

IT Architectural Principles for Designing a Dynamic IT Organization

Tim Durniak, IBM STG CTO for Public Sector

Tuesday, August 3, 2010: 4:30 PM-5:30 PM
Room 108 (Hynes Convention Center)



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Abstract and Audience

ABSTRACT: Datacenter managers (and all IT managers) are constantly being challenged to provide more service with less, and then asked to change direction to suit needs of the business.

This session will cover the IT architectural principles that provide the foundation to designing an IT organization that is built to be efficient and more responsive.

Our speaker will help you understand how IT and the business must both understand the business's functional and non-functional requirements. They both must also understand their interdependence on setting IT Strategy, Direction and planning, so that the IT organization is responsive to the dynamic needs of their business.

You will leave the session with a road map of ways to apply these principles in an incremental manner that you can personalize to suit your situation without having to start from scratch.

INTENDED AUDIENCE: Datacenter managers, Line-of-Business Leaders, Application Lead Users, Application Architects and Developers, Infrastructure Architects, Operations managers, Operations Specialists. This presentation is geared to help all these groups understand the shared issues and their interdependence on setting IT Strategy, Direction and planning for a datacenter that is responsive to the dynamic needs of their business.

Your Speaker



Timothy Durniak

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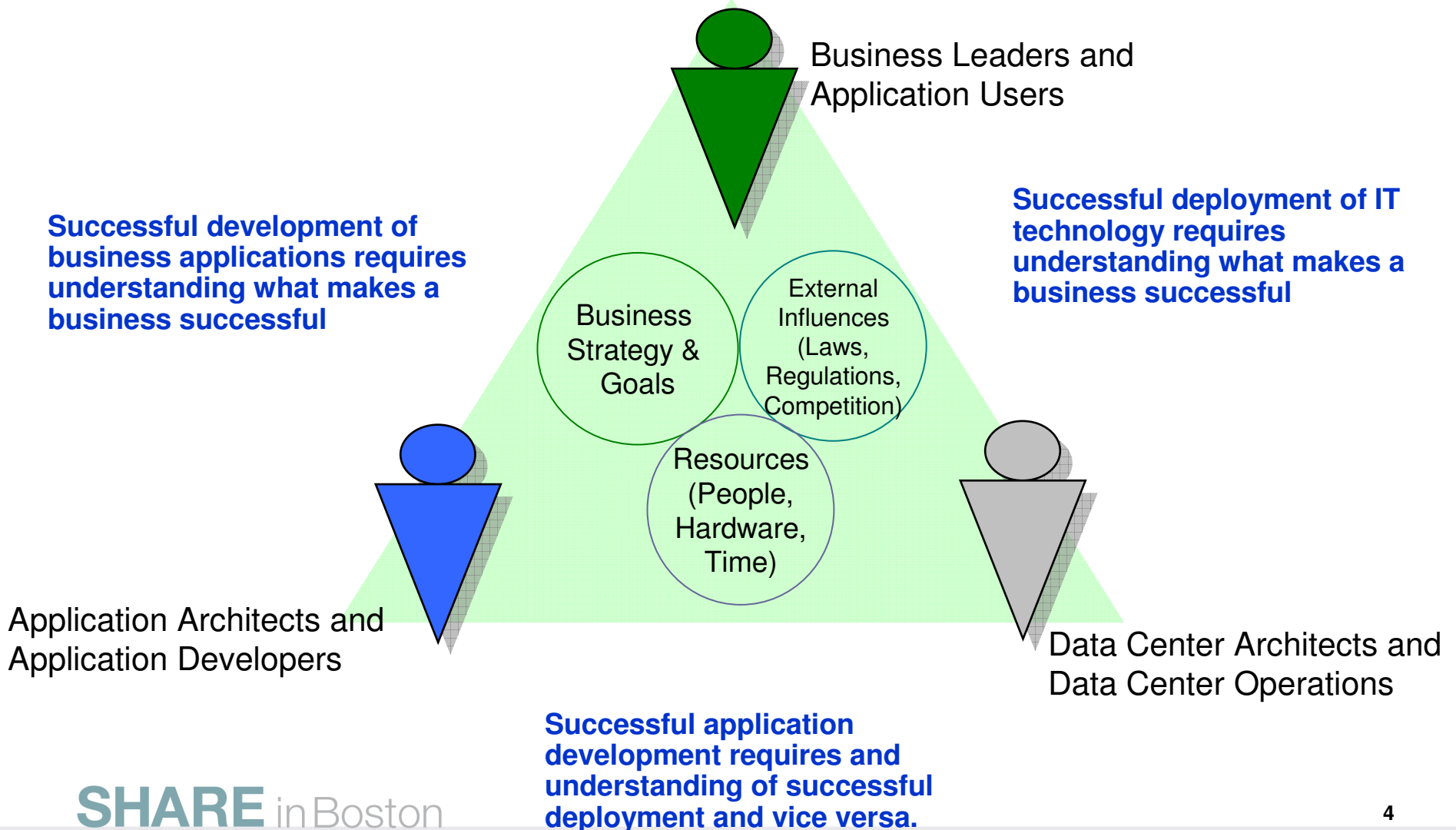
STG CTO For Public Sector

Executive IT Architect

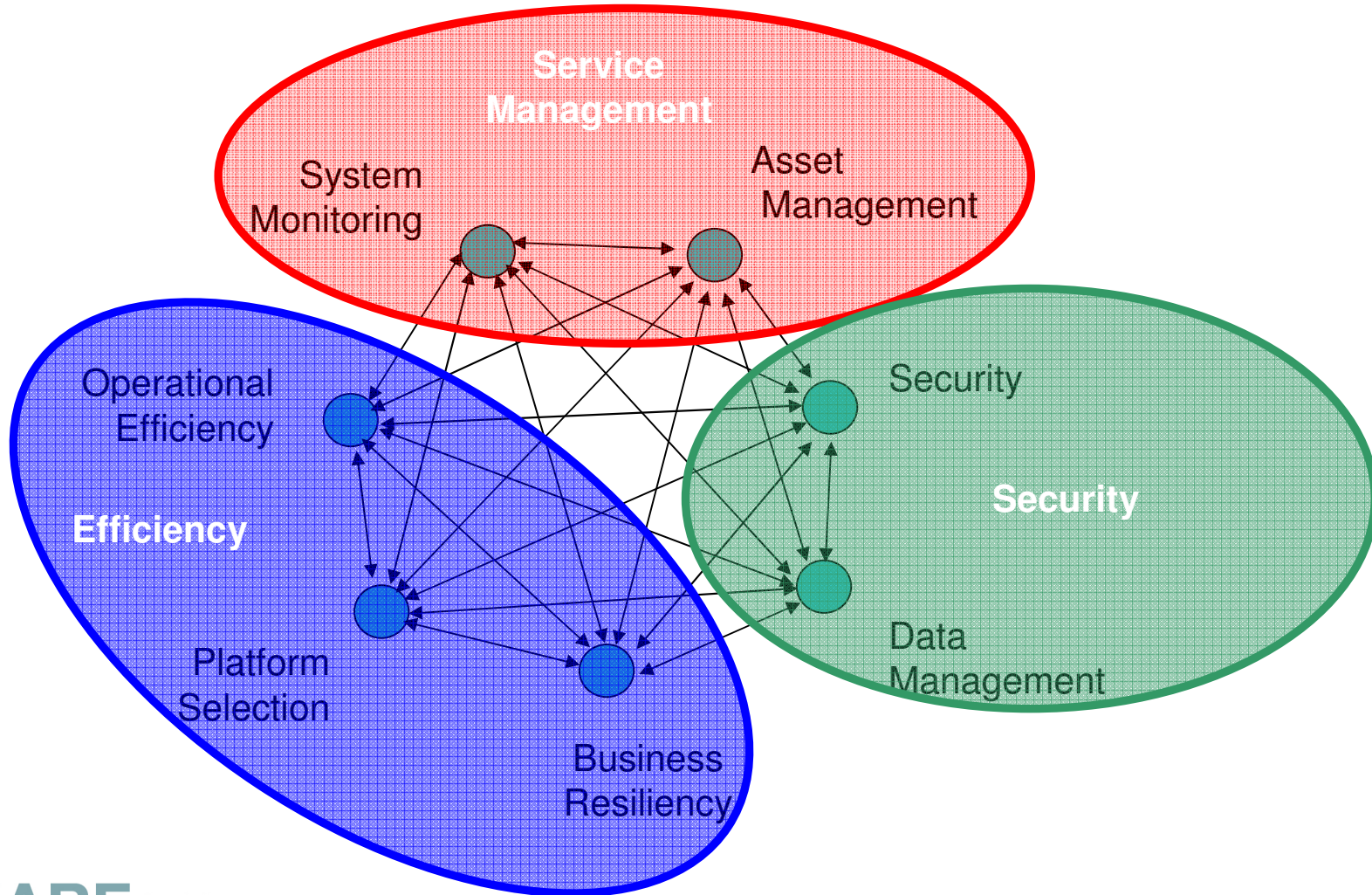
IBM Center for Solution Integration



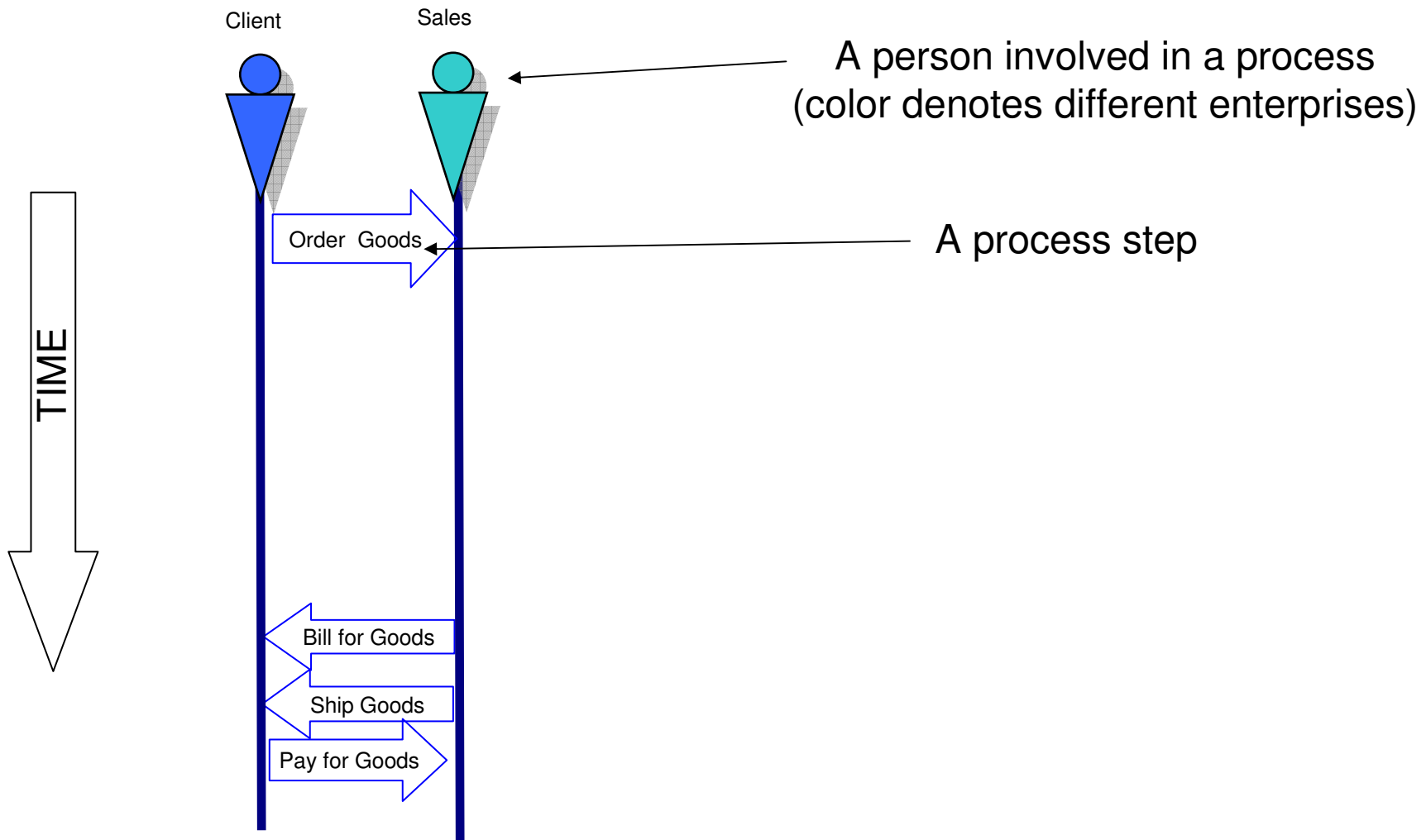
It is no longer IF a business will use Information Technology but how well IT is used and how that relationship changes over time, and what skills are needed to exploit IT.



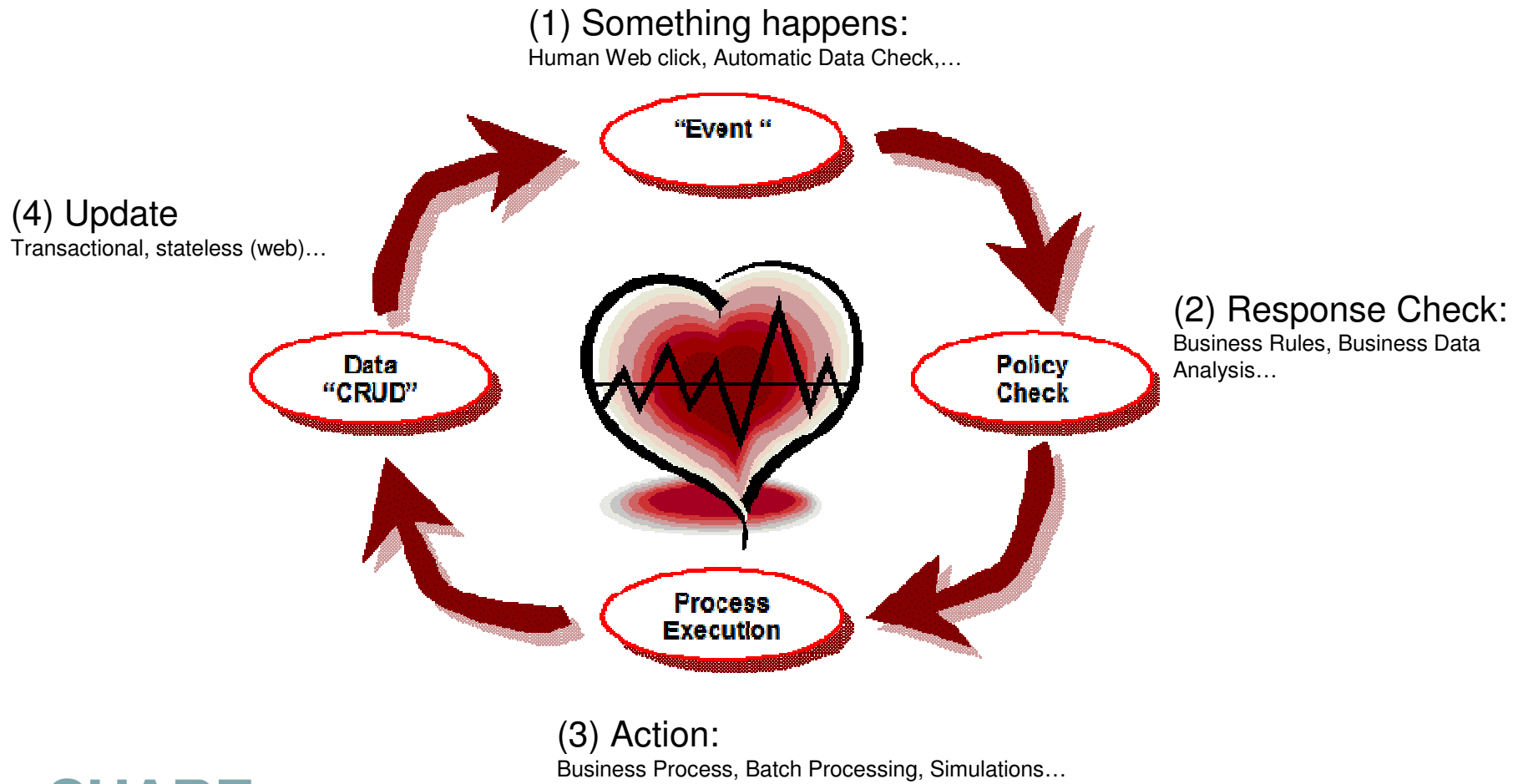
The architecture of the dynamic IT environment can be encompassed in 3 major areas: Service Management, Security, Efficiency



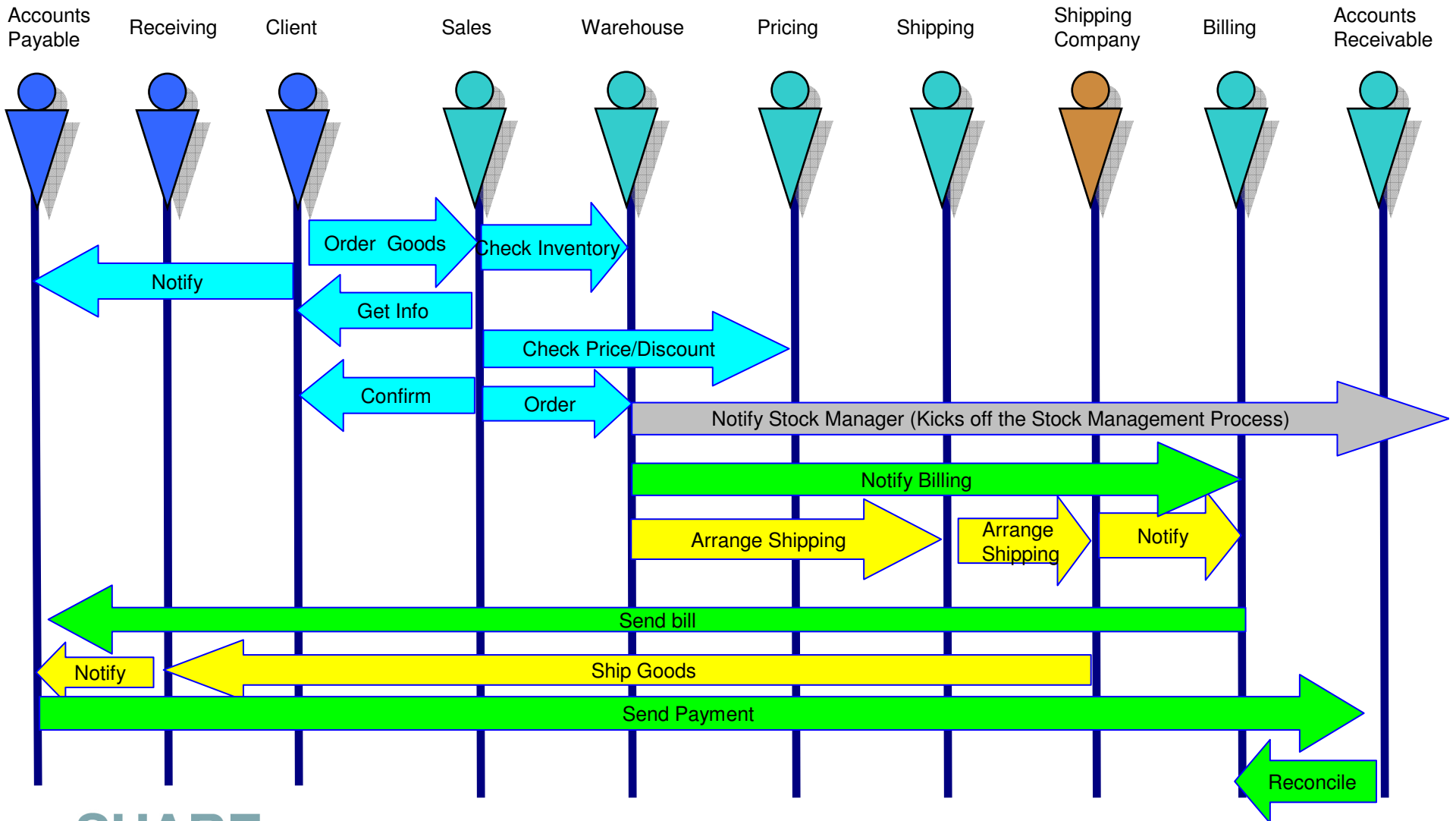
PRINCIPLE: Business processes are not *static*, each step represents movement of data, goods, or money, and usually kicks off other processes...



PRINCIPLE: Every business process has a “Heartbeat”– the pattern of regular behavior in response to stimulus - This is the source of the dynamic nature of any business.



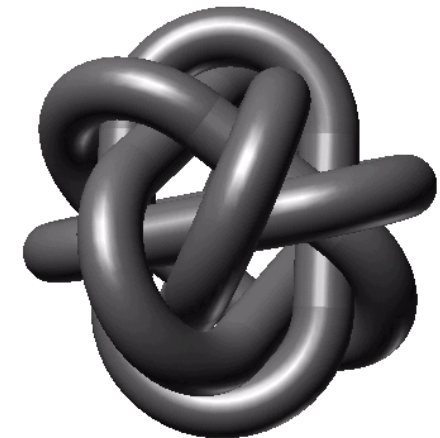
Reality: The heartbeat of a business is the collection of the heartbeats of all its processes.



Processes repeat over time....



... and likely fold on themselves.



PRINCIPLE: Provide process monitoring.

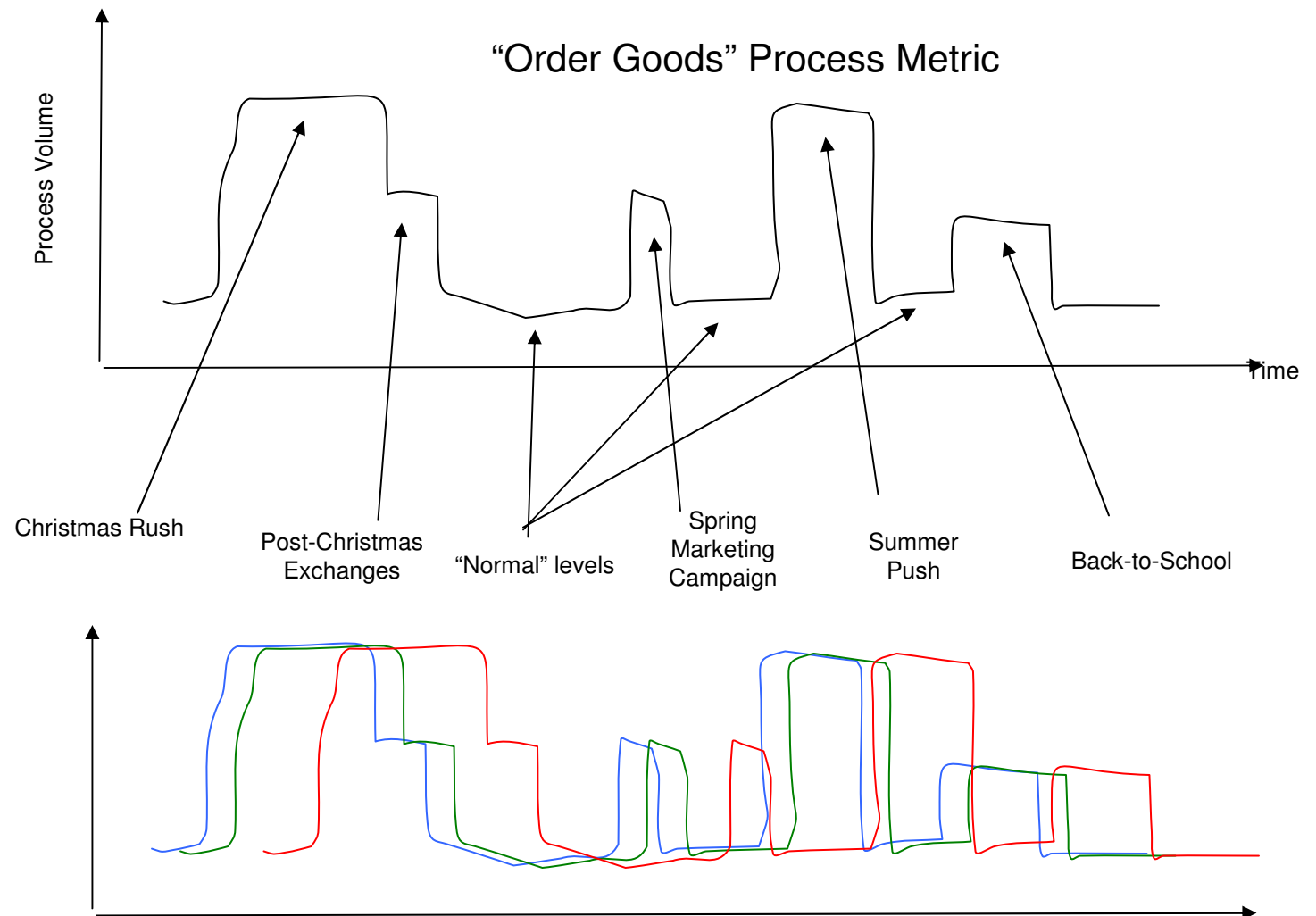
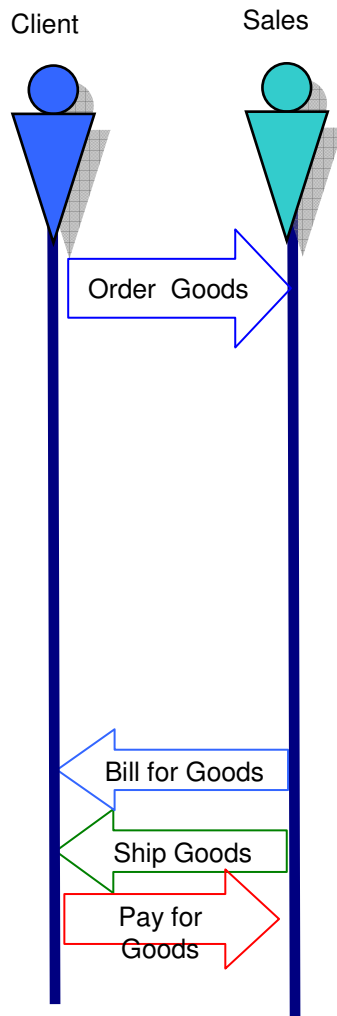
At all levels, make sure that there is linkage to the business

- **Business Dashboards** – displays the key performance indicators of the business perspective
- **Services Dashboards** – displays the key performance indicators of the services used by the business
- **Operations Dashboards** – displays the key performance indicators of the implementation of the services
- **Facilities Dashboards** – displays key performance indicators of the environment supporting the infrastructure.

Watch out for “Lies, Damn Lies and Statistics”.

Business Dashboards

Business Process "EKG"

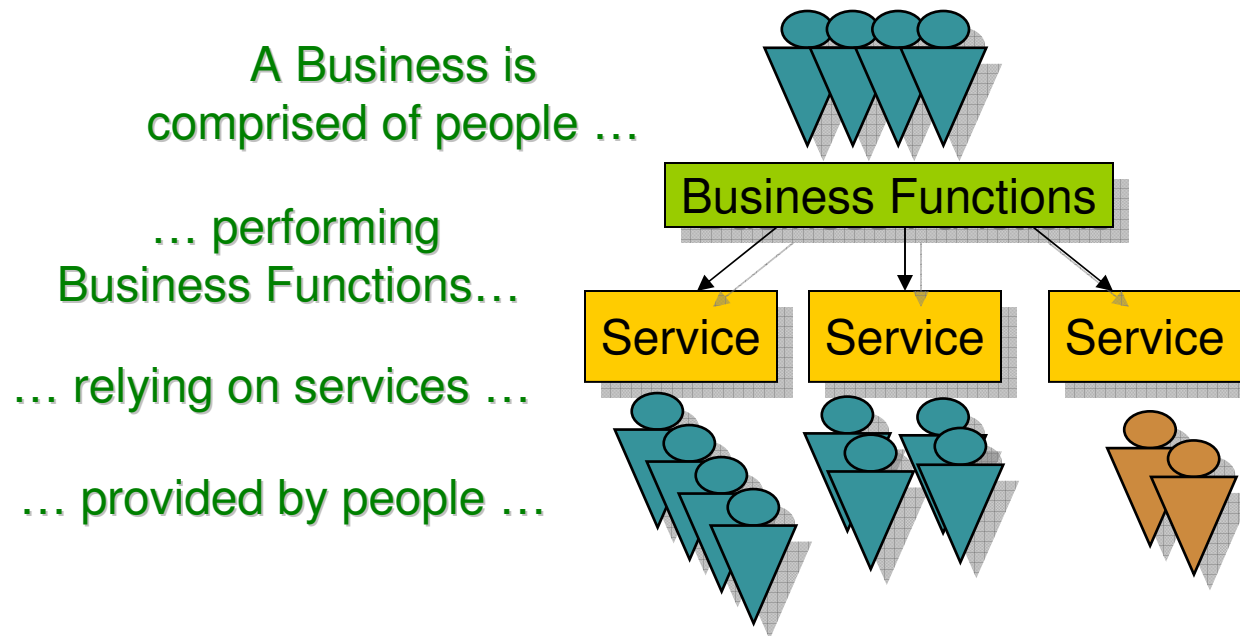


Principle: Link process monitoring to the resources that implement the process



- In two words: “Asset Management”
 - Recall that an Asset is something that has or provides value
- Knowing what resources are engaged in what processes provides feedback
 - what resource is an assets and what resource is not an asset.
 - what resource change will impact which process
 - what process change will impact which resource
- Feedback is how organizations learn and become smarter
- Resources can be people or technology
 - Fiscal policies tend to cause confusion, feedback is key to understanding the value of any resource

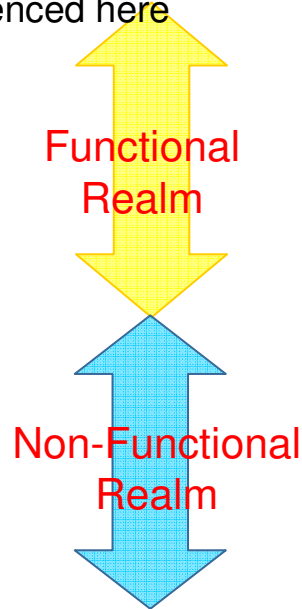
Back in the day, business solutions were simple.



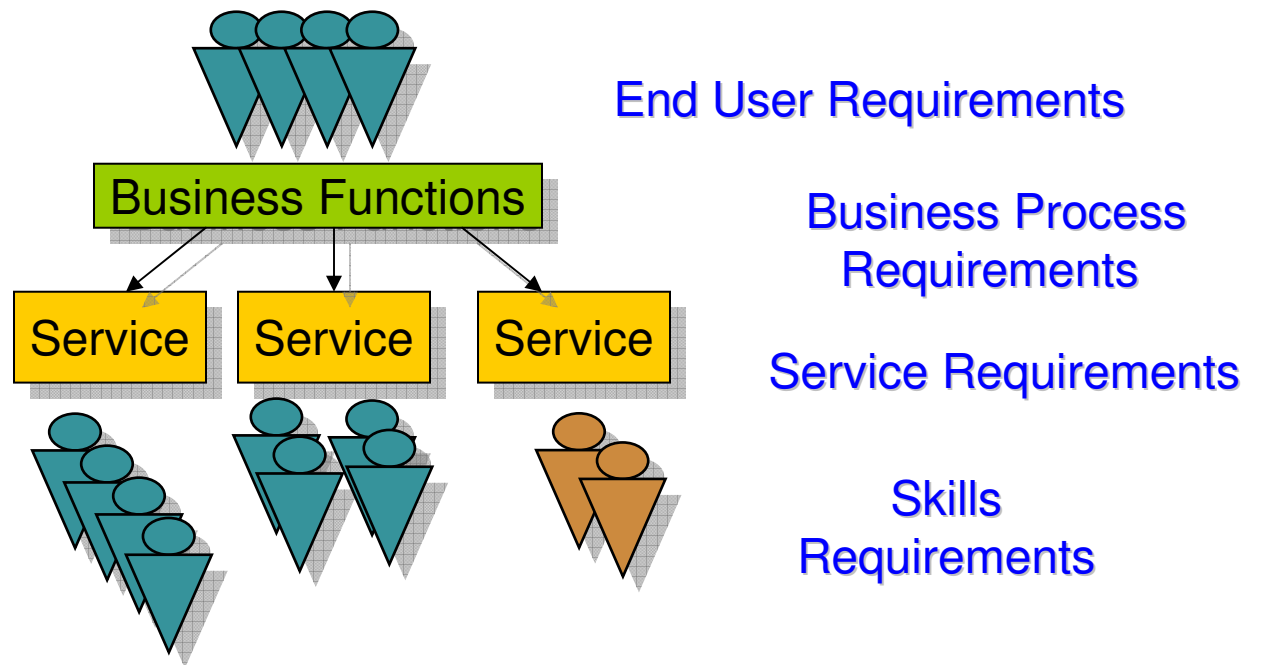
...to provide goods and services to benefit that business' clients.
(And make \$\$ for that business)

Requirements on solutions come in two distinct but inseparable parts, what the solution does and how well the solution performs.

What a solution does is most influenced here



How well the solution performs is most influenced here

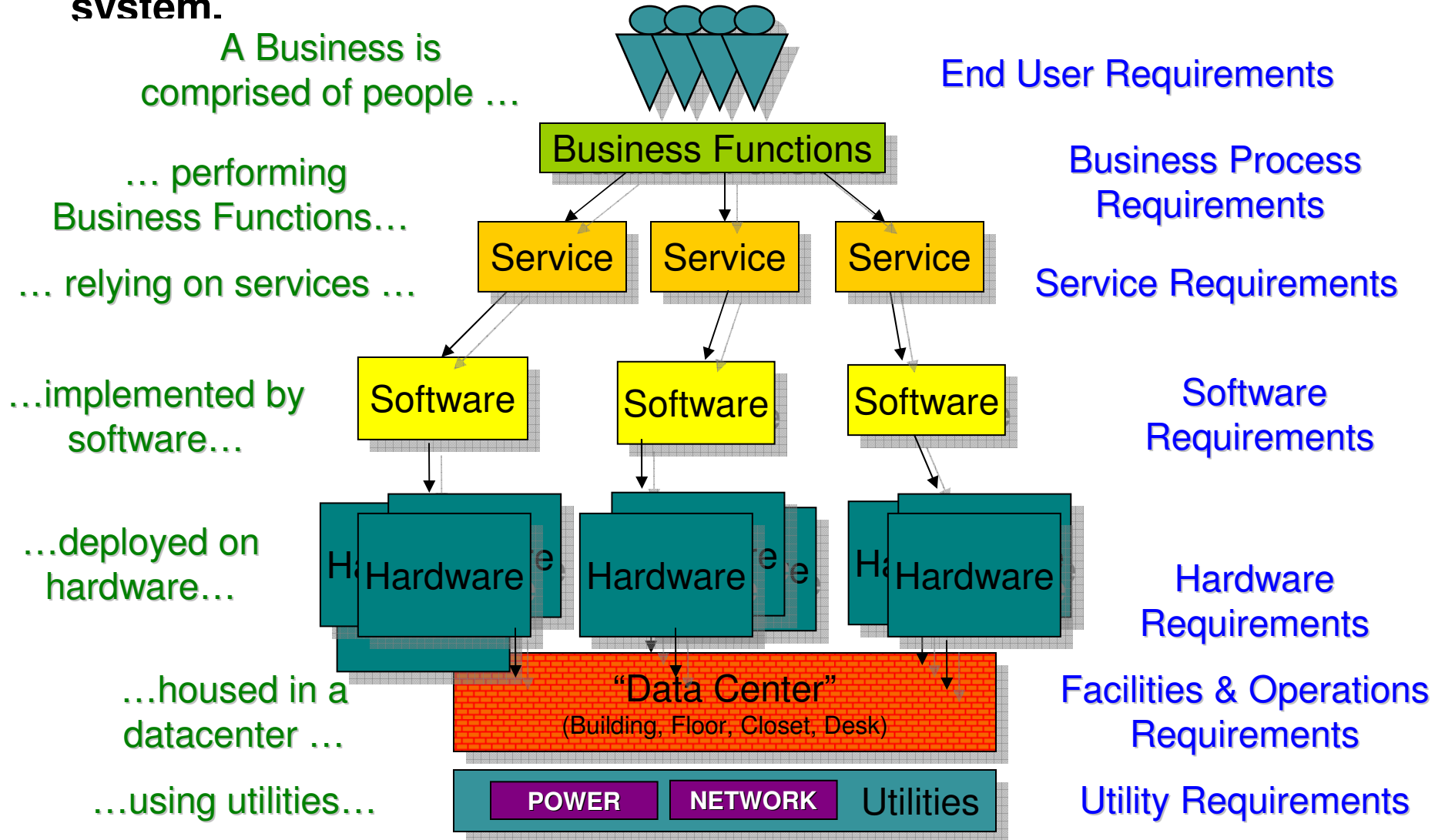


How well a business performed is grounded in how well their employees performed.

PRINCIPLE: Efficiency through Automation

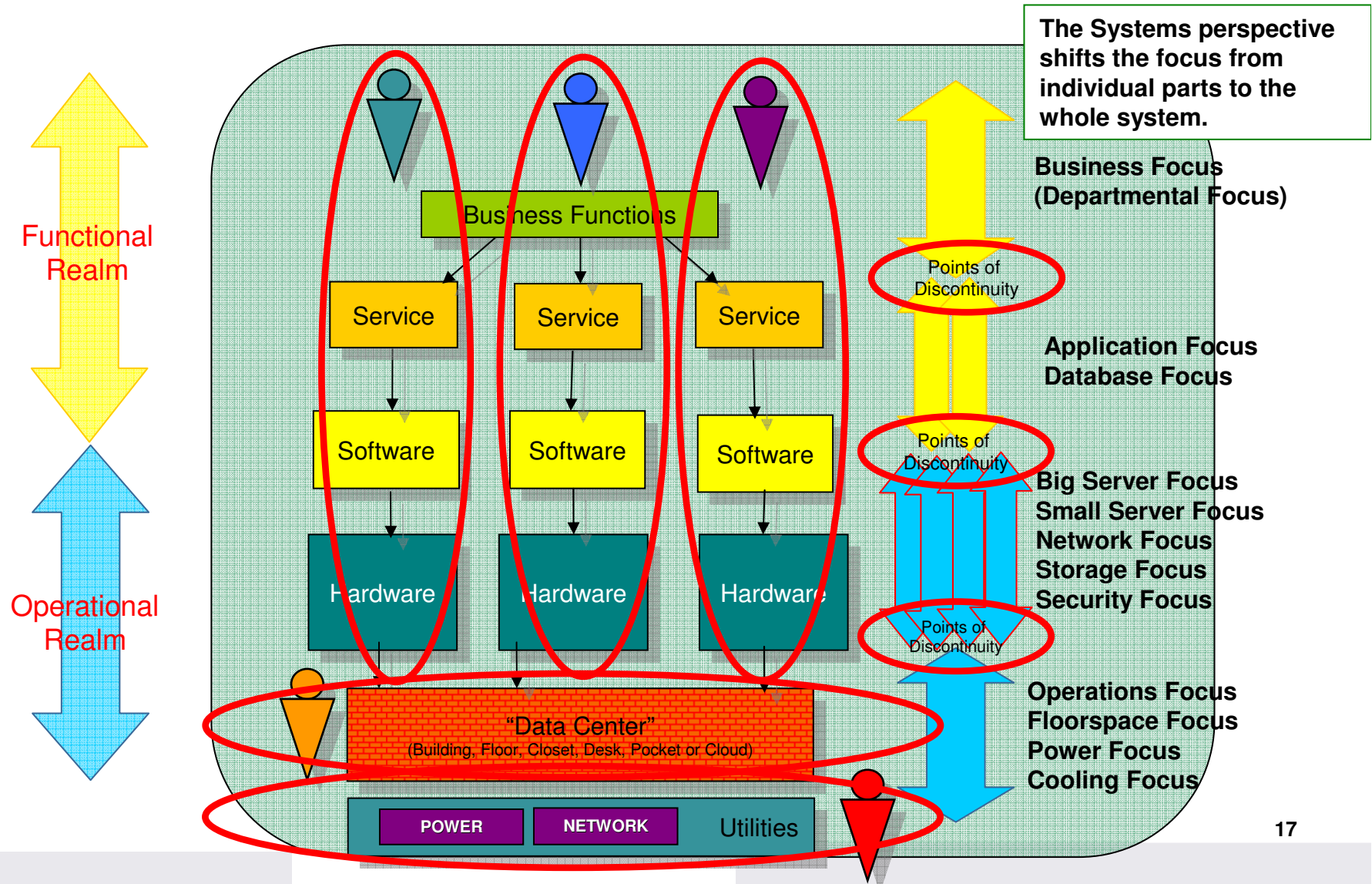
- **Business Process Automation Efficiencies:**
 - Automate the simple, defer the hard stuff to humans
 - Automate the repeatable, high volume – defer the rare stuff to manual or semi-automatic
 - “Just because you can doesn’t mean you should”
- **Business Automation Benefits**
 - Repeatability
 - Ability to Audit (Measure)
 - Traceability
- **Business Automation Inhibitors**
 - Incompatible processes
 - Silos, Mergers & Acquisition
 - Policies
 - Regulations

Automation shifts work from humans to systems of technology, introducing new sets of requirements spread across the system.



...to provide goods and services to benefit that business' clients.

**Reality: The Natural tendencies of human organizations leads to silos.
 Silos are a primary source of discontinuities.
 Discontinuities inhibit the system integration that improves efficiencies.
 Yet, *System Integration is required to provide new business capabilities.***

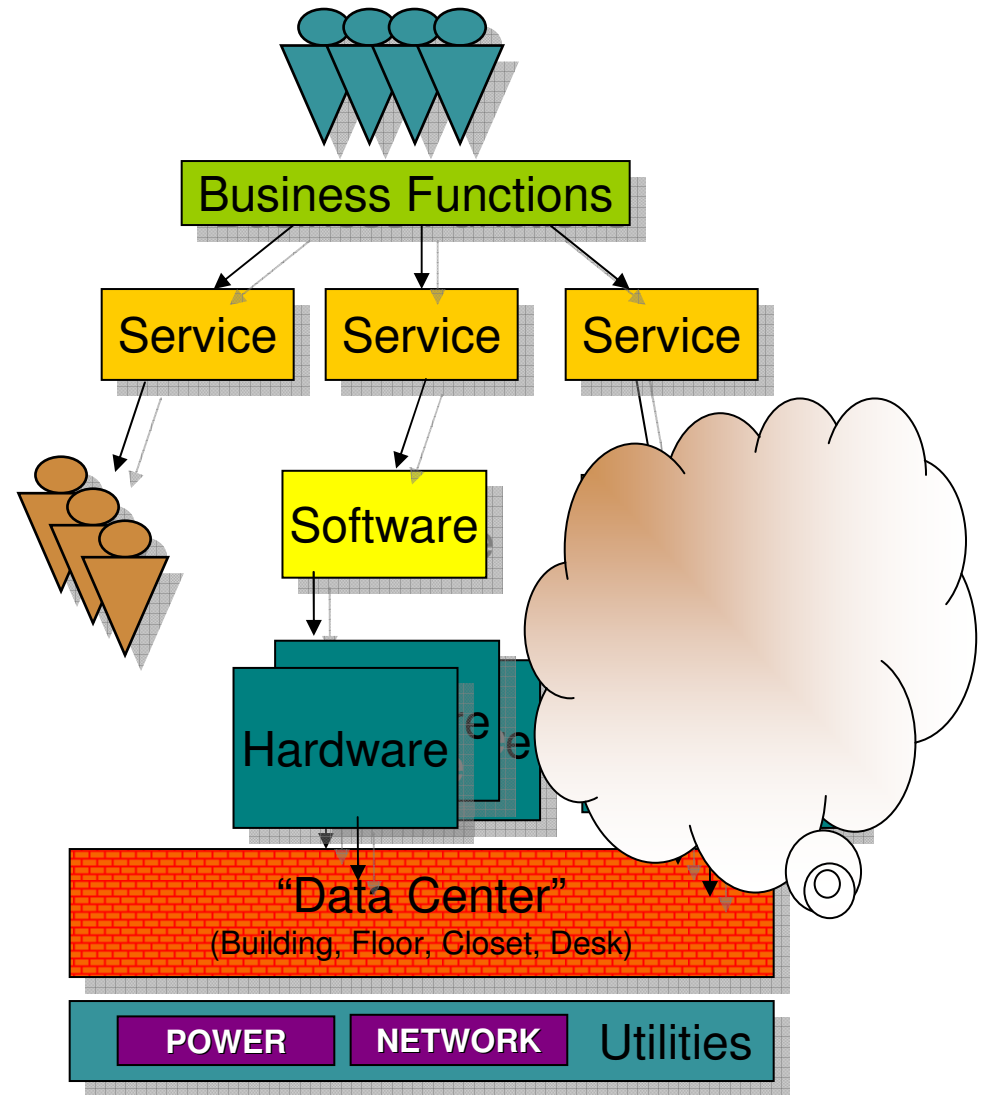


Reality: Outsourcing introduces silos.



Use of outsourcing (people – or – technology) will change the flow of the processes within the business – ultimately changing the structure of that business.

Introducing any change to the structure of the business is a business decision.



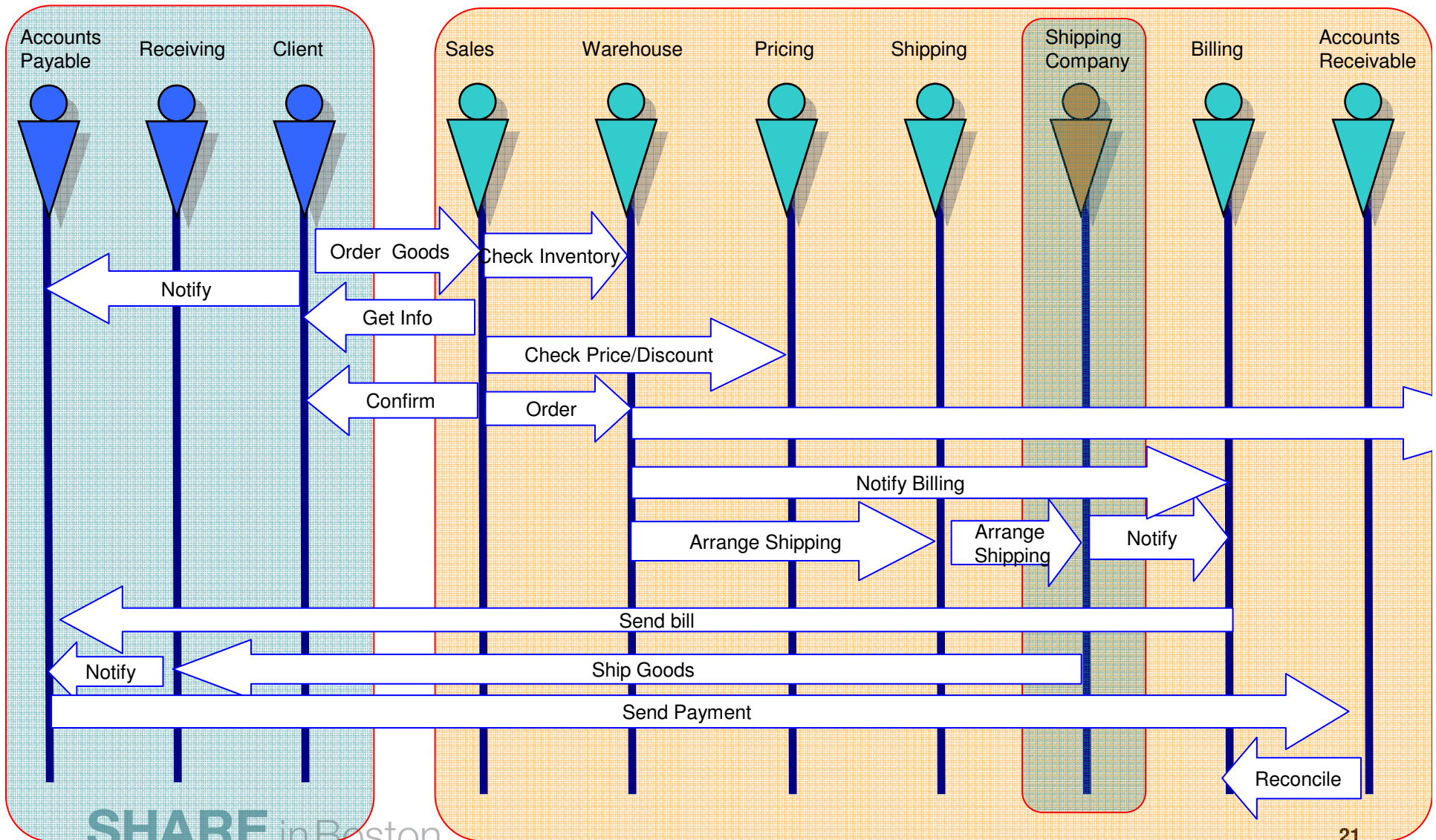
PRINCIPLE: Security is minimizing risks

- Identify those processes, data, resources that are critical to the business
- Associate risks to each one
- Make investments appropriate to the risk
 - Watch for security “speed bumps”
- Repeat
 - Reevaluate regularly

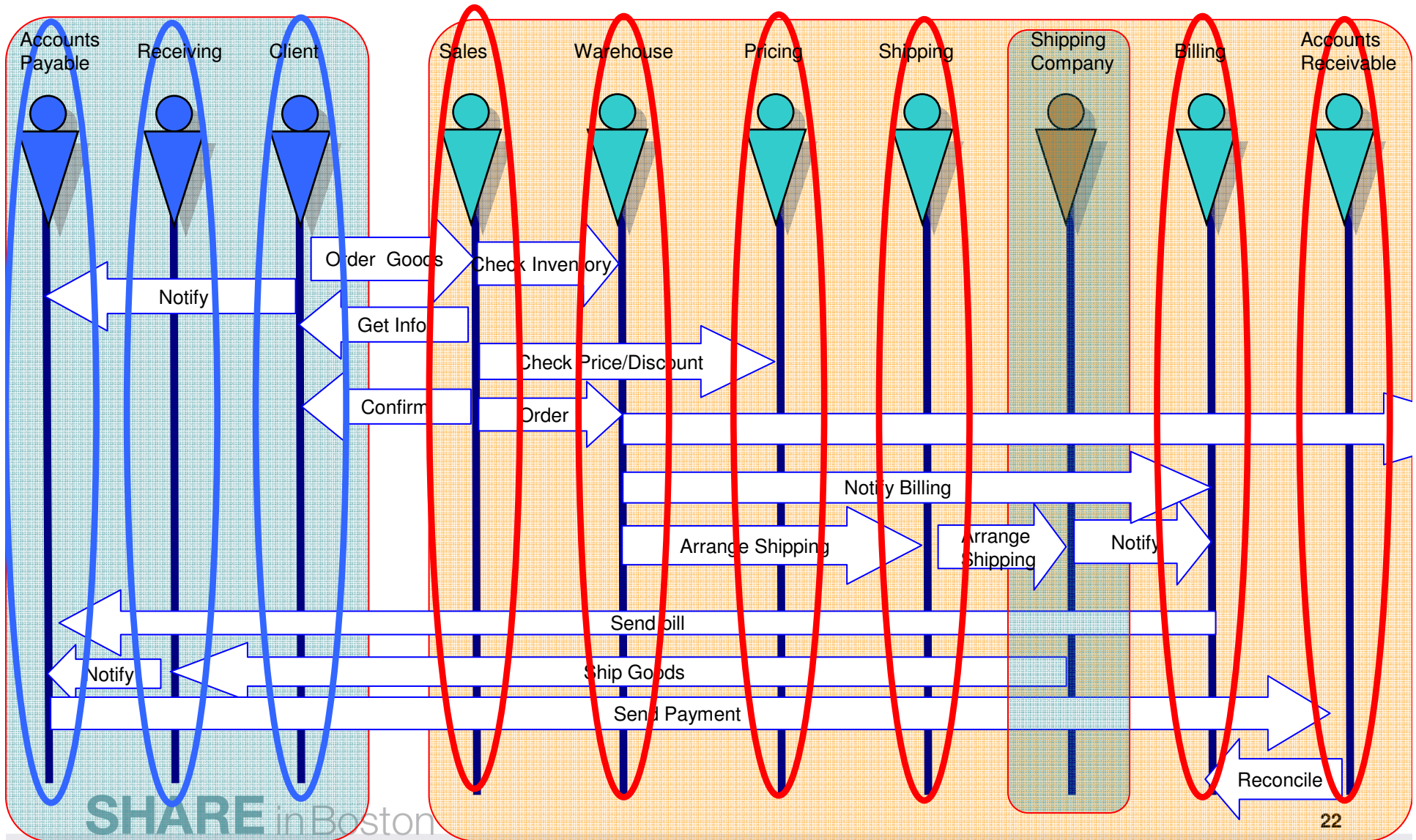
Security Basics

- **Process Perspective**
 - Who is permitted to see what data
 - Who is permitted to perform which tasks
 - Who is permitted to change what data
 - Who is permitted to initiate which processes
 - Who is permitted to override processes/policies
- **Data Center Perspective**
 - How do I identify who someone is, and what role they are playing?
 - Who accesses what data through what interfaces?
 - What traffic is permitted on what networks ? When ?
 - Do you need to be protect the data at rest, in flight, in-use ?
 - What do you do with all the encryption keys ?

Reality: Security requires trust and verification, enterprise boundaries are just a starting point...



Reality: ...as integration occurs, the number of boundaries that need to be secured increase.



PRINCIPLE: Follow the Data, Control the Data



- **Process Perspective**

- Who creates the data ?
- Who uses the data ? Who can see what ?
- What data is needed when during the process?
- When do you create copies ? When do you recalculate ?
- Where is the master copy of the data ? Who owns it ?

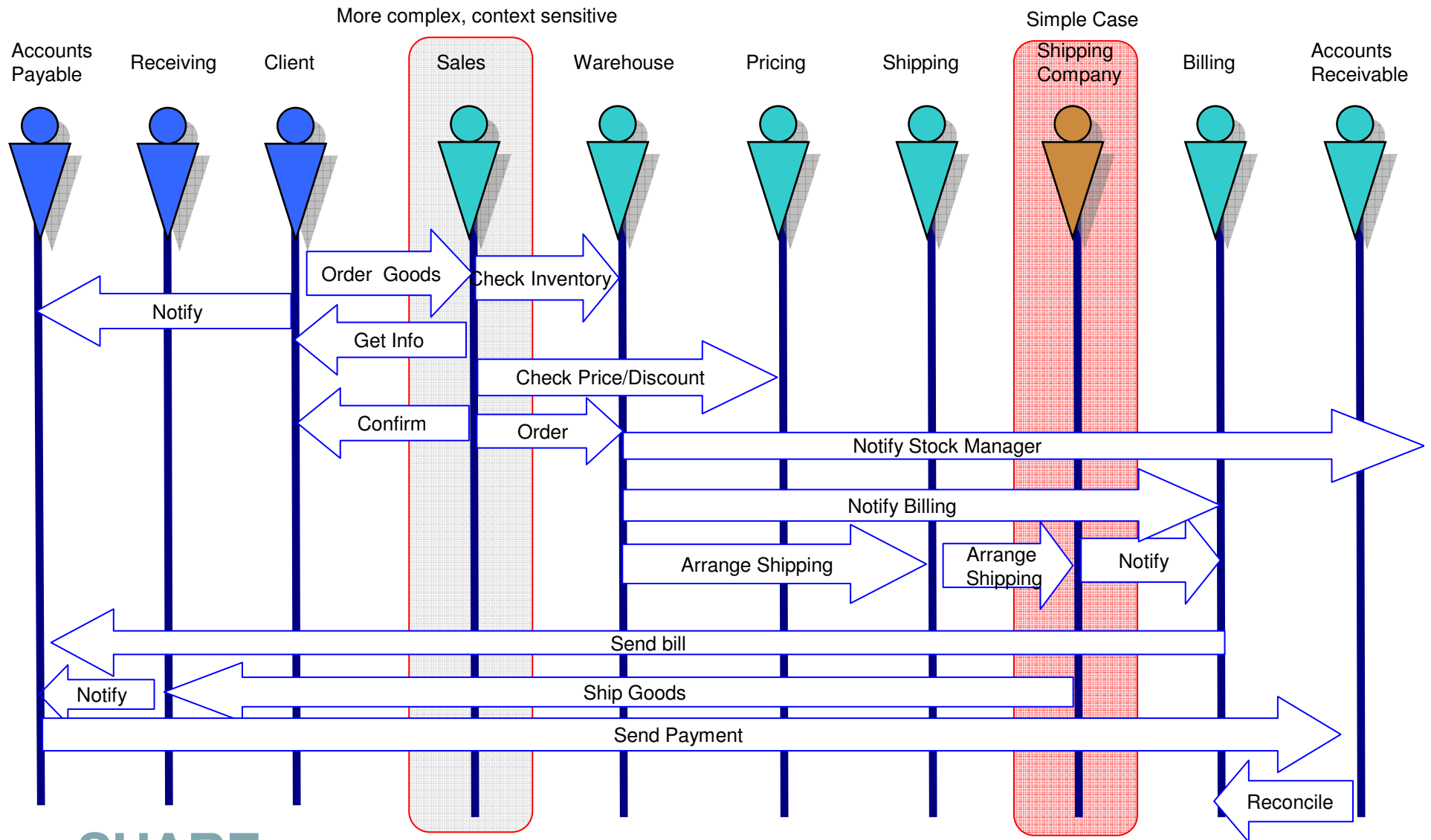
- Good Practice: Work towards the minimum requirement per *role*
- Good Practice: Work towards the minimum number of unique roles.
- Good Practice: Assign Single Owners

- **Data Center Perspective**

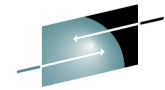
- How much data is there ? How many copies ?
- What is the data lifecycle ?
- What are the performance requirements ?
- What are the data security requirements ?
- How many system images have access to data ?

- Good Practice: Work towards the minimum # of copies of data
- Good Practice: Work towards the minimum # of unique environments to manage
- Good Practice: Align Ownership by business data not by database technology

Reality: Data access = sum total of all required tasks per role.



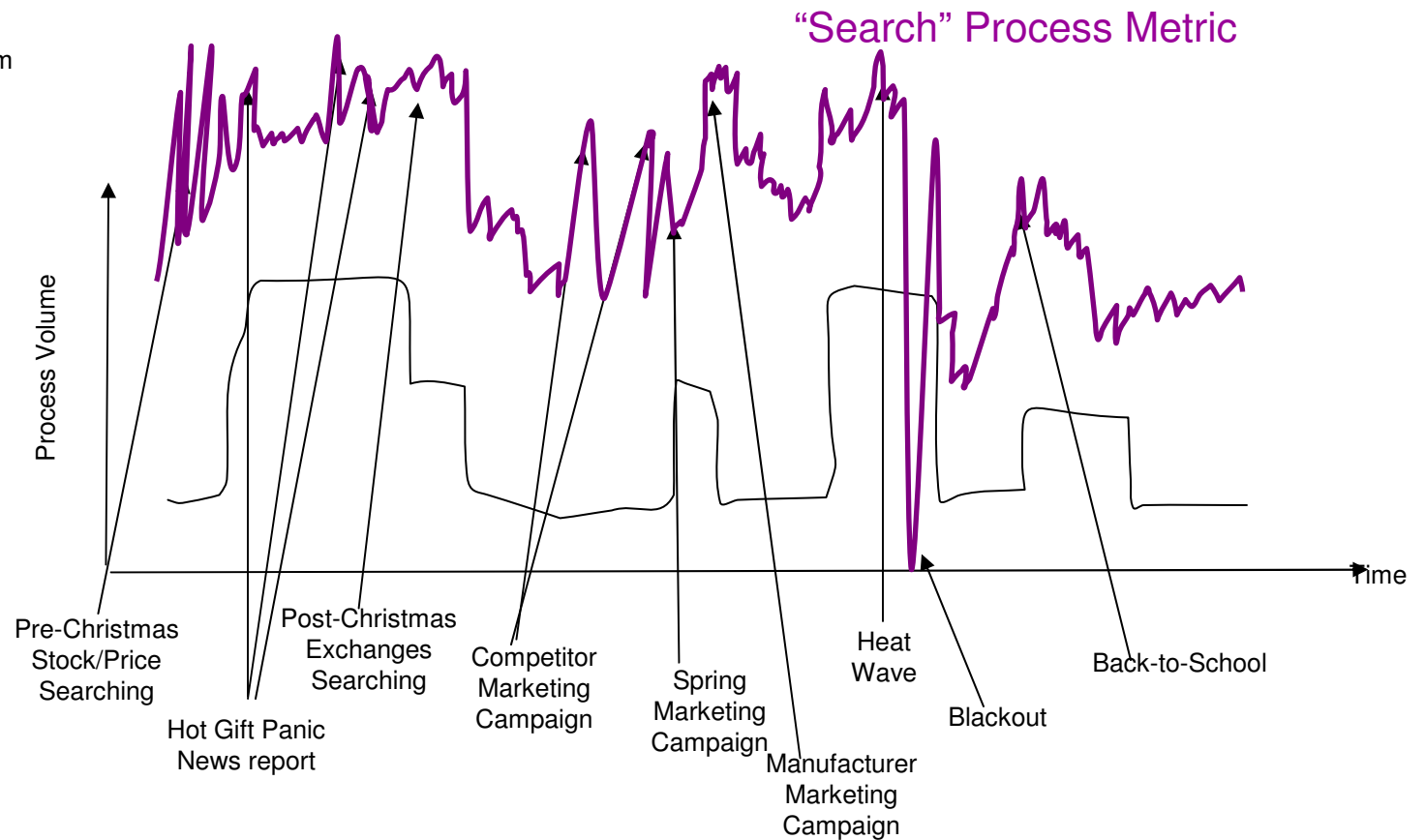
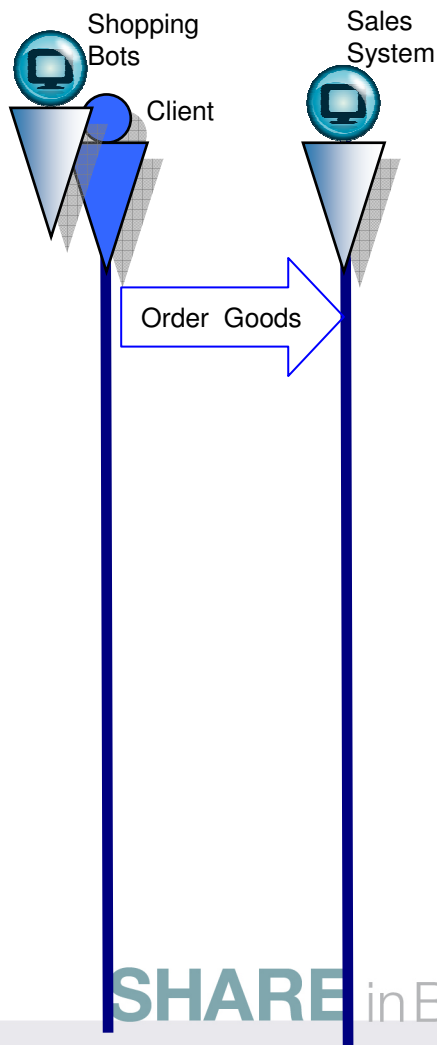
Impacts of Automation: Workload Transformation



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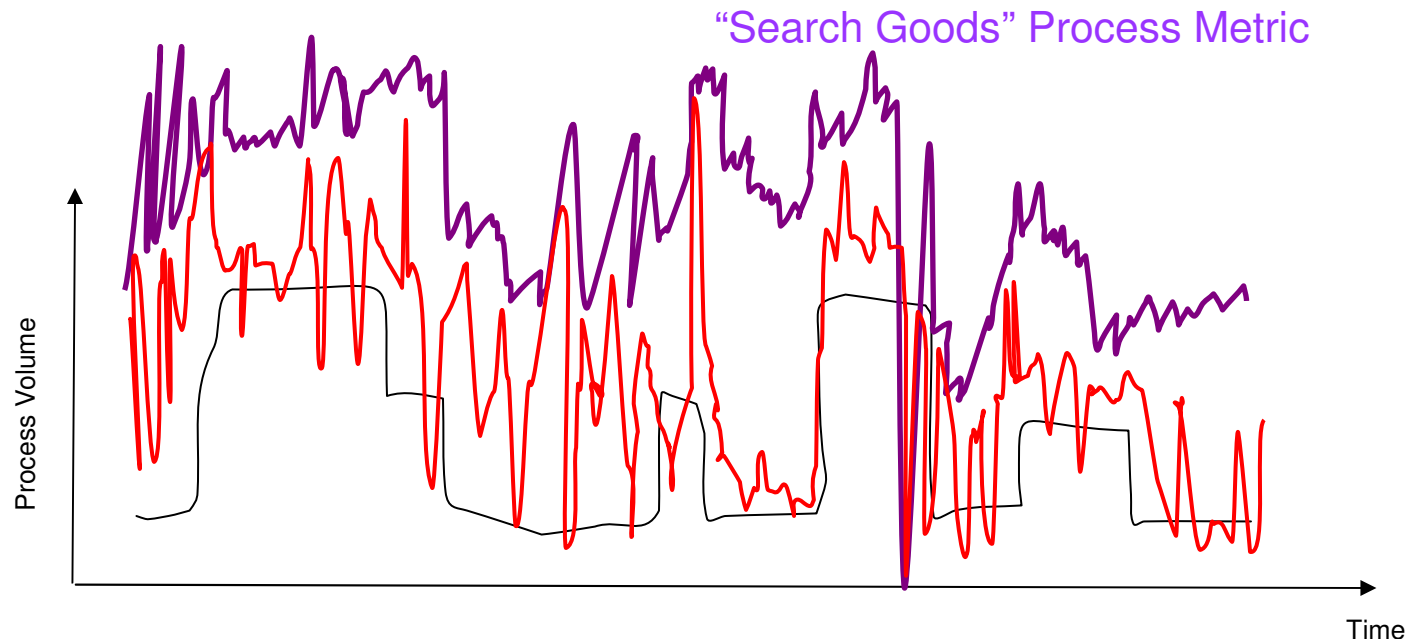
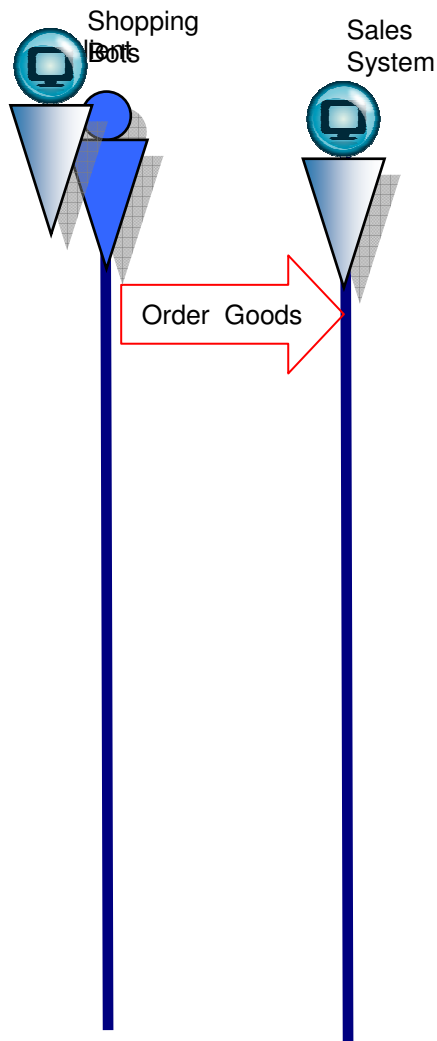
Technology - Connected - Results

Example: Providing direct access to the catalog, inventory and pricing alters the loading on the underlying systems.



The aggregation of these asynchronous ad-hoc queries changes the operating characteristics from order processing to database analytics.

Impacts of Automation: Increased Volatility



- Number of orders up (more orders coming in, around the clock)
- Revenue per order down (smaller # items per orders)
- Volatility of inventory up, Predictability of inventory down
- Predictability of workload down
- Impact to Revenue ? Impact to profit ?

Efficiencies in the Datacenter: Volatility creates tension between maximizing benefit vs minimizing expenditures



- Succeeding in a volatile environment requires strong governance.
 - Good measures and metrics
 - Strong tie between the business function and its implementation
 - Investing for the success of the business rather than success at a budget meeting

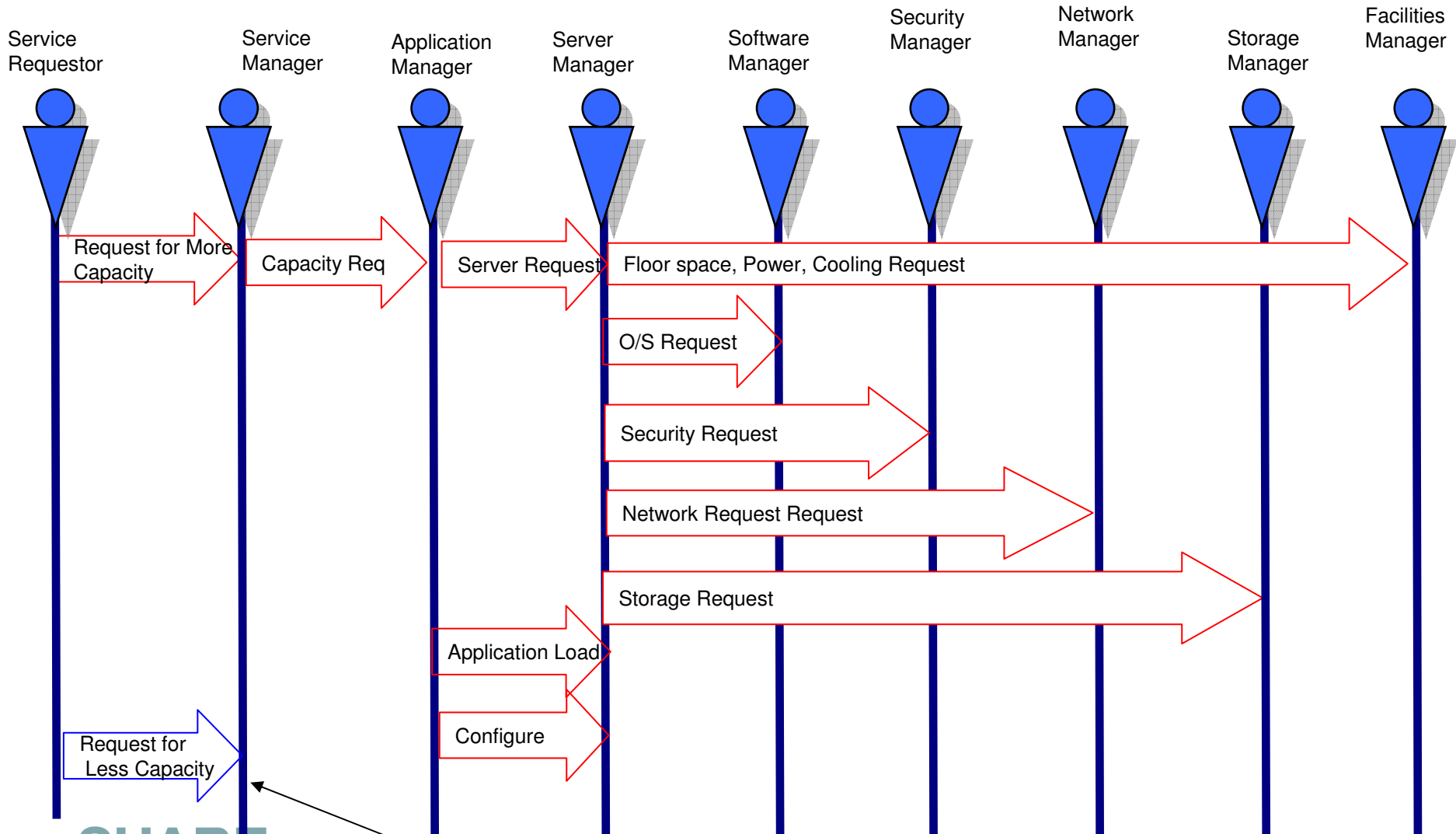
Volatility of Loading:

Driving new dynamics in operational requirements *

- **Data Center Process Automation Efficiencies:**
 - Must be Quick to Respond
 - Must be two-way (increase and decrease capacities)
[Dynamically respond to volatility need to respond to changes in non-functional requirements]
- **Data Center Process Automation Benefits:**
 - Repeatability
 - Ability to Audit (Measure)
 - Traceability
- **Data Center Process Inhibitors**
 - Silos
 - Policies
 - Regulations

Impact of Silos:

The responsiveness of the system is governed by its slowest component, local choices may not help the overall system.



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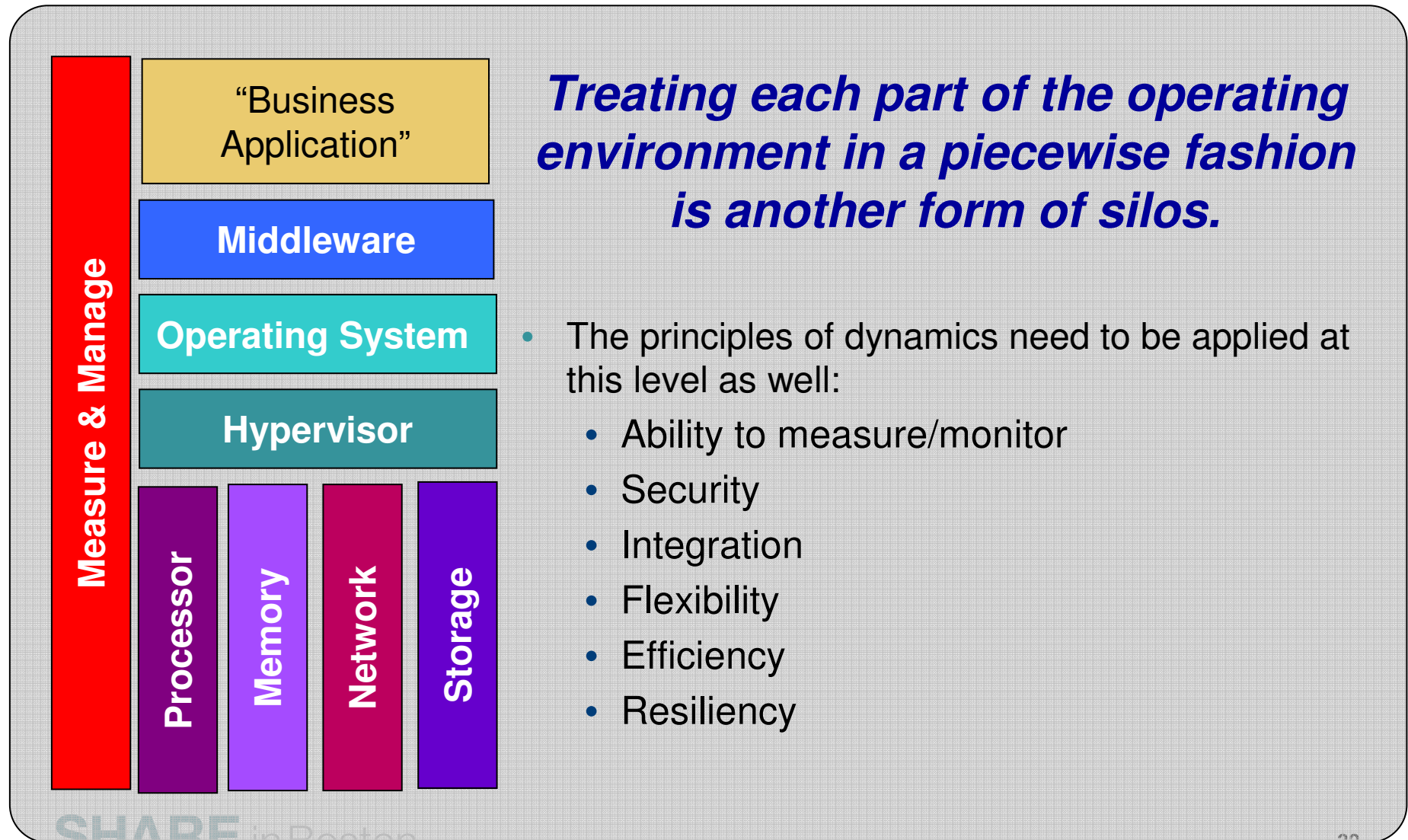
Would people request less capacity, if they knew they knew they could get more capacity in a timely fashion ?

Impact of Volatility: Workloads change their characteristics, influencing platform choice – one size does not fit all.



Workload Type	Operational Characteristics
Transaction Processing & Database	<ul style="list-style-type: none"> ▪ High Transaction Rates ▪ High Quality of Service ▪ Peak Workloads ▪ Resiliency and Security Required
Analytics & HPC	<ul style="list-style-type: none"> ▪ Compute intensive ▪ Floating point Operations ▪ High Memory Bandwidth
Business Applications	<ul style="list-style-type: none"> ▪ Scale Up Capable ▪ Quality of Service ▪ Large Memory Footprint ▪ Responsive Infrastructure
Web, Collaboration Infrastructure	<ul style="list-style-type: none"> ▪ Highly Threaded ▪ Throughput-oriented ▪ Scale Out Capable ▪ Lower Quality of Service
Mixed Workloads	<ul style="list-style-type: none"> ▪ Variable Problem sizes ▪ High Context Switch Rates ▪ Inconsistent Arrival Rates

Reality: “Platform” means more than processor architecture



PRINCIPLE: Business Resiliency –minimizing the impact of an outage.

- **Process Perspective**

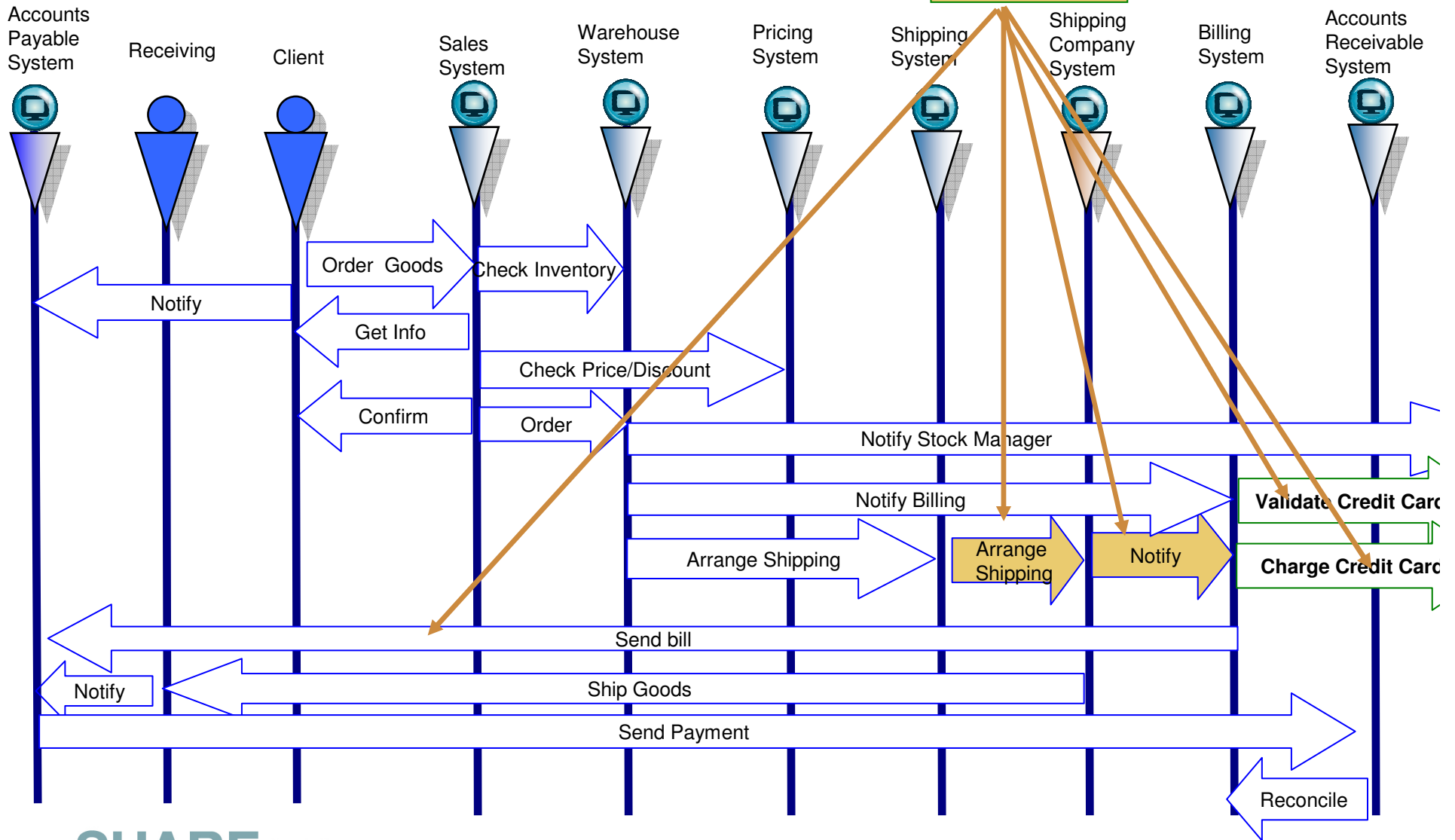
- What happens if the IT systems are not available ?
 - Do you need continuous availability ?
- What happens if the people are not available ?
 - Do you need continuous availability ?
- How tolerant is the business to outages ?
 - How quickly do you need the process back on-line ?
 - How quickly do you need people in place ?

- **Datacenter Perspective**

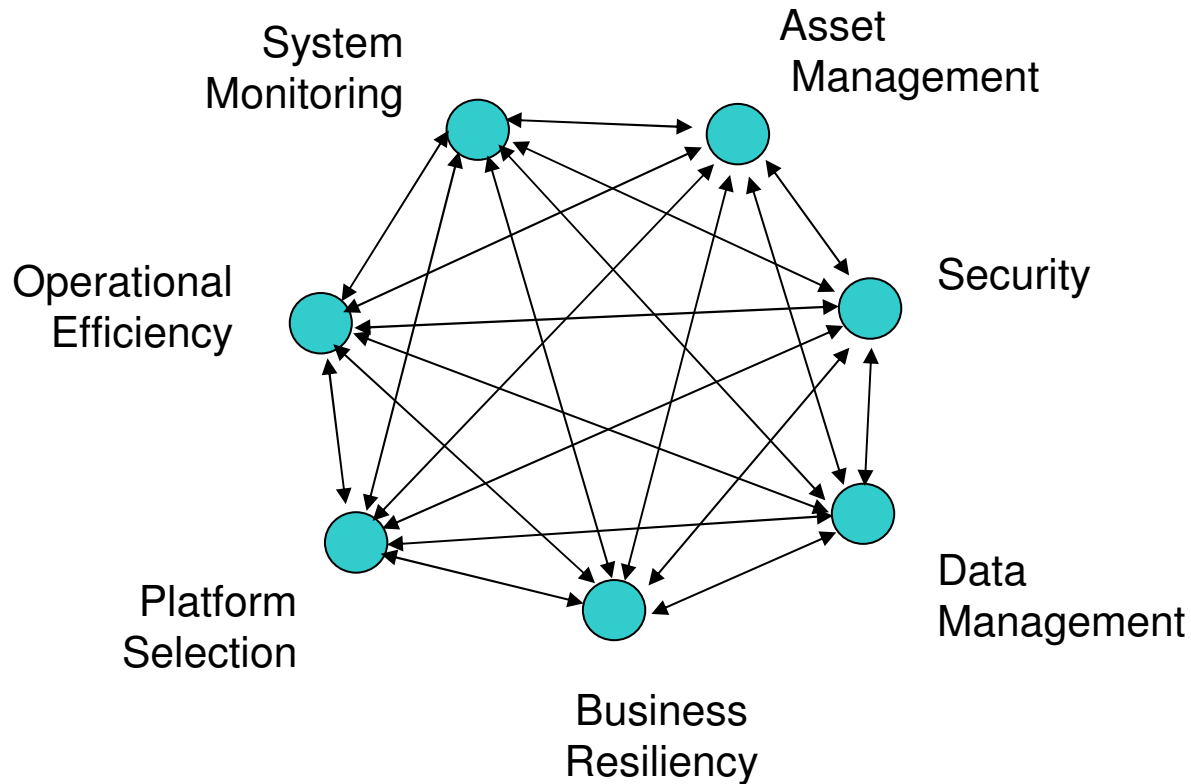
- What types of failures are probable ?
- Continuous operations vs. rapid recovery ?
- What needs to be recoverable, how quickly ?
- Where are the people located ? How do they connect ?

Impacts of Automation: Work requires IT

How much of the system is really required to run the business ?



**Roadmap: It is your journey - your path may vary.
Reality: It will be dynamic, expect change.**



Good Practice: Start with monitoring so you can tell if you are moving and in what direction.

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