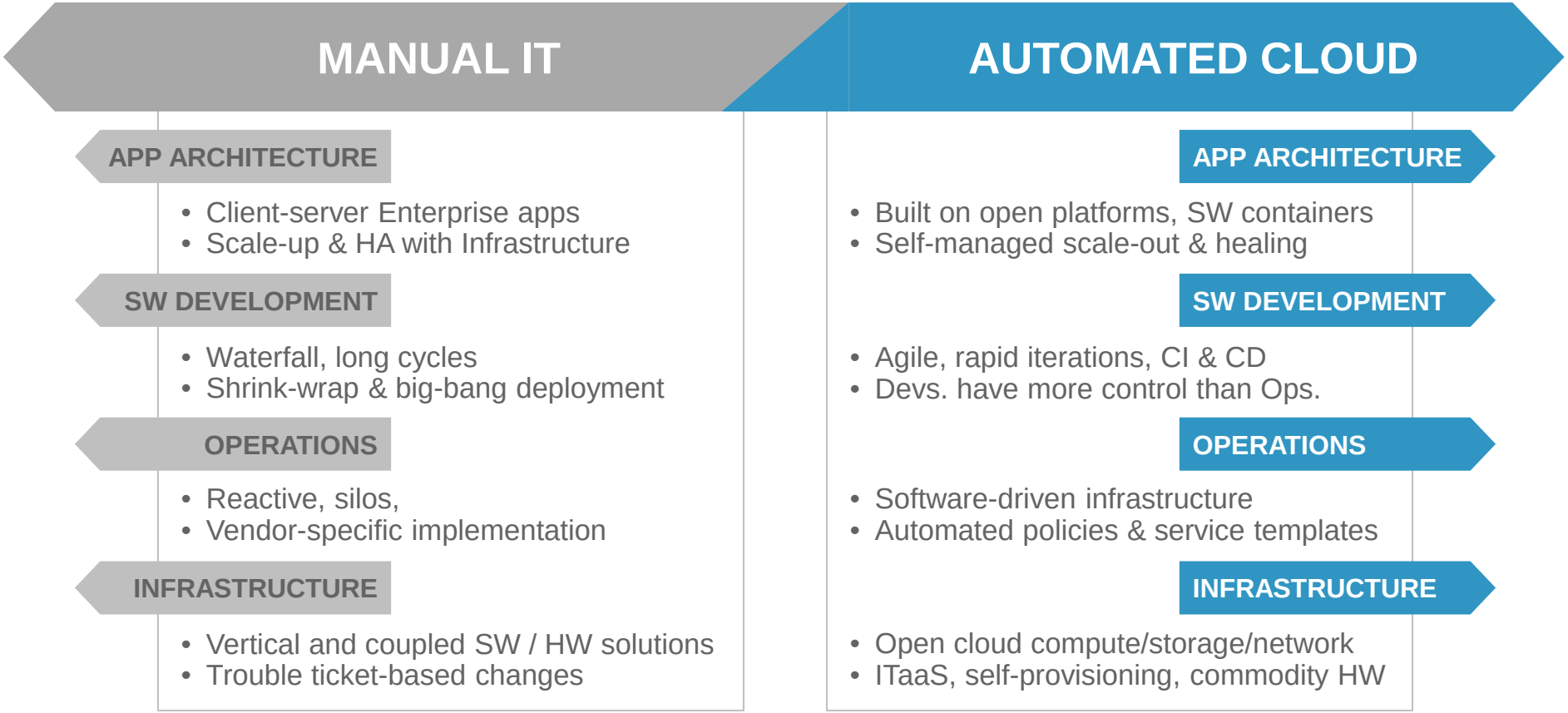
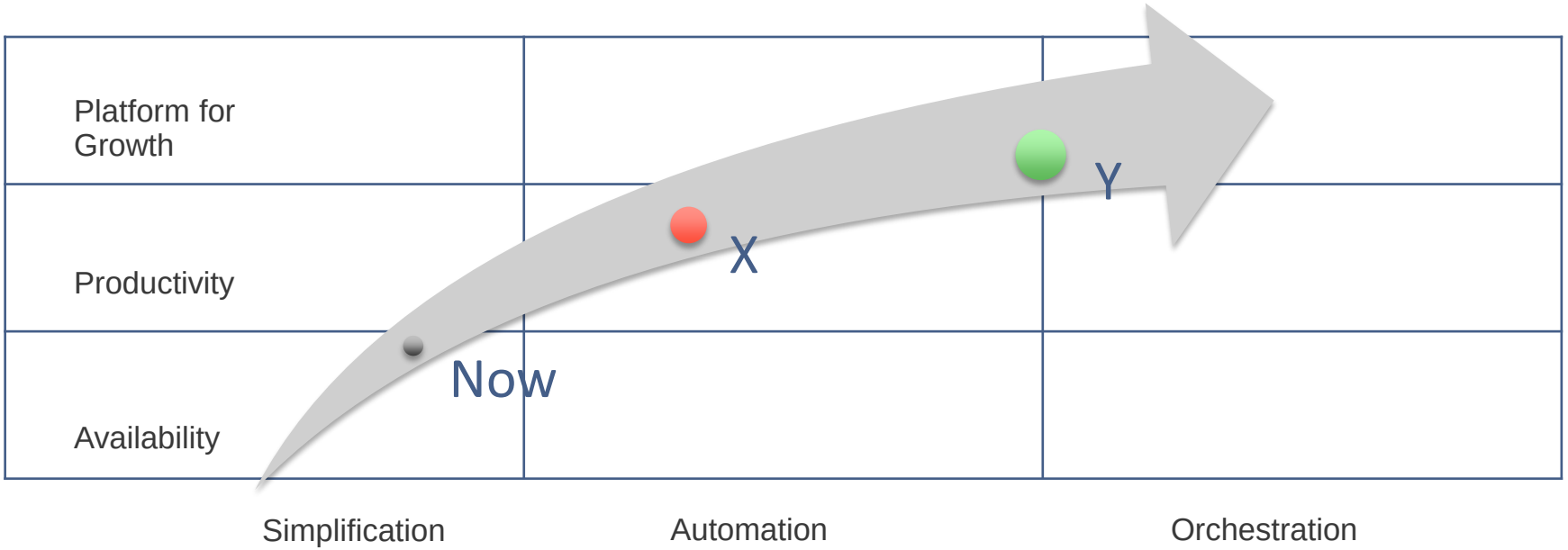
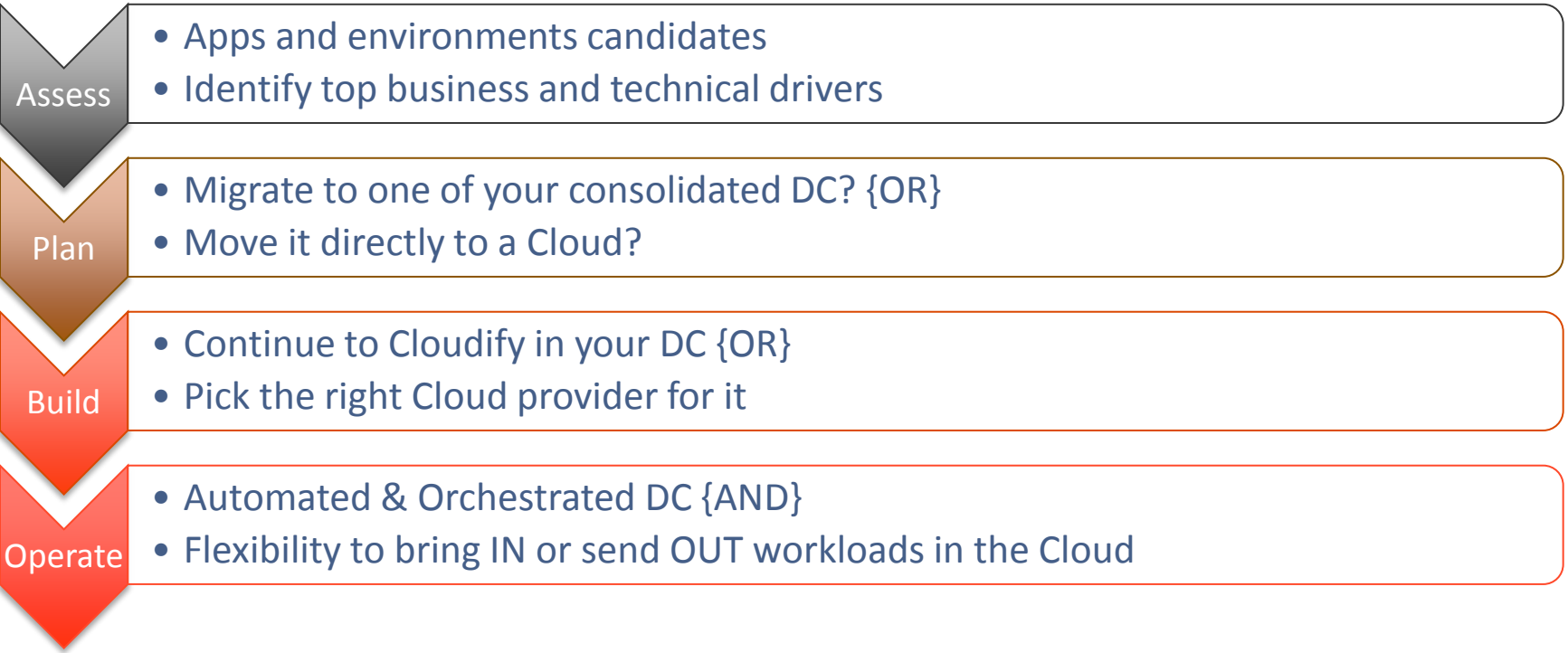

MANUAL IT
AUTOMATED CLOUD
APP ARCHITECTURE
• Client-server Enterprise apps
• Scale-up & HA with Infrastructure
SW DEVELOPMENT
• Waterfall, long cycles
• Shrink-wrap & big-bang deployment
OPERATIONS
• Reactive, silos,
• Vendor-specific implementation
INFRASTRUCTURE
• Vertical and coupled SW / HW solutions
• Trouble ticket-based changes
APP ARCHITECTURE
• Built on open platforms, SW containers
• Self-managed scale-out & healing
SW DEVELOPMENT
• Agile, rapid iterations, CI & CD
• Devs. have more control than Ops.
OPERATIONS
• Software-driven infrastructure
• Automated policies & service templates
INFRASTRUCTURE
• Open cloud compute/storage/network
• ITaaS, self-provisioning, commodity HW

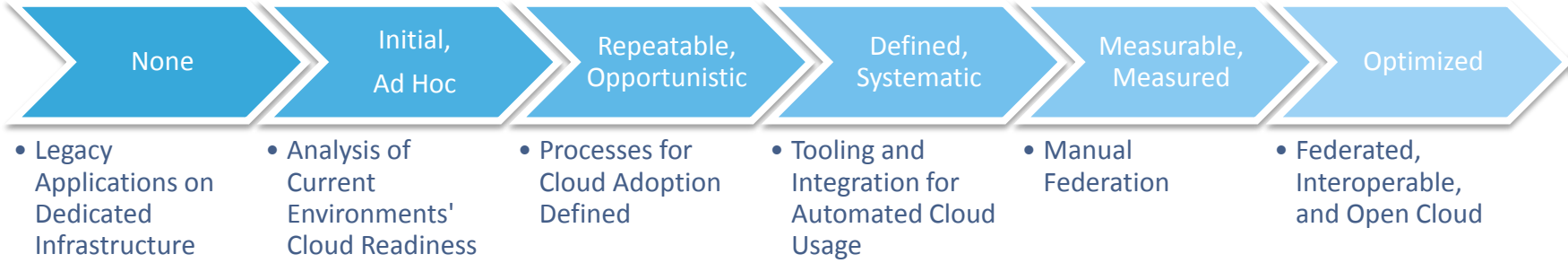
# Adoption path



# Apps in the Cloud – Lifecycle Approach



# Cloud Maturity Model



# Your Evolutionary Journey to the Cloud

**1.** Legacy IT Data Center

**2.** Identify services that will benefit from agility and automation

Increased Virtualization

**3.** Start small, jump-starting a private cloud project

Agility & Automation

**4.** Choose a foundation that offers scalability and prevents lock-in

Integrated Orchestration

Design a private cloud with interoperability and legacy in mind

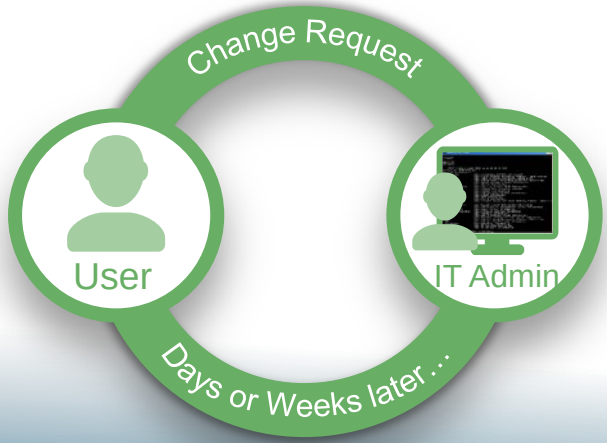
Elastic, Flexible & On-Demand

Fully automated and self-provisioned cloud

A Single, Open, and Smart Juniper Network

# Path to Success: Identify

## Today You Are Here



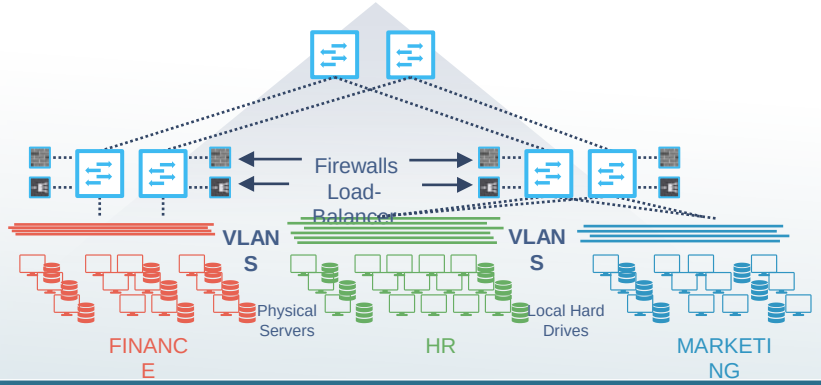

## You Need to Be Here

SDN? | Orchestration? | Security? | Protocols? | Intelligence? | Support?

# Path to Success: Set Goals

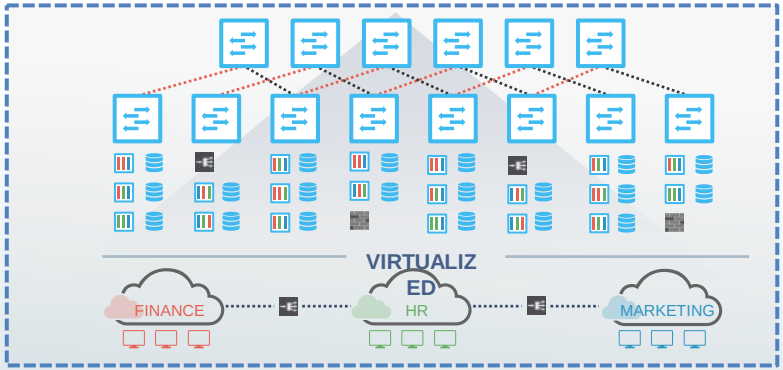
## Today You Are Here

- Resources are in silos
- Network services are on physical appliances
- Tasks are not automated
- Orchestration is decentralized
- Security is an afterthought

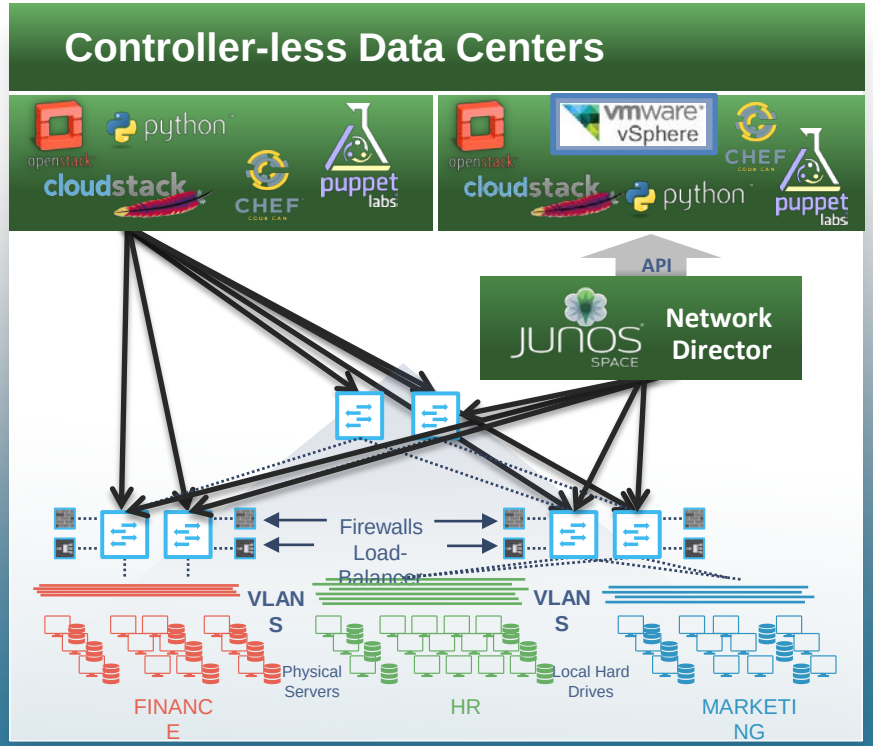


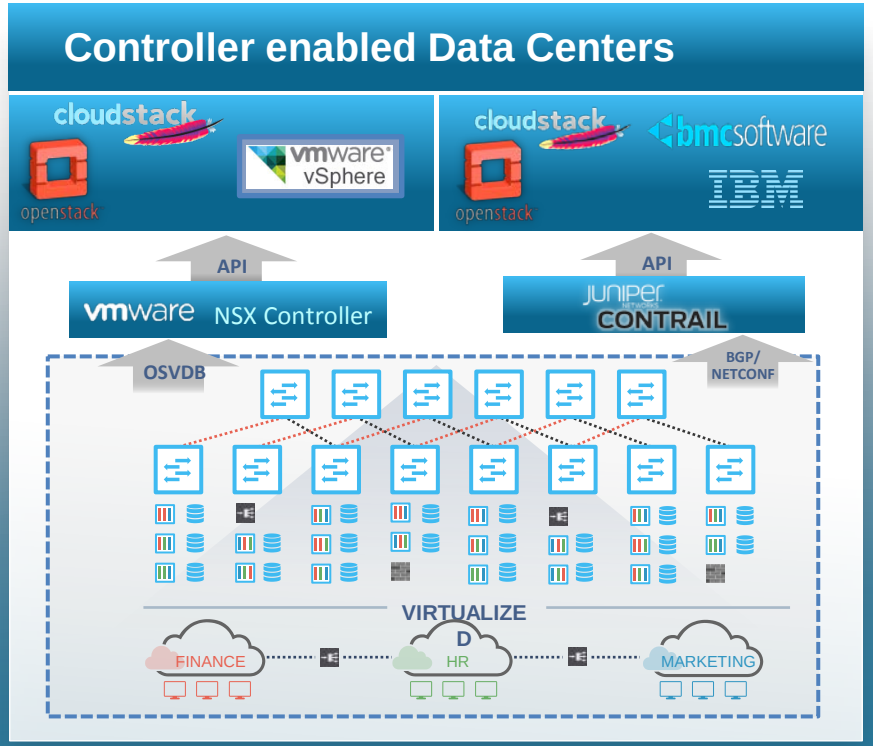

## You Need to Be Here

- Resources are pooled
- Network services are virtualized and distributed
- Moves/adds/changes are fully automated
- Orchestration is completely centralized
- Security is integrated



# Path to Success: Plan



# Who Are You?

## Commercial Buyers

Off-the-shelf buyers

Value simplicity

Limited customization

## Open Source

Frustrated off-the-shelf

Hands on and technical

Requires customization

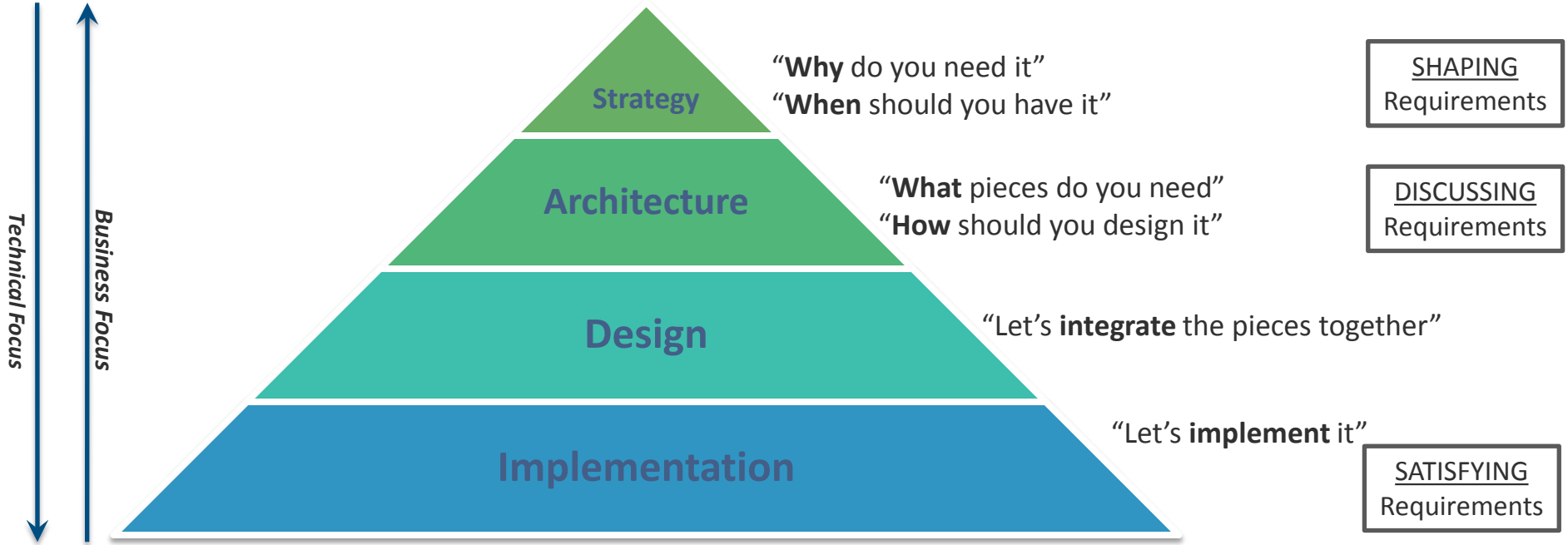
## Dev Ops

Highly skilled, DIY

Self-reliant, highly adept

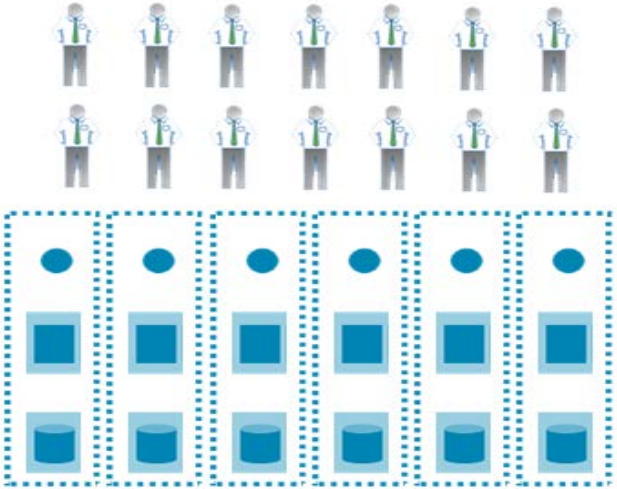
Automation is key

# The Architectural Journey

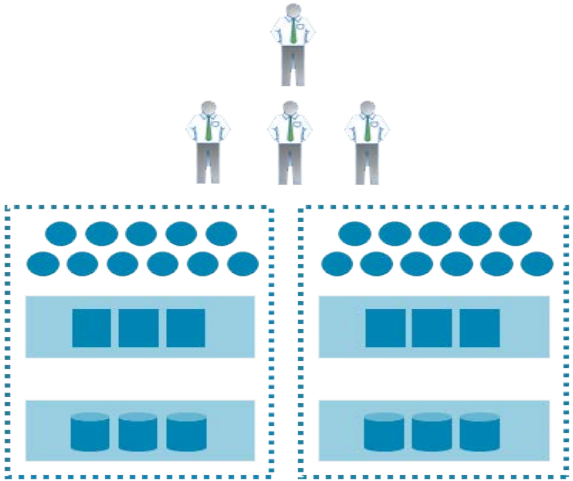



Most customers have **implemented** technology prior to defining a strategy

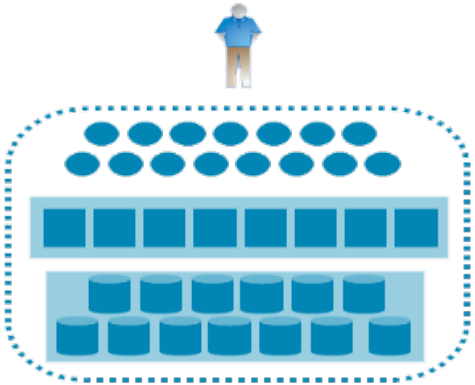
# Cloud is an Evolution, not a Revolution



Traditional physical datacentre (SILOs)

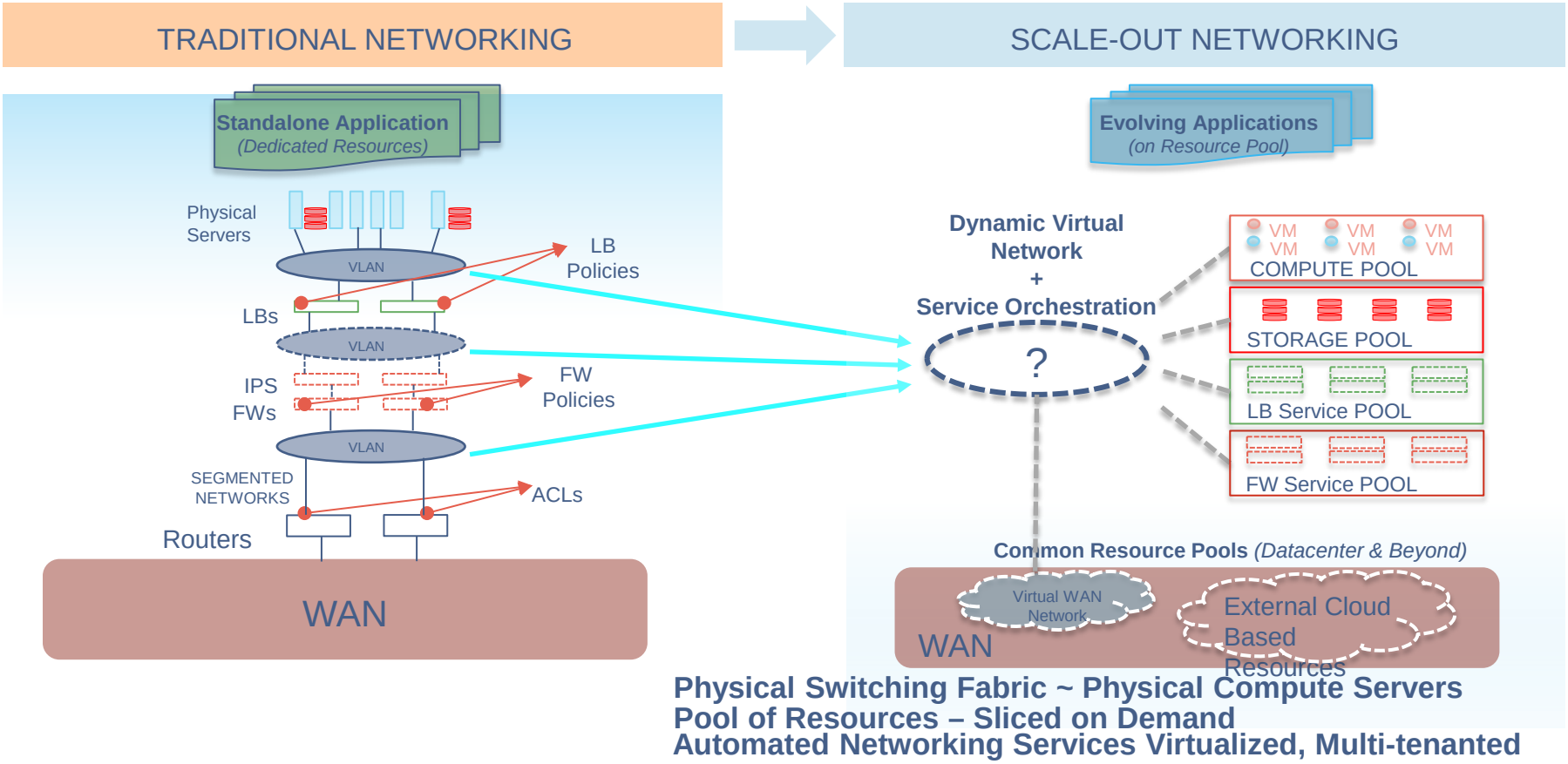


Virtualized datacentres (SILOs)



ITaaS (Cloud)

# CLOUD READY – NETWORK VIRTUALIZATION




**Physical Switching Fabric ~ Physical Compute Servers**
**Pool of Resources – Sliced on Demand**
**Automated Networking Services Virtualized, Multi-tenanted**

MetaFabric™ ARCHITECTURE

JUNIPER NETWORKS

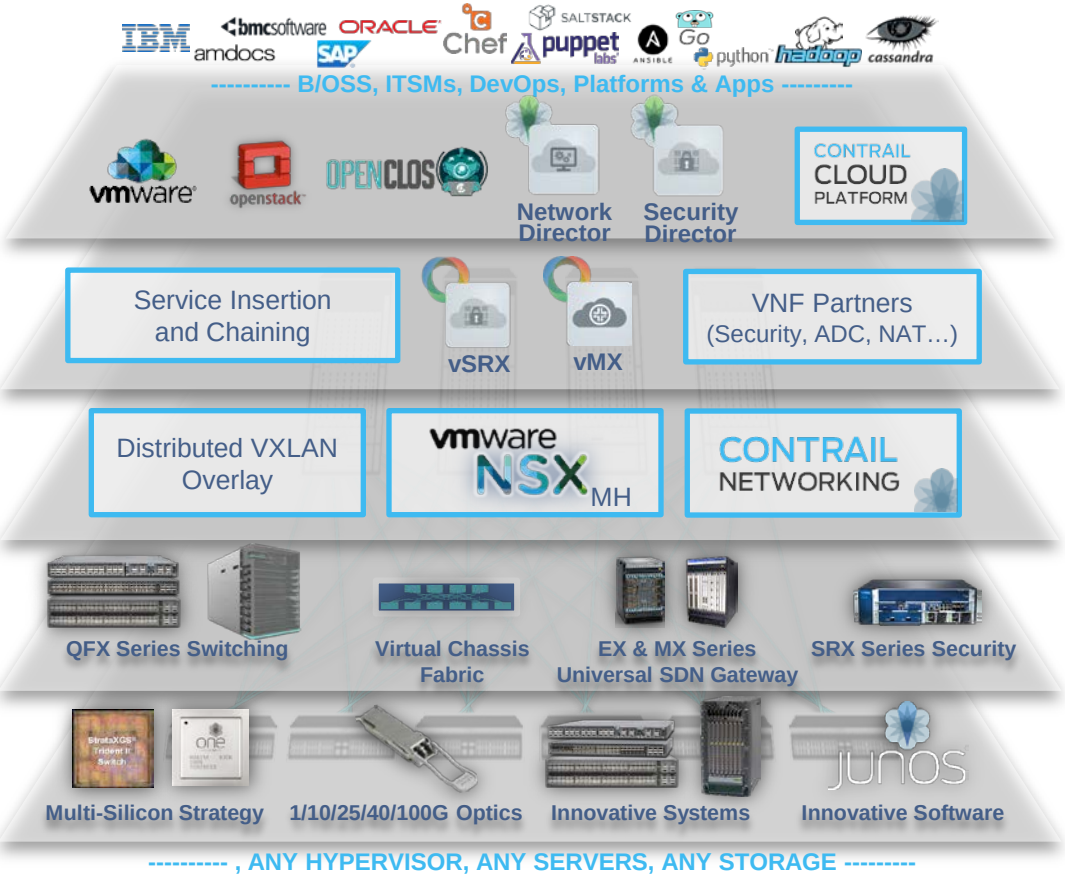
INTEGRATED MANAGEMENT

SERVICE VIRTUALIZATION

OVERLAY ARCHITECTURE

UNDERLAY ARCHITECTURE

FOUNDATION TECHNOLOGIES




OVERALL SOLUTION INTEGRATED WITH OPEN TECHNOLOGIES

*EACH LAYER CAN BE UPDATED WITHOUT A WHOLE REDESIGN OR REPLACING OTHER PARTS*

Thank you