Acquiring IT Applications and Infrastructure

Management Information

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01. Information System Acquisition

- Information System Acquisition
    - The Acquisition issue is still complex
    - Various approaches to obtaining information systems
        - Buying
        - Leasing
   - Building

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01. Information System Acquisition

- E-Business Application Development
    - The diversity of e-business models and applications, which vary in size from a small store to a global exchange, requires a variety of development methodologies and approaches.
    - There are several options for developing e-business (e-biz) applications:
        - Buying an existing package can be cost-effective and timesaving in comparison to in-house application development.
        - Leasing is advantageous over buying in those cases where extensive maintenance is required, or where the cost of buying is very high.
        - Develop in-house.
            - Build from scratch.
            - Build from components.
            - Enterprise application integration

01. Information System Acquisition

• Five Major Steps of Acquisition

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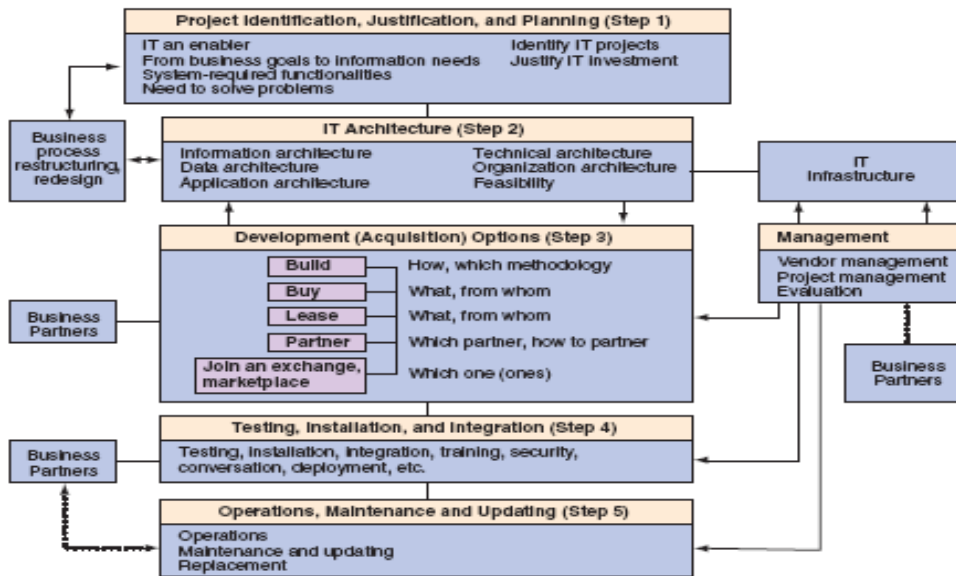
01. Information System Acquisition

• Criteria for Determining Which Application Development Approach to Use

- The functionalities of packages
- Information requirements
- User friendliness of the application
- Hardware and software resources
- Installation difficulties; integration
- Maintenance services requirements
- Vendor quality and track record
- Estimated total costs of ownership
- Ability to measure tangible benefits
- Personnel needed for development
- Forecasting and planning for technological evolution (what will come next)
- Scaling (ease, cost, limits)
- Sizing requirements
- Performance requirements
- Reliability requirements
- Security requirements

01. Information System Acquisition

• Advantages and Disadvantages of Various Systems Acquisition Methods

Advantages	Disadvantages
External Acquisition (Buy or Lease)	
• Software can be tried out.	• Controlled by another company with its own priorities and business considerations.
• Software has been used for similar problems in other organizations.	• Package's limitations may prevent desired business processes.
• Reduces time spent for analysis, design, and programming.	• May be difficult to get needed enhancements.
• Has good documentation that will be maintained.	• Lack of intimate knowledge in the purchasing company about how the software works and why it works that way.
End-User Development	
• Bypasses the IS department and avoids delays.	• May eventually require maintenance assistance from IT department.
• User controls the application and can change it as needed.	• Documentation may be inadequate.
• Directly meets user requirements.	• Poor quality control.
• Increased user acceptance of new system.	• System may not have adequate interfaces to existing systems.
• Frees up IT resources.	
• May create lower-quality systems.	
Traditional Systems Development (SDLC)	
• Forces staff to systematically go through every step in a structured process.	• May produce excessive documentation.
• Enforces quality by maintaining standards.	• Users may be unwilling or unable to study the specifications they approve.
• Has lower probability of missing important issues in collecting user requirements.	• Takes too long to go from the original ideas to a working system.
	• Users have trouble describing requirements for a proposed system.
Prototyping	
• Helps clarify user requirements.	• May encourage inadequate problem analysis.
• Helps verify the feasibility of the design.	• Not practical with large number of users.
• Promotes genuine user participation.	• User may not give up the prototype when the system is completed.
• Promotes close working relationship between systems developers and users.	• May generate confusion about whether the system is complete and maintainable.
• Works well for ill-defined problems.	• System may be built quickly, which may result in lower quality.
• May produce part of the final system.	

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02. Acquisition - Buy

• Advantages and Limitations of the "Buy" Option

Advantages of the "Buy" Option	Disadvantages of the "Buy" option
• Many different types of off-the-shelf software are available.	• Software may not exactly meet the company's needs.
• Much time can be saved by buying rather than building.	• Software may be difficult or impossible to modify, or it may require huge business process changes to implement.
• The company can know what it is getting before it invests in the software.	• The company will not have control over software improvements and new versions. (Usually it may only recommend.)
• The company is not the first and only user.	• Purchased software can be difficult to integrate with existing systems.
• Purchased software may avoid the need to hire personnel specifically dedicated to a project.	• Vendors may drop a product or go out of business.
• The vendor updates the software frequently.	
• The price is usually much lower for a buy option.	

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03. Acquisition - Lease

- Types of Leasing Vendors
  - The first way is to lease the application from an outsourcer and install it on the company's premises.
    - The vendor can help with the installation and frequently will offer to also contract for the operation and maintenance of the system.
    - Many conventional applications are leased this way.
  - The second way, using an application system provider (ASP), is becoming more popular.
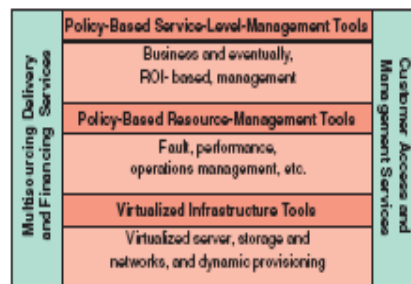
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04. Acquisition – Development In-House

- Development In-House
  - There are two major approaches to in-house development: building from scratch or building from components.
    - Build from scratch
    - Build from components
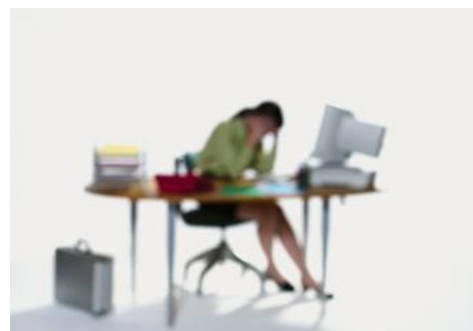
04. Acquisition – Development In-House

- Development In-House
  - Build from scratch
    - This option should be considered only for specialized applications for which components are not available.
    - It is an expensive and slow process, but it will provide the best fit.

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04. Acquisition – Development In-House

- Development In-House
  - Build from components
    - Companies with experienced IT staff can use standard components (e.g., a secure Web server), some software languages (e.g., Java, Visual Basic, or Perl), and third-party subroutines to create and maintain applications on their own.
    - (Or, companies can outsource the entire development process to an integrator that assembles the components.)
    - From a software standpoint, using components offers the greatest flexibility and can be the least expensive option in the long run.
    - However, it can also result in a number of false starts and wasted experimentations.
    - For this reason, even those companies with experienced staff are frequently better off modifying and customizing one of the packaged solutions as part of the "buy" option.

04. Acquisition – Development In-House

• Systems Development Life Cycle (SDLC)
  • Formal and disciplined approach to systems development
  • Provides a comprehensive formal framework for designing and developing systems for the effective and efficient processing of information.
  • There is no universal, standardized version of the SDLC however a typical eight stage model is shown below.
  • It is important that the design and development stages produce systems that are easy to maintain and are flexible enough to handle future expansion, upgrading and capacity increases.

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04. Acquisition – Development In-House

• Systems Development Life Cycle (SDLC)
  • Eight stages of SDLC

(1) Project Initiation
(2) System Analysis and Feasibility Studies
(3) Logical Analysis & Design
(4) Acquisition or Development
(5) Implementation
(6) Operation
(7) Post-Audit
(8) Maintenance

Go Back to a Previous Stage or Stop

Note that the stages overlap: One stage may start before the previous stage ends. This is in contrast to the traditional **waterfall method,** in which the work flows through all the tasks in one stage before going on to the next stage. Also note that the processes can go backward more than one stage.

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04. Acquisition – Development In-House

- Systems Development Life Cycle (SDLC)
  - Stage 1: Project initiation
    - Projects often start when a manager has a problem or sees an opportunity.

04. Acquisition – Development In-House

- Systems Development Life Cycle (SDLC)
  - Stage 2: Systems analysis and feasibility studies
    - Systems analysis
      - It is the phase that develops a thorough understanding of the existing organization, its operation, and the situation that is causing a problem.
      - Systems analysis methods include:
        - Observation
        - Review of documents
        - Interviews
        - Performance measurement.

04. Acquisition – Development In-House

- Systems Development Life Cycle (SDLC)
  - Stage 2: Systems analysis and feasibility studies
    - Feasibility studies
      - It studies calculate the probability of success of the proposed solution and include:
        - Technology
        - Economics
        - Organizational factors
        - Legal, ethical, and other constraints

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04. Acquisition – Development In-House

- Systems Development Life Cycle (SDLC)
  - Stage 3: Logical analysis and design
    - It emphasizes the design of system from the user's point of view.
    - It identifies information requirements and specifies operations such as input, output, processing and storage.
    - To represent logical processes and data relationships modeling tools such as data flow diagrams and entity-relationship diagrams can be used.
    - The logical design is followed by a physical design.

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04. Acquisition – Development In-House

- Systems Development Life Cycle (SDLC)
  - Stage 4: Development or acquisition
    - The actual development or acquisition of the system.
    - IS personnel use the specifications to purchase the hardware and software required for the system.
    - Programmers write code for parts of the system.
    - Technical writers develop documentation and training materials.
    - IS personnel test the system
    - Users test prior to the actual implementation.

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04. Acquisition – Development In-House

- Systems Development Life Cycle (SDLC)
  - Stage 5: Implementation
    - This is an important stage
    - The system can fail here even if it has all the specified functionality.
    - Users need training
    - Forms need to be ordered
    - Help desk needs to be created
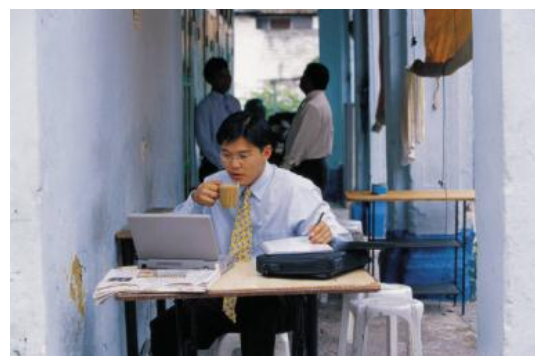
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04. Acquisition – Development In-House

- Systems Development Life Cycle (SDLC)
  - Stage 5: Implementation
    - Also requires a conversion from a previous system. Conversion approaches include:
      - Parallel conversion: The old and new systems operate concurrently for a test period, and then the old system is discontinued.
      - Direct cutover: The old system is turned off, and the new system is turned on.
      - Pilot conversion: The new system is implemented in a subset of locations (for example, some of the branches in a large banking chain) and is extended to remaining locations over time.
      - Phased conversion: Large systems often are built from distinct modules. If the modules were originally designed to be relatively independent, it may be possible to replace the modules one at a time.

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04. Acquisition – Development In-House

- Systems Development Life Cycle (SDLC)
  - Stage 6: Operation
    - Post production environment

04. Acquisition – Development In-House

- Systems Development Life Cycle (SDLC)
    - Stage 7: Post-audit evaluation
        - It reviews the stages and processes to determine best practice methods.

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04. Acquisition – Development In-House

- Systems Development Life Cycle (SDLC)
    - Stage 8: Maintenance
        - Every system needs two regular types of maintenance:
            - Fixing of bugs
            - Regular system updating

04. Acquisition – Development In-House

- Alternatives to SDLC Methodologies
  - The traditional SDLC approach works best on projects in which users have a clear idea about their requirements.
  - Projects that require major changes in existing processes, through reengineering or development of new processes or those that build upon inter-organizational and international systems using Web technologies indicate a need for alternatives or supplements to conventional SDLC methodologies.

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04. Acquisition – Development In-House

- Alternatives to SDLC Methodologies
  - Prototyping (evolutionary development)
    - Instead of spending a lot of time producing very detailed specifications, the developers find out only generally what the users want.
    - The developers do not develop the complete system all at once.
    - Instead they quickly create a prototype, which either contains portions of the system of most interest to the users, or is a small-scale working model of the entire system.
    - After reviewing the prototype with the users, the developers refine and extend it.
    - This process is continued until the final specifications.

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04. Acquisition – Development In-House

- Alternatives to SDLC Methodologies
  - Joint application design (JAD)
    - It is a group-based method for collecting user requirements and creating system designs.
    - It is used within the systems analysis and design stages of the SDLC.
    - Unlike the traditional SDLC, where the analysts interview individual users of the new information system to understand their needs JAD has a meeting in which all users meet simultaneously with analysts.
    - During the meeting, all users jointly define and agree upon systems requirements.

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04. Acquisition – Development In-House

- Alternatives to SDLC Methodologies
  - Other alternatives:
    - Rapid application development (RAD)
    - Object-oriented development (OOD)
    - Component-based development (CBD)
    - Extreme Programming (XP)

05. System Development Alternatives

- Outsourcing
    - Use of outside contractors or external organizations to acquire IT services
    - It outsources the entire systems development process.

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05. System Development Alternatives

- Application Service Provider (ASP)
    - ASP is an agent or vendor who assembles the software needed by enterprises and packages them usually with outsourced development, operations, maintenance, and other services.
    - The main difference between an ASP and an outsourcer is that an ASP will manage application servers in a centrally controlled location, rather than on a customer's site.

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05. System Development Alternatives

- Purchasing
  - The make-or-buy decision lets users use off-the-shelf software packages.
  - Six step selection method
    - 1) Identify potential vendors
    - 2) Determine the evaluation criteria
      - Request for proposal (RFP)
      - List of users
    - 3) Evaluate vendors and packages
    - 4) Choose the vendor and package
    - 5) Negotiate a contract
    - 6) Establish a service level agreement (SLA)

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05. System Development Alternatives

- Purchasing
  - Criteria for selecting a software application package

- Usability and reusability
- Cost and financial terms (cost/benefit ratio)
- Upgrade policy and cost
- Vendor's reputation and availability for help
- Vendor's success stories (visit their Web site, contact clients)
- System flexibility and scalability
- Managability, such as ease of Internet interface, and user acceptance
- Availability and quality of documentation
- Necessary hardware and networking resources
- Required training (check if provided by vendor)
- Security
- Required maintenance cost
- Learning (speed of) for developers and users
- Performance
- Interoperability and data handling
- Ease of integration
- Minimal negative cross-impact (on other applications)

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05. System Development Alternatives

- End-User Development (EUD)
    - EUD lets users build their own systems.

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05. System Development Alternatives

- Utility Computing
    - It consists of a virtualized pool of "self-managing" IT resources (computing power and storage capacity) that can be dynamically allocated for any application

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06. Business Process Redesign

- Business Process Redesign (BPR)
  - Environmental pressures from customers, competition and market changes may require more comprehensive responses then typical organizational responses.
  - These extensive changes in operations, processes or structure are called business process redesign.
  - A business process is a collection of activities that take one or more kinds of inputs and create an output.

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06. Business Process Redesign

- Business Process Reengineering (BPR)
  - Business process redesign was preceded by business process reengineering, a methodology in which an organization fundamentally and radically redesigned its business processes to achieve dramatic improvement.
  - Today, BPR can focus on anything from the redesign of an individual process, to redesign of a group of processes, to redesign of the entire enterprise.

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06. Business Process Redesign

- Drivers of Process Redesign
  - Fitting commercial software
  - Streamlining the supply chain
  - Participating in private or public e-marketplaces
  - Improving customer service
  - Conducting e-procurement
  - Enabling direct online marketing
  - Reducing cost and improving productivity
  - Automating old processes
  - Transformation to e-business

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06. Business Process Redesign

- Business Process Management (BPM)
  - A new method for restructuring combines workflow systems and redesign methods.
  - This emerging methodology covers three process categories:
    - People-to-people interactions
    - Systems-to-systems interactions
    - Systems-to-people interactions
    - It is a blending of workflow, process management, and applications integration.


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06. Business Process Redesign

- Information Technology's Role
  - The traditional process of looking at problems first and then seeking technology solutions for them may need to be reversed.
  - A new approach is first to recognize powerful redesign solutions that restructuring and BPR make possible, and then to seek the processes that can be helped by such solutions.
  - Redesign of business processes often means a need to change some or all of the organizational information systems.
  - This process is referred to as retooling

06. Business Process Redesign

- Information Technology's Role
  - Thus the role of IT in redesigning business processes can be very critical.
    - Integrating fragmented information systems
    - Employing data warehouses
    - Implementing an extended supply chain
    - Utilizing B2B e-marketplaces
    - Providing a single point of contact for customers
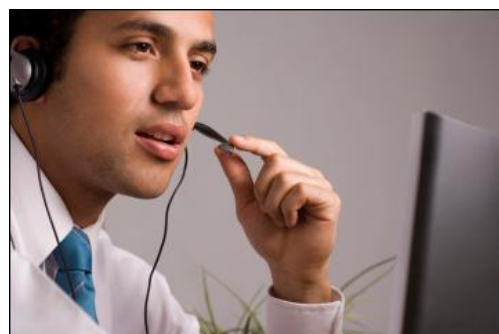
06. Business Process Redesign

- Information Technology's Role
    - Changes in business processes brought by IT

Old Rule	Intervening Technology	New Rule
Information appears in only one place at one time.	Shared databases, client/server architecture, Internet, intranets	Information appears simultaneously wherever needed.
Only an expert can perform complex work.	Expert systems, neural computing	Novices can perform complex work.
Business must be either centralized or distributed.	Telecommunications and networks: client/server, intranet	Business can be both centralized and distributed.
Only managers make decisions.	Decision support systems, enterprise support systems, expert systems	Decision making is part of everyone's job.
Field personnel need offices to receive, send, store, and process information.	Wireless communication and portable computers, the Web, electronic mail	Field personnel can manage information from any location.
The best contact with potential buyers is a personal contact.	Interactive videodisk, desktop teleconferencing, electronic mail	The best contact is the one that is most cost-effective.
You have to locate items manually.	Tracking technology, groupware, workflow software, search engines	Items are located automatically.
Plans get revised periodically.	High-performance computing systems, intelligent agents	Plans get revised instantaneously whenever needed.
People must come to one place to work together.	Groupware and group support systems, telecommunications, electronic mail, client/server	People can work together while at different locations.
Customized products and services are expensive and take a long time to develop.	CAD/CAM, CASE tools, online systems for JIT decision making, expert systems	Customized products can be made quickly and inexpensively (mass customization).
A long period of time is spanned between the inception of an idea and its implementation (time-to-market).	CAD/CAM, electronic data interchange, groupware, imaging (document) processing	Time-to-market can be reduced by 90 percent.
Organizations and processes are information-based.	Artificial intelligence, expert systems	Organizations and processes are knowledge-based.
Move labor to countries where labor is inexpensive (off-shore production).	Robots, imaging technologies, object-oriented programming, expert systems, geographical information systems (GIS)	Work can be done in countries with high wages and salaries.

Source: Compiled from M. Hammer and J. Champy. *Re-engineering the Corporation.* (New York: Harper Business, 2001).

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06. Business Process Redesign

- Development Software
    - A large variety of IT tools can be used to support redesign and BPR.
    - Some are generic, while others are specifically designed for redesign and BPR.
    - BPR software also has "what-if" capabilities in that it enables process simulation and performance comparison of alternative process designs.
    - BPR software may incorporate some aspects of project management in terms of allocating resources and costs to work activities and their time sequencing.

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06. Business Process Redesign

- Development Software
  - Special BPR and process redesign software enables the capture of the key elements of a business process in a visual representation made up of interconnected objects on a time line.
    - The elements include:
      - Activities
      - Sequencing
      - Resources
      - Times
      - Rules

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06. Business Process Redesign

- Restructuring Processes
  - Redesign, restructuring, and reengineering efforts involve many activities on the value and supply chains.
    - Efficient PO, to AP to receiving system the classical "3-way" match
    - Cross-docking: movement of just received merchandise to out going loading platforms
    - Mass customization: maintaining work-in-process inventory
    - Cycle time reduction: the time it takes to complete a process from beginning to end
    - Vendor managed inventory
    - Mobile devices
    - Many more …

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06. Business Process Redesign

- Restructuring the Organization
    - The fundamental problem with the hierarchical organizational structure is that any time a decision needs to be made, it must climb up and down the hierarchy.
    - Yet in thin structures there is a need for horizontal communications to minimize inefficiencies.

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06. Business Process Redesign

- Restructuring the Organization
    - Efficient structures
        - Thick (many levels) hierarchical structure
        - Thin (single level) structure
        - Network structure
        - Virtual Network structure or organization

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06. Business Process Redesign

- Restructuring the Organization
  - Why is an efficient structure important?
    - Management suited to strategy
    - Better response to opportunities and threats
    - Higher morale
    - Developing culture
    - Control

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06. Business Process Redesign

- Change Management
  - Major organizational changes such as transformation to e-business are referred to as organization transformation.
  - This process usually requires change management.

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06. Business Process Redesign

- Change Management
  - Organization transformation refers to an organization with a "new face," whose business processes, structure, strategy, and procedures are completely different from the old one.
    - Such a radical transformation can be a lengthy, expensive, and complex process, which may involve organizational learning, changes in management and personnel, creation of a new structure, and employee retraining.


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06. Business Process Redesign

- Change Management
  - Change management refers to the implementation, control and guidelines to introduce change into organizations.
    - Changing business processes, organizational structure and operating procedures are interrelated and depending upon the magnitude of the change can be met with employee resistance.
    - Since change is a learning process its impact can be minimized if properly managed.
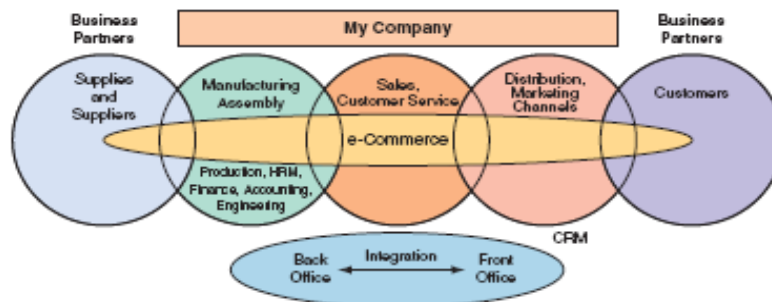

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06. Business Process Redesign

- An example
  - A reengineered bank with integrated systems
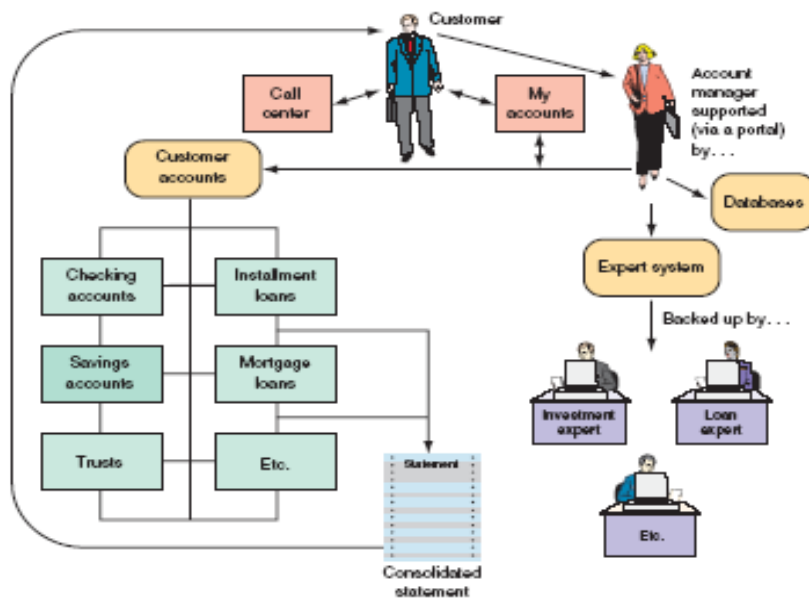
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06. Business Process Redesign

- Connecting To Databases and Business Partners
  - EC must be integrated.
    - Many IT applications need to be connected to a database.
    - IT must be connected to business partners, especially for B2B EC.

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