Session 2

World Med MBA

Types of IS

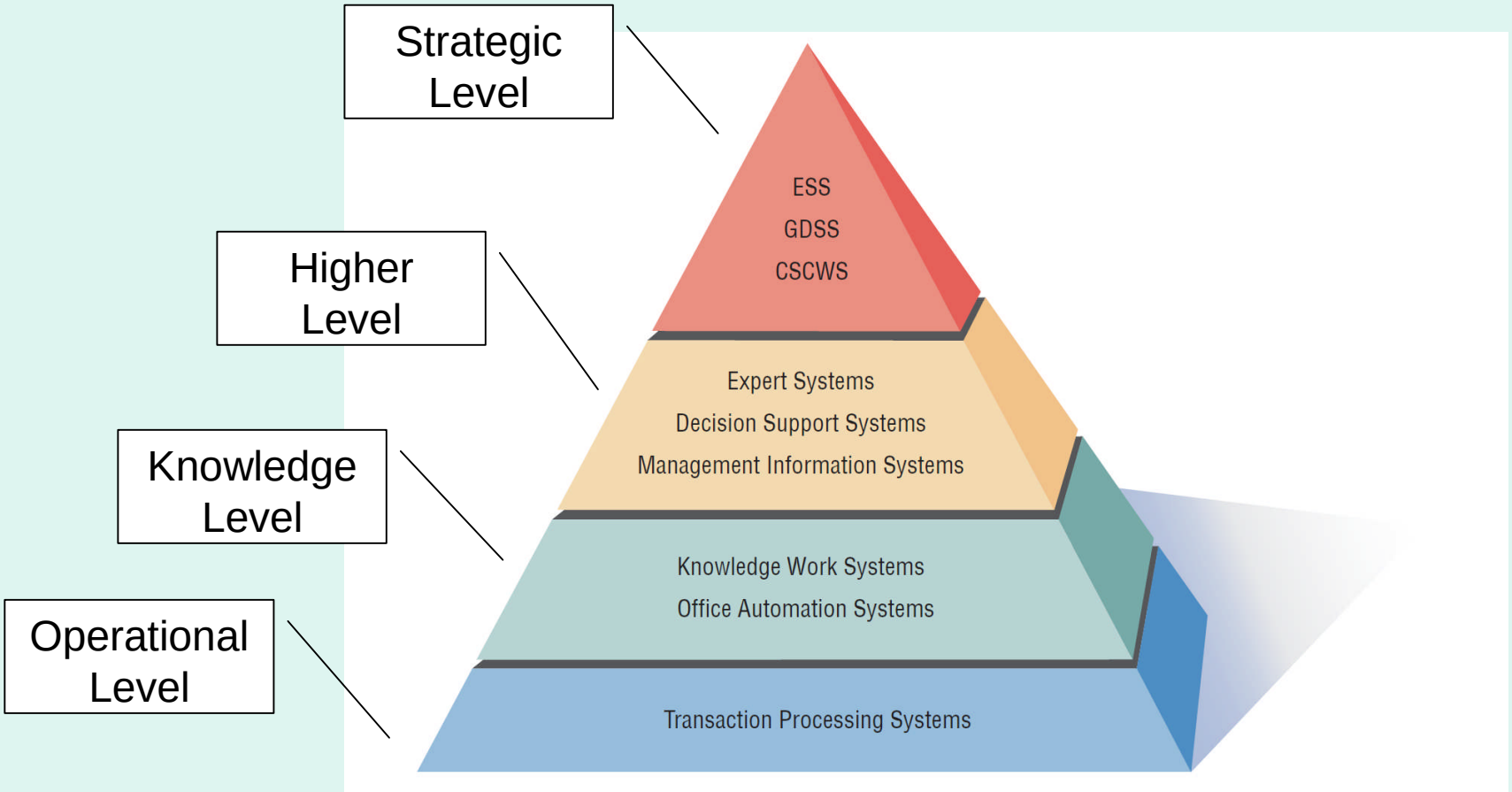
The 'classic' IS

- Classification is the means by which objects are categorised or classified.
- Certain attributes or behaviours are used to deal with complexity by identifying commonality between objects.
- The classification of IS is a useful shorthand - not a definition to which any system must adhere.

IS as a pyramid

- Operational-level systems
  - support operational management by tracking the basic transactions such as sales, receipts and materials used.
- Management-level systems
  - help middle managers in monitoring, controlling and making decisions by comparing current output with previous outputs.
- Knowledge-level systems
  - enable the organization integrate new knowledge into the business and control the documentation of the business process.
- Strategic-level systems
  - help senior management in addressing strategic issues and long-term trends, within the firm and in the environment at large

Systems and levels



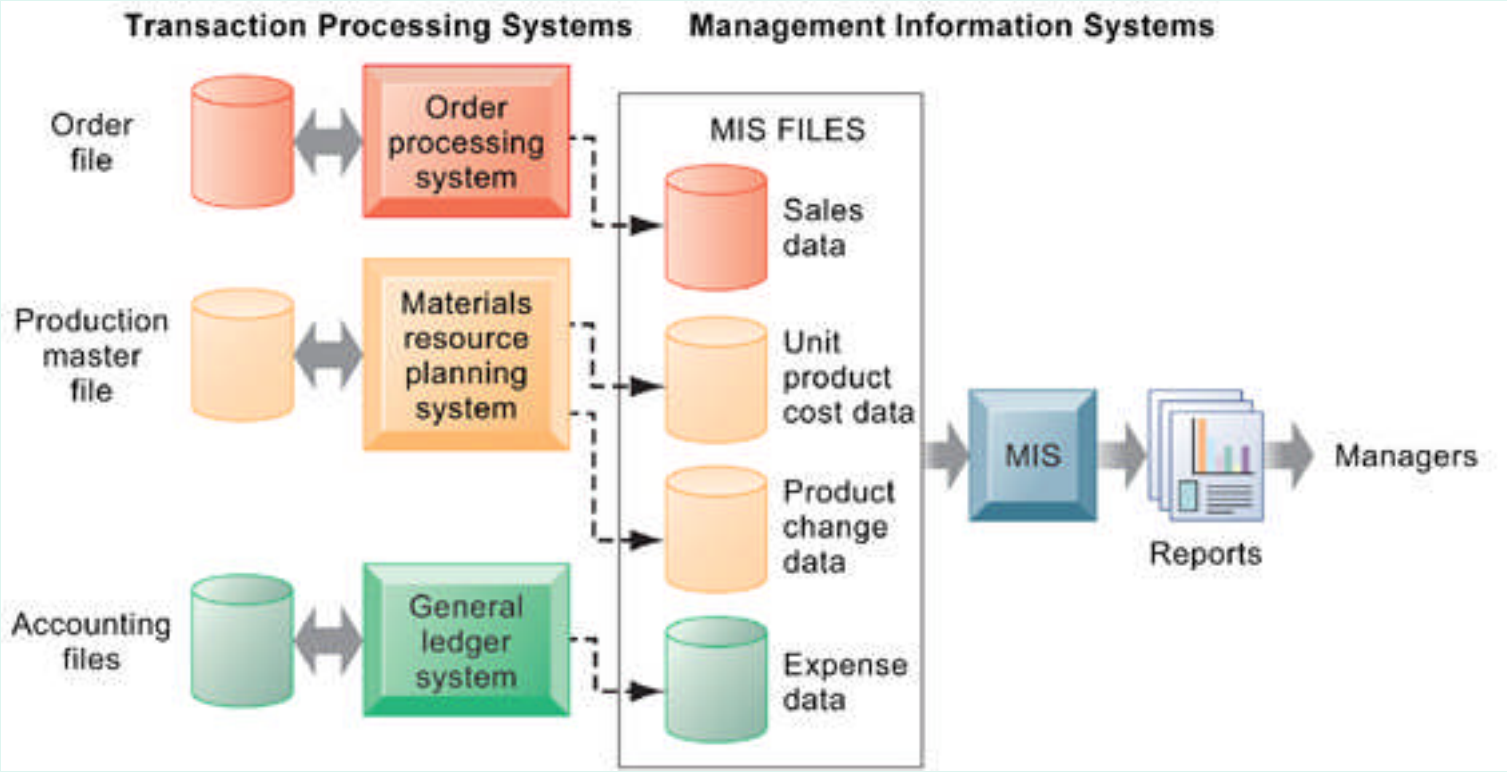
'Classic' types of information system

- Transaction Processing Systems
  - Perform and record daily routine transactions necessary to conduct business
  - Allow managers to monitor status of operations and relations with external environment
  - Serve operational levels
  - Serve predefined, structured goals and decision making

'Classic' types of information system

- Management Information Systems
  - Serve middle management
  - Provide reports on firm's current performance, based on data from TPS
  - Provide answers to routine questions with predefined procedure for answering them
  - Typically have little analytic capability

Management Information Systems



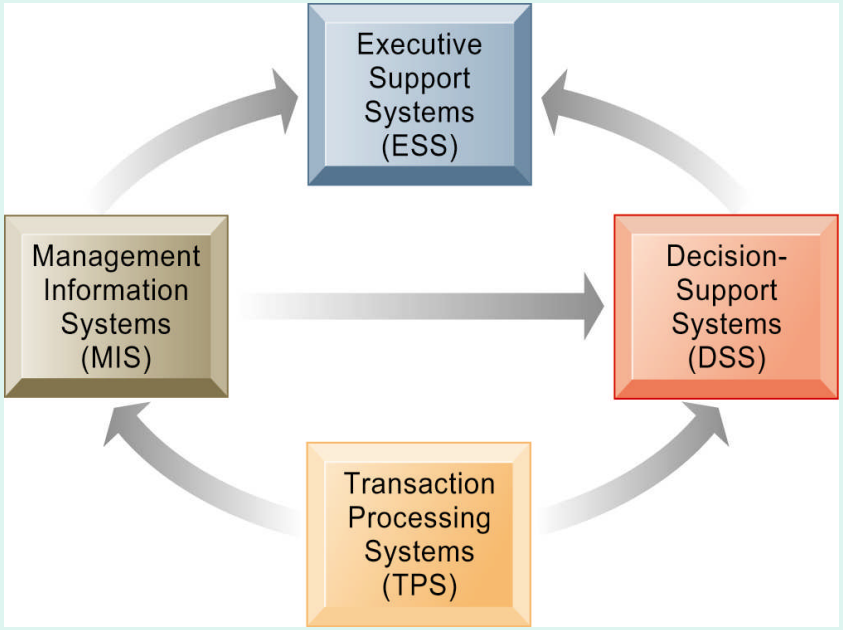
'Classic' types of information system

- Decision Support Systems
  - Serve middle management
  - Support non-routine decision making
  - Often use external information as well from TPS and MIS
    - Model driven DSS
    - Data driven DSS

'Classic' types of information system

- Executive Information Systems
  - Support senior management
  - Address non-routine decisions requiring judgment, evaluation, and insight
    - Incorporates data about external events (e.g. new tax laws or competitors) as well as summarized information from internal MIS and DSS
    - Provides minute-to-minute view of firm's financial performance as measured by working capital, accounts receivable and payable, cash flow, etc

Interrelationships Among Systems



'Classic' information system functions

Operational level

- Transaction Processing System
  - Process large amounts of data for routine business transactions
  - Boundary-spanning
  - Support the day-to-day operations of the company

'Classic' information system functions

Knowledge level

- Office Automation System (OAS)
  - Supports data workers who share information, but do not usually create new knowledge
- Knowledge Work System (KWS)
  - Supports professional workers who use such as scientists, engineers, and doctors
- Knowledge Management Systems (KMS)
  - Supports knowledge workers who both create and use knowledge such as designers

'Classic' information system functions

Management level

- Management Information System (MIS)
  - Support a broad spectrum of organizational tasks including decision analysis and decision making
- Decision Support System (DSS)
  - Aids decision makers in the making of decisions

'Classic' information system functions

Strategic level

- Executive Information System (EIS)
  - Helps executives to make unstructured strategic decisions in an informed way
- Group Decision Support System (GDSS)
  - Permit group members to interact with electronic support

Old Systems

Old Systems

- "Legacy is a function of change … and without change, there can be no legacy"
- Software change is inevitable
  - Requirements emerge when software is used
  - The business environment changes
  - Errors must be repaired
  - New equipment must be accommodated
- Example = Y2K

Legacy Systems are …

- … "mature" information systems that are often 20 - 30 years old.
- … often general purpose business systems developed to perform routine tasks for large to medium sized companies.
- … often simple mainframe systems or distributed systems with a mainframe as a central component.
- … often housed in special buildings and operated by specialist staff.

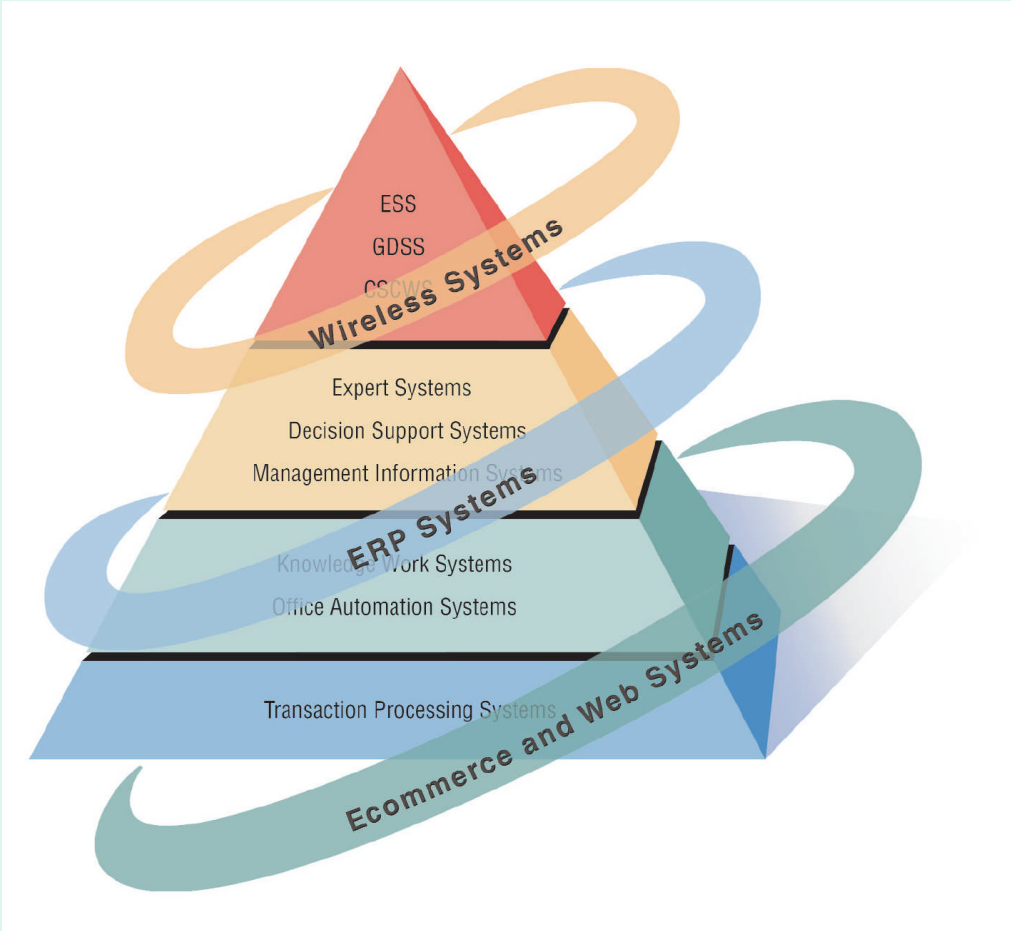
Legacy Systems

- In many organisations older systems have become the keystone of systems that deal with everyday business operations.
- Many are still capable of meeting business needs although they may pose other problems such as poor integration with newer systems, high costs or limited functionality.

Legacy Systems

- If it ain't broke don't fix it.
  - Existing systems are stable and provide a return on investment
- Modify and/or upgrade.
  - Pandora's Box ...
- Replace.
  - The old data will still be needed; new systems carry a risk of disruption of vital core activities.

New Systems


ESS
GDSS
Wireless Systems
Expert Systems
Decision Support Systems
ERP Systems
Office Automation Systems
Transaction Processing Systems
Ecommerce and Web Systems

Updating the classics

- The classic IS are helpful to identify the key roles that IS can play but do not reflect the complexity of real organizations
  - The organization as a single enterprise
  - The problem of functional 'silos'
  - The coordination of activities
  - IS as a medium for communication

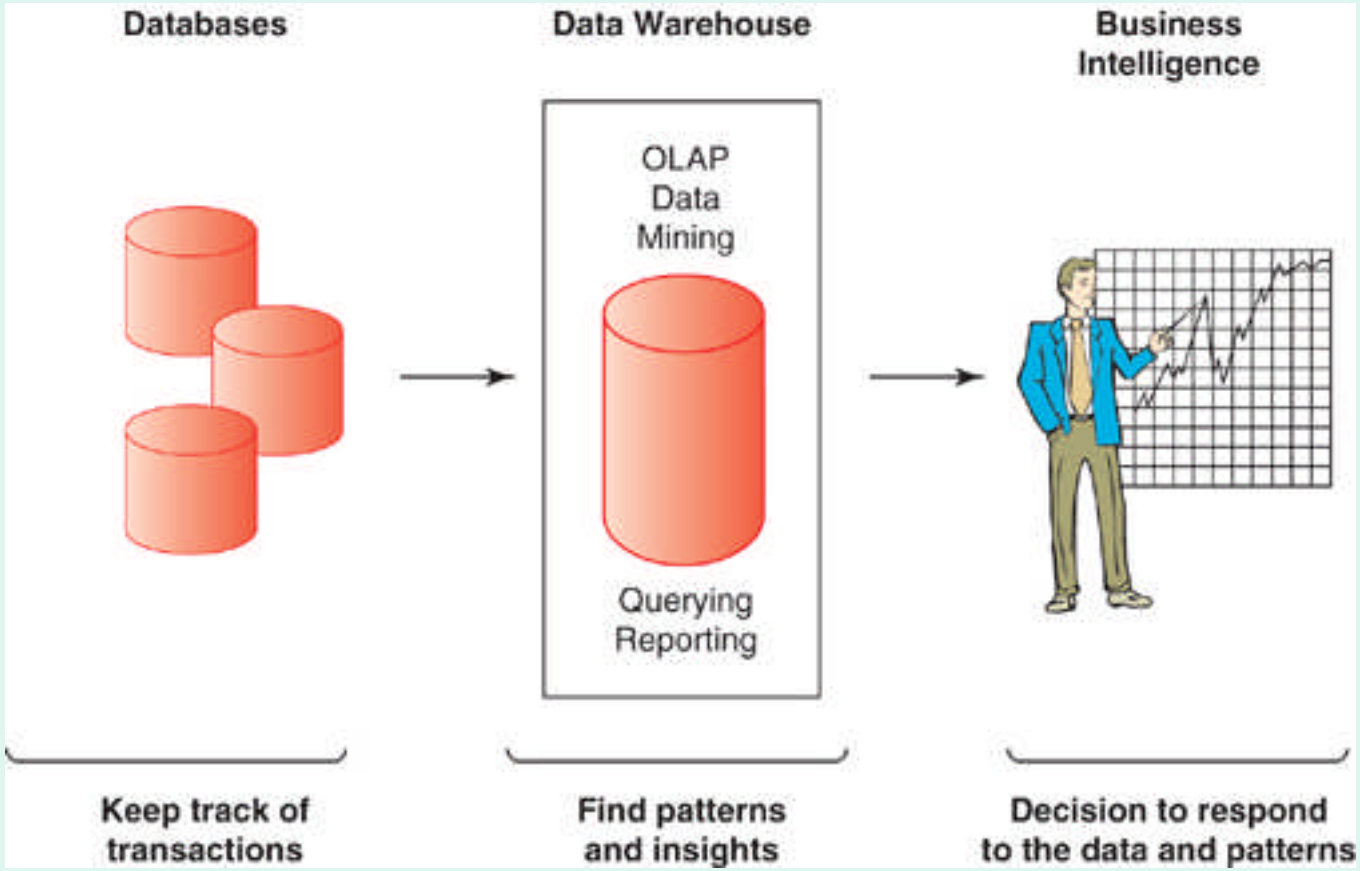
Data warehouse / Data mart

- Data warehouse
  - Stores, consolidates and standardizes data across the enterprise
  - Data cannot be changed or altered
- Data mart
  - Subsection of data warehouse focused on particular area of a business
- Uses
  - Query, analysis and reporting of data

Data mining / KDD

- Data mining / KDD (Knowledge Discovery in Databases)
  - finds hidden patterns in large pools of data
  - Infers rules to predict future behaviour
  - patterns and rules can be used for decision making and forecasting
- uses
  - analyse data from visits to a website
  - identify fraud
  - Information mosaics

Put it all together ...



Updating the classics

- Enterprise Information Systems
  - A single platform that is capable of supporting a wide range of activities across an entire organization
- Features
  - Large systems with scalable architectures
  - Integration of many different types of system
  - Integration of many different views of the data

Enterprise Systems

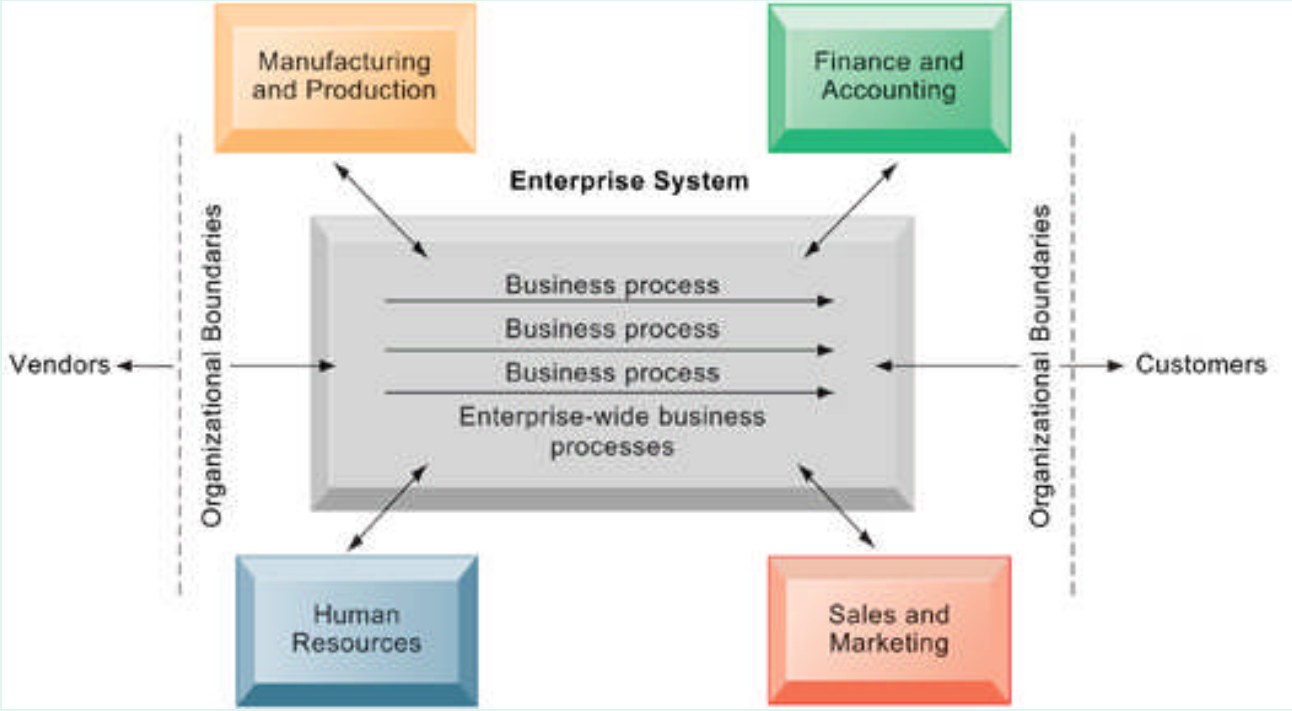
- Enterprise level applications
  - Span functional areas
  - Execute business processes across firm
  - Include all levels of management
  - Three common applications:
    - Enterprise Information Systems
    - Supply Chain Management Systems
    - Customer relationship management systems

Enterprise Information systems

- Enterprise Information Systems
  - Collect data from different firm functions and stores it in a single central data repository
  - Resolve the problem of fragmented, multiple and redundant data
    - Coordination of daily activities and information for decision making
    - Efficient response to customer orders (production, inventory)
  - Example = BMW

Enterprise Information Systems

Enterprise Information Systems

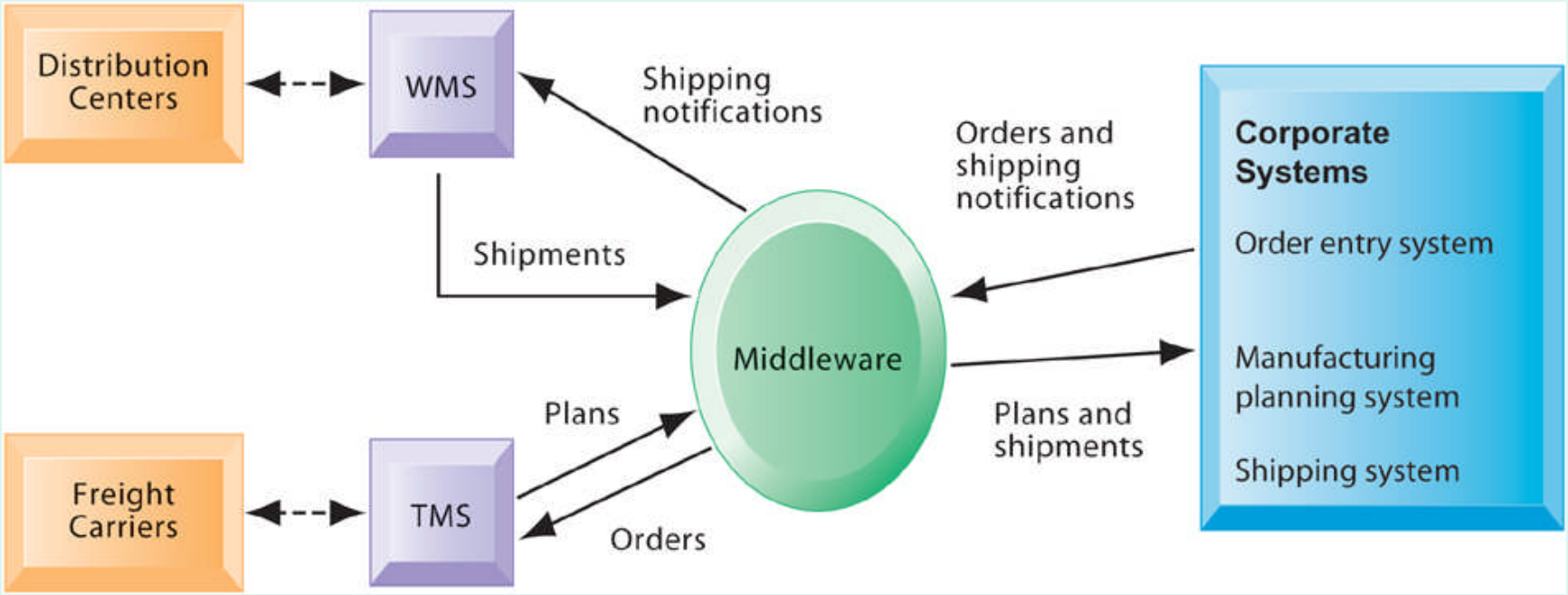


Supply Chain Management

- Supply Chain Management Systems
  - Manage firm's relationships with suppliers
  - Goal: Right amount of products to destination with least amount of time and lowest cost
    - Share information about orders, production, inventory levels, delivery of products and services
  - Example = Dell

Supply Chain Management

Supply Chain Management System



Customer Relationship Management

- Customer Relationship Management systems (CRM)
  - Coordinates all of the business processes that deal with customers to optimize revenue, customer satisfaction and customer retention.
  - Integrates the firm's customer-related processes and consolidates customer information
  - Example = Amazon

MRP

- Manufacturing Resource Planning (MRP / MRP II) describes an integrated organizational information system
- Integrates many information from different management levels and different functions
- Helps the flow of information related to the *manufacturing* of a product across the organization

ERP

- Enterprise Resource Planning (ERP) describes an integrated organizational information system
- Integrates information from many systems on different management levels and across different functions
- Helps information concerning *resources* flow between different functional areas within the organization

The acquisition of IS
- The options

Choices in the acquisition of IS

- Some common questions:
  - What is the fit between our IS and our business model?
  - How should our IS spending be prioritised?
  - What is the best value for money choice for our IS?
  - How does this fit with our strategic objectives?
  - How much do we actually spend on IS?
  - What value is added by this expenditure?

Choices in the acquisition of IS

- A technical exercise?
- A financial exercise?
- A strategic decision?
  - 4 options:
    - Make (build it yourself)
    - Buy ("off the shelf")
    - Outsource (get somebody to do it for you)
    - Open Source (share with others)

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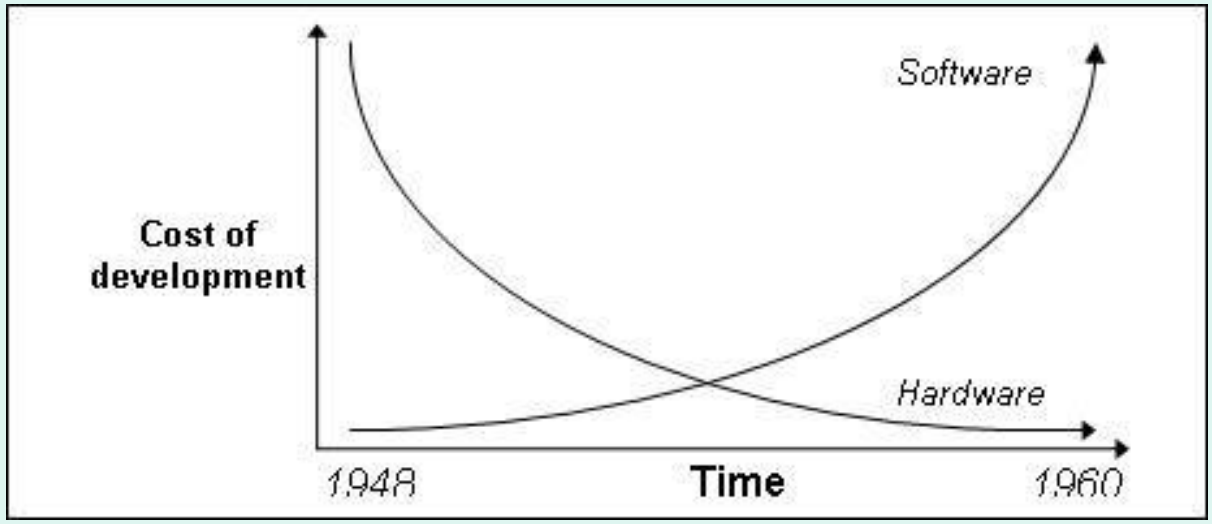
Technical Choices

The history of software development

Cost vs Benefit



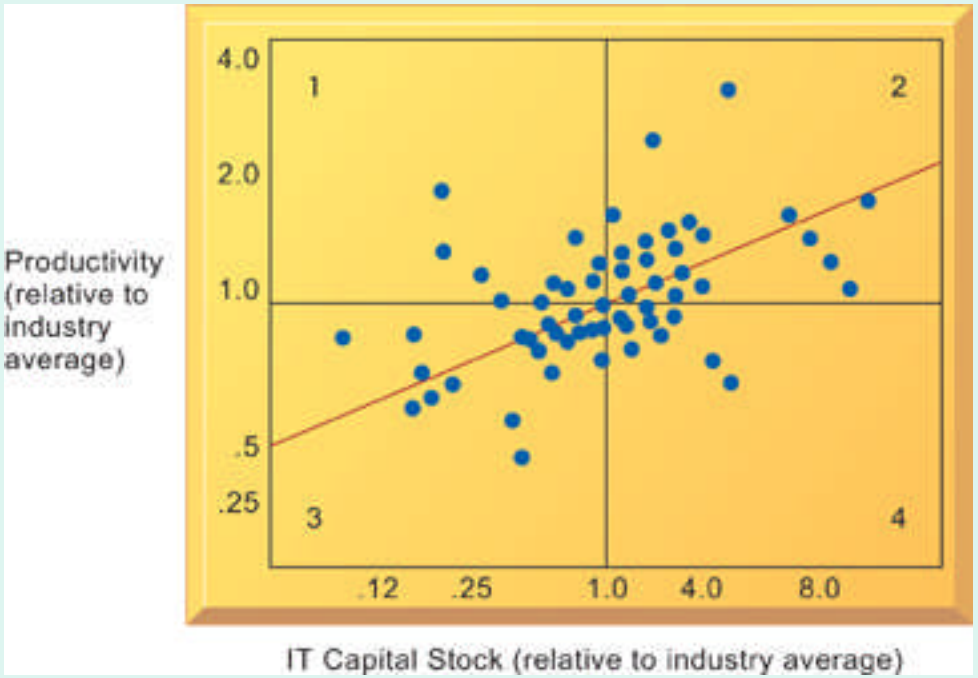
The history of software development

- Brooks' Law
  - Adding manpower to a late software project makes it even later
- Boehm's Empirical Studies
  - There is an optimum time (T) for a software project
  - Over that time, the cost rises slowly ('people with more time take more time')
  - under that time, the cost rises sharply
  - Hardly any projects are completed in less than 3/4T, regardless of the number of people employed!

The history of software development

- Software was never completed, even after significant investments had been made.
- Removing bugs from "completed" software took more time than to write the original code.
- The functionality of the software seldom matched the requirements of the end-users.
- Software was impossible to maintain, the ability to understand what had been written decreased rapidly with time.

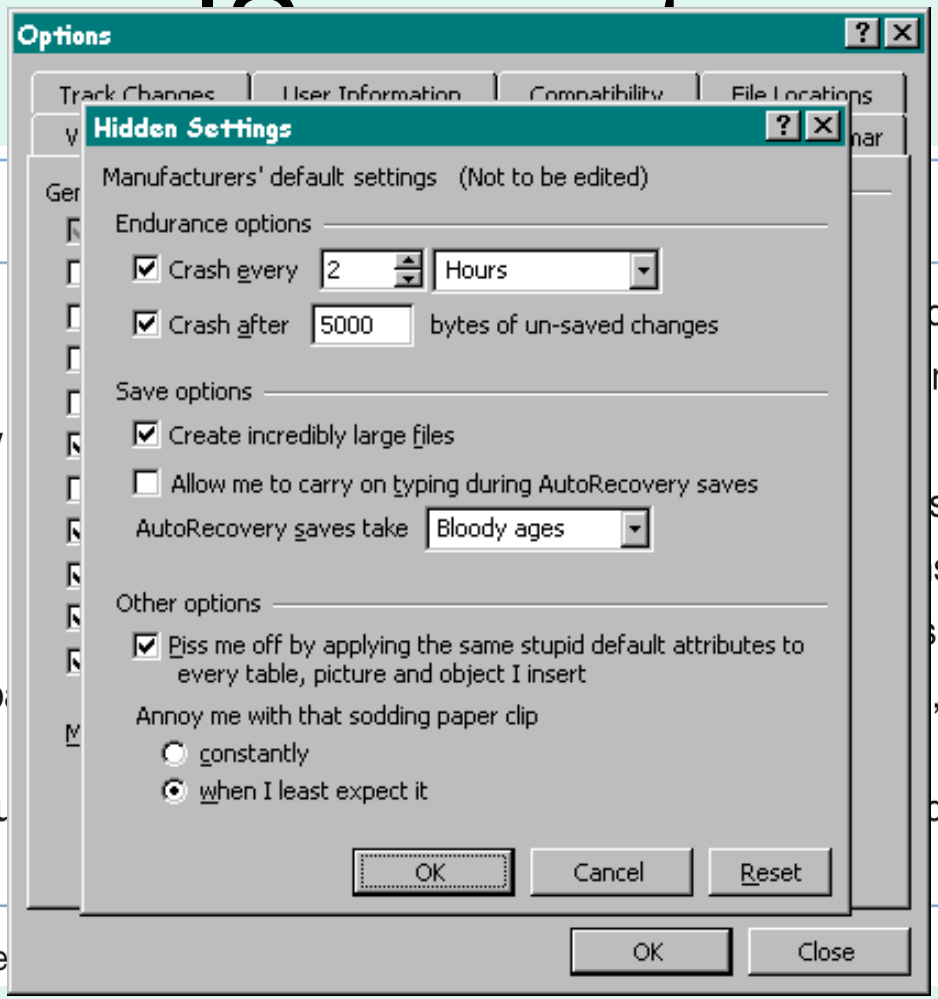
The unpredictable outcomes of IS projects



The unpredictable outcomes of

Dimension	
Project quality	dget.
System quality	me.
Information quality	
Information use	s.
User satisfaction	s.
Individual impact	s.
Organisational imp	, service
Preparing for the fu	cture for the future?

Source: Based on She

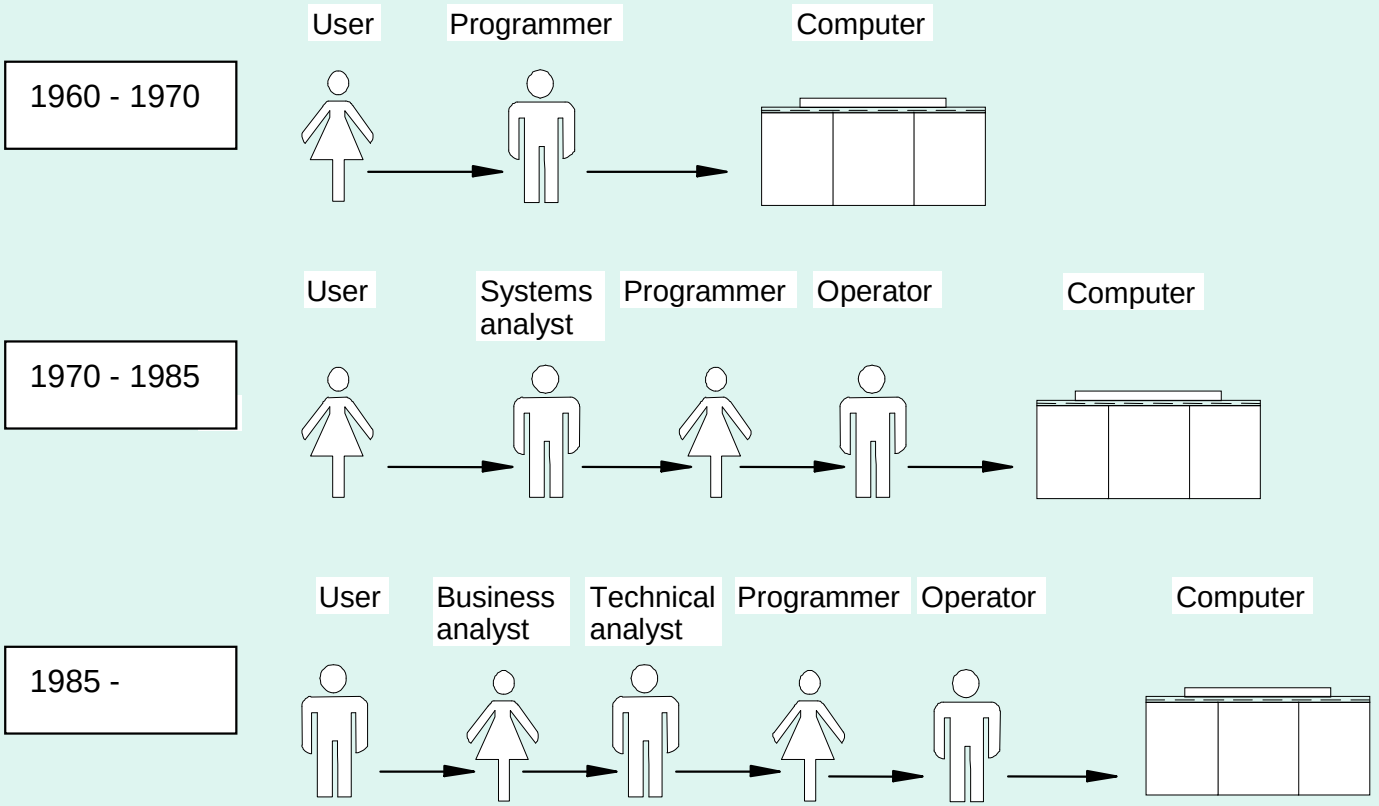


Systems Development Models

Systems Analysis

- The solution – understand the problem
  - Reports that say that something hasn't happened are always interesting to me, because as we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns - the ones we don't know we don't know.
    - Donald Rumsfeld, Feb. 12, 2002, Department of Defense news briefing

Analysts


1960 - 1970
User
Programmer
Computer
1970 - 1985
User
Systems analyst
Programmer
Operator
Computer
1985 -
User
Business analyst
Technical analyst
Programmer
Operator
Computer

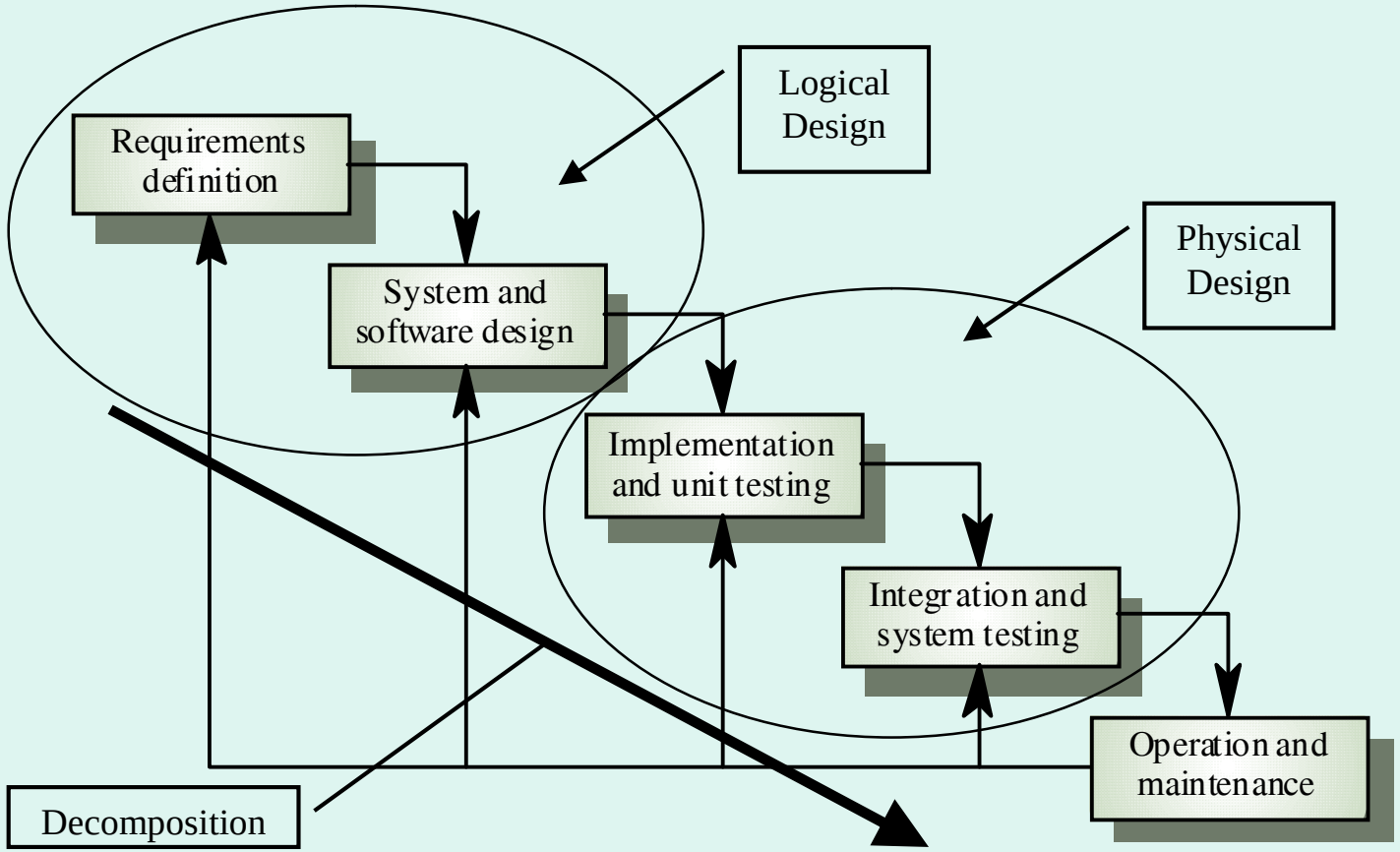
Systems development models

- The solution – develop a model
  - Lay out the high-level steps that the systems development process should take and use these abstract generic models as a guide to what should be happening in practice
  - Two basic types of model have been developed – linear and spiral models – which reflect a completely different view of how systems should be developed

The Systems Development Life Cycle

- Often known as the waterfall model is attempt to model the underlying process used to develop software.
- It:
  - Provides an abstract description of the development process
  - Decomposes functions and activities into discrete (independent) components
  - Separates logical from physical design
  - Separates different functions from activities

The Waterfall Model



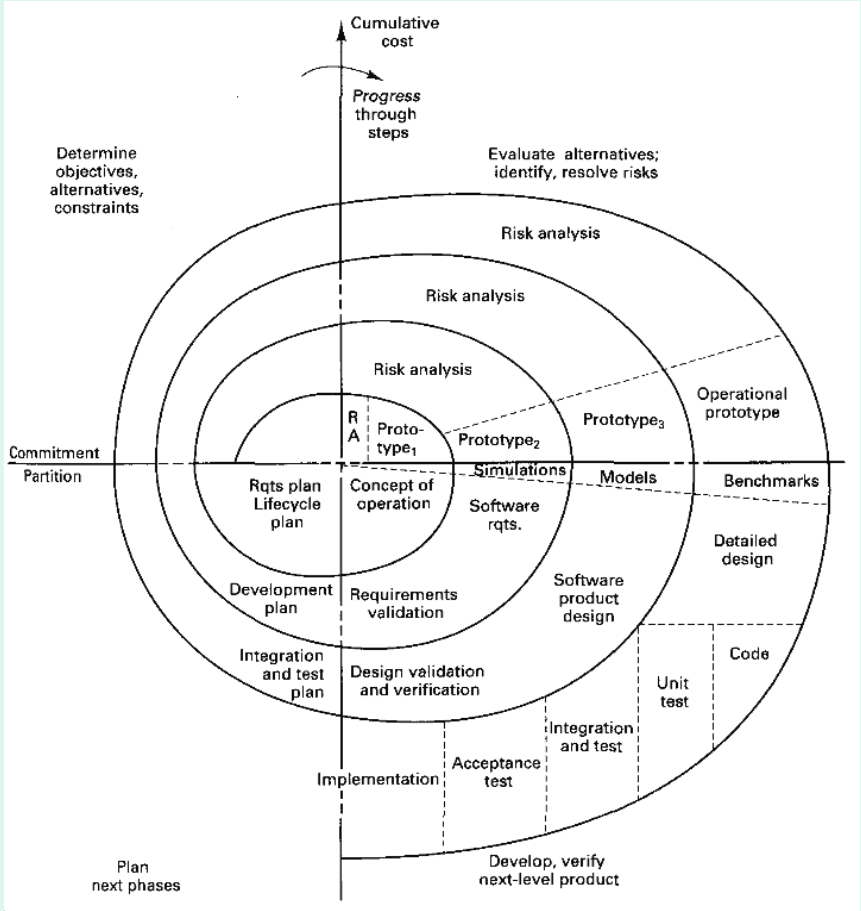
Waterfall Weaknesses

- Assumes that requirements can be defined, in detail, in advance of any development work
  - Customers change their minds
  - New technologies are developed
  - Laws change
  - Markets change
- The later the changes come in this model, the more expensive they get and the harder it becomes to stay on target.

The Systems Development Life Cycle

- The spiral model of software development was proposed based on the observation of how projects were actually developed
  - Uses the idea of a series of incremental developments or releases.
  - Development 'spirals' outward from the centre with each cycle representing a successive refinement of the system.

Boehm's Spiral



The Four Quadrants

- Planning (bottom left) which is about planning the activities for the next phase.
- Objectives (top left) which is about setting the objectives for the next phase.
- Risk analysis (top right) which is concerned with the identification and resolution of risks.
- Development (bottom right) which, in the early stages might be the development of paper models and in the latter stages might be the development of a prototype system.

Spiral Weaknesses

- Assumes that appropriate information can be identified and captured
  - Difficult to manage and control
  - When does the loop terminate?
  - Requires skilled analysts
  - Complicated to schedule and organise
  - Can be inefficient
  - Not all of the team are used all of the time

Software Development Methods

- The solution – develop a recipe
  - Software Development Methods grew from existing knowledge about how to write programs and existing knowledge about how to manage projects.
  - Later these were further refined into process models and eventually these models became 'Software Design Methodologies'

Software Design Methodologies

- A better end product
  - People may want a methodology to improve the end product of the development process, that is, they want better information systems.
- A better development process
  - The benefits of controlling the development process and identifying the outputs: improved management and enhanced productivity.
- A more standardized process
  - More integrated systems, staff can move from project to project without retraining and easier maintenance of systems.

Software Design Methodologies

- A software design methodology is:
  - A collection of procedures, techniques, tools and documentation, which will help developers in their efforts to design and implement a new information system.
  - A collection of phases and sub-phases that guide developers toward appropriate techniques for each stage in a project and help them plan and evaluate it.

Early Methodologies

- Based on program design methods from early languages
  - Top down design based on a stepwise elaboration from an abstract model to implementation level details
  - The decomposition of a complex problem into simpler sub problems
- Example = SSADM / PRINCE / MERISE

Later Methodologies

- Based on design concepts from Object Orientated languages
- The designer looks for commonality:
  - Classes of similar or related objects based on features known to be of interest
  - Hierarchies where the properties of one object are passed on to another
- Example = OOA / OOD / RUP / UML

Financial Choices

Choices in the acquisition of IS

- A technical exercise?
- A financial exercise?
- A strategic decision?
  - 4 options:
    - Make (build it yourself)
    - Buy ("off the shelf")
    - Outsource (get somebody to do it for you)
    - Open Source (share with others)

Costs

- Some quantifiable costs
  - Hardware
  - Software
  - Installation
  - Environmental
- Some less quantifiable costs
  - Maintenance
  - Security
  - Networking
  - Training
- Unquantifiable costs
  - Organisational change
  - Opportunity cost

Benefits

- Some quantifiable benefits
  - increased productivity
  - reduced operational costs
  - reduced overheads
- Some less quantifiable benefits
  - more timely information
  - improved flexibility
  - improved control
- Unquantifiable benefits
  - improved organisational learning
  - improved employee satisfaction
  - improved planning
  - improved customer satisfaction

Justifying investment in IT

- An infrastructure project?
  - (Long term, long payback)
- A capital project?
  - (2 year payback?)
- A recurrent cost?
  - (Ongoing outflow of funds)

Justifying investment in IT

- Some problems:
  - Costs and benefits are difficult to quantify
  - Factors interact with each other - Synergy
  - Problems with metrics e.g. "man hours"
  - Financial models assume a stability
  - Accounting discounts long term benefits

Strategic Choices

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Strategy?

- Which approach gives the best solution?
  - A system which makes most use of computers is a good solution
  - A system which has accurate documentation is a good solution
  - A system which is the cheapest to run is a good solution
  - A system which is most quickly implemented is a good solution
  - A system which is the most adaptable is a good solution
  - A system that is liked by the users is a good solution.
- What assumptions do we need to make to choose a particular approach and why are they appropriate?
- How does approach fit with our business model and business strategy?

Strategic decisions

- Make
  - better match to requirements
  - more flexibility
  - more control
  - retain knowledge
- Buy
  - lower cost
  - less risk
  - higher quality
  - quicker
  - fewer resources

Strategic decisions

- out-source
  - minimise costs
  - focus on core skills
  - managed as a contract
  - horizontal integration
  - shared risks
- open source
  - lower costs
  - retain knowledge
  - learn from others
  - horizontal integration
  - shared risks

Choices in the acquisition of IS

- A technical exercise?
- A financial exercise?
- A strategic decision?
- A social / ethical decision?

Ethical Choices

How might managers use IS?

- Substitution of people by technology.
  - Increased efficiency and pace of work.
  - Removal of low-level tasks.
  - The "automation" of office work.

How might managers use IS?

- Information systems as a productivity tool.
  - Improved effectiveness and content of work.
  - Higher-level tasks.
  - Increased throughput.

How might managers use IS?

- Information systems as a medium for communication.
  - More accurate and timely data.
  - Improved visibility of task or organisation.
  - Increased control and monitoring of information workers.
  - Downsize/delayer middle management.

How might managers use IS?

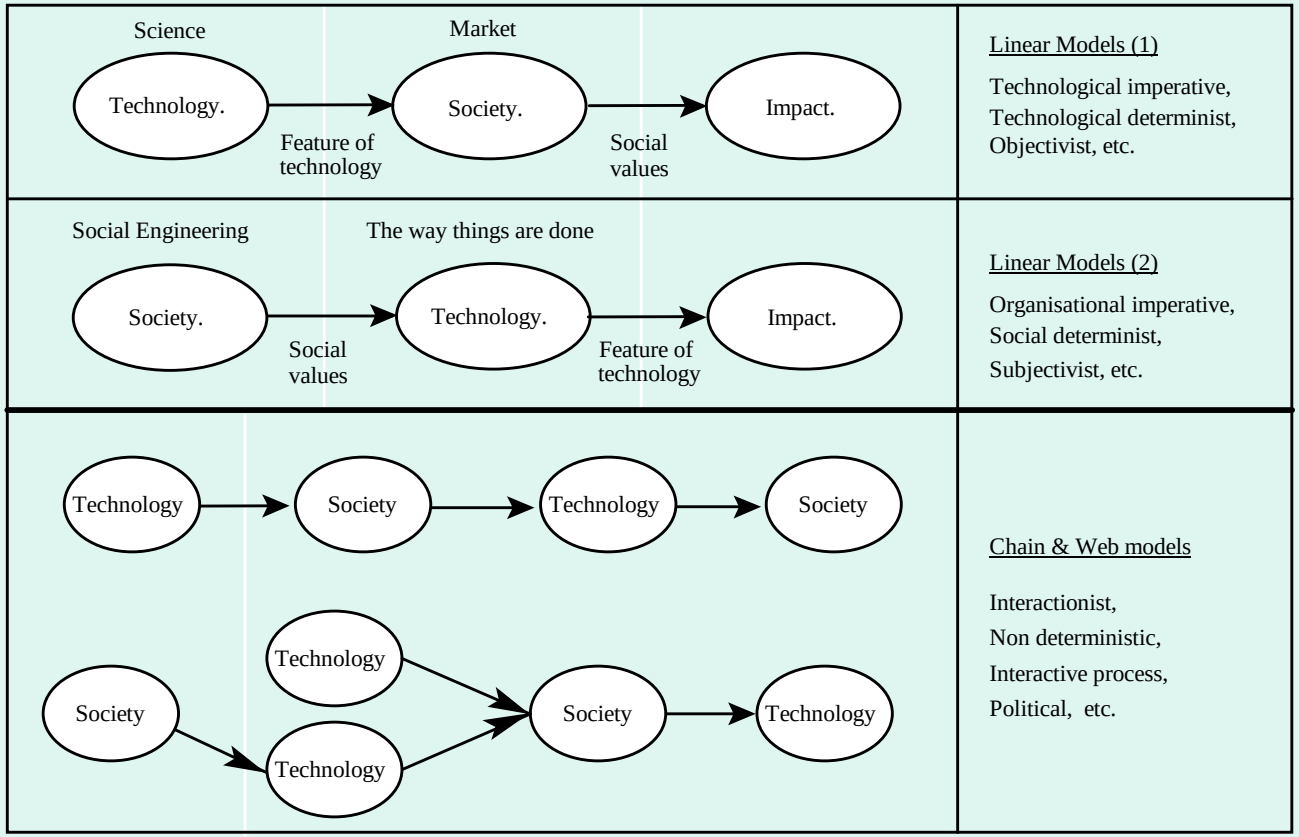
- Expert Systems and work.
  - More accurate and reliable information.
  - The automation of managerial work.
  - Increased control of knowledge workers.

How might managers use IS?

- Information systems as agent of change.
  - Breaking down of vertical hierarchy.
  - Breaking down of horizontal functional specialisation.
  - Job/task redesign.

Models of Change

Models of Change



Technological determinist

- Underlying this first model is the notion of an impartial and objective technology "impacting" upon its social context.
  - Technology is the outcome of scientific progress.
  - The adoption of a more "efficient" technology is inevitable.
  - The outcome can be predicted and controlled.
  - Any resulting "impact" is a side effect and is morally neutral.

Social determinist

- Underlying the second model is the notion of "freedom of choice" and social values "impacting" upon a technology and its use.
  - Change is the outcome of rational choice.
  - Social values are "built into" a technology.
  - The outcome can be predicted and controlled.
  - The resulting "impact" is intentional.

Interactionist

- Underlying this model is the notion of diversity, indeterminacy and non causality.
  - Change is a recursive and ongoing process.
  - The outcome at any one point is the result of several interacting factors.
  - The role of technology is as a medium for social interaction.
  - The model is not a predictive model but a descriptive model.

Next session

- Review of the concept of competitive advantage
- Review of concept of a business model and its links to IS/IT
- Analysis of the use of IS / IT to change organizations and their structure
- Discussion of the requirements for the first assessment