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DENVER, CO
OCTOBER 17-20

2017 Fall Technical Forum
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Fungible Virtualization Stacks

Refocusing on Optimization of Underlying Resources

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Why Virtualize?

Automation

Virtualization + Automation

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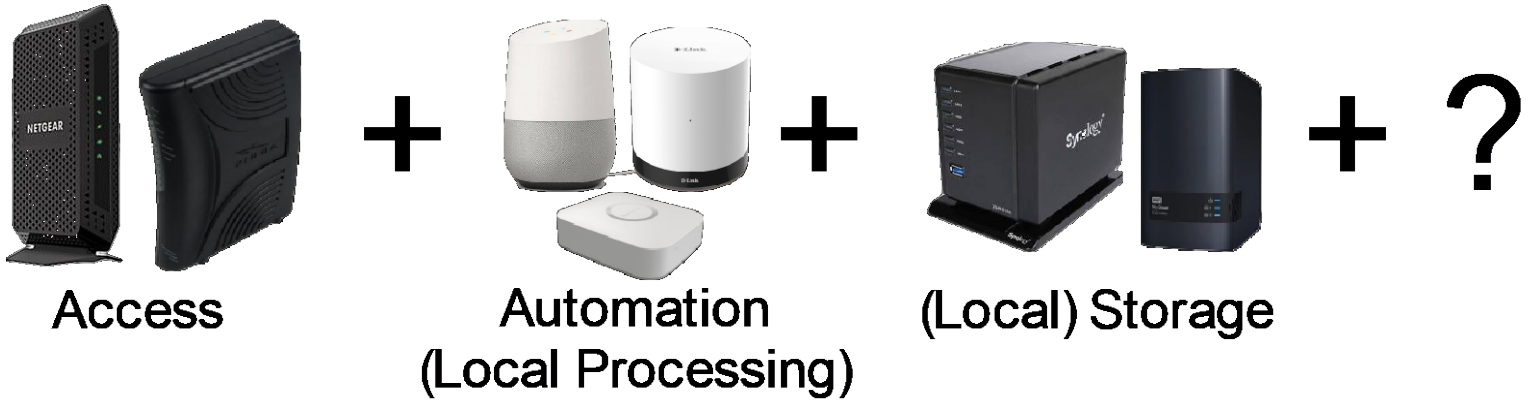
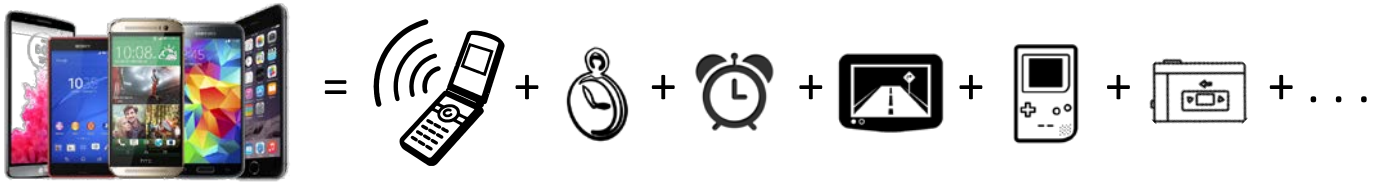
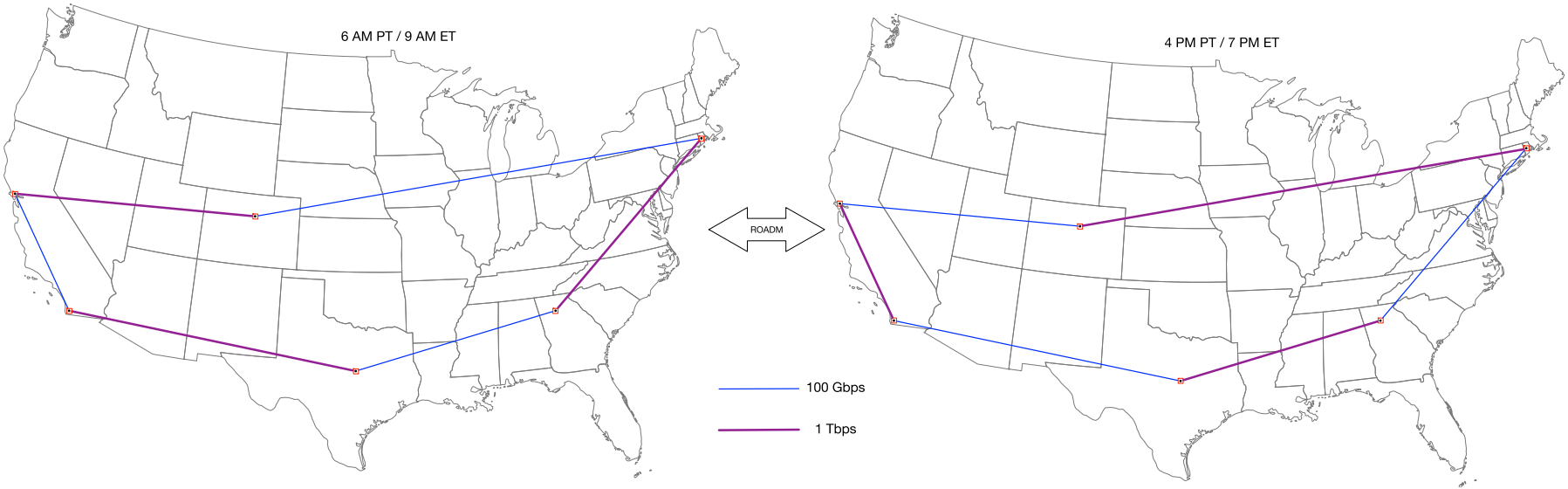
Customer Premise Compute





Leveraging Reconfigurable Optical Add-Drop Multiplexing (ROADM)



Customer Instances

OSS/BSS Systems

Customer / Demand

This includes all provisioning activity, service assurance, business intelligence, etc.

Many things that are managed may not be mapped to customer instances!

Logical Instances

Orchestrator of Orchestrators

Not currently in-use, customers off-line

In-Use Capacity

SLA / Protect Capacity

If an instance that is mapped to the customer is changed, this is where that is handled, it is transparent to OSS/BSS systems other than a notification that an event occurred.

Reduces dependency on VNF boot or configuration times, based on probabilities and failure group sizes.

Virtual Instances

NFVO/ VNFM

Virtualized Network Functions (or VNF Chains)

The NFVO/VNFM will make sure these are running, will restart if required, but do not typically re-optimize for location or plan spares for accelerated recovery.

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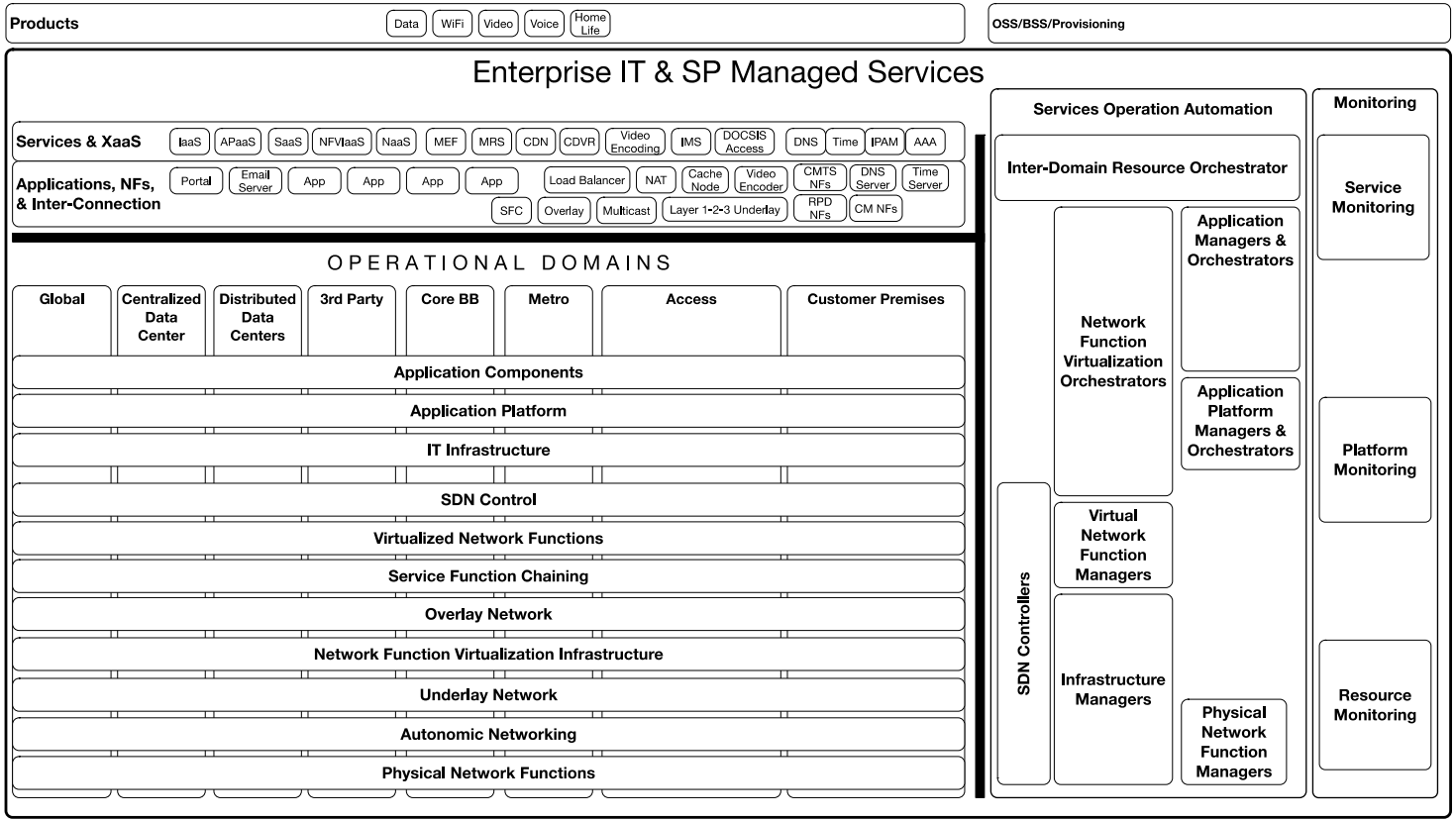
= chain of one or more virtual network function(s)

Domains



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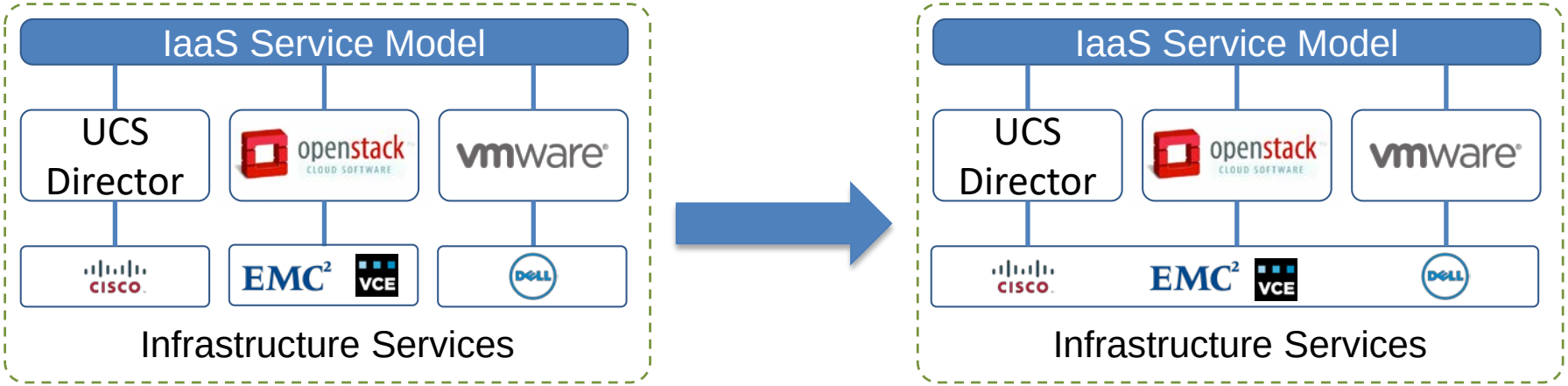


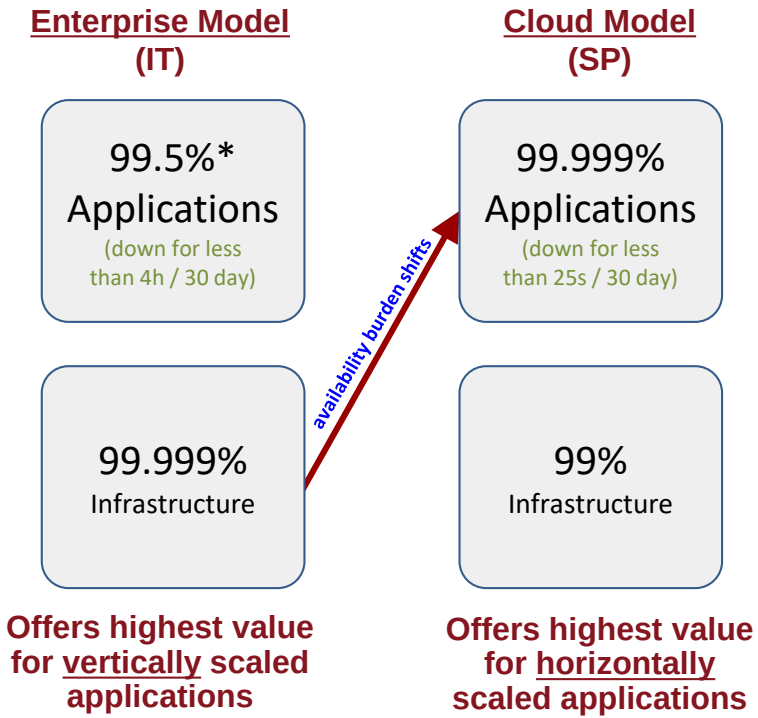
Shift the focus to optimizing our resource pools independent of the Virtualization Stack.

Shifting the Availability Burden

Enterprise Class to Carrier Grade

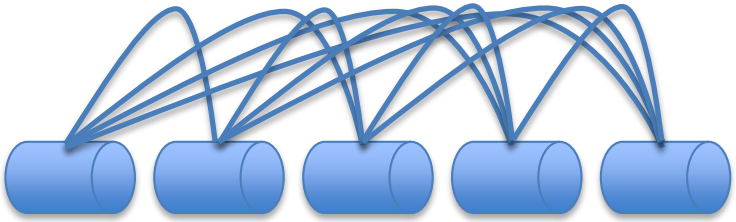
Application design will dictate whether it requires a HA infrastructure to provide service or can provide an HA service on general purpose infrastructure.

The most cost effective solution may be to support both paradigms – electing the appropriate paradigm for each application.

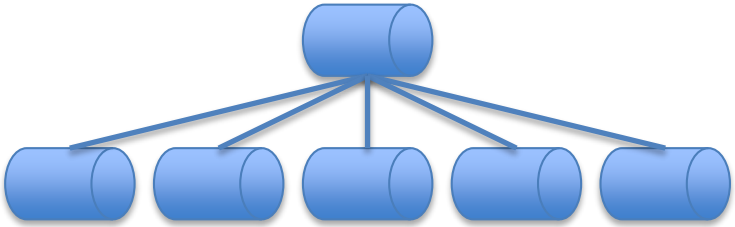


Use integration concepts to prevent direct integration between every domain.

Many-to-Many

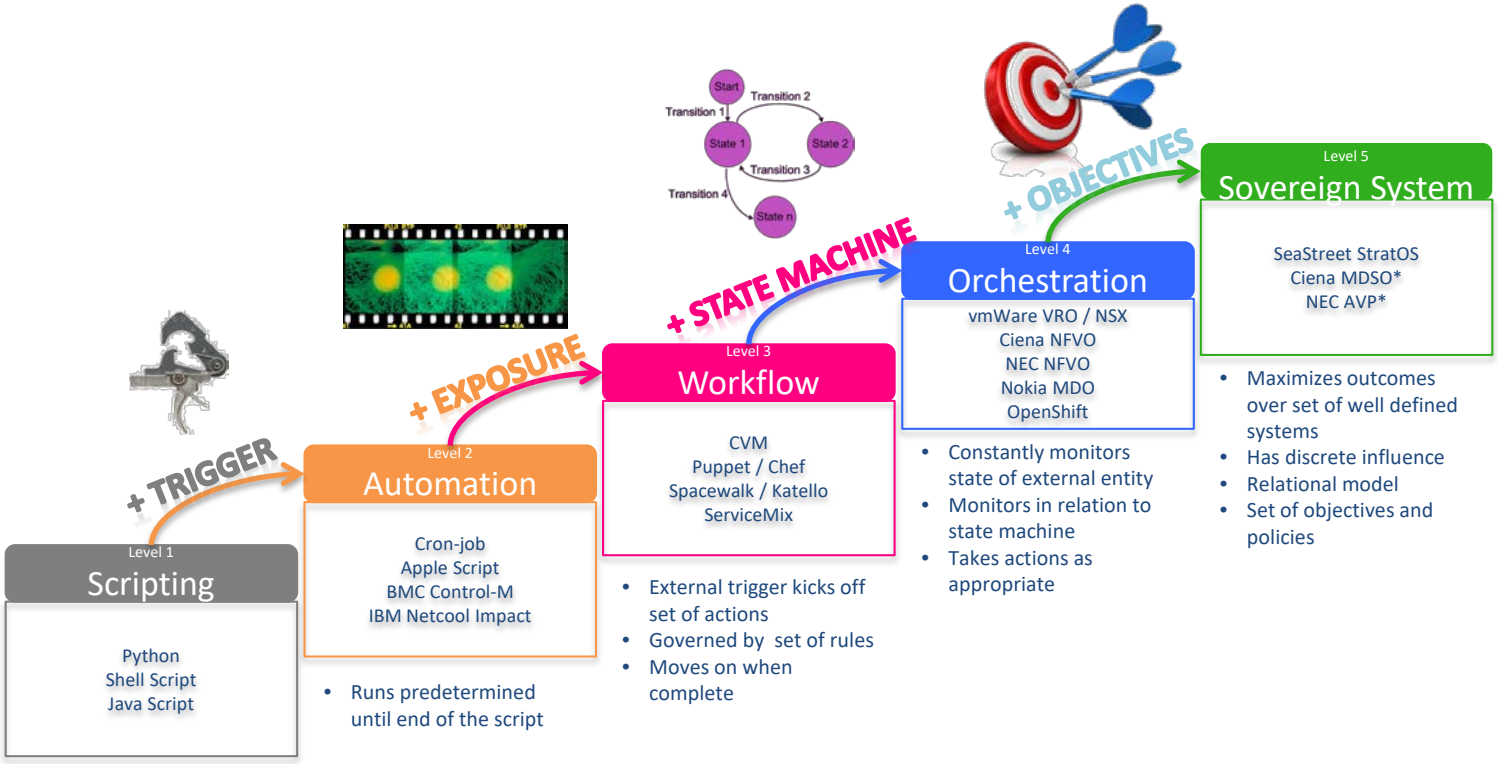


One-to-Many



Hierarchical Integration does not prevent domains from directly interacting with each other… it may serve only to broker the interaction.

Fungible Virtualization Stacks:
Refocusing on Optimization of Underlying Resources



State Machines (with Meta-Analytics)

Controller-oriented approach providing a deterministic, unified, & responsive event-based control loop.

Preferable when you have high quantity of relatively low variety, especially when using single-purpose micro-services with finite states (SP-scale).

Analytics performed once, re-used many times for deterministic behavior

Current state and potential next-state with associated probabilities are used to balance protect capacities.

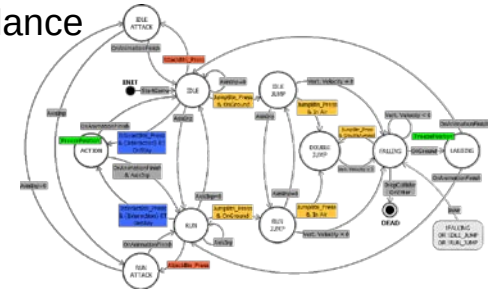
Analytics-Only

Pattern matching/query-based approach.

Preferable when you have high variety with relatively low quantity, especially when using complex monolithic services (IT-scale).

Slight delay to real-time, often favors workflow (external trigger) over orchestration.

Can be leveraged to produce events into running state machines and, (combined with machine learning) advice for state machine modification.

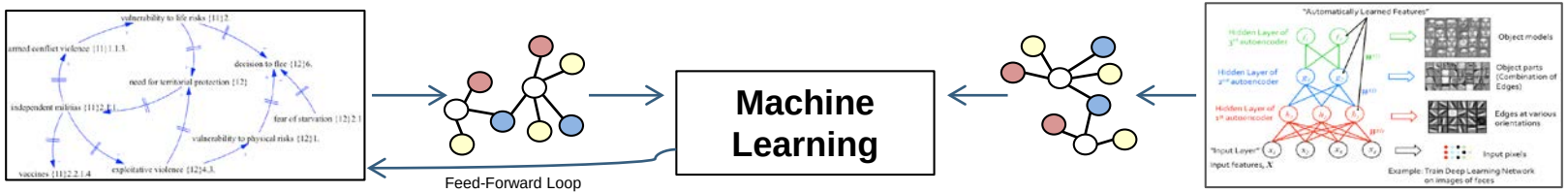


Data Intensive Scientific Discovery (DISD)
"The Fourth Paradigm"

Deriving new insights, correlations, and discoveries not otherwise possible from diverse experimental and computational data (Meta-Analytics)

Deep Knowledge Analytics (DKA)
"Cognitive Computing"

Obtaining insights, identifying trends, aiding in discovery, and finding answers to specific questions by mining knowledge (Big Data Analytics)



Designed Models
(Meta-Analytics)

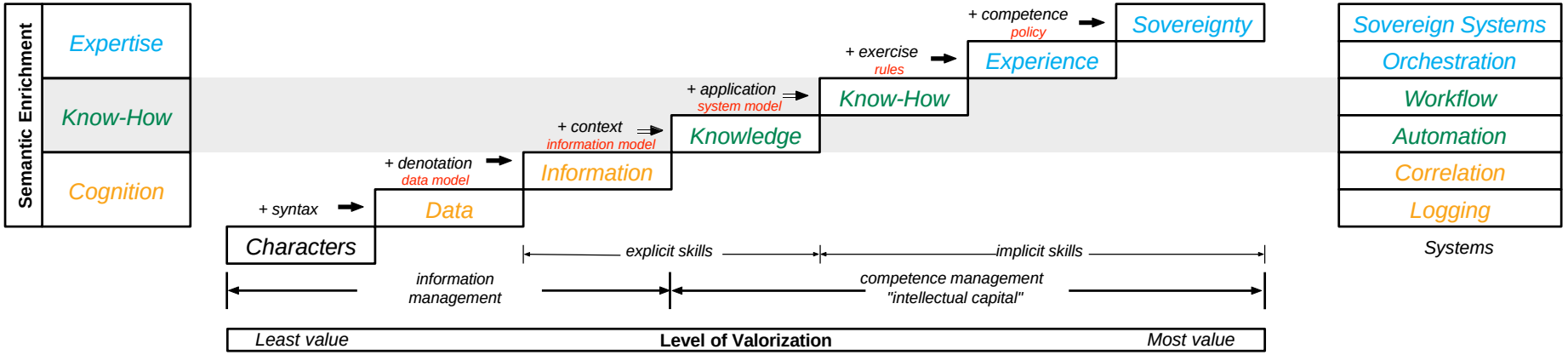
Operational
Analytics
(Big Data Analytics)

The deterministic nature of Micro-Services provides visibility into (including probabilities for) next-state and next-actions.

The declarative nature of Micro-Services telemetry includes structures that can be analyzed using big-data techniques.

The relationship between Systems and Data Science

As systems become more complex, a higher level of Systems Engineering capability maturity coupled with new Data Science techniques will be a critical success factor.



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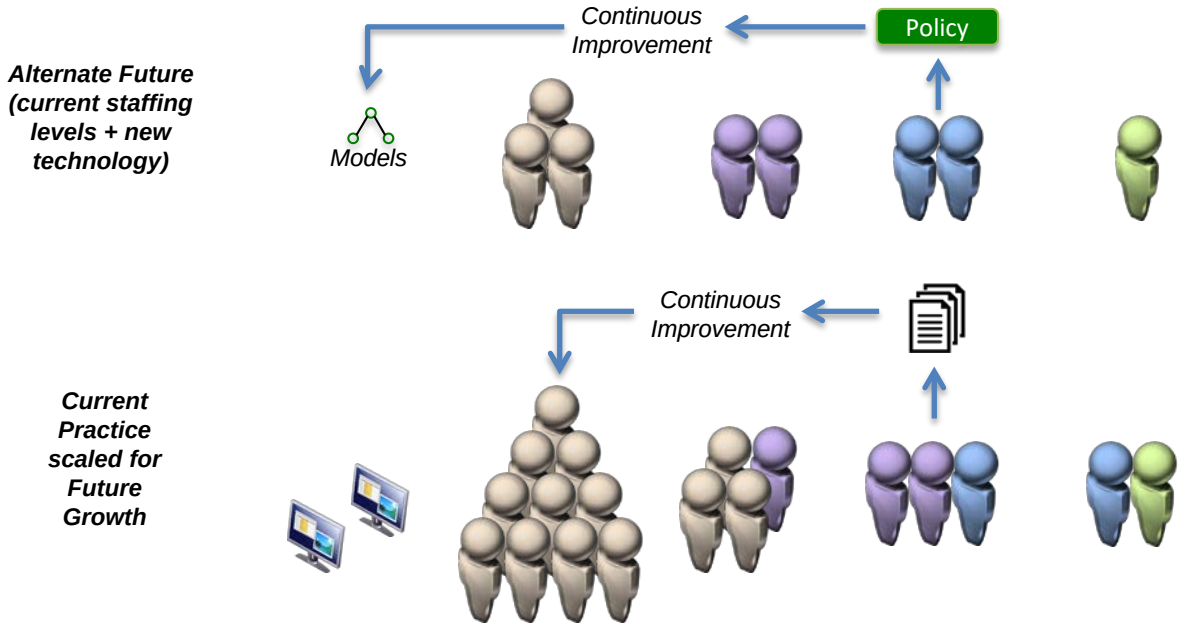
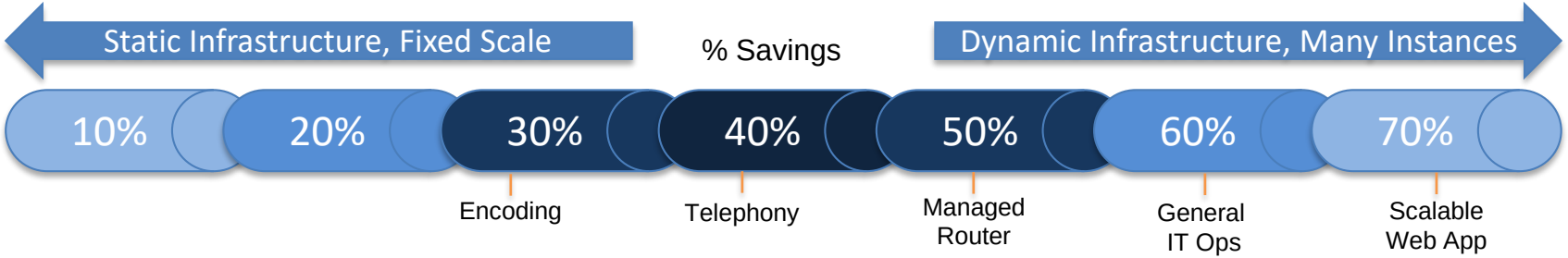
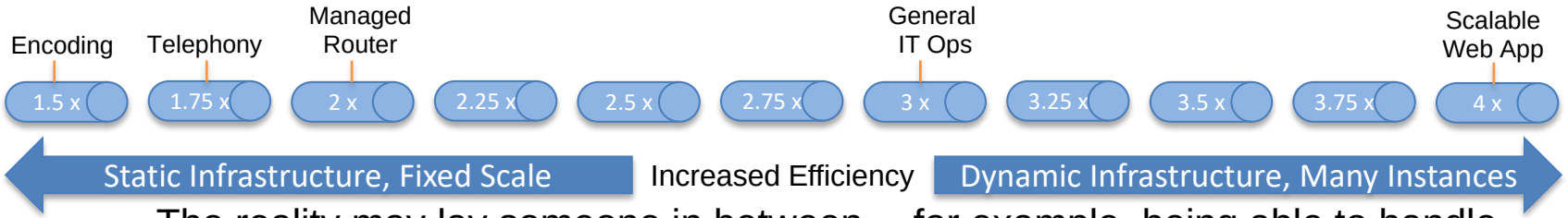




Claims of savings of 33%-75% may be hard to believe.
Being able to operate more equipment using the same resources is easier for people to understand.



The reality may lay someone in between… for example, being able to handle twice the amount of equipment with half the resource expense…

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THANK YOU!

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