COC100: Enterprise Resource Planning Systems

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About the module …

- The importance of integrating 'business processes' across a business
- Enterprise Resource Planning (ERP) software
- An introduction to SAP ('ess ay pee')
  - The leading ERP solution, used by many large organisations such as VW, Unilever, B&Q, Rolls Royce, Sony, Nissan, BMW, BP etc to manage most aspects of their business
- An appreciation of
  - The kinds of business processes that are managed
  - The complexity of business information systems
    - Specifically ERP systems
  - The benefits ERP systems can bring to managing business processes
  - The difficulty in implementing ERP systems
- Mainly practical – attendance is very important!

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Assessment

- Multiple Choice / Short Answer Class test
  - 20 – 25 questions
  - 20%
  - Will take place in the lecture-slot in week 11
  - Question format can be seen in the short sample test on Learn.
- Report
  - 2500-3000 words
  - 80%
  - Due week 11
  - More information later in term
  - Outlining the pros and cons of implementing an ERP system such as SAP
    - Illustrated by screen shots and reference to SAP software

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Reading List

- Portougal, Victor & Sundaram, David, *Business processes operational solutions for SAP implementation*, 2nd Edition, Idea Group, Inc., 2005 [Held by Library. E-resource]
- Lau, Linda K. & *Managing business with SAP planning implementation and evaluation*, Idea Group, Inc., 2004 [Held by Library. E-resource]
- Magal S & Word J. *Integrated Business Processes with ERP Systems.* Wiley. 2012. [Held by Library].
- Magal S & Word J. *Essentials of business processes and information.* Wiley 2009 [Held by Library]
- Monk, E, Wagner, B. *Concepts in Enterprise Resource Planning*, Course Technology Cengage Learning. 2009
- Jacobs, F. Robert, Whybark, D. Clay, *Why ERP? : a primer on SAP implementation*, Irwin/McGraw-Hill, 2000 [Held by Library]
- Knolmayer, Gerhard, Mertens, Peter, *Supply chain management based on SAP systems : order management in manufacturing companies*, Springer, 2002 [Held by Library]

There are books discussing how to use SAP – however I do not find these particularly useful. The practical handouts are much better:

- Anderson, George W, Larocca, Danielle, *Sams teach yourself SAP in 24 hours*, 2nd Edition, Sams, 2006 [Held by Library]
- Mazzullo, Jim, Wheatley, Peter, *SAP R/3 for everyone : step-by-step instructions, practical advice, and other tips and tricks for working with SAP*, Prentice Hall Professional Technical Reference, 2006 [Held by Library]

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Why Enterprise Resource Planning ?

1. ERP software supports a range of business processes that underpin the way in which organisations conduct their business;
2. ERP is a multi-disciplinary subject, studying ERP systems introduces students to a range of integrated business processes;
3. Knowledge of ERP systems (and SAP) are highly valued in the job market.
4. A good blend of highly practical skills (from week 3 onwards) to support underlying theory

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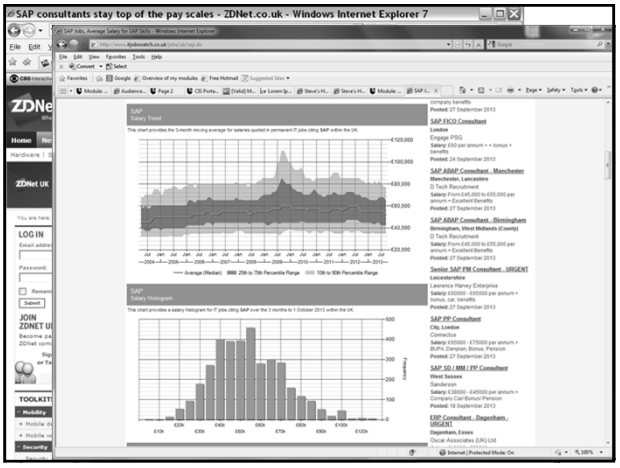

To begin with we're going to look at Integrating Business Processes …

- The way a company manages its business processes can have a major impact on its profitability
- A business process is a group of related tasks that together create value for the business.
  - EG: The 'order to cash' process is a process comprising of a series of tasks including receiving the order, entering it into a computer system, checking the customer's credit, allocating inventory from stock, raising an invoice and so on;
- "a structured, measured set of activities designed to produce a specific output for a particular customer or market. It implies a strong emphasis on how work is done within an organization, in contrast to a product focus's emphasis on what is sold/created. A process is thus a specific ordering of work activities across time and space, with a beginning and an end, and clearly defined inputs and outputs: a structure for action. ... Processes are the structure by which an organization does what is necessary to produce value for its customers." – Davenport 1993.
- "a set of linked activities that take an input and transform it to create an output. Ideally, the transformation that occurs in the process should add value to the input and create an output that is more useful and effective to the recipient either upstream or downstream." – Johansson 1993.

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Business processes

- Example business processes:
  - Sales order process
  - Materials requirements planning process
  - Procurement process (purchasing)
  - Manufacturing
    - Including production planning processes (i.e. scheduling machines etc)
  - Stock takes, inventory and warehouse management
    - All the above need to feed into both financial and management accounting practices
    - Analysis of the inputs and outputs of these processes can provide 'intelligence' for a business
- There is often division of labor between the steps in a process

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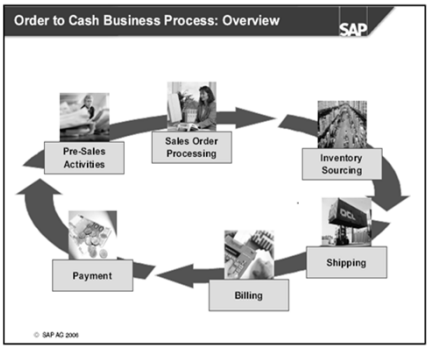
Sales – order process (according to SAP)



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Organisational departments required in previous slide

- Pre-sales activity: Marketing Department
- Sales Order Processing: Sales Department
- Inventory Sourcing:
  - Inventory/Warehousing Department
  - and/or Manufacturing Department
  - and/or Procurement Department
- Shipping: Warehousing and Logistics Department
- Billing & Payment: Finance Department
- Relationship to finance and accounting:
  - If inventory is sourced from stock, then a reduction in stock results in a decrease in a company's stock assets (though there will subsequently be an increase in the cash assets when the invoice is paid). Removal of an item from stock must be notified to a materials requirement planning process that can indicate whether new stock needs to be manufactured, in which case new raw material may need to be procured by the procurement department.
  - Management accounting is also used so that the company can analyse the profit margins across its range of products, divisions, cost centres etc.

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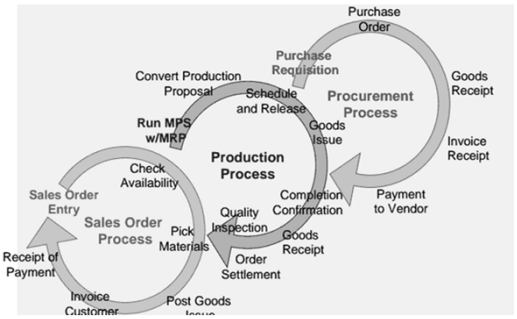
Process Integration



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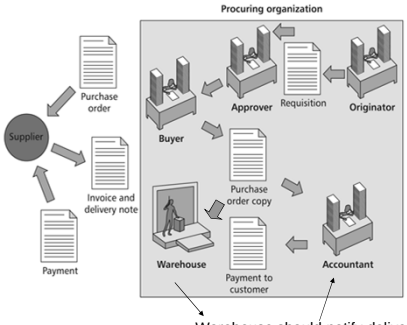
Before IT - the procurement process



Warehouse should notify delivery via a goods receipt notice

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Automating business processes

- Use of IT to facilitate the way processes are managed. Early implementations improved speed of processes. Often led to …
  - A sales order system
  - A customer relationship management system
  - A procurement system
  - A materials requirements planning system
  - A warehousing system
- Information Silos / Islands – e.g. the sales order system would not share data with the procurement system.
  - Fragmented data across information systems
  - Data duplicated in different systems
    - Data entry may be duplicated
    - Possibility of inconsistencies & errors in data
      -> Problems with day to day operations
      -> Inaccurate information for planning purposes

Lesson:

- Develop software to enable business processes fusion and integrated business processes, rather than software specific to each business department (or function)

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Task (Broad overview of a business process integration)

The IDES company manufacture motorcycles
A motorcycle consists of a frame and an engine, engines are made from a block and a camshaft
Assume an order comes in for a motorcycle
IDES have 1 frame and 1 engine block in stock but have no camshafts, semi-finished engines or motorcycles
Arrange the following actions in the correct order if IDES are to effectively fulfil the order?

receive sales order,
stock check (engines),
raise production order (engine/motorcycle),
raise purchase requisition/order for camshft,
raise goods receipt notification,
raise invoice,
raise production order (finished products)

stock check (finished product - motorcycles),
stock check (frame),
release goods to begin production(goods issue),
confirm completed production order,
raise shipping notice,
adjust stock levels (multiple instances)
stock check (blocks and camshafts)

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Think about the points in the process at which the 'value' of the company changes

One possible order to the previous slide may be:

The following departments have been involved
sales,
manufacturing/production,
procurement,
warehousing,
finance

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What other functions have not been considered ?

- Scheduling the production/assembly line
- Maintenance of equipment/assembly line
- Materials requirements planning (i.e. based on past sales/history should we order in more stock before it is needed)
- Managing Human Resources (pensions, payroll …)

- Management accounting (allocating costs to cost centres)
- Customer relationship management
- …

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A Business Processes in detail (Booking a Room)

- Flow charts can show processes in detail
- Each process may link to other processes within the system
- Complex web of linked flow charts underpin ERP systems such as SAP

Key
Function
Event
And
Or
XOR

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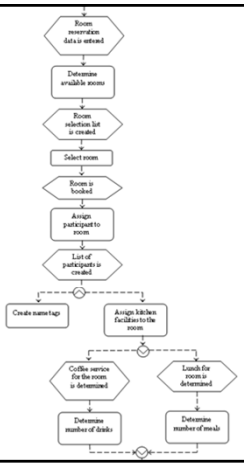

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ERP systems support business processes

- A complex web of processes, based on detailed flow charts, support ERP systems such as SAP
- These are 'best practice' and reflect contemporary thinking about how businesses processes should be undertaken
- Documents and indicators indicate the stages that have been completed, by whom and when; allowing a thorough auditing of the process
- Businesses may have to adapt their processes to fit in with the ERP software
  - It is recommended to use 'Vanilla' ERP systems (or may encounter upgrade and support issues)
  - ERP systems can be time consuming and difficult to implement.

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Lean (Just in Time) Manufacturing

- Reduce capital tied up in inventory
- Improved information management and efficient business processes within an organisation coupled with increased speed of communicating with suppliers to obtain raw materials means business can run 'Just in Time'
- Benefits of JIT
  - Reduced inventory (of stock and finished product)
  - Quick to respond to changing market demands – responsive and AGILE.
  - Personalized and configurable products
- For Business to run JIT their suppliers must be able to deliver quickly:
  - Procurement links between business and supplier should be e-enabled (Electronic Data Interchange over internet or Value Added Networks required)
  - ERP systems can be configured to deliver purchase orders over EDI networks automatically
- For Business to run JIT, information must be shared between all departments of the organisation. One business process (i.e. making a sale) must instigate other processes (requirements planning, procurement, production planning, warehousing and shipping etc.)

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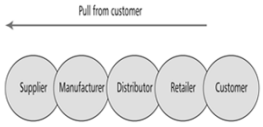
A Pull Supply Chain



Aim	Reduce capital tied up in stock, run JIT, more agile and responsive organisation
Characteristics	Short lead & cycle time, low inventory levels
Techniques used	Close cooperation between business processes Fast communication with customers & suppliers **Excellent management of business information within organisation**

22 Pull systems often referred to as 'Kanban' in Japanese.

Pull Supply Chains need …

- Smooth continual product flow through organisation matched to consumption
  - Optimise productivity of inventory
- Optimise for time/cost when ordering
- **Timely, accurate paperless information flow through organisations**

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Mini Case Study

- Read the Dell case study
- What is it about Dell's approach that make it so successful?
- What are the advantages - can you think of any drawbacks?

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Recap: The Pull Supply Chain at Dell

- Dell assembles 80,000 PCs per day
- They carry no more than 2 hours of inventory
  - They have no warehouses of raw materials only assembly plants
  - A PC is only assembled once it has been ordered.
- Good example of integrated business processes: e.g. Sales, materials planning, procurement, manufacture are all inter-related:
  - "Dell's clout with its suppliers is epitomized by a set of thin white lines on the floor of the TMC plant. The lines form a rectangle that fronts each of the 110 cargo bays encircling the factory. Tractor-trailers loaded with parts line up at the bays. When an assembly line runs low on disk drives, a signal goes out. A forklift wheels onto a trailer bed, snatches a pallet of disks, and pulls out onto the floor. When the forklift crosses the white line, a scanner records the shipment's bar code and the parts move from the supplier's books to Dell's. **Dell doesn't pull the part until it has a customer order**; it doesn't take ownership until it pulls the part. In effect, that thin white line demarcates Dell's entire supply chain. Dell holds inventory only for the six to eight hours it travels across the assembly line"
- Dell have a negative cash conversion cycle
  - Dell pay their suppliers 36 days after parts are received; Dell receive payment as soon as customers make an order
- Reduced inventory means Dell's can be much more flexible in meeting customer needs – though Dell's suppliers have to keep inventory stock to ensure they can deliver parts within the time-frame allowed by Dell.
- **Dell need very efficient information systems**
- From: 'Living in Dell Time'
  http://www.fastcompany.com/magazine/88/dell.html

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Running with a lean inventory

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JIT and the 'River of Inventory'

Business Process Problems

Information Handling Problems

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An Aside: Toyota Production System

- The Toyota Production System (developed by Toyota in the 1970s) was the precursor to Lean Manufacturing – among a number of 'principles' used in TPS are:
  - Standardized tasks and processes are the foundation for continuous improvement and employee empowerment. Use stable, repeatable processes to maintain the quality and predictability of your output;
  - Create continuous integrated processes– supported by just-in-time [JIT] principles - to bring problems to the surface (river of inventory);
  - Use pull systems to avoid overproduction. Match production to the day-to day shifts in customer demand rather than relying on wasteful inventory to meet customer demand;
  - Level out workload – work like tortoise not a hare. Problems and waste is created when employees are put under too much pressure;
  - Use only reliable, thoroughly tested technology that supports your processes.

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Supply Chain Management

- All companies in a supply chain need to work together to ensure that the whole of the supply chain has sufficient, but not excessive inventory.
- Many companies, such as Dell, placed a lot of pressure on their suppliers so that Dell could reduce their inventory - however, more and more companies are realising the importance of the entire of the supply chain. In many forward looking companies, all parts of the supply chain are collaborating to ensure the needs of the end consumer are being met.
  - Companies are sharing demand forecasts with suppliers to help them plan

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Business Process Fusion

- The principle that companies are 'agile', 'flexible' and pro-active (or at worst able to react quickly to rapidly changing demands) due to rapid sharing of information across business processes.
- Involves using knowledge of certain business processes to impact on other processes.
  - E.g. if a company is running low on stocks of item X (based on data from a stock control system) then promote item Y (the domain of the marketing process).
- "Dell and its customers benefit from matching intelligence on parts availability in the supply chain to the various customer-facing sales channels. 'Take flat panel displays," Dell's operations manager said, "If our intelligence tells us that there's good availability on 15-inchers at the same time that there are supply constraints on the 17-inchers, we'll push the 15-inchers and we'll adjust the pricing to make it worth the while of the customers that originally wanted 17-inchers. Knowing something about availability is a key advantage of ours."
  - - http://techupdate.zdnet.com/business_process_confusion.html
- Combines data across many different business processes and functions (stock control, procurement, CRM) etc. Hence ERP applications can be of great benefit.

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Fusion of Business Processes …

- To react quickly to customer demands
- To have accurate and real time information that is consistent across all business functions
- To eliminate data duplication and inefficient practices
- To manage links and information flow across all aspects of a business (i.e. manage information across the whole enterprise)
- Support efficient supply chain management

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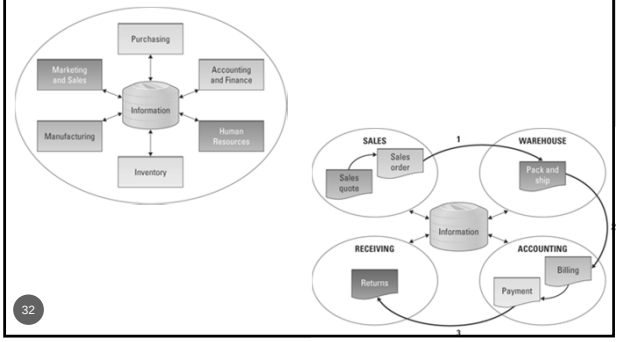
Requires a Database-centric Application



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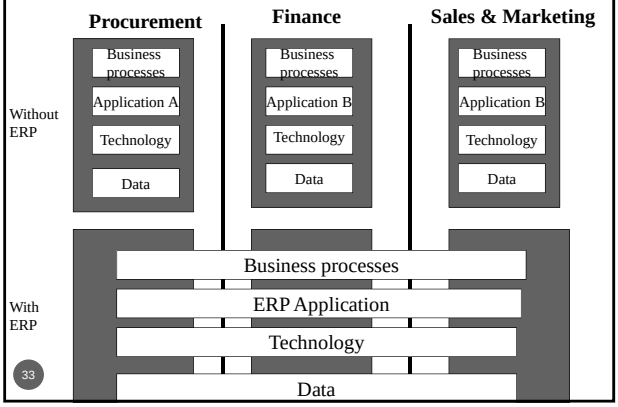
Infrastructure



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Enterprise Resource Planning (ERP) systems

- "a packaged business software system that allows a company to automate and integrate the majority of its business processes; share common data and practices across the enterprise. Through integration of various functions in the organization, managers and employees alike can use timely information to make better decisions and to perform activities, which add value to the company "
  - Deloitte 1998.

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ERP

- One of the fastest growing markets in the software industry in last 10-15 years.
- According to a 2011 study by Forrester (now part of Gartner Grp), the ERP market is poised to reach $50 Billion USD by 2015 (http://www.cbronline.com/news/tech/software/enterprise-apps/erp-market-to-grow-to-503bn-in-2015-forrester-060511)
- Major players in the ERP software sector include SAP, Oracle, Infor ERP (was BAAN), PeopleSoft (now part of Oracle), Microsoft Dynamics, others …
- "Took-off" in the mid-90s. Part of the 'Business Process Reengineering' trend that hit the corporate world in the early 90s
- ERP systems are organised around business processes which cut across business functions

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ERP Systems

- Modular:
- Replace myriad of legacy systems which were often incompatible
- ERP modules offered by most ERP vendors include:
  - Finance & accounting, sales & marketing, human resources, capacity planning, production, procurement, warehouse & logistics, enterprise asset maintenance
- Some ERP vendors differentiate themselves by offering unique components including:
  - CRM, SCM, Business Integration etc
- Enterprise Application Integration(EAI) may be required for a full Enterprise-wide solution: ERP, SCM, CRM, EDI etc in one solution
  - Middleware and transformational software to interface systems with ERP systems
  - Information becomes available across the enterprise, in real time as required.
- ERP systems such as SAP provide a software framework to implement 'best practice' business processes

BUT …

- ERP implementation can be risky – as they can affect all aspects of an organisations business
  - According to Gartner, only 30% of ERP projects are fully implemented and failure rates are high !!! http://www.informationweek.com/669/69iudis.htm

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