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- Miscellaneous ... **Misc**

Assessing the Risks of Commercial-Off-The-Shelf Applications

*Lessons Learned from the
Information Technology Resources Board*

Revised Version
December 1999

www.itrb.gov

About the Information Technology Resources Board (ITRB)

Pursuant to the Government Performance and Results Act of 1993, Paperwork Reduction Act of 1995, and Information Technology Management Reform Act of 1996, the ITRB was established in July 1996 by Executive Order 13011. Some of the goals of this Executive Order were to:

- Create a support structure that builds on existing successful interagency efforts to provide expertise and advice to agencies;
- Improve the management and use of IT within and among agencies by identifying and sharing experiences, ideas, and promising practices; and
- Provide innovative, multi-disciplinary, project-specific support to agencies to enhance interoperability, minimize unnecessary duplication of effort, and capitalize on agency successes.

In concert with these goals, the ITRB has two primary objectives. The Board conducts confidential assessments of mission critical information system projects at the request of client agencies. In addition, based upon their own experiences and insights gleaned from their assessments, the ITRB shares information across all levels of government in the form of publicly available guides. To date, these guides are:

- *Project Management for Mission Critical Systems*
- *Practical Strategies for Managing Information Systems*
- *The Diminishing Pool of Skilled Information Technology Executives: IT Brain Drain; and*
- *Managing Information Systems: A Practical Assessment Tool.*

Board members are executives and experienced practitioners from Federal agencies who bring diverse program, technical, and acquisition management expertise to managing and developing major information systems. Ultimately, the ITRB's activities advance measurable improvements in mission performance and service delivery through the strategic application of information technology.

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Introduction

Increasingly, Federal agencies are turning to a Commercial Off the Shelf (COTS) application package solution for requirements that previously were met by in-house or contractor software development projects. This shift to COTS solutions is driven by several factors, including the:

- inability of software developers to complete projects on time, or within or under budget,
- growing availability of COTS packages for business and administrative functions,
- allure of enterprise-wide solutions, and
- volume of articles in the trade press that have declared COTS solutions as more cost effective than developed software.

Caveat emptor. The majority of COTS solutions require extensive customization to meet the needs and support the business processes of the Federal environment. Federal agencies must make major business process reengineering changes to use COTS solutions as delivered. Often, COTS packages provide only a partial solution and require an interface to an existing system. The interface may be simple or difficult to implement, but usually requires personnel resources to resolve subsequent problems.

The Information Technology Resources Board (ITRB) believes that the availability of appropriate guidelines and information gleaned from case examples will promote a greater awareness and better informed decisions when considering a COTS solution. This in turn, will lead to more successful COTS implementations in the Federal environment and ideally, result in better service to the American public. So, the ITRB has developed this tool to assist Federal organizations in clarifying the myriad risks they will encounter when facing a COTS implementation.

We also recognize the value of sharing practical, proven experiences. To supplement the Risk Profile, the ITRB offers the following "lessons learned" distilled from our extensive experience in developing, acquiring, and managing information systems for the Federal government:

- **Understand the COTS product**—Early in the process, obtain a comprehensive understanding of the functionality of the COTS package. If possible, obtain hands-on experience with the system. Consider prototyping or piloting the package in your environment. At a minimum, visit another organization that is operating the same software.

ensure that the product's capabilities support the needs of your organization. For instance, confirm

- **Examine the "gap"**—Because no COTS product has been specifically designed to meet your organization's unique requirements, there will be a gap between the business processes supported by your existing systems and those supported by the COTS package. It is imperative that you understand this gap *well before* the implementation begins and ensure your organization can accept this gap without degrading performance.
- **Incorporate lessons learned**—One of the benefits of using a COTS product is that other organizations have undergone a similar implementation process. Be sure to actively solicit and rigorously incorporate into your own plans those lessons learned from organizations *similar to yours*.
- **Secure required resources**—Acclimating an organization to the new business processes supported by a COTS product takes time and resources. Be sure, before the implementation begins, that your organization has the time and financial and personnel resources necessary to support it during the acclimation period. It is also important that your team contains the appropriate "balance" of technical and functional experts and (if possible) is experienced in the implementation of the considered COTS product.
- **Focus on the data and the interfaces**—Document the legacy database, and build and test conversion routines early on. Build interfaces before deciding on a business solution, then look at the business solution that satisfies those interfaces. Key business practices that are hard to change are likely to be captured in interfaces. Go through initial prototyping early.
- **Involve functional users**—Because the implementation of a COTS product could significantly impact the business functions of an organization, it is imperative to involve the user community in the planning process from the outset. In addition to the technical issues, understanding the business issues will lower the risks associated with the COTS implementation. A stable operating environment coupled with functional users willing to accept a new way of doing business will also minimize implementation obstacles.
- **Validate performance and scalability**—Confirm, with other users, the product's capabilities, especially performance and scalability. Also

Risk Profile

This Risk Profile is organized around five broad categories: business purpose, organization, technology, acquisition, and implementation. Each category, which represents critical aspects required for the successful implementation of a COTS application package(s), is defined below:

- **Business Purpose:** The business requirements driving the organization to consider a COTS solution and the “fit” of those requirements with available COTS application package(s).
- **Organization:** The existing organizational factors that determine the appropriateness of a specific COTS solution including - but not limited to - location(s), infrastructure, and staff experience.
- **Technology:** The technical “fit” of the COTS product(s) with the existing and planned technical architecture, which supports an organization. This includes the organization’s inherent technical challenges, such as the number and complexity of interfaces and performance requirements.
- **Acquisition:** The key considerations for developing and executing a successful acquisition strategy, including type of contract and vendor past performance.
- **Implementation:** The process that drives the delivery of a COTS solution within an organization that includes - but is not limited to - cost, schedule, testing, and managing organizational change.

***NOTE:** Within each category, Risk Profile questions about COTS software refer to COTS application package(s) and COTS product(s), synonymously.*

Assessing Results

Risk Profile questions are organized around the five broad areas of implementing a COTS solution as presented above. Each question prompts you, the respondent, to think about key factors for a successful COTS application package implementation. You should carefully consider your answer in terms of how it pertains to projects within your own organization.

Completing the questions and assessing results will help you to better understand the overall level of risk associated with

that the product has previously supported the number of users and geographic locations your organization will require. Test the COTS product in your operating environment to ensure compatibility.

- **Select mature products**—An implementation involving a COTS product with a successful track record is less risky than one that involves new, unproven capabilities. It is therefore crucial to utilize mature, "road-tested" COTS products. Ensure that a reputable and reliable vendor is and plans to be available to support the product.
- **Fully understand contractual conditions**— Understand completely, the details associated with the product contract, including the licensing agreement. Be sure to find out: who owns the license to the source code; what rights are provided relative to source code modification; and what arrangements will exist at contract expiration. Validate that the agreement sufficiently meets your organization's needs. For example, if everyone in the organization will need to access the product, ensure the license is for the entire enterprise. It has also been proven that a mutually beneficial relationship between the government and the vendor will allow the government to drive or benefit from enhancements to the COTS product.
- **Sustainment is usually underestimated**— A perception exists that a COTS approach minimizes future requirements. In fact, sustainment of a COTS product requires maintenance of system interfaces, integration of various components, and accommodation of hardware/operating system changes. It is important that resources for sustainment are both planned for and appropriately allocated.

The Risk Profile offered here incorporates some of the most significant lessons learned from a variety of COTS implementations to help you evaluate risk in your own organization.

implementing a COTS application package(s) given current business needs and organizational conditions. In turn, this knowledge will help guide you to take the steps necessary to minimize specific risks associated with the implementation of a COTS product(s). Your profile may also be particularly useful in formulating a strategy for acquiring a COTS product(s).

Answers to each question are provided by the choice a, b or c, which correlate to the three levels of risk: low, medium and high, respectively. A box is provided for adding the total number of a, b, or c responses for each section.

If most of your responses were a's, your organization has a low risk profile for successfully implementing a COTS application package(s). While an overall profile of low risk is a strong indicator, it is important to note that this profile does not mean a "no-risk" profile. Every COTS product(s) implementation involves some degree of risk.

If most of your responses were b's, your organization has a moderate risk for implementing a COTS application product(s). Carefully examine the questions, particularly with medium risk (b) and high risk (c) responses to identify specific vulnerabilities.

If most of your responses were c's, your organization has a high degree of risk for implementing a COTS product(s). Review the questions to help your organization identify critical areas that need to be reexamined regardless of its COTS implementation phase. Many organizations who attempt to implement a COTS application package(s) without sufficient analysis and preparation encounter significant challenges that can be related to the business processes used to build systems, technologies used to construct the system, and organizational change management issues that inevitably arise. Careful consideration of these issues will help to minimize your organization's Risk Profile and curb future expenditures.

With any level of risk, awareness of lessons learned by other organizations that have implemented a COTS application package(s) will help build or strengthen strategies to address any unexpected challenges that may arise.

Business Purpose

1. How well are your organization's business requirements documented?
 - a. Thoroughly—comprehensive, current documentation exists
 - b. Moderately well—comprehensive documentation exists, but has not been updated recently
 - c. Poorly—minimal documentation exists
2. What priority does the COTS application package(s) implementation represent in the organization?
 - a. High—for example, included in business plan
 - b. Medium
 - c. Low
3. Because specific business processes are associated with each COTS application package(s), how would you describe the relationship between the business processes of the COTS product(s) and those of your organization?
 - a. Ideal—great fit
 - b. Satisfactory—acceptable fit
 - c. Unsatisfactory—marginal fit
4. How would you describe the level of consistency or standardization of operating procedures among your organization's business functions that will be affected by the COTS product(s) implementation?
 - a. High
 - b. Medium
 - c. Low
5. How would you describe your organization's ability to adapt to the new business processes supported by the COTS product(s)?
 - a. Very able—there is a general understanding that the new business processes would enhance organization's operation
 - b. Somewhat able—there is a general understanding that the new business processes would not enhance or deter organization's operation
 - c. Not able—there is a general understanding that the new business processes would deter organization's operation

The implementation of a COTS application package dramatically changed "the division of labor" in the business processes that affected the government and the client community they served. In exchange for a promise from the government that there would be no user fees on the client community, the client community willingly accepted the shift of burden to them associated with the COTS-related business processes. This up-front agreement with affected clients created early buy-in, and accelerated the business changes needed to assure a successful implementation.

DEFINITIONS

Business Function: A collection of related business processes, e.g., personnel function

Business Process: A specific ordering of work activities across time and place, with a beginning, an end, and clearly defined inputs and outputs that deliver value to customers

6. Was a "gap" analysis conducted to determine the fit of the identified requirements with the COTS product(s)?
 - a. Yes
 - b. Don't know
 - c. No

7. How many business functions (e.g., accounting, procurement) are supported by the COTS application package(s)?
 - a. Single function
 - b. Few functions
 - c. Many functions

8. How many COTS product(s) can accommodate your organization's requirements?
 - a. Many
 - b. Some
 - c. Few

9. In the organization where the COTS product(s) will be implemented, how would you characterize the need for the organization to respond to mandatory, quick changes (e.g., legislative changes)?
 - a. Demands for changes are limited and few
 - b. Demands for changes are moderate
 - c. Demands for changes are frequent and far reaching

10. Who will be responsible for identifying business processes affected by the COTS product(s) implementation?
 - a. End users
 - b. Middle management
 - c. Executive management

A large federal agency had undertaken reengineering in some key areas. As a result, several "stovepiped" systems solutions emerged to support the new processes. The organization decided to invest in an enterprise-wide implementation of a COTS application package to create better integration information and processes. The selected package was highly compliant with Federal requirements for the affected functions. The agency decided to reengineer concurrently with deployment, using the vendor provided "template" as a starting point for certain business processes.

One program manager within a large organization strongly emphasized the need to, "shape expectations and stay the course". He found it critical to have a committed core group of users and senior leadership because it is inevitable that "nay-sayers" will materialize at the first misstep. This program manager had success in quelling the "nay-sayers" with visibly committed senior leadership and "getting to the field quickly."

Responses in
Business Purpose
Section:

a ____ x 1 = ____

b ____ x 2 = ____

c ____ x 3 = ____

Total = ____

Organization

1. How many sites within your organization will be affected by the COTS product(s)?
 - a. One
 - b. Several
 - c. Many
2. How would you describe the geographic dispersion of the organization where the COTS product(s) will be implemented?
 - a. All offices are local
 - b. Offices are regional
 - c. Offices are national
3. How would you describe the organization that will be affected by the COTS application package(s) implementation?
 - a. Single office within an agency
 - b. Multiple offices within an agency
 - c. Multiple agencies within a department
4. How would you describe the operational control of the organization affected by the COTS product(s) implementation?
 - a. Centralized
 - b. Combination of centralized and decentralized
 - c. Decentralized
5. How would you describe the existing telecommunications infrastructure's ability to support new configurations and processes?
 - a. Can support new configurations and processes
 - b. Needs improvement
 - c. Cannot support new configurations and processes
6. How would you describe the sufficiency of *skilled staff in the business functions affected* by the COTS application package(s) implementation?
 - a. Sufficiently staffed and skilled at each affected location
 - b. Minimally staffed and skilled at most affected locations
 - c. Insufficiently staffed and skilled at most or all locations
7. How much experience does the COTS implementation project team have with the COTS product(s)?
 - a. Extensive experience
 - b. Some experience
 - c. No experience

One successful agency learned the importance of emphasizing the business first. "Find out the fundamental impact on the business, rather than the most elegant technical solution", advised the program manager. To strike the appropriate balance, the enterprise-wide COTS implementation project team was staffed with a mix of functional experts, business people, and technicians. "Representation of functional experts was even more critical to this COTS implementation than to a comparable in-house development".

8. How much experience does the project team have with implementation of other COTS products?
- a. Experienced with many COTS products
 - b. Experienced with a few COTS products
 - c. Experienced with no other COTS products
9. If the COTS product includes a data base management system (DBMS), how much experience does the project team have with the DBMS of the COTS application package(s)?
- a. Extensive—COTS DBMS is included in many of the organization's systems
 - b. Some—COTS DBMS is included in few of the organization's systems
 - c. None—COTS DBMS is not included in any of the organization's systems

Responses in
Organization Section:

a ___ x 1 = ___

b ___ x 2 = ___

c ___ x 3 = ___

Total = ___

Technology

1. Is the COTS application package(s) a totally new system for the organization?
 - a. System is a replacement
 - b. Components of the system are new
 - c. New system
2. To adequately address your organization's needs, what is the level of customization required for the COTS product(s) baseline?
 - a. No customization necessary
 - b. Some customization necessary
 - c. Much customization necessary
3. How does the COTS application package(s) "fit" with the organization's existing and planned architecture?
 - a. Good fit
 - b. May fit
 - c. Not a fit
4. How would you describe the complexity of the interfaces between the COTS product(s) and other systems?
 - a. Simple
 - b. Somewhat complex
 - c. Very complex
5. How many systems interfaces must remain unchanged after the implementation of the COTS product(s)?
 - a. Few
 - b. Some
 - c. Many
6. How would you describe the sufficiency of documentation supporting the system(s) with which the COTS application package(s) will interface?
 - a. Thorough documentation
 - b. Some documentation
 - c. Poor documentation
7. Using the number of tables as an indicator, how complex is the COTS application package(s)?
 - a. Not complex—very few tables
 - b. Somewhat complex—moderate number of tables
 - c. Very complex—large number of tables

One program manager within a large organization experienced problems when working with two inter-dependent modernization programs. Both programs were going down two different paths with COTS and they were not interfacing. "No disciplined interface control process", became a large obstacle. "It is crucial that the developer understands the two interfacing systems."

8. To what extent has your organization tested COTS application package(s) in your environment?
 - a. Conducted extensive testing
 - b. Conducted some testing
 - c. Have not conducted any testing
9. Do the security features included in the COTS product(s) need modification to meet your organization's needs?
 - a. No modification needed
 - b. Some modification needed
 - c. Extensive modification needed
10. How well does the database design and structure of the COTS application package(s) support the planned use of the product and your organization's business functions?
 - a. Supports most requirements
 - b. Supports some requirements
 - c. Does not support requirements
11. Using the number of records as an indicator, what is the level of effort associated with converting required data to the COTS product(s) database or DBMS?
 - a. Small number of database records to be converted
 - b. Moderate number of database records to be converted
 - c. Large number of database records to be converted
12. How would you describe the run time performance of the COTS product(s) in your environment?
 - a. Very efficient
 - b. Moderately efficient
 - c. Not efficient
13. Does the run time performance of the COTS application package(s) meet the organization's performance needs?
 - a. Efficiently supports the number and location of users
 - b. Supports needs with performance degradation
 - c. Does not support needs
14. How flexible is the design of the COTS product(s) to allow for future changes in functionality?
 - a. Very flexible—product functions can be easily separated to be modified
 - b. Moderately flexible—product functions can be separated to be modified
 - c. Not flexible—product functions can not be separated to be modified

The program office for a large enterprise-wide COTS application package implementation was caught by surprise after initial deployment. They were implementing a "solution" that was 70% unique and customized, and 30% truly "off-the-shelf". They purchased an enterprise license for the software, only to discover that under that agreement they had not gained crucial rights to use the source code. They felt as though they were held hostage!

15. How would you describe the COTS product(s) ability to meet the Joint Financial Management Improvement Program (JFMIP) core requirements, if applicable?

- a. Exceeds JFMIP core requirements
- b. Meets JFMIP core requirements
- c. Does not meet JFMIP core requirements

16. Has the COTS application package(s) been certified by JFMIP, if applicable?

- a. Yes
- b. Not applicable
- c. Not sure

Responses in
Technology Section:

a ___ x 1 = ___

b ___ x 2 = ___

c ___ x 3 = ___

Total = ___

Acquisition

1. What type of contract will be used to procure the COTS application package(s) and support services?
 - a. Firm fixed price
 - b. Cost reimbursable/best effort
 - c. Multiple Award Schedule
2. How many contracts will be used to procure the COTS product(s) and support services?
 - a. 1
 - b. 2-3
 - c. More than 3
3. Do users of the considered COTS product(s) view it as a time-tested, mature product?
 - a. Very mature
 - b. Somewhat mature
 - c. New or immature
4. How satisfied are users with the considered COTS application package(s)?
 - a. Consistently reported as satisfied
 - b. Qualified or limited satisfaction
 - c. No experience or unsatisfied
5. What is the vendor's experience with implementing the COTS product(s) in organizations of a size similar to yours?
 - a. Extensive experience
 - b. Some experience
 - c. No experience
6. What is the vendor's experience with implementing the considered COTS product(s) in organizations of a management structure similar to yours?
 - a. Extensive experience
 - b. Some experience
 - c. No experience
7. What is the vendor's experience with implementing the COTS product(s) in organizations of a geographic dispersion similar to yours?
 - a. Extensive experience
 - b. Some experience
 - c. No experience

Despite a good evaluation of available, suitable products on the market, and a limited Operational Capability Demonstration, one large program office found that even these well-executed steps were insufficient to avoid major problems when it came to implementation. Integration of the selected COTS application package with existing systems caused major delays and cost overruns. A key official offered hindsight wisdom, that "we should have required a full-blown test before selection"!

8. How has the vendor performed in the integration of the COTS application package(s) elsewhere?
 - a. Excellent past performance
 - b. Good past performance
 - c. Poor or unknown past performance

9. What is the vendor's track record with implementing the COTS product(s) within their cost proposal?
 - a. Below total life cycle cost estimate
 - b. Met total life cycle cost estimate
 - c. Exceeded total life cycle cost estimate

10. How do other users of the COTS product describe their satisfaction with the experience levels of the vendor staff?
 - a. Very satisfied
 - b. Somewhat satisfied
 - c. Unsatisfied

11. How do other users of the COTS product describe their satisfaction with availability of the vendor staff?
 - a. Very satisfied
 - b. Somewhat satisfied
 - c. Unsatisfied

12. How much experience do other support contractors serving your organization in functions affected by the COTS implementation have with the COTS application package(s)?
 - a. Extensive experience
 - b. Some experience
 - c. No experience

13. To what extent does your acquisition approach include an understanding of the vendor's future plans for the COTS product(s)?
 - a. Statement of direction for the product, including planned enhancements and release dates, has been received
 - b. Discussions have been conducted with vendor regarding future direction, but no plans have been received in writing
 - c. No discussion with vendor regarding future direction

14. If the COTS vendor offers one suite of products that provides a commonly needed system functionality, are customization and maintenance included in the cost proposal?
 - a. All changes negotiated into cost
 - b. Many changes negotiated into cost
 - c. Uncertain what changes are needed

The program office selected to spearhead the large, enterprise-wide COTS implementation had little experience dealing with vendors. Their "best effort" contract created disincentives for the vendor that had been unanticipated. For example, the program office suspected that they were not receiving the benefit of improvements to the product made and paid for by other government clients. Because contractually the company could charge each government client for changes, the company was not motivated to improve its baseline product.

A large, complex COTS implementation yielded several pearls of wisdom from the surviving program manager. "With vendors you want discipline and flexibility but they seldom coexist. Look for a company that can do both. System integration always takes longer than planned -- double the amount of time and maybe even triple it. When you start looking for schedule savings -- don't look there for it. Sustainment is also almost always underestimated. A small maintenance fee is the wrong idea."

15. If the COTS vendor offers an integrated, heterogeneous mix of products to provide a customized system functionality, are customization and integration included in the cost proposal?
- a. All changes negotiated into cost
 - b. Many changes negotiated into cost
 - c. Uncertain what changes are needed

Responses in
Acquisition Section:

a ___ x 1 = ___

b ___ x 2 = ___

c ___ x 3 = ___

Total = ___

Implementation

1. Has your organization examined and applied the lessons learned from other organizations that implemented the COTS application package(s)?
 - a. Yes—relevant lessons learned have been incorporated into the implementation plan
 - b. Somewhat—past projects have been discussed by the project team
 - c. No—have not gathered any information regarding other implementations
2. How will your organization measure the impact and effectiveness of the COTS product(s)?
 - a. Comprehensive performance measures (including cost, time spent on each activity, etc.) have been established
 - b. Performance measures have been discussed but not finalized
 - c. No discussion of performance measures
3. How does the implementation approach support the assessment of benefits?
 - a. Rapid test and assessment are incorporated
 - b. Some test and assessment are incorporated
 - c. No test and assessment are incorporated
4. What sort of testing approach is planned for the COTS product(s)?
 - a. Designed specifically for a COTS implementation
 - b. Combines traditional systems development testing with COTS-specific testing
 - c. Designed for traditional systems development activities
5. How was the implementation schedule developed?
 - a. Developed by the implementation team after considering all of the relevant factors
 - b. Developed by individuals not responsible for the implementation
 - c. No implementation schedule was developed
6. What factors were considered in developing the implementation schedule?
 - a. Time required, needed resources, (e.g., money and people) and experiences from similar implementation
 - b. Time required and needed resources
 - c. Time required

The COTS implementation program office selected one of the largest organizational components in which to pilot the COTS application package. Unfortunately, the pilot organization refused to abandon their arcane business process and adopt the accepted business rules in the selected COTS product. Not until a new leadership team was brought in did the implementation make headway. The pilot organization is moving swiftly now toward the new business practices.

7. How will your organization staff the COTS application package(s) implementation?
 - a. Dedicated full time staff
 - b. Dedicated part time staff
 - c. Ad hoc staffing

8. How would you describe the process by which your organization will implement new requirements after the initial implementation of the COTS product(s)?
 - a. Well-defined, proven process has been established to evaluate and implement new requirements (e.g., configuration control board)
 - b. Process for evaluating and implementing new requirements has been discussed, but not solidified
 - c. No process exists for evaluating and implementing new requirements

9. There are a variety of regulations, policies, and directives related to the general use of commercial products. How will your organization ensure appropriate regulations, policies, and directives have been incorporated into the COTS product(s) and associated business processes?
 - a. Designate an individual to focus on these issues
 - b. Assign the project team to investigate these issues, as time permits
 - c. Rely on the COTS vendor to inform the organization of any changes

10. How would you describe your organization's ability to support new releases of the COTS product(s)?
 - a. Sufficient—staffing plan for ongoing support of the COTS application package(s) has been developed
 - b. Moderate—staffing needs have been identified, but plan has not been finalized
 - c. Minimal—no staff resources are available after the initial implementation

11. How has the organization prepared for the possibility that the COTS application package(s) vendor goes out of business or discontinues support for the product?
 - a. Contingency plan finalized and ready to implement
 - b. Possibility discussed, but have no finalized plan
 - c. Possibility not discussed, no contingency plan being developed

One agency created a successful partnership with their COTS vendor. The performance-based contract placed the burden of version control and integration at the agency's numerous sites on the vendor. The government gained access to a factory testbed supported by all of the vendor's clients, far superior to the government's previous development testbed. Further, based upon excellent results, the government endorsed the vendor's product to several countries. This resulted in sales that increased the client base. This in turn, further reduced the cost of upgrades to the government. The agency also offered to share training experience and access to their operational testbed with other countries in order to foster international standards.

DEFINITION

Configuration Control Board:

A group of designated individuals responsible for approving change request for software

Responses in Implementation Section:

a ___ x 1 = ___

b ___ x 2 = ___

c ___ x 3 = ___

Total = ___

Tools for the Toolkit

Software Engineering Institute
Carnegie Mellon University
Pittsburgh, PA 15213-3890
Phone, Voicemail, and On-Demand Fax: 412-268-5800
<http://www.sei.cmu.edu/sei-home.html>

- Software Engineering Institute's COTS-Based System Initiative
<http://www.sei.cmu.edu/cbs/>

Institute for Information Technology
National Research Council of Canada
Building M-50
Montreal Road
Ottawa, ON K1A 0R6
Phone: 613-993-3320
Fax: 613-952-0074
<http://www.iit.nrc.ca/english.html>

- "COTS-Software in Systems Development" (article)
<http://wwwsel.iit.nrc.ca/projects/cots/COTSpq.html>
- "Managing Long Lived COTS-Based Systems" (article)
<http://wwwsel.iit.nrc.ca/seldocs/cotsdocs/NRC41587.pdf>

Software Technology Support Center
OO-ALC/TISE
7278 Fourth Street
Hill AFB
UT 84056-5205
Phone: 801-777-8045
Fax: 801-777-8069
<http://www.stsc.hill.af.mil/stscinfo.asp>

- "The Ten Commandments of COTS" (article)
<http://www.stsc.hill.af.mil/crosstalk/1997/may/commandments.asp>
- "A Software Development Process for COTS-Based Information System Infrastructure" (article)
<http://www.stsc.hill.af.mil/crosstalk/1998/mar/fox.pdf>

Joint Financial Management Improvement Program (JFMIP)
<http://www.financenet.gov/financenet/fed/jfmip/jfmip.htm>

Additional Resources

DOD Software Program Managers Network
PO Box 2523
Arlington, VA 22202
Phone: 703-521-5231
<http://www.spmn.com>
spmn@aol.com

Defense Technical Information Center

8725 John J. Kingman Road
Suite 0944

Ft. Belvoir, VA 22060-6218

Phone: 800-225-3842

bcporder@dtic.mil

<http://www.dtic.mil>*

**there may be a fee associated with accessing information*

General Accounting Office (GAO)

441 G Street, NW

Washington, DC 20548

Phone: 202-512-3000

<http://www.gao.gov>

documents@gao.gov

- [T-AIMD-97-176] Medicare Automated Systems: Weaknesses in Managing Information Technology Hinder Fight Against Fraud and Abuse
- [AIMD-99-20] Defense IRM: Alternatives Should Be Considered in Developing the New Civilian Personnel System
- [T-AIMD-95-133] Medicare Claims Billing Abuse: Commercial Software Could Save Hundreds of Millions Annually

Defense Systems Management College

9820 Belvoir Road

Fort Belvoir, VA 22060-5565

Phone: 703-805-3666

<http://www.dsmc.dsm.mil>

Relevant DSMC course:

- Advanced Software Acquisition Management
<http://www.dsmc.dsm.mil/courses/crsdesc/sam301.htm>

Federal Acquisition Institute Online University

General Services Administration

18th and F Streets, NW

Washington, DC 20405

<http://www.faionline.com>

acquisition@gsa.gov

Relevant FAI Online University courses:

- Intermediate Software Acquisition Management
- Advanced Software Acquisition Management
<http://dau.fedworld.gov/dau/catalog/catalog1.cfm?coursePrefix=SAM>



Report to the Joint Legislative Audit Committee: A New Approach to IT Management

APPENDIX D

DOA Form 2840—State of Wisconsin Master Lease Program—Request for
Use and Approval

Master Lease Program REQUEST FOR USE & APPROVAL

Request Date											
Requesting Agency		Program Name									
Division / Bureau		Contact Person									
Agency Address		Phone No. ()									
Zip & 4		Fax No. ()									
Equipment to be Financed		Use / Purpose of Equipment									
Total Amount of Equipment	Amount (if any) to be paid up front										
Proposed Vendor(s)		Proposed Delivery Date									
Master Lease Purchase Order Number(s)		Proposed Acceptance Date									
Requested Payment Period In Number of Years		Are anticipated lease payments part of base budget? <input type="checkbox"/> No <input type="checkbox"/> Yes									
Preferred Starting Date Feb 1, 19 _____ OR Aug 1, 19 _____		Final Payment Date Feb 1, 19 _____ OR Aug 1, 19 _____									
		Proposed Funding Source <input type="checkbox"/> GPR <input type="checkbox"/> SEG <input type="checkbox"/> Leg Other _____									
		Proposed Statutory Appropriation for lease payments: <input type="checkbox"/> Alternative Financing Options attached									
WiSMART Accounting Codes (from which lease payment will be made)	Agy.	Org.	Sub Org	App r	Actv.	Obj.	Sub. Obj.	Rptg. Cat.	Proj #	FY	\$ Amount OR %
If different from contact listed above, person to receive Updated Lease Schedules.		Name		Phone No.		Fax No.					
FOR DOA USE ONLY										Special Conditions	
Master Lease Program Approval									Date		
State Budget Analyst Approval									Date		
DOA Secretary's Office Preliminary Approval									Date		



Report to the Joint Legislative Audit Committee: A New Approach to IT Management

APPENDIX E

DOA Form 2481—State of Wisconsin Master Lease Program—Notice of
Equipment Acceptance

State of Wisconsin
Department of Administration
Division of Executive Budget & Finance
Capital Finance Office
Master Lease Program
DOA-2481 (C08/95)

101 E. Wilson Street, 10th Floor
Madison, WI 53707-7864
(608) 267-0374
FAX (608) 266-7645

Master Lease Program NOTICE OF EQUIPMENT ACCEPTANCE

Date	This Notice and ORIGINAL invoice (s) must be returned to the Master Lease Program for payment to be issued.		
Agency	Division / Bureau		
Vendor	Master Lease Purchase Order No.		
Invoice Number(s)			
Equipment _____ _____ _____ _____ _____ _____ _____			
The equipment listed above has been delivered, installed according and accepted to agency specifications. The Department of Administration is advised that corresponding invoices can be paid.			
Agency Authorized Representative			
_____ Type or Print Name		_____ Title	
_____ Signature		_____ Date	



Report to the Joint Legislative Audit Committee: A New Approach to IT Management

APPENDIX F

State of Wisconsin Master Lease Program—approval, financing or agency repayment activity in FY07 for IT projects

**State of Wisconsin Master Lease Program
Approval, Financing, or Agency Repayment Activity in FY07
IT Projects - Software And Systems Development Only**

		Approval Information									
Agency	Equipment / Project	Approval Date	Approved Financing Amount	Financing Approved in FY07	Prior Approvals Unoriginated 7/1/2006	Approvals During FY07	Approvals Originated During FY07	Approvals Cancelled During FY07	Approvals Unoriginated 6/30/2007		
505	DL Navigator Equipment Package Upgrade for BadgerNet	11/23/2005	2,500,000.00	-	1,384,000.00	-	744,000.00	640,000.00	-		
505	Server Consolidation Initiative Phase 1 ⁽¹⁾	3/3/2006	9,702,249.00	-	3,770,902.52	-	429,746.83	3,341,155.69	-		
505	Server Consolidation Initiative Phase 2 ⁽¹⁾	4/17/2006	21,230,639.00	-	19,322,140.29	-	10,075,517.92	9,246,622.37	-		
505	Integrated Business Information System (IBIS) - Software	6/30/2006	10,466,015.91	-	6,641,008.00	-	1,626,477.10	-	5,014,530.92		
	Administration Total		43,898,903.91	-	31,118,050.81	-	12,875,741.85	13,227,778.06	5,014,530.90		
410	Development of Integrated Corrections System (ICS)	9/28/2001	1,615,450.00	-	(3)	-	-	-	-		
410	Development of Integrated Corrections System (ICS)	8/22/2002	5,690,000.00	-	(3)	-	-	-	-		
410	Development of Integrated Corrections System (ICS)	9/19/2003	179,500.00	-	(3)	-	-	-	-		
410	Development of Integrated Corrections System (ICS)	12/11/2003	205,000.00	-	(3)	-	-	-	-		
410	Development of Integrated Corrections System (ICS) ⁽²⁾	3/30/2005	10,350,000.00	-	10,350,000.00	-	-	-	10,350,000.00		
	Corrections Total		18,039,950.00	-	10,350,000.00	-	-	-	10,350,000.00		
435	Development of WISACWIS Phase 2 Statewide Rollout	7/18/2001	22,577,421.00	-	(3)	-	-	-	-		
435	Development of E-WISACWIS	7/16/2002	4,200,000.00	-	(3)	-	-	-	-		
435	CARES Web Graphical User Interface	7/20/2004	4,000,000.00	-	(3)	-	-	-	-		
435	Medicaid Management Information System (MMIS)	9/29/2005	2,150,000.00	-	2,150,000.00	-	-	-	2,150,000.00		
	Health and Family Services Total		32,927,421.00	-	2,150,000.00	-	-	-	2,150,000.00		
455	Servers and Storage Area Network System ⁽¹⁾	9/20/2004	499,871.00	-	(3)	-	-	-	-		
	Justice Total		499,871.00	-	(3)	-	-	-	-		
765	Development of Data Center ⁽¹⁾	1/6/2005	3,200,000.00	-	(3)	-	-	-	-		
	Legislature Total		3,200,000.00	-	(3)	-	-	-	-		
370	Recreational Vehicle Online Registration System	1/23/2007	275,000.00	YES	-	275,000.00	-	-	275,000.00		
	Natural Resources Total		275,000.00	YES	-	275,000.00	-	-	275,000.00		
255	Various IT Hardware/Software Upgrades ⁽¹⁾	5/5/2005	169,483.40	-	(2)	-	-	-	-		
	Public Instruction Total		169,483.40	-	(2)	-	-	-	-		
566	Integrated Tax System (ITS) - Excise Tax System	2/21/2002	1,898,682.00	-	(3)	-	-	-	-		
566	Integrated Tax System (ITS) - Phase 2.1	12/19/2002	7,303,244.00	-	(3)	-	-	-	-		
566	Integrated Tax System (ITS) - Phase 2.2	12/19/2002	16,726,640.51	-	7,940,455.93	-	3,910,000.00	4,030,455.93	-		
566	Development of E Filing of Real Estate Transfer Return	3/17/2005	256,000.00	-	(3)	-	-	-	-		
566	Data Warehouse Project ⁽¹⁾	4/13/2005	404,612.08	-	(3)	-	-	-	-		
566	Integrated Property Assessment Software (IPAS)	5/19/2006	1,023,770.00	-	879,583.00	-	111,050.00	-	788,533.00		
566	Integrated Tax System (ITS) WINPAS - Phase 4	6/6/2007	17,540,000.00	YES	-	17,540,000.00	-	-	17,540,000.00		
	Revenue Total		45,152,948.59	YES	8,820,038.93	17,540,000.00	4,021,050.00	4,030,455.93	18,308,533.00		
395	CADD Equipment	2/7/2000	1,000,000.00	-	209,701.00	-	-	-	209,701.00		
395	DMV Database Redesign 2001	1/31/2002	9,000,000.00	-	(3)	-	-	-	-		
	Transportation Total		10,000,000.00	-	209,701.00	-	-	-	209,701.00		
	Grand Total		154,163,577.90	-	52,647,790.74	17,815,000.00	16,896,791.85	17,258,233.99	36,307,764.90		

Notes

⁽¹⁾ Primarily hardware components, but included on this report because software and systems development components are present as well.

⁽²⁾ Conditional approval pending

⁽³⁾ Reflects completion of project prior to July 1, 2006

**State of Wisconsin Master Lease Program
Approval, Financing, or Agency Repayment Activity in FY07
IT Projects - Software And Systems Development Only**

		Financing Information					
Equipment / Project	Agency	Maturity Date	Principal Retired in FY07	Principal Balance 7/1/2006	Amount Financed During FY07	Principal & Interest Payments During FY07	Principal Balance 6/30/2007
DL Navigator Equipment Package Upgrade for BadgerNet	505	9/1/2008	YES	1,012,531.47	744,000.00	1,824,043.46	4,500,155.20
Server Consolidation Initiative Phase 1 ⁽¹⁾	505	3/1/2009	-	5,792,279.57	429,746.83	1,979,621.97	9,578,713.76
Server Consolidation Initiative Phase 2 ⁽¹⁾	505	3/1/2009	-	530,488.04	10,075,517.92	1,174,061.11	5,102,676.30
Integrated Business Information System (IBIS) - Software Administration Total	505	3/1/2013	-	3,693,154.61	1,626,477.10	345,830.30	19,181,545.26
				11,028,453.69	12,875,741.85	5,323,556.84	
Development of Integrated Corrections System (ICS)	410	9/1/2008	-	765,973.17	-	381,995.88	413,215.99
Development of Integrated Corrections System (ICS)	410	9/1/2008	-	1,190,748.64	-	613,504.15	628,050.09
Development of Integrated Corrections System (ICS)	410	9/1/2008	-	83,935.00	-	39,428.87	48,219.64
Development of Integrated Corrections System (ICS)	410	9/1/2008	-	57,123.19	-	26,833.90	32,816.58
Development of Integrated Corrections System (ICS) ⁽²⁾	410		-				
Corrections Total				2,097,780.00	-	1,061,762.80	1,122,302.30
Development of WISACWIS Phase 2 Statewide Rollout	435	3/1/2006	-	3,474,531.34	-	1,460,680.52	2,162,036.82
Development of E-WISACWIS	435	3/1/2007	YES	975,568.32	-	450,850.73	566,929.75
CARES - Web Graphical User Interface	435	9/1/2009	-	2,895,537.63	-	1,046,180.99	1,983,215.78
Medicaid Management Information System (MMIS)	435		-				
Health and Family Services Total				7,345,637.29	-	2,957,712.24	4,712,182.35
Servers and Storage Area Network System ⁽¹⁾	455	9/1/2007	-	137,213.82	-	97,020.62	45,916.30
Justice Total				137,213.82	-	97,020.62	45,916.30
Development of Data Center ⁽¹⁾	765	3/1/2009	-	2,463,614.17	-	1,154,570.52	1,418,990.31
Legislature Total				2,463,614.17	-	1,154,570.52	1,418,990.31
Recreational Vehicle Online Registration System	370		-				
Natural Resources Total							
Various IT Hardware/Software Upgrades ⁽¹⁾	255	3/1/2008	-	63,964.01	-	34,586.97	32,185.21
Public Instruction Total				63,964.01	-	34,586.97	32,185.21
Integrated Tax System (ITS) - Excise Tax System	566	9/1/2008	-	712,879.55	-	324,280.14	420,506.49
Integrated Tax System (ITS) - Phase 2 1	566	9/1/2009	-	3,725,283.71	-	1,249,269.56	2,645,063.37
Integrated Tax System (ITS) - Phase 2 2	566	9/1/2009	-	5,597,805.83	3,910,000.00	1,831,831.38	8,046,221.95
Development of E Filing of Real Estate Transfer Return	566	3/1/2008	-	380,286.24	-	208,207.82	189,966.46
Data Warehouse Project ⁽¹⁾	566	3/1/2008	-	277,800.96	-	150,214.02	139,783.05
Integrated Property Assessment Software (IPAS)	566	3/1/2013	-	28,281.64	111,050.00	19,492.65	125,462.48
Integrated Tax System (ITS) WINPAS - Phase 4	566		-				
Revenue Total				10,722,337.93	4,021,050.00	3,783,295.57	11,567,003.80
CADD Equipment	395	9/1/2006	YES	256,801.72	-	105,224.64	163,373.13
DMV Database Redesign 2001	395	9/1/2008	-	4,136,367.46	-	1,432,404.96	2,852,635.06
Transportation Total				4,393,169.18	-	1,537,629.60	3,056,068.19
Grand Total				38,252,170.09	16,896,791.85	15,950,135.16	41,130,193.72

Notes

- ⁽¹⁾Primarily hardware components, but included on this report because software and systems development components are present as well.
- ⁽²⁾Conditional approval pending
- ⁽³⁾Reflects completion of project prior to July 1, 2006

**State of Wisconsin Master Lease Program
Approval, Financing, or Agency Repayment Activity in FY07
IT Projects - Hardware Only**

Equipment / Project	Agency	Approval Information									
		Approval Date	Initial Approved Financing Amount	Financing Approved in FY07	Prior Approvals Unoriginated 7/1/2006	Initial Approvals During FY07	Approvals Originated During FY07	Approvals Cancelled During FY07	Approvals Unoriginated 6/30/2007		
Manframe Capacity Upgrade	505	6/29/2007	12,700,000.00	YES	-	12,700,000.00	-	-	-	12,700,000.00	
Administration Total			12,700,000.00		-	12,700,000.00				12,700,000.00	
IBM pSeries Server Systems	370	5/12/2004	606,134.21	-	(1)	-	-	-	-	-	
Mobile Communications Upgrade	370	11/9/2005	391,860.00	-	(1)	-	-	-	-	-	
Mobile Communications Upgrade	370	6/16/2006	406,936.60	-	-	2,250.00	-	-	2,250.00	-	
Communications Equipment Upgrade	370	6/30/2006	1,599,348.00	-	-	1,309,084.00	-	-	636,952.98	672,131.02	
Communications Equipment Upgrade	370	6/30/2006	131,998.90	-	-	-	-	-	-	-	
Natural Resources Total			3,136,277.71		1,311,334.00	-	-	-	636,952.98	672,131.02	
IT Equipment - Department Wide Applications	255	1/16/2004	142,616.78	-	(1)	-	-	-	-	-	
PCs, Laptops, Monitors & Hardware	255	1/19/2007	212,127.73	YES	-	212,127.73	-	-	212,127.73	-	
Public Instruction Total			354,744.51		-	212,127.73			212,127.73		
Emergency Server Replacement/Laptops	566	4/13/2005	133,405.41	-	(1)	-	-	-	-	-	
LAN Infrastructure Replacement	566	11/22/2006	243,227.62	YES	-	243,227.62	-	-	228,568.46	14,659.16	
PC Replacement	566	1/19/2007	593,154.19	YES	-	593,154.19	-	-	525,249.87	67,904.32	
Revenue Total			969,787.22		-	836,381.81			753,818.33	82,563.48	
Digital Microwave Communication Infrastructure Phase 2	395	1/31/2002	1,309,148.00	-	(1)	-	-	-	-	-	
Portable Radios & Inband Repeaters	395	1/11/2006	1,034,000.00	-	5,613.00	-	-	-	-	-	
Mobile Computer Replacement	395	1/19/2007	3,357,358.45	YES	-	3,357,358.45	-	-	3,134,209.24	223,149.21	
Transportation Total			5,700,506.45		5,613.00	3,357,358.45			3,134,209.24	223,149.21	
PCs for Academic Computing Labs	285	6/10/2004	68,400.00	-	(1)	-	-	-	-	-	
PCs for Academic Computing Labs	285	6/10/2004	43,428.00	-	(1)	-	-	-	-	-	
PCs for Academic Computing Labs	285	6/10/2004	83,300.00	-	(1)	-	-	-	-	-	
Apple Mac PCs; General Access Lab	285	5/5/2005	69,540.00	-	(1)	-	-	-	-	-	
PCs	285	5/5/2005	46,665.00	-	(1)	-	-	-	-	-	
PC and Monitor Replacement	285	4/15/2007	85,779.00	YES	-	85,779.00	-	-	-	85,779.00	
University of Wisconsin Total			397,112.00		-	85,779.00			-	85,779.00	
PCs, Laptops, Monitors, & Hardware	445	2/2/2007	694,095.36	YES	-	694,095.36	-	-	678,395.88	15,699.48	
Workforce Development Total			694,095.36		-	694,095.36			678,395.88	15,699.48	
Grand Total			23,952,523.25		1,316,947.00	17,885,742.35		5,415,504.16	7,863.00	13,779,322.19	

Notes

¹Reflects completion of project prior to July 1, 2006.

**State of Wisconsin Master Lease Program
Approval, Financing, or Agency Repayment Activity In FY07
IT Projects - Hardware Only**

Equipment / Project		Agency	Financing Information				
Maturity Date	Principal Retired in FY07	Principal Balance 7/1/2006	Amount Financed During FY07	Principal & Interest Payments During FY07	Principal Balance 6/30/2007		
Mainframe Capacity Upgrade		505					
Administration Total							
	IBM pSeries Server Systems	370	261,941.40	-	271,386.56	151,645.01	
	Mobile Communications Upgrade	370	353,440.83	-	219,192.09	220,890.88	
	Mobile Communications Upgrade	370	336,462.67	-	128,270.81	485,779.79	
	Communications Equipment Upgrade	370	131,467.23	636,952.98	287,478.49	34,467.27	
	Communications Equipment Upgrade	370	92,115.25	-	61,875.99	892,782.95	
	Natural Resources Total		1,175,427.38	636,952.98	978,203.94		
	IT Equipment - Department Wide Applications	255	15,165.17	-	14,028.59	212,127.73	
	PCs, Laptops, Monitors & Hardware	255	-	212,127.73	-	212,127.73	
	Public Instruction Total		15,165.17	212,127.73	14,028.59		
	Emergency Server Replacement/Laptops	566	22,556.55	-	12,196.89	11,349.94	
	LAN Infrastructure Replacement	566	-	228,568.46	25,241.99	210,183.52	
	PC Replacement	566	-	525,249.87	-	525,249.87	
	Revenue Total		22,556.55	753,818.33	37,438.88	746,783.33	
	Digital Microwave Communication Infrastructure Phase 2	395	529,325.63	-	302,187.49	248,701.68	
	Portable Radios & Inband Repeaters	395	897,255.10	-	232,691.13	710,683.47	
	Mobile Computer Replacement	395	-	3,134,209.24	-	3,134,209.24	
	Transportation Total		1,426,580.73	3,134,209.24	534,878.62	4,093,594.39	
	PCs for Academic Computing Labs	285	25,957.58	-	26,893.57	-	
	PCs for Academic Computing Labs	285	16,480.92	-	17,075.20	-	
	PCs for Academic Computing Labs	285	31,612.09	-	32,751.96	-	
	Apple Mac PCs, General Access Lab	285	71,260.81	-	38,532.53	35,856.80	
	PCs	285	33,349.91	-	18,033.14	16,780.91	
	PC and Monitor Replacement	285	-	-	-	-	
	University of Wisconsin Total		178,661.31	-	133,286.40	52,637.71	
	PCs, Laptops, Monitors, & Hardware	445	-	678,395.88	-	678,395.88	
	Workforce Development Total		-	678,395.88	-	678,395.88	
	Grand Total		2,818,391.14	5,415,504.16	1,697,836.43	6,676,321.99	

Notes

¹Reflects completion of project prior to July 1, 2006.



Report to the Joint Legislative Audit Committee: A New Approach to IT Management

APPENDIX G

Project estimates tool from the Department of Workforce Development

BITS Project Estimating Model

Estimate ProjectEstimatingModel.xls

Phases to be included in the estimate:

- | | | |
|--|---------------------------------------|--|
| <input type="checkbox"/> Project Planning | <input type="checkbox"/> Design | <input type="checkbox"/> System/User Testing |
| <input type="checkbox"/> Requirements Definition | <input type="checkbox"/> Construction | <input type="checkbox"/> Implementation |
| <input type="checkbox"/> Technical Architecture | | |

User Interfaces

of Windows and Reports

0	*	0	=	0
0	*	0	=	0

of Static Web Pages

0 U.I. Base

User Interface Adjusters

% of U.I. that can be built by cloning or modifying

0%	-	10%	=	0%	*	-(% of U.I. Base)	=	0
----	---	-----	---	----	---	-------------------	---	---

No U.I. standards

<input type="checkbox"/>	+	160	=	0
--------------------------	---	-----	---	---

Rewrite of/Enhancement to an existing system

<input type="checkbox"/>				0%	*	U.I. Base	=	0
--------------------------	--	--	--	----	---	-----------	---	---

Availability/Sophistication/Expertise of team

positive situation

<input type="checkbox"/>				-10%	*	U.I. Base	=	0
--------------------------	--	--	--	------	---	-----------	---	---

challenging situation

<input type="checkbox"/>				10%	*	U.I. Base	=	0
--------------------------	--	--	--	-----	---	-----------	---	---

<Summary of User Interface Footnotes>

0 U.I. Total

System Interfaces

of Simple System Links (example: within the system)

0	*	0	=	0
---	---	---	---	---

of Moderate System Links (example: to an internal system)

0	*	0	=	0
---	---	---	---	---

of Complex System Links (example: to an external system)

0	*	0	=	0
---	---	---	---	---

0 S.I. Base

System Interface Adjusters

% of S.I. that can be built by cloning or modifying

0%	-	10%	=	0%	*	-(% of S.I. Base)	=	0
----	---	-----	---	----	---	-------------------	---	---

<Summary of System Interface footnotes>

0 S.I. Total

Data Interfaces

of Fields in Existing Database to be Converted

0	*	0	=	0
---	---	---	---	---

of New Tables

0	*	0	=	0
---	---	---	---	---

of New Stored Procedures and Triggers

0	*	0	=	0
---	---	---	---	---

<Summary of Data Interface Footnotes>

0 D.I. Total

Project Factors

U.I. Total + S.I. Total + D.I. Total

0 Project Base

Average Number of Project Team Members

1	-	3	~	-13%	*	Project Base	=	0
---	---	---	---	------	---	--------------	---	---

Project Adjusters

of Tiers

0	-	2	~	-20%	*	Project Base	=	0
---	---	---	---	------	---	--------------	---	---

of Functional Areas Involved (Users)

0	-	1	~	-4%	*	Project Base	=	0
---	---	---	---	-----	---	--------------	---	---

Skill Level of Project Team

% Very experienced

0%	/	-2	=	0%	*	Project Base	=	0
----	---	----	---	----	---	--------------	---	---

% Average or less experience

0%	/	2	=	0%	*	Project Base	=	0
----	---	---	---	----	---	--------------	---	---

Very High Technical Complexity

<input type="checkbox"/>				10%	*	% of Project Base	=	0
--------------------------	--	--	--	-----	---	-------------------	---	---

Mission Critical or High Risk System

<input type="checkbox"/>				10%	*	Project Base	=	0
--------------------------	--	--	--	-----	---	--------------	---	---

Extensive Documentation Required

<input type="checkbox"/>				10%	*	U.I. Total	=	0
--------------------------	--	--	--	-----	---	------------	---	---

Work Completed To-Date (on phases selected)

0	*	60%	=	0	*	-1	=	0
---	---	-----	---	---	---	----	---	---

New Technical Infrastructure Required

<input type="checkbox"/>		If Selected, TSS Time is 20% of Project Base, Else 10%.						
--------------------------	--	---	--	--	--	--	--	--

<Summary of Project Factor Footnotes>

<Project Number>
<Project Name>
<Current Date>
<Estimator Name>

**0 ADS, SIS &
BSS Hours**

0 TSS Hours

0 Total Hours

BITS Interface Project Estimating Model (B.I.P.E.M.)

Footnotes

Details of the customer's request, such as scope items, assumptions, rationale, and comments. If these details are too extensive for the space provided, document them separately and use this space to cross reference the document. Be sure to include the document name, date created, and last revision date or revision number.

User Interface Footnotes

System Interface Footnotes

Data Interface Footnotes

Project Factor Footnotes

BITS Interface Project Estimating Model (B.I.P.E.M.)

Instructions

The BITS Interface Project Estimating Model (B.I.P.E.M.) can be used to create an estimate for a project phase, multiple phases, or for the entire project. The estimate is shown in terms of hours of effort. The model is intended for development and redevelopment projects. Package solutions are not covered by the model.

The model is broken up into five pieces:

Phases to be included ...	- which allow you to specify which phases you want the estimate to cover
User Interfaces	- which include everything the user actually sees in the system (windows/reports)
System Interfaces	- which include every connection between the new system and existing systems or links within the system
Data Interfaces	- which include the one-time activities needed to initially model, create, load, and write procedures against the database
Project Factors	- which summarize the other pieces and include overall project factors

To use the model, get answers to the questions on the B.I.P.E.M. Questions sheet, then fill the answers into the B.I.P.E.M. Estimate sheet. The sheet will calculate the project totals at the bottom. There are three things that should be noted about the B.I.P.E.M. Estimate sheet:

1. The weighting factors (typically found in column F) will change based on the phases to be included.
2. Use of a "~" instead of an "=" in a calculation indicates there are calculations above and beyond what is shown on the sheet to derive the result. Click on the result cell to view the calculation.
3. The summary areas under each section and the corresponding footnotes tab should be filled in to log your assumptions & rationale, or be cross-referenced to a formal assumptions document.

The B.I.P.E.M. Example sheet may also be helpful when filling out the B.I.P.E.M. Estimate sheet.

When the project is complete, the B.I.P.E.M. Actual sheet should be filled out. It contains the same information as the B.I.P.E.M. Estimate sheet, with additional fields to capture the Actual Hours of the project.

BITS Interface Project Estimating Model (B.I.P.E.M.)

Instructions

Phases to be included in the estimate

This section is included to give the model the flexibility to calculate an estimate for an individual project phase, multiple phases, or an entire project. If a Project Charter is to be produced, the Project Initiation box should be checked. If you are in the middle of a project and want to use the model to help estimate the next phase, check only that box.

The Requirements Definition phase covers the gathering, modeling, and documenting of requirements. On occasion, this phase will also contain a Technical Architecture piece. Technical Architecture includes determining the technical direction for the new system and doing a proof-of-concept. If this results in a system that will pilot technology unfamiliar to BITS, the Very High Technical Complexity adjuster within the Project Factors section should also be checked. The Technical Architecture checkbox requires a checked Requirements Definition box to become activated; it can not be completed without general requirements gathering, which is the major activity of the base Requirements Definition phase. User Interface and database design are in Design, program specs are in Construction. The first week of post-production support is covered by Implementation.

When using the checkboxes, keep in mind that the sum of the parts will be greater than the whole. In other words, the total estimate for an entire project will be less than if you added up the estimates for each individual phase. This is done to account for the efficiency of looking at the project as a whole and upon completion of a phase, immediately flowing into the next phase. If a project is stopped then restarted more than 2 weeks later, the Project Planning box will need to be checked for both segments to account for the ramp-up time in each case.

BITS Interface Project Estimating Model (B.I.P.E.M.)

Instructions

User Interfaces (U.I.)

The U.I. piece is based on the premise that an estimate for work can be derived from the number of interfaces the user sees. Regardless of window or report, the amount of work going into a user interface is about the same. No specific accommodation is made for the complexity of any one interface, as usually that level of detail is not known. If the number of windows and reports cannot be derived, use the number of business processes that will be satisfied by the new system and multiply that number by 5 (to account for 1 Entry Window, 1 Maintenance Window, and 3 Query Windows/Reports per business process). Count "tabs" as unique windows.

If you are being given the user interface and asked to do only the internal programming, that counts as a link within the system under the System Interfaces section.

The # of Static Web Pages factor accounts for the reduced complexity of user interfaces with no processing behind them. Web pages requiring a database connection or running a script do *not* belong in this category. This factor has as high a multiplier as it does because of the time spent compiling content/links/graphics and reviewing the page with users; checking only the Construction checkbox results in an estimate of 18 hours per static web page.

There are U.I. Adjusters to change the estimate (up or down) to cover factors that are usually known:

- | | |
|---|--|
| % of U.I. that can be built by cloning or modifying | - This accounts for the efficiency of designing/coding/testing very similar or pre-existing windows and reports. A system with 10 windows where there are 4 pairs of virtually identical windows and 2 unique windows would result in a 40% value for this factor (6 would be built, 4 could be copied). If the system had 7 new & unique windows, required updates to 2 existing windows, and a near rewrite of 1 other window, it would result in a 20% value for this factor. |
| * Use of this adjuster is STRONGLY encouraged | |
| * This adjuster only applies to Design, Construction, and System Testing | |
| * For new development, this adjuster is typically in the 10-50% range | |
| * For maintenance efforts, this adjuster is typically in the 40-80% range | |
| No U.I. standards | - This accounts for the time to develop U.I. standards (if needed). |
| Rewrite of/Enhancement to an existing system | - This accounts for the fact that analysis and design will be easier to get started with a working system that is being used and system testing will be more difficult because a parallel test will be needed. |
| Availability/Sophistication/Expertise of team | - This accounts for how easy (or difficult) it will be to gather requirements, explain designs, and supervise acceptance testing. If team members are in remote sites, this is almost automatically a very challenging situation. |

If the team is having difficulty coming to agreement on the requirements or business rules, this is also usually a very challenging situation. If the team has a history of extensive requirements changes, you may want to consider using the "very challenging situation" checkbox.

BITS Interface Project Estimating Model (B.I.P.E.M.)

Instructions

System Interfaces (S.I.)

The S.I. piece is based on the premise that the number and similarity of background interfaces between the new system and existing systems can be used to estimate work. **All batch programs are considered system interfaces within this estimating model.** This area also includes all modules associated with receiving data into or sending data from the new system to existing systems. Links within the new system are also used to derive the estimate; they include distinct modules that link code from one piece of the system to another.

Use the examples below as *guidelines* when categorizing links.

The # of Simple System Links (example: within the system) covers the number of straight-forward linkage modules in the system. Typically, these linkages are within the system and include source code for internal APIs, COM objects, functions, and sub-system linkage programs. This type of link will commonly be found in the middle tier(s) of an n-tier application and control processing or perform business logic.

The # of Moderate System Links (example: to an internal system) includes the number of linkage modules of moderate complexity. Typically, linkages in this category are links to other existing systems within the organization that will send to or receive data from the new system. An example of this would be an invoicing system that receives data from an order entry system and posts data to a general ledger system (resulting in a value of 2 for the factor).

The # of Complex System Links (example: to an external system) covers the number of highly complex linkages requiring significant effort to analyze and test. Typically, linkages in this category involve transferring data to/from other organizations or between platforms within an organization.

Please note that linkage modules within a system are not confined to the Simple category. They may in fact be Moderate or Complex. The same rule holds for the examples in the other categories. If little is known about a link in question, use the examples above as guidelines to designate the module as Simple/Moderate/Complex. As the true complexity of each module becomes known, shift it as necessary. An example could be a link to an internal e-mail system. While at first glance that would fall into the Moderate category (a link to another internal system), the process may be so well-documented and tested that it should be placed in the Simple category.

There is an S.I. Adjuster to lower the estimate to cover a factor that is usually known:

% of S.I. that can be built by cloning or modifying

- this accounts for the efficiency of designing/coding/testing very similar or pre-existing linking modules and follows the same logic as with the corresponding U.I. Adjuster.

BITS Interface Project Estimating Model (B.I.P.E.M.)

Instructions

Data Interfaces (D.I.)

The D.I. piece is based on the premise that one-time conversion and database set-up activities take place on many projects, and they need to be accounted for in determining the project's estimate.

The # of Fields in Existing Database to be Converted factor relates directly to the amount of data conversion that will need to be done. The number of rows of data is not nearly as important as the number of COLUMNS. Each column needs to be addressed individually. The # of New Tables factor covers the time required to model, design and create new tables. The # of New Stored Procedures and Triggers factor includes the time required to design, code, test, implement, and document stored procedures and triggers on the database. If stored procedures and triggers are used extensively, the modules for the windows and reports in the system will have fewer instructions and, thus, are apt to be more similar. This causes the value for the "% of U.I. that can be built by copying or modifying" adjuster to rise. **All batch programs are considered system interfaces in this estimating model.**

BITS Interface Project Estimating Model (B.I.P.E.M.)

Instructions

Project Factors

There are many factors that affect the project as a whole. The Project Base estimate is a summary of the total estimates for the three interface pieces (U.I., S.I., D.I.) and is the base amount used in the project factors.

The one required bit of project-level information is the average number of project team members. This item directly affects "Project Management Time". The usual way of calculating project management time, a fixed % of the project base, is not always appropriate. As more team members are added, the additional project infrastructure required to manage the team increases. Thus, a project team of 10 will need more time allotted for project management than a project team of 5, even if the amount of work (the project base) is the same. The calculation is an AVERAGE. For example, a project with a duration of 50 weeks that has 1 person on it for the first 25 weeks and 5 people for the last 25 has an average number of team members of 3. Include all team members, Technical Writers, and the Project Manager in this calculation.

The team member weighting factor ("3") is derived by the assumptions that went into the other weighting factors in the model. Built into each weighting factor is the estimated amount of project management required for a 3 person project. Should a project be staffed by 1 or 2 people, the overall estimate will go down, as less project management is required than is already built into the estimate. Any more than 3, however, and the estimate goes up to account for the additional levels of reporting, project tracking, and overall increase in the amount of communication.

The # of Project Team Members calculation shows a "~" instead of an "=". This indicates additional, unseen calculations.

There are Project Adjusters to change the estimate (up or down) to cover factors that are usually known:

- | | |
|--|--|
| # of Tiers | - This accounts for the additional complexity brought on by multiple tiers. This does not cover the time to build middle tier modules - that is covered in the # of System Links within the System factor. |
| # of Functional Areas Involved (Users) | - This accounts for the additional complexity brought on by having multiple user departments involved in the project - scheduling meetings, obtaining sign-offs, resolving conflicts. Internal BITS groups are NOT included in this calculation. |
| Skill Level of Project Team | - This allows the estimate to go up or down if the team is loaded with experts or less experienced. Take into account all knowledge required for each role on the project. This would include having the necessary knowledge of the business functions, existing systems, and project methodology, as well as the necessary technical expertise. |
| Very High Technical Complexity
* This adjuster only affects Design through Implementation | - If the project is to use a technology new to your section or team, the estimate needs to be increased. If the technical direction for the project has not been decided, check the Technical Architecture box at the top of the Estimate sheet, then check this box if the resulting technical direction meets the criteria specified above. |
| Mission Critical or High Risk System | - Mission critical projects usually require more review, sign-offs and testing, as do high risk systems. "High Risk" meaning <i>serious</i> consequences of incorrect data. |

BITS Interface Project Estimating Model (B.I.P.E.M.)

Instructions

Extensive Documentation Required

- Select this factor if extensive online help or user manuals are to be produced, or if your software development processes require extensive system documentation (requirements docs, design specs, test plans, documented test results, etc). A minimum base of system documentation and programmer-written help is already built into the model.

Work Completed To-Date

- This factor should be used in situations where you are re-starting a project. This would generally occur under two scenarios:
 1. Previously started projects that were cancelled or put on hold for at least 2 to 4 weeks.
 2. Projects that were originally started by an outside vendor, and now BITS is completing the work.

This factor takes into account any work previously completed on the phases to be included in this estimate. Do not include time already spent on Analysis if Analysis is not to be included in the estimate.

The intention of this factor is to take into account work that was in progress that should be salvageable. However, due to two factors, 100% credit cannot be given for work previously completed work:

1. Your project team will probably need to review the existing work.
2. Some of what has been completed may need to be redone.

If there is a deliverable associated with the phase in process and you are unsure how much time was spent on it, assume 7 hours per page.

New Technical Infrastructure Required

- For all projects, the model will automatically add 10% to the total estimate to account for Technical Support Services time. However, if a new technical infrastructure is required, the model will add 20%. A new technical infrastructure would include such things as new networking architectures, development platforms, previously unsupported database technologies, etc.

TSS time is listed as a separate total on the spreadsheet for budgeting purposes. It does not include time spent by the application development team on TSS related tasks.

BITS Interface Project Estimating Model (B.I.P.E.M.) Questions

Before estimating the project, be sure the following questions have been answered:

User Interfaces (U.I.)

- 1 How many business processes will the new system satisfy (and what are they)?
- 2 Do you expect some of the windows and reports to look similar?
- 3 Do you have U.I. standards?
- 4 Will this system replace an existing system?
- 5 How available will the users be to meet? Are some in remote locations?
- 6 Have the users worked on I.T. projects in the past?
- 7 How long have the users been in the jobs they're in?

System Interfaces (S.I.)

- 1 How many distinct subsystems do you see in the new system?
- 2 Will the new system interface with other existing systems? Which ones?
- 3 Are there any files to be passed to or from other organizations?
- 4 Do you expect some of the links to look similar?

Data Interfaces (D.I.)

- 1 Is there any data conversion required for the new system?
- 2 Will there be a significant number of new tables required? Data Model needed?
- 3 Will stored procedures be used? Will we be able to leverage off of existing ones?

Project Factors

- 1 Has the technical direction been set? If so, what is it? Is this a new technology for your section? For BITS?
- 2 How many different departments/functional areas will be directly involved in the project?
- 3 At what level of skill are your personnel that will be assigned to this project? Experts? Novices?
- 4 Is this a Mission Critical system or High Risk system?
- 5 Has any substantial work been done on the new system yet? If so, how many hours have been spent, and on what tasks or phases?



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