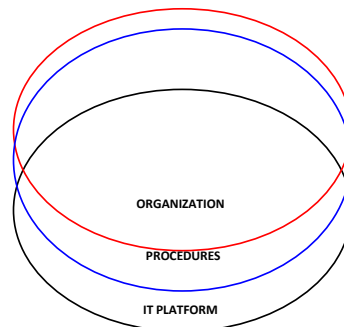


ERP Systems for information management

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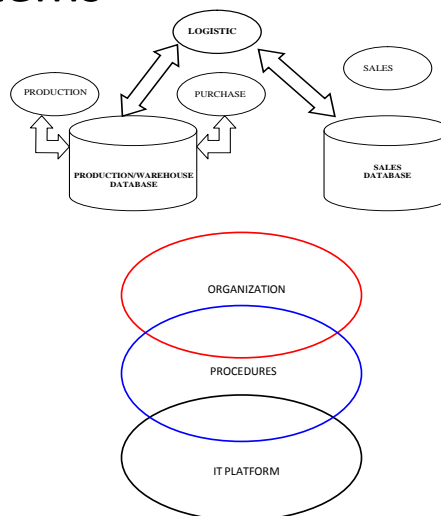
Legacy systems

- + highly customized systems
- Complete lack of flexibility
- Very hard to develop/upgrade
- Any procedural change deeply affects the IT platform



Computer-based management systems

- + not too much expensive
- + upgradable
- Data duplication is possible
- Often procedural changes affect the IT platform
- Limited integration



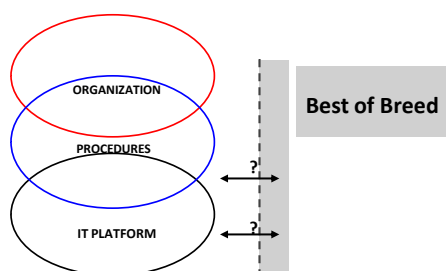
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Best of Breed

- + highly focused and specialized systems
- Integration with other CB systems/BoB
- Limited flexibility at organizational level



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A comparison...

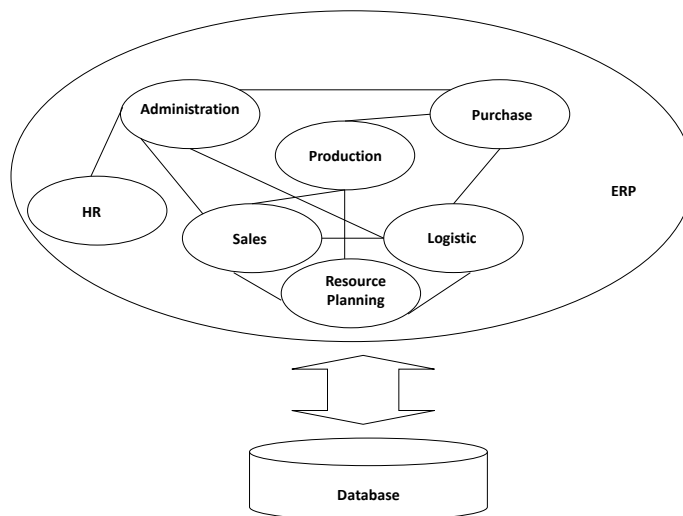
	Legacy systems	CB management systems	Best of Breed
Operative efficiency	LOW	MEDIUM	HIGH
Coverage of business activities	MEDIUM/ HIGH	MEDIUM	LOW
Specialization	HIGH	LOW	HIGH
Extent of integration	LOW (often impossible)	LOW	LOW (expensive but indispensable)

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Enterprise Resource Planning

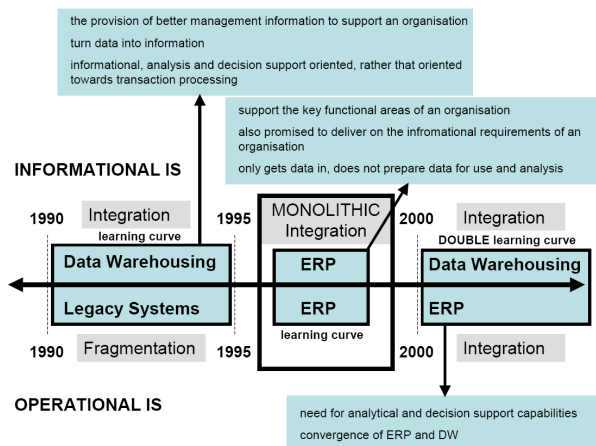


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Another perspective: Operational & Informational IS



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Enterprise System Software

- Packaged application software that integrates data, processes and IT
- Impound deep knowledge of business practices, influence process design within client companies
- Are generic products that must be configured, customised and integrated with other IS to meet business needs

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What is an Enterprise System?

- Enterprise Systems are large-scale organisational systems (people, processes and IT) built around packaged enterprise system software
- Enterprise Systems and the internet are the two most important IT developments to emerge in the 1990s

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Enterprise System Software

- **Enterprise Resource Planning (ERP)**
- Customer Relationship Management (CRM)
- Supply Chain Management (SCM)
- Product Lifecycle Management (PLM)
- Enterprise Application Integration (EAI)
- Data Warehousing (DW)
- eMarketplace / eProcurement platforms

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ERP Systems

- ERP systems are packaged software systems that
 - Automates and integrates business processes
 - Shares common data and practices across the entire enterprise
 - Produces and accesses information in a real-time environment

(Deloitte Consulting 1999)

Major ERP suppliers

- SAP
- Oracle
- Microsoft

The basic idea

- Key benefit is **INTEGRATION**
 - Trade off versus specialized applications for each functional area
- But
 - Home-grown development efforts have failed
 - “Best of Breed” packages are too hard to integrate
- So
 - Throw everything out
 - Buy one huge, pre-integrated package

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How does ERP work?

- Easy information exchange among units
- Support to the main business activities by the means of various software modules
- Client/Server architecture
- Each module works separately from the others and performs specific activities

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Characteristics of ERP

- Modularity
 - Different modules cover specific business activities
- Integration
 - Each module is seamlessly linked to others
- Process-oriented view
 - Each module is in charge of a specific process
- Standardization of procedures
 - Highly formalized procedures → best practices
- Customization and parameterization
 - Trade off between best practices and organizational change
 - System “set-up”

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Modularity

- Step by step implementations can be performed
 - ERPs are flexible because they allow the organization to incrementally support new activities
 - Integration issues “should” be eliminated by the identity along time of both the technological platform and databases

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Integration

- Int/ext interoperability
 - Internal: each ERP module offers native integration with other modules
 - External: ERP modules can be integrated with third-party application (other ERPs or “BoB” applications)
 - “BoB” approach within the ERP industry

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Process-oriented view

- Each ERP module performs the whole set of activities referring to a specific business process

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Standardization of procedures

- Highly formalized procedures
- BPR
 - best practice and customisation
 - vertically organized ERP systems

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Customization and parameterization

- Before implementation ERP systems don't reflect the organizational and operational characteristics
- Within each module, it's possible to activate/de-activate specific functionalities
 - “fine tuning” of best practices
- Addition of new functionalities
 - ERP often covers only from 50% to 70 of the functionalities required

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Benefit: Operational Efficiency

- Lower cost
 - Data entered only once, used by all processes and departments
- Better customer service
 - Current data accessible to all participants
 - E.g. customer service rep can see stock levels in other divisions, progress on order, etc.
- Allows management of processes across organizational boundaries

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Benefit: lower IT costs

- ERP is very expensive
- But expect long term savings from
 - Elimination of legacy systems
 - Upgrades, maintenance and licensing costs
 - Future maintenance and upgrades cheaper
 - Spread costs over a large base
 - Biggest saving in integration?
 - Huge costs for ad-hoc integration of aging applications

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Benefit: standard process

- ERP is managerial means to force global standardization in processes
 - Technological enforcement coded into software
 - Local variation, workarounds eliminated
- Centralization of control over procedures
 - May bring efficiency
 - Will sacrifice flexibility

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Benefit: managerial data

- Standardizing processes requires standardization of:
 - Product codes
 - Accounting methods
 - Human Resources systems
- This allows comparisons between divisions
 - Especially using financial measures of effectiveness – eg. Economic Value Added (EVA) analysis
 - On global basis

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Issue: cost

- Meta Group survey shows
 - Total Cost of Ownership of ERP system over first two years of use is \$53,320 per “heads down” user
 - 23 months work and \$15 million dollars
 - Average benefits \$1.5 million less than costs
- Project cost is 2 to 10 times software price
- High profile implementation failures

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Issue: complexity

- Inherent complexity of global project
 - Training costs for users easy to underestimate
 - Existing data often in worse shape than admit
- ERP team is permanent fixture
 - Rely on to keep business running
 - Will need further work on analysis to deliver promised benefits
- New system gives short-term efficiency slump
 - Like any major reorganization
 - But may afflict whole business at once

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Issue: inflexibility

- ERP standardizes business processes
 - Will be running business the same way as competitors
 - Sees its processes as core competence
- Possible problems
 - Can't find better ways to do things
 - Tied to capabilities of software
 - Limits scope for reengineering, etc except as software requires and supports

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Issue: dependence

- “SAP is not just a new program, it's a new way of doing business”
 - How to deal with things it won't support?
- Long-term commitment...
 - Can users lobby for new features?
 - What if supplier is taken over?
 - What if supplier raises prices?
 - What if supplier shifts direction of product?

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Issue: integration

- When doesn't work well in one area
 - Can try to patch the ERP software
 - Can rely on external application and links
 - Can alter business to fit the software
- Problems in integrating into other systems
 - Create and maintain custom interfaces
 - Not well suited for data warehouses

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Issue: upgrades

- Like other software there are frequent new releases
- Can be a year long project, cost 30% of original installation price
- Can cause major disruption
 - Likely to break custom code and interfaces to other applications
 - Users may not appreciate having to upgrade just because vendor is pulling support

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ERP Implementation

- Complex process of configuration of fit business
 - Entering rules and preferences
 - Loading and standardizing existing data
 - Hooking up to remaining applications
 - Writing custom code where needed
 - Also human parts
 - Retraining users
 - Redesigning business processes

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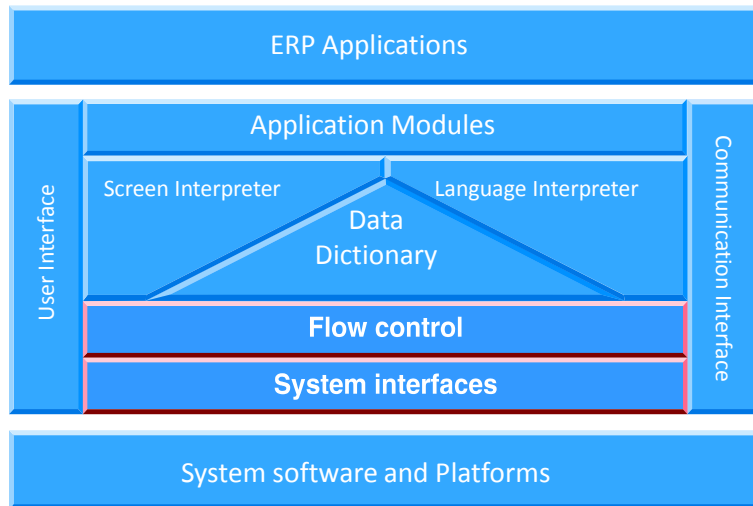
Logical architecture

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Logical architecture



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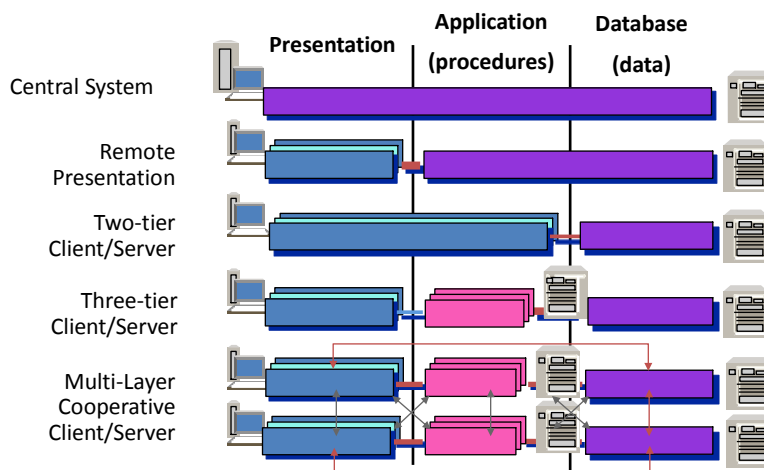
Physical architecture

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Physical architecture /1



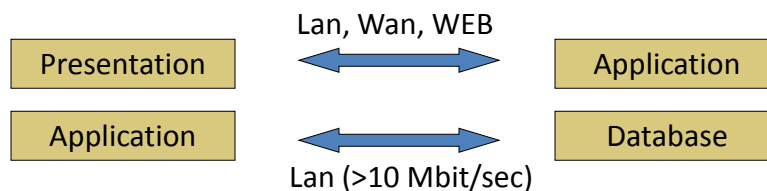
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Physical architecture /2

- Load balancing, exploitation of heterogeneous HW platforms, usually only one DB server
- Central instance (basic services): on DB server (data) or application server (procedures)
- Communications based on TCP/IP

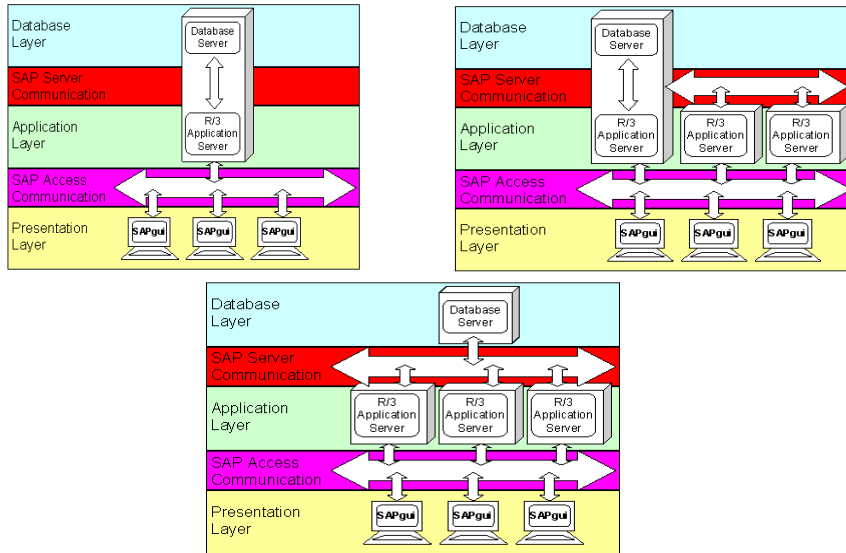


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Physical architecture /3



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Physical architecture /4

Presentation	Web Browser		MS Windows		OS2	Mac				
Middleware	COM/DCOM ActiveX		Corba	HTTP/XML		MQ - Series MSMQ				
languages	ABAP/4 (Objects)			C/C++		Java				
RDBMS	Ababas	IBM DB2 /UDB /400 /390		Informix	MS SQL Server	Oracle				
OS	Unix				NT	Midrange Mainframe				
	HP UX	IBM AIX	Sun Solaris	Linux	Siemens	Compaq Digital	NT	OS/400	OS/390	
Architecture	PA	Power PC	Sparc		MIPS	Alpha	Alpha	Intel	AS/400	S/390

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From ERP to ERP II

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ERP Enabled Transformation

- **First Wave**
 - Changes to the organisation that include and accompany “going live” with ERP
- **Second Wave**
 - Actions that are taken after going live that help organisations achieve the full capabilities and benefits of ERP-enabled processes

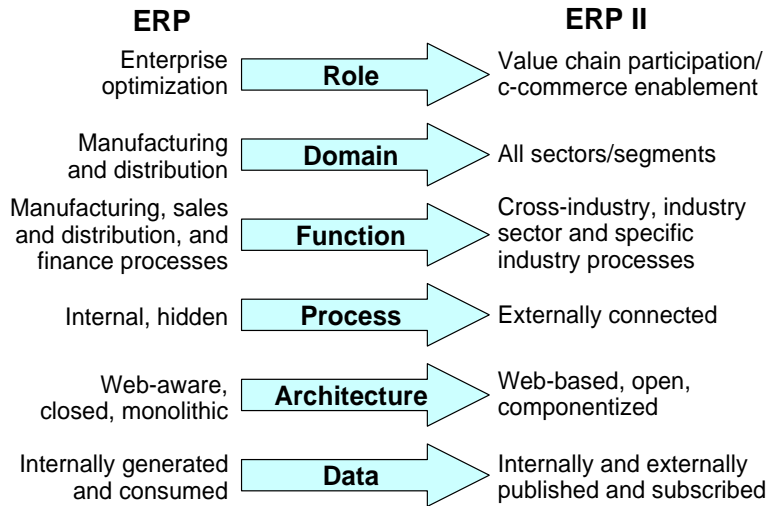
(Deloitte Consulting 1999)

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From ERP to ERP II

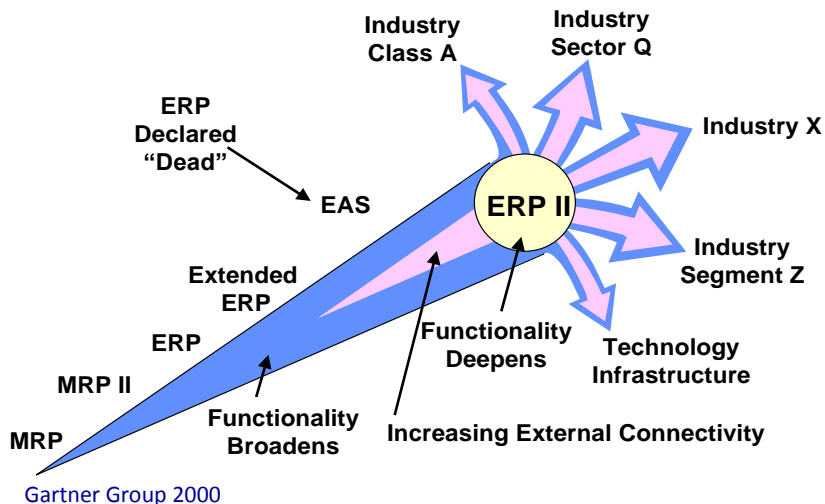


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From ERP to ERP II

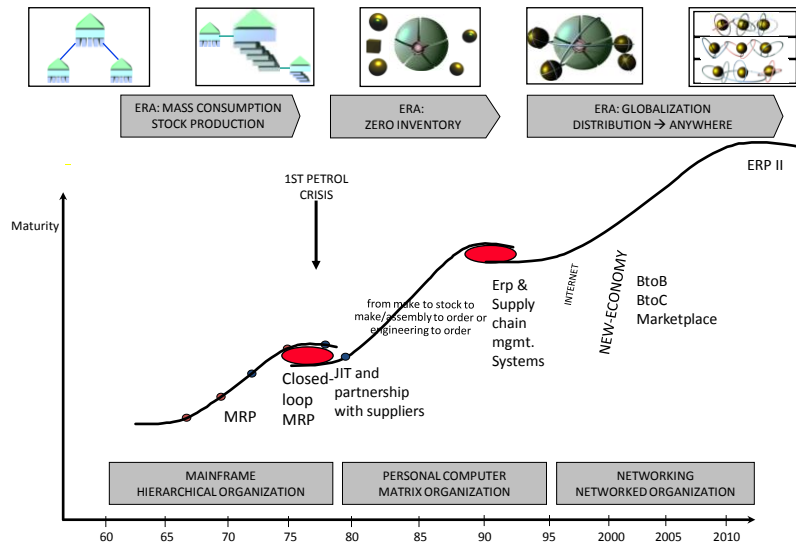


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The evolution of CB systems from a Supply Chain perspective



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A supply chain analysis...

	Functional organization	Process-oriented view	Broadened firm	Integrated firm	Networked firm
Strategy	<ul style="list-style-type: none"> Functional integration. Focus on cost reduction and efficiency. 	<ul style="list-style-type: none"> Internal integration between functions. Lack of external integration with partners. 	<ul style="list-style-type: none"> Partially developed supply chain strategy. Focus on the horizontal logistic processes. 	<ul style="list-style-type: none"> Firm Supply Chain strategy. Integration with Business Partner. 	<ul style="list-style-type: none"> Supply Chain reconfiguration to manage external changes.
Process	<ul style="list-style-type: none"> Function-based. Focus on functions. 	<ul style="list-style-type: none"> Co-ordination based on inter-functional processes. Cross-functional teams. 	<ul style="list-style-type: none"> Creation of <i>process owner</i> depending on the guidance of the Supply Chain. 	<ul style="list-style-type: none"> Integrated processes with Business Partner. 	<ul style="list-style-type: none"> End-to-end processes between Business Partner.
IT	<ul style="list-style-type: none"> Independent Systems. Lack of supply chain systems. 	<ul style="list-style-type: none"> Integrated CB systems. Lack of supply chain systems. 	<ul style="list-style-type: none"> Supply Chain solutions with business partners. 	<ul style="list-style-type: none"> IT architecture defined on the basis of Supply Chain requirements. Internet-based solutions with Business Partners. 	<ul style="list-style-type: none"> Architecture for information sharing. Focus on technology for Supply Chain management.
Organization	<ul style="list-style-type: none"> Tight control. Pyramidal structure. 	<ul style="list-style-type: none"> Hierarchical structure. Independent decisions at functional level. 	<ul style="list-style-type: none"> Some inter-functional desional processes. 	<ul style="list-style-type: none"> Integrated decisional processes. Partnership and alliances. Management by flows. 	<ul style="list-style-type: none"> Virtual company structuring to support the Supply Chain.
Information	 <i>Transactional</i> <i>Shared</i> <i>Collaborative</i>				

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ERP: pros and cons

- + process-oriented view (integration)
- + customization (often limited)
- + integration and efficiency
- + standard protocols throughout the organization
- + seamless
- **Cost/length of implementation**
 - Downgraded solutions (es. Business One)
- **Organizational resistance to change**
- **“Over customization” vs “in-depth” BRP**
 - Vertical ERP solutions

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Cons of ERP Systems

- **Implementation**
 - **Critical success factors**
 - Process models
- Achieving benefits
- Knowledge transfer
- **Cultural issues**
- Future scenarios for ERP systems

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The Future for ERP Software

- Application software integration (through EAI and intelligent portals)
- Inter-organisational process integration through exchanges
- Use of shared services and Service Oriented Application (SOA)
 - XML
 - Web services