


Utility, Usability and Complexity of Emergent IS

The complexity reduction trajectory – enabling e-systems at what cost?

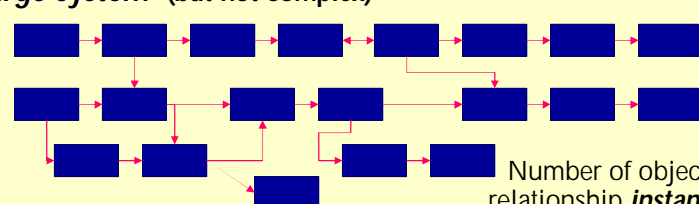
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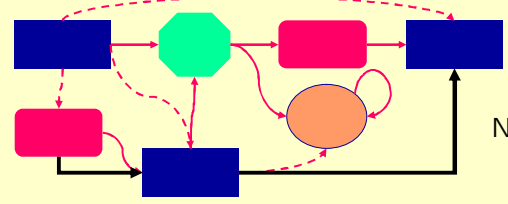
Brief comments on complexity

A large system (but not complex)



Number of object & relationship *instances*

A complex system (but not large)



Number of object & relationship *types*

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Complexity reduction by abstraction

1. Encapsulate a collection of lower level objects and relations into a single "higher level" (or *meta*) object (with general properties and behaviors)
2. Identify a specific recurring "pattern" (or *chunk*) as an encapsulation (with specific properties and repeatable behavior)

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Complexity reduction

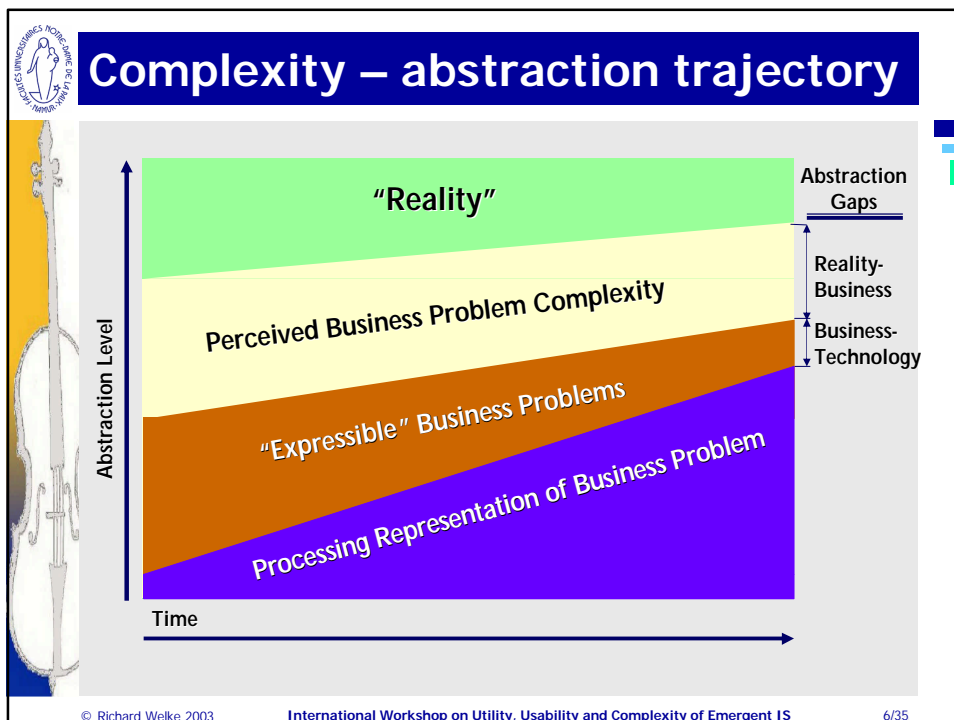
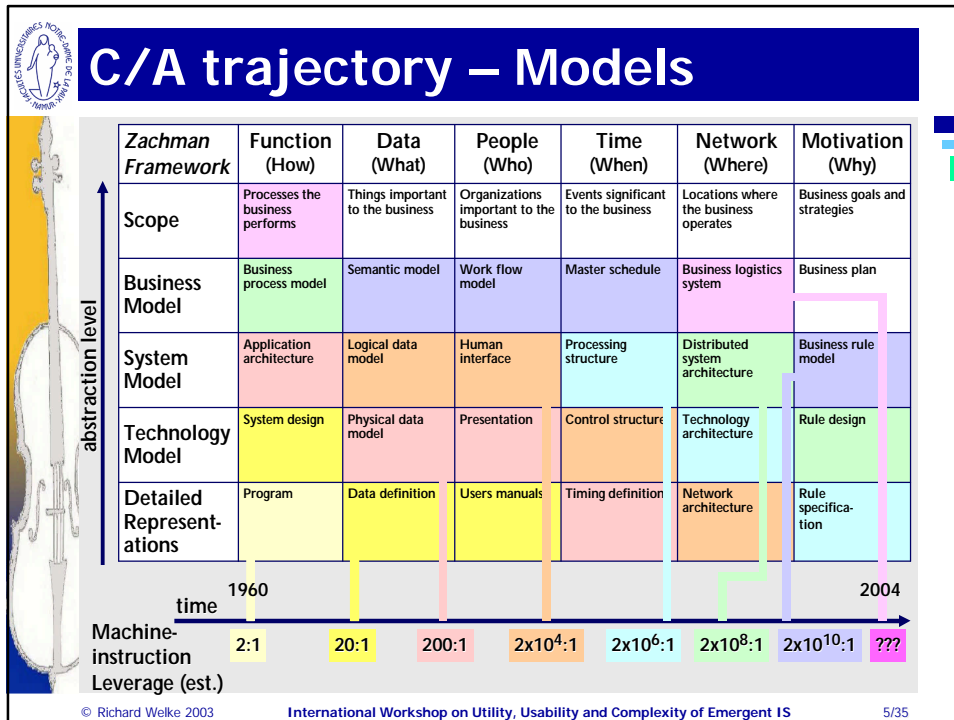
Increasing abstraction

- Programming languages
- Operating system scope/function
- Software engineering models
- Business models

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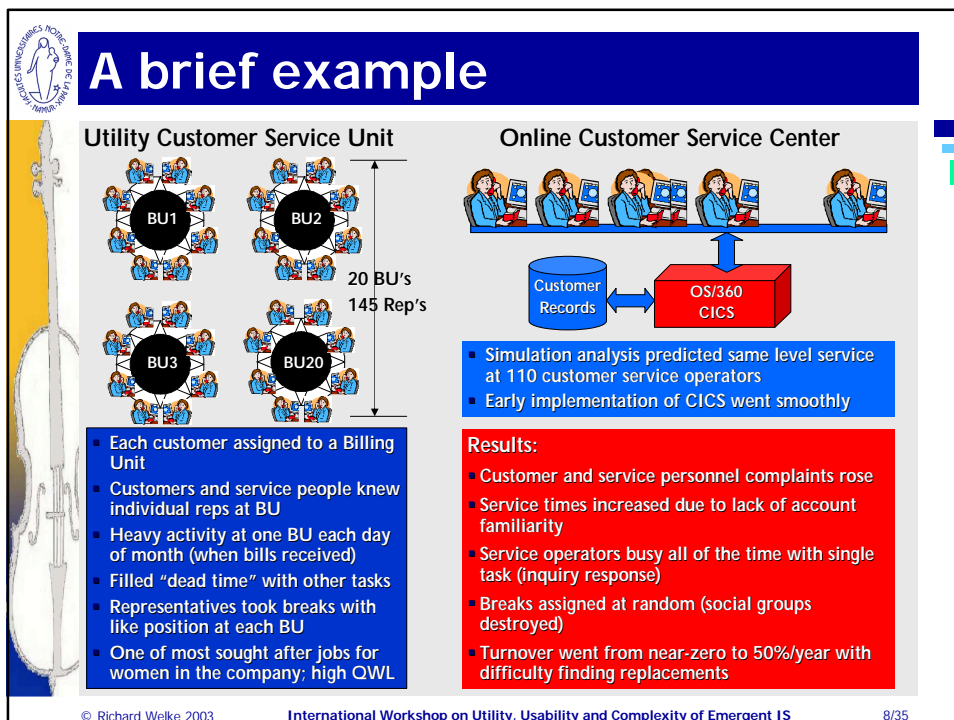
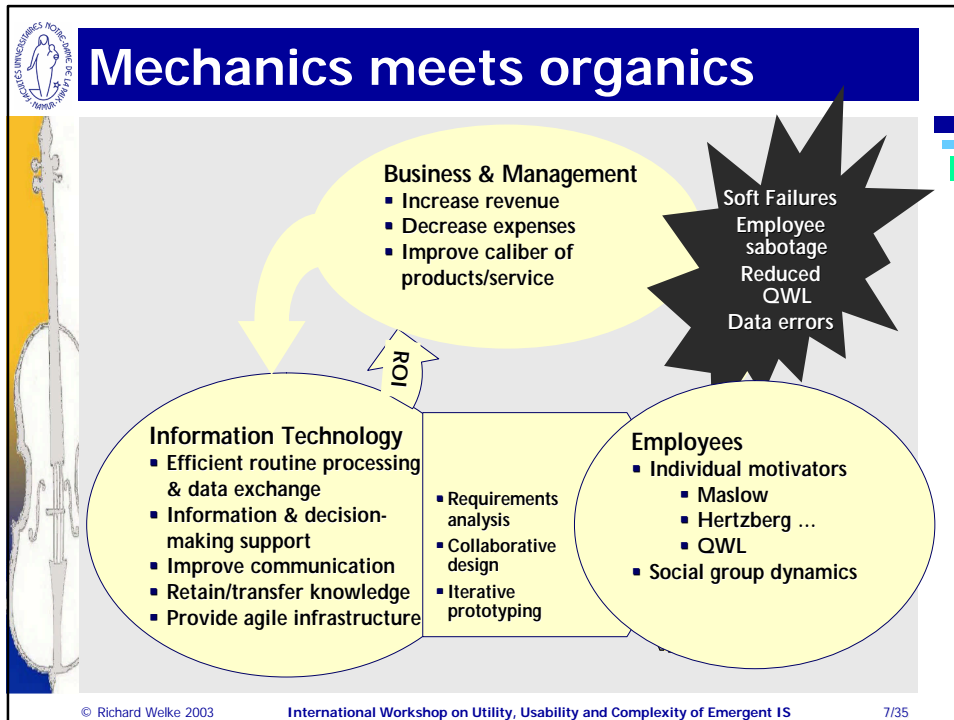


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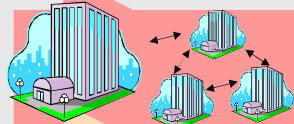

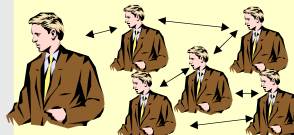
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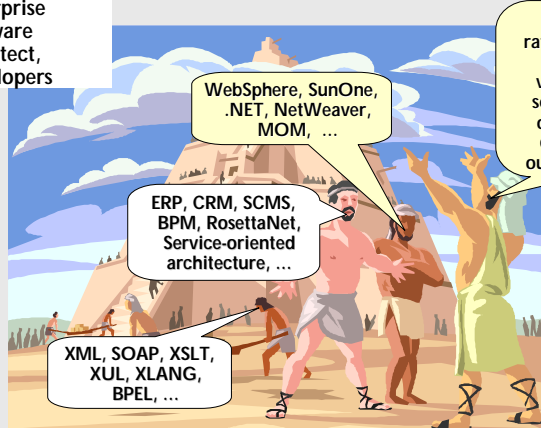
Lagging "social" considerations

| Level | Example App's | Social aspect |
|--|---|--|
|  Inter-Organization | e-Business, e-Commerce, EDI, portals, e-services | Agile unit design, incomplete contacts ??? |
|  Intra-Organization | ERP, knowledge management, business intelligence | User design groups, trust-building, change management |
|  Group, Unit or Function | Group support, task coordination, accounting packages | Collaborative design, iterative prototyping, use cases |
|  Individual | Task processing, data access, decision support | Manuals, training |

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Specification impedance

**Systems analysts,
enterprise software architect,
developers**



Supply chain rationalization, cash velocity, agile vendor structure, sense-and-respond order fulfillment, demand pricing, outsourcing, ROI ...

WebSphere, SunOne, .NET, NetWeaver, MOM, ...

ERP, CRM, SCMS, BPM, RosettaNet, Service-oriented architecture, ...

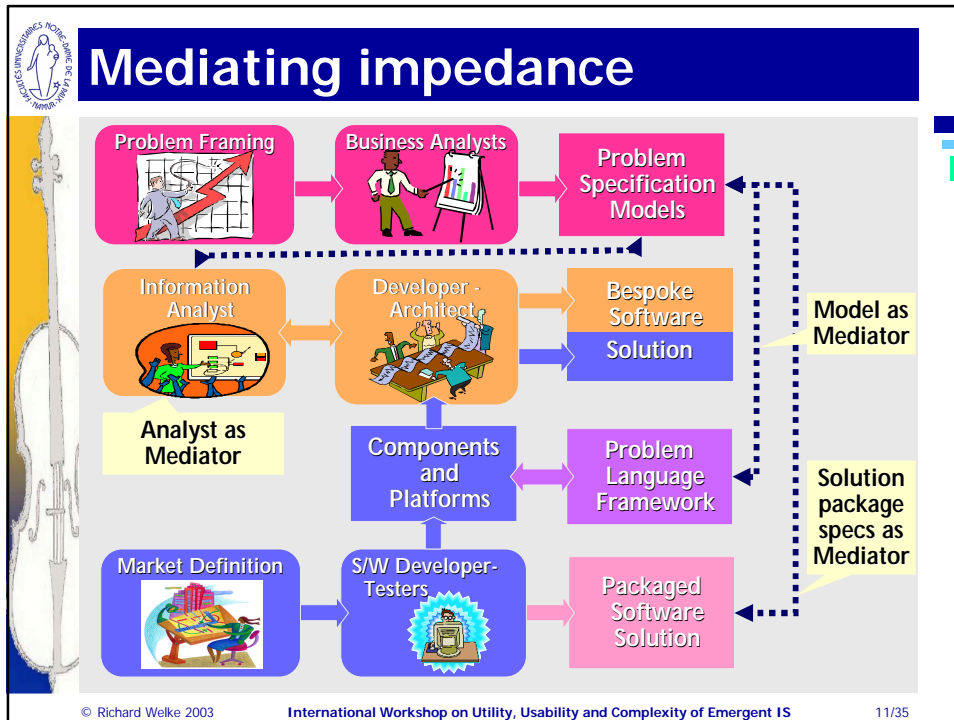
XML, SOAP, XSLT, XUL, XLANG, BPEL, ...

**Business owners,
problem owner,
business analyst**

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Problem model/level progression

| Level | Analyst as Mediator I (bespoke) | Solution Specs as Mediator | Analyst as Mediator II (components) | Model as Mediator |
|-------------------------|---------------------------------|--------------------------------|--|-------------------------|
| Inter-Organization | EDI systems | Extended ERP, SCMS, CMS, email | UN/CEFACT, MDA, Service-oriented architectures | Business Process Models |
| Intra-Organization | Most "legacy" systems | ERP, IM | Client-server applications, web apps | ASAP? |
| Group, Unit or Function | A/R systems | Payroll, inventory packages | Lotus notes | ISDOS PSL/PSA (vision) |
| Individual | FORTAN programs | DSS packages | Visual basic programs | GPSS (simulator) |

Approach to problem/solution coupling

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Convergence – Business Processes

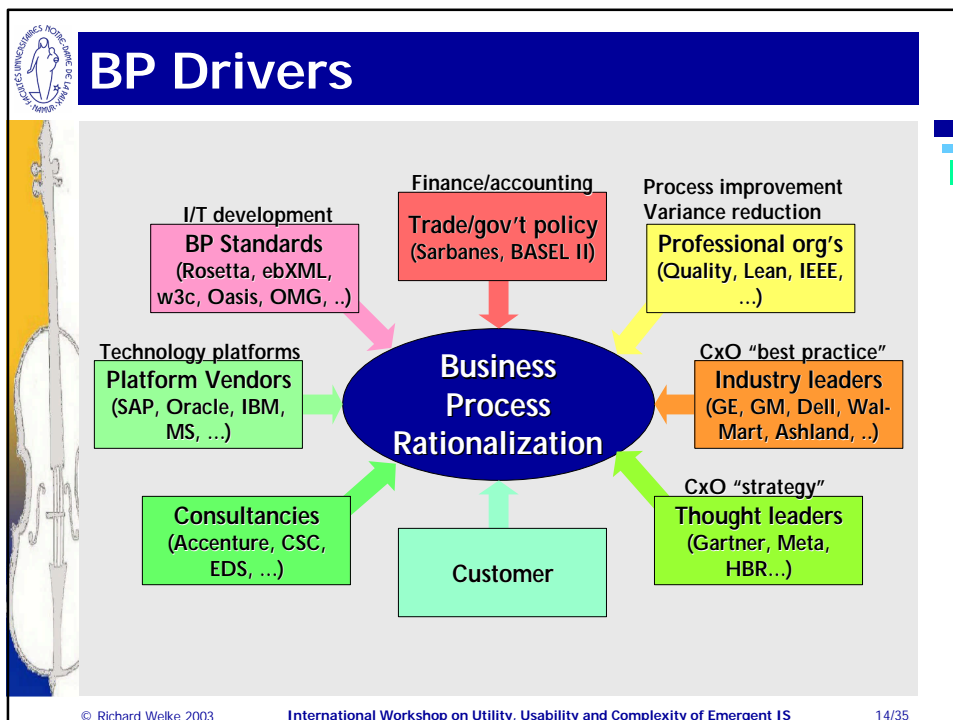
Definitions:
 (Smith & Fingar 2003): "The complete, dynamically coordinated set of collaborative and transactional activities that deliver value to customers."
 (WFMC): "A collection of interrelated works tasks, initiated in response to an event, that achieves a specific result for the customer of the process."

Characteristics

- Large/complex involving flow of: materials, information, value & commitments
- Very dynamic, responding to demands from customers to changing needs
- Widely distributed and customized across boundaries within/between BU's
- Long running (e.g. cash to order may run for months or even years)
- Dependent on human intelligence & judgment; mix of structured & unstructured tasks
- Difficult to make visible; often undocumented and implicit

Smith & Fingar 2003

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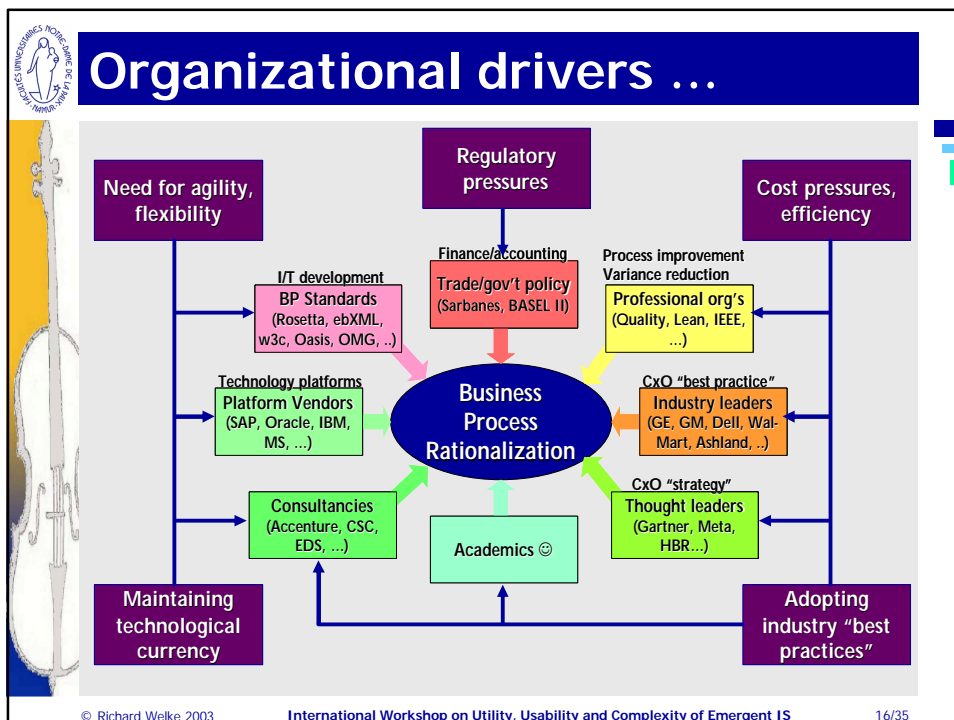


Customer drivers ...

(e-Commerce inspired) Customer needs:

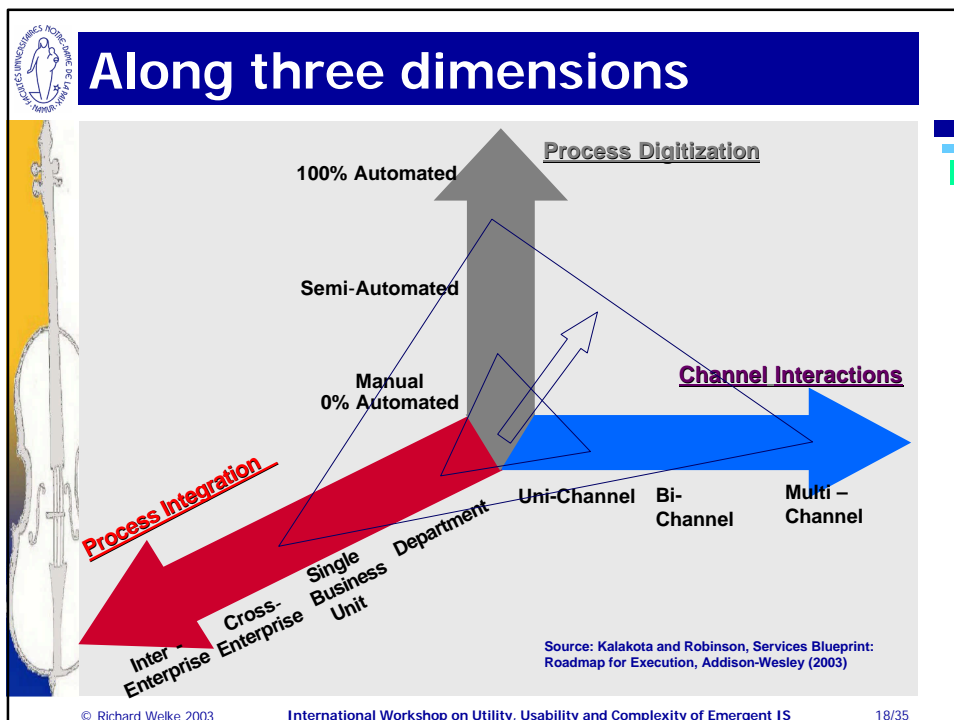
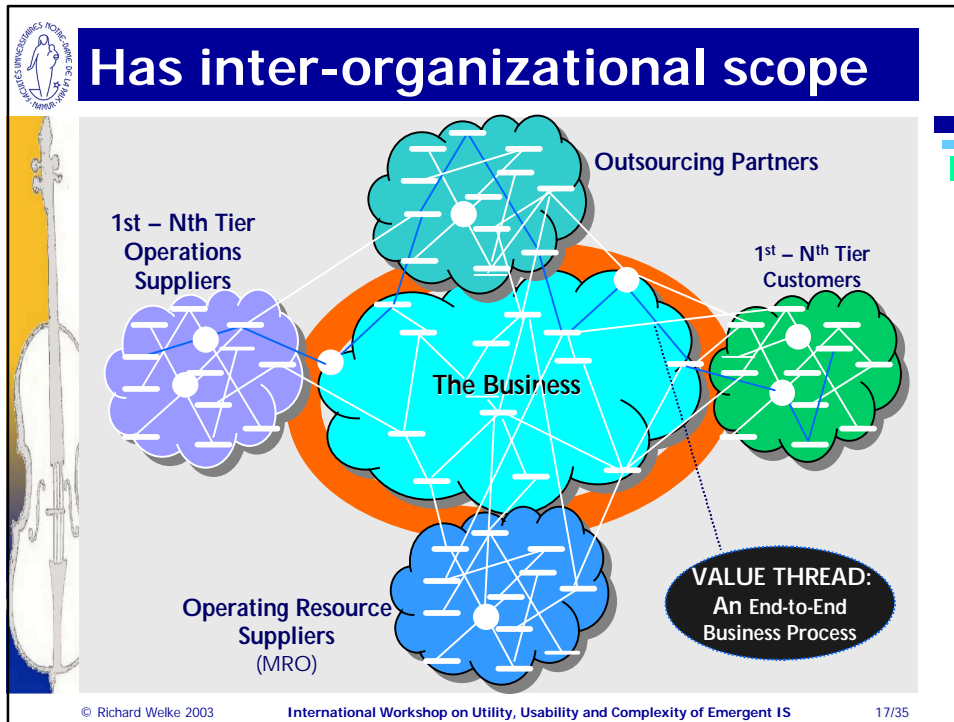
1. **Wants it now** (from information to product)
 - Anytime, anyplace
 - 24 x 7 x 365
 - Tethered or un-tethered (stationary/mobile)
2. Expects you to **know them**
 - Personalized interaction, tailored information
3. Product/service **tailored** to changing needs
 - Mass customization (market of one)
4. **End-to-end** need **fulfillment** in one-stop
 - Understand the full need
 - Organize to fulfill it, service it, replace it
5. With **minimum total costs** to consumer
 - Minimize client-experienced transaction costs
6. Across **multiple channels**
 - Bricks, clicks, mobile, face-to-face, etc.

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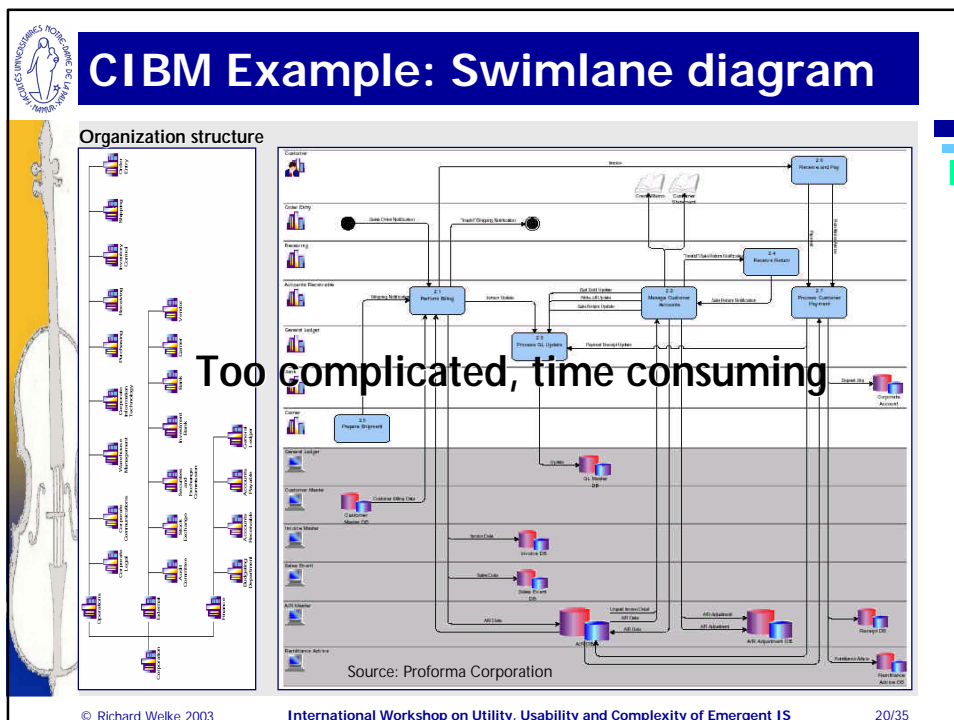
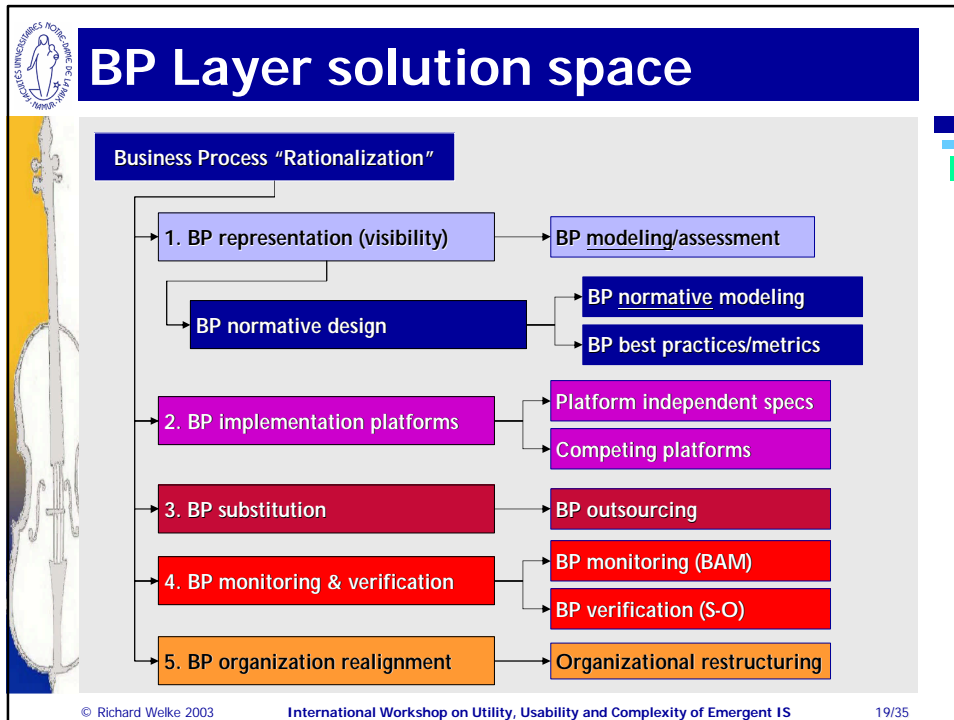


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Categories & types of BP's

Some "high-level" business processes:
Supply chain management, demand chain management, product/service design, customer service, contract management, etc.

Made up of a myriad of lower-level "part processes":

"Process Catalog"

| | | | |
|---|--|---|---|
| <ul style="list-style-type: none"> Account management Advance planning & schedule Advertising Assembly Asset management Benefits administration Branch operations Budget control Build to order Call center service Capacity reservation Capital expenditures Check request processing Collateral fulfillment Collections Commissions processing Compensation Component fabrication Corporate communications Credit request/authorization | <ul style="list-style-type: none"> Customer acquisition Customer inquiry Customer requirements Customer self-service Customer/product profitability Demand planning Division/VAR management Facilities management Financial planning Financial close/consolidation Hiring/orientation Installation management Integrated logistics Internal audit Inventory management Investor relations Invoicing IT service management Knowledge management Manufacturing | <ul style="list-style-type: none"> Manuf. capability development Market research & analysis Market test Materials procurement Materials storage Order dispatch & fulfillment Order management Organizational learning Payroll processing Performance management Physical inventory Planning & resource allocation Post-sales service Problem resolution management Process design Procurement Product data management Product design & development Product/brand management Production scheduling | <ul style="list-style-type: none"> Program management Promotions Property tracking/accounting Proposal preparation Publicity management Real estate management Recruitment Returns & depot repair Returns management Quality control Sales channel management Sales commission planning Sales cycle management Sales planning Service agreement management Service fulfillment Service provisioning Shipping ... Zero-based budgeting |
|---|--|---|---|

Where to start?

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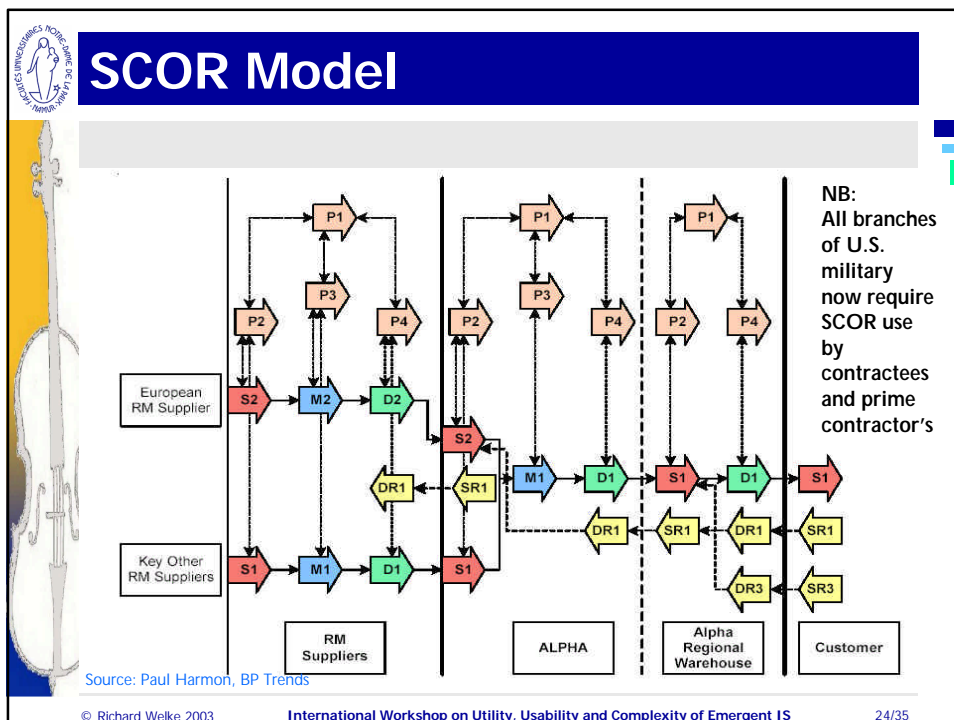
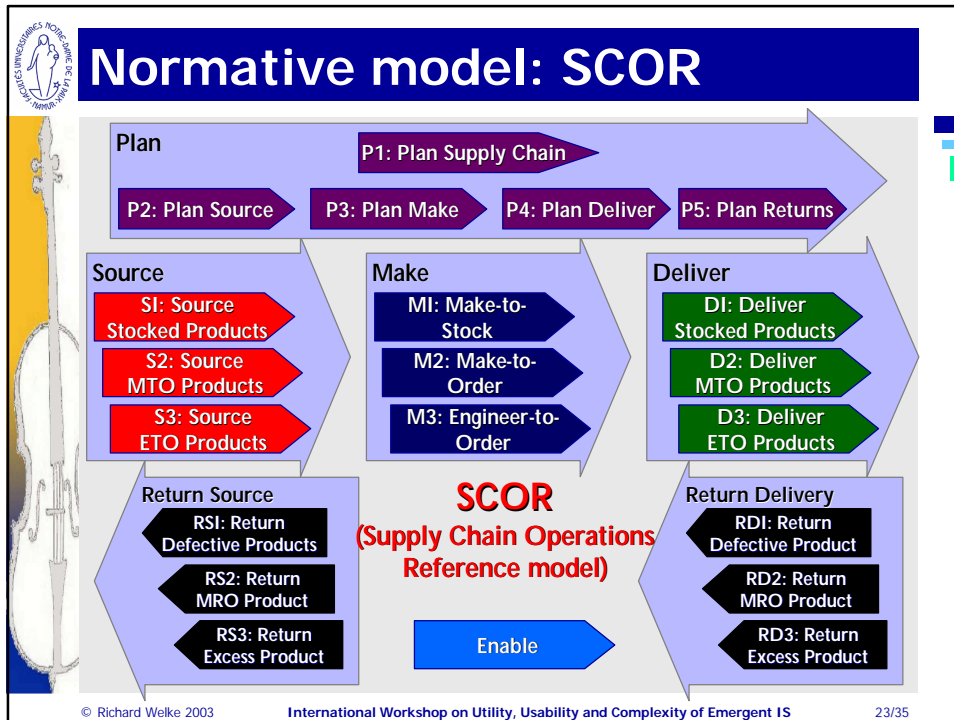
Emerging: Normative models

- What are they?
 - A model constructed from a predefined set of alternatives
 - Prescribed view of how the object of the model "should be" seen and behave
- What is their value?
 - Simplification of modeling (constrained choice vs. green field): higher level of abstraction
 - Standardization enables
 - **Exchange of models** across units & organizations
 - Description of common **problems and metrics**
 - Exchange of industry norms (**benchmarking**) and **best practices**

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The 3-part SCOR "payoff"

| Supply Chain SCORcard | | Industry Benchmarks | | | | | | |
|-----------------------|--------------------------|-------------------------------------|---------------------------|-----------|----------|-------------------------|--|---------------------|
| Overview Metrics | SCOR Level 1 Metrics | Actual | Parity | Advantage | Superior | Value from Improvements | | |
| EXTERNAL | Supply Chain Reliability | Delivery Performance to Commit Date | 50% | 85% | 90% | 95% | | |
| | | Fill Rates | 63% | 94% | 96% | 98% | | |
| | | Perfect Order Fulfillment | 0% | 80% | 85% | 90% | \$30M Revenue | |
| EXTERNAL | Responsiveness | Order Fulfillment Lead Times | 35 days | 7 days | 5 days | 3 days | \$30M Revenue | |
| | | Supply Chain Response Time | 97 days | 82 days | 55 days | 13 days | Key enabler to cost and asset improvements | |
| INTERNAL | Flexibility | Production Flexibility | 45 days | 30 days | 25 days | 20 days | | |
| | | Cost | Total SCM Management Cost | 19% | 13% | 8% | 3% | \$30M Indirect Cost |
| | | | Warranty Cost | NA | NA | NA | NA | NA |
| INTERNAL | Assets | Value Added Employee Productivity | NA | \$156K | \$306K | \$460K | NA | |
| | | Inventory Days of Supply | 119 days | 55 days | 38 days | 22 days | NA | |
| | | Cash-to-Cash Cycle Time | 196 days | 80 days | 46 days | 28 days | \$7 M Capital Charge | |
| | | Net Asset Turns (Working Capital) | 2.2 turns | 6 turns | 12 turns | 19 turns | NA | |

1. Metrics

| Process Category: Source Stocked Product | | Process Number: S1 |
|--|---|--------------------|
| Process Category Definition | | |
| The procurement, delivery, receipt and transfer of raw material items, subassemblies, product and/or services. | | |
| Performance Attributes | Metrics | |
| Reliability | % Orders/lines processed complete | |
| Responsiveness | Total source cycle time to completion | |
| Flexibility | Time and cost related to expediting the sourcing processes of procurement, delivery, receiving and transfer | |
| Cost | Product acquisition costs | |
| Assets | Inventory DOS | |
| Best Practices | | Features |
| Joint Service Agreements | | None identified |
| Alliance and Leverage Agreements | | |

2. Industry benchmarking

S1. Source Stocked Product

S1.1 Schedule Product Deliveries
S1.2 Receive Product
S1.3 Verify Product
S1.4 Transfer Product
S1.5 Authorize Supplier Payment

3. Prescribed "level 3" processes

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Broadening the normative model set

HP's full enabling-process set

Used by HP to manage M&A with Compaq

Basis for extensions to open standard, SCOR-style, normative models

Level 0: Organization
Divided into 4 Major Domains: Resources, Design Chain, Business Development, Customer Chain.

Level 1 Processes: Plan, Integrate, Research, Design, Amend, Source, Make, Deliver, Return, Analyze, Develop, Market, Revise, Relate, Sell, Contact, Assist.

Level 2 Variations:

- Level 2 Processes: New Technology, New Product, Product Revision
- Level 2 Processes: Made to Stock, Made to Order, Engineered to Order
- Level 2 Processes: Expansion, Extension, and Creation
- Level 2 Processes: Relate to Intermediary, Relate to Grouped Account, Relate to Named Account

Level 3 Subprocesses in Relate to Named Account: R3.1 (Receive, Validate & Approve), R3.2 (Assign Account Team), R3.3 (Define Engagement Model), R3.4 (Obtain Customer Needs), R3.5 (Establish Customer Profile), R3.6 (Publish Business Rules), R3.7 (Release to Sell).

Level 4: Activities Specific to Particular process and company.

Metrics and Best Practices for Subprocesses: Tables for Each Process and Subprocess. Information on specific metrics and best practices to implement this subprocess.

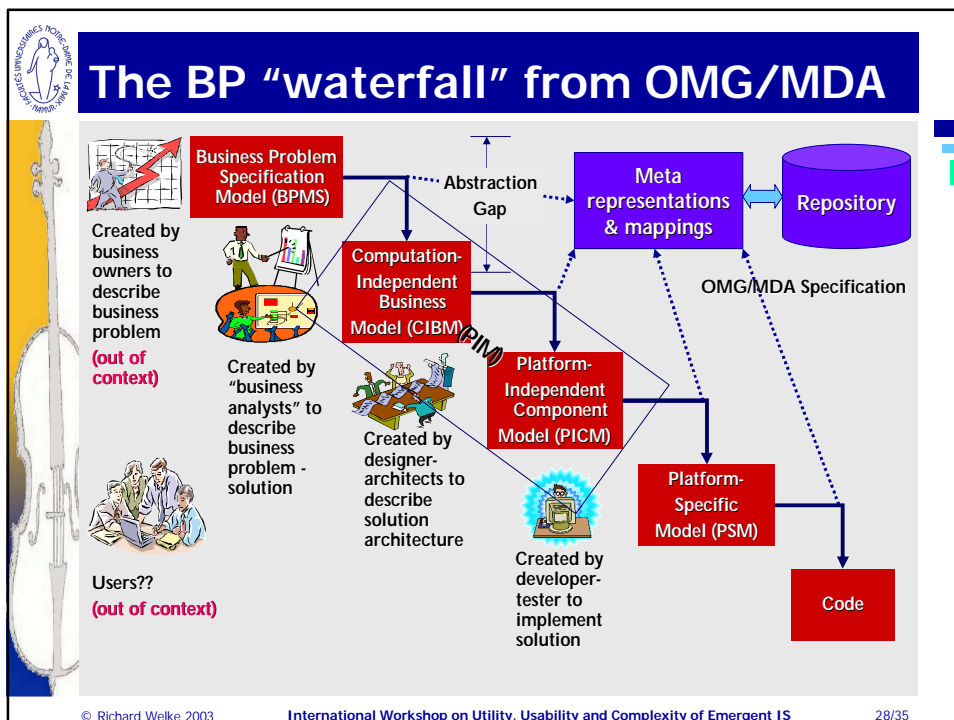
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BP specification/design space

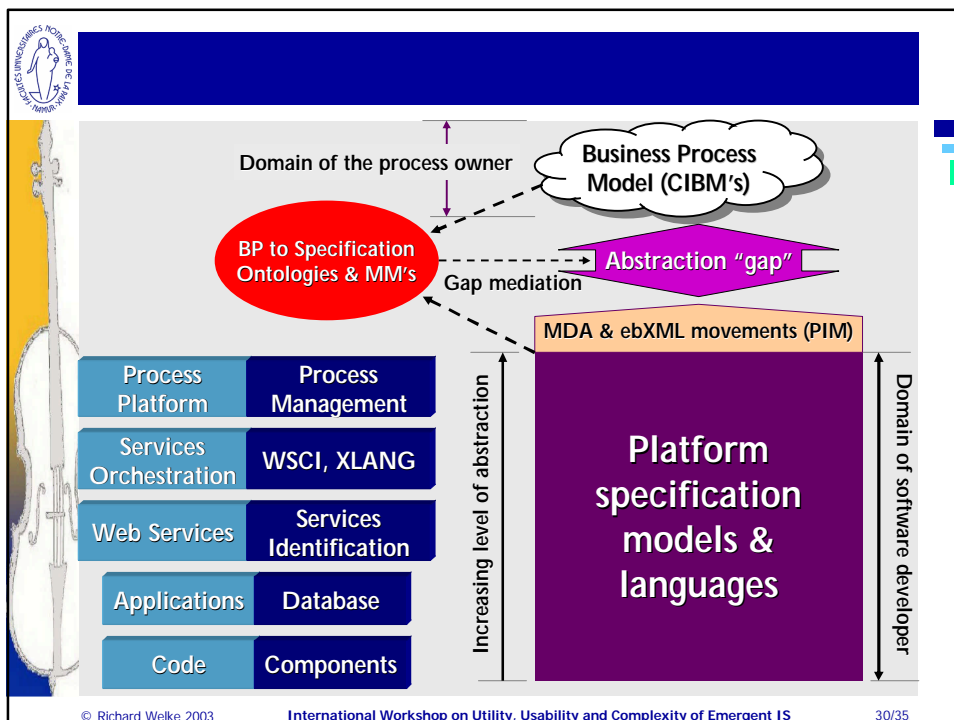
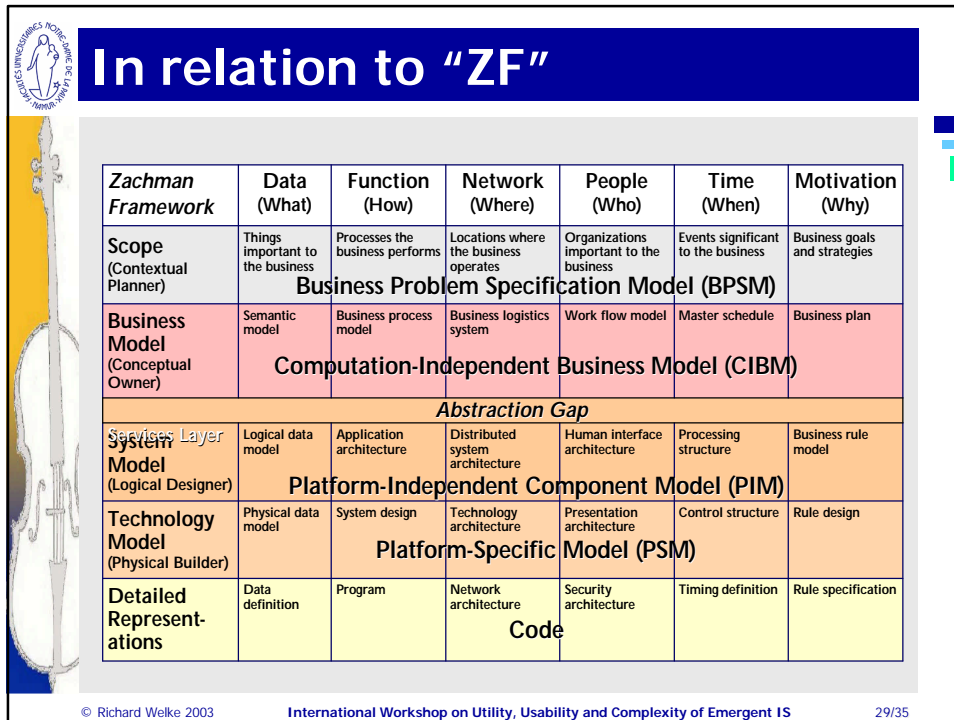
- **Competing PICM's**
 - MDA/UML (OMG)
 - BPEL (Oasis)
 - BPMI/BPML (W3C)
 - UN/CEFACT (DISA)
 - WFSL (WFMC)
- **Competing PDM's**
 - Web services models with WS "orchestration"
 - IBM WebSphere (Holosofx → BPEL)
 - MS .NET and BizTalk 2003 (VS.Net → BPEL)
 - SAP NetWeaver (Aris → xApp specs)
- **Direct implementation models (PICM→PDM)**
 - BPN → BPML → Proprietary platforms
 - e.g. Intalio

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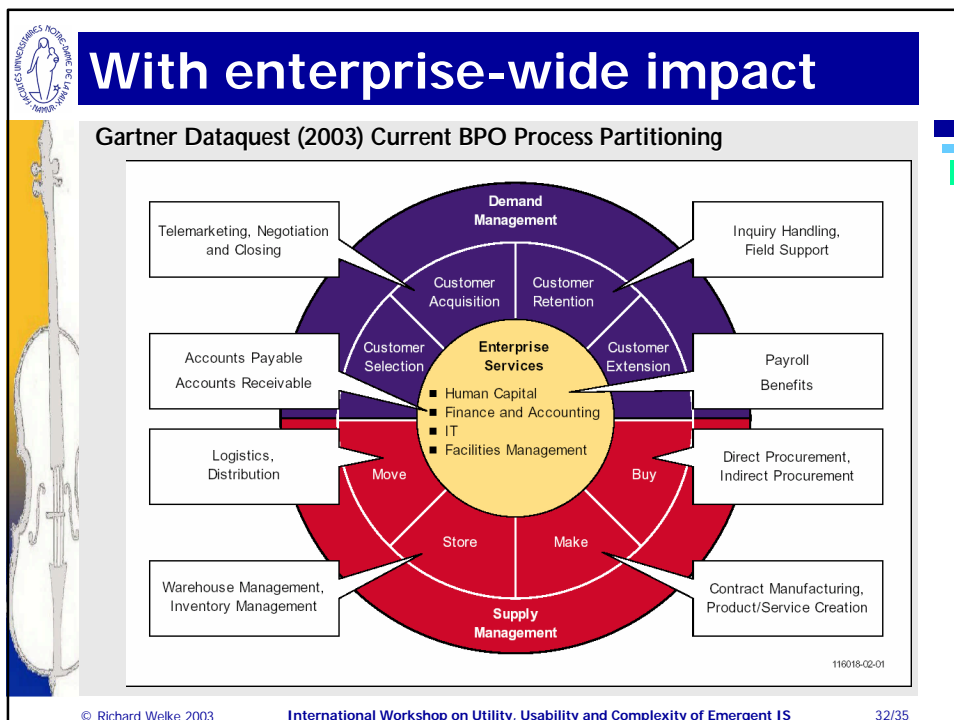
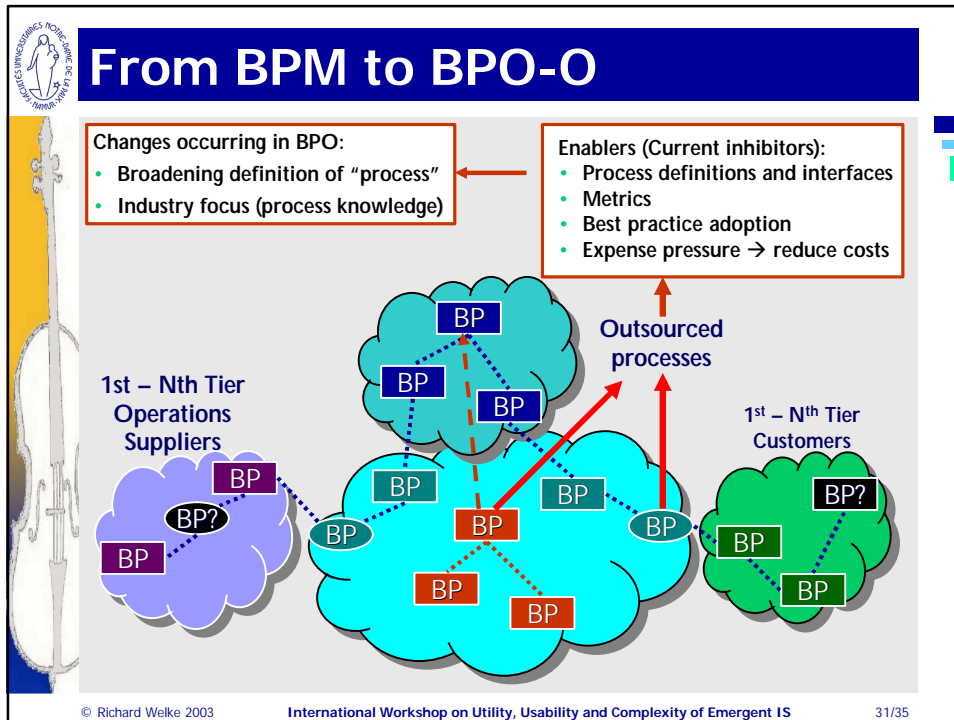


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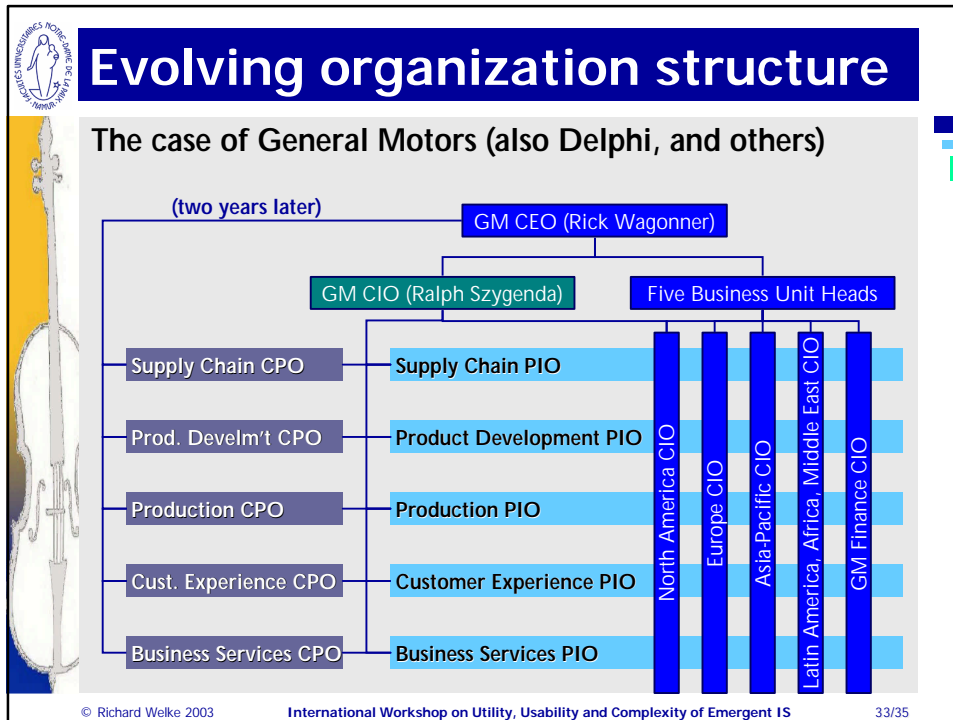


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Summary & conclusions

- Over the past 40 years, truly amazing progress has been made in software engineering through encapsulation abstraction
 - Service-oriented architectures, just now being deployed will be encapsulated into the Longhorn O/S (Indigo)
 - MDA variants "promise" to align closely with business processes
- On the business side, pattern abstractions are now being widely deployed to capture value chains that weren't even perceivable 15 years ago
 - SCOR, D-COR, C-COR, BSS (ebXML), ...
- However:
 - The **Achilles heel** of implementation remains the **individual**
 - As abstraction levels increase, the individual disappears further and further into the background
 - The new layers of abstraction (services, business processes) "promises" large scale failures at an industry/country level

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