# Cloud Computing

# What's the Business Scenario?

July 22, 2009

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# Overall objectives

- Bottom line up front
  - Capture real business requirements
- Desired outcome
  - Ultimately
    - Enable the supply side to better understand the needs of the buy side
    - Support the business case for the vendors collectively to deliver genuinely responsive offerings
  - In workshops
    - Begin to describe the Business Scenario

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# Desired outcome

- In next few hours
  - To capture a starting point on
    - Issues
    - Challenges, and
    - Advantages
  - Of utilizing Cloud Computing
- This work will (ultimately) be in the public domain and the debate we generate will seek to benefit users and suppliers alike

# Agenda

- 10:00 to 10:30 Background
    - Cloud context
    - What is a business scenario
    - Initial questions
- 10:30 to 11:00 Think break
    - Put your customer hat on
- 11:00 to 12:30 Workshop brainstorming

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# Agenda

- ❑ 10:00 to 10:30 Background
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  - ▪ Business scenario
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# A call to action for the worldwide cloud community *

**Key Principles**

1. Cloud providers must **work together** to ensure that the **challenges** to cloud adoption (security, integration, portability, interoperability, governance/management, metering/monitoring) are addressed through open collaboration and the appropriate use of standards.

2. Cloud providers must **not** use their market position to **lock customers** into their particular platforms and limit their choice of providers.

3. Cloud providers must use and adopt existing **standards** wherever appropriate. The IT industry has invested heavily in existing standards and standards organizations; there is no need to duplicate or reinvent them

4. When new standards (or adjustments to existing standards) are needed, we must be judicious and pragmatic to avoid creating too many standards. We must ensure that **standards promote innovation** and do not inhibit it.

5. Any community effort around the open cloud should be driven by **customer needs**, not merely the technical needs of cloud providers, and should be tested or verified against real customer requirements.

6. Cloud computing standards organizations, advocacy groups, and communities should **work together and stay coordinated,** making sure that efforts do not conflict or overlap

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* From: http://csrc.nist.gov/groups/SNS/cloud-computing/

# Definition highlights  *

- Following are the highlights of the definition of cloud computing published by NIST, the  U.S. Government's National Institute of Standards and Technology

- NIST's policy states, "This material is public domain although attribution to NIST is requested. It may be freely duplicated and translated."

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# 5 essential characteristics to cloud computing *

❑ On-demand self-service

 ▪ No human interaction is required to use resources

❑ Ubiquitous network access

❑ Location-independent resource pooling

❑ Rapid elasticity

 ▪ In the world of the cloud, we talk about elasticity instead of scalability. Scalability implies the ability to deploy resources dynamically; elasticity also includes the ability to undeploy resources dynamically as well

❑ Measured service

 ▪ Utility-style billing, you pay only for what you use

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# 3 delivery models *

❑ Software as a Service (SaaS)

▪ The consumer uses an application, but does not control the operating system, hardware or network infrastructure on which it's running.

❑ Platform as a Service (PaaS)

▪ The consumer uses a hosting environment for their applications. The consumer controls the applications that run in the environment (and possibly has some control over the hosting environment), but does not control the operating system, hardware or network infrastructure on which they are running.

❑ Infrastructure as a Service (IaaS)

▪ The consumer uses "fundamental computing resources" such as processing power, storage or middleware. The consumer controls the resources, but not the cloud infrastructure beneath them.

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# 4 deployment models *

- Private Cloud
  - The cloud infrastructure is used entirely by one organization.
- Community Cloud
  - The cloud infrastructure is shared by several organizations.
- Public Cloud
  - The cloud infrastructure is made available to the public
- Hybrid Cloud
  - The cloud infrastructure is composed of two or more clouds that are bound together for data and application portability.

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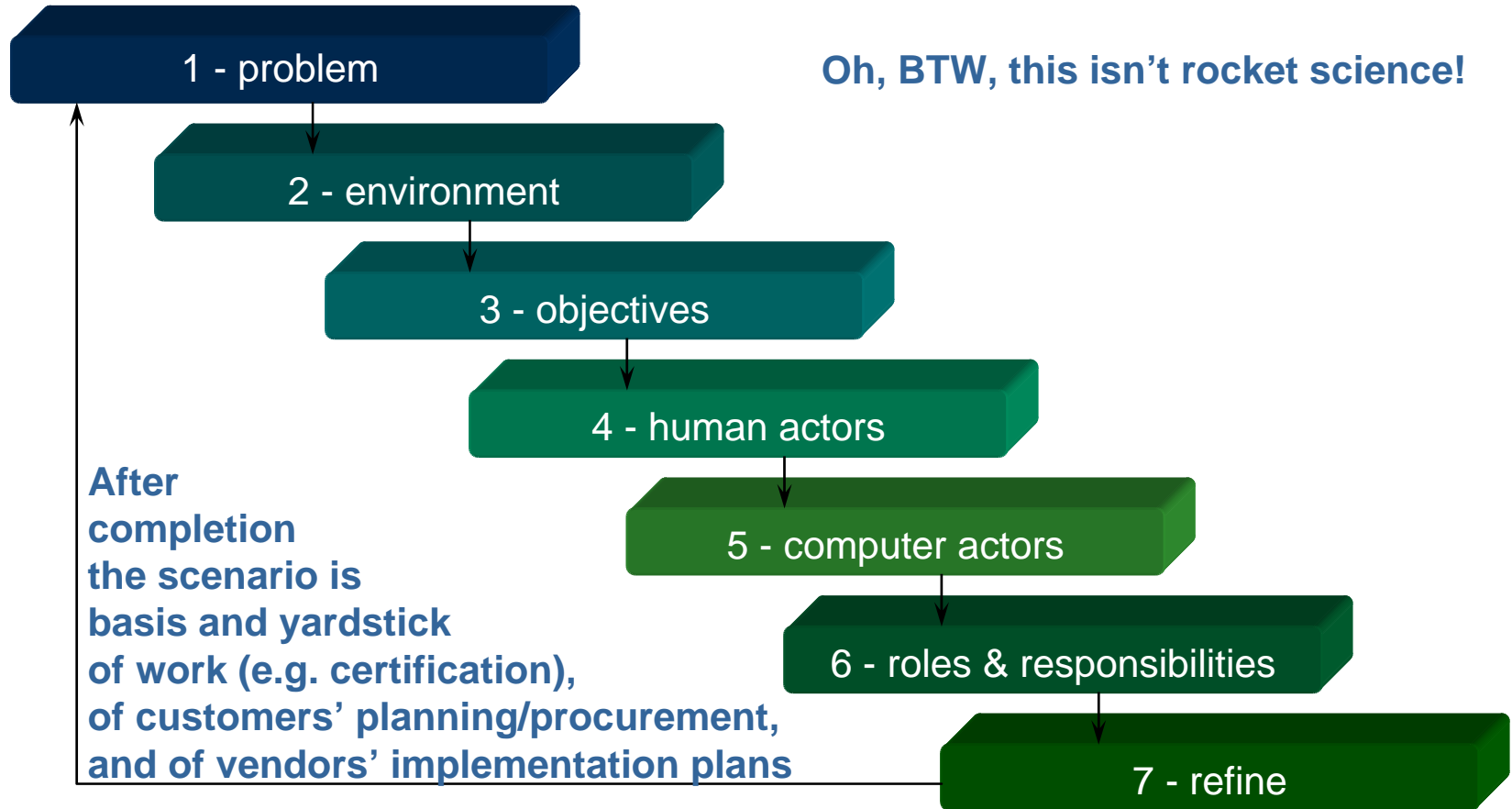
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# What is a business scenario?

❑ A Business Scenario describes:

- a business process, application or set of applications that can be enabled by a solution;

- the business and technology environment;

- the people and computing components (the "actors") who execute it;

- the desired outcome of proper execution.

❑ A good Business Scenario

- is representative of a significant market

- enables the supply side to understand the value to the buy side of a developed solution

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# Building a business scenario includes...

1 - problem

**Oh, BTW, this isn't rocket science!**

2 - environment

3 - objectives

4 - human actors

5 - computer actors

**After
completion
the scenario is
basis and yardstick
of work (e.g. certification),
of customers' planning/procurement,
and of vendors' implementation plans**

6 - roles & responsibilities

7 - refine

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# Workshop goals

- Brainstorm using the "Business Scenario" method, bounding our discussion today around cloud computing
  - Discuss the pain points associated without having cloud computing and the implication of them
  - Build a consensus around the priorities of the pain points
  - Identify the critical elements of the environment, business, people, and technical
    - Generalize
    - Establish roles for each
  - Discuss the objectives of addressing the pain points
    - Get as specific and tangible as possible

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# Processing the results

- Results will be documented and circulated amongst participants and amended until we all are in agreement
- The Open Group will host follow-up events through Cloud Work Group http://www.opengroup.org/cloudcomputing
  - The contents of the White Paper will be discussed and the responses, improvements points solicited
  - Create an Action Plan with agreed targets and timescales
- The Open Group will host a larger public event where the nature of the exercise and its results will be published and comment sought
  - To begin the public phase to promote where we roll out to embrace other sectors and more suppliers

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# Our roles

- Terry
  - Facilitator and first level questioner
- John
  - Recorder and 2nd level questioner
- Dave
  - Recorder and 2nd level questioner
- Chris
  - Listener
- Attendees – customers
  - Respond openly to questions, and ask more questions
- Attendees – vendors of cloud computing
  - Listeners
  - In this meeting the customers rule – 1st order of business is to quickly decide whether vendors should be allowed to represent customer needs – show of hands

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# Initial questions

- What are the pain points and ramifications of not addressing the pain points (bound by scope)
- What are the key processes that would take advantage of cloud computing
- What are the desired objectives of handling/addressing the pain points
- Who are the human actors and their roles
- What are the major computer actors and their roles
- What are the known needs that cloud computing must fulfill to help improve the processes

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# Agenda

❑ 10:00 to 10:30 Background

  ▪ Cloud context

  ▪ Business scenario

  ▪ Initial questions

❑ 10:30 to 11:00 Think break

  ▪ Put your customer hat on

  ▪ Think about the questions

  ▪ Talk to others during break and get views

❑ 11:00 to 12:30 Workshop brainstorming

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- 10:00 to 10:30 Background

- 10:30 to 11:00 Think break

- 11:00 to 12:30 Workshop brainstorming

  - Pain points and ramifications

  - Key processes

  - Desired objectives

  - Human actors and their roles

  - Major computer actors and their roles

  - Known needs to improve the processes

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# Agenda

- ❑ 10:00 to 10:30 Background

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- ❑ 11:00 to 12:30 Workshop brainstorming
  - ▪ Pain points and ramifications
  - ▪ Key processes
  - ▪ Desired objectives
  - ▪ Human actors and their roles
  - ▪ Major computer actors and their roles
  - ▪ Known needs to improve the processes

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# Example of pain points and implications

- Increasing IT costs
  - redundancy and duplication in IT assets
  - increased maintenance cost
  - increased reliance on (expensive) IT service providers
- Lack of effectiveness of IT
  - poor service provision to users
  - IT changes not implemented when the business needs
  - IT a restraint, not an enabler
- Lack of effectiveness of business operations
  - increasing costs to run the business
  - increased time to market for the enterprise
  - inability to provide effective services to customers

1 - problem
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7 - refine

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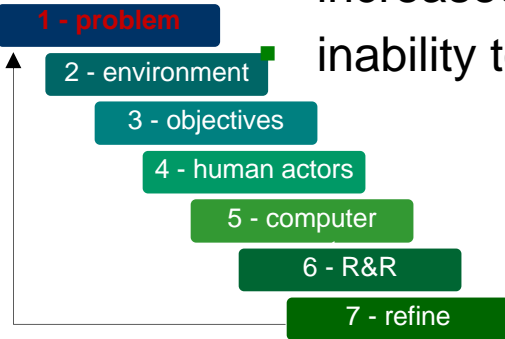
# Pain points and implications

- ❑ Cloud Computing is a big change
- ❑ Please re-cap how the lack of Cloud Computing causes your business pain
- ❑ For example,
  - ▪ Without CC our organization spends extra time and costs in scaling
  - ▪ Without CC our organization doesn't readily scale up and/or down

# Priorities of the pain points

- If you had 20 million how would you allocate it against these pain points
  - We are now passing out a specific number of tokens, each of which represent an equal part of the 20 million
  - Please simply write the issue number on the token
    - Can apply all your tokens to 1 issue by writing that issue on all tokens
    - Or evenly distribute your tokens across issues
  - Please do this as if you were being judged by your business

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# Critical elements

❑ For each of the subjects listed below write down some of the critical elements related to use of cloud computing

- For examples:
  - Process elements
    - 4.2 Customer Scenario: Payroll Processing in the Cloud *
    - 4.3 Customer Scenario: Logistics and Project Management in the Cloud *
    - 4.4 Customer Scenario: Central Government Services in the Cloud *
    - 4.5 Customer Scenario: Local Government Services in a Hybrid Cloud *
  - Personnel
    - Procurement personnel
    - Quality personnel
  - Technical components
    - Corporate databases
    - Network

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# Some work in progress – candidate technology actors

## A Taxonomy for Cloud Computing
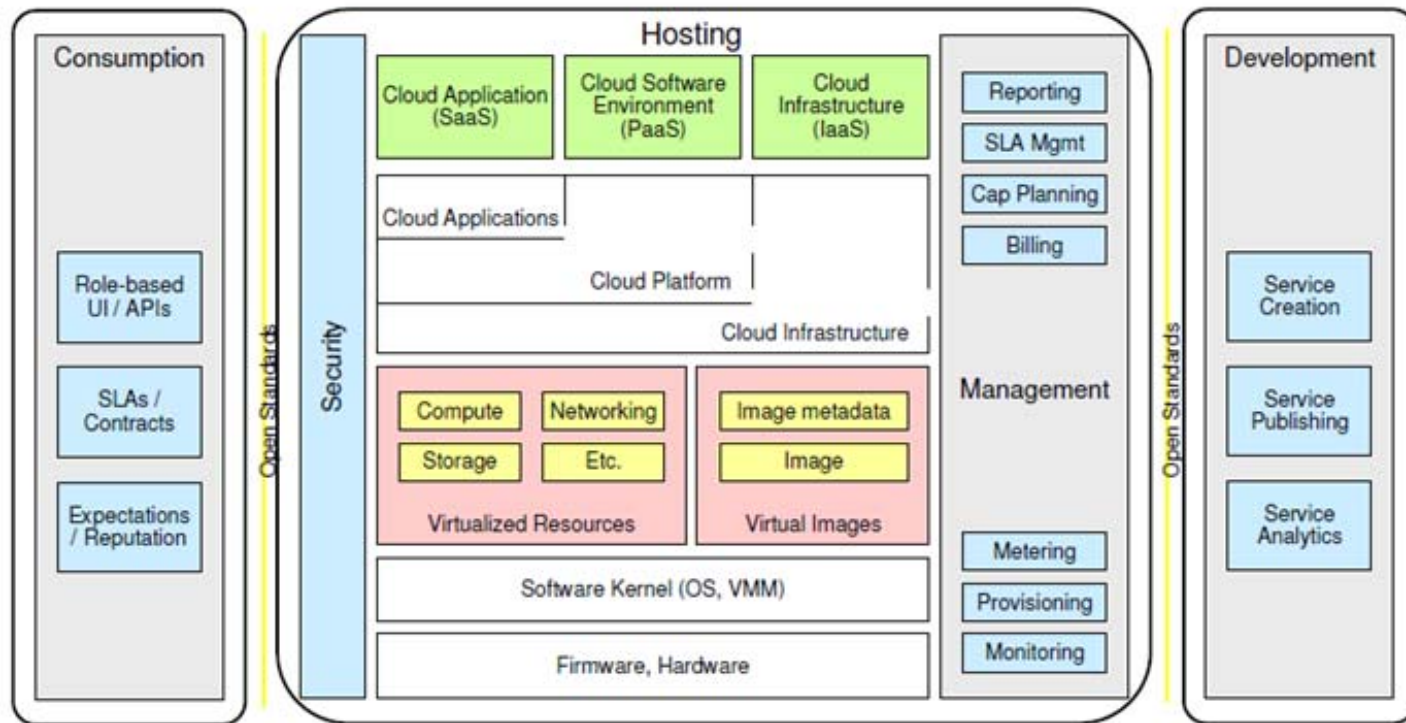


Adapted from: http://cloud-computing-use-cases.googlegroups.com/web/Whitepaper_Draft_2.pdf

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# Key roles

- ❑ For each of the critical elements captured above describe their roles
    - ▪ For examples:
        - ▪ Process element roles
            - ● Quality assurance process - to assure that 100% of specified functionality is provided
            - ● Integration test process - to assure that all components that are required to work together can connect and exchange data
        - ▪ Personnel element roles
            - ● Quality tester - creates and executes full coverage tests
        - ▪ Technical element roles
            - ● Corporate database - assures single record of reference

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# Objectives

- If the issues were addressed, then how will you know?
  - For example:
    - Addressing the issues/pain points will
      - Lower IT budget by 5%
      - Improve IT project times by 10%
      - Lower production costs by 5%
      - Improve production quality by 10%
      - Increase customer satisfaction by 5%
      - …

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# Benefits -> objectives input

- ❑ Potential benefits - what promises of Cloud are really attracting you? *
    - ▪ Cost savings
    - ▪ Enterprise security benefit for cloud is that it can enable affordable business continuity plans
    - ▪ Elasticity, reduced capital expenditure, and the ability to offload IT management concerns, e.g., keeping systems up to date, security enforcement and regulatory compliance on to the Cloud services provider
    - ▪ "Software as a Service" or "Business as a Service" may allow businesses to get specialized expertise on certain business processes on a shared-cost basis

* From: "Cloud Computing: The Open Group's Activities":

http://www.opengroup.org/cloud/activities.htm

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# Are these objectives SMART

❑ Key Objectives
  ▪ X
  ▪ X
  ▪ X
  ▪ X
  ▪ X

❑ Test each objective for
  ▪ Specific
  ▪ Measurable
  ▪ Actionable
  ▪ Realistic
  ▪ Time-bound

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# Needs -> requirements input

- ❑ Needs - what's your biggest fear in implementing Cloud? *
  - ▪ Distinguish between Information Risk Mgmt vs. Enterprise Risk Mgmt (business impact)
  - ▪ Trade off between cost savings resulting from use of cloud and the need to invest in cloud security
  - ▪ Usable multi-vendor standards for Identity Management are a fundamental enabler for the cloud
  - ▪ Enterprise Security in terms of regulatory compliance and discoverability
  - ▪ Security and legal professionals will need to sort issues of data ownership and which jurisdictions apply to data and services in a location-independent Cloud
  - ▪ Hire and train IT practitioners knowledgeable in Cloud outsourcing
  - ▪ Skills in governance, management of Cloud service providers and ability to deal with the complexity,
  - ▪ Deal with chains of responsibility and "finger pointing" in outsourced services
  - ▪ Lack of maturity of architectural models of cloud is a barrier to understanding and adoption
  - ▪ Consensus on Cloud models and taxonomies, and a mapping of those taxonomies by use model would help address this need

* From: "Cloud Computing: The Open Group's Activities":
http://www.opengroup.org/cloud/activities.htm

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# So what do we know now about requirements

- ❑ Security
  - ▪ Handling sensitive information
- ❑ Portability and interoperability
  - ▪ A common data access API - no custom cloud code
  - ▪ Build a VM image and deploy it to the cloud as necessary
  - ▪ Cloud interaction and interoperation
- ❑ Management and governance
  - ▪ Management of VMs
  - ▪ Handling industry- and geography- specific governance requirements
- ❑ Metering and monitoring
  - ▪ Track cloud usage for cost control and charge backs
- ❑ Lifecycle
  - ▪ Discovery
  - ▪ Legal liabilities – data ownership and stewardship
  - ▪ Organizational specific data management rules
    - ▪ Data history/audit

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# Wrap-up

❑ Today you take back our notes from this session

❑ This will be followed up with a White Paper on Cloud Computing

❑ We Thank You for Your Participation

# Backup Slides

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# A good business scenario

❑ A good Business Scenario will also be:

- Specific
    - defining what needs to be done to improve interoperability;
- Measurable
    - with clear metrics for success;
- Actionable
    - by clearly segmenting the problem, and providing the basis for determining elements and plans for the solution;
- Realistic
    - defining the bounds of technology capability and cost constraints;
- Time-bound
    - with a clear understanding of when the solution opportunity expires

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# Getting business scenarios right

- ❑ Customers almost always know what they want
  - ■ But often not written down, especially linkage to business
  - ■ So we help get it written down
- ❑ Customers sometimes do not know what they really need
  - ■ So we observe and probe to help discover what's needed
  - ■ So we help bring out critical business rules
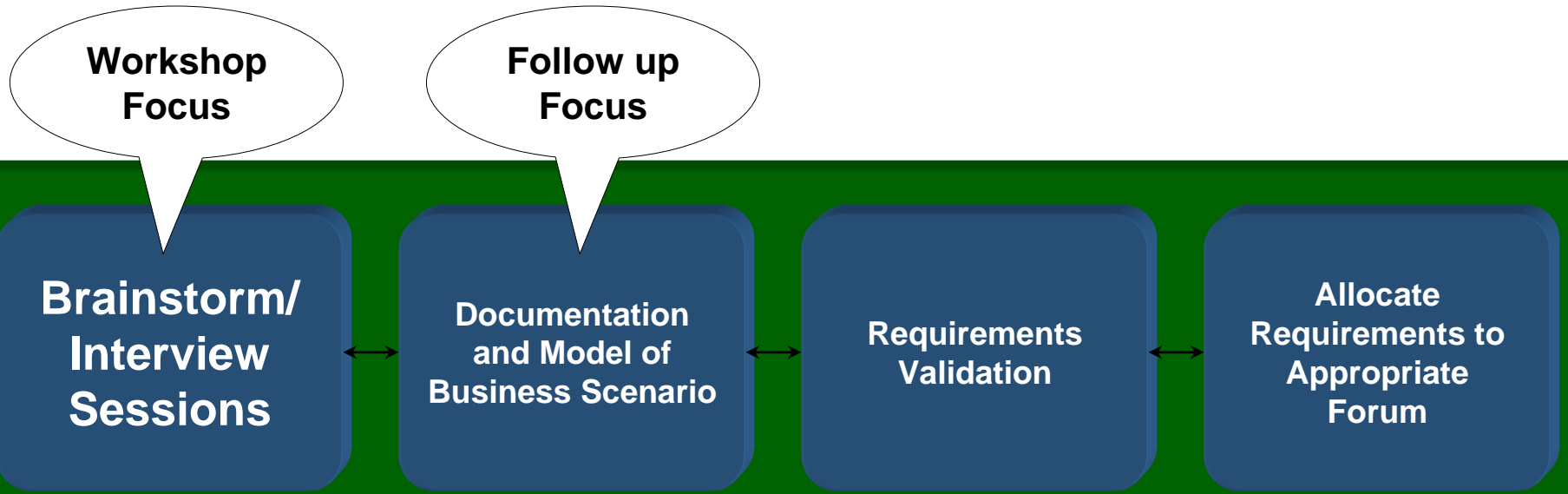  - ■ We also focus on the "what" not the "how"

# Documentation

- Business Scenario models capture business and technology views
  - Graphically for comprehension
  - A starting point for requirements, and relate actors and interactions
- Business Scenario descriptions
  - Capture and sequence the critical steps between actors involved in the situation
  - Partition the responsibility of the actors
    - List pre-conditions that have to be met prior to proper system functionality, and
    - Provide some technical requirements to ensure acceptable quality
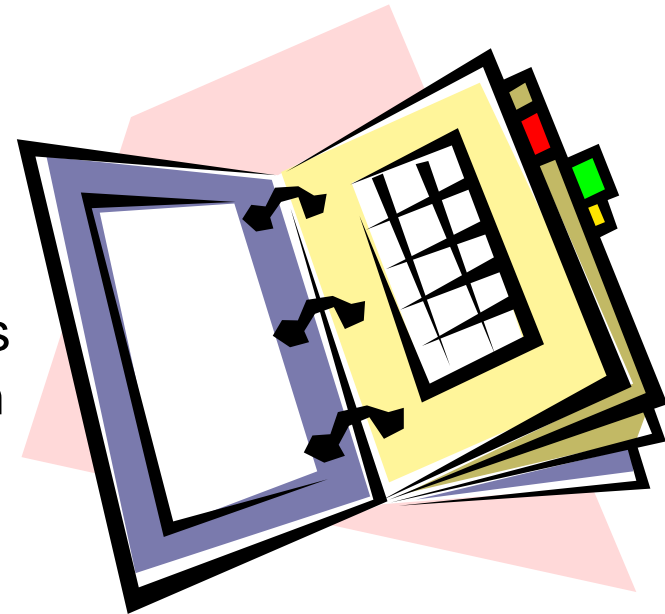
# Some reminders

- Business Scenarios are a part of and enable a larger process
- Business Scenarios are just a tool, not the objective
- We use them, don't get lost in them
- Stay focused - watch out for "feature creep"
  - address the most important issues that tend to return the greatest value

**Workshop Focus**

**Follow up Focus**

| **Brainstorm/ Interview Sessions** | ↔ | **Documentation and Model of Business Scenario** | ↔ | **Requirements Validation** | ↔ | **Allocate Requirements to Appropriate Forum** |

Business Scenario(s) Provide Coherence and Consistency

# Generalization of critical elements

❑ For each of the critical elements captured above are there any generalizations that can be made

  ▪ Are these specific to this industry
    ▪ If they aren't can they be cast as general elements

  ▪ For examples:
    ▪ Process elements

    ▪ Personnel elements

    ▪ Technical elements

# Background

❑ Interoperability has been registered as a requirement for The Open Group

  ▪ However interoperability is a big issue

  ▪ Interoperability has many meanings

❑ Therefore we decided to understand what is really meant by this requirement

  ▪ Decide to use business scenarios

❑ The following is an update of our current understanding of some real problems behind the interoperability requirement

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# Shared problems within industry

| Transportation Co 1 | Transportation Co 2 | Transportation Co 3 |
|---|---|---|
| **Business Processes**<br>Manufacturing Process X…<br>Scheduling<br>Procurement<br>Human resources, … | **Business Processes**<br>Manufacturing Process Y…<br>Scheduling<br>Procurement<br>Human resources, … | **Business Processes**<br>Manufacturing Process Z…<br>Scheduling<br>Procurement<br>Human resources, … |
| **Business Logic**<br>Manufacturing Logic for X<br>Scheduling<br>Procurement<br>Human resources, … | **Business Logic**<br>Manufacturing Logic for Y<br>Scheduling<br>Procurement<br>Human resources, … | **Business Logic**<br>Manufacturing Logic for Z<br>Scheduling<br>Procurement<br>Human resources, … |
| **Business Metadata**<br>Manufacturing Metadata for X<br>Scheduling<br>Procurement<br>Human resources, … | **Business Metadata**<br>Manufacturing Metadata for Y<br>Scheduling<br>Procurement<br>Human resources, … | **Business Metadata**<br>Manufacturing Metadata for Z<br>Scheduling<br>Procurement<br>Human resources, … |
| **Middleware** | **Middleware** | **Middleware** |
| **Operating Systems** | **Operating Systems** | **Operating Systems** |
| **Computer Hardware** | **Computer Hardware** | **Computer Hardware** |
| **Networks** | **Networks** | **Networks** |

**Common problems**

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# Shared problems among industries

| Transportation | Finance | Petrochemicals |
|---|---|---|
| **Business Processes**<br>Manufacturing…<br>Scheduling<br>Procurement<br>Human resources, … | **Business Processes**<br>Banking…<br>Scheduling<br>Procurement<br>Human resources, … | **Business Processes**<br>Exploration…<br>Scheduling<br>Procurement<br>Human resources, … |
| **Business Logic**<br>Manufacturing<br>Scheduling<br>Procurement<br>Human resources, … | **Business Logic**<br>Banking…<br>Scheduling<br>Procurement<br>Human resources, … | **Business Logic**<br>Exploration…<br>Scheduling<br>Procurement<br>Human resources, … |
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**Common problems**
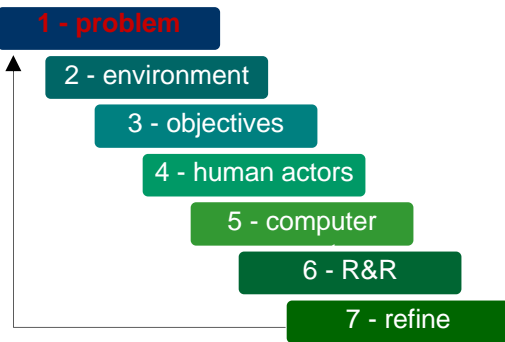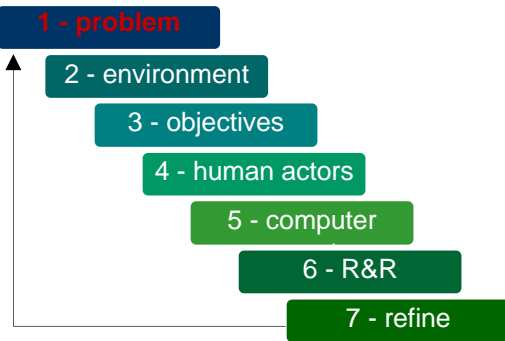
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# Customer problem statement

❑ I could run my business better if I could gain operational efficiencies through

  ▪ **integrated information, and integrated access to that information, to**

    ▪ **to support the many different business processes of the enterprise - both internal, and spanning the key interactions with suppliers, customers, and partners**
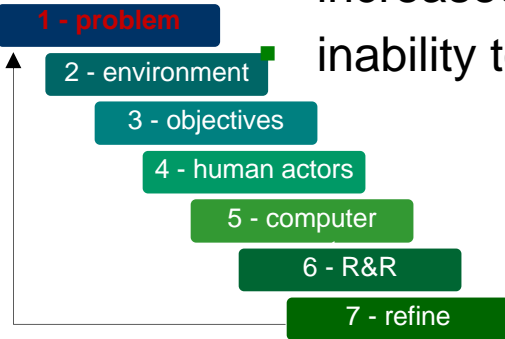
1 - problem
2 - environment
3 - objectives
4 - human actors
5 - computer
6 - R&R
7 - refine

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# What is meant by interoperability

❏ I believe the following definition provides a useful working definition of interoperability

  ▪ The ability of two or more systems or components to exchange information and to use the information that has been exchanged *"to meet a defined mission or objective"*
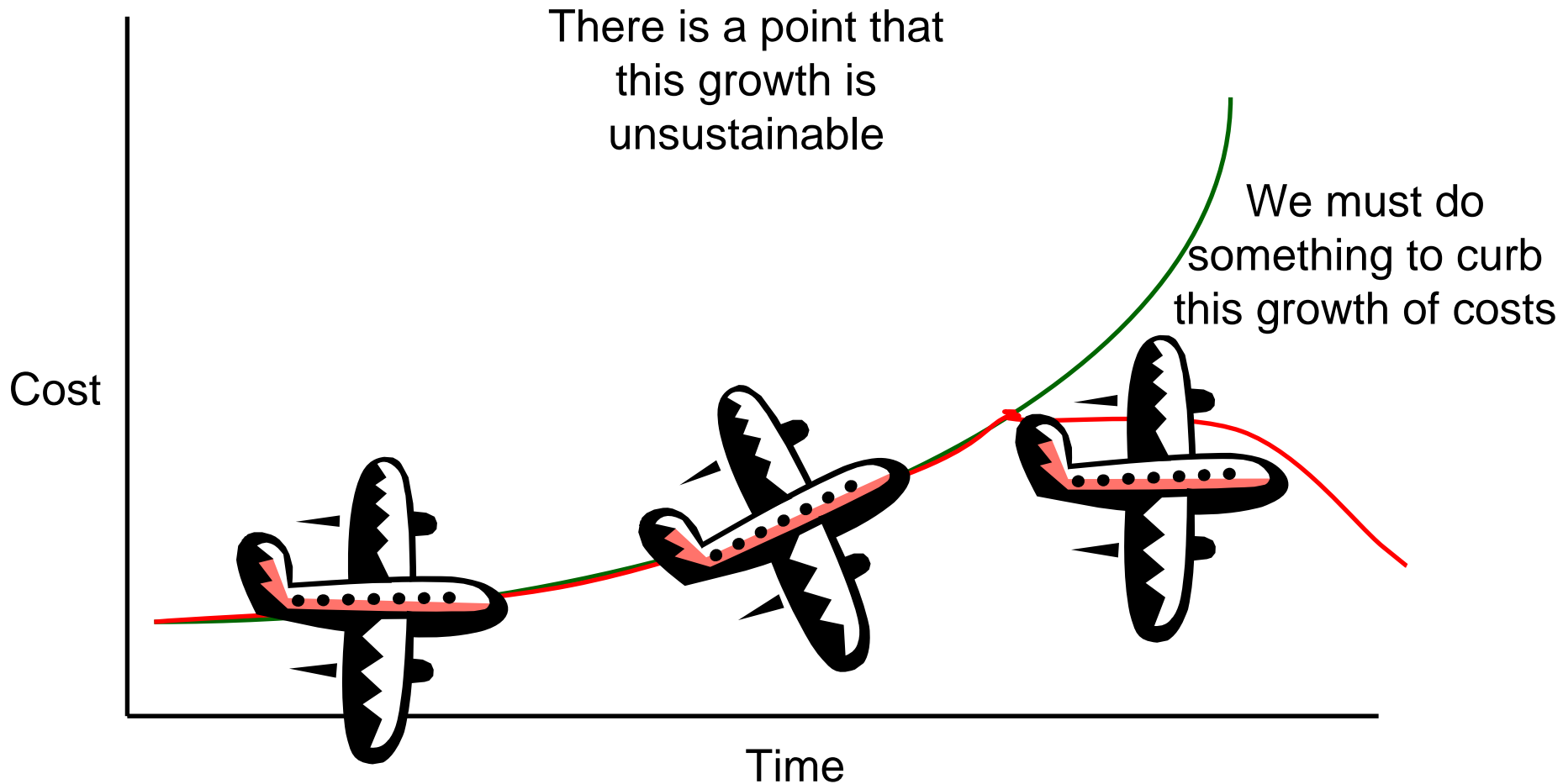
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# Pain points and implications

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  - ▪ increased maintenance cost
  - ▪ increased reliance on (expensive) IT service providers
- ❑ Lack of effectiveness of IT
  - ▪ poor service provision to users
  - ▪ IT changes not implemented when the business needs
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- ❑ Lack of effectiveness of business operations
  - ▪ increasing costs to run the business
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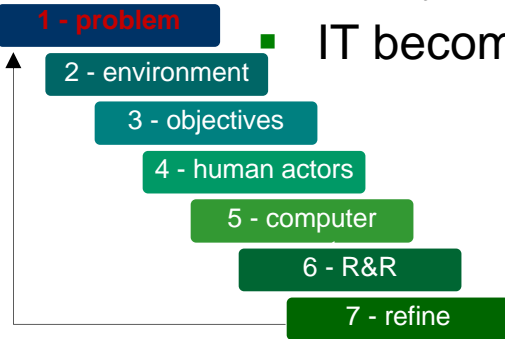  - ▪ inability to provide effective services to customers

1 - problem

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# The criticality of IT costs



There is a point that
this growth is
unsustainable

We must do
something to curb
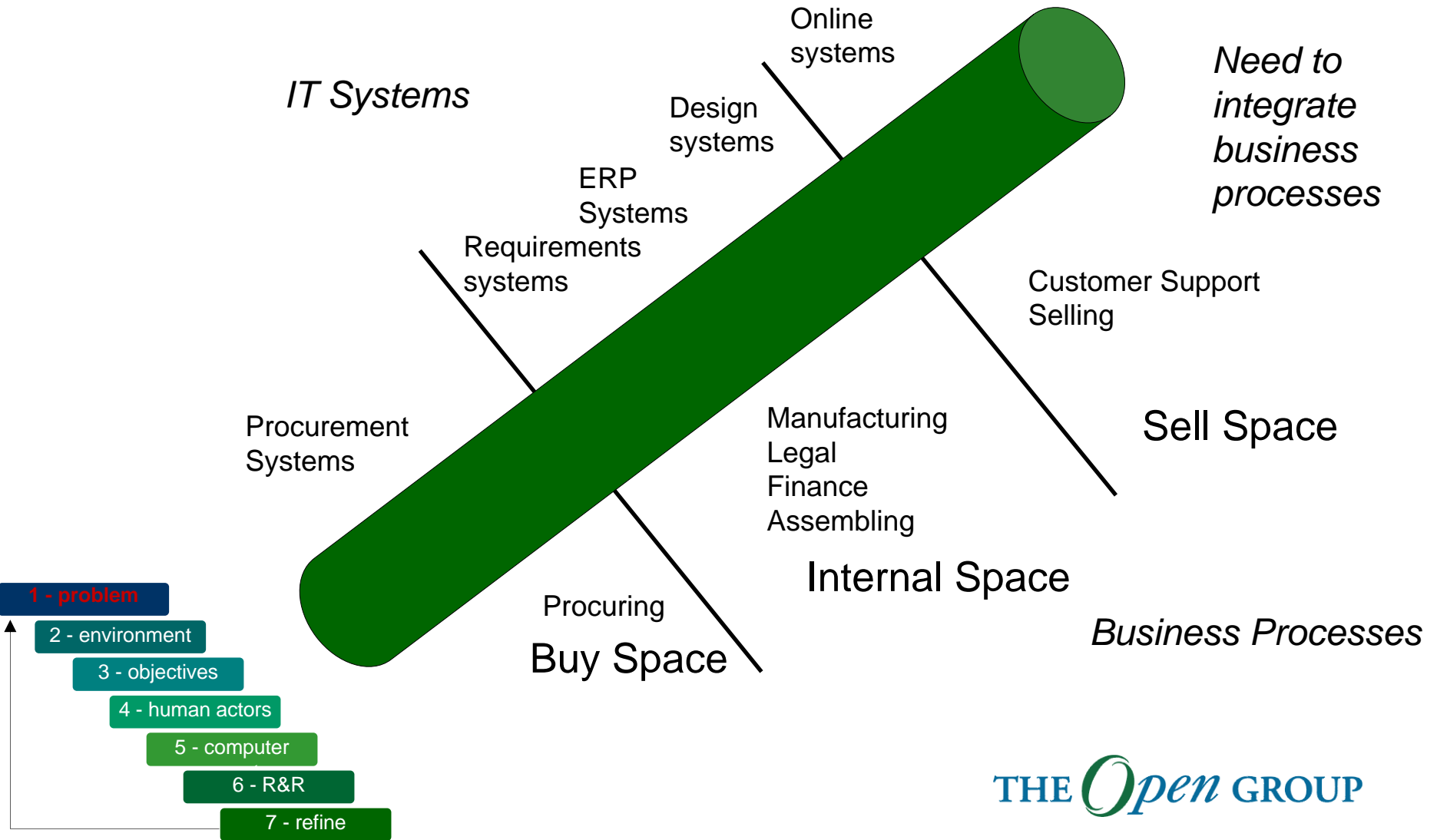this growth of costs

Cost

Time

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# Pain points and implications

- Lost opportunity to add value to the business
  - non-discretionary spend rising, spend on extra business value decreasing.
  - new features sacrificed just to "keep things running"
- Reduced management control
  - IT and business environment too complex to manage
  - IT not driven from strategic architecture
  - difficult to balance short and long term choices
- Increased operational risk
  - security
  - safety criticality
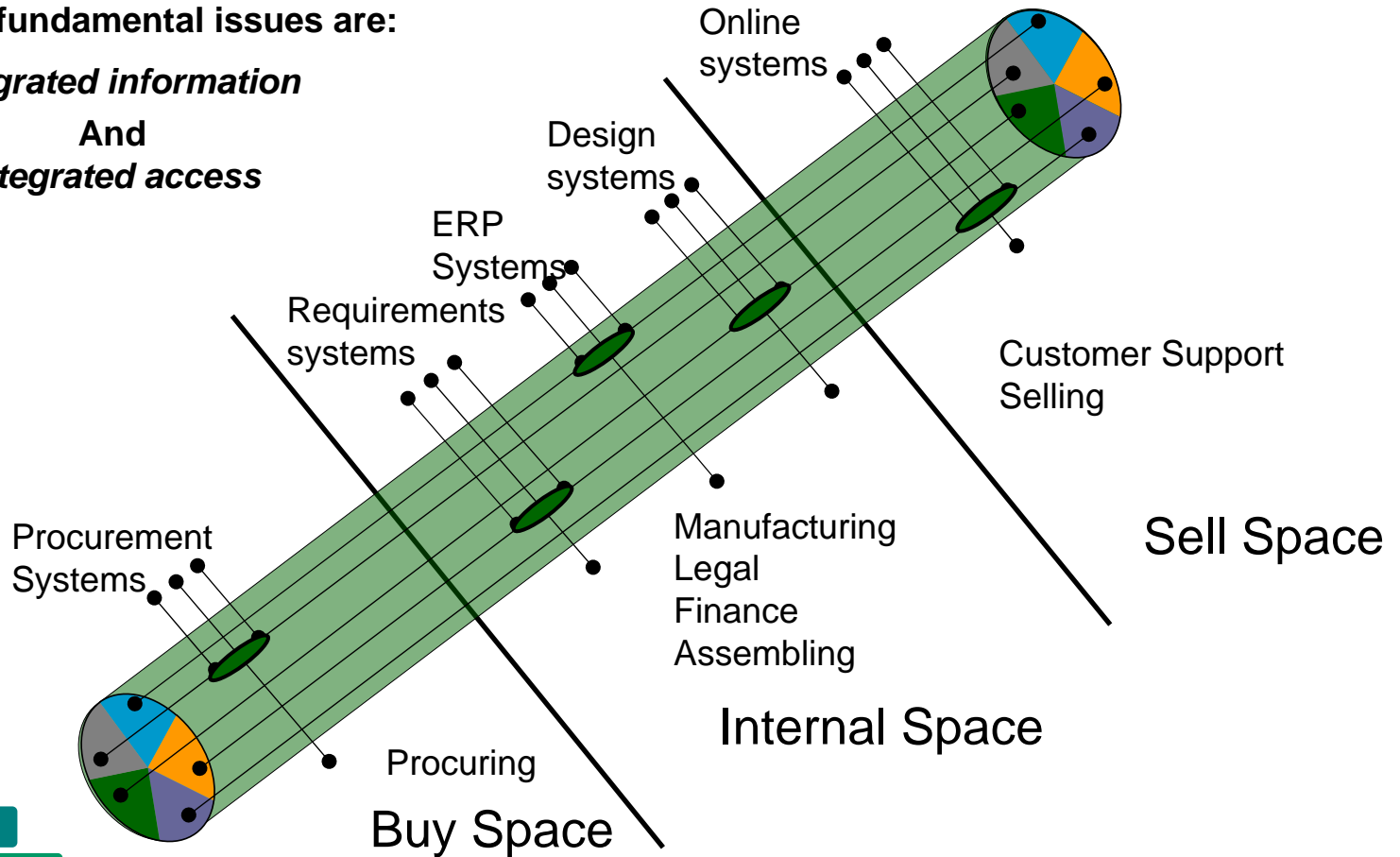  - IT becomes a "choke point" - the business stalls

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# Interoperability problems from …

Online
systems

*IT Systems*

Design
systems

*Need to
integrate
business
processes*

ERP
Systems

Requirements
systems

Customer Support
Selling

Procurement
Systems

Manufacturing
Legal
Finance
Assembling

Sell Space

Internal Space

Procuring

Buy Space

*Business Processes*

1 - problem

2 - environment

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# Interoperability problems from ...

**However fundamental issues are:**

*Integrated information*

**And**

*Integrated access*



Online systems

Design systems

ERP Systems

Requirements systems

Procurement Systems

Manufacturing
Legal
Finance
Assembling

Customer Support
Selling

Sell Space

Internal Space

Procuring

Buy Space

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# Need for access portals



Supplier Portal

Finance Portal

Procurement

Accounting

Legal

Personnel

Legal Portal

Employee Portal

Technical

Customer Portal

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7 - refine

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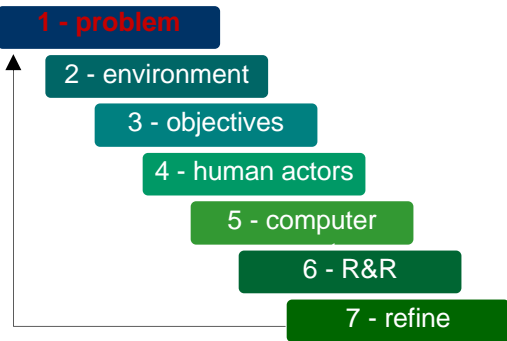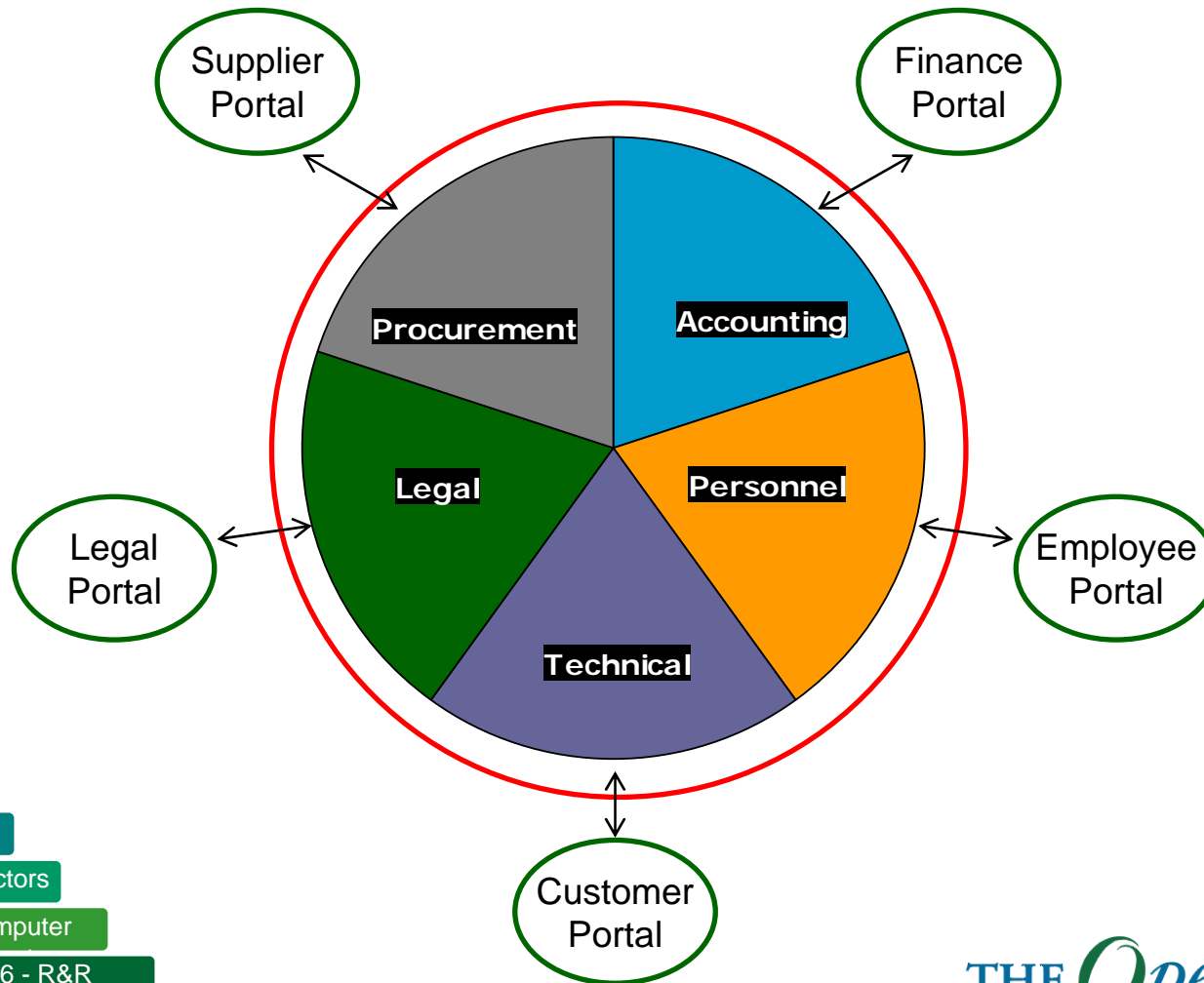
# Business environment

**Banks**

**Lawyers**

**Risk Sharing Partners**

**Suppliers**
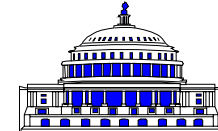
**Government**

**External**

**Internal**

**The Public**

**Customers**

**Certification Authorities**

**Retail Outlets**
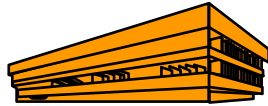
**Offices**

**Trucks**

**Trains**

**Boats**

**Planes**

**Distribution Centers**

**Factories**

**Research Laboratories**

**Producing Locations**

1 - problem

*2 - environment*

3 - objectives

4 - human actors

5 - computer

6 - R&R

7 - refine

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# Business environment

- Number of facilities of *different kinds and in different locations*.
- Usually has users who are *mobile*.
- Business relationships with *other organizations* of various kinds
  - customers, suppliers, risk sharing partners, banks, legal advisors, regulatory agencies, and government departments.
- May interface with the general public.
- Shape of the organization and its business relationships is *dynamic*.
- The distinction between those "inside" and those "outside" the organization may not be easy to make.

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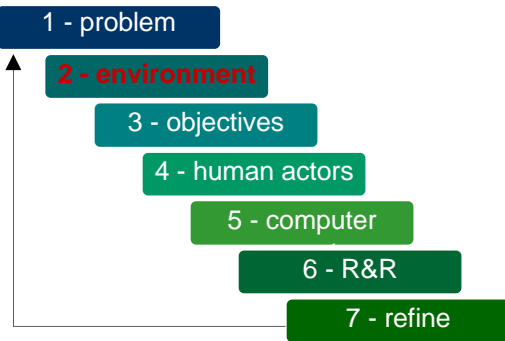
# Business environment

- ❑ Process Categories
  - ▪ Buy side processes

  - ▪ Internal processes

  - ▪ Sell side processes

- ❑ Process Description
  - ▪ Buy side processes include processes such as ordering, procurement, and accounts payable and receivable.
  - ▪ Internal processes include processes such as logistics, manufacturing, competitive intelligence, production, assembling, delivery, and product lifecycle.
  - ▪ The sell side processes include processes such as sales, customer support, and customer relationship management.
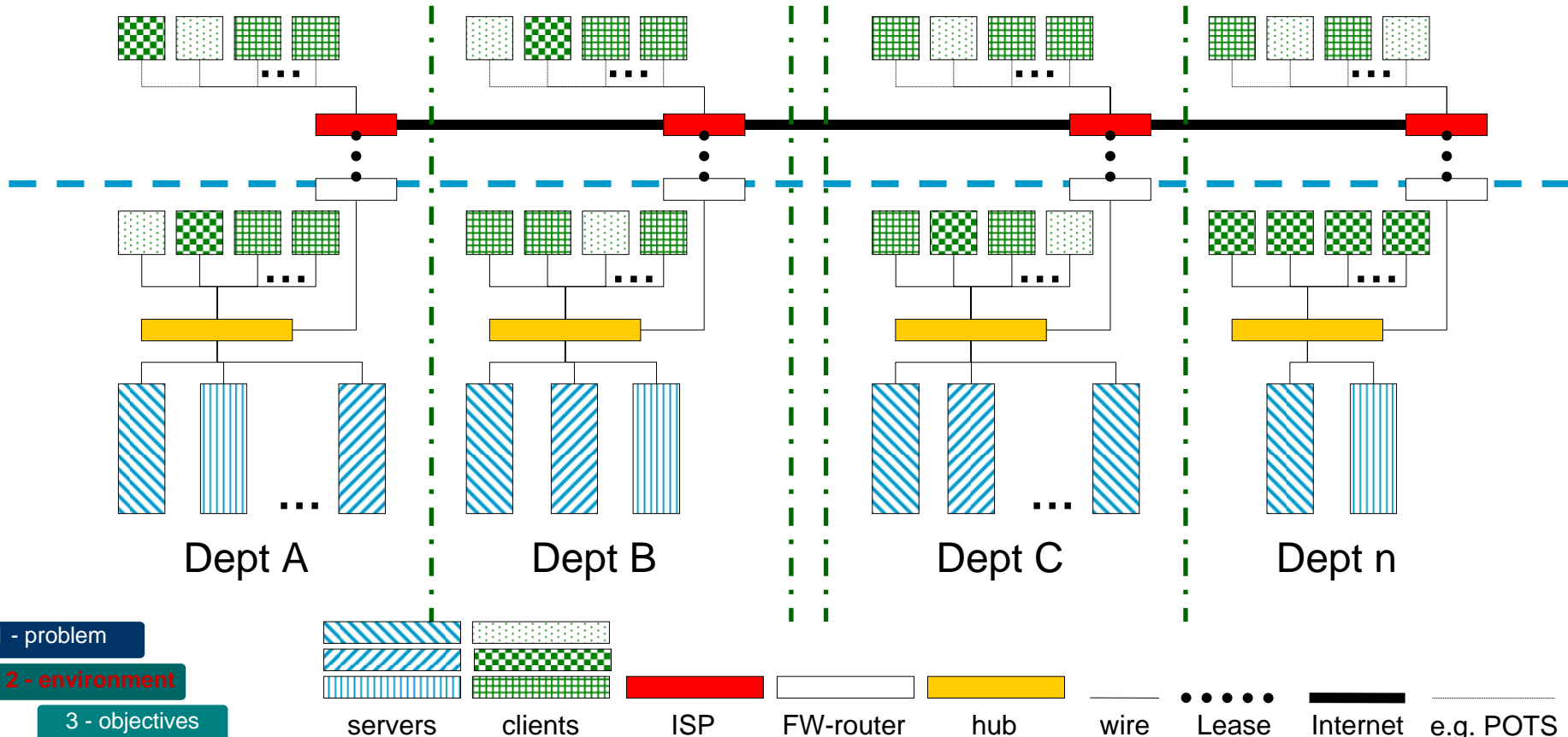
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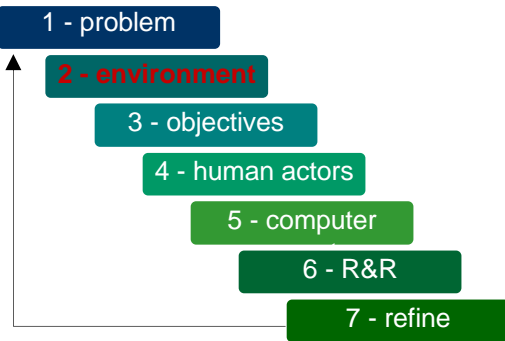
# Business environment

❑ Internal processes include processes like:

- ▪ product definition;

- ▪ manufacturing process design and definition;

- ▪ inbound logistics;

- ▪ workflow / shop floor logistics;

- ▪ outbound logistics (fulfillment/delivery);

- ▪ maintenance; and

- ▪ discontinuance
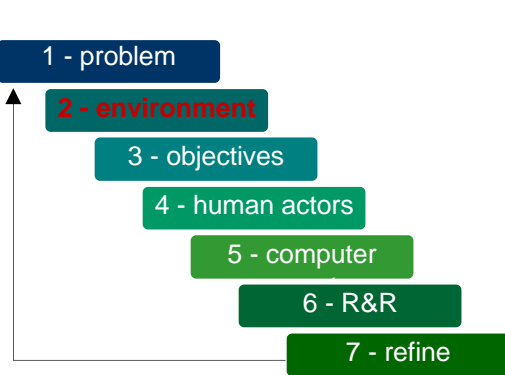
**Success is measured in terms of executing the processes efficiently and accurately!**

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7 - refine

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# Technology environment network view



Dept A     Dept B     Dept C     Dept n

1 - problem
2 - environment
3 - objectives
4 - human actors
5 - computer
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7 - refine

servers   clients   ISP   FW-router   hub   wire   Lease   Internet   e.g. POTS

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# Technical environment

- 1000s of systems and equipment types that can not be used together
  - Have legacy systems, and there is mission value to map the information in these legacy systems to current systems if the price is affordable
- Current solutions include translators and re-entering of data where it is critical
- Current solution approach also to reduce to minimum number of systems that perform similar functions
- Existing information ranges from current to very stale, with similar data sometimes having different levels of integrity
- Also much data is stored and carried around on desktops rather than in safe repositories such as data stores
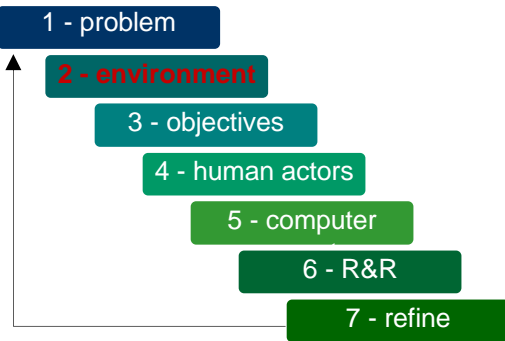
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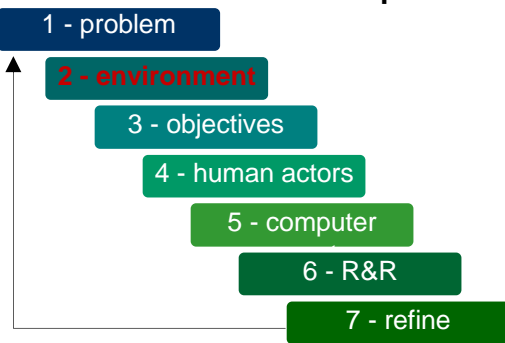
# Technical environment

❑ Systems typically be a mix specific to particular vertical domains and common to multiple vertical domains.

❑ Systems that support enterprise functions common to a number of vertical domains typically include:

  ▪ personnel management

  ▪ workflow management

  ▪ finance

  ▪ procurement

  ▪ supply chain and catalog management

  ▪ customer relationship management.

❑ All of these systems need to talk to each other.

1 - problem
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# Objectives

❑ Improve business process performance

❑ Decrease IT costs
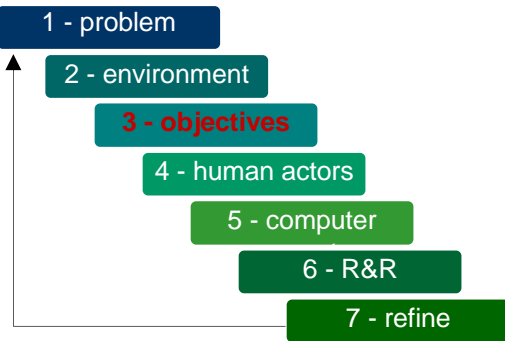
❑ Improve effectiveness of business operations

❑ Improve effectiveness of information technology organization

❑ Improve management efficacy

❑ Reduce risk

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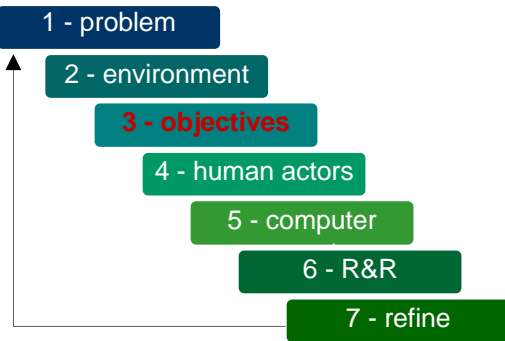
# Measures

- ❑ Funding growth through consolidation - improved asset utilization
- ❑ Improving business operations
  - ▪ effectiveness of business operations more important than effectiveness of IT - leverage is orders of magnitude higher
- ❑ Driving revenue growth
- ❑ Lower IT spend for the entire organization
- ❑ Increase % of procurements against standards
- ❑ Decrease spend on customizations
- ❑ Improved cycle time for rolling out upgrades

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# Examples of human actors

- Company clerk
- Supply clerk
- Logisticians
- Engineers
- Materials acquisition and procurement specialists(secondary actor)
- Suppliers(secondary actor)
- Shop floor workers and technicians(secondary actor)

- Shipping and delivery personnel(secondary actor)
- Intelligence gatherers
- Intelligence support technicians
- Cryptographers, Encryption/decryption analysts
- Arial photo analysts
- Satellite image analysts
- Warfighter

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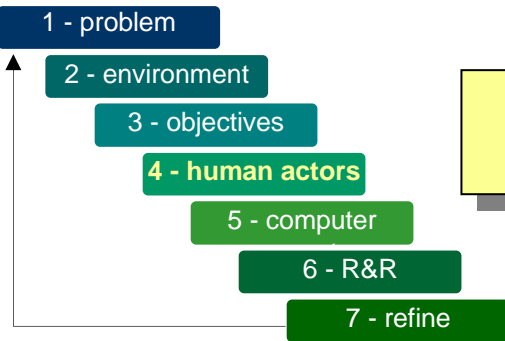
**People are always in the value chain! Somewhere.**

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# Technology environment
## Network view of department



Remote clients

Desktop clients in workgroups

Desktop clients in workgroups

eMail Servers

Web Servers

Print Servers

Application

Servers

File Servers

Directory Servers

Collabor- ation Server

Fax Server

Security Server

Database Servers
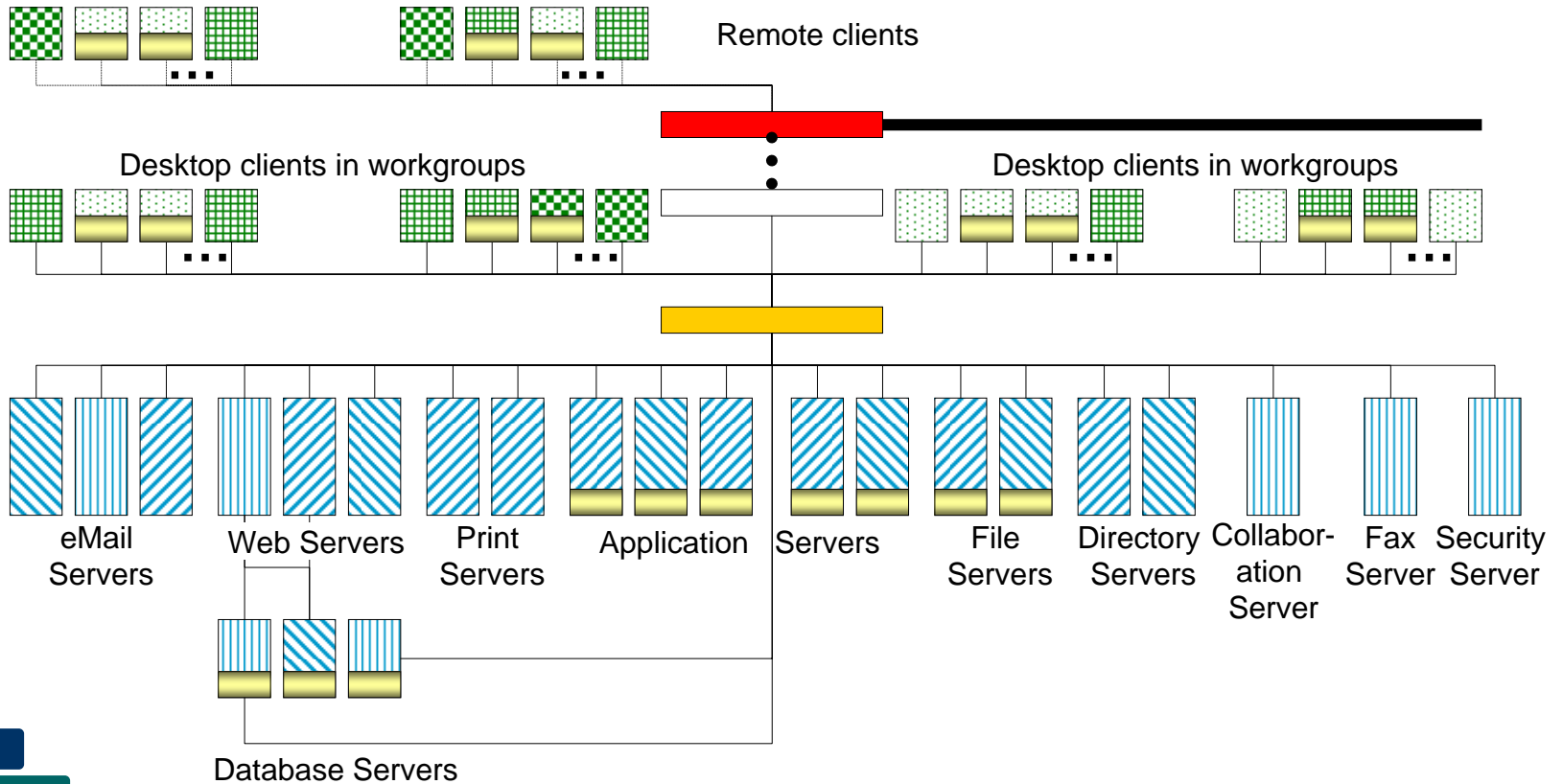
1 - problem

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7 - refine

User data  servers  clients  ISP  FW-router  hub  wire  Lease  Internet  e.g. POTS

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# Technology environment

❑ Of importance here is

  ▪ Depiction of the numerous owners of the subject data

    ▪ from the clients, desktops, applications servers, database servers, and file servers.

  ▪ Requires attention for data movement, reformatting, and transformations

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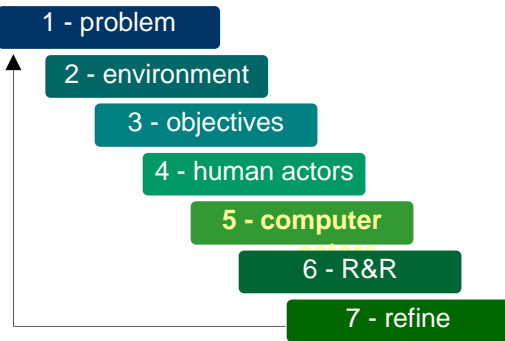
# Resulting requirements

- Openness
    - Standards based open interfaces need to exist for critical interfaces.
- Data integrity
    - The solution must translate as necessary between the multiple formats.
- Availability
    - The solution must be available 7*24*365.
- Security
    - The solution must be able to support different security levels and protection based upon both the sensitivity of the data and the use of the data.
- Accessibility
    - The solution must provide global accessibility to the information while not compromising security.
- Manageability
    - The solution must be manageable.
- Internationalization and Localization
    - The solution should be designed to accommodate multiple languages and adapt to cultural and technical requirements of specific countries.

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# Technology environment
## Software view
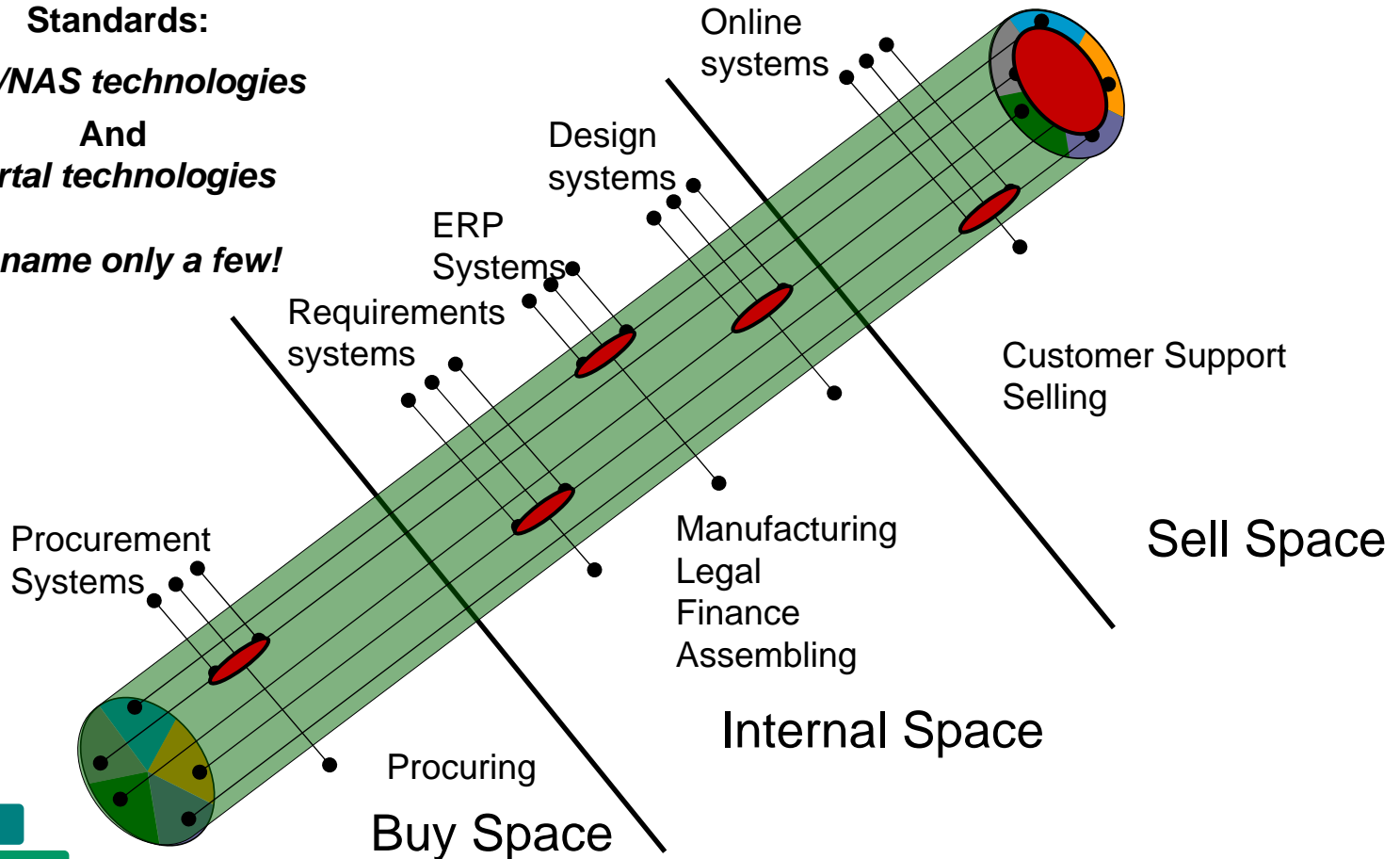
**Security and Management**

**Web Browser**

Application - Client    Web Portal - Client    Mail Client    Desktop Video Conference Client

Streaming audio / video Client    Phone / Fax Client

Application Messaging    Data Access    Transaction Processing    Networking and Communications

Client OS and Platforms

Encryption    Intrusion Detection    Firewall

Messaging/Event Brokering    Component and Object Management    Process/Workflow Control

Enterprise Application Integration    Data Interoperability Services

NW OS and Platforms

Gate way
in    out
Mail Services

Telephony
Fax/Phone Services

eForms
Proxy server
Portal services
(push & pull)
Streaming audio / video
Commerce services
Web Services

Application Messaging
TP TM

Applications

DBMS & TP RM

Database Services

LDAP
X.500

Directory Services

Discussion Groups

Collaboration Services

ftp

File Services

Authentication
Authorization
Access Control

Security Services

Server OS and Platforms

**Security and Management**

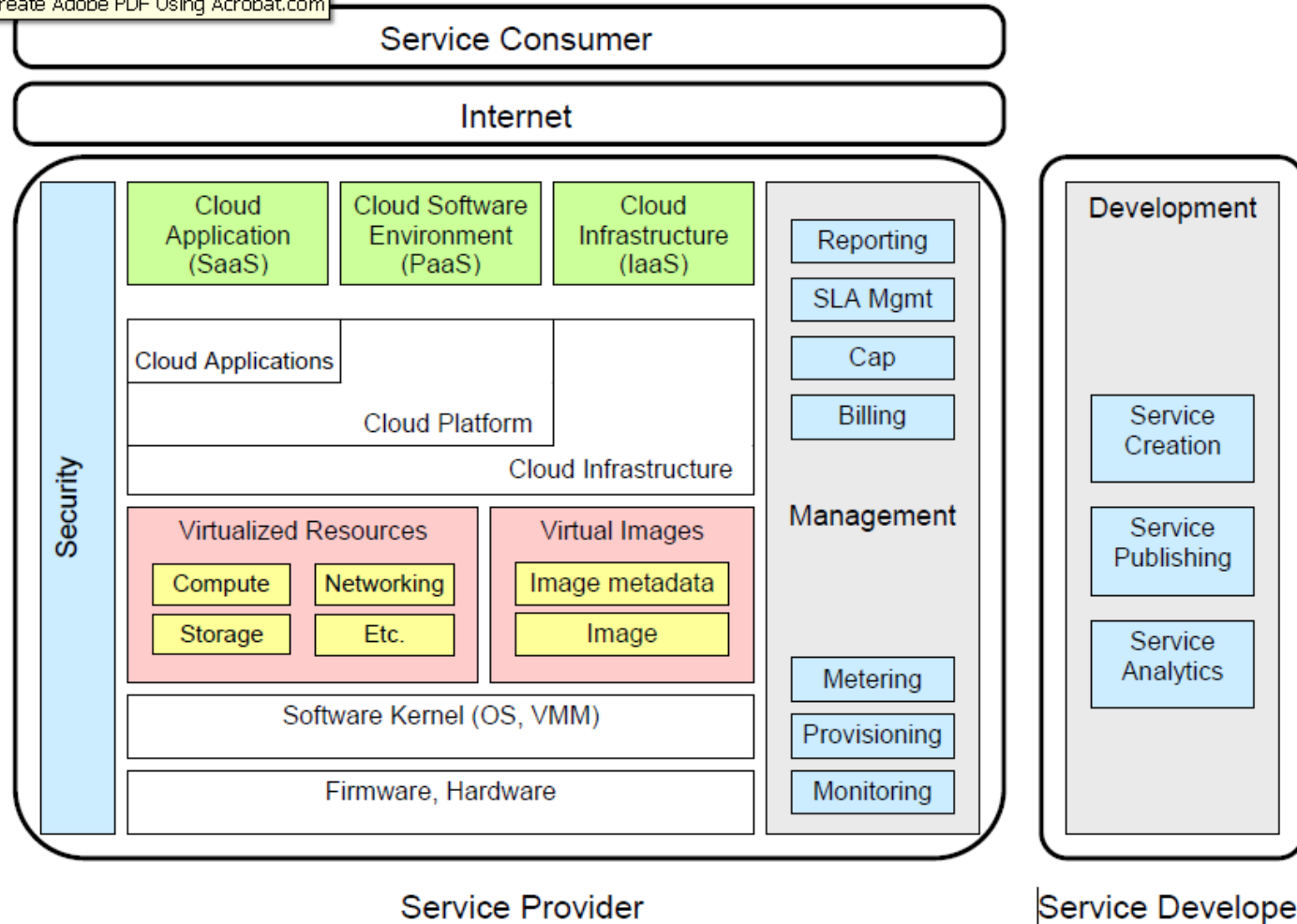User data    server    client    VAN

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# Interoperability issues can be addressed by ...

**Standards:**

*SAN/NAS technologies*

**And**
*Portal technologies*

*To name only a few!*

Online systems

Design systems

ERP Systems

Requirements systems

Customer Support Selling

Procurement Systems

Manufacturing
Legal
Finance
Assembling

Sell Space

Internal Space

Procuring

Buy Space

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# Some work in progress – candidate technology actors



From: Cloud Computing Use Cases
http://groups.google.com/group/cloud-computing-use-cases?hl=en

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