

CLOSER 2011

1st Int. Conf. on Cloud Computing
and Services Science:
“The Cloud Service Supply Chain”

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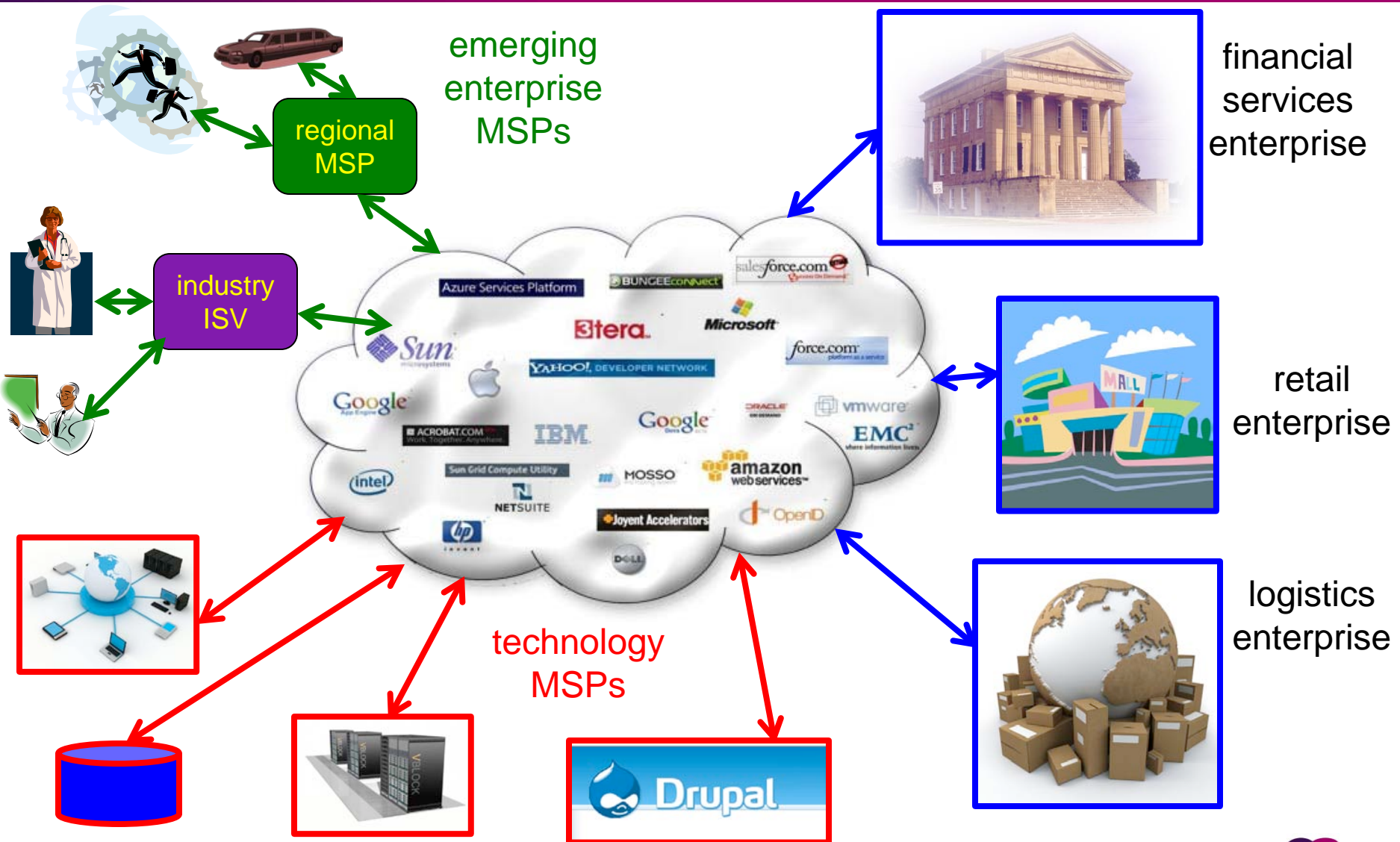
—an overview of

- some problems/requirements for service centric cloud computing
- this “big picture” of what solutions will look like
- explanation of existing capabilities in IT management and security systems, e.g.
 - discovery
 - analysis
 - security
 - provisioning

—but,

- this is a research conference
- and I will identify areas where we need exploration
- possible avenue for collaboration, standards, etc.

cloud is an economy of services and roles, *technically providing and consuming services*



an (ancient) example of cloud computing

- Scenario – Logitech web promotion
(www.akamai.com/html/customers/case_study_logitech.html)
 - marketing campaign to get registered customers, increase product awareness
 - five hour online, Web promotional contest
 - win a free wireless mouse and keyboard
- Solution
 - develop/modify a Web application, pages and data; remote interactions (SOA); etc
 - deploy application and data into the Akamai cloud (CDN)
 - virtualizing and build a cloud connected solution started with the composite application
- Benefits
 - Quality: The promotion had 10x as many Web transactions as expected, which would have overwhelmed an onsite solution
 - Agility: Did not have to purchase, install, configure, etc hardware/software
 - Risk: Akamai CDN is extensively tested by 100s of applications, which is likely to be more reliable than a quickly assembled on premise system
 - Capability
 - Geographic content caching and request routing
 - Library of templates and best practices
 - End-to-end monitoring of the entire Web experience, not just the “on premise” part
 - Cost: Rented the resources for five hours instead of buying HW and SW

examples

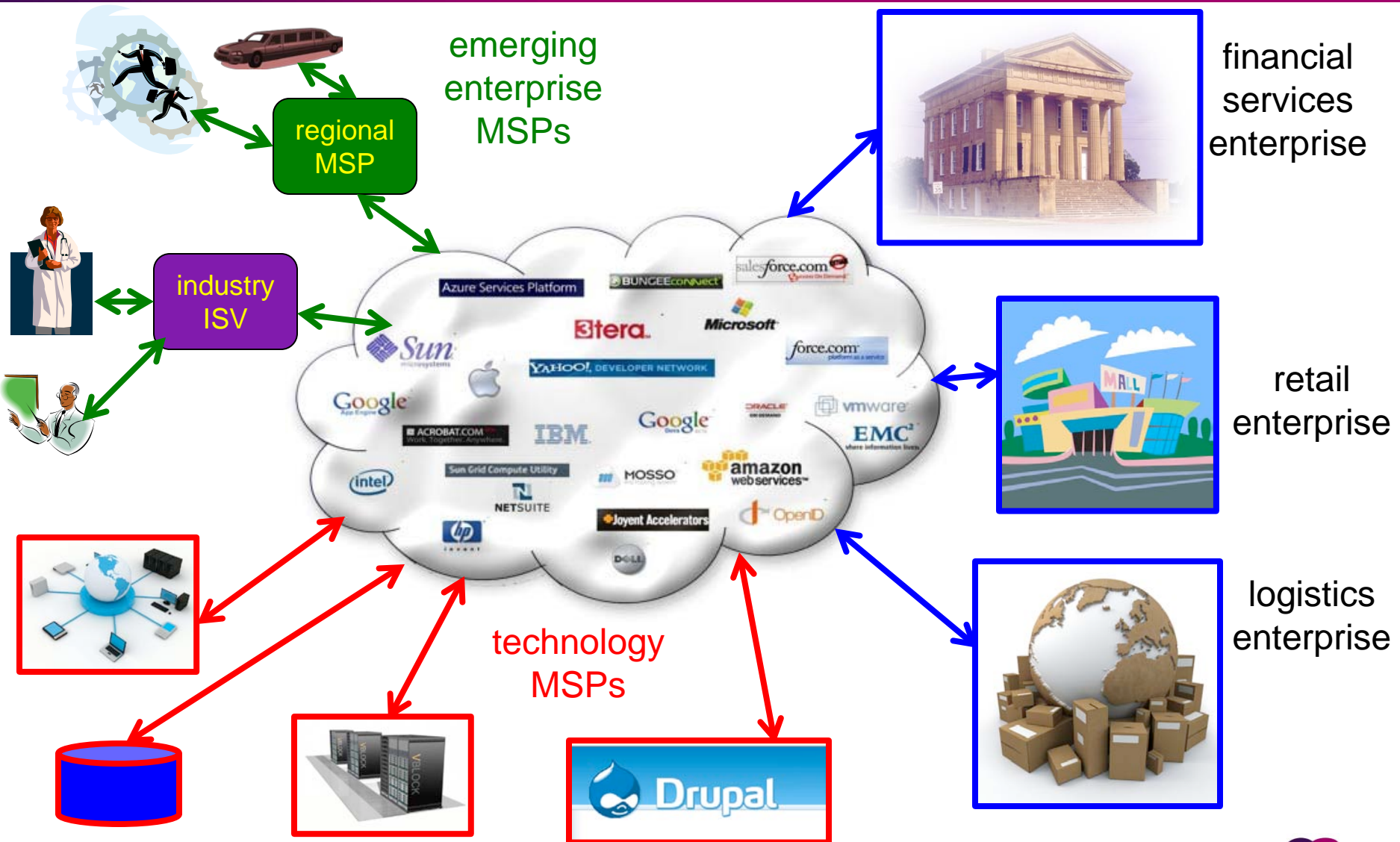
— Application Agility: entertainment company

- scenario: movie releases and events drive
 - rapid development of short duration web applications
 - lines-of-business/departments
 - use different application platforms
 - have embedded infrastructure/clouds
- solution
 - central private cloud for efficiency and reliability
 - tools for defining standard, customizable runtime configurations for applications
 - self-service portal for provisioning and optimization
 - autonomic resource allocation to meet performance objectives

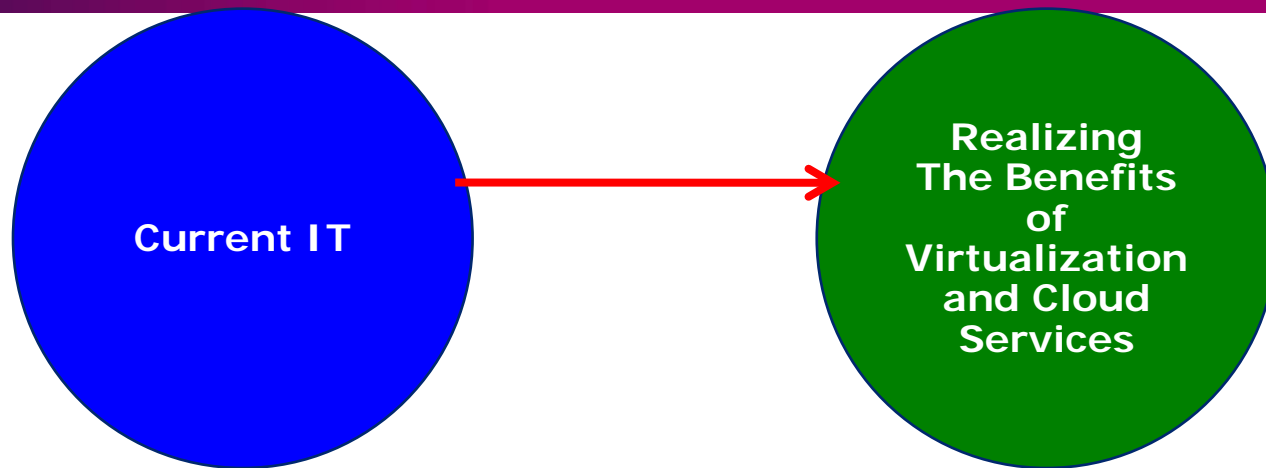
— Incremental Transformation: Netflix

- scenario
 - customer traffic is predictably, highly variable, e.g. more movies on Saturday night than Tuesday night
 - need to apply cloud computing to get variable capacity for existing applications
- solution
 - use IaaS to deliver elements of the composite application at peak times
 - manage, secure, automate, ... applications that span on-premise and cloud
 - understand in advance
 - the implications of multiple possible design choices
 - impact on on-premise systems

OK, looks good. let's go.



transforming Enterprise IT

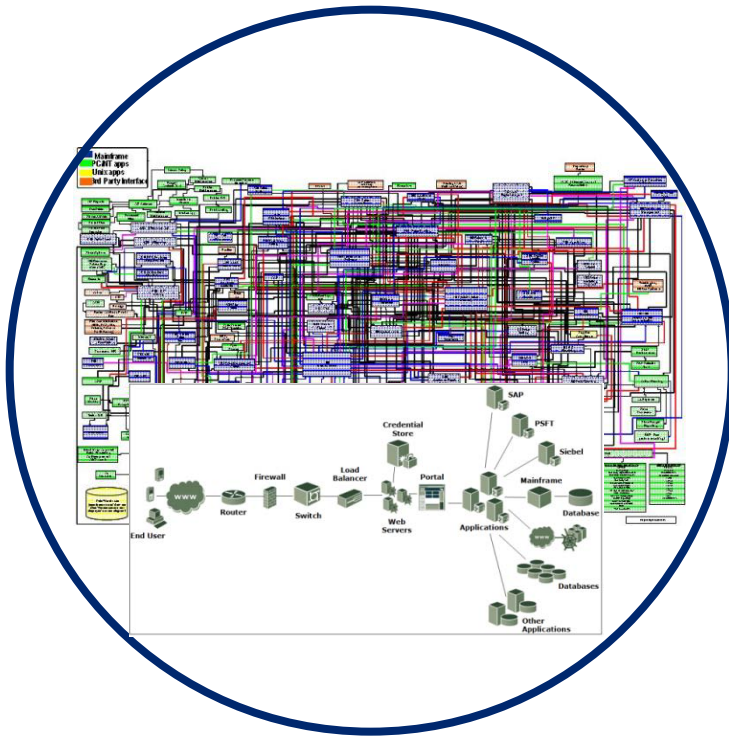


Exploiting virtualization or becoming a cloud—connected enterprise should not be hard. The questions and tasks are:

1. Where am I?
2. Where could I go?
3. Where should I go?
4. How do I get there?
5. Go there.
6. Decide if you made the right decision.
7. Tell your friends.
8. Repeat.

OK, maybe it is hard

Current IT



Virtual, Cloud-Connected IT

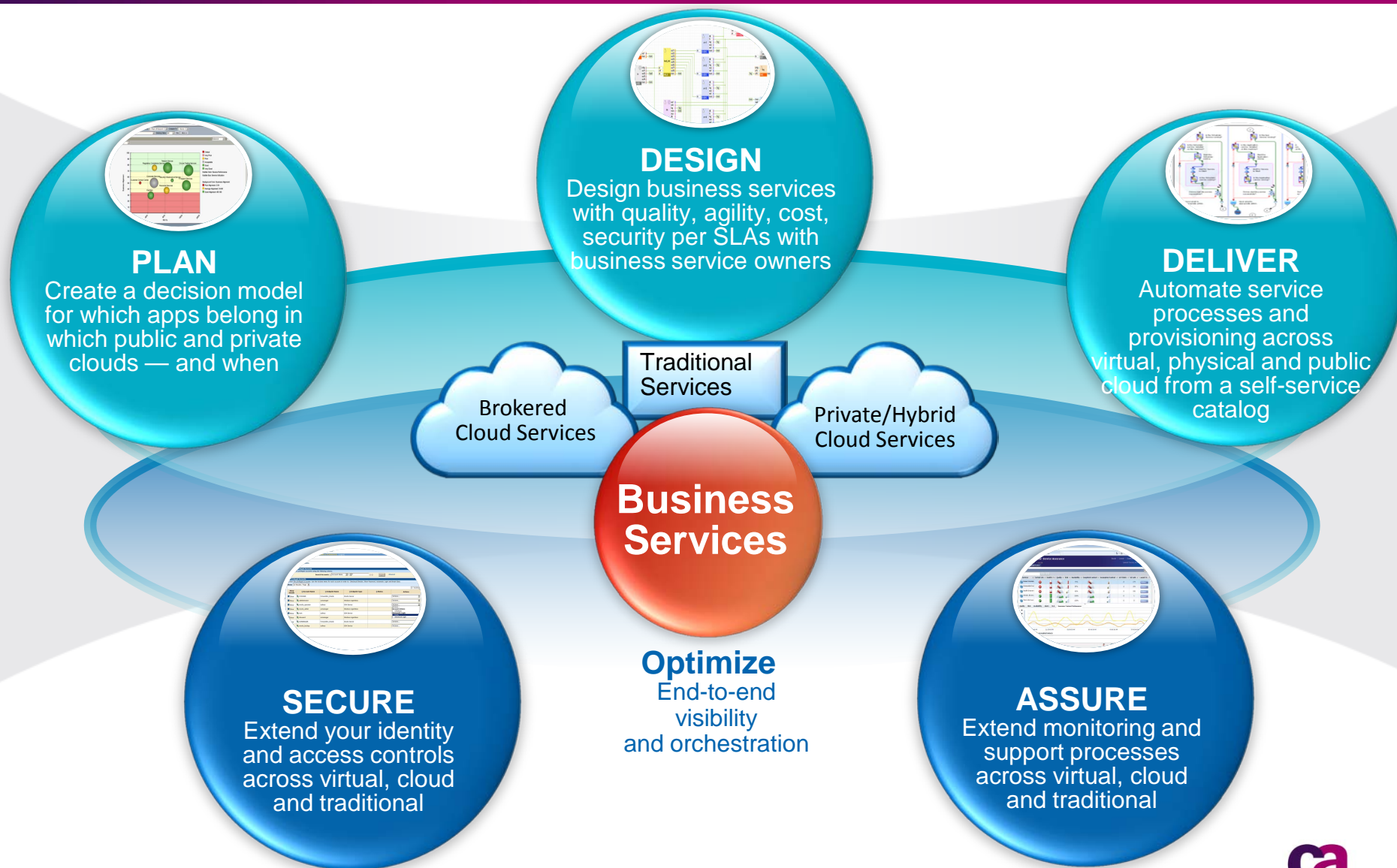


“I do not know where I should go, which is OK because I do not know where I am and getting there would be too expensive and I am not even sure why I want to go there other than my boss keeps asking ‘Are we there yet?’”

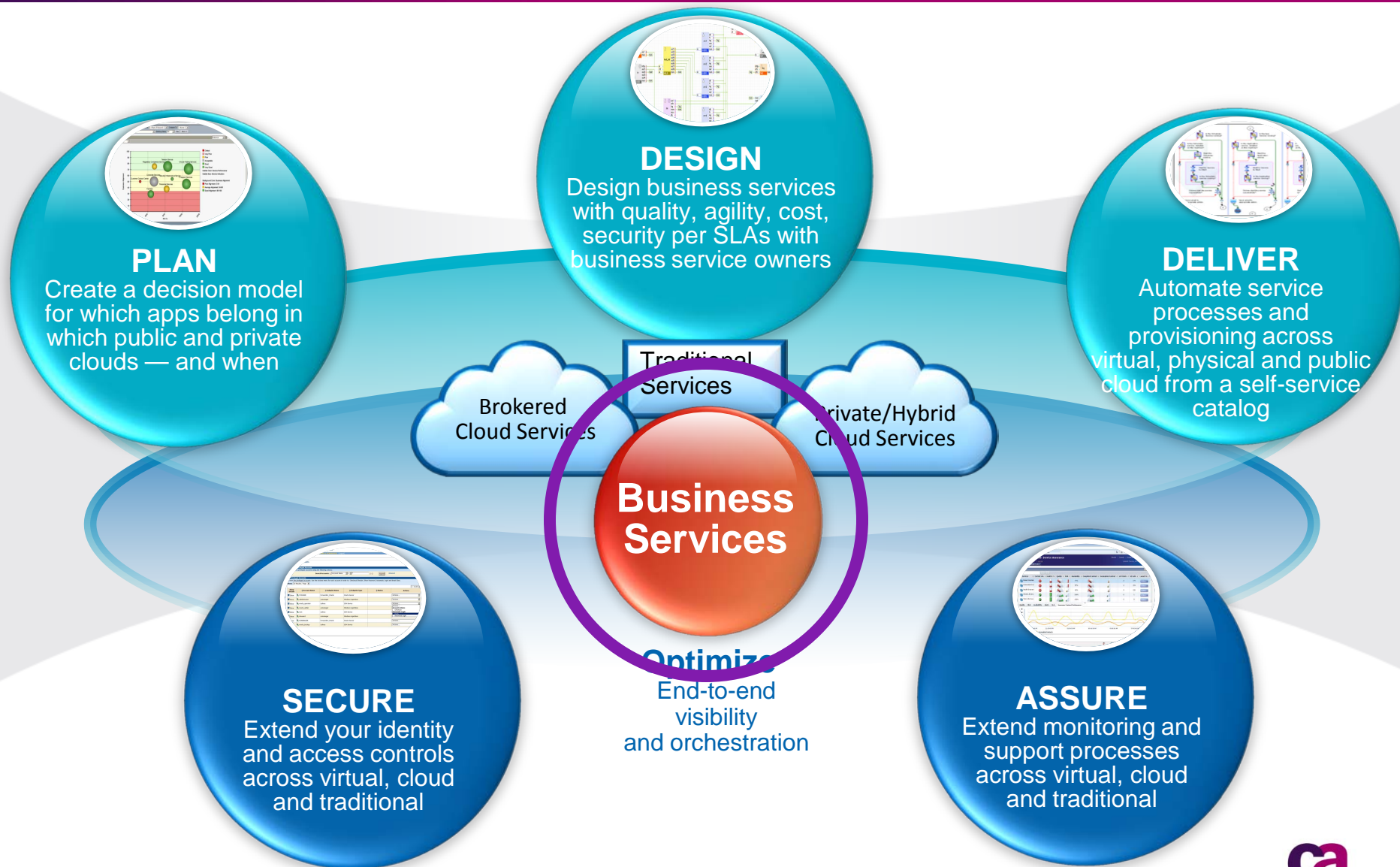
IT supply chain

- any non-trivial application is a composite application, e.g.
 - web content
 - JavaBeans
 - database schema and stored procedures
 - pricing rules
- a composite application *requires* a composite IT systems, which is a connected set of (supply chain of)
 - HW infrastructure, e.g.
 - servers
 - storage
 - networking
 - SW infrastructure, e.g.
 - operating systems
 - web application servers
 - distributed file systems
- cloud computing evolves composite IT systems from
 - a vertically integrated, all resources “in the data center” model to
 - a supply chain of cloud services

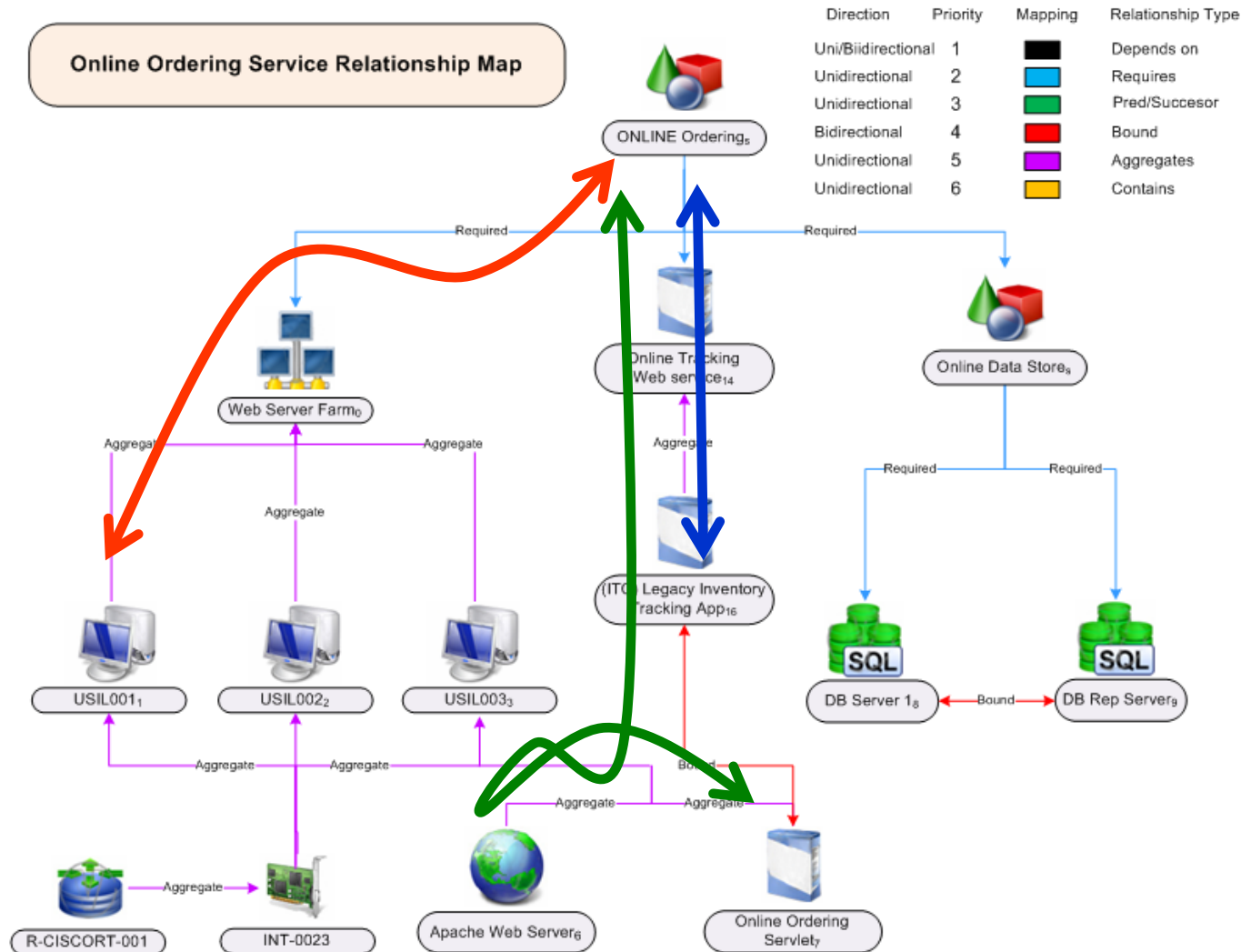
cloud computing requirements



must be business service centric

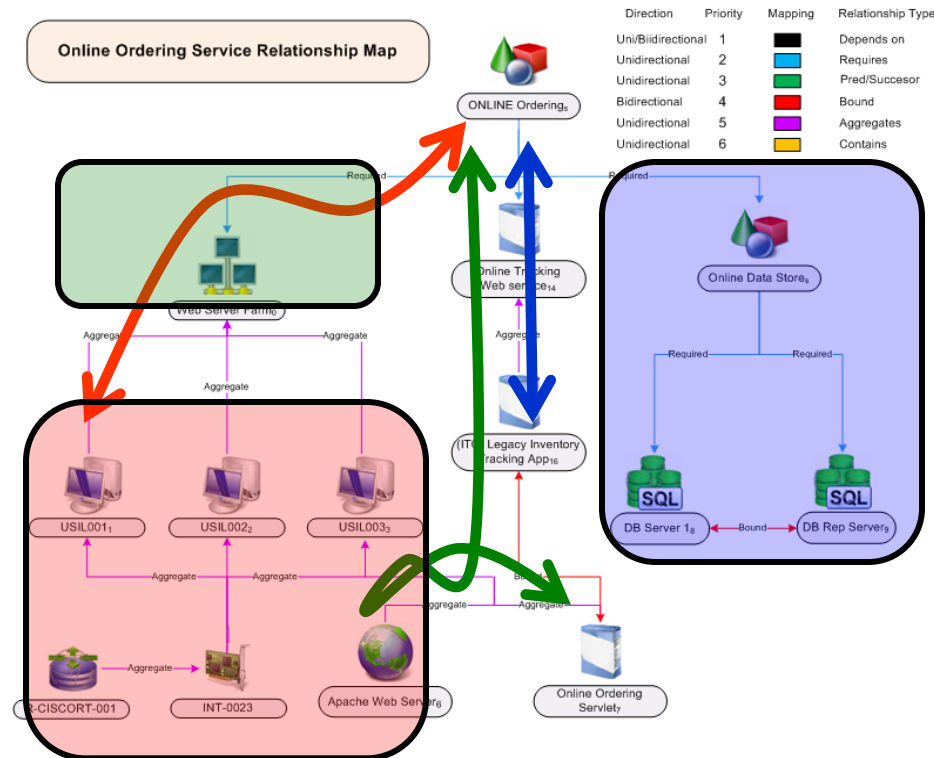


composite IT systems (partially) realize business services through an IT supply chain



cloud IT supply chain

use OpenID instead
of internal security

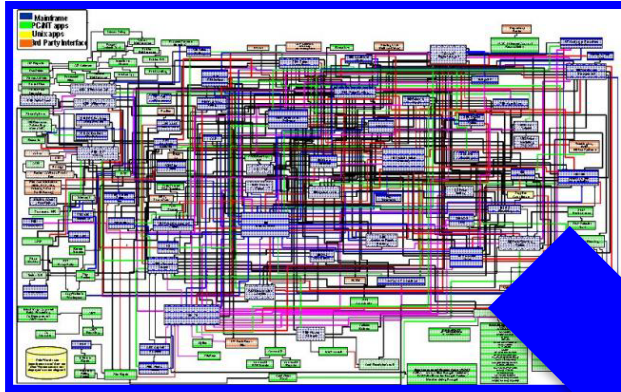


replace on
premise commerce
DB with
cloud storage

use cloud compute service
to host web servers

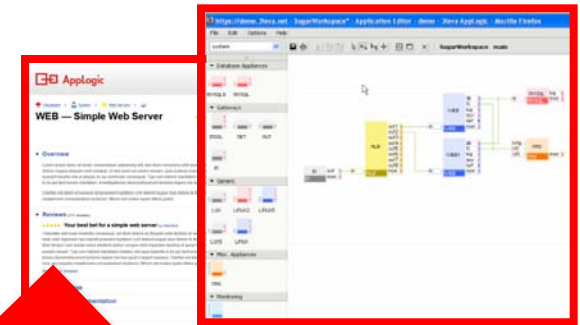
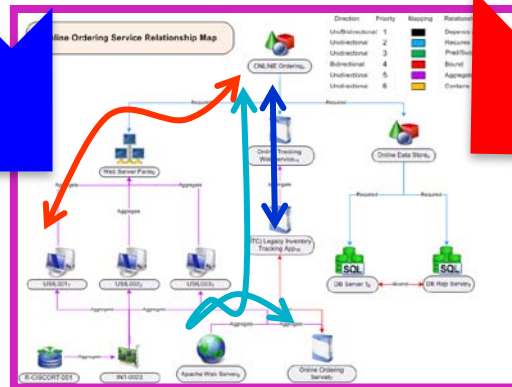
two canonical approaches to cloud computing but most customers will have a bit of both

existing IT environment



incremental transformation
of existing IT environments

composite app
composite IT system



purchase
deploy

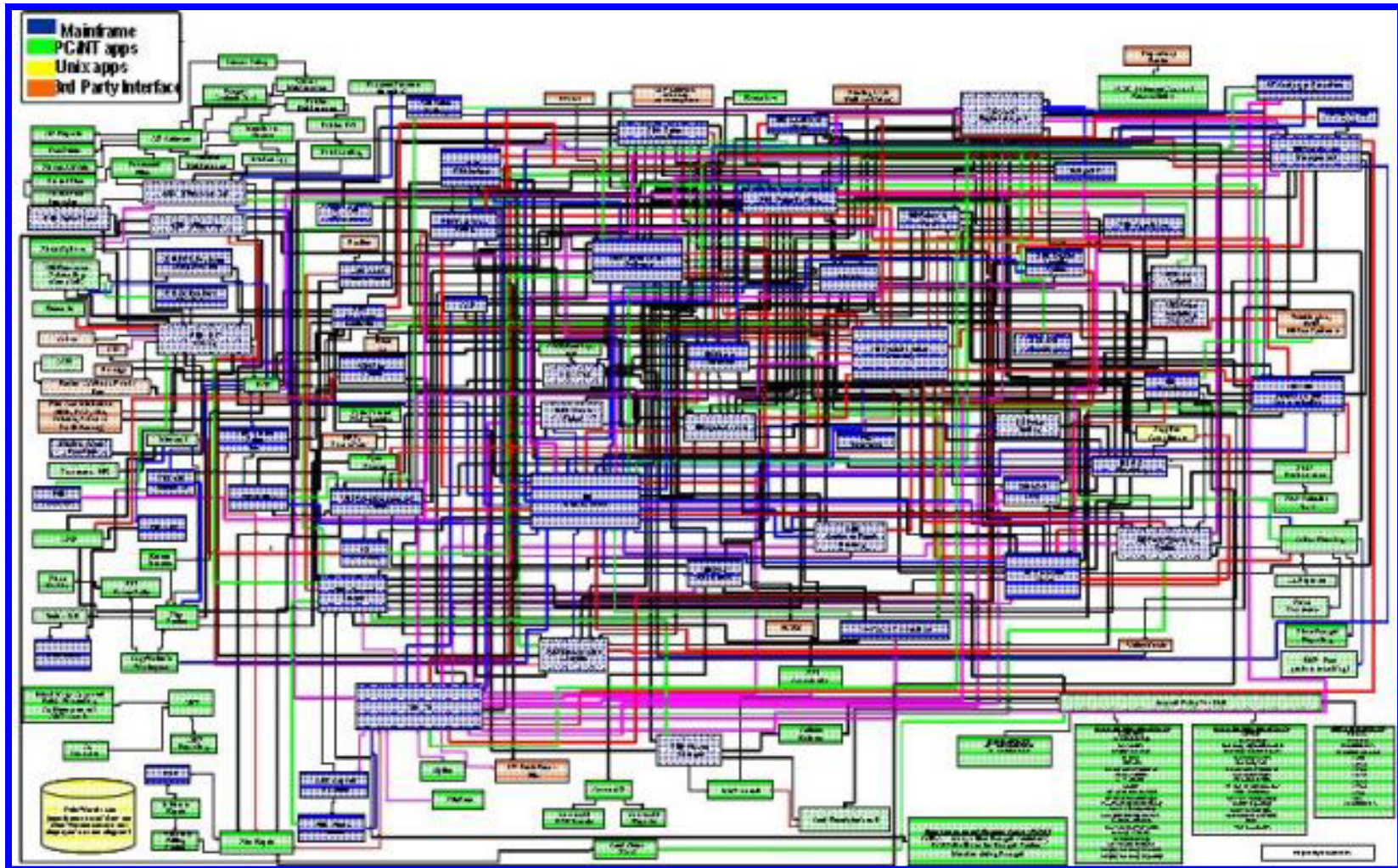
define,
assemble,
configure,
reuse

agility for new apps for
new business opportunities

public, private, hybrid cloud
IaaS, PaaS, SaaS, prog. web

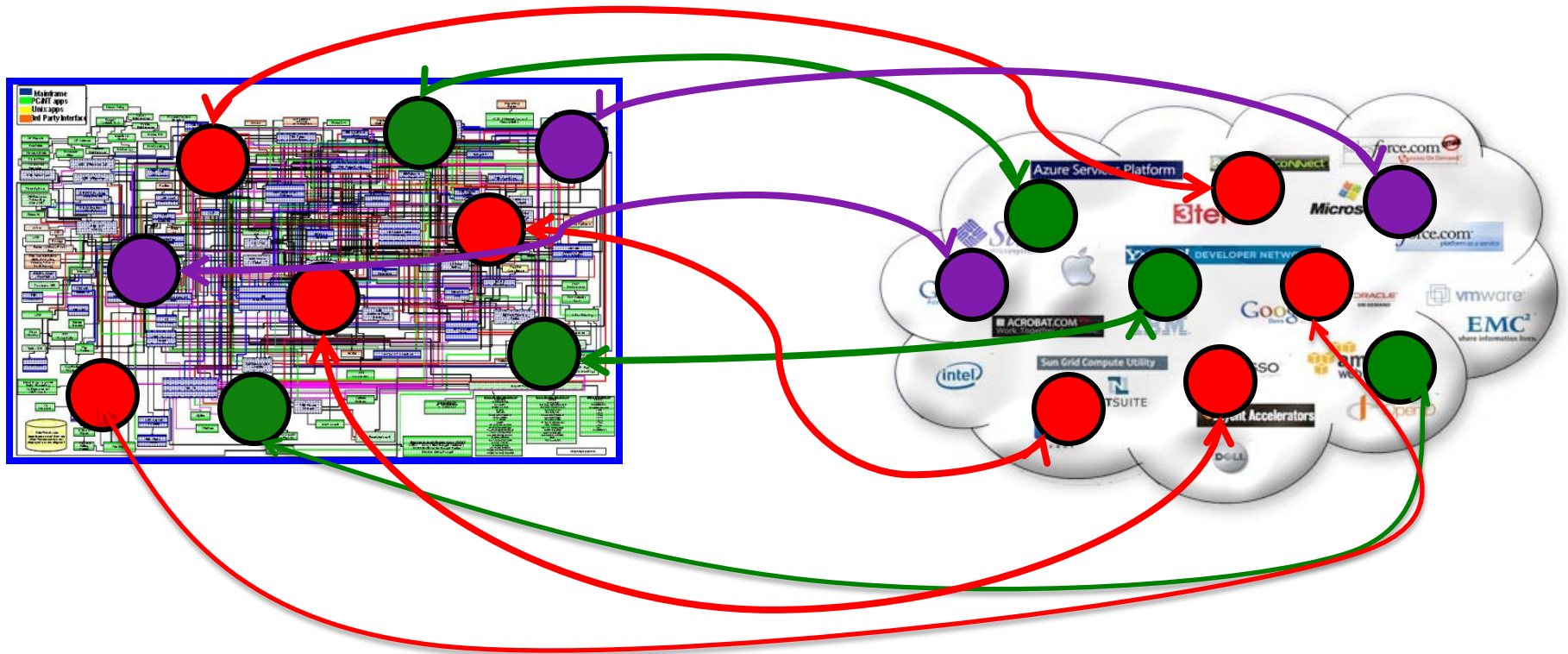


unfortunately, a typical enterprise IT environment – applications, SW and HW infrastructure



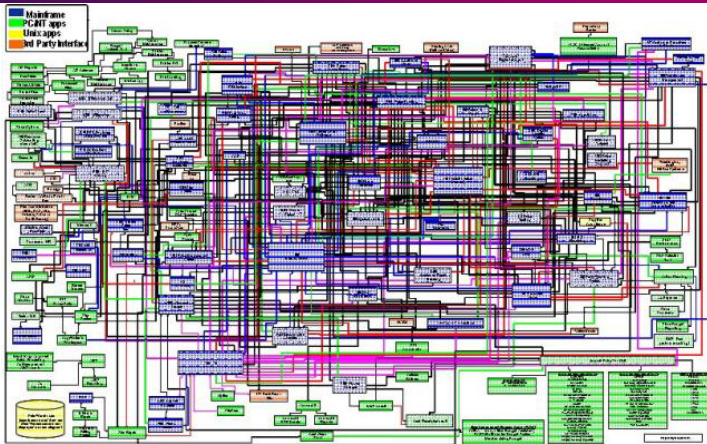
cloud computing – consume and offer cloud services

This seems risky.

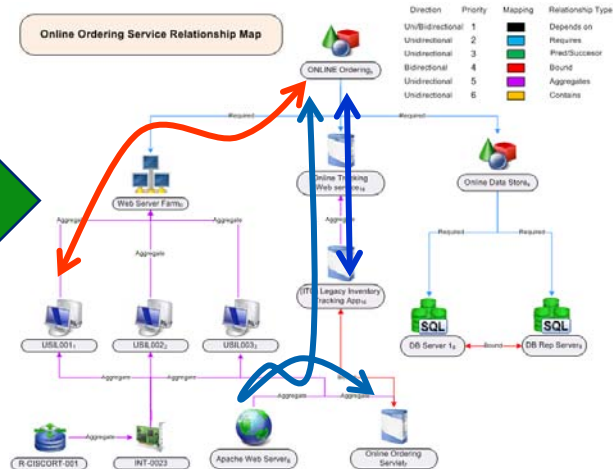


- replacing roll-your-own apps/SW with cloud services
- building new solutions using the cloud to extend my business
- enhancing existing solutions by exploiting cloud services

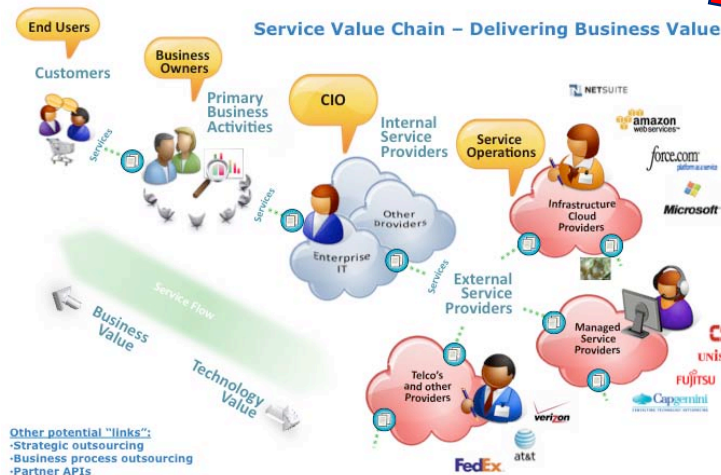
incremental transformation



Discover, Analyze, Correlate, Reconcile
Surface from the business perspective



Business Service Perspective and
IT realization



Incremental transformation
to exploit cloud services
and virtualization via
Insight, Optimize, Community, Automate

composite IT system *insight enables planning*

- most enterprises only partially understand the structure of their composite IT systems and how applications use them
- transformation to cloud computing requires insight into
 - HW and SW infrastructure supporting applications
 - interconnections between systems
 - transactions flowing through systems
 - performance requirements
 - etc.
- IT management systems have various techniques for gathering aspects of the information about composite IT system
 - packet inspection
 - file system scans
 - port inspection
 - remote management instrumentation
 - logs
 - etc.
- Insight fuses the information to identify the composite IT systems, and enable analysis of transformations to cloud computing

planning also requires a *unified service model*

- the classic “spanner” versus “wrench” problem
- must normalize internal and external definitions of IT resources into a common representation for
 - storage
 - networking
 - compute
 - platforms
 - business functions
 - etc.
- to enable comparisons and recommendations

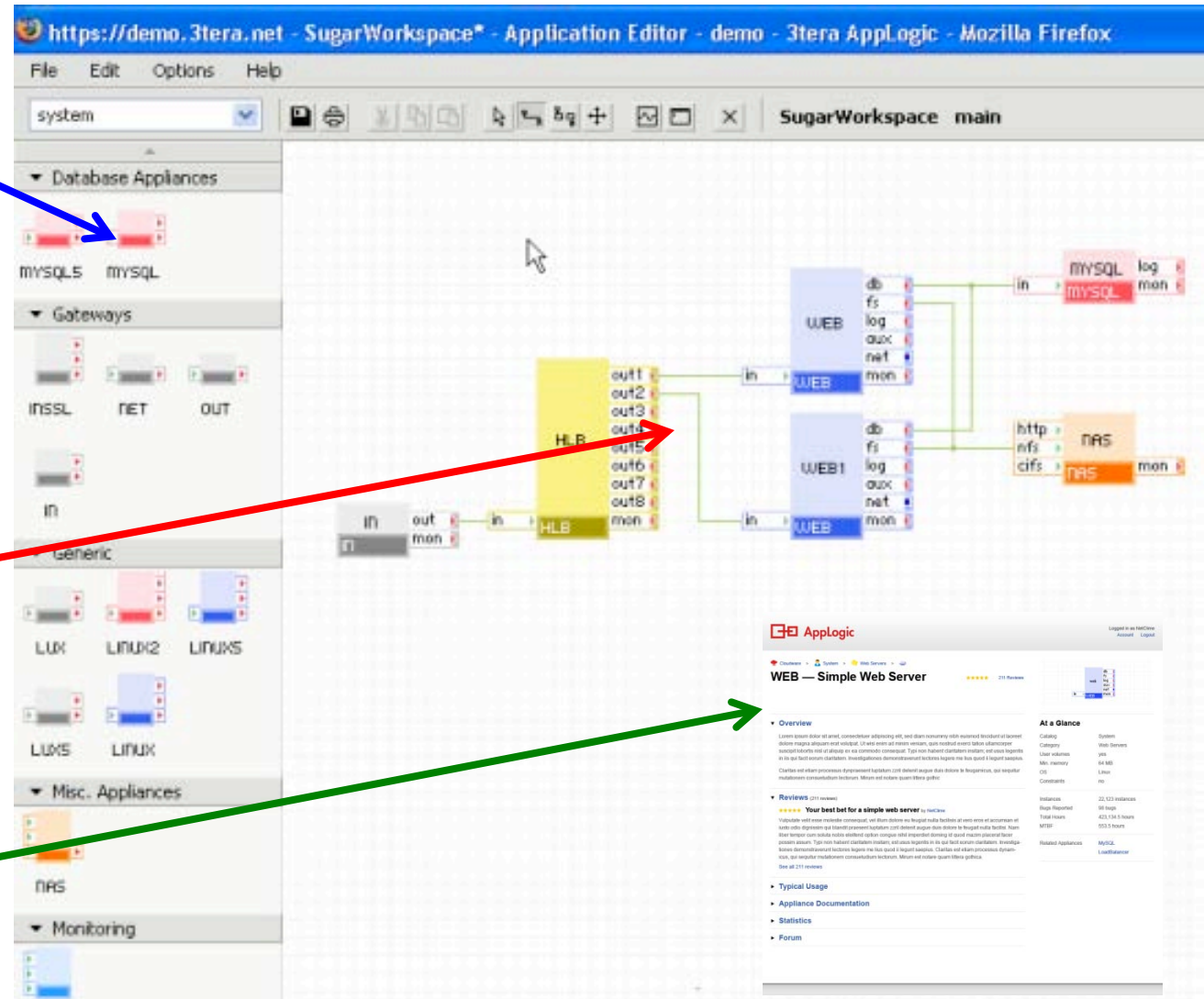
normalization enables visual modeling to design and assemble new systems

Library

- Resources
- Templates
- Patterns

Visual

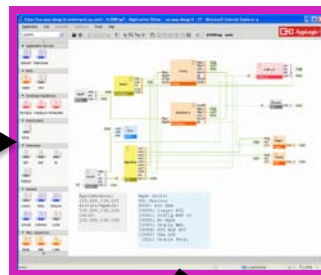
- Assembly
- Customization



composite system virtualization is the key to delivering the supply chain



appliance
catalog

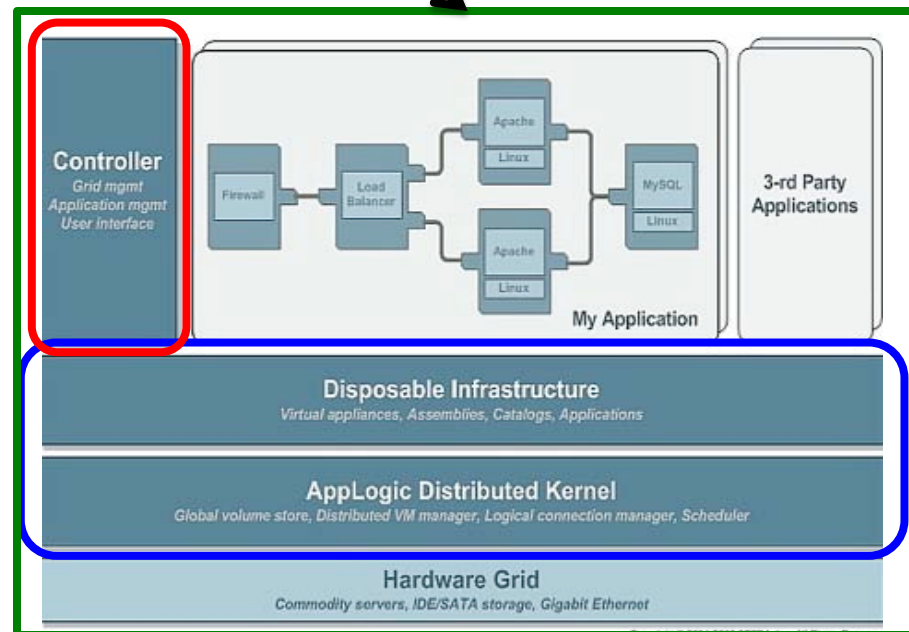


Composite
IT
System

deploy the service model

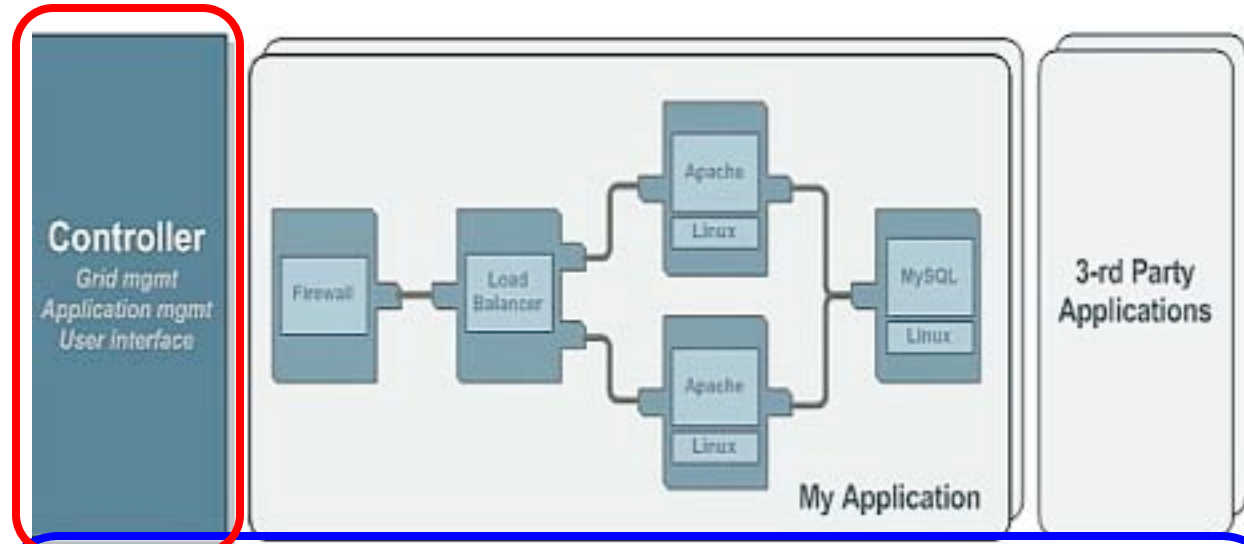
automate and
optimize

pool of
virtual machines and
storage for dynamic
use and release



extending to support the entire cloud

automate
and
optimize



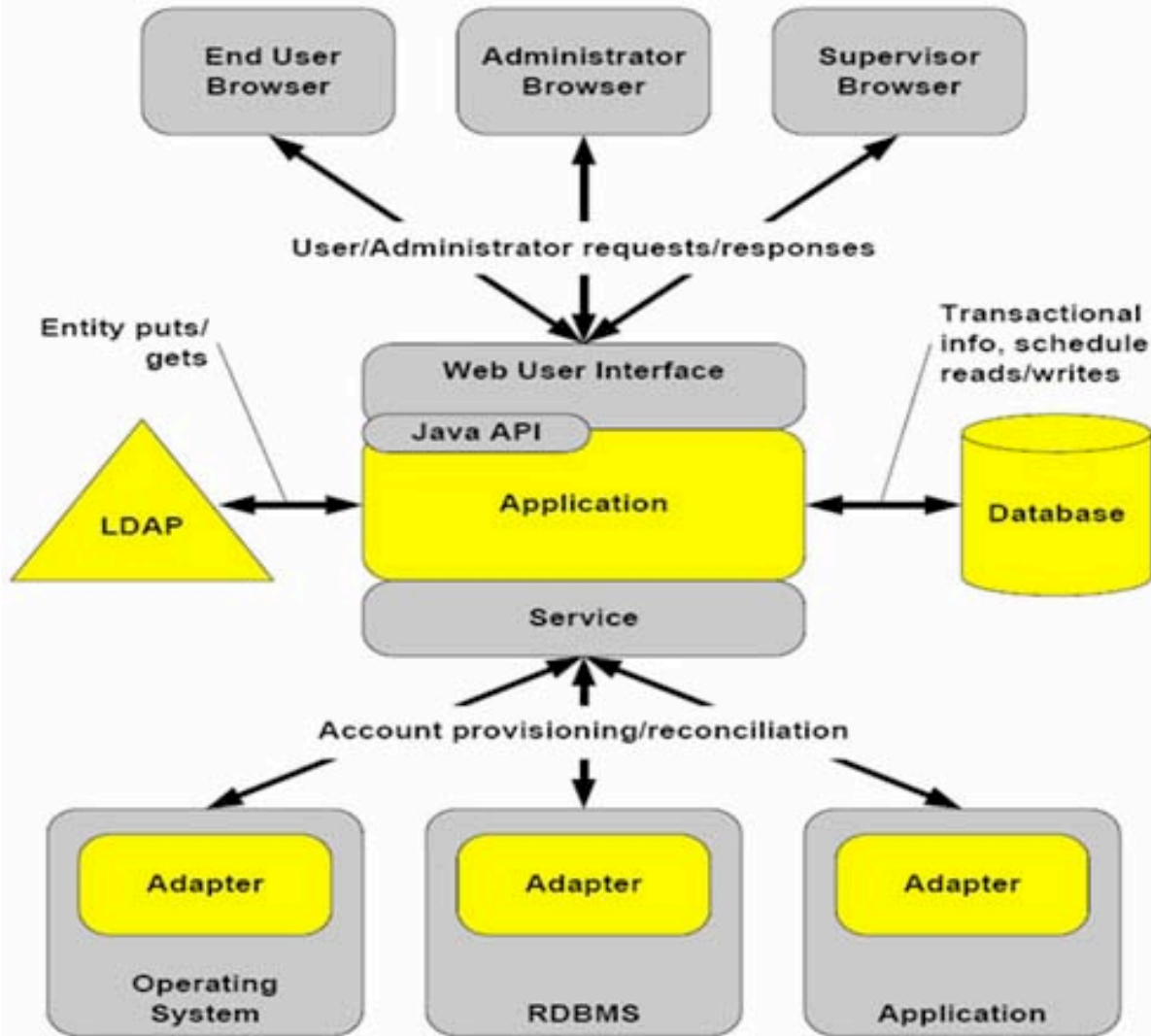
expand beyond
current
models
of virtualization
to virtualize
the cloud



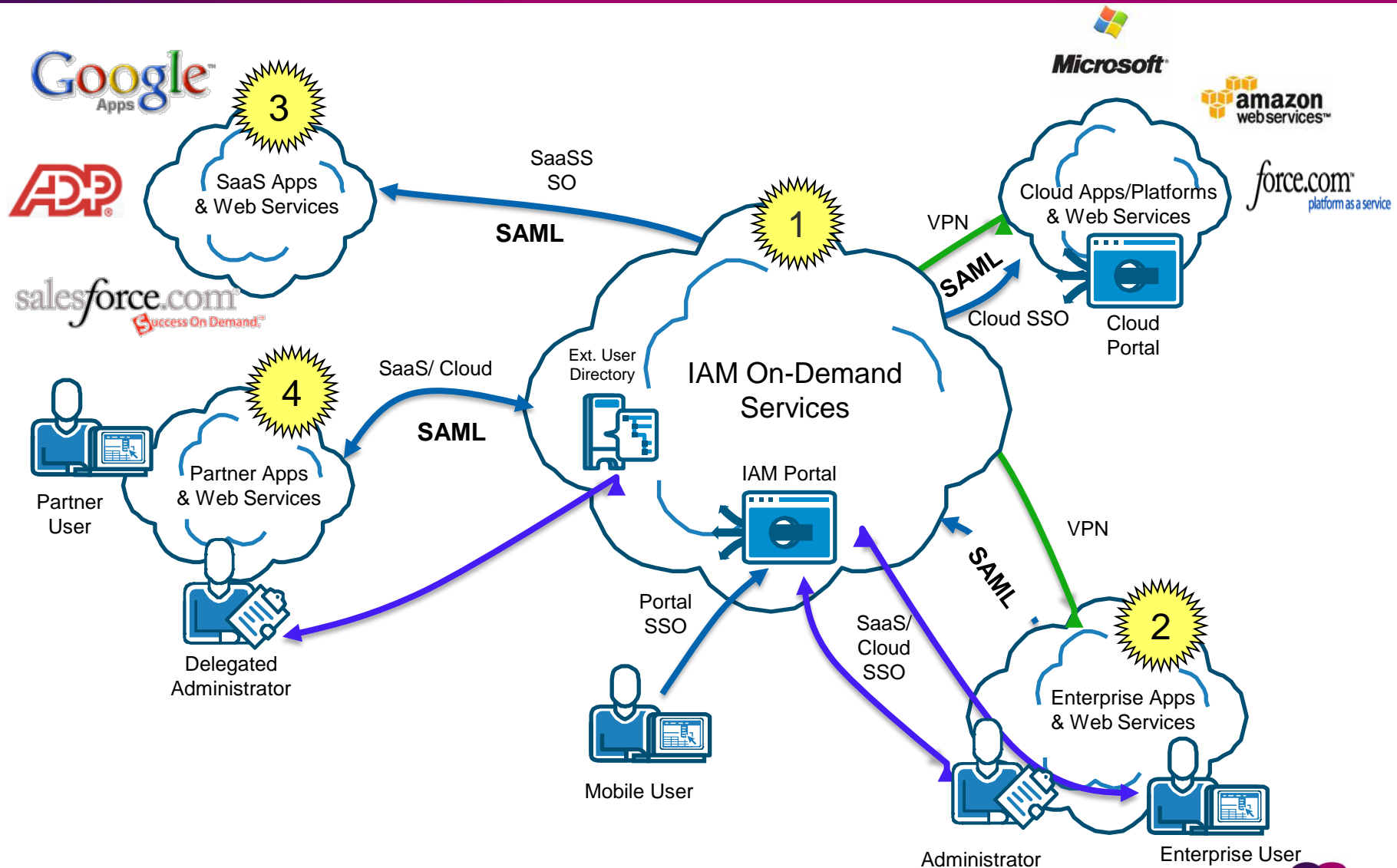
at first, this seem preposterous

- virtualization, and the cloud, have two constructs
 - artifact
 - interpreter
- generalize the model to apply to all aspects of a cloud IT supply chain
 - WAR file → J2EE application server
 - database schema → cloud RDB
 - web content → cloud CDN
- the act of performing a deployment or change of an artifact becomes
 - a generic operation
 - on a generic concept of “interpreter”
- deploying a composite system on the cloud becomes an optimization problem of
 - identify possible interpreters for each application artifact
 - select an optimal configuration based on
 - service level objectives
 - application requirements (security, availability, ...)
 - cost
 - etc.
- and managing the *cloud spanning application/supply chain*

identity and access provisioning – today



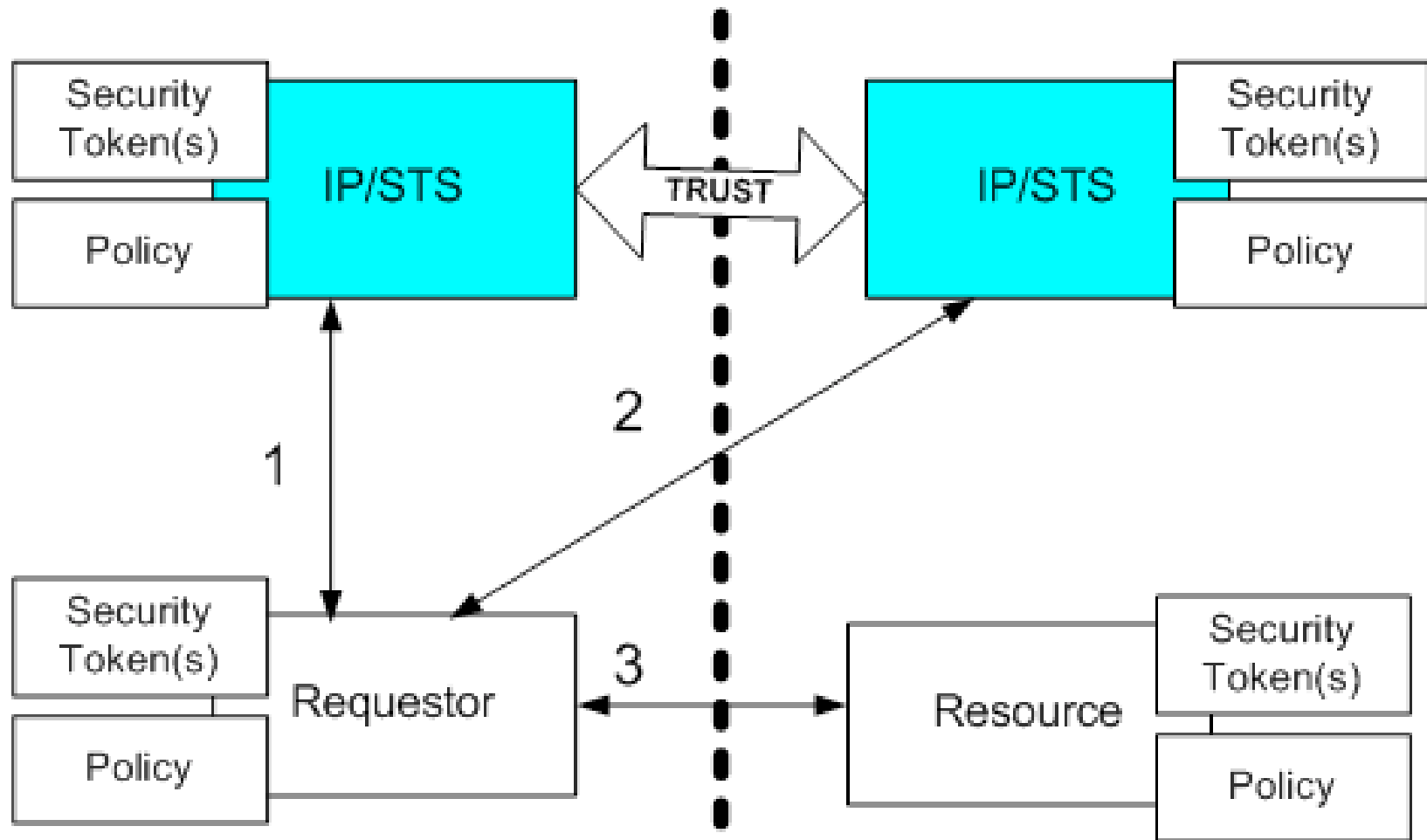
cloud identity/access management provisioning



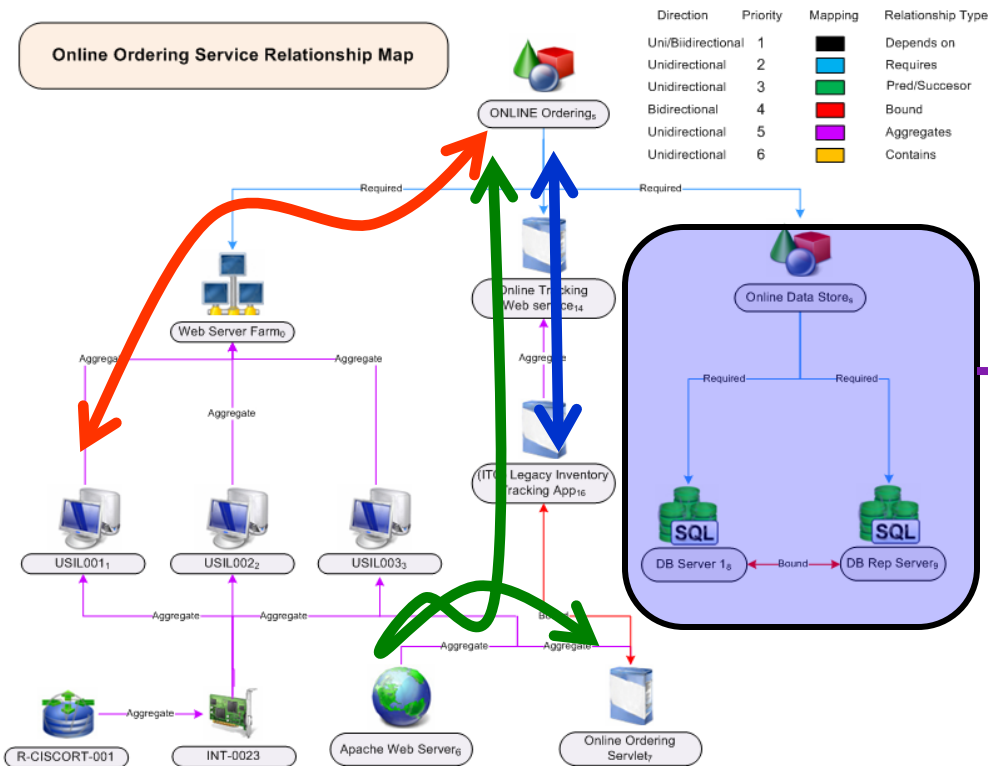
cloud identity/access management

- the basic model of security works for the cloud
 - systems-of-record for identity definitions and access policies
 - workflow processes for propagating identity and policy into management systems, with translation through adaptors
 - plug-in/enforcement points in applications/databases that “phone home” for information
 - distributed audit logs and gathering
- some changes are necessary
 - unified service model for the “subjects” of access
 - federated identity and trust models
 - *stronger authentication to mitigate exposures*
 - optimized implementations

federated identity



cloud services and contracts



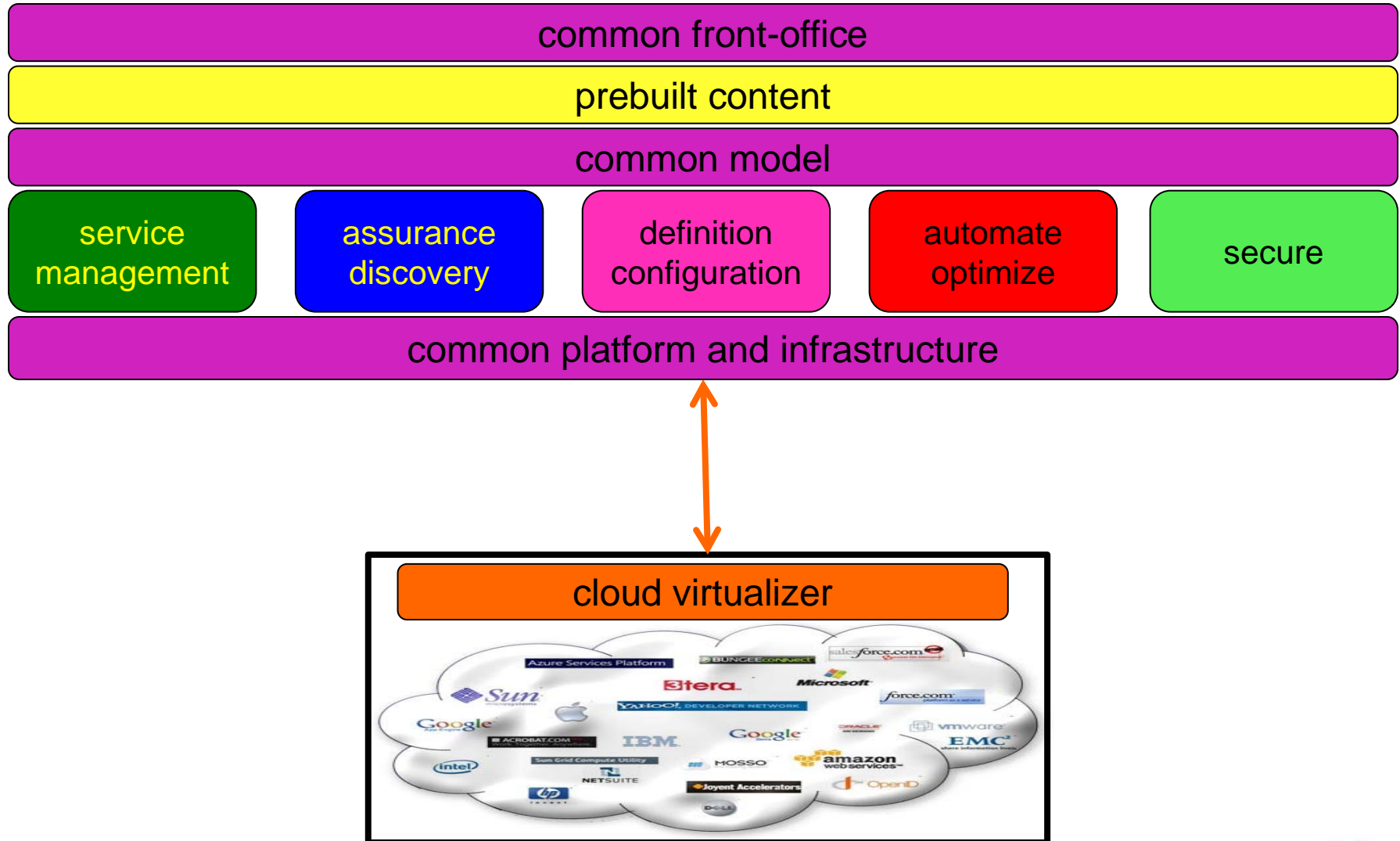
using a cloud service
creates a service contracts



service contract management

- every connection to a cloud service requires
 - monitoring
 - analysis
 - *data leak prevention*
- this information enables analysis of *technical service level contracts* based on
 - response time
 - throughput
 - usage patterns
 - exceptions
 - etc.
- but, ultimately this flows into an engine that analyzes and computes financial contracts
 - penalties for not meeting RT/throughput goals
 - over usage/extra charges
 - etc.

cloud service management



cloud service management

in IT management, “service management” does not necessarily mean “managing SOA.”

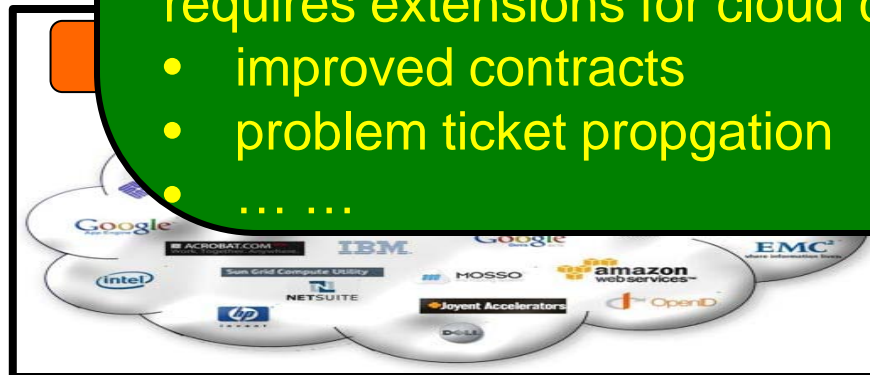
service
management

service management is

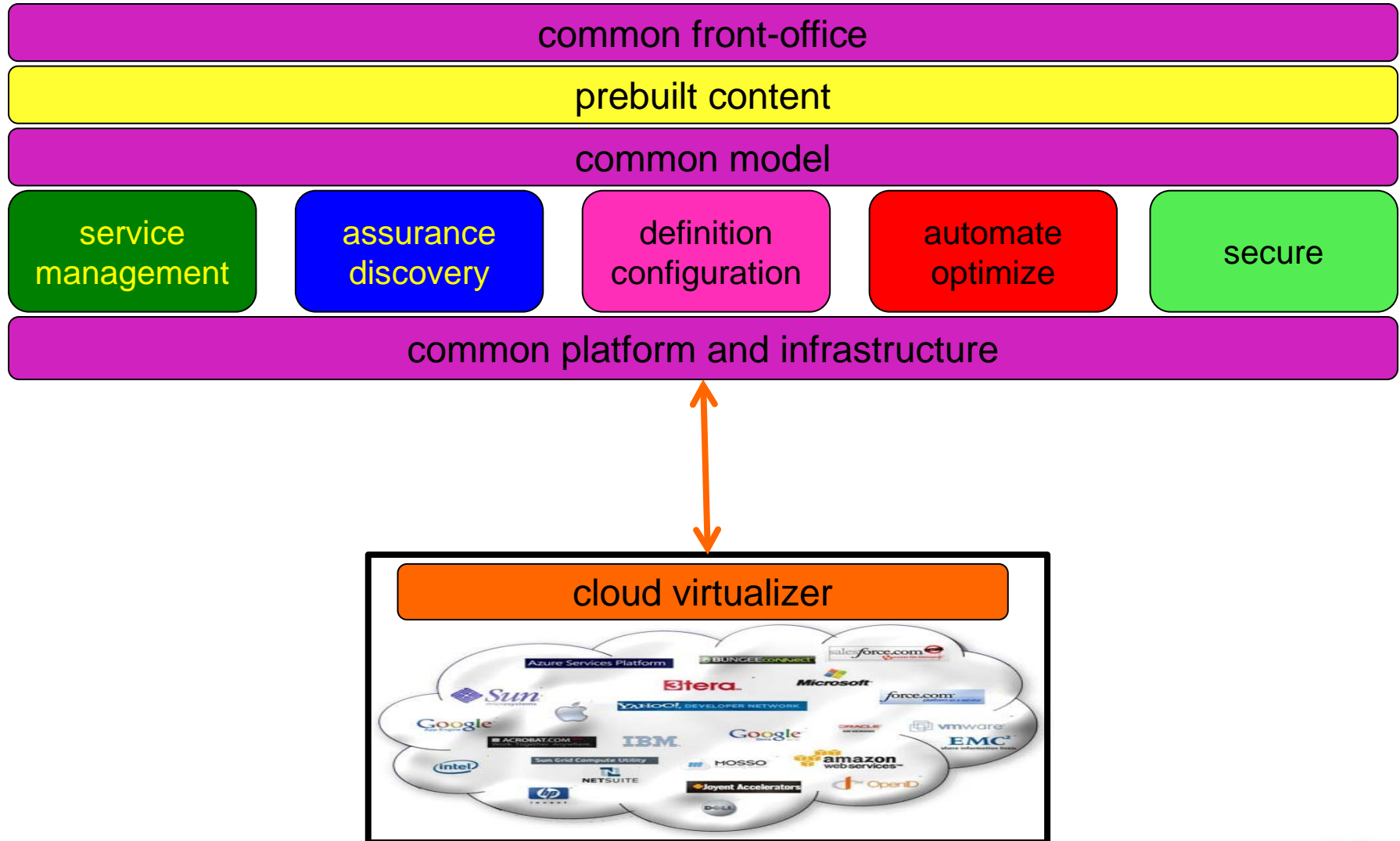
- catalog for requesting cloud services
- chargeback, variable pricing, packages, ...
- problem management tickets
- change requests
- etc.

requires extensions for cloud computing

- improved contracts
- problem ticket propagation
-



plus, why don't we just offer the whole thing as a federated set of cloud services?



summary and conclusions

- at the most basic level,
 - cloud computing simply extends “distributed computing” outside the firewall
 - the basic management and security building blocks are in place
 - monitoring
 - access control
 - deployment, configuration
 - performance, problem management
 - etc.
- but, there are some massive open problems
 - normalization and unified representation of cloud services
 - end-to-end issues when a cloud service provider uses a cloud service provider to meet my needs
 - IT management and security, itself as a cloud service
 - economic matching and optimization
 - simplified, “domain specific language” for defining cloud supply chains