PROJECT SELECTION

ITACS 5203, Unit 3

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Introduction
Sources of Software
- Outsourcing
- Packaged Software
- Vendors
- Cloud
- Open Source
- In-House
- RFP
- Reuse

Project ID & Selection
Feasibility Assessment
- Technical
- Financial
- (Other)

LEARNING OBJECTIVES

Describe the sources of information systems,

describe the project identification and selection process,

describe the corporate strategic planning and information systems planning process, and

Perform a technical, financial, and other feasibility analysis

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Project ID & Selection
Feasibility Assessment
- Technical
- Financial
- (Other)

TOPICS

4. Identifying and Selecting Projects
4.1. Process
4.2. Deliverables
4.3. Corporate Strategic Planning
4.4. Information Systems Planning
5. Initiating and Planning Systems Development Projects
5.1. Deliverables and Outcomes
5.1.1. Baseline Project Plan
5.2. Feasibility Analysis
5.2.1. Economic
5.2.1.1. NPV
5.2.1.2. ROI
5.2.2. Technical
5.2.3. Other Feasibility
3.2. Business Case and Feasibility Analysis
3.2.1. Auditor's Role in Business Case Development
3.3.3. SDLC Phases
3.3.3.1. Feasibility

IT Auditors are required to confirm information systems the business chooses to rely on:

1. Meet return on investment (ROI) expectations
2. Are planned, developed, implemented and maintained in a controlled and dependable manner

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SOURCES OF SOFTWARE

Historically, software development for a corporate information systems department was done primarily in-house.

Now it involves use of components from external sources.

Much in-house application coding involves making the components work together.

Six sources of software:

- Information technology service firms
- Packaged software providers
- Vendors of enterprise-wide solution software
- Cloud computing
- Open-source software
- In-house development

There are ways to evaluate software from sources

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OUTSOURCING

Outsourcing: The practice of turning over responsibility of some or all of an organization's information systems applications and operations to an outside firm

Outsourcing Example

- Shell Oil outsource spending: $3.2 billion (2008)
- Shell's outsourcing vendors (2008-2011): EDS, T-Systems, AT&T, IBM, Logica, Wipro, Accenture

Reasons to outsource

- Cost-effectiveness
- Take advantage of economies of scale
- Make up for lack of in-house knowledge
- Free up internal resources
- Reduce time to market
- Increase process efficiencies
- System development is a non-core activity for the organization
- Political reasons (e.g. labor disputes)

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PACKAGED SOFTWARE

- Serve many market segments
- Provide software ranging from broad-based packages (i.e. general ledger) to niche packages (i.e. day care management)
- Pre-packaged, off-the-shelf software
- Software runs on all size computers, from microcomputers to large mainframes.
- Prepackaged software is off-the-shelf, turnkey software (i.e. not customizable).
- Off-the-shelf software, at best, meets 70% of organizations' needs.

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ENTERPRISE SOLUTIONS SOFTWARE

Enterprise Resource Planning (ERP) systems integrate individual traditional business functions into modules enabling a single seamless transaction to cut across functional boundaries.

SAP AG is the leading vendor of ERP systems.

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CLOUD COMPUTING

The provision of computing resources, including applications, over the Internet, so customers do not have to invest in the computing infrastructure needed to run and maintain the resources

Pay-per-use or monthly/yearly licenses

Examples:

- Google Apps– for sharing documents, spreadsheets, and presentations
- Salesforce.com – online customer relationship management (CRM) software
  - An example of software as a service (SaaS)
- Microsoft Azure platform
- Amazon.com cloud infrastructure and services
  - An example of hardware as a service (HaaS)

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CLOUD COMPUTING

Heavy growth predicted

Benefits:

- Frees company of internal IT staff requirements
- Faster access to application than via internal development
- Lower cost than internal development

Concerns

- Security
- Reliability
- Regulation compliance

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OPEN SOURCE SOFTWARE

Freely available including source code

Developed by a community of interested people

Performs the same functions as commercial software

Examples: Linux, mySQL, Firefox

How to make money?

- Provide maintenance/services
- Sell a more featured version of the free software

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IN-HOUSE DEVELOPMENT

If sufficient system development expertise with the chosen platform exists in-house, then some or all of the system can be developed by the organization's own staff.

- In-house development usually leads to more maintenance burden than other approaches

Hybrid solutions involving some purchased and some in-house components are common.

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IN-HOUSE DEVELOPMENT

Producers	When to Go to This Type of Organization for Software	Internal Staffing Requirements
IT services firms	When task requires custom support and system can't be built internally or system needs to be sourced	Internal staff may be needed, depending on application
Packaged software producers	When supported task is generic	Some IS and user staff to define requirements and evaluate packages
Enterprise-wide solutions vendors	For complete systems that cross functional boundaries	Some internal staff necessary but mostly need consultants
Cloud computing	For instant access to an application; when supported task is generic	Few; frees up staff for other IT work
Open-source software	When supported task is generic but cost is an issue	Some IS and user staff to define requirements and evaluate packages
In-house developers	When resources and staff are available and system must be built from scratch	Internal staff necessary though staff size may vary

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EVALUATION OF SOURCES

Cost: comparing the cost of developing the same system in-house with the cost of purchasing or licensing the software package

Functionality: the tasks that the software can perform and the mandatory, essential, and desired system features

Vendor support: whether and how much support the vendor can provide and at what cost

Viability of vendor: can vendor continue to adapt/update software to changes in systems software and hardware

Flexibility: the ease with which software is customized

Documentation: understandable and up-to-date user's manual and technical documentation

Response time: how long it takes the software package to respond to the user's requests in an interactive session

Ease of installation: a measure of the difficulty of loading the software and making it operational

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EVALUATION OF SOURCES

Send a **request for proposal (RFP)** to vendors.

- RFP – a document provided to vendors to ask them to propose hardware and system software that will meet the requirements of a new system

Use a variety of information sources:

- Collect information from vendor
- Software documentation
- Technical marketing literature

Sometimes called a **Request For Quote** (**RFQ**)

Analyst selects best candidates based on:

- vendor bids
- a variety of information sources

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INFORMATION SOURCES FOR RFP

Vendor's proposal

Running software through a series of tests

Feedback from other users of the vendor's product

Independent software testing services

Customer surveys

Articles in trade publications are sometimes biased (seeded by manufacturer)

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REUSE

The use of previously written software resources, especially objects and components, in new applications

Commonly applied to two different development technologies:

- Object-oriented development
  - Object class encapsulates data and behavior of common organizational entities (e.g. employees)
- Component-based development
- Components can be as small as objects or as large as pieces of software that handle single business functions

Can be effective (increased productivity, less defects, reduced rework)

Technical issues – lack of methodology for component library (creating and labeling reusable components)

Organizational issues – lack of commitment, training, and organizational support; hard to measure economic benefits; legal and contractual issues

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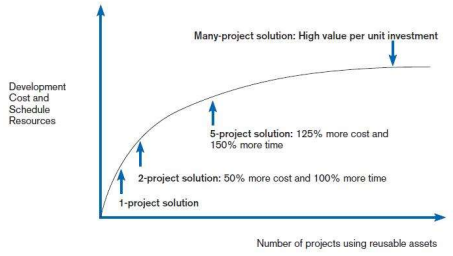
REUSE



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APPROACHES TO REUSE

Ad-hoc: individuals are free to find or develop reusable assets on their own

Facilitated: developers are encouraged to practice reuse

Managed: the development, sharing, and adoption of reusable assets is mandated

Designed: assets mandated for reuse as they are being designed for specific applications

(Griss 2003)

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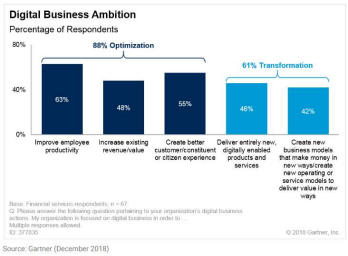
TODAY'S BUSINESS IT ENVIRONMENT

It is impossible for enterprises of any size in any market sector to exist without computers to assist in business operations

- Computer revolution started in the 1950's continues…
- Equipment capacity and performance continues to grow while cost and size is shrinking
- Today's focus is on developing and implementing more effective and responsive information systems that optimize and transform the business



Source: Gartner (December 2018)

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INFORMATION SYSTEMS PROPOSALS

Proposals for new information systems come from a variety of sources, for example, they may come from:

- Board of Directors as a result of a business change
- Government in the form of legislative and regulatory changes
- Management initiatives intended to…
  - Improve business effectiveness or efficiencies
  - Respond to competitive forces
- Information Technology which has changed

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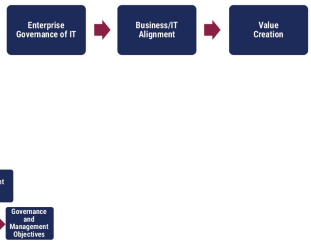
ENTERPRISE GOVERNANCE OF INFORMATION AND TECHNOLOGY

Enterprise governance of new and improved information and technology is focused on:

1. **Benefits Realization**
2. **Risk Optimization**
3. **Resource Optimization**



COBIT 2019 Framework: Introduction & Methodology, ISACA, 2018

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ENTERPRISE GOVERNANCE OF INFORMATION AND TECHNOLOGY

1. **Benefits Realization**
   - Creating value for the enterprise through IT:
     - Maintaining and increasing value derived from existing IT investments
     - Eliminating IT initiatives and assets that are not creating sufficient value
   - Delivery of fit-for-purpose services and solutions
     - On-time and within budget
     - That generate the intended financial and nonfinancial benefits
   - Value that IT delivers should be
     - Aligned directly with targeted business values
     - Measured in ways that show impact and contributions of IT-enabled investments
2. **Risk Optimization**
   - Addresses business risk associated with use, ownership, operation, involvement, influence and adoption of IT within the enterprise
   - IT-related business risk consists of IT-related events that could potentially impact the business
   - While value delivery focuses on creation of value, risk management focuses on the preservation of value
3. **Resource Optimization**
   - Recognizes
     - Data and information are an important resources
     - Exploiting data and information to gain optimal value is a key focus
   - Ensures
     - Appropriate capabilities are in place to execute the strategic plan
     - Sufficient, appropriate and effective resources are provided
     - An integrated, economical IT infrastructure is provided
     - New technology is introduced as required by the business
     - Obsolete systems are updated or replaced

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THE PROCESS OF IDENTIFYING AND SELECTING PROJECTS

- ***Top-down*** *source* are projects identified by top management or by a diverse steering committee.
  - Broader perspective.
  - Improved integration.
  - Improved management support.
  - Better understanding.
- ***Bottom-up*** *source* are project initiatives stemming from managers, business units, or the development group.
  - Identifies IS development projects based on solving specific operational business problems or taking advantage of specific opportunities.
  - Can be faster and less costly, so may be beneficial in certain circumstances.

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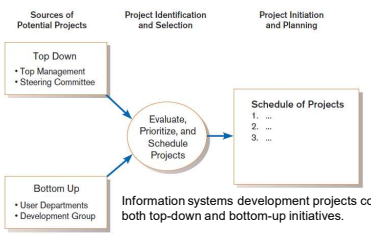
THE PROCESS OF IDENTIFYING AND SELECTING PROJECTS



Information systems development projects come from both top-down and bottom-up initiatives.

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THE PROCESS OF IDENTIFYING AND SELECTING PROJECTS

TABLE 4-1 Characteristics of Alternative Methods for Making Information Systems Identification and Selection Decisions

Selection Method	Characteristics
Top Management	Greater strategic focus Largest project size Longest project duration Enterprise-wide consideration
Steering Committee	Cross-functional focus Greater organizational change Formal cost–benefit analysis Larger and riskier projects
Functional Area	Narrow, nonstrategic focus Faster development Fewer users, management layers, and business functions involved
Development Group	Integration with existing systems focus Fewer development delays Less concern with cost–benefit analysis

(*Source:* Based on McKeen, Guimaraes, and Wetherbe, 1994; GAO, 2000.)

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CLASSIFYING AND RANKING IS PROJECTS

- Evaluation Criteria
  - Value Chain Analysis
    - Extend to which activities add value and costs when developing products and services
  - Strategic Alignment
    - Extent to which the project is viewed as helping the organization achieve strategic objectives
  - Potential Benefits
    - Extent to which the project is viewed as improving processes
  - Resource Availability
    - Amount and type of resources the project requires, and their availability
  - Technical Difficulty / Risks
    - Level of technical difficulty to successfully complete the project

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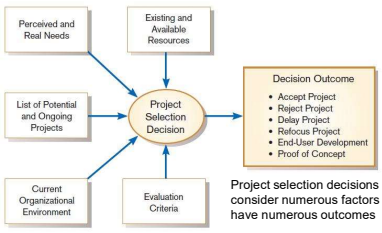
CLASSIFYING AND RANKING IS PROJECTS



Project selection decisions must consider numerous factors and can have numerous outcomes

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WEIGHTED ANALYSIS

One method for deciding among different projects or alternative designs:

- For each requirement or constraint:
  Score = weight X rating
- Each alternative: sum scores across requirements/constraints
- Alternative with highest score wins

Criteria	Weight	Alternative A		Alternative B		Alternative C	
		Rating	Score	Rating	Score	Rating	Score
Requirements							
Real-time data entry	18	5	90	5	90	5	90
Automatic reorder	18	1	18	5	90	5	90
Real-time data query	14	1	14	5	70	5	70
	50		122		250		250
Constraints							
Developer costs	15	4	60	5	75	3	45
Hardware costs	15	4	60	4	60	3	45
Operating costs	15	5	75	1	15	5	75
Ease of training	5	5	25	3	15	3	15
	50		220		165		180
Total	100		342		415		430

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ALIGNMENT WITH STRATEGY

TABLE 4-3 Generic Competitive Strategies

Strategy	Description
Low-Cost Producer	This strategy reflects competing in an industry on the basis of product or service cost to the consumer. For example, in the automobile industry, the South Korean–produced Hyundai is a product line that competes on the basis of low cost.
Product Differentiation	This competitive strategy reflects capitalizing on a key product criterion requested by the market (for example, high quality, style, performance, roominess). In the automobile industry, many manufacturers are trying to differentiate their products on the basis of quality (e.g., "At Ford, quality is job one.").
Product Focus or Niche	This strategy is similar to both the low-cost and differentiation strategies but with a much narrower market focus. For example, a niche market in the automobile industry is the convertible sports car market. Within this market, some manufacturers may employ a low-cost strategy and others may employ a differentiation strategy based on performance or style.

(*Source:* Based on The Free Press, a Division of Simon & Schuster Adult Publishing Group, from Porter, 1980. Copyright © 1980, 1998 by The Free Press. All rights reserved.)

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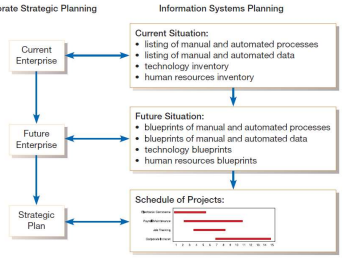
ALIGNMENT WITH STRATEGY

Parallel activities of corporate strategic planning and information systems planning



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ASSESSING TECHNICAL FEASIBILITY

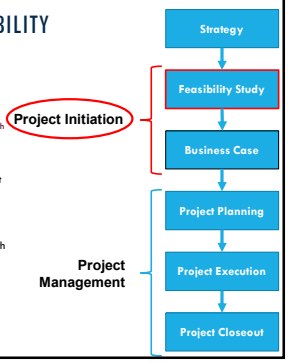
Technical feasibility: a process of assessing the development organization's ability to construct a proposed system

Assessment of the possible target hardware, software, and operating environments

Consider system size, complexity, and the group's experience with similar systems

The potential consequences of not assessing and managing risks can include:

- Failure to attain expected benefits from the project
- Inaccurate project cost estimates.
- Inaccurate project duration estimates.
- Failure to achieve adequate system performance levels.
- Failure to adequately integrate the new system with existing hardware, software, or organizational procedures.



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TECHNICAL RISK FACTORS

Project size

- Team size, organizational departments, project duration, programming effort

Project structure

- New vs. renovated system, resulting organizational changes, management commitment, user perceptions

Development group

- Familiarity with platform, software, development method, application area, development of similar systems

User group

- Familiarity with IS development process, application area, use of similar systems

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TECHNICAL RISK ASSESSMENT

Four general rules of risk assessment:

1. *Larger projects are riskier than smaller projects.*
2. *A system in which the requirements are easily obtained and highly structured will be less risky than one in which requirements are messy, ill structured, ill defined, or subject to the judgment of an individual.*
3. *The development of a system employing commonly used or standard technology will be less risky than one employing novel or nonstandard technology.*
4. *A project is less risky when the user group is familiar with the systems development process and application area than if unfamiliar.*

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FINANCIAL FEASIBILITY ANALYSIS

Economic feasibility: a process of identifying the financial benefits and costs associated with a development project

- Often referred to as a *cost-benefit analysis*
- Project is reviewed after each SDLC phase in order to decide whether to continue, redirect, or kill a project

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DETERMINING PROJECT BENEFITS

Tangible benefits refer to items that can be measured in dollars and with certainty.

Examples include:

- reduced personnel expenses
- lower transaction costs, or
- higher profit margins.

Most tangible benefits will fit within the following categories:

- Cost reduction and avoidance
- Error reduction
- Increased flexibility
- Increased speed of activity
- Improvement of management planning and control
- Opening new markets and increasing sales opportunities

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DETERMINING PROJECT BENEFITS

Intangible benefits are benefits derived from the creation of an information system that cannot be easily measured in dollars or with certainty.

- May have direct organizational benefits, such as the improvement of employee morale
- May have broader societal implications, such as the reduction of waste creation or resource consumption

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DETERMINING PROJECT COSTS

Tangible cost: a cost associated with an information system that can be measured in dollars and with certainty

IS development tangible costs include:

- Hardware costs
- Labor costs, or
- Operational costs, including employee training and building renovations.

Intangible cost: a cost associated with an information system that cannot be easily measured in terms of dollars or with certainty

Intangible costs can include:

- Loss of customer goodwill,
- Employee morale, or
- Operational inefficiency.

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DETERMINING PROJECT COSTS

One-time cost: a cost associated with project start-up and development or system start-up

These costs encompass activities such as:

- Systems development,
- New hardware and software purchases,
- User training,
- Site preparation, and
- Data or system conversion.

Recurring cost: a cost resulting from the ongoing evolution and use of a system

Examples of these costs include:

- Application software maintenance
- Incremental data storage expenses
- Incremental communications
- New software and hardware leases, and
- Supplies and other expenses (i.e., paper, forms, data center personnel).

Both one-time and recurring costs can consist of items that are fixed or variable in nature.

Fixed costs are billed or incurred at a regular interval and usually at a fixed rate.

- Example: facility lease payment

Variable costs are items that vary in relation to usage.

- Example: long-distance charges

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TIME VALUE OF MONEY

Time value of money (**TVM**): the concept that money available today is worth more than the same amount tomorrow

Discount rate: the rate of return used to compute the present value of future cash flows (*the cost of capital*)

Present value: the current value of a future cash flow

Net Present Value (NPV)

- Use discount rate to determine present value of cash outlays and receipts

Return on Investment (ROI)

- Ratio of cash receipts to cash outlays

Break-Even Analysis (BEA)

- Amount of time required for cumulative cash flow to equal initial and ongoing investment

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TIME VALUE OF MONEY

Net Present Value

- PV*n* = *present value* of *Y* dollars *n* years from now based on a *discount rate* of *i*.
- NPV = sum of PVs across years.
- Calculates *time value of money*

$$\mathrm{PV}_n = Y \times \frac{1}{(1+i)^n}$$

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TIME VALUE OF MONEY

Break-even analysis: a type of cost-benefit analysis to identify at what point (if ever) benefits equal costs

$$\text{Break-Even Ratio} = \frac{\text{Yearly NPV Cash Flow} - \text{Overall NPV Cash Flow}}{\text{Yearly NPV Cash Flow}}$$

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TIME VALUE OF MONEY

Break-even analysis: a type of cost-benefit analysis to identify at what point (if ever) benefits equal costs

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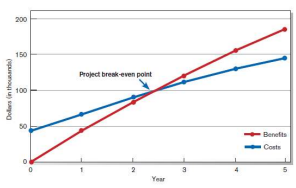

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PRACTICE CASE

Practice using the CalculateProjectNPV_B.xlsx spreadsheet to calculate costs and benefits for the Customer Tracking System (Pine Valley Furniture) as you read Chapter 5 in Modern Systems Analysis and Design (MSAD). Apply the spreadsheet to illustrate cost/benefit analysis, including: Cash flow analysis, use of Net Present Value (NPV) in calculating Return on Investment (ROI), and break-even analysis

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ANNUAL COSTS OF LEGACY SYSTEMS

		Oracle		IBM		Total
Costs of Existing Resources	Salaries for each position		Totals for each position		Totals for each position	
System administrator	$ 130,000	1	$ 130,000	1	$ 130,000	$ 260,000
Database analyst	$ 110,000	2	$ 220,000	3	$ 330,000	$ 550,000
ETL programmer	$ 80,000	2	$ 160,000	2	$ 160,000	$ 320,000
Query programmer	$ 70,000	3	$ 210,000	3	$ 210,000	$ 420,000
Network administrator	$ 80,000	1	$ 80,000	1	$ 80,000	$ 160,000
Support staff	$ 40,000	2	$ 80,000	2	$ 80,000	$ 160,000
Total annual salary & benefits cost/system			$ 1,232,000		$ 1,386,000	$ 2,618,000
Nonpersonnel support/system			1,000,000		1,800,000	$ 2,800,000
Total salary and benefits/system			2,232,000		3,186,000	$ 5,418,000
Number of systems			4		1	$ 5
Total yearly costs personnel + support			8,928,000		3,186,000	$ 12,114,000

…these costs become benefits of switching to the new system, i.e. costs not incurred after replacement

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OTHER FEASIBILITY ASSESSMENTS

Operational

Legal / Contractual

Political

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