

Addressing Systemic Complexity with SOA and Cloud



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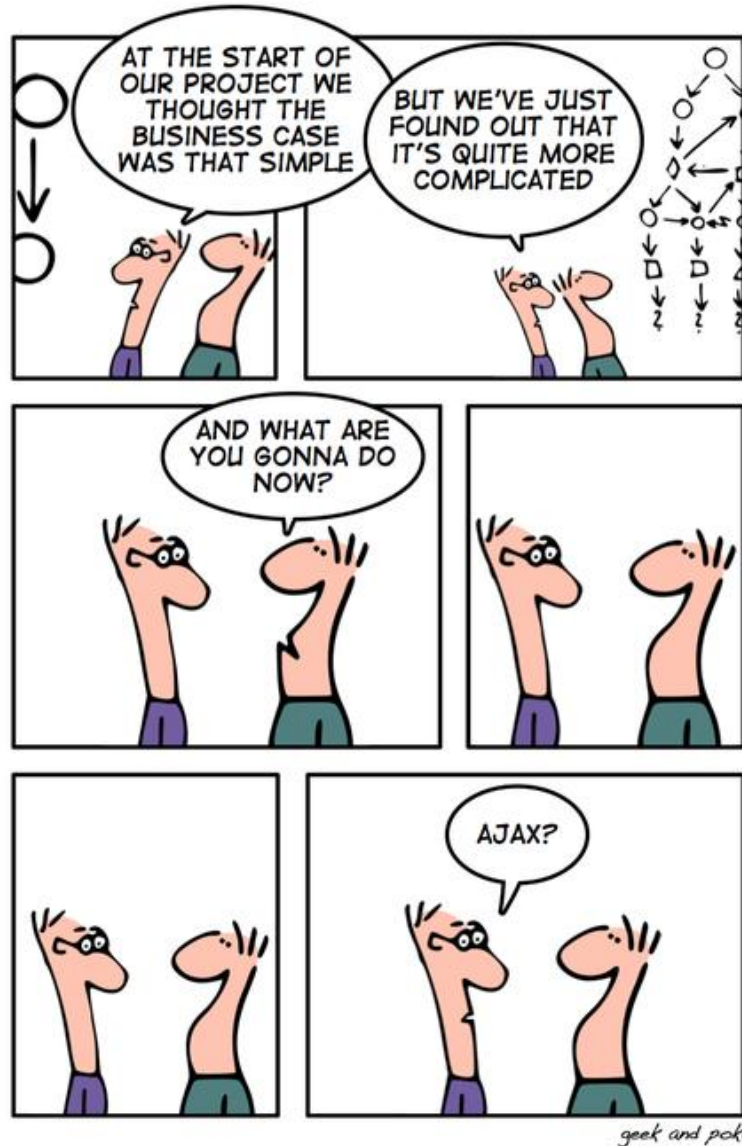
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Introduction



Concept of SOA

The Open Group

- Service-Oriented Architecture (SOA) is an **architectural style** that supports service orientation, which is a way of thinking in terms of services and service-based development and the outcomes of services.

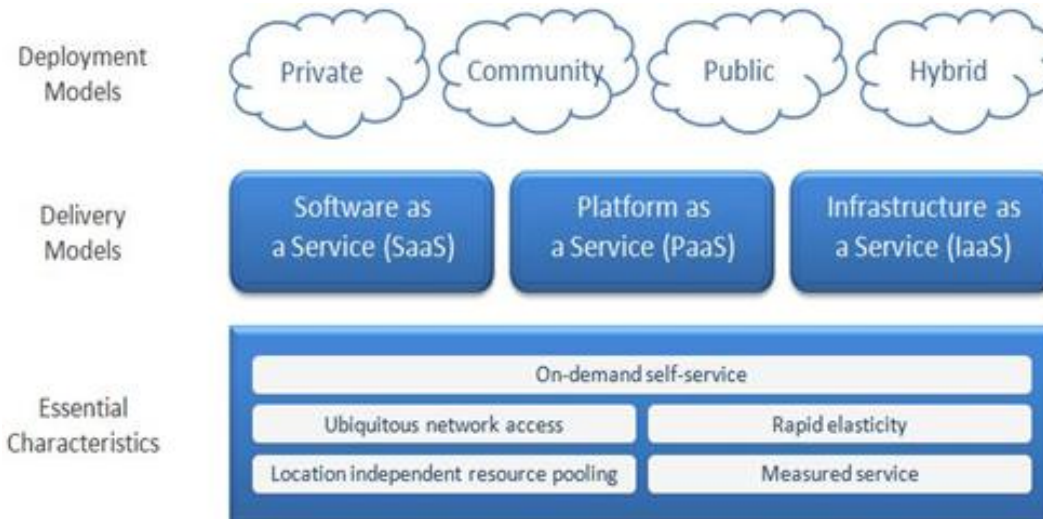
OASIS

- SOA is a **paradigm** for organizing and utilizing **distributed capabilities** that may be under the control of different ownership domains. It provides a **uniform means** to offer, discover, interact with and use capabilities to produce desired effects consistent with measurable preconditions and expectations.

Definition of Cloud Computing

Cloud Computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models.

-- NIST Definition, V15



Why SOA+Cloud Combined?

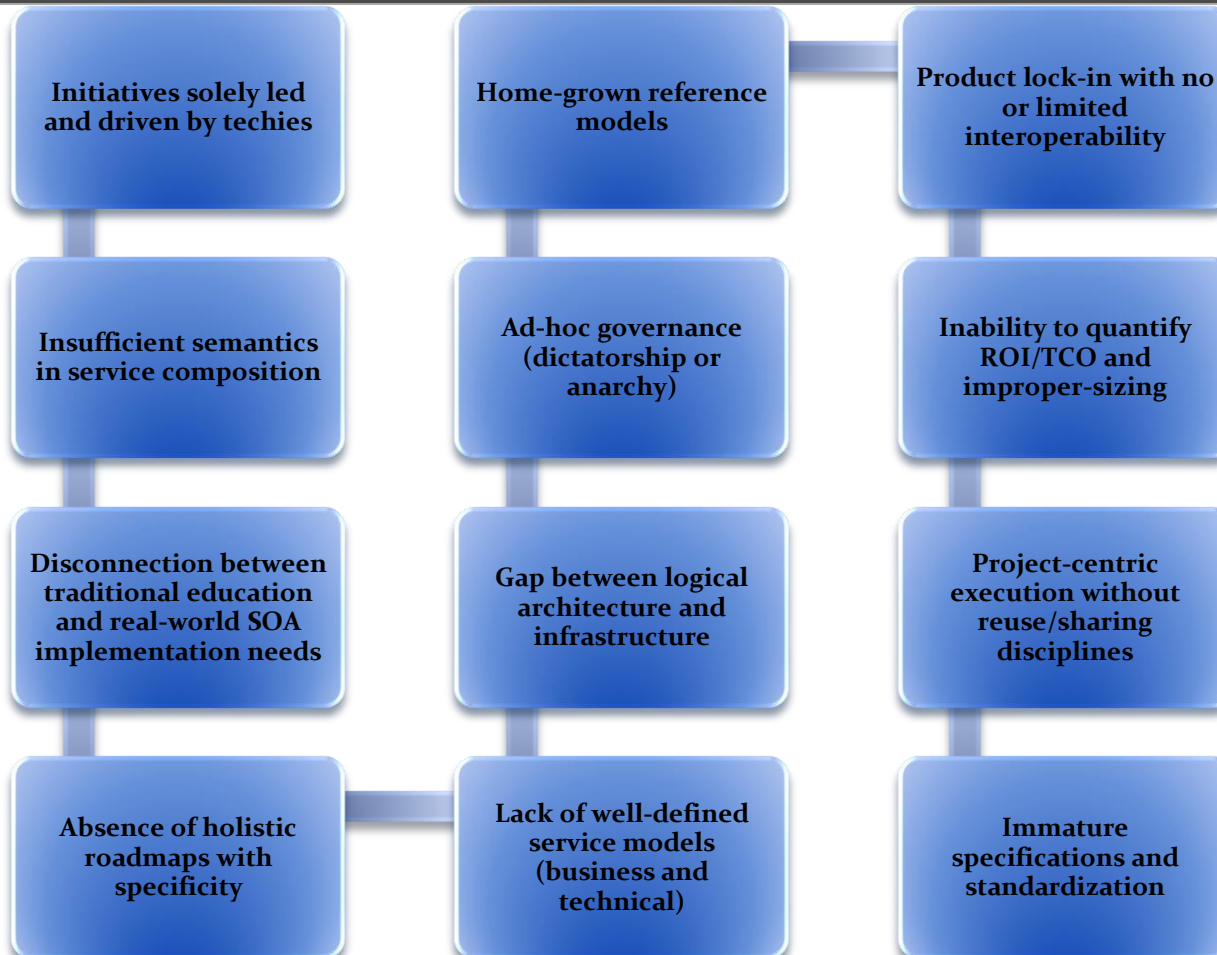
SOA

- Service Orientation
- Mostly software-intensive
- Application integration
- Service reuse via shared services
- Predominantly used within the enterprise

Cloud

- XaaS
- Mainly hardware-focused
- Resource provisioning
- Infrastructure pooling and outsourcing
- New business model for service delivery and consumption

Barriers to Successful SOA



Top 10 Cloud Adoption Inhibitors

Risk-Testing

- How is the cloud computing vendor managing risk?

Data Location

- Where is the data being stored? In-country or out of the country? What restrictions and laws are placed upon the data dependent on location of stored data?

Data and Code Portability

- Once the data has been put onto the cloud computing system, how difficult will it be to get the data back out?

Data Loss

- Does the cloud computing system back-up and restore data?

Data Privacy

- Does the data become more vulnerable when it is located on an external cloud computing system?

Vendor Viability

- What will happen if the cloud computing vendor goes out of business?

Performance

- How can SLA guarantee performance?

ROI

- Does operational expense always trump capital expense, at least in technology investment?

Security

- What are the vulnerabilities in the Cloud architecture?

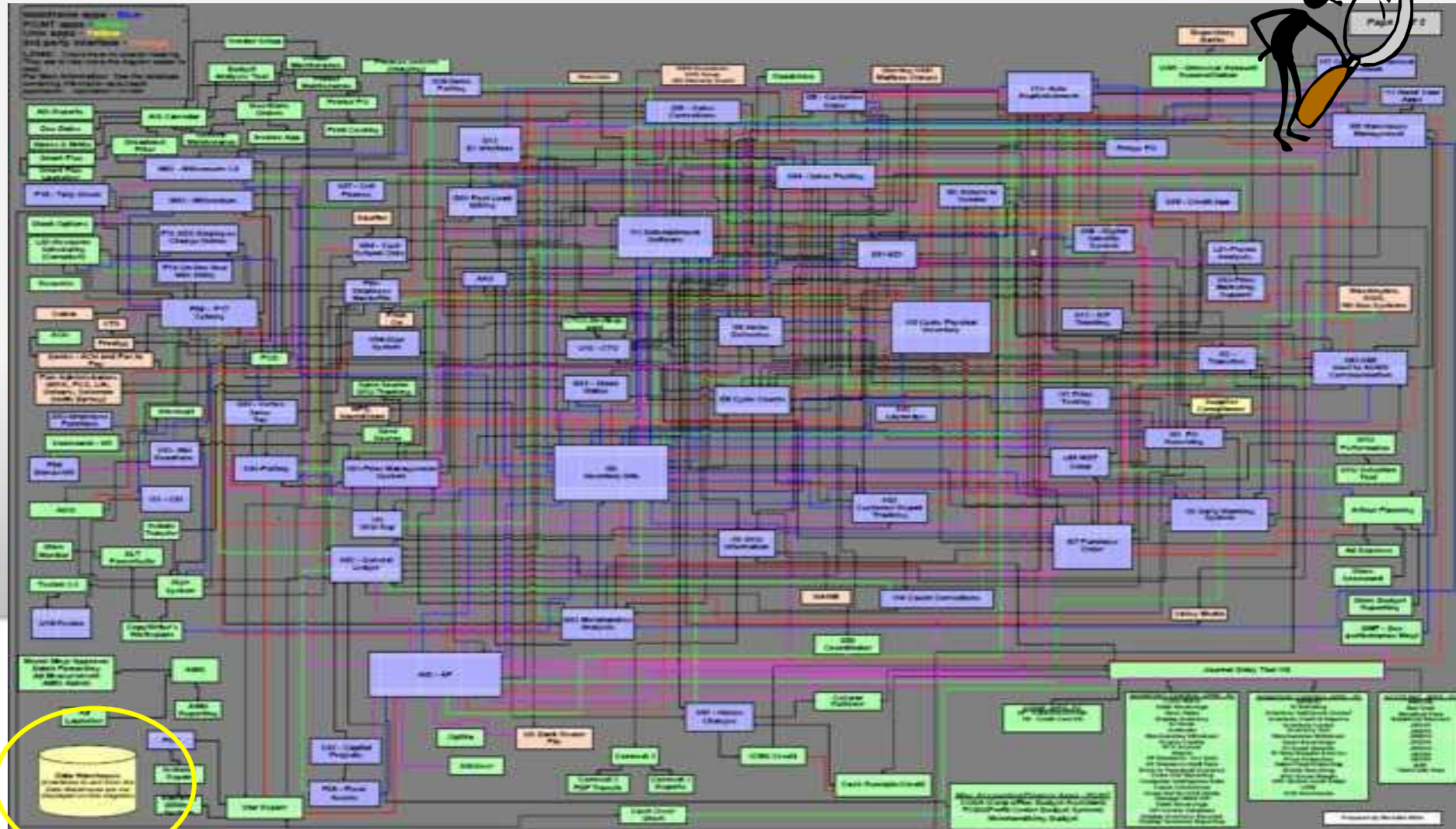
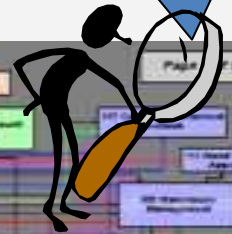
Control

- How can a cloud provider be trusted that they care about your IT processing as much as you do?

Source: Adapted and extended from Gartner and InformationWeek reports in 2009 and 2010.

What these lead to...

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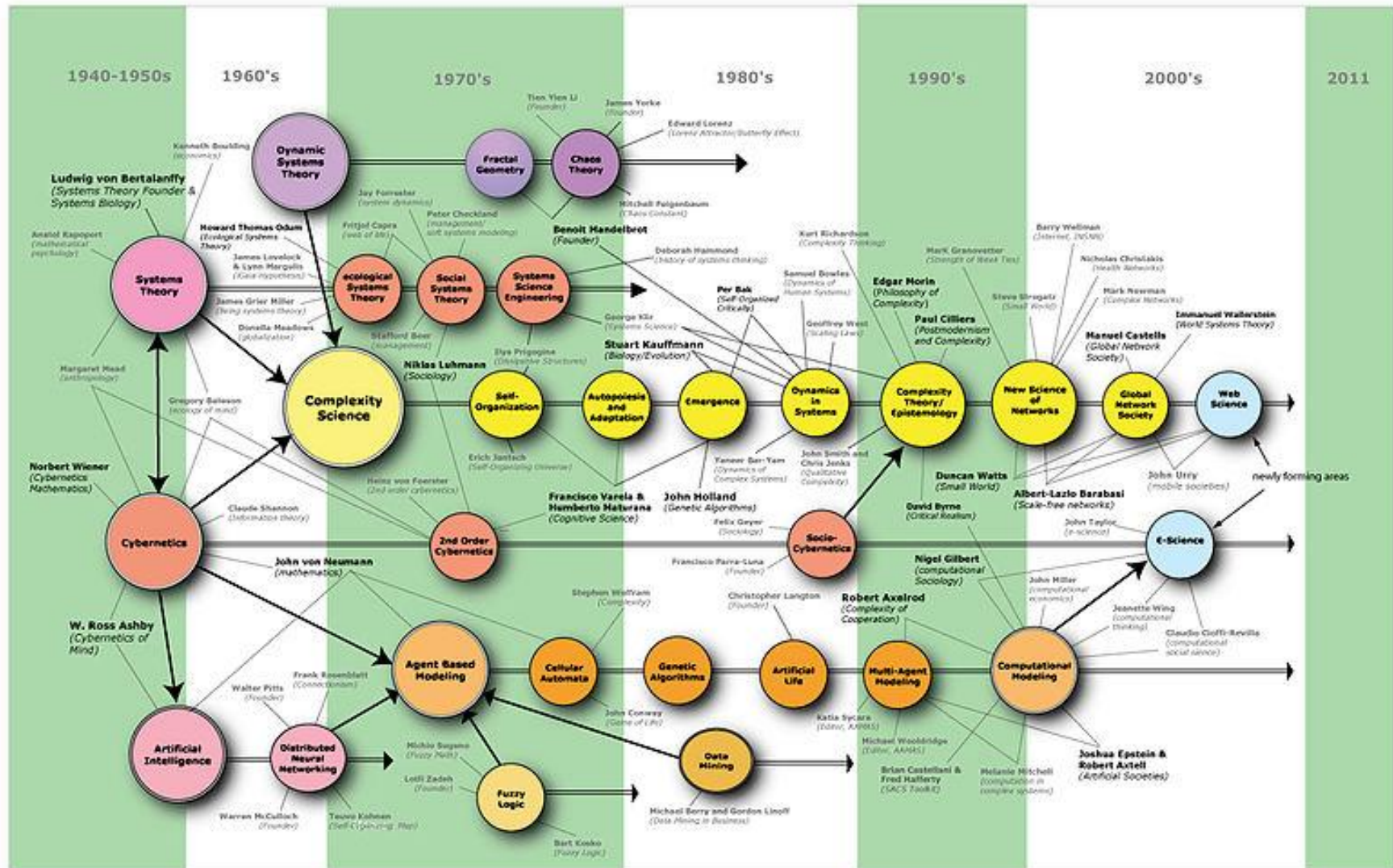
Addressing Systemic Complexity

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How to Effectively Deal with Complexity?



State of Art



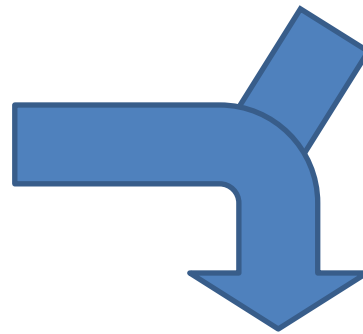
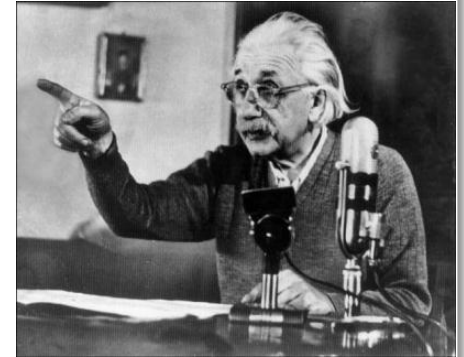
Source: Wikipedia

In Search for a Pragmatic Approach



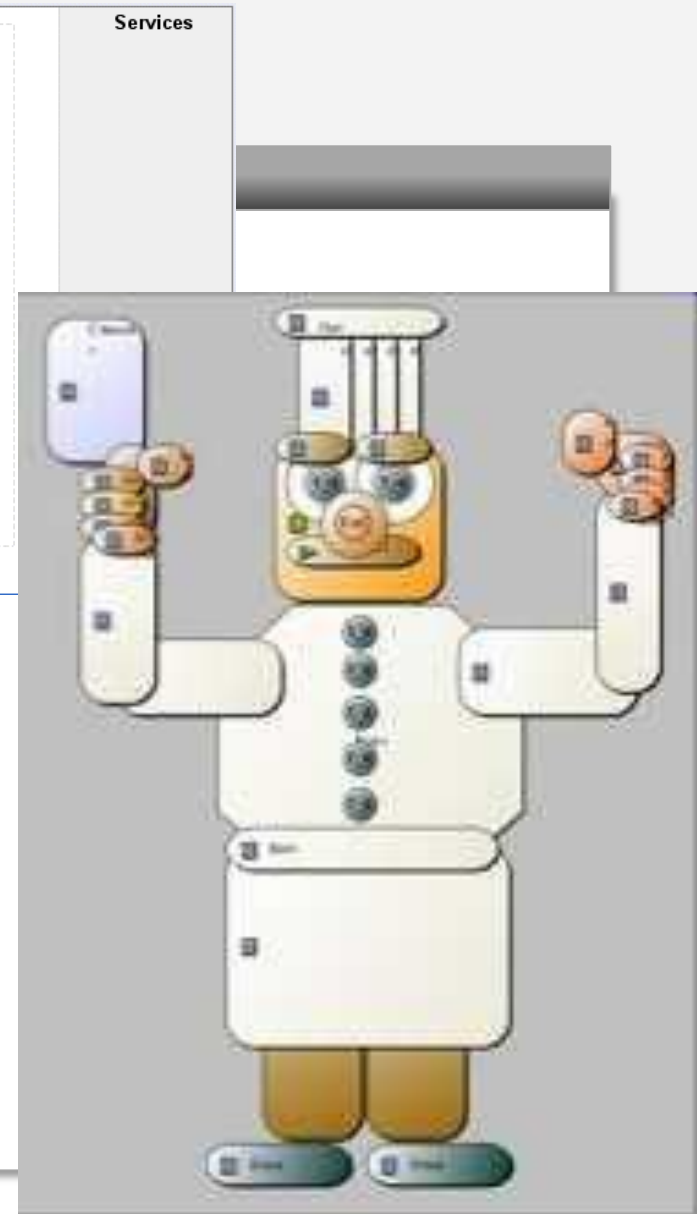
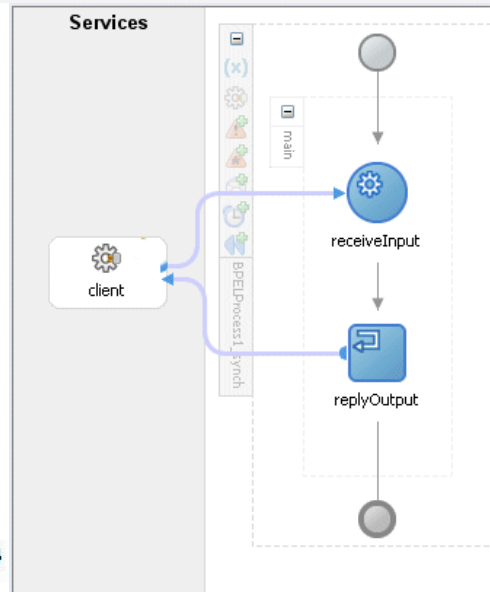
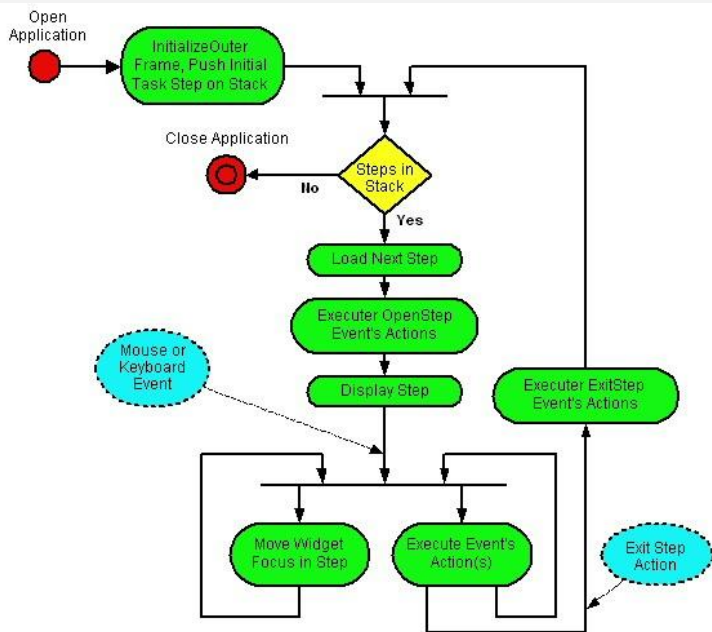
Tomorrow's computing systems cannot be built using methods of today. [Computing Research Association (CRA) report]

We can't solve problems by using the same kind of thinking we used when we created them. [Albert Einstein]

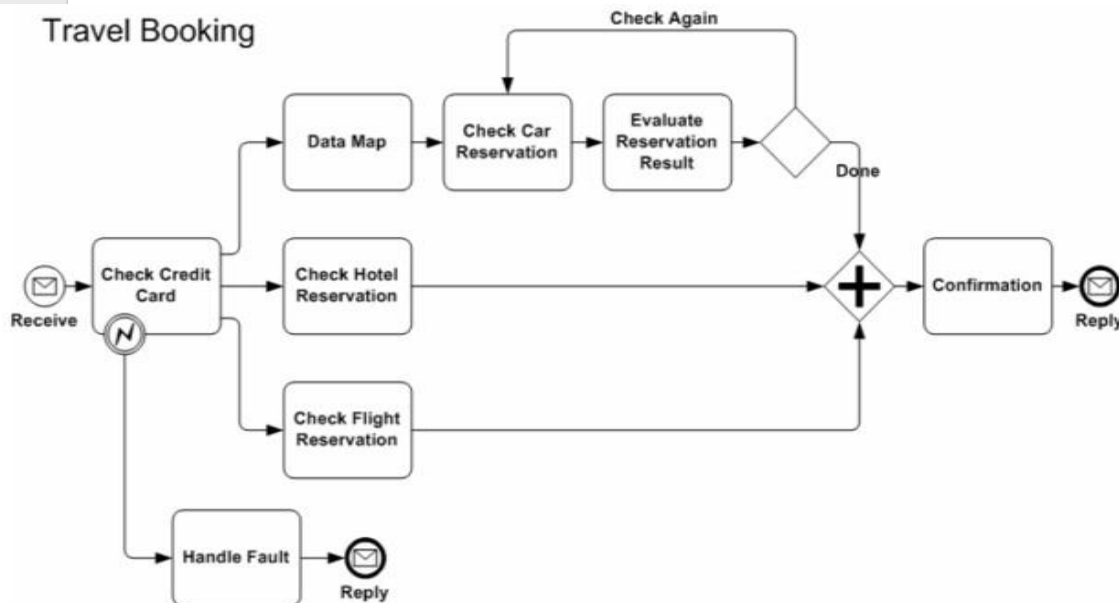


Conquering Complexity – one of five “deliberately monumental” research challenges, each requiring **"at least a decade"** of concentrated research in order to make substantive progress”. [“Grand IT Research Challenges” report supported by NSF]

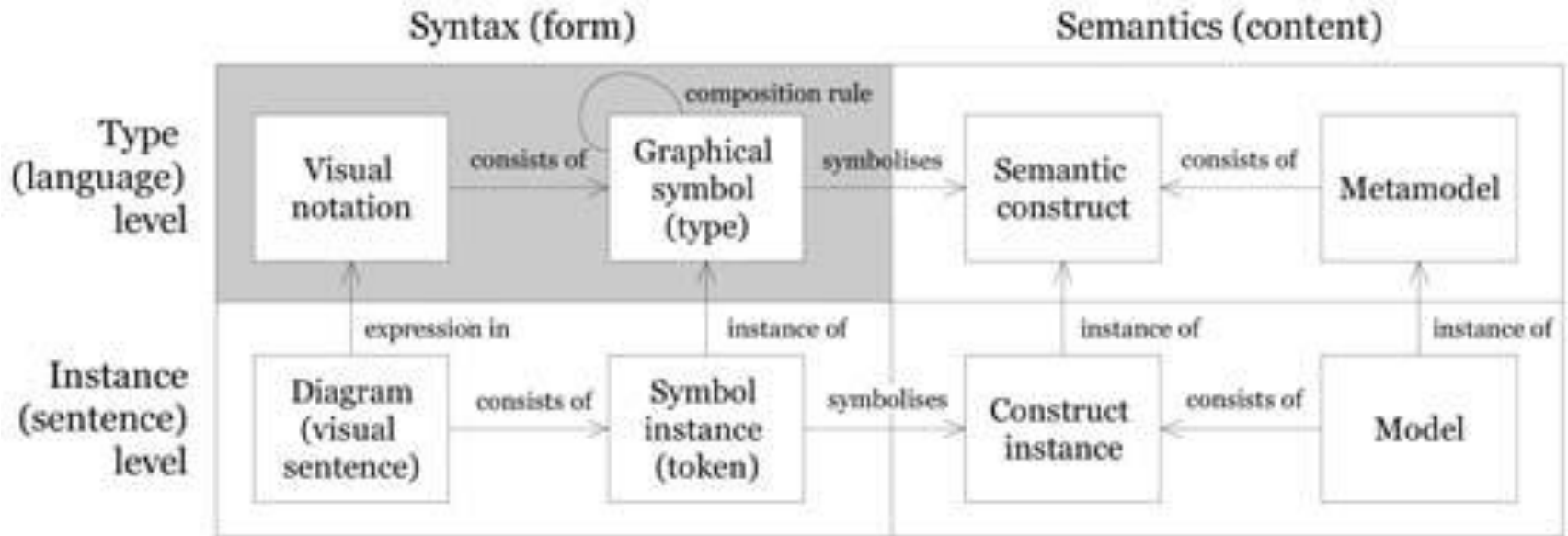
Increasing Disparate Representations



Travel Booking

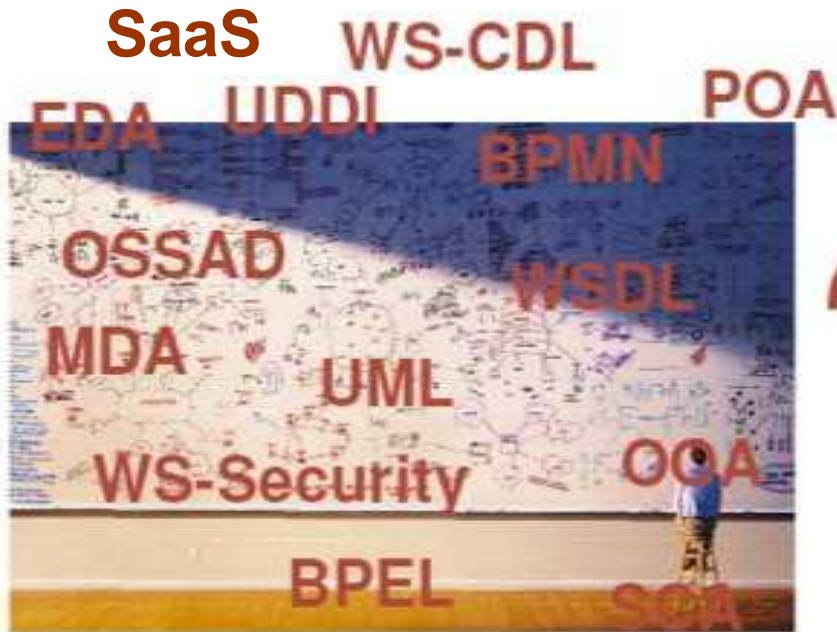


Semantic Notations

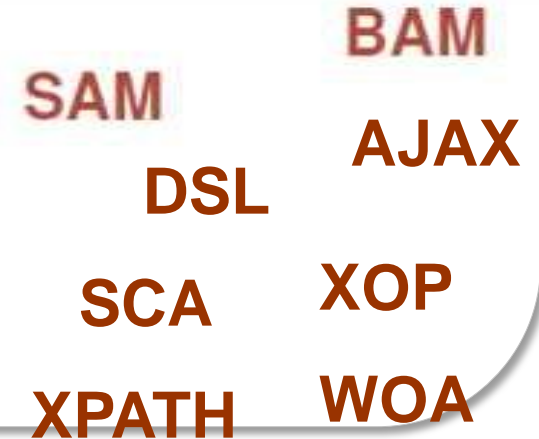
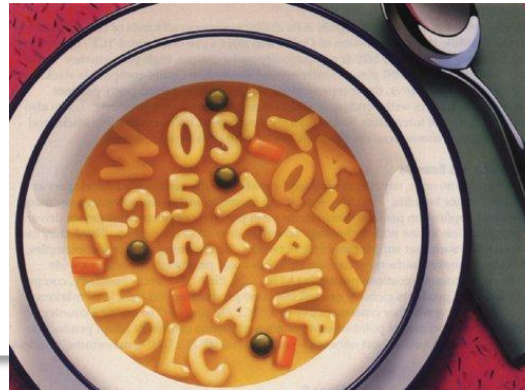
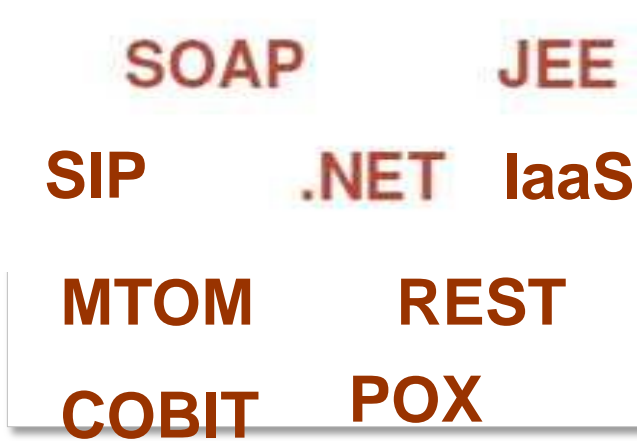


Source: The "Physics" of Notations

Increasing Dynamics



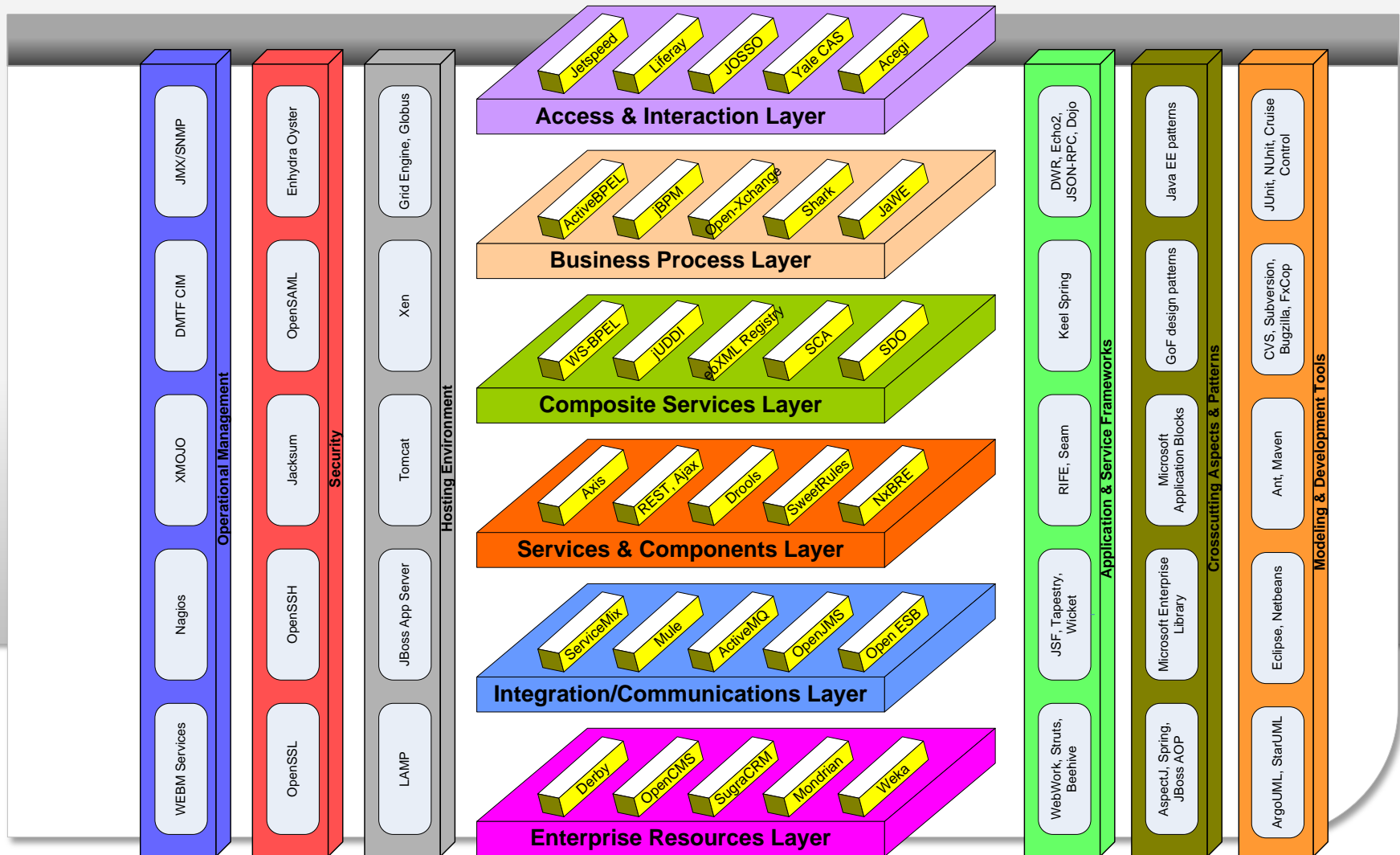
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Service-Oriented Design Accelerator

Reference Model of Solutions Architecture for N-Tier Applications

Designed by Tony Shan



Increasing Fragmented Activities on Specifications



Stack of Standards

Management

- WS-Policy
- WS-PolicyAttachment
- WS-SecurityPolicy
- WS-Manageability
- WS-Management
- WSDM
- WS-Provisioning
- WSDM

Security

- WS-Security
- WS-SecureConversation
- WS-Federation
- SAML
- Liberty Alliance IDFF
- WS-Trust
- XKMS
- XACML
- XrML
- EPAL

Transaction

- WS-Coordination
- WS-Business Activity
- WS-Atomic Transaction
- WS-Context
- WS-CF
- WS-TXM
- WS-TX

Semantics

- RDF
- WSDL-S
- SA-WSDL, SA-REST
- OWL-S, RDF/S
- SWSO, WSMO
- SWSL, WSML
- SOA-S, FEARMO, ODM

Presentation

- WSRP
- XUL
- XAML
- XBL
- XForms
- MXML
- Ajax

Process

- WS-Choreography
- BPMN
- BPDM
- BPML/BPQL
- XPDL
- WSCI
- CDL4WS
- BMM
- UML
- OAGIS

Composition/Orchestration/Construction

- BPEL
- WS-CAF
- WSE
- WCF
- JAX-WS
- SAAJ
- SCA
- Axis

Messaging

- SOAP
- REST
- JSON
- SwA
- WS-I Attachment Profile
- XML Security: XML Encryption, XML Signature

Interoperability

- WS-I Basic Profile
- WS-I Basic Security Profile
- WS-I Reliable Secure Profile
- Governance Interoperability Framework (GIF)
- Reusable Asset Specification (RAS)
- DMTF CIM

Resources

- WSRF
- WSRF-ResourceProperties
- WSRF-ResourceLifetime
- WSRF-ServiceGroup
- WSRF-BasicFaults
- WS-Transfer
- RRSHB
- WS-Enumeration

QoS

- WS-ReliableMessaging
- WS-Reliability
- WS-RX

Foundation

XML Processing

- DOM
- SAX
- XPath
- XSLT
- XQuery
- .Net XML
- Serialization
- JAXB
- SDO
- STAX

Description

- XML
- XML Schema
- WSDL
- XML Info Set
- XOP/MTOM
- SML
- DMCBX
- RELAX NG
- Schematron
- Assertion Lang

Discovery

- OWL
- WS-Discovery
- WS-MetadataExchange
- UDDI
- ebXML
- SwSA

Communications and Events

- Transport: SSL/TLS
- Network: IPSec
- BEEP
- HTTP/IIOP/MQ
- WS-Eventing
- WS-Notification
- WS-Addressing

Increasing Components

Mapping SOA Reference Architecture to the Enterprise SOA Maturity Model

Traditional Development

Develop Web Applications

Composite Applications

Automate BP

Enterprise Services: Basic services required across the enterprise. Examples: Directory Service, Content Management, Search, eMail, Calendar, IM, Discussion Forum, White Board, etc.

Packaged Applications: These are the best of the breed packaged application that also act as the system of record for a particular business function.

Custom Applications: These are either built on an App Server, Portal or proprietary thick client. Application Framework required to leverage reuse. Examples: Logging, Exception handling, data services, application configuration, monitoring, search framework, notification framework, service proxy, Single Sign-On

Enterprise Portal: Role based portal that is available 24x7. Provides single point of entry for all users, multi-channel support, consistent look and feel, access to business capabilities based on role.

Enterprise Security: Provide user authentication, authorization, identify management, profile management, delegated admin, etc.

Enterprise Service Bus: Route services to the appropriate destination; receive and transmit messages in any protocol, provide message transformation, routing, validation, auditing, security, monitoring and reporting services.

Business Process Manager: Configure and automate business process. Provide business users the capability to modify the business process & policies.

Service Registry: Service registry containing service properties such as service capabilities, parameters, service levels, etc.

Shared Data Services: Extract, Transform & Load (ETL), Electronic Data Interchange (EDI), Enterprise Information Integration Data Quality (Matching Engine, Master Data Management)

Service Manager: Manage service lifecycle across the enterprise.

Enterprise Application Integration: Traditional enterprise integration approach. Provide Application Adapters, Business Process, Messaging, Security, etc. capabilities. Mostly proprietary in nature and application integration generally implemented as a point-to-point integration on a Hub..

Business Service Management: Monitoring, capacity planning, utility computing

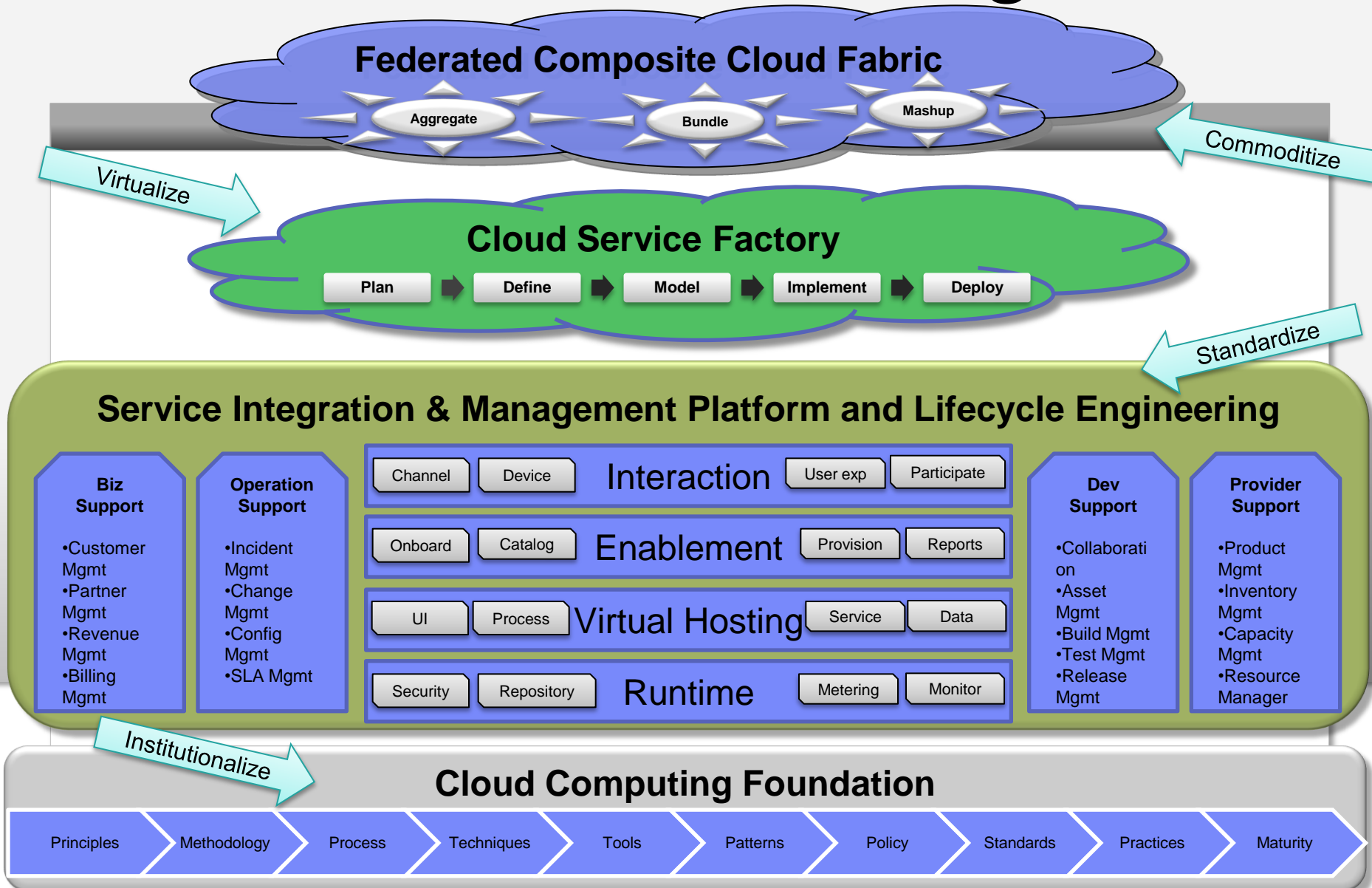
Mainframe Application : Access data via gateways

Business Service Management
Availability Mgmt, Program Mgmt, Service Level Mgmt, Capacity Mgmt, Utility Computing

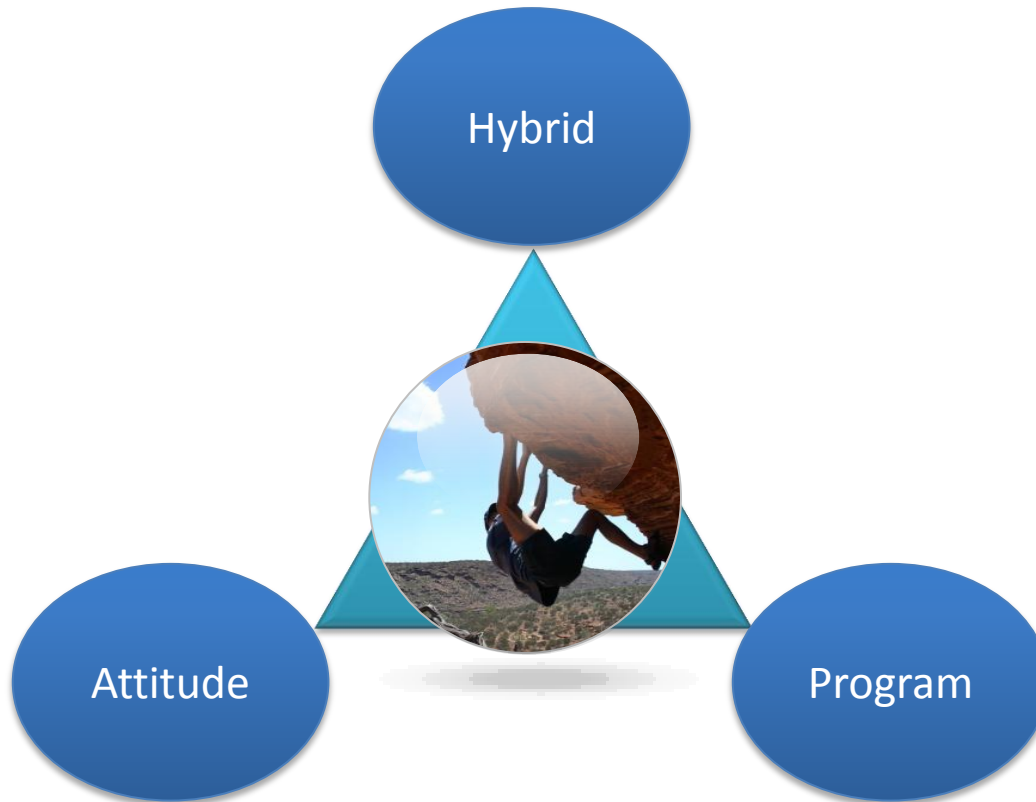
Enterprise Security – Authentication, Authorization, Identity Management, Delegated Admin, User Provisioning, etc.



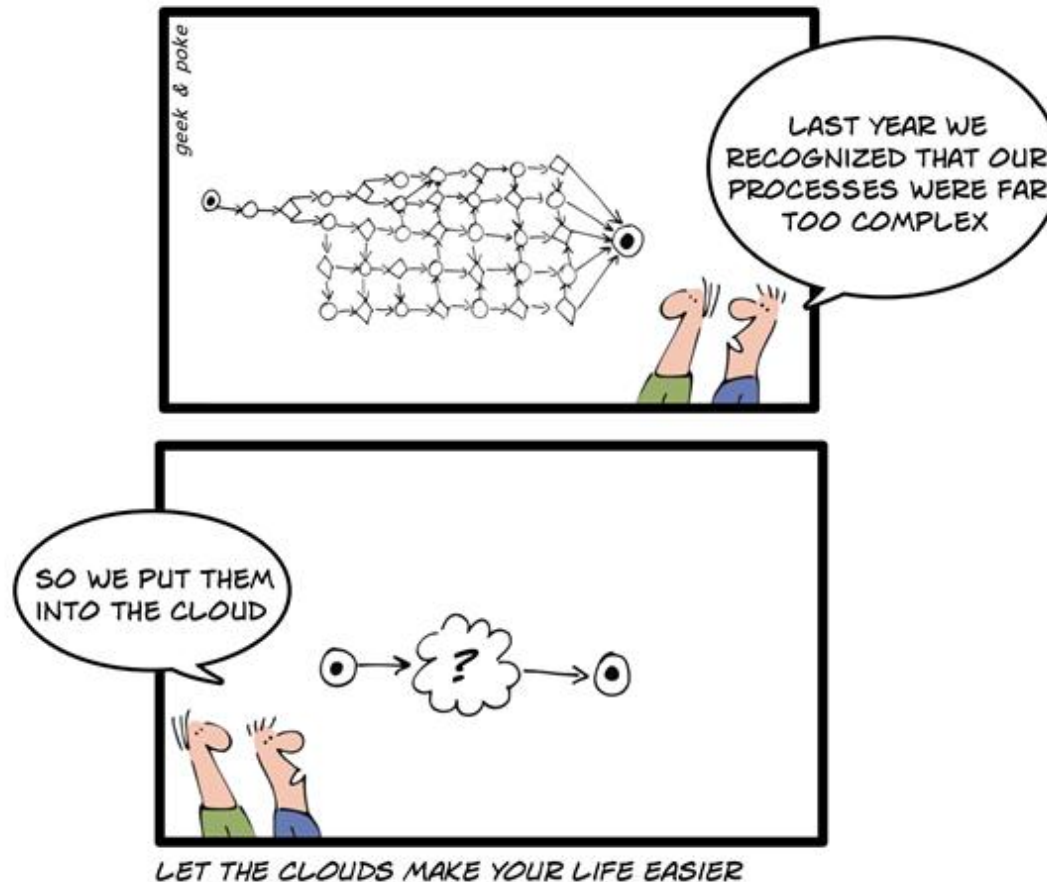
Cloudonomic Paradigm



Best Practices



Case Study of Healthcare Vertical





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धन्यवाद Hindi 多謝 多谢 Traditional Chinese ขอบคุณ Thai
Спасибо Russian 多谢 Simplified Chinese Obrigado Brazilian Portuguese
شكراً Arabic **Thank You**
Grazie Italian Danke German ありがとうございました Japanese
Multumesc Romanian Merci French 감사합니다 Korean Gracias Spanish