



# InCoCo-S

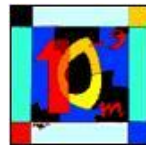
Innovation, Coordination and Collaboration  
in Service Driven Manufacturing Supply Chains

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## Next Generation Service Concepts

### Industrial Service Business Days

18<sup>th</sup> April 2007, Helsinki



- q Company Portrait SKF
- q Challenges in a Process Oriented World
- q Process and Service Definition
- q Demands from the Business
- q Requirements for Networked Services
- q Implementation Platform for Networked Services
- q Summary and Outlook



## q SKF, the Knowledge Engineering Company

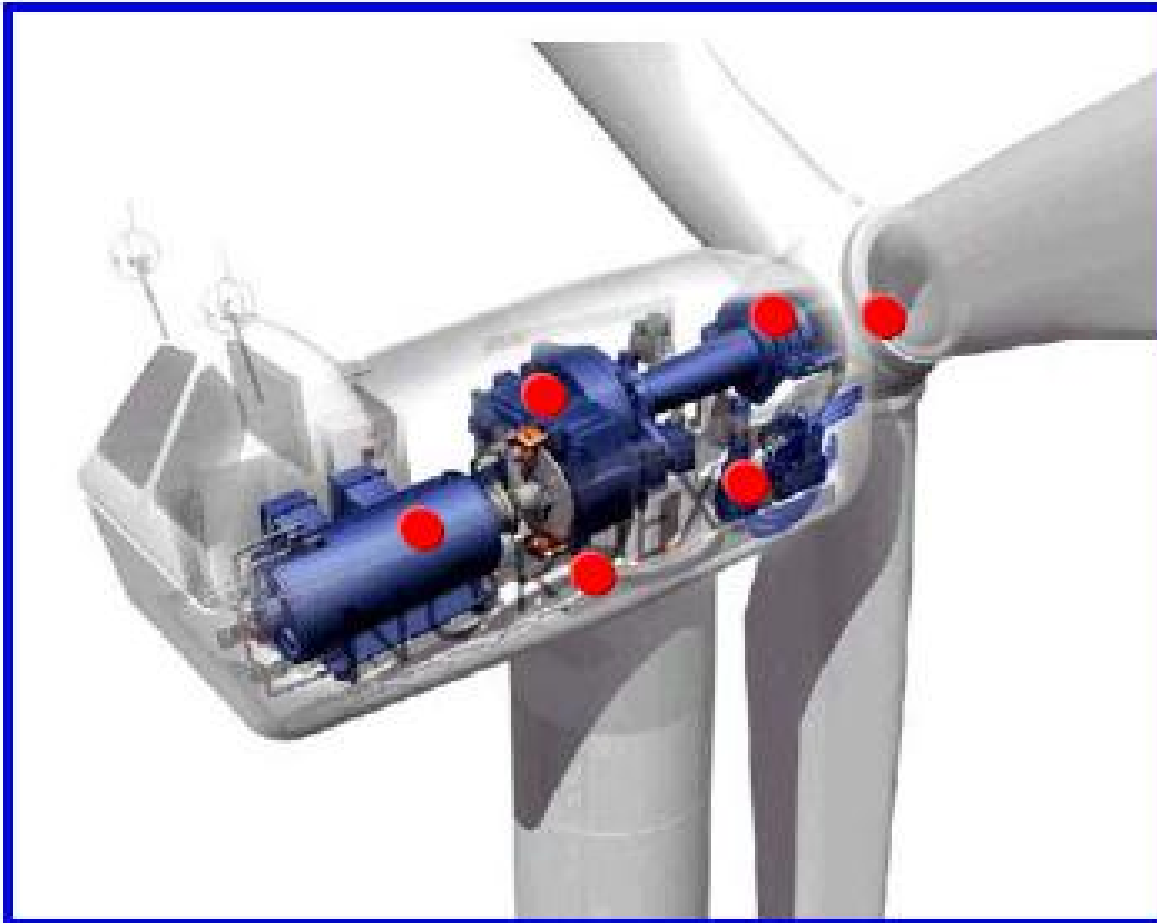


- q 5 billion € annual turnover
- q 100 manufacturing sites worldwide
- q 40.000 employees

## q SKF • Service Division • Reliability Systems

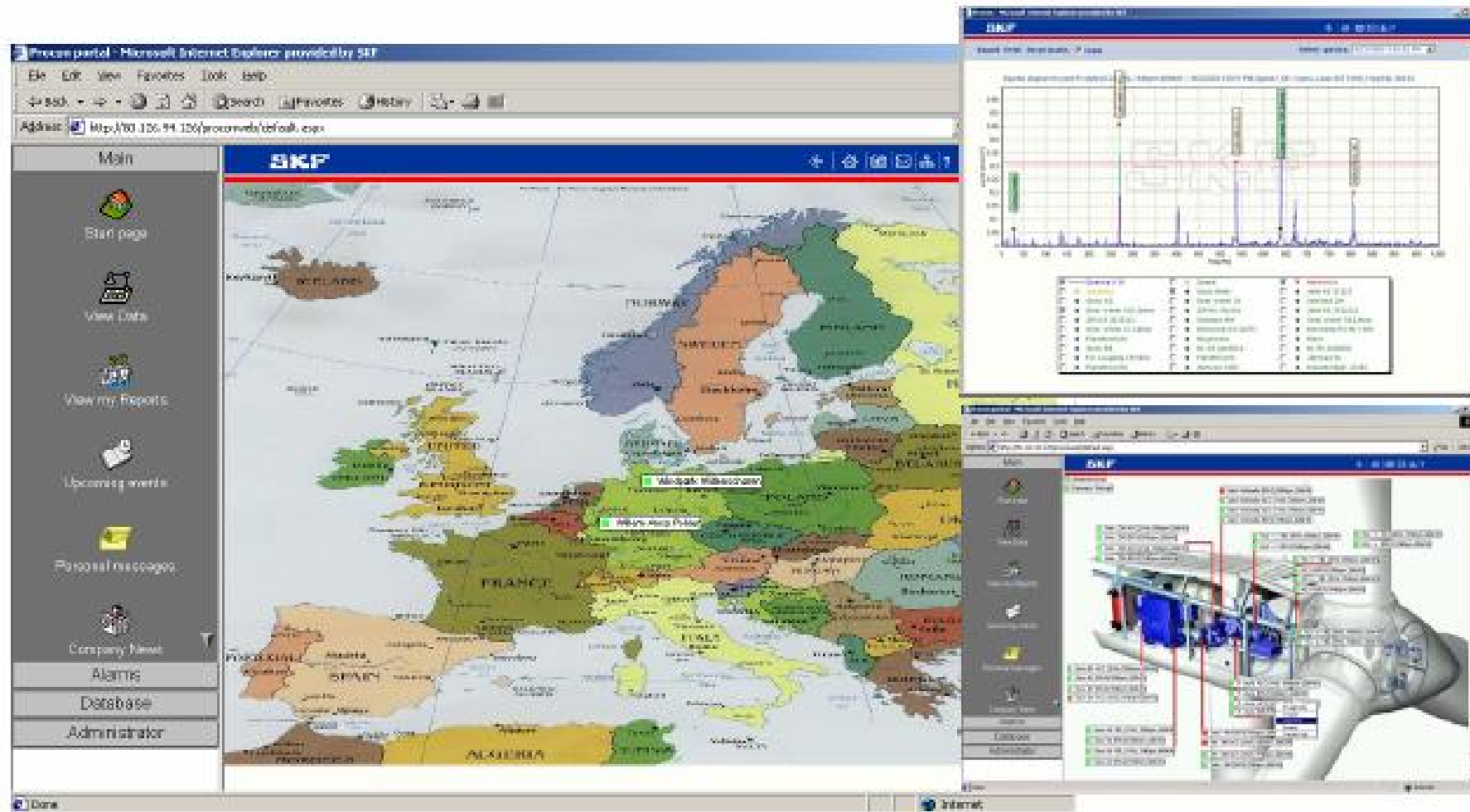


Provision of manufacturer independent premium services for a sustainable increase of the asset efficiency by means of a combination of products and technical services according to the specific requirements



- q Health check of components:
  - § Rotor-blade
  - § Main Bearing
  - § Gearing
  - § Generator
  - § Mounting Base/Tower
  - § Oil-Temperature/ -Pressure/ -Quality

# Condition Monitoring (cont'd)



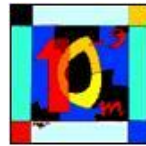


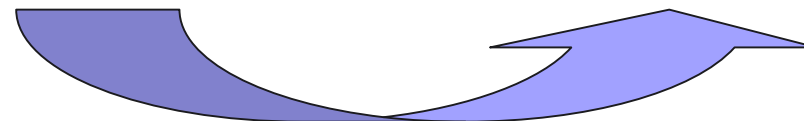
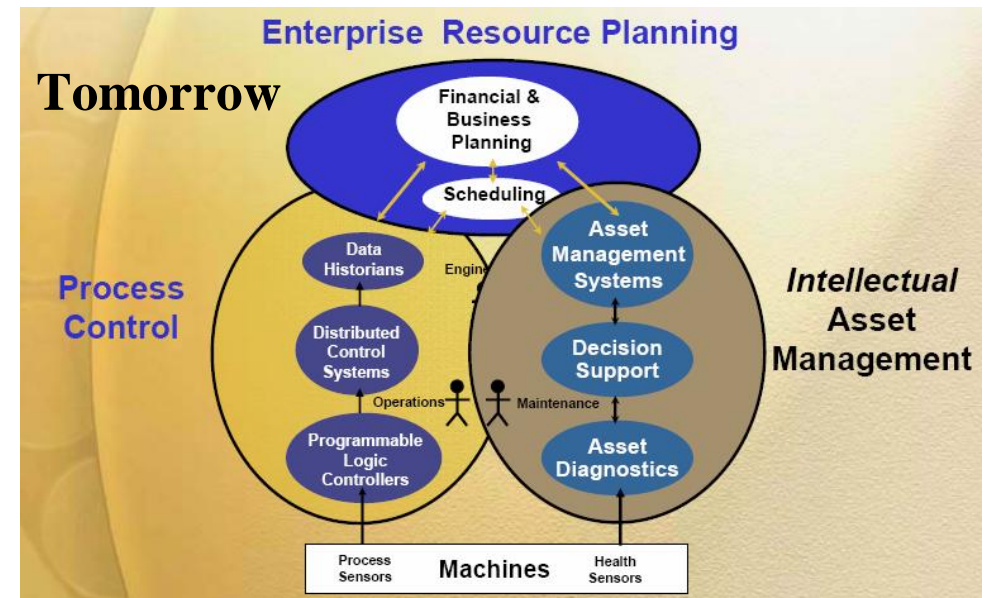
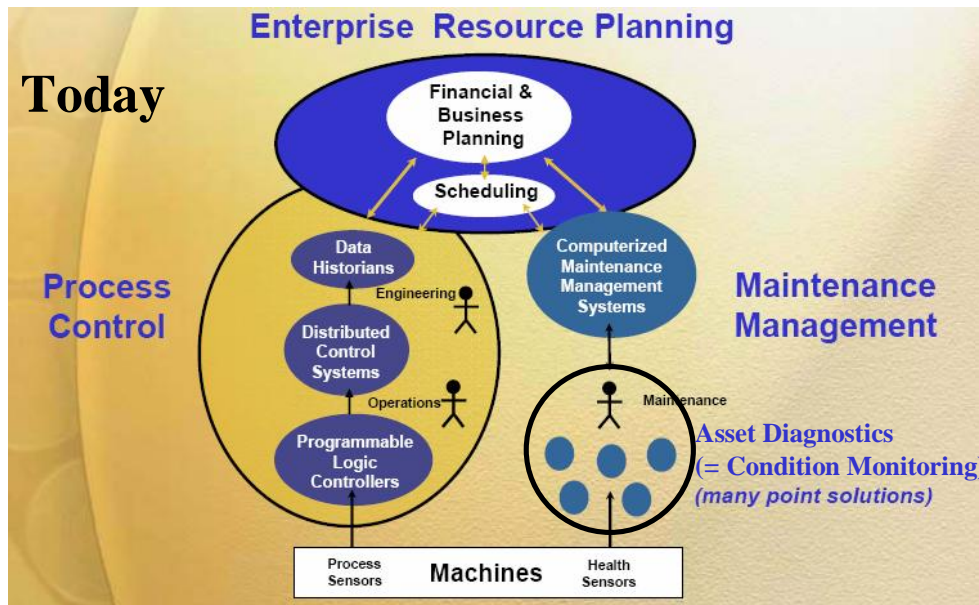
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## Challenges in a Process Oriented World





Currently two (isolated) areas in the manufacturing process are existing: Process control to supervise the manufacturing process by measuring e.g. pressures, cutting speeds, temperatures etc., and maintenance management to check the health of the machines.

At the moment no deep integration from CMMS systems to CM system is realized, which enables "Intellectual Asset Management".

### Life-Time Model • Re-Engineering

... provides values for the conditional probability of failure of the asset component from the beginning of the life-time.

### Symptom Model • Condition Monitoring

... forecasts the asset component breakdown after the first-time occurrence of the condition.

Spare Part Optimizer

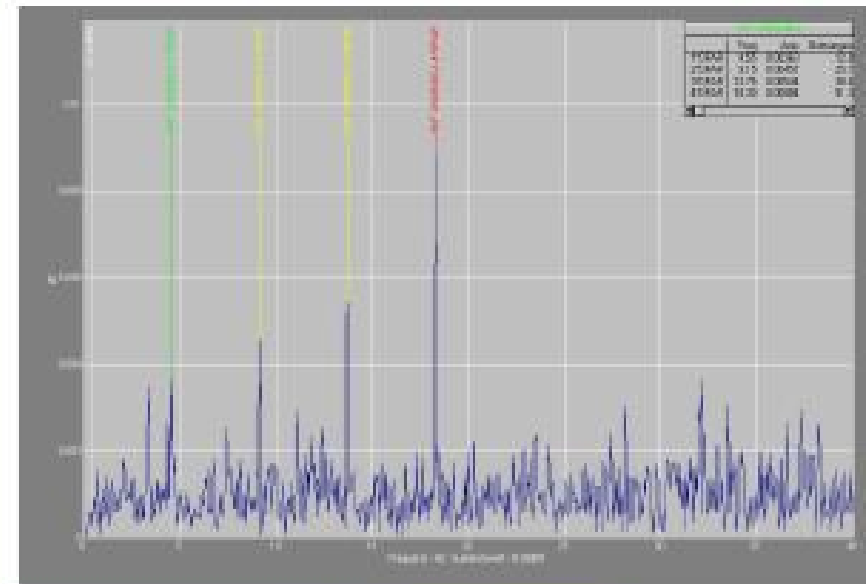
Home Help

About Terminal Conditions

Spare Part Report

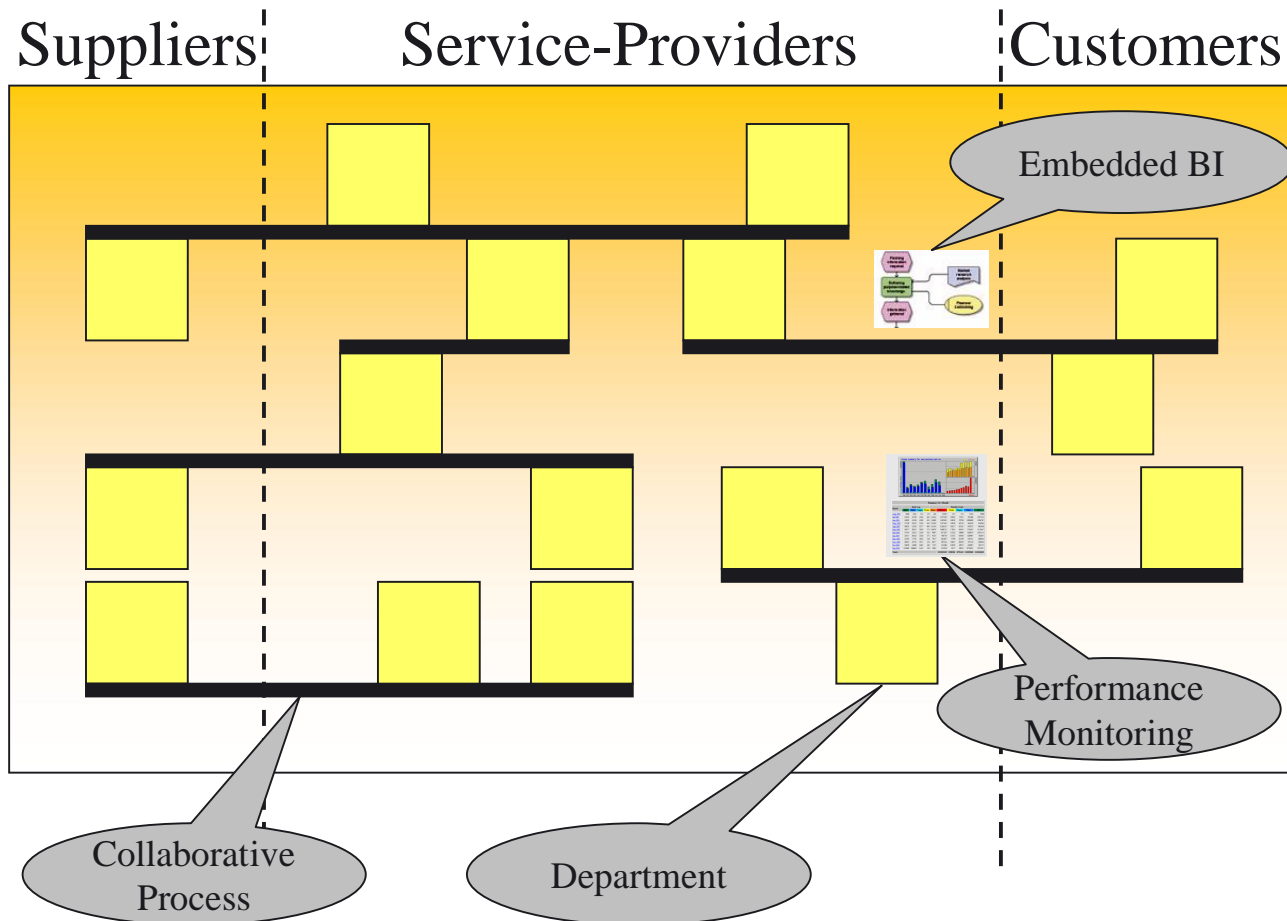
Calculation results for sparepart #Wobloger Newpart

Number of spare parts on stock	Risked downtime cost [LCU]	Depreciation cost [LCU]	Capital interest cost [LCU]	Warehouse cost [LCU]	Total cost [LCU]	Spare parts availability
0	8029,44	0,00	0,00	0,00	8029,44	0,0000
1	162,11	200,00	700,01	340,00	829,11	0,5617
2	162,11	1400,00	1400,01	3680,00	4642,11	0,3088
3	4,90	2100,00	2100,01	2510,00	6724,90	0,2599
4	0,76	2800,00	2800,01	3340,00	8940,76	1,0000
5	0,81	2800,00	2800,01	4280,00	11280,81	1,0000
6	0,80	4200,00	4200,01	2040,00	18440,80	1,0000
7	0,80	4900,00	4900,01	3880,00	19680,80	1,0000
8	0,80	5600,00	5600,01	6710,00	17910,80	1,0000
9	0,80	6300,00	6300,01	7540,00	20180,80	1,0000
10	0,80	7000,00	7000,01	8480,00	22480,80	1,0000

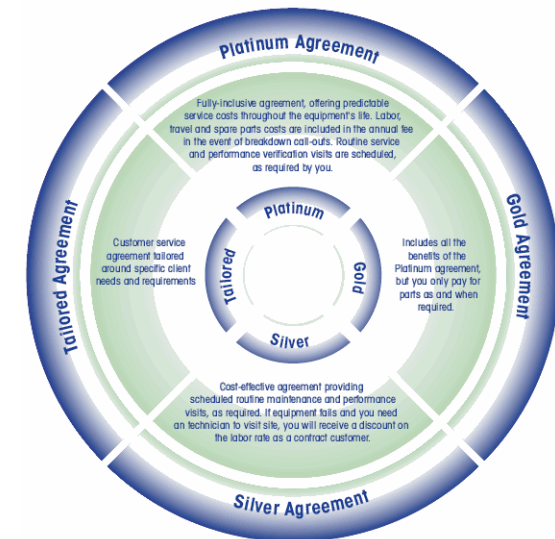


## Contribution to the Life Cycle Management during the Utilisation Phase

- q Collaboration
- q Innovation
- q Optimization
- q Compliance



- q Broad range of services in provider's portfolio
  - § Provide services to as broad a range of consumers as possible
  - § Reduce demands from new consumers for additional features
- q Reduce effort to use new services
  - § Compose new services from existing ones
- q Reduce effort to maintain existing services
  - § Reduce impact of changes to service implementations
- q Configurable services
  - § Provide services in new and unforeseen context



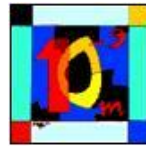


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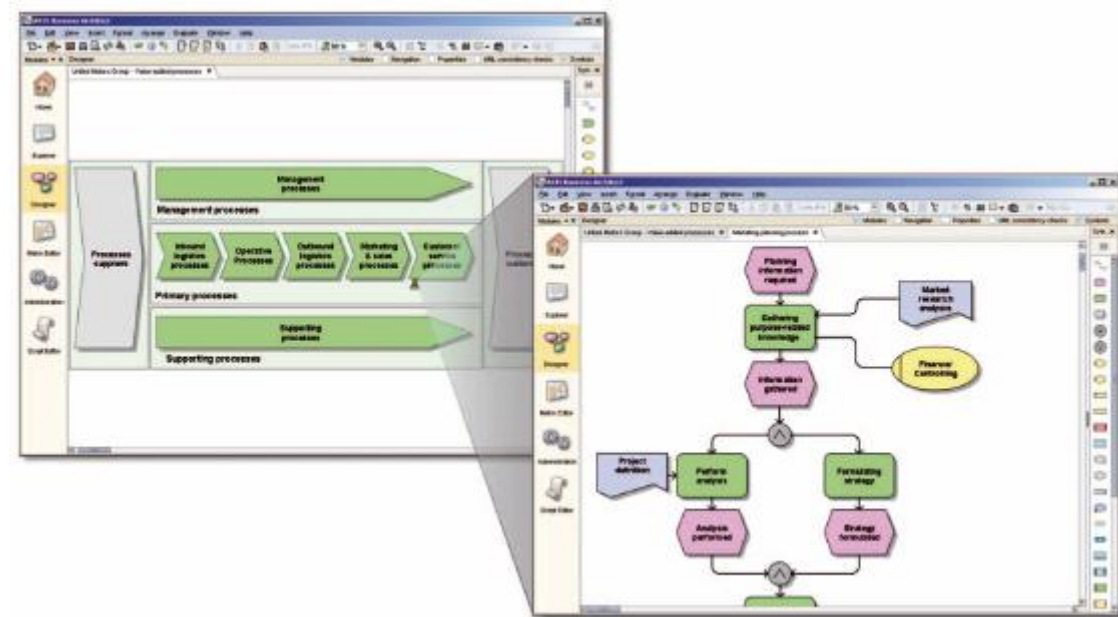
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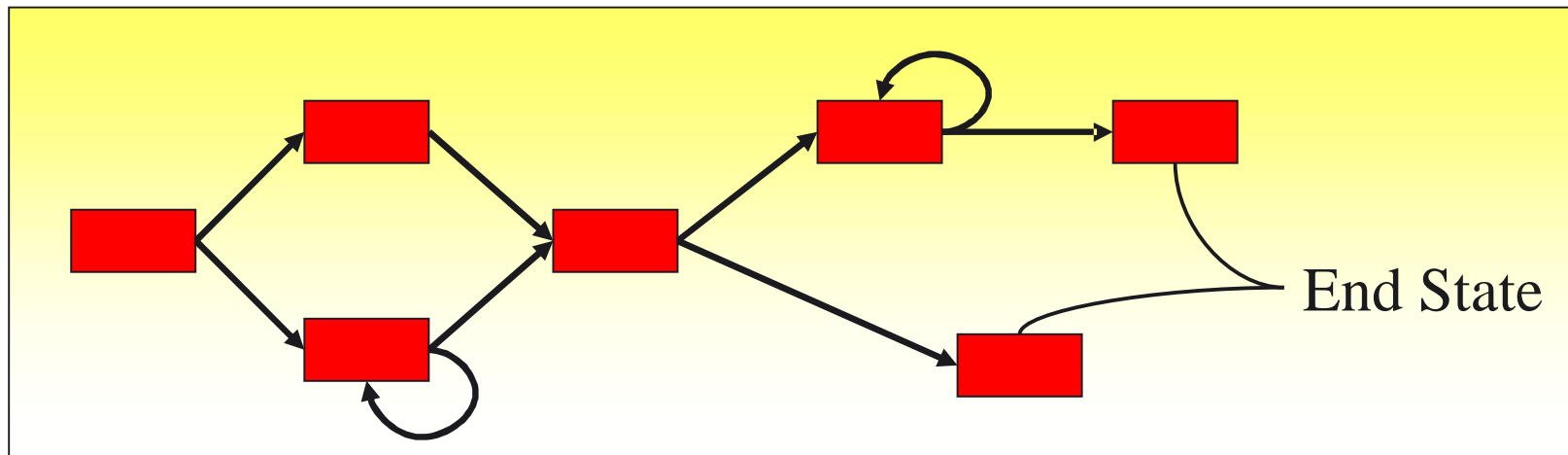
## Process and Service Definitions



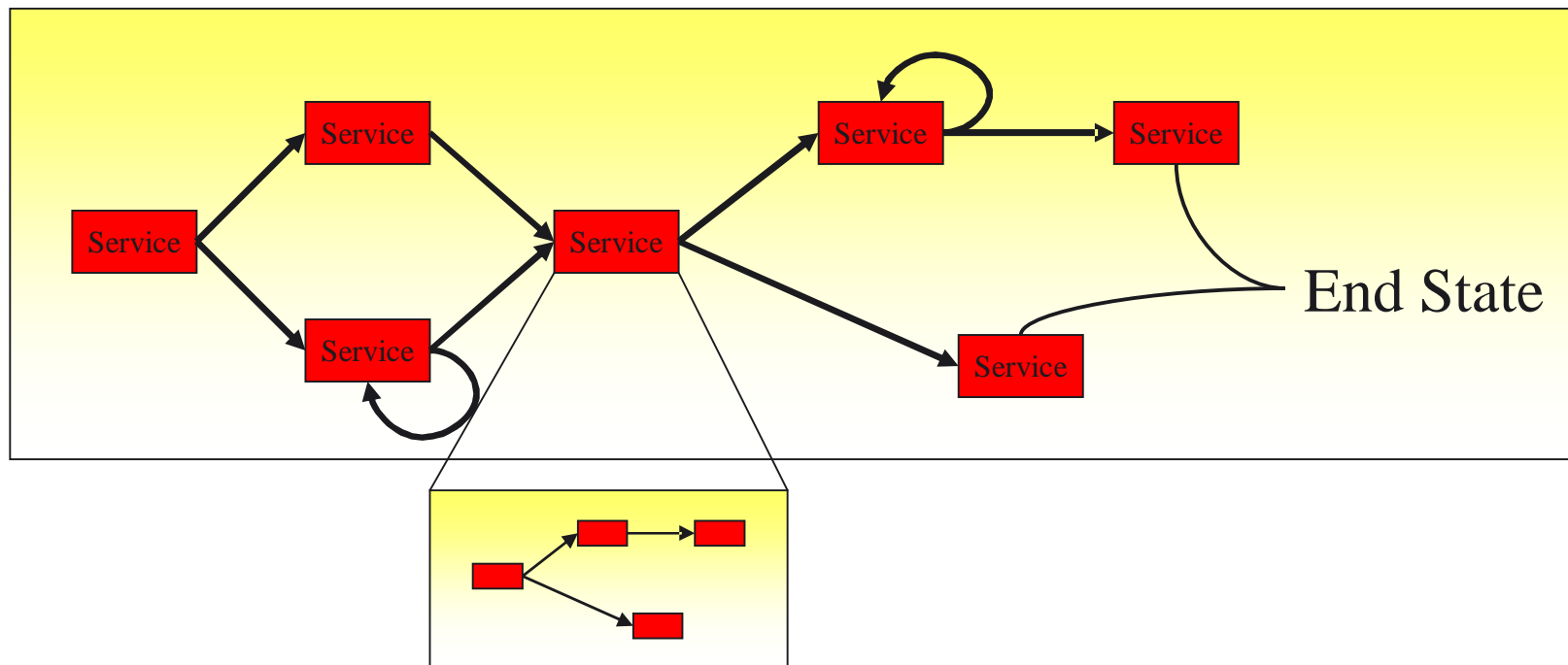
- q A process may be defined as:
  - § 'a particular course of action intended to achieve a result'
- q or more specifically as
  - § 'a set of logically related tasks performed to achieve a defined business outcome'



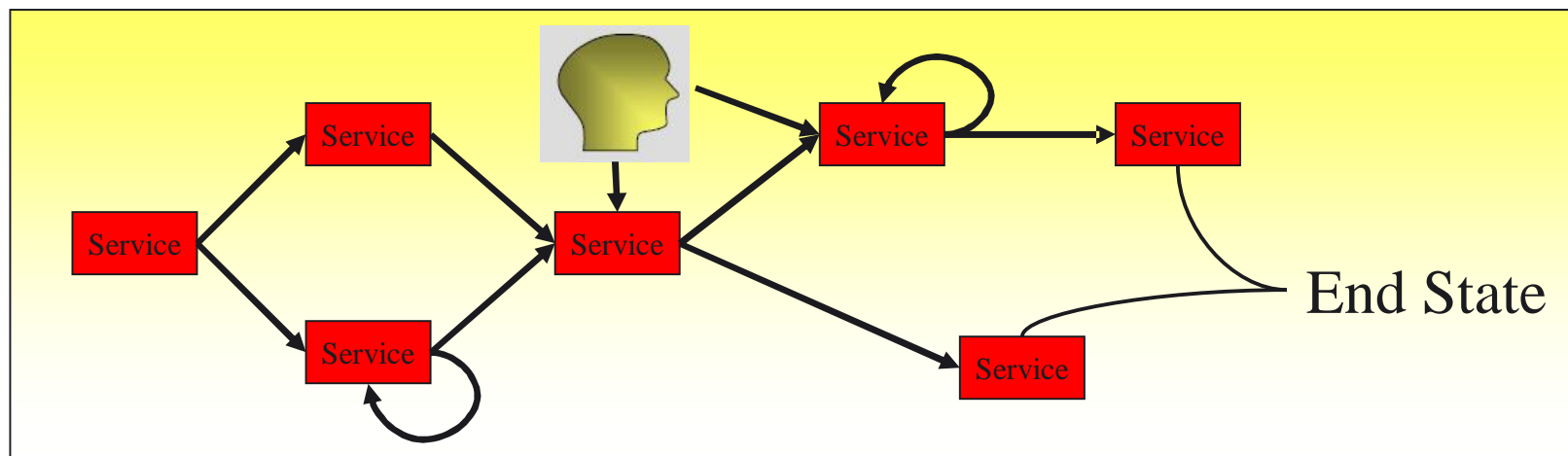
- q A business process is:
  - § a set of activities and tasks, performed by resources  
*(services conducted by human beings and machines)*
  - § by use of various information pools  
*(structured and unstructured)*
  - § by means of different interactions  
*(predictable and unpredictable)*
  - § controlled by management policies and principles  
*(business rules and decision criteria)*

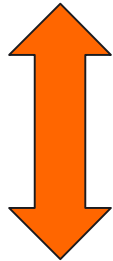


- q A process serves to implement a strategy with the purpose, to reach a defined goal
- q Activities are conducted by services
- q Processes are based on the concept of sub-processes, therefore a service can be a process and vice versa

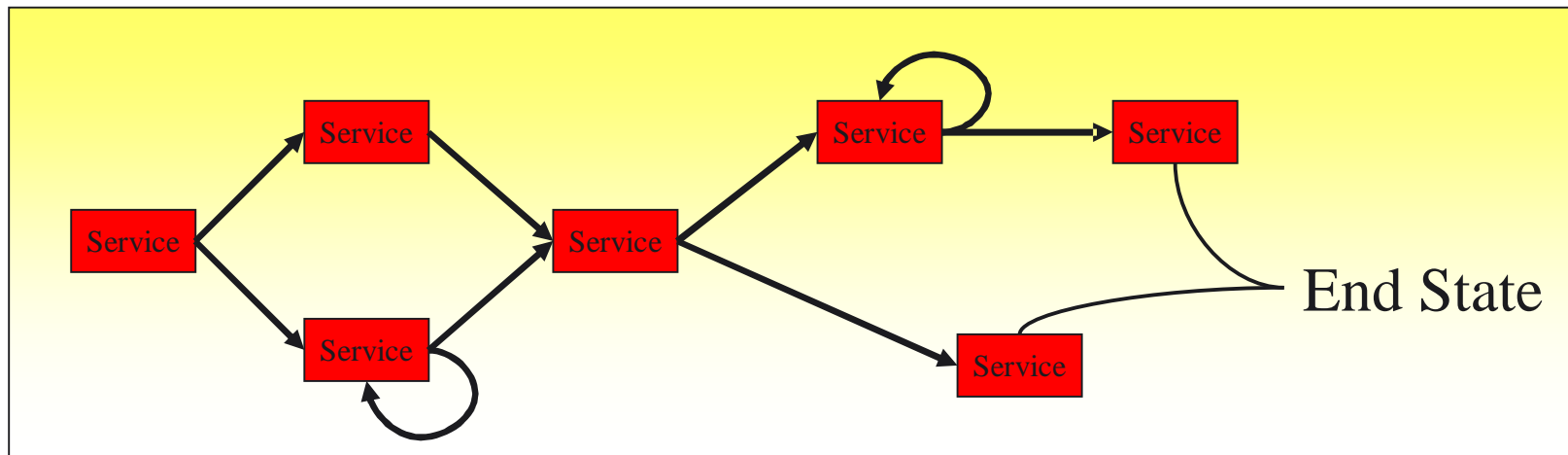


- q Two process types can be defined:
  - § an automatized process ('black box processing')
  - § an interaction based process
- q A process combines both process elements according to the process logic
- q The combination can be any order





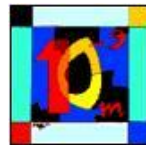
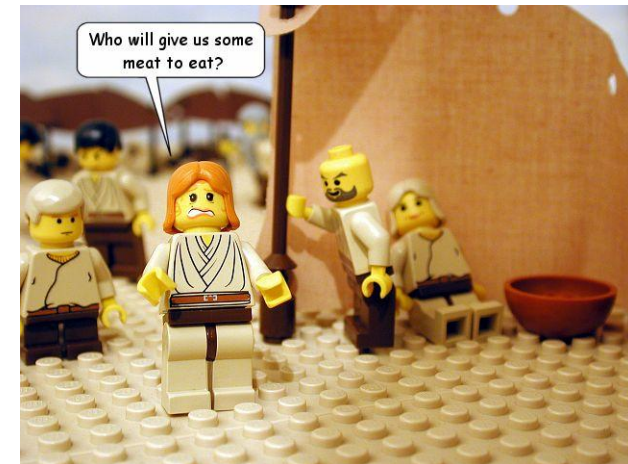
- q Creation of events
- q Decision among alternatives
- q Creation of virtual teams
- q Exception management
- q Escalation management
- q Approval procedures
- q Collaboration



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## Demands from the Business

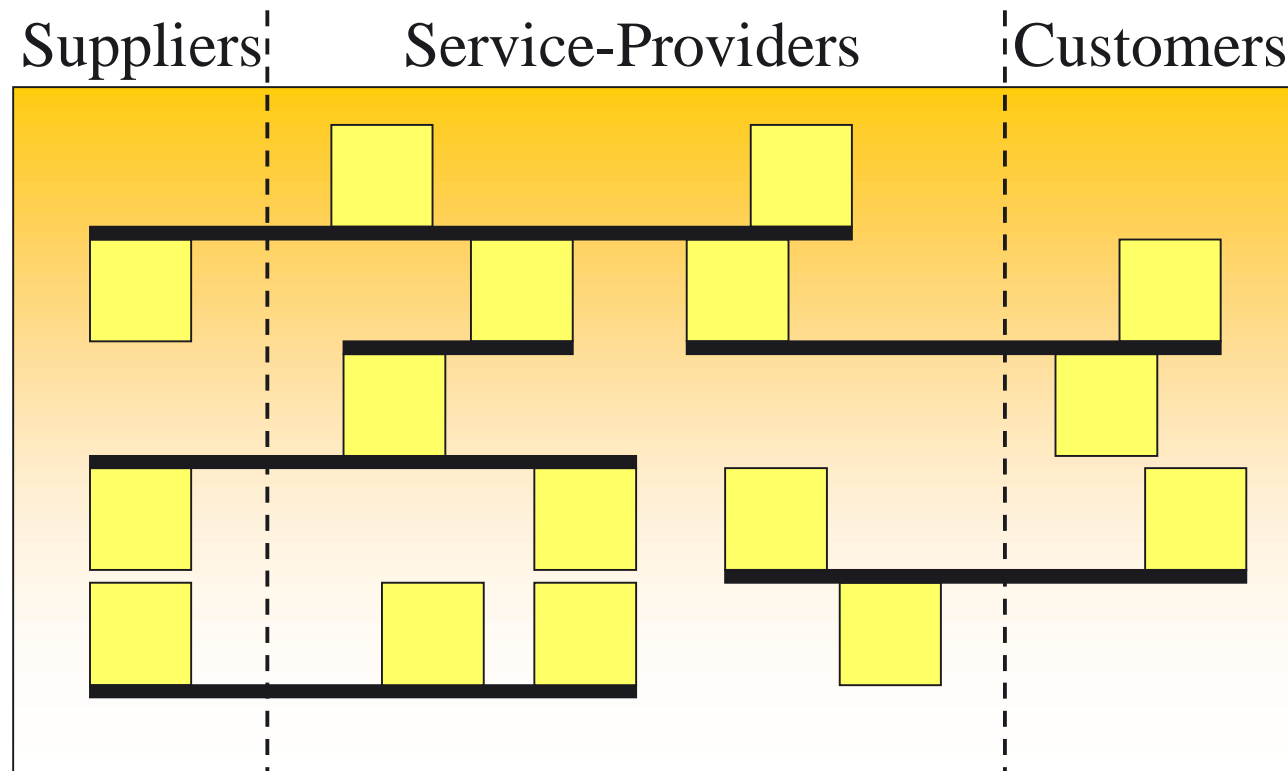


- q Regulation compels to process orientation
- q Market dynamics compels to process orientation
- q Globalization compels to process orientation
- q Collaboration compels to process orientation
- q Goals are
  - § creating an innovative and proactive organization
  - § creating an organization that is capable of delivering on the business strategy

 Process orientation is a strategic driver



- q Processes span multiple departments and enterprises
  - q Processes become more and more intelligent
- ➔ Special requirements for service providers and service consumers



Service Consumer Objectives	Design Principles
Reduce effort to use new services	<ul style="list-style-type: none"><li>q Precise specifications</li><li>q Standardized services</li></ul>
Choose alternative instances of services type	<ul style="list-style-type: none"><li>q Services well abstracted from implementation</li><li>q Standardized services</li></ul>

Service Provider Objectives	Design Principles
Reduce demands from new consumers for additional features	Coarse grained, abstracted services that meet a wide range of service requests
Compose new services from existing ones	Fine grained, generalized services that can be composed in a variety of ways
Reduce impact of changes to service implementations	Services well abstracted from implementation
Provide services in new and unforeseen context	Generalized services
Provide services to as broad a range of consumers as possible	Coarse grained, and generalized services

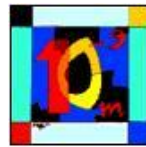


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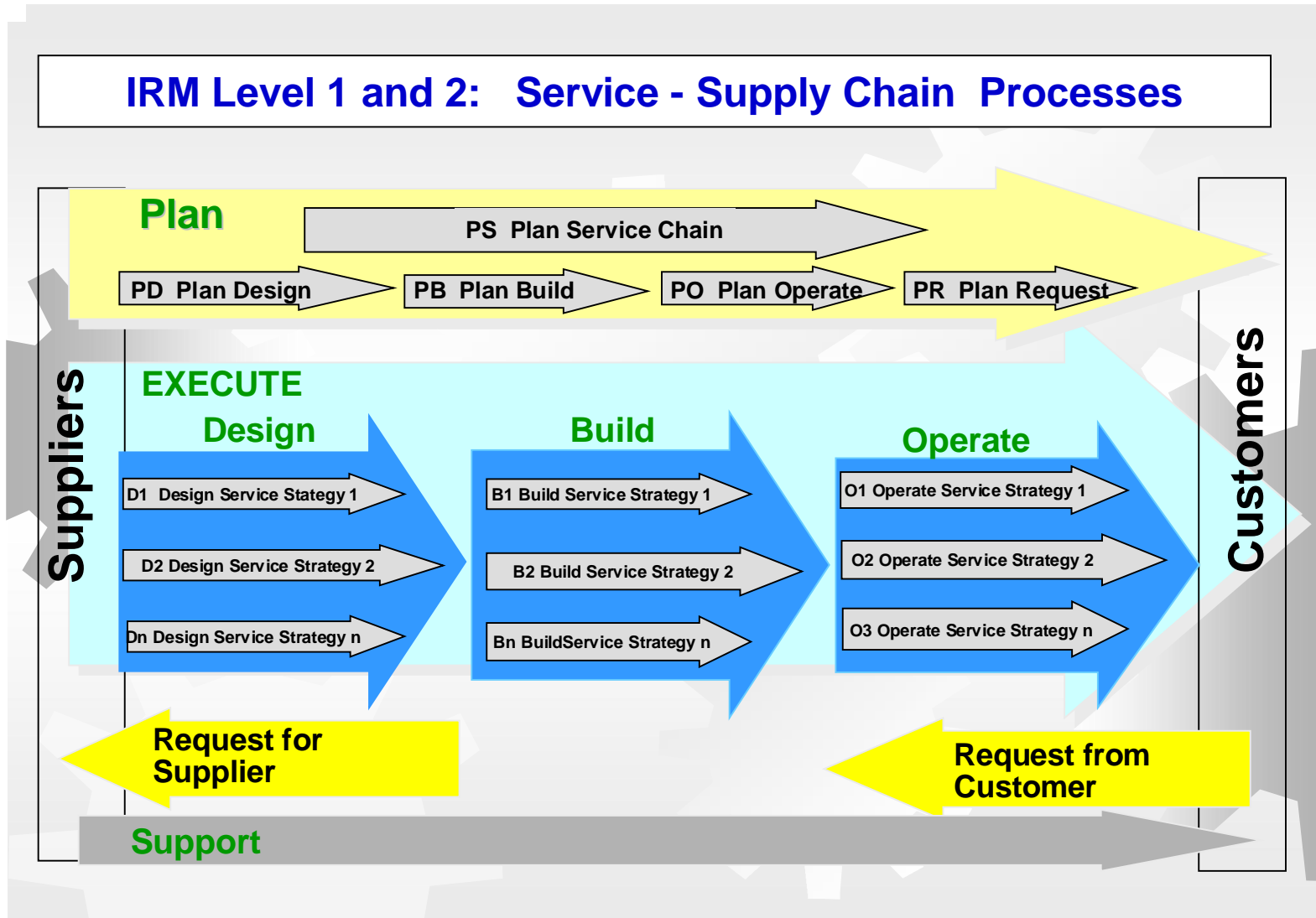
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## Requirements for Networked Services

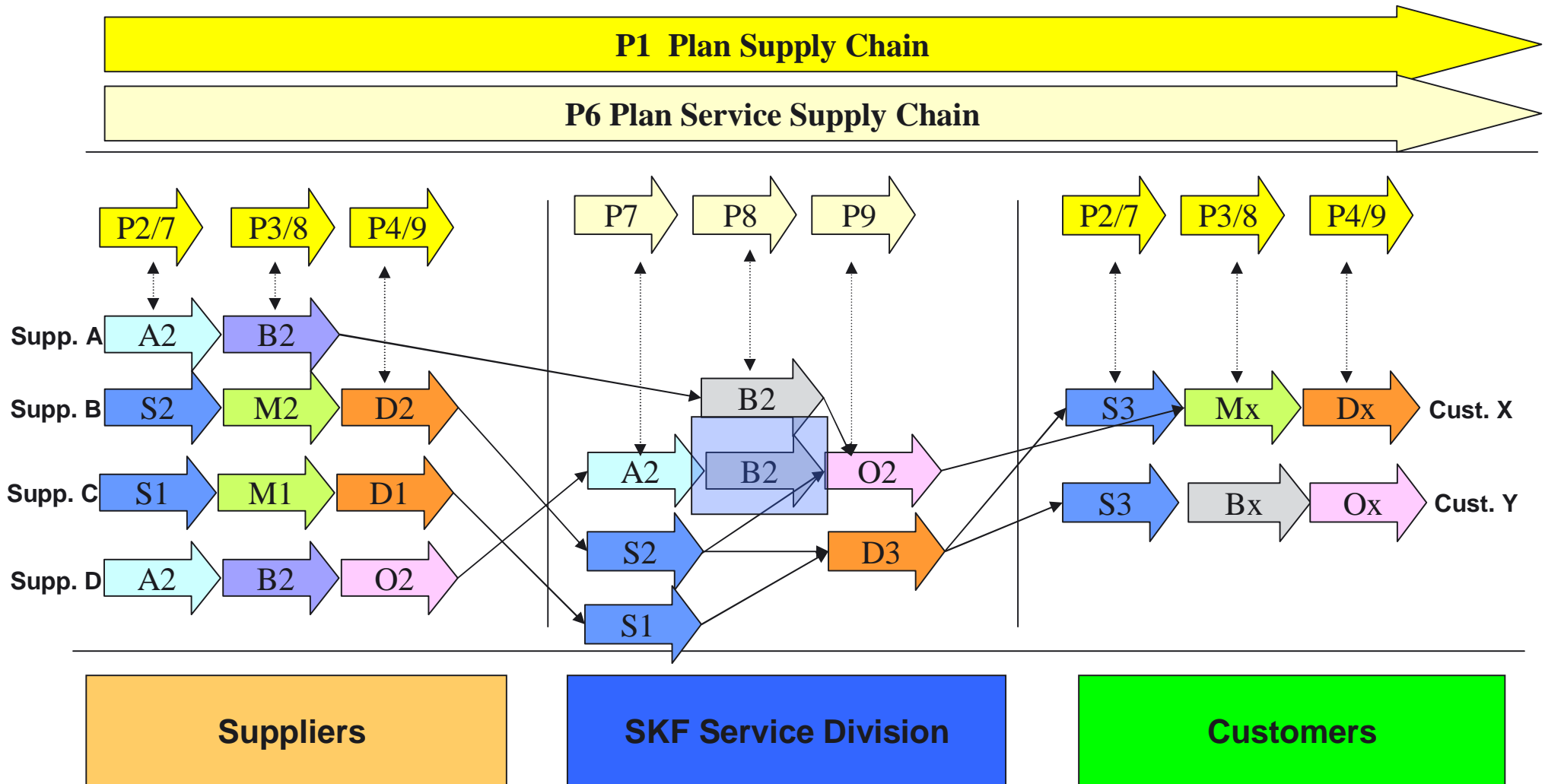


- q Coordination Mechanisms
  - § Consider the business as a whole, not only for a specific customer
  - § Generalize services that may be applicable elsewhere
  
- q Information Systems
  - § Develop a model to share the business strategies with IT
  - § Develop agile solutions instead of isolated applications
  - § Define data structure for information exchange
  
- q Synchronization of Technical Terms
  - § Create a seamless interconnect between IT and process architecture
  - § Develop a single repository to fully align IT systems with business needs
  
- q Performance Measures
  - § Definition of the suitable KPIs

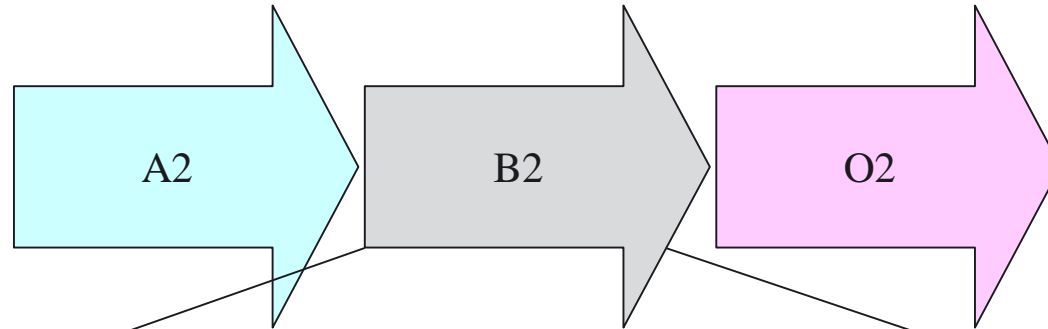
## IRM Level 1 and 2: Service - Supply Chain Processes



# Simplified SKF Process Model



# Simplified SKF Process Model (cont'd)



BUILD B2.1



BUILD B2.2



Input: Signed contract, factory layout, machine list, indication of critical machines, machine data (e.g. bearing type, defect frequencies, machine history)

### Define Virtual Plant Structure

Output: Virtual plant structure, number of sensors per machine

Measure of Performance: none

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Input: Signed contract, specifications from the suppliers

### Set-up specifications of Hardware/Software and Related Services

Output: System specification

Measure of Performance:

- Lead time

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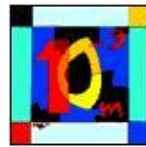


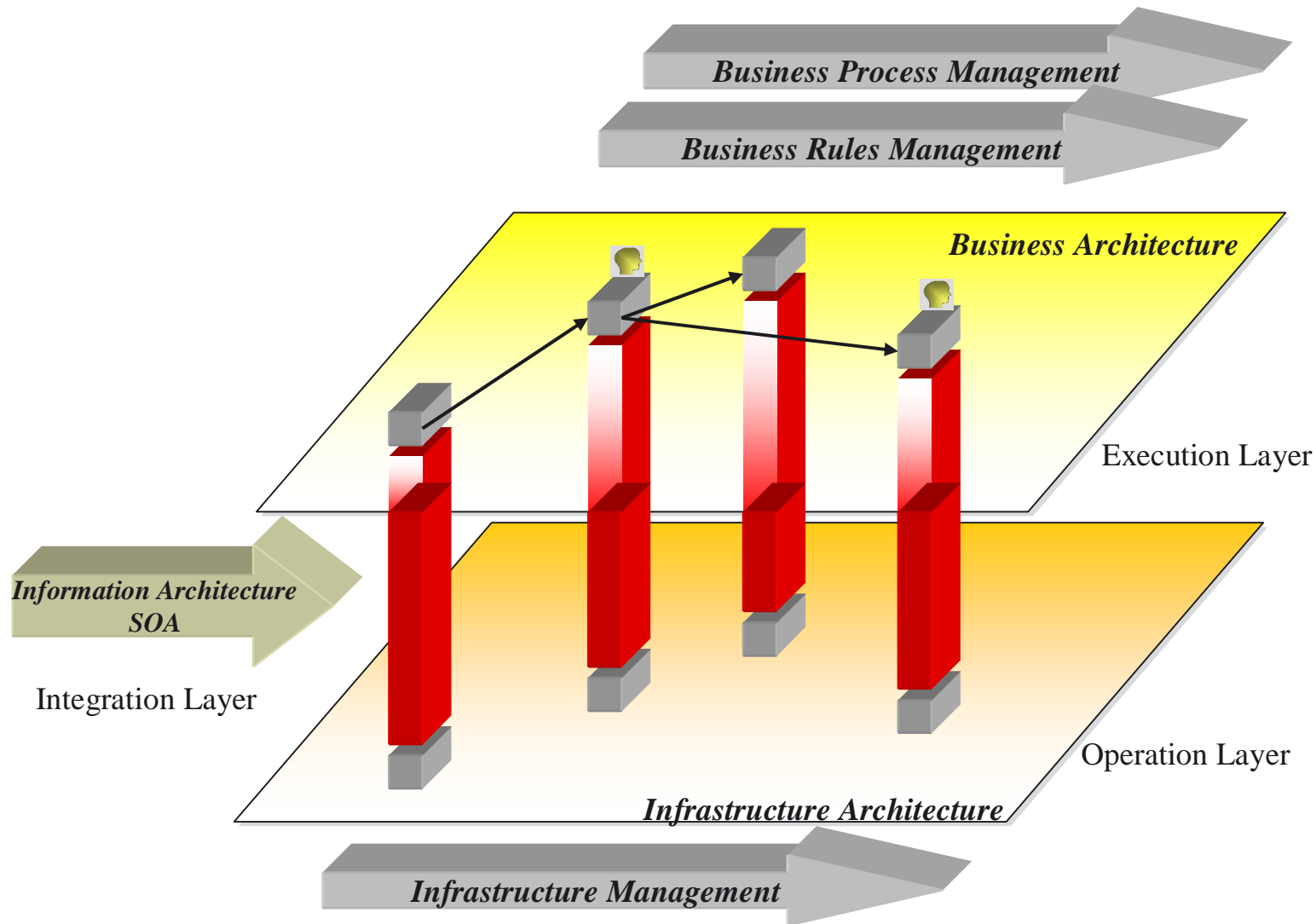
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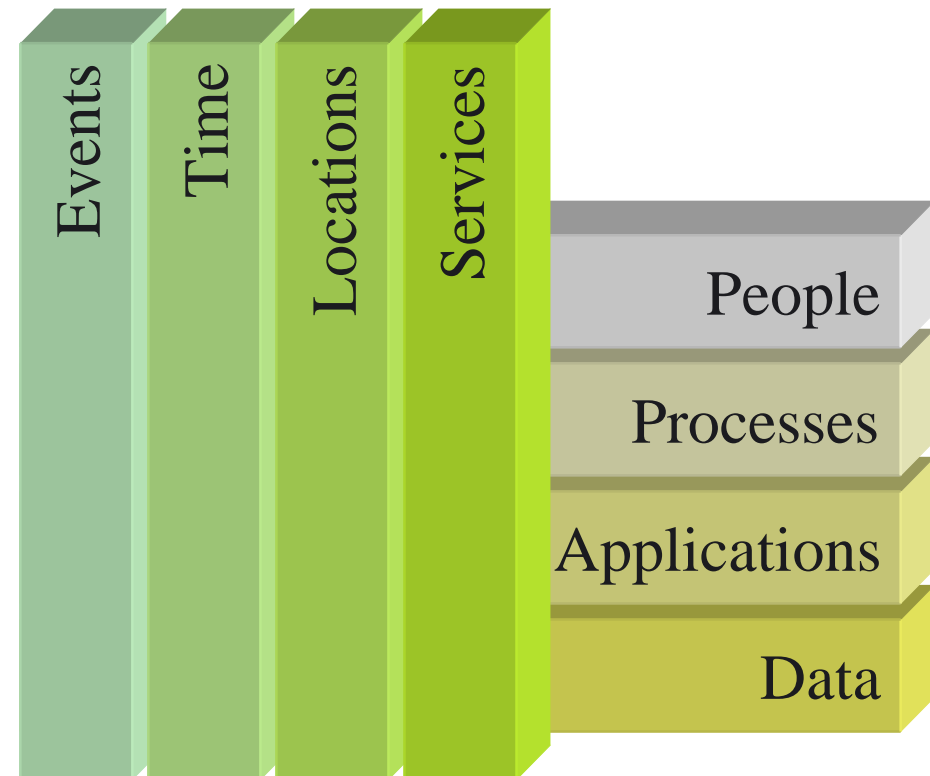
## Implementation Platform for Networked Services



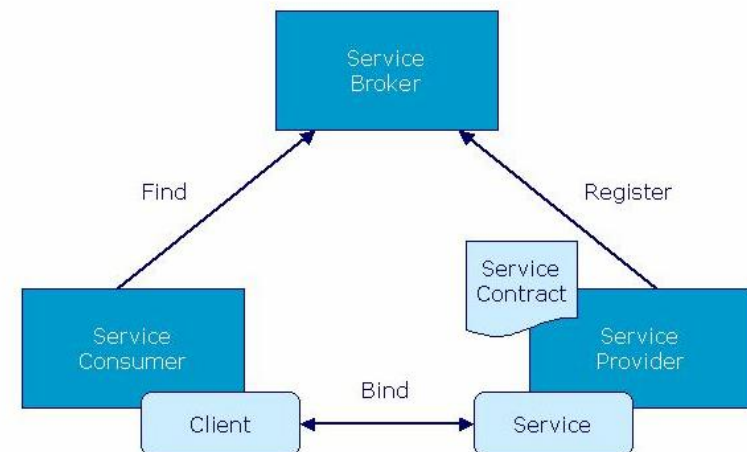


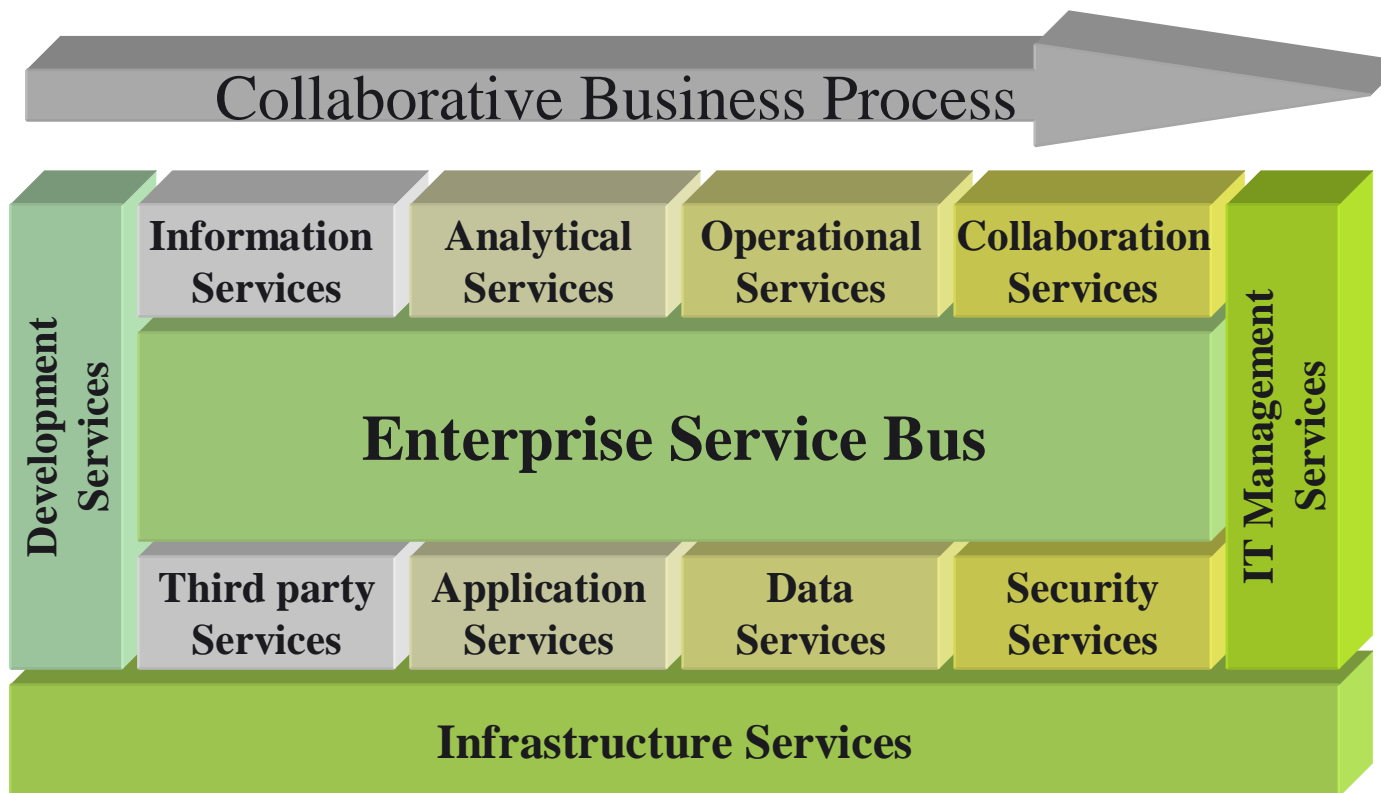
- q BPM and SOA
  - § A SOA separates business logic from process logic
  - § A SOA is an infrastructure for BPM
- q Principles of SOA
  - § SOA is a software design approach
  - § SOA is technology independent
  - § SOA is based on component architectures
  - § SOA is business driven

 BUT: ROI is not achieved by SOA, but from the implemented processes!

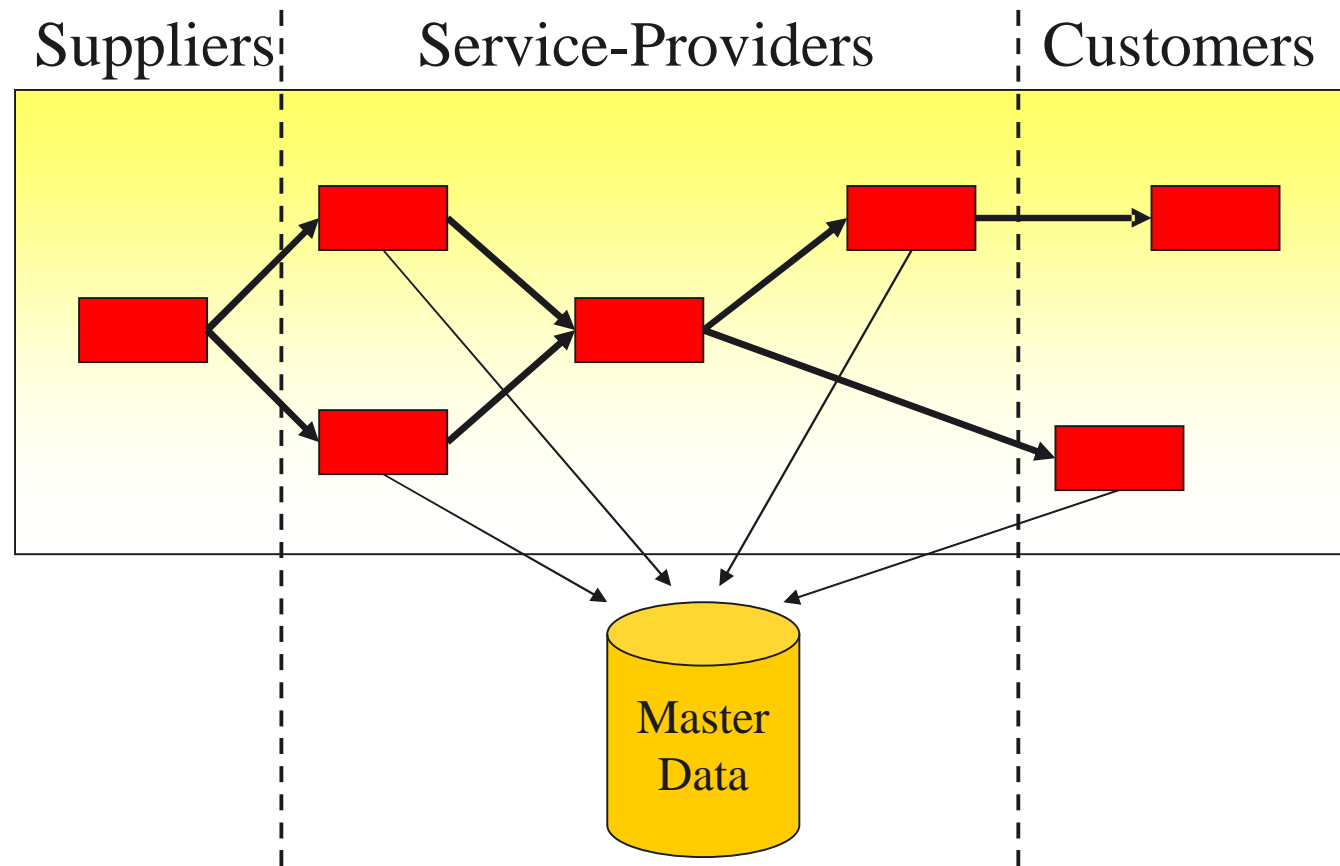


- q Responsibility for the result
  - § Service provider is responsible for the execution and the result of the service
  - § Service consumer is responsible for controlling the service execution
- q Clearly defined service levels
  - § Each service execution is clearly defined regarding time, costs, quality
  - § Input and output of the services are clearly defined and known to both parties by agreed Service Level Agreements (SLAs)
- q Sharing of events
  - § Service consumer is well informed of each agreed status change of his request
  - § Service provider is obliged to inform the service consumer of unforeseen events



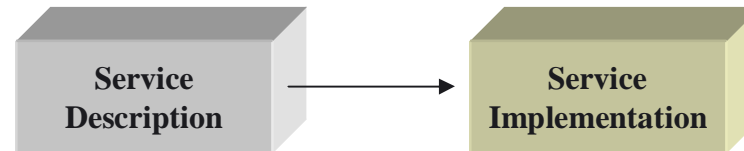


- q Processes, rules and master data are application independent
- q Architectures for master data management
  - § Point-to-point
  - § Master-slave
  - § Hub and spoke

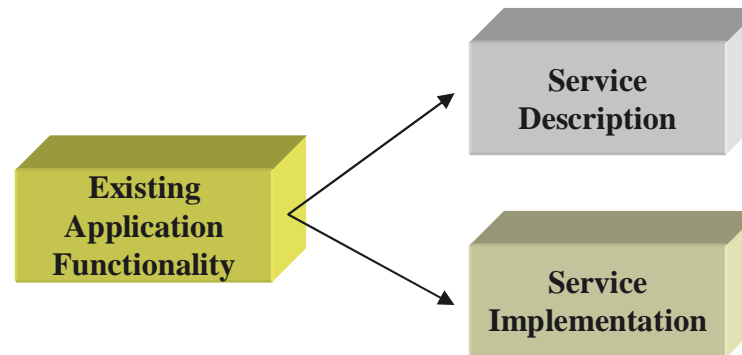


- q Service identification is one of the first steps in the service oriented development life cycle
- q The process of identifying services can be approached from a number of perspectives
- q The following are the approaches for service identification:
  - § Top-down
  - § Bottom-up
  - § Meet-In-The-Middle, exposing existing assets

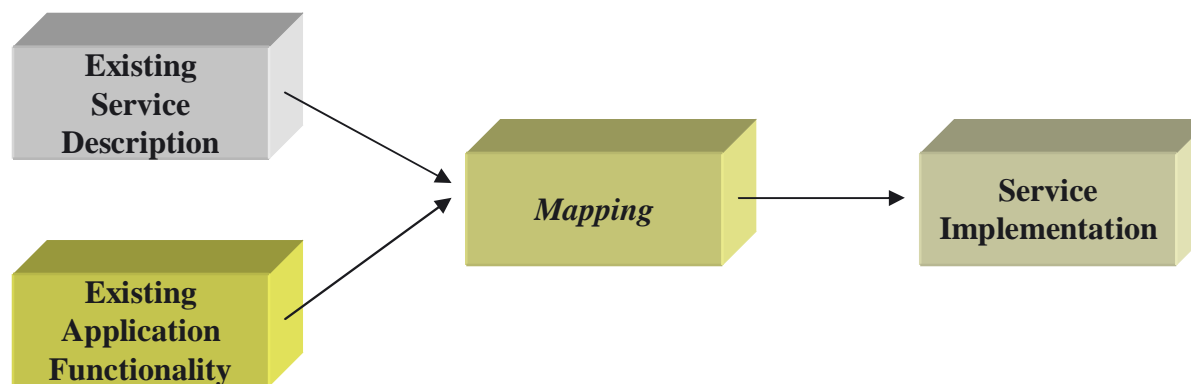
- q Creating a service that is not based on existing application components
- q The service developer first creates a service description that specifies the service
- q Afterwards the developer implements the (web) service application components to satisfy the criteria specified



- q Creating a service that exposes the functionality from existing application components
- q The starting point is a suite of application components
- q The service developer generates the necessary service description and infrastructure files



- q The meet-in-the-middle approach is used when a service developer maps the functionality from existing application components to an existing service description



q Collaborative processes only work, if a common vocabulary is used

§ Alignment of term and expressions among of partner involved

§ Definition of a Process Repository

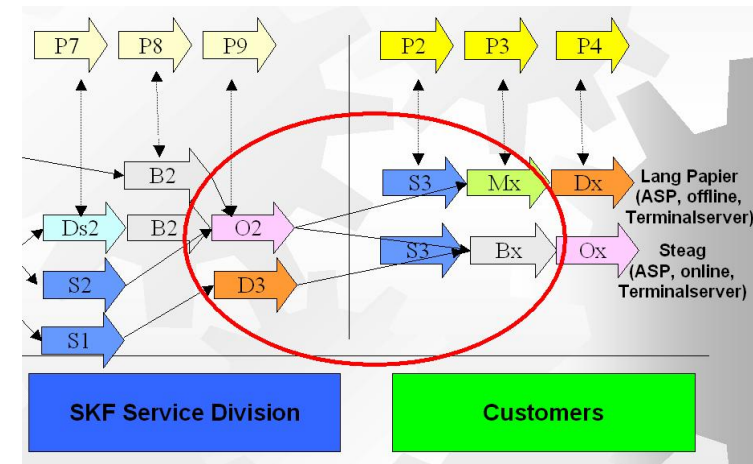
2 Service Cluster – Maintenance 1

Process	Input	Output	Old Term	New Term	Definition
PA2.1	x		Request of service from the customer	Customer request	Request of service provision addressed by the customer to the service provider as first contact
	x		Names of the persons part of the service team for the Adapt phase and responsibilities (with names)	Service team (Adapt phase) and responsibilities (with names)	Definition of the service team which will carry out the work during the Adapt phase of the service provision. Names of the persons part of the team and their responsibilities are given so well
	x		List of potentially applicable services out of the existing portfolio	List of suitable services out of the existing portfolio	List of standard services included in the portfolio of the service provider which could meet the customer's request (totally or partially)
PA2.2	x		Request of service from the customer	Customer request	Request of service provision addressed by the customer to the service provider as first contact
	x		List of potentially applicable services out of the existing portfolio	List of suitable services out of the existing portfolio	List of standard services included in the portfolio of the service provider which could meet the customer's request (totally or partially)
	x		Service offer	Service offer	First service offer from the service regular to the customer. The offer included technical data, performance levels guaranteed and economic data
	x		Technical data	<Included above>	<Included above>
	x		Performances guaranteed	<Included above>	<Included above>
	x		Economic data	<Included above>	<Included above>
PA2.3	x		Service offer finalized by the customer	Service offer approved	Service offer returned and approved by the customer
	x		Legal aspects defined to be included in the service contract	Legal aspects definition	Self explanatory
PA2.4	x		Service offer finalized by the customer	Service offer approved	Service offer returned and approved by the customer
	x		Technical aspects defined to be included in the service contract	Technical aspects definition	Self explanatory
PA2.5	x		Technical aspects defined to be included in the service contract	Technical aspects definition	Self explanatory
	x		Plan for the maintenance strategy and list of main high-level performance measures	Maintenance strategy	Self explanatory
	x			High-level performance measures	Self explanatory
PA2.6	x		Legal aspects defined to be included in the service contract	Legal aspects definition	Self explanatory
	x		Technical aspects defined	Technical aspects	Self explanatory

q Development of a Reference Model

§ Development of a model to share the business strategies

§ Alignment of (IT) systems with business needs



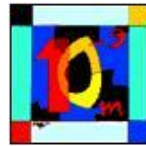


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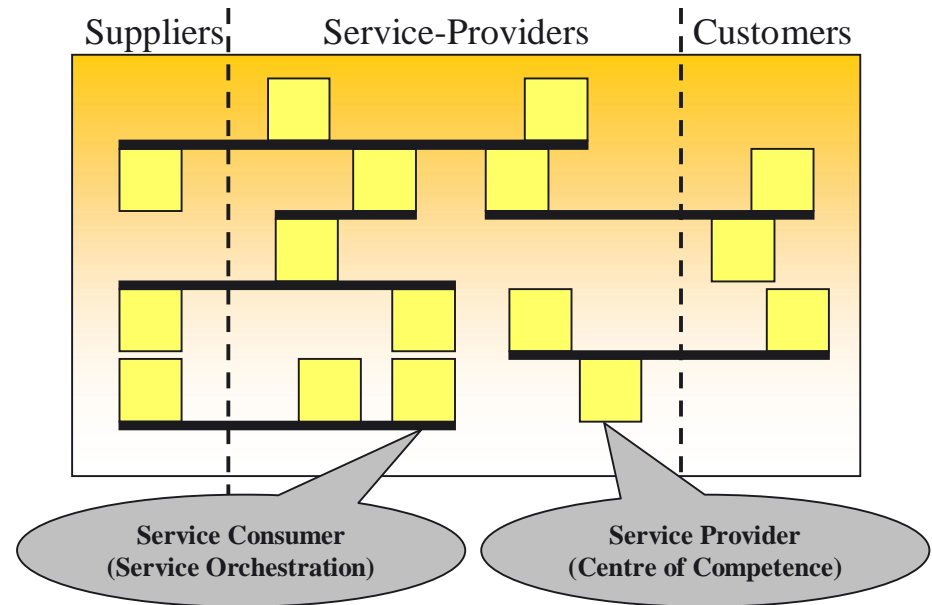
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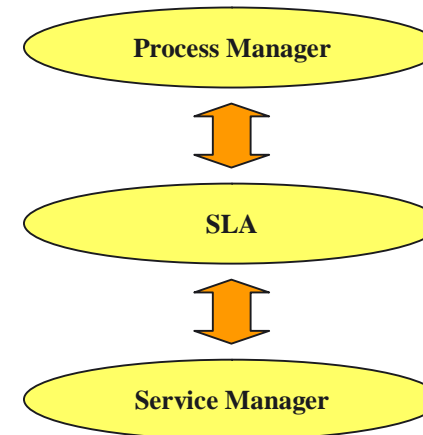
## Summary and Outlook



- q Processes have to be industrialized
- q Processes have to be designed in a flexible way



- q Service Level Agreements are the link between Process and Service Manager



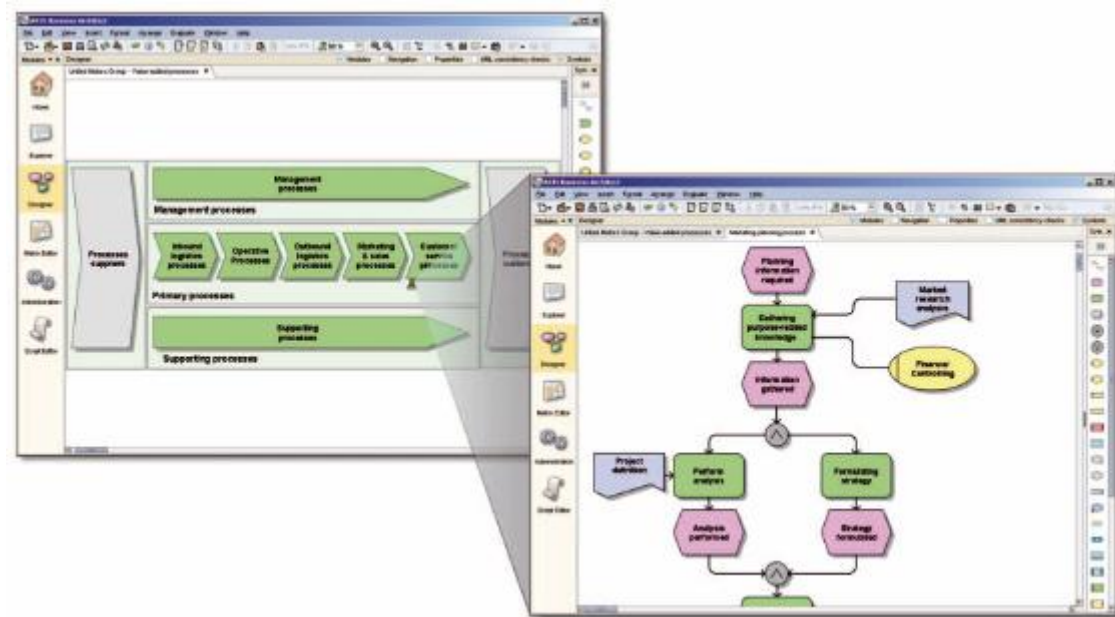
- q Leading enterprises are process oriented
- q Investments and competitiveness are encapsulated in the processes
- q The technical and organizational infrastructure for process orientation is a Service Oriented Architecture

 SOA is essential!

## Continuous Improvement Process



- q The key function of IT is to support and optimize corporate processes.
- q IT architectures need to be analyzed and optimized from a business perspective.
- q Bringing together business process design and IT architectures allows coordinated management of these two areas.





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SKF GmbH

Stefan Schleyer

Gunnar-Wester-Strasse 12

97421 Schweinfurt (Germany)

+49 9721 563193

[stefan.schleyer@skf.com](mailto:stefan.schleyer@skf.com)

