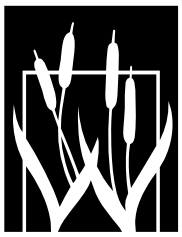

Whitemarsh
Information Systems Corporation

Return on Investment (ROI)

Business Information System Manufacturing

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Whitemarsh ROI Savings Summary

From the very beginning of IT, there has been a dramatic year-by-year decrease in the cost of computer hardware even in the face of significant increases in computer hardware capacity and performance. Sadly, the same cannot be said about business information systems. Over the years, even in the face of increased computer software sophistication, the cost of business information system software has continuously increased.

Starting however, in the middle 1980s, there has been a steady growth in the ability to actually manufacture business information systems. Whitemarsh has been a continuous supporter and user of business information system generators. For example, the Whitemarsh Metabase System has 279 database tables. Under traditional business information system development techniques, the Metabase System should have cost $4.5 million. In fact, it has cost greater than four times less than that amount.

In another example, an association membership management system for an international standards organization had a database of about 90 database tables. The traditional cost for this system should have been $1.5 million. The actual invoices were for less than $300K.

The key strategy for a very dramatic cost savings is to have an environment within which business information systems are manufactured rather than created through highly-skilled, hand-crafting artisans.

Under this approach, well in excess of 90% of every business information system function can be generated through business information system generators. In addition to generating correct-the-first time business information systems, this changed approach produces an ROI of 2.8.

Supporting Links	
Link Area	**Link**
Enterprise Data Management Areas	http://www.wiscorp.com/roi_manufacturingbusinessinformationsystemsenterprisedatamanagem.html
The Data Administration News Letter Articles	http://www.wiscorp.com/roi_manufacturingbusinessinformationsystemstdan.html
Short Papers	http://www.wiscorp.com/roi_manufacturingbusinessinformationsystemsshort_papers.html
Clients	http://www.wiscorp.com/roi_manufacturingbusinessinformationsystemsclients.html

1.0 Issue

Every business information system development effort consists of a series of processes commonly known as a system development life cycle (SDLC) and is shown in Figure 1. Fundamentally, the four major phases are:

- Requirements, Analysis, and Design
- Detailed Design, Coding, and Unit Testing
- System Testing, Documentation, Training, and Acceptance Testing
- Implementation, Operation and Maintenance

In general, the resources required for each is a straight forward ratio of 1 to 4. That is, for every 1 unit of effort expended to complete the first phase, Requirements Analysis and Design, 4 additional units of effort are required for the remaining three life cycle phases. In total then, there are a total of five units of effort for the completion of the first implementation of the business information system.

This method of life cycle duration determination is not an alternative to the use of the Function Point count determination in other ROIs where the count of database tables, multiplied by 80

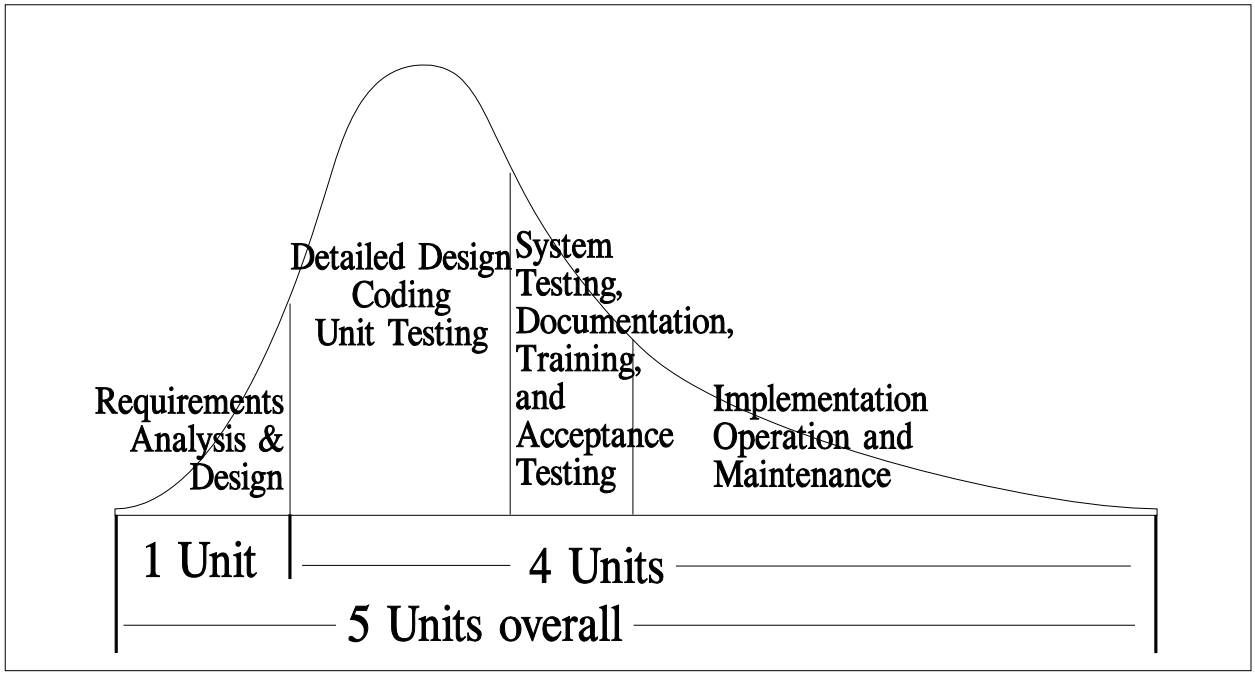

Figure 1. Traditional Business System Development Life Cycle.

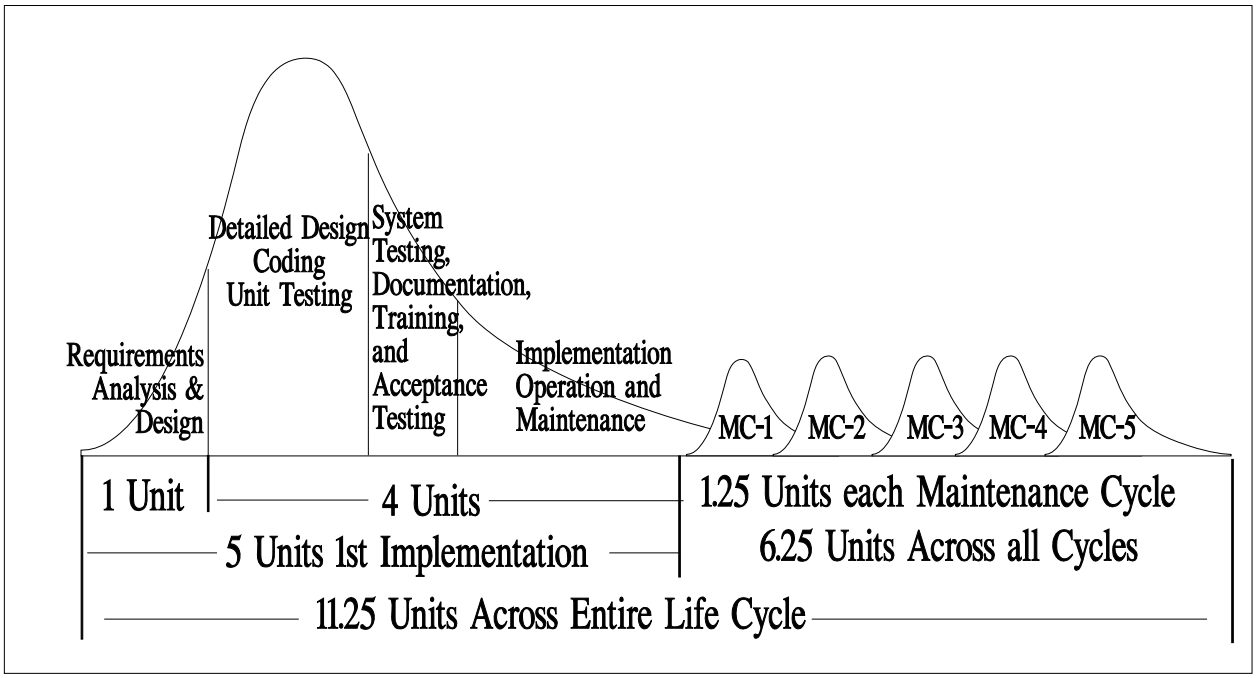

Figure 2. Traditional Business Information System Development Life Cycle with Maintenance.

produces an approximation of the Function Points scope and size for a Business Information System. Rather, this ROI's form of life cycle effort determination is merely the expression of the effort ratios between the first major phase and the remaining three phases.

Once a first implementation cycle of a business information system is completed and is set into production, maintenance begins almost immediately. That is because during the third phase, System Test, Documentation, Training, and Acceptance Testing, needed enhancements are invariably uncovered that were not accomplished because they were not identified as "show stoppers."

The first round of business information system enhancements are configured into a maintenance cycle that are almost always smaller-scale versions of all the phases. Thus, the maintenance cycle almost always has the Requirements through to Acceptance Testing subphases. Over a business information system's total life cycle, there are commonly five distinct iterations of maintenance cycles. These are illustrated in Figure 2, the Traditional Business Information System Life Cycle with Maintenance.

It is almost always the case that each maintenance cycle does not require the entire 5 units of effort that are required for the initial cycle. Thus, for each of these revision cycles, the quantity of unit efforts is not 5 but at most 1.25 (i.e., 25% of the original total effort). In total, across the entire life cycle of a business information system, the total unit efforts is thus: 5 units of effort

for the initial production implementation effort plus five recycles of revision of 1.25 units each or a total of 11.25 units of effort.

The issue here is to identify and set out a strategy that reduces the cost of the complete life cycle of a business information system. Regrettably, a common approach is to reduce the time for Requirements, Analysis, and Design. That approach however has two very negative side effects. First the work products are lower in quality, and second, not only will the quantity of changed work products be greater, but there will also be a larger quantity of maintenance cycles because second, third, and fourth order changes will not have been teased out through prototyping.

2.0 Solution Approach

The solution approach includes the following four significant changes:

- Employing a data-driven methodology versus a process-driven methodology. This is detailed during the ROI, Data-Centered Development and Management.

- The maximal use of business information system generators to eliminate coding errors. This is set out in the ROI, Efficient and Effective Information System Development.

- The deployment of the Metabase System on the critical path of work product development to capture, store, report, and evolve all SDLC work products. This is set out in the following ROIs:

    - ROI, Manufacturing Integrated, Interoperable and Non Redundant Data Models, Section 2.

    - ROI, Efficient and Effective Business Information System Development, Sections 2.4 and 3.4

- The modification of the first major phase to include prototyping to eliminate the vast majority of requirements and design errors and omissions.

The Whitemarsh Development Life Cycle diagram shown in Figure 3 illustrates changes resulting from this last bullet.

The changed life cycle diagram shows that the first phase consumes 33% of the first-implementation effort rather than the traditional 20%. Additionally the diagram shows that the next two phases take 66% of the effort before first the implementation is completed. This is a reduction from what was 80% to 40%. More importantly, while the traditional effort was based

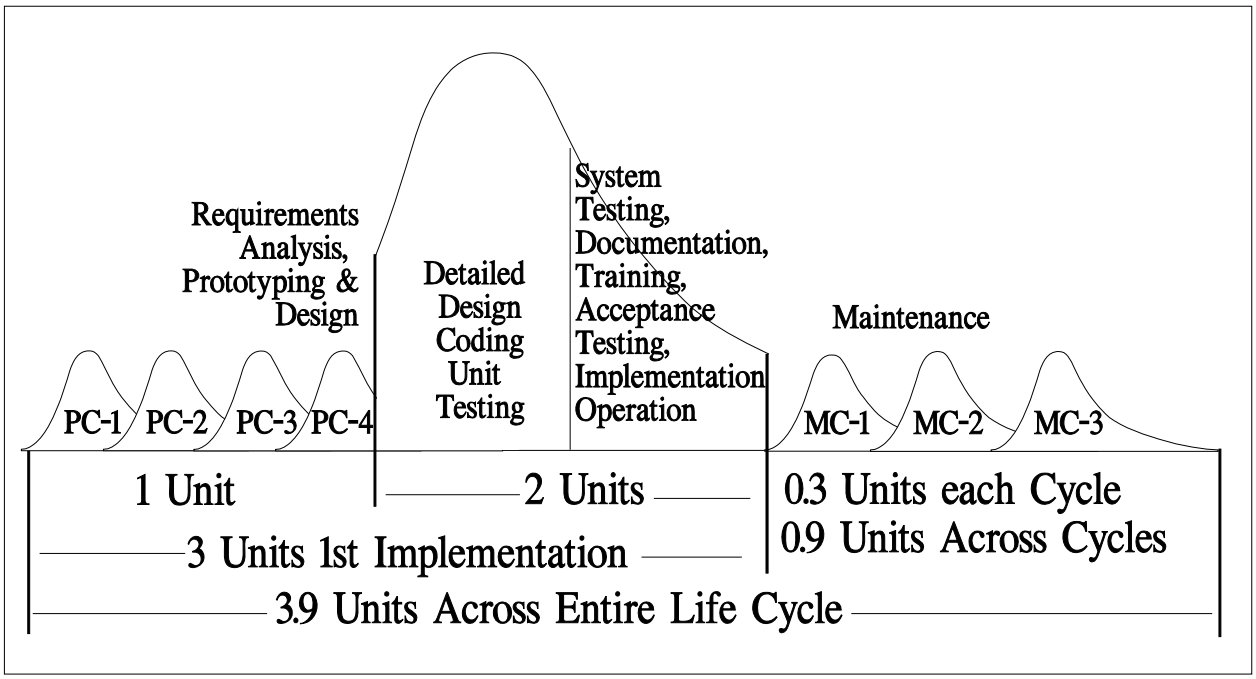

Figure 3. Whitemarsh Business System Development Life Cycle with Maintenance.

on just text and drawings produced from the first phase, the solution approach is based on four or so cycles of operational prototypes of the entire business information system.

The key benefit to true operational prototyping is that its four iterations almost always eliminates the vast majority of critical errors that cause system failures. The Whitemarsh Knowledge Worker Framework, shown in Table 1, maps to nearly all the work products required for business information systems. To illustrate, the first two rows of U.S. General Accountability Office's error percent that are allocated to the Whitemarsh Knowledge Worker Framework, show that 41% of all business information system failures occur during the Scope and Business rows. This is shown in Table 2.

Another 50% of errors occur when the enterprise does not reconfigure and optimize it's organizations and functions to take advantage of reconstituted business information systems. In short, 91% of all IT business information system failures are directly attributable to non-IT reasons.

The 41% source of errors are dramatically reduced or eliminated entirely by the Section 2 Solution Approach set out in ROI, Business Information Systems Plan.

Whitemarsh Knowledge Worker Framework						
Perspective	**Mission**	**Database Object**	**Business Information System**	**Business Event**	**Business Function**	**Organ-ization**
Scope	Business missions	Major business resources	Business information Systems	Interface events	Major business scenarios	Organizations
Business	Mission hierarchies	Database Domains, and Resource Life Cycles	Information sequencing and hierarchies	Event sequencing and hierarchies	Business scenario sequencing and hierarchies	Organization charts, jobs and descriptions
System	Policy hierarchies	Data Elements Specified data models and Identified Database Objects	Information system designs	Invocation protocols, input and output data, and messages	Best practices, quality measures and accomplish ment assessments	Job roles, responsibilitie s, and activity schedules
Technology	Policy execution enforcement	Implemented data models and Detailed Database Objects	Information systems application designs	Presentation layer information system instigators	Activity sequences to accomplish business scenarios	Procedure manuals, task lists, quality measures and assessments
Deployment	Installed business policy and procedures	Operational data models	Implemented information systems	Client & server windows and/or batch execution mechanisms	Office policies and procedures to accomplish activities	Daily schedules, shift and personnel assignments
Operations	Operating business	View data models	Operating information systems	Start, stop, and messages	Detailed procedure based instructions	Daily activity executions, and assessments

Table 1. Whitemarsh Knowledge Worker Framework.

Knowledge Worker Framework

Deliver-ables	Mission	Man-Machine Interface					Row Pct
		Machine		Inter-face	Man		
		Database Object	Business Infor-mation System	Business Event	Business Function	Organ-ization	
Scope	5	2	3	1	3	4	18
Business	5	3	2	1	6	6	23
System	3	**2**	**2**	**1**	12	8	28
Technology	1	**0**	**0**	**0**	8	6	15
Deployment	0	**0**	**0**	**0**	5	5	10
Operations	0	**0**	**0**	**0**	3	3	6
Col. Pct	**14**	**7**	**7**	**3**	**37**	**32**	**100**

Table 2. GAO Allocated Business Information System Errors across the Knowledge Worker Framework.

Note: All numbers expressed as Percent allocations of errors to cells ...12 Gray cells are IT Cells

The 50% of errors surfaced during the business information system code generation prototyping cycles provide a significant head-start on identifying the changes required by business organizations and functions to meet the needs of newly conformed business information systems. It is not that the business organizations and functions are automatically changed, however. Rather these result in the necessary lead time to accomplish these organizational and functional changes.

Prototyping business information systems is both quick and easy because the business information system's data model will have already been developed. Developed too will be the business information system's function model. Because of this, multiple staff can proceed in parallel to generate functional subsets of the overall business information system.

Once business information systems have been generated, they are immediately demonstrated to stake-holders with the hope and expectation that such reviews surface needed data model and business information system changes. Once these changes are quickly incorporated in the data

and business information system models, the business information system can be regenerated. After four or five such cycles, the vast majority of the requirements or design omissions or mistakes will have been resolved.

The second and third phases from the Whitemarsh Life Cycle diagram start at Version 5 or 6. Once the business information system is completed, there are fewer life cycles because the first production version is Version 5 or 6. Consequently, the changes are fewer, smaller, and faster to accomplish.

3.0 Solution Engineering

Manufacturing business information systems is founded upon, facilitated by, and engineered through the following:

Related ROI	Model/ ROI Contributing Components
Project Management	Project, Deliverable, and Task Templates, Staff Skill factors, Work environment factors, generation of work plans, direct references to produced deliverables, and supported earned value reports.
Business Information Systems Planning	Enterprise Data Models, Database Object Models, Resource Life Cycle Analysis, Business Information System Models
Data-Centered Development and Maintenance	Mission, Organization and Function models. Database Domain, Database Object, and Data Element models. Requirements Models with direct links to actual deliverables.
Manufacturing Integrated, Interoperable, and Non Redundant Data Models	Concepts, Database Logical, and Database Physical models,
Efficient and Effective Business Information System Development	Non Redundant development. Reusable Data and Process components. Business information system generators with sophisticated IDE, control templates, control template language, procedure language and object oriented language, compilers, linkers, and near-real-time development cycles characterized by “conceive-posit-prove-reflect-optimize.” Maximized ability to quickly and easily accomplish evolution and maintenance

4.0 The ROI

The traditional calculation for effort (regardless of size) based on the Traditional Life Cycle that illustrated in Figure 2 takes 11.25 unit of efforts.

The changed approach life cycle is fundamentally founded on the employment of a business information system generator that enables four or more cycles of business information system prototyping, which, in turn, surfaces changes that are accomplished prior to a first production implementation.

The introduction of business information system prototyping reduces the overall life cycle effort to just 3.9 units of effort.

The ROI created from the traditional approach effort to the changed approach effort is 2.8. That is a dramatic reduction in effort.