Enterprise Software Overview

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Rakesh Ranjan:Bio

- Lecturer, MS Software Engineering, Department of Computer Engineering, San Jose State University
- Senior Manager and Architect @ IBM silicon Valley Lab, San Jose CA
- 18 years of IT industry experience:
  - Big Data Analytics and Cloud
  - Software systems architecture in cloud operating model
  - Large software product development & testing
  - Extensive Database & Business Analytics experience
- Authored a text book Enterprise Software Platform
- Co-authored 2 books on DB2 and Business Intelligence
- Frequent speaker at Software & Systems Engineering Conferences
- Strategic thinking and execution with completeness of visions
- Getting in touch:
  - **Email to rakesh.ranjan@sjsu.edu**
  - http://www.linkedin.com/in/ranjanr 
  - http://www.ranjanr.blogspot.com/ 

Course outcome

- Demonstrate an understanding of advanced knowledge of the practice of software engineering, from vision to analysis, design, validation and deployment.
- Understand emerging technology principles and architecture and be able to apply in creating innovative solutions
- Tackle complex engineering problems and tasks, using contemporary engineering principles, methodologies and tools.
- Demonstrate leadership and the ability to participate in teamwork in a large software product development organization.
- Communicate effectively, in both oral and written forms.

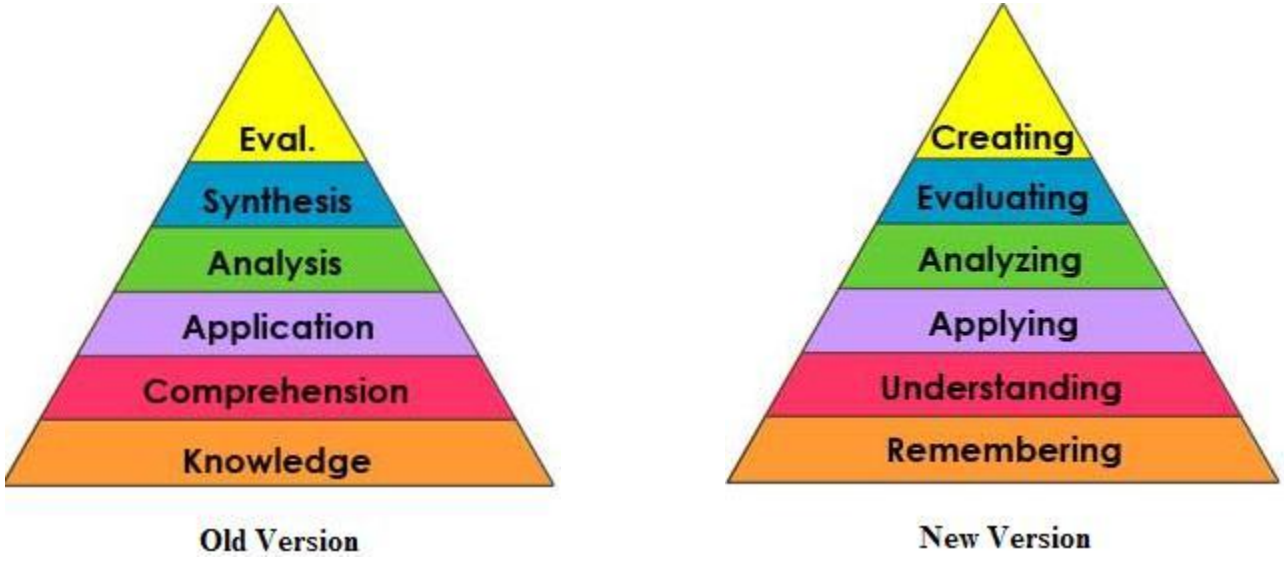
Class Participation

- Must attend all lectures (in case of emergency, send me an email)
- Lectures and other class materials will be posted at D2L after the class, You must be able to access D2L.
- Missing Quizzes, Assignments and Exams will severely affect your grade
- You will be provided constructive feedback on your assignments, Quizzes and midterm.

Class Rubric

A	• Always prepared and attends class • Participates constructively in class • Exhibits preparedness and punctuality in class/class work • Works well with others and is a team player • Demonstrates initiative and improvement • Seeks to understand and acknowledge others' thoughts • Often reaches full potential if sufficiently challenged • Class assignments have something extra about them • Exceptional content knowledge • Demonstrates ability to integrate new knowledge into work • Challenges his/her own thoughts and ideas
B	• Usually prepared and attends class • Participates constructively in class, works well with others, and is a team player • Excellent content knowledge • Completes all class assignments; occasionally adds something extra • Demonstrates initiative and improvement • Seeks to understand and acknowledge others' thoughts • Stretches to reach full potential
C	• Sometimes prepared and attends class • Average content knowledge • Occasionally or only challenges thought when encouraged by others • Assignments reflect average work • Sometimes an active participant in class; works well with others
D	• Rarely prepared or attends class • Rarely participates constructively in class • Assignments are late, incomplete, or not turned in at all • Low level of content knowledge • Does not strive to reach potential.

Learning method: Bloom's Taxonomy



Reference: http://cte.uwaterloo.ca/KSU/Bloom's_Taxonomy_Cognitive_Domain.pdf

Software Development for Enterprise Systems

Enterprise systems are software applications that automate and integrate all or many of the key business processes(workflow, messaging and services) of an organization.

After studying this unit, you should be able to:

- understand the overview of a software development platform and its core components that facilitates enterprise software development.
- understand the various terminologies used in the context of enterprise software and systems.
- understand the difference between orderly software engineering and exploratory software engineering practices how you can apply in real world scenario to develop more standards based software

What is an Enterprise Software?

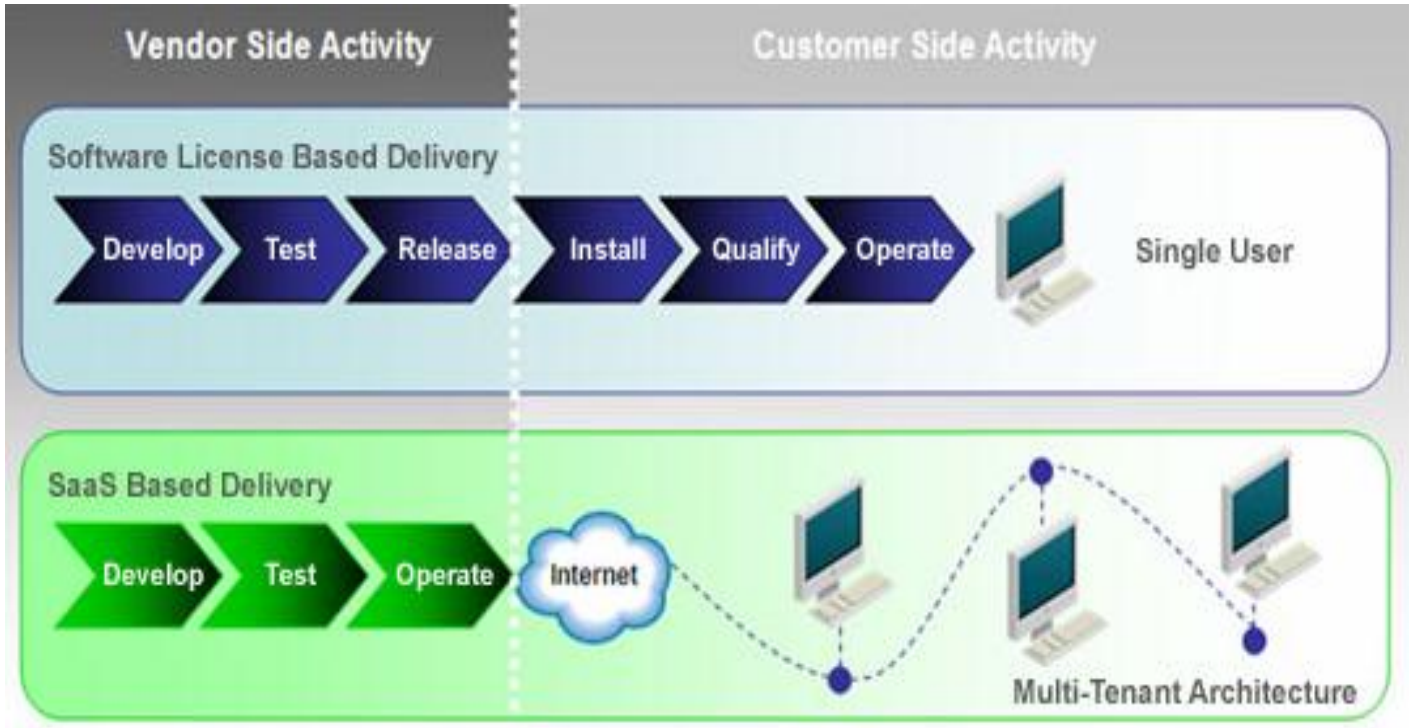
- Used by medium and large enterprises (corporations, non-profits, governments) and not by a consumers?
- ERP or CRM software? enterprise resource planning is business management software to store and manage data from every stage of business
- How about social network software like Facebook and LinkedIn?
- How about a continuous integration system?
- A Perl module?
- Finance/ Accounting software?
- Big databases that run banks and airlines?
- Middleware software like IBM Web sphere and Oracle Fusion?
- OS as software platforms?

Factors/Characteristics

- Various connotations of the term “enterprise”
- Delivery model of the software
- Impact of failure
- Pricing / Ease of acquisition and deployment
- Performance
- Scalability with business growth
- Long term support / viability
- User base
- Security / Reliability
- Other ideas?

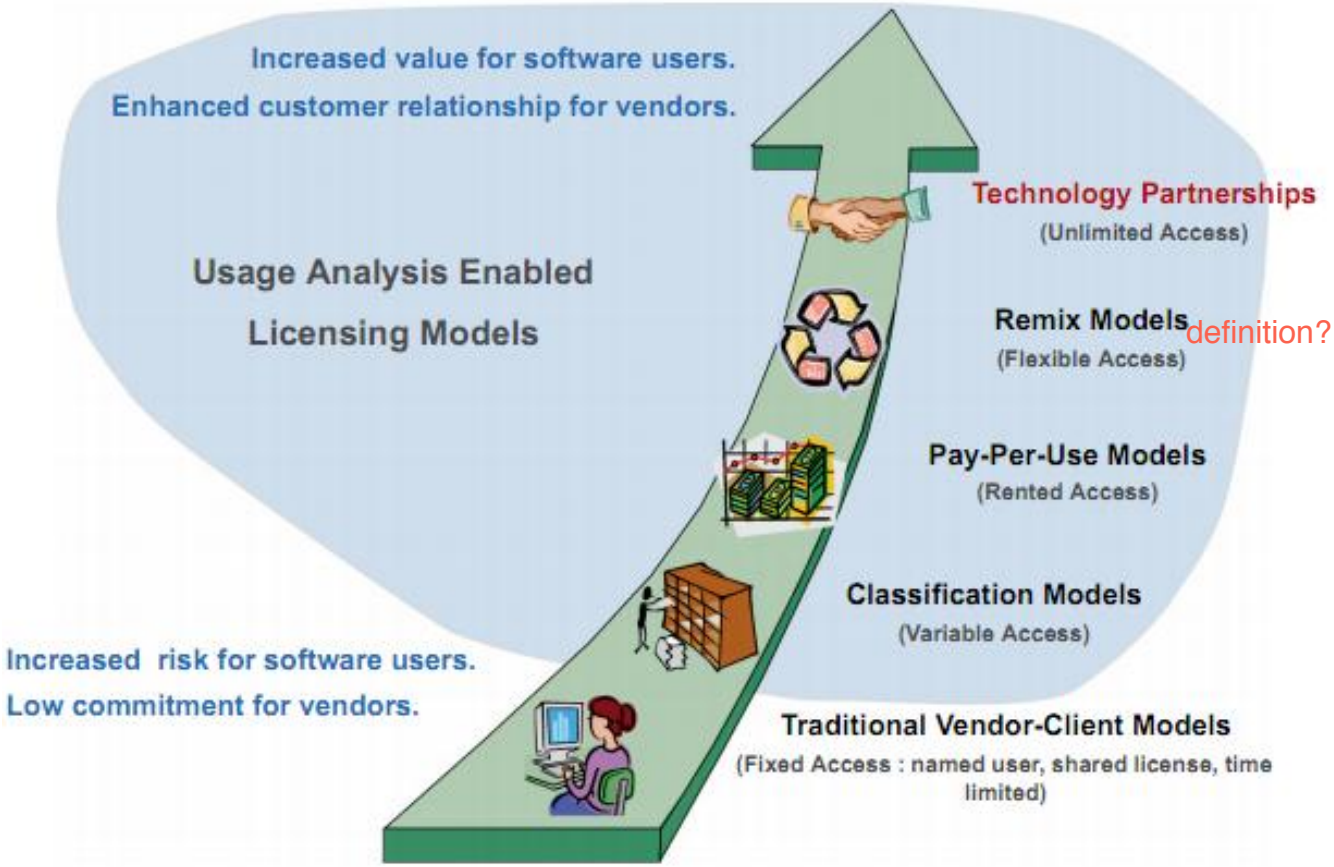
Software Delivery Model

- Traditional software License based delivery
- Software as a Service (SaaS) based delivery



Impact of Failure

Software Licensing Model



Open Source & Standards

- Open Source
  - Open source in IT is software whose source code is published and made available to the public, enabling anyone to copy, modify and redistribute the source code without paying royalties or fees.
- Standards
  - A standard is a specification that has been agreed upon by a community, through usage or declaration. Once established, any number of duplicates or variants can be made, while keeping the basic structure or function intact.
  - American National Standards Institute (ANSI)
    - http://ansi.org/
  - Web Standards:
    - http://www.w3.org/standards/faq.html
  - Information security standards
  - Vertical industry standards

Open Source in the Enterprise

Distributed Systems
- Hadoop(HDFS)
- Java Caching Service
- Cassandra
- MPI

Enterprise Portal
- Apache Jetspeed
- Liferay

Code Testing
- JUnit
- Jakarta Cactus
- Selenium/webdriver

Continuous Integration
- buildbot
- LuntBuild
- Apache Continuum
- CruiseControl

IDEs
- Eclipse
- Java.net NetBeans

Enterprise Application Development

eclipse

Enterprise Systems Management

Application Management
- LiveTribe
- Nagios/GroundWork
- OpenNMS

The Apache Software Foundation
http://www.apache.org/

Message-oriented Middleware
- Apache ActiveMQ
- Jboss Messaging
- Objectweb JORAM

java.net The Source for Java Technology Collaboration

Enterprise Service Bus (ESB)
- Apache ServiceMix
- Mule ESB
- OpenESB (Oracle)
- Jboss ESB

Enterprise Integration & SOA

Performance Management
- JMeter
- allmon
- CLIF (Load Injection)
- dbmonster

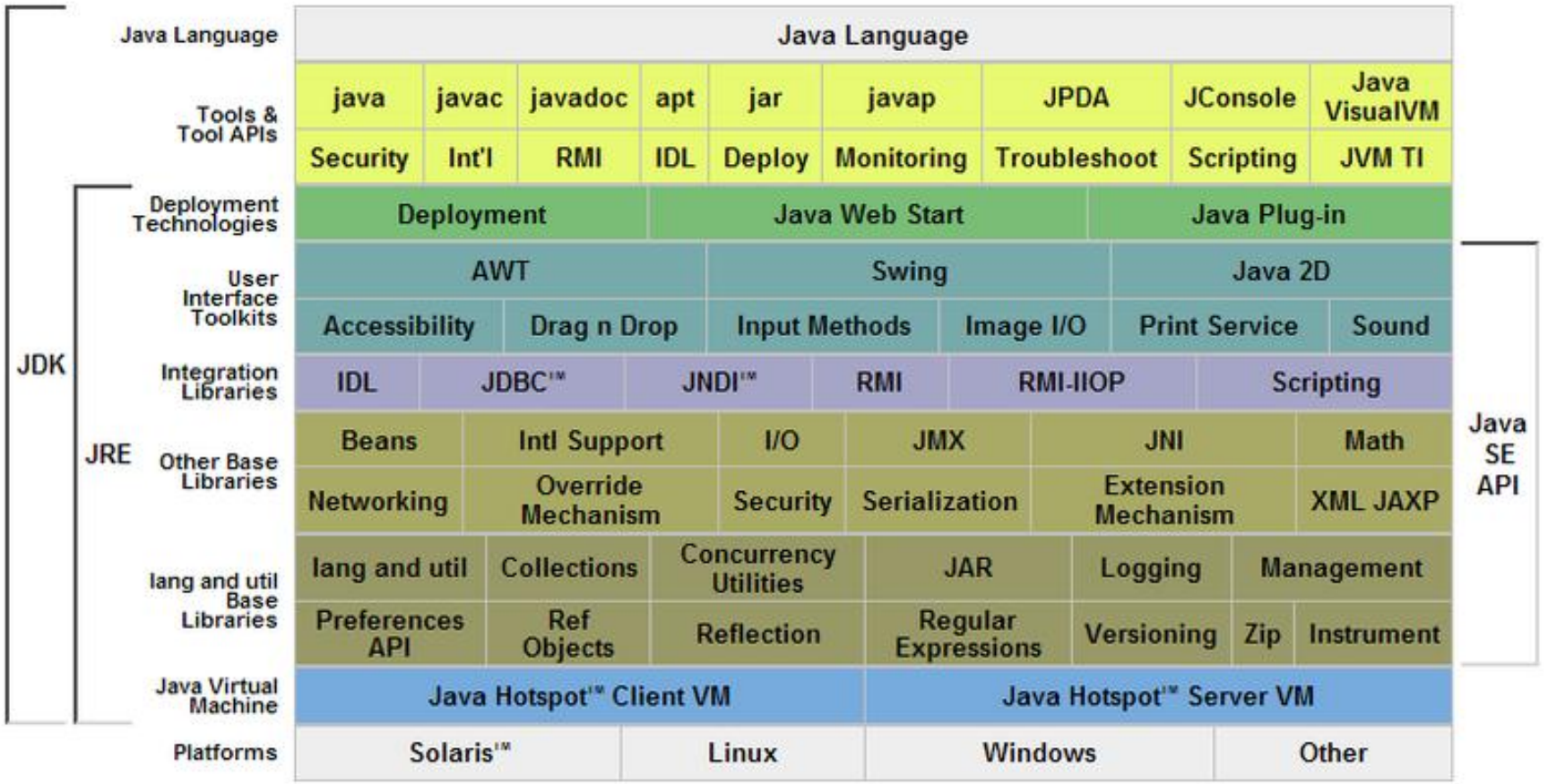
Web Services (SOAP Stack)
- Apache Axis2
- Gomba
- Apache CXF

J2EE App Server
- Apache Geronimo
- Jboss AS
- Glassfish

Evolution of Software Platform

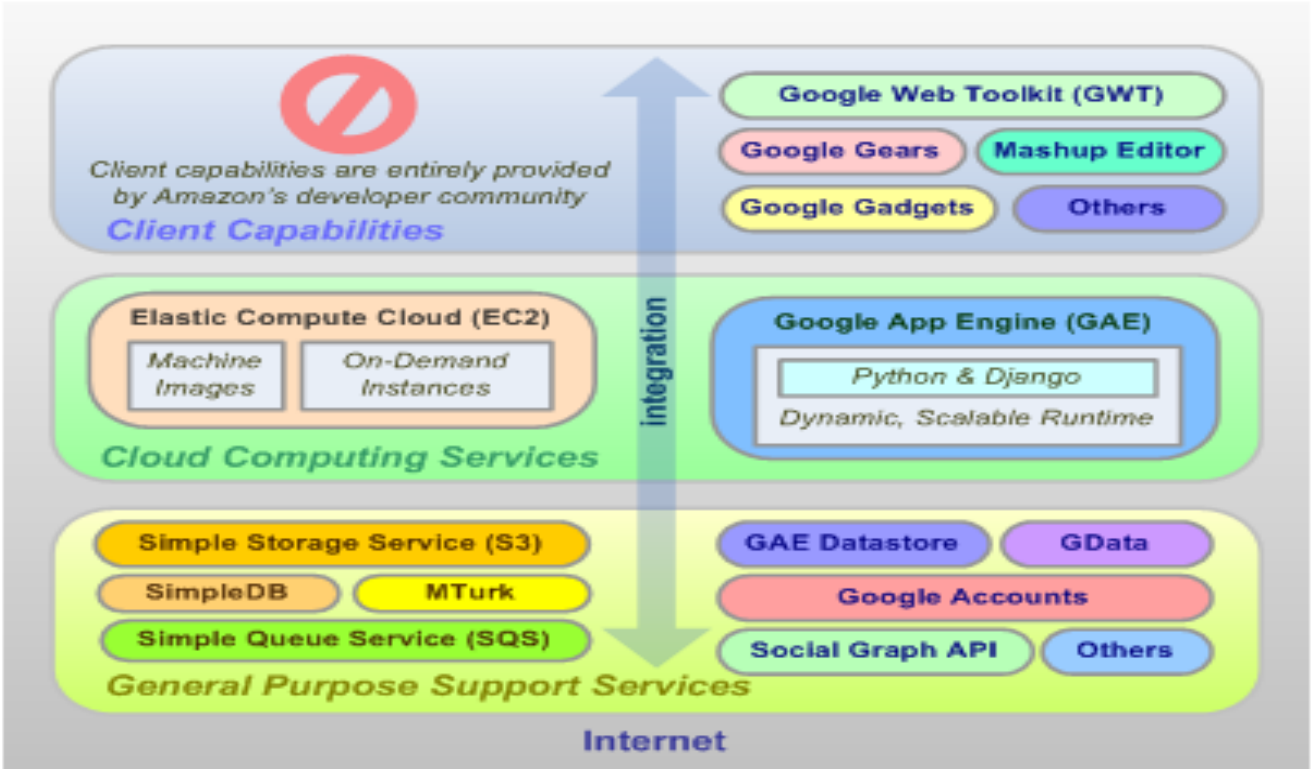
- Software platform – accumulation of technologies developed over decades:
  - Programming techniques
    - OO / Functional / Scripting / Framework based / Hadoop MR
  - Tools and Interfaces
  - Interface languages
  - Communication protocols
    - Distributed / Network services
  - Middleware
    - Transaction processing / Analytic platform
  - Run time components
  - OS platforms
    - Linux
  - New layer is always added

Java Software Platform – an example



From Wikipedia

Software Platform in the Cloud



Source: zdnet

Information Management

Information Management is an approach for transforming information into a trusted strategic asset that can be rapidly leveraged across applications, processes and decisions for sustained competitive advantage.

The Happy CIO

As the CIO of a growing business, you are happy to report that your latest information projects are going well. The new call center is up and running, the new data warehouse is on-line and the new customer loyalty systems have been deployed successfully.

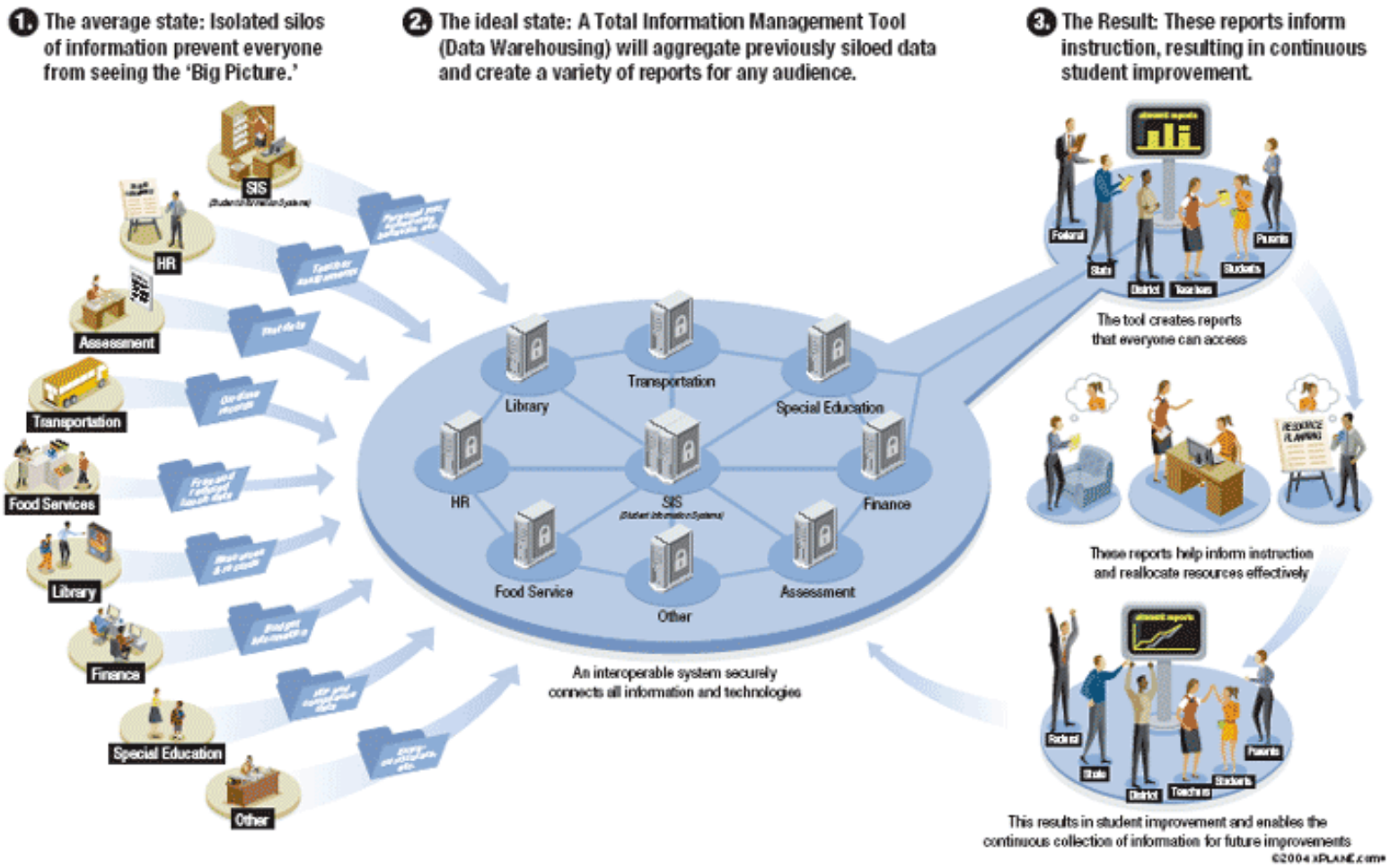
Then CEO asks

- Who are our most profitable customers and which channels do they prefer?

And then CFO asks

How are we going to make cuts across the board to respond to tough economic times?

Can your Information Management system answer?



Information Security

- Key Security concepts
- Designing Secure Systems
- Worms and Other Malware
- Buffer Overflows
- Client-state Manipulation
- SQL Injection
- Password Security
- Cross domain security

Distributed Systems & Parallel Programming

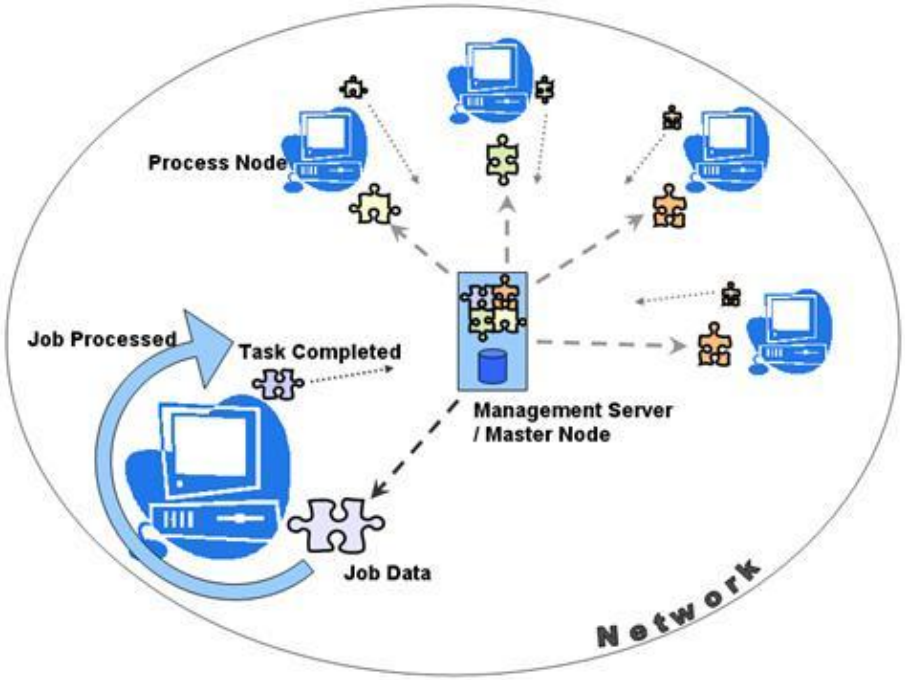
Parallelism
Cluster computing
Message Passing Interface
Functional programming overview
Map Reduce paradigm

Distributed computing problems

- Rendering multiple frames of high-quality animation
- Simulating several hundred or thousand characters
- Indexing the web (Google)
- Speeding up content delivery (Akamai)

Distributed Vs. Parallel Computing

- Parallel computing can mean
  - Vector processing of data
  - Multiple CPUs in a single computer
- Distributed computing is:
  - multiple CPUs across many computers



Distributed Systems Communication

- RPC (Remote Procedure Calls)
  - Synchronous RPC (remote function call)
  - Asynchronous RPC (remote thread spawn)
- Message Passing Interfaces
  - A specification / standard
  - Provides synchronization

Multi-service network protocols

- Internet depends on communication networks
- How devices are inter connecting over Internet
- Protocols – HTTP, TCP/IP and ATM
- OSI Reference model

Middleware overview

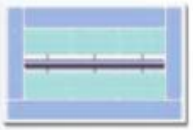
What is middleware?

- The software platform that allows developers to create a networked application
- Provides a set of services to applications

Basic Middleware services

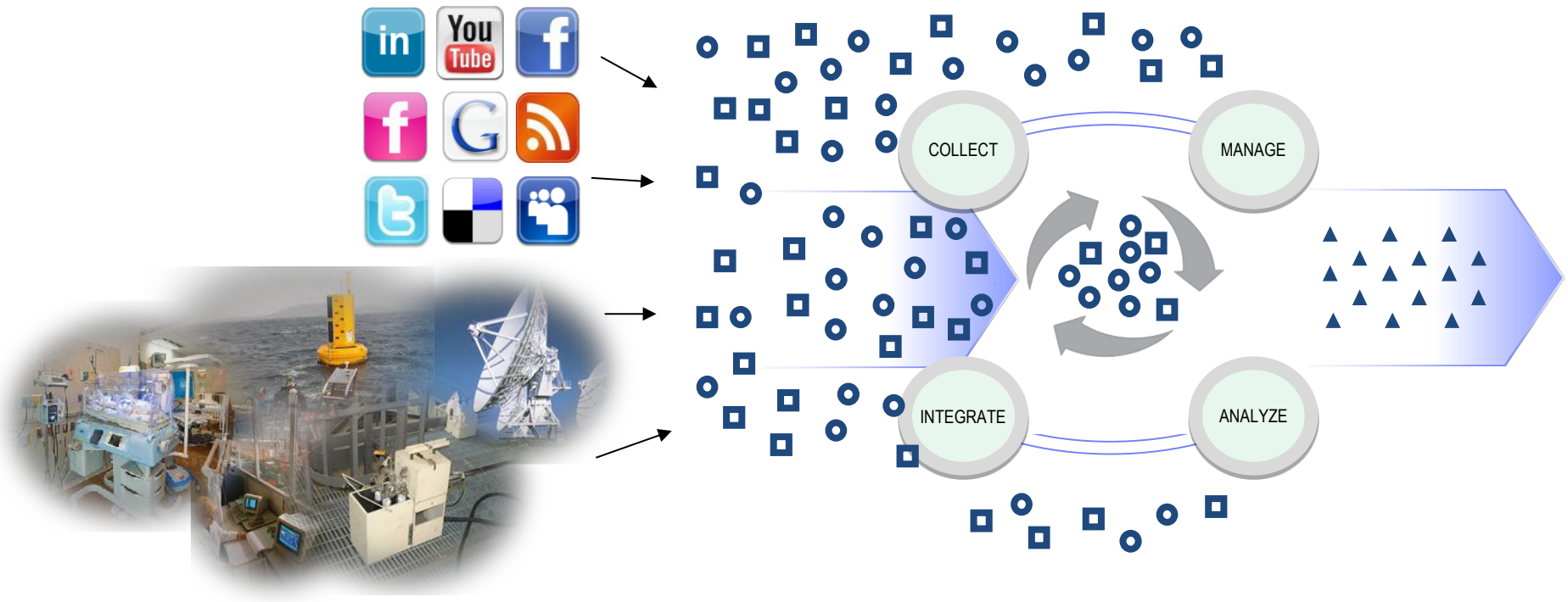
- Facilitates communication mechanism for applications across networks (eg. Sending database query results over network)
- Platform transparency
- Network transparency (TCP/IP, NetWare IPX/SPX, and NetBIOS/NetBEUI (Named Pipes)
- Application and Tool Support (ODBC/JDBC)
- Programming languages support
- Databases support

Service Oriented Architecture

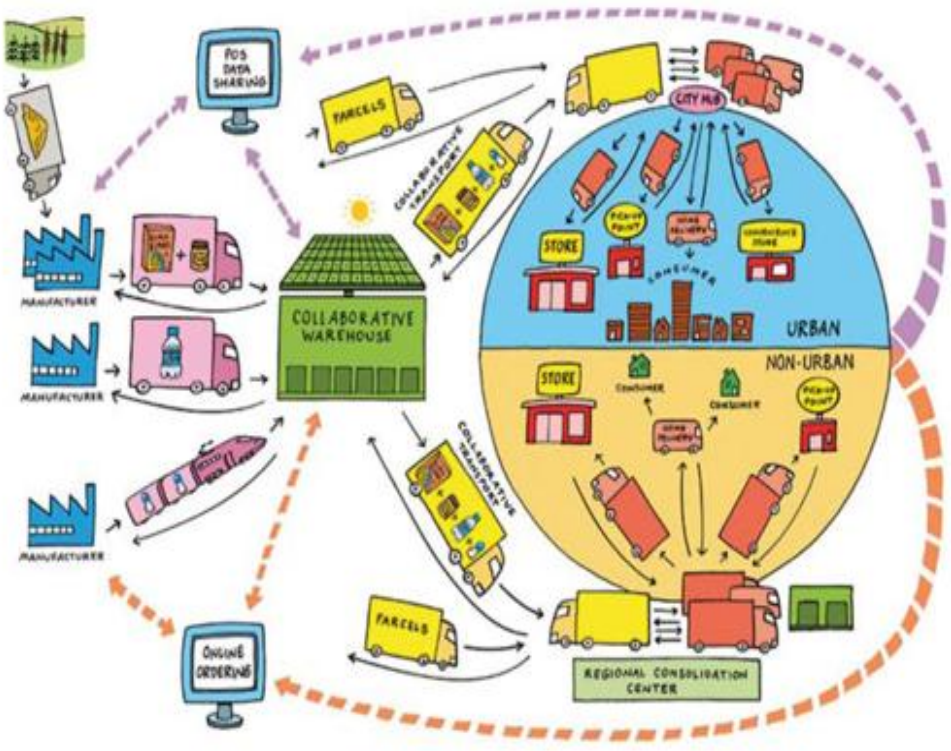
	Roles	
Capabilities that a business wants to expose as a ***set of services*** within the enterprise or to clients and partner organizations	**Business**	
An ***architectural style*** which requires a service provider, requestor and a service description. It addresses characteristics such as loose coupling, reuse and simple and composite implementations	**Architecture**	
A ***programming model*** complete with standards, tools, methods and technologies such as Web services	**Implementation**	
A ***set of agreements*** among service requestors and service providers that specify the quality of service and identify key business and IT metrics	**Operations**	

The BIG Data Challenge

- Manage and benefit from massive and growing amounts of data
- Handle varied data formats (structured, unstructured, semi-structured) and increased data velocity
- Exploit *BIG Data* in a timely and cost effective fashion



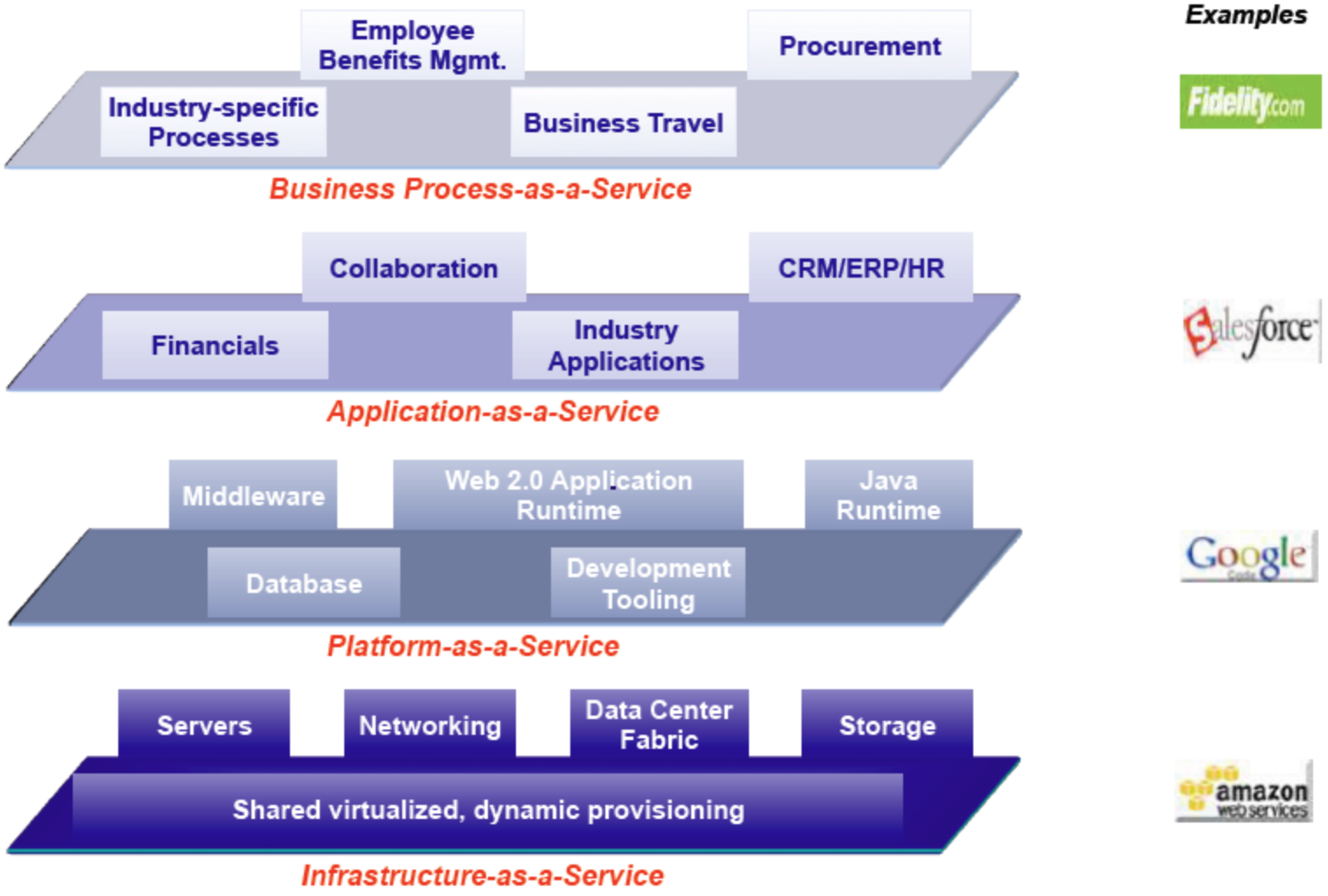
eCommerce and Future Supply Chain



The Future of Supply Chain (Image Source: '2016 Future Supply Chain', © Global Commerce Initiative, Capgemini. All rights reserved.)

- The future model will be based on multi-partner information sharing among key stakeholders: consumers
- (the originators of the demand signal, either from home or from a store), suppliers, manufacturers,
- logistics service providers and retailers.
- After production the products will be shipped to collaborative warehouses in which multiple manufacturers store their products.
- Collaborative transport from the collaborative warehouse will deliver to city hubs and to regional consolidation centers.
- Warehouse locations on the edge of cities will be reshaped to function as hubs where cross-docking will take place for final distribution.
- Non-urban areas will have regional consolidation centers in which products will be cross-docked for final distribution.
- Final distribution to stores, pick-up points and homes in urban and non-urban areas will take place via consolidated deliveries using efficient assets.

Cloud Computing & SaaS



Slide courtsey: Holger Reinhardt, WebSphere Technology Institute *IBM*

Location based services

RFID will bring location attributes to not only our handheld devices but our consumer goods as well

Semantic Web

Enabling more intelligent applications to be developed for the Web

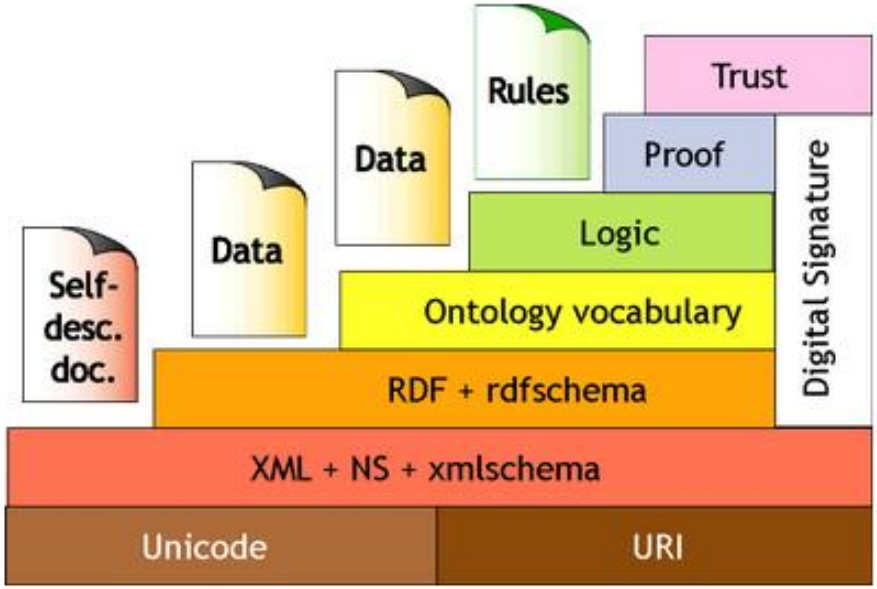
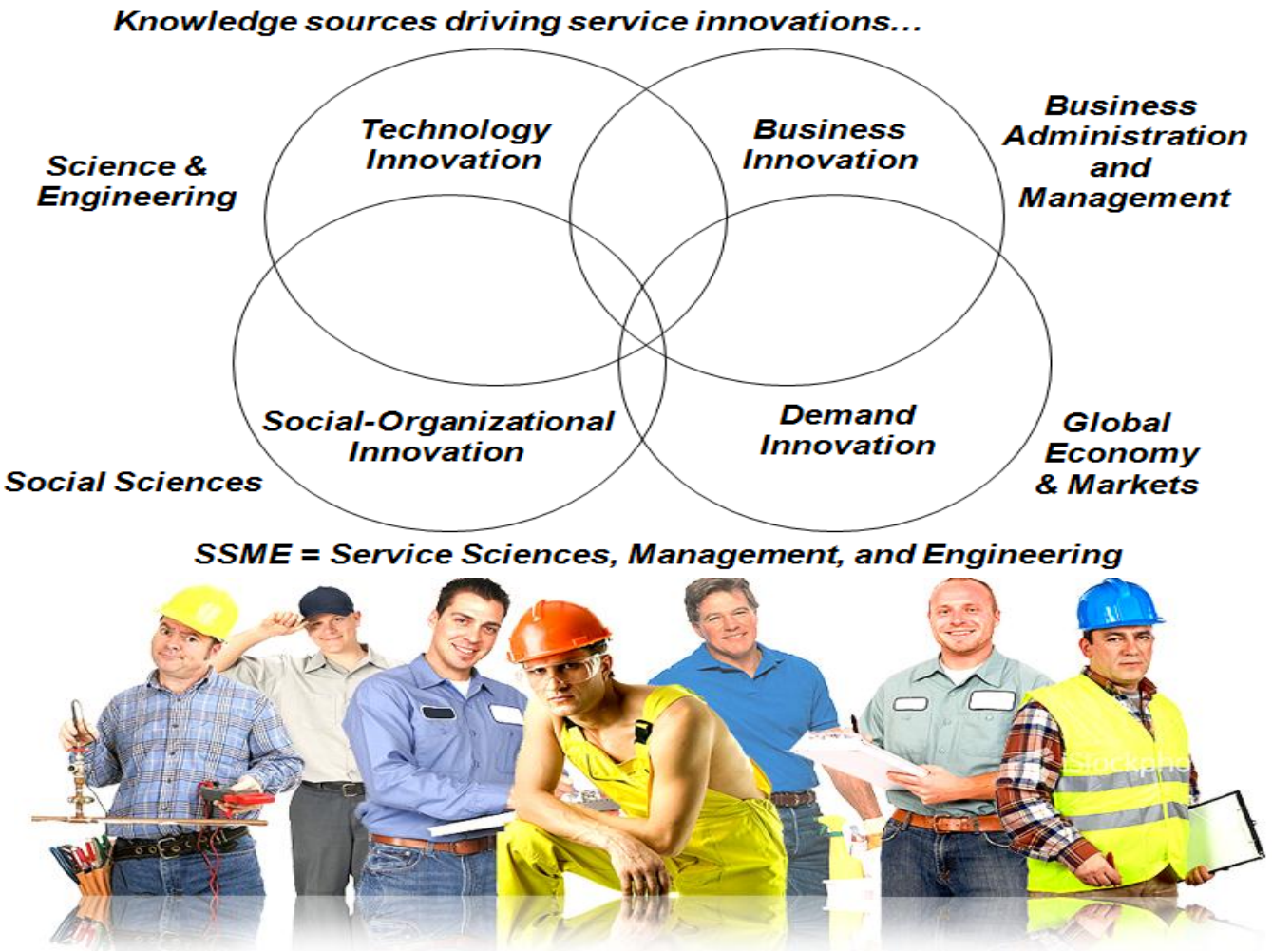


Figure 1: The Semantic Web "layer cake" as presented by Tim Berners-Lee.

SSME



Source: Gartner

Class Project

- You will create a solution to real life human/business problem using real data
- Project has these deliverables:
  - Approved Problem statement and abstract
  - Project Report
  - Project presentation
  - Demo

Preparation for next class

- Next class is on Operating Systems Overview
- We will be using Linux to understand OS concepts
- If you have access to a Linux system /partition, you will be able to try out commands and learn more
- Some Linux flavors come on USB keys as well (ex. Puppy Linux)