



Calculating ROI for IT Process Improvement

Introduction

This paper presents evidence and examples of how the cost of introducing information technology (IT) process improvements can produce a demonstrable return on investment (ROI).

In the last 40 years, the software industry has changed considerably. How IT is viewed by senior management has also changed. Profit-generating business units now regard software as a critical part of their infrastructure and competitive advantage. In fact, companies that do not leverage information technology as a key part of their business strategy to cut costs and increase productivity may ultimately cease to exist. Simply put, properly positioned IT and its associated processes will keep corporations in business.

Many senior managers today are focused on cutting costs, increasing profitability, and improving productivity. Because an IT organization is usually a cost center, and not a profit center, it is very difficult to discuss the *development* of software in terms of profitability—so for now, let's not attempt to address the ROI issue in terms of pure profit. But parts of the software development lifecycle can be quantified as cost savings and increased productivity, which are actually two sides of the same coin, both of which can be reduced to the same factor in terms of return on investment.

Cost Savings Defined

Some financial experts claim there's a difference between cost savings and cost avoidance—for the sake of this discussion, let's assume they're the same thing, and here's why. The key to increasing productivity is reducing the amount of time it takes a person in a company to do some "thing" as compared to achieving the same results using the current approach. How process improvement contributes to corporate cost savings is that better articulated, well documented, more accessible, and more standard best practices lead to a reduced amount of time for a person on staff to accomplish a goal or complete an activity. Thus, if it took X amount of time prior to the improved process being available, and it takes Y amount of time afterwards, one can calculate the delta of X minus Y to reflect a cost savings as a result of productivity improvement.

One might argue that the costs are not really saved because they're applied to additional work, but that's exactly the point—the additional work performed by that person that they otherwise would not have performed is a cost saved from having to hire yet another person to complete that work. So when aggregated over time, the improved productivity based on reduced task time translates directly into savings achieved by not having to hire additional people to perform the same work that the first person could have already performed.

Stages of IT Process Improvement

The first stage in quantifying IT process ROI is to agree that implementing an improved process (either in-house or off-the-shelf) and making that process available to the entire IT organization is something



that should be done for all the reasons previously stated. The second stage, which is the basis of this paper, is to identify and quantify enough measurable process improvement opportunities so as to demonstrate the relative benefit of instituting and publishing that process. The third stage, which is beyond the scope of this paper, is to employ organizational change management techniques to overcome people's natural reluctance to change their own behavior for the better.

The second stage mentioned above (which is the crux of this paper) is divided into three steps:

- **Step 1:** Identify opportunities where process improvement can be effectively measured and quantified
- **Step 2:** Devise coherent, plausible formulas for calculating a cost savings for each process improvement opportunity
- **Step 3:** Reduce those calculations to a number that becomes the bottom line ROI for a process improvement effort over time

The remainder of this paper will demonstrate how to calculate process improvement ROI for a generic, mid-sized IT organization. These same techniques can be applied to your organization using a little creativity to spot cost savings opportunities. In some cases, a few benefits of an improved IT process can be described but not quantified. Using the approach described here, only the quantifiable portion can contribute to ROI, but the non-quantifiable aspects of process improvements should be documented in the business case nonetheless so as not to be lost as part of the overall process improvement strategy. However, some experts feel that unquantifiable benefits can always be quantified with a bit of imagination.

Step 1: Identify Process Improvement Opportunities

Types of IT Processes

IT processes document two basic types of activities: project-based and non project-based. Project-based activities typically lead to a delivered result (often a software product or part thereof). Non project-based activities represent on-going work needed to maintain operational systems in a steady state.

Project-based IT processes generally describe how projects are instantiated and conducted, with the result of a project being some desired software product, the installation and configuration thereof, or the enhancement and maintenance of software products in a production environment. Since projects, and the portfolios within which groups of projects are managed (i.e., Portfolio Management), are a good way for IT organizations to deliver products to their customers, whether they be internal business units, external clients, or service providers, project-based IT processes appropriately describe how to execute and manage a project.

Non project-based IT processes typically document and inform people about the more long-term aspects of post-application delivery, specifically those areas of service support and service delivery, which include (to name a few):

- Service Desk



- Incident Management
- Problem Management
- Change Management
- Configuration Management
- Release Management
- Availability Management
- Capacity Management
- Service Level Management

Process Adoption Considerations

This paper does not mean to imply that you need to define the entire process first and then start measuring to determine cost savings; that's not a realistic requirement and is rarely an option. What most organizations do is baseline their existing process, then make improvements incrementally over time and measure as they go.

The ROI methodology documented here fully supports IBM's Measured Capability Improvement Framework (MCIF), a systematic approach to incrementally improving IT organizations. Using MCIF, companies can adopt one or more practices at a time (a practice is a documented approach to solving one or several commonly occurring problems) and build on the previous baseline. Practices themselves are designed to have a positive impact on one or more business objectives, such as time-to-market, improved quality, increased innovation, etc., and can be effectively measured.

Common Cost Saving Opportunities

Some common opportunities for cost savings (both project-based and non project-based) found in a typical IT organization include:

- Increased product quality due to use of best practice standards; more appropriate requirements, design, and code reviews; more effective testing; etc.
- More effective governance, portfolio management, time tracking, project management, cost management, and resource allocation
- More up-front involvement of key stakeholders who can provide earlier feedback
- Improved scheduling and forecasting as part of capacity and demand management
- Improved service support and service delivery to end users
- Better vendor management
- Faster on-boarding of new personnel
- Reduced time spent in meetings
- Reduced design and code re-work
- Fewer process disputes between in-house staff and 3rd party vendors
- Less time spent finding templates and researching how to do things
- Fewer misunderstandings between different teams, sites, cultures, and languages
- Reduced need for methodology and skills training for in-house staff



Improved software quality is typically hard to measure, but if you're able to trace the higher quality of a deployed software application to an improved process, then factors like "Reduced number of Help Desk calls due to less defects" or "Increased Internet sales due to a more intuitive user interface" can be measured and added to the list of software improvement opportunities.

A Real-World Example

A client recently lamented that before a project started, his team members spend almost a month:

- Determining which roles people will perform and the responsibilities of those roles
- Deciding how the team will approach this type of project
- Finding document templates and examples from other projects that might be useful for this type of project (including digging through numerous and often obscure shared drives for the files themselves as well as determining which versions to use)
- Drafting a work breakdown structure (WBS) as the basis for a project schedule
- Educating team members on what needs to be done and when it needs to be done

Given this scenario, let's say it takes a project of ten people three weeks to get organized before they can kick off the project. Let's also say that, on average, 20% of each person's time during those three weeks is wasted embroiled in the unnecessary activities described in the list above. Using a fully loaded rate of \$65 per hour for an average IT employee¹ and given 40 paid hours per week for three weeks, the amount saved by having a standard, documented, organized, useful process available could be \$15,600 (10 people x 3 weeks x 40 hours/week x 20% time savings x \$65/hr). Then multiply that amount by each additional project that is started within a one year period, let's say 10 projects a year for a medium-sized IT organization, and a savings of \$156,000 can be realized for project startup activities alone. This particular problem is quite typical in IT organizations, so it's safe to say that the amount saved avoiding this singular issue could pay for a substantial part of a process improvement effort.

Process as an Organizer

Just getting an IT shop organized produces significant dividends. There's a reason successful professionals spend time getting organized each day—because it helps them accomplish their goals and makes their lives less stressful. In the same way, an organizing IT process (or any other business process for that matter) allows people to more effectively accomplish their objectives and have a little fun at the same time. Being organized also translates into higher productivity because people tend to be more creative when operating under less stress.

Step 2: Devise Formulas for Calculating Cost Savings

Below is a sample template that can be used for Step 2. Its simple design makes it easy to express a cost savings for an IT problem area that can benefit from process improvement. If more accuracy is desired, figures can be adjusted for inflation, discounted to net present value, or be made to account for market fluctuations that may skew some variables one way or another.

From the list of common cost savings opportunities in Step 1, let's use four examples:



- Faster on-boarding of new personnel
- Reduced time spent in meetings
- More effective governance and portfolio management
- Improved service support and service delivery

The examples below assume a process improvement effort is undertaken in 2009 with cost reductions being realized in out-years (2010 through 2012). All personnel costs are based on the fully loaded cost of an average IT worker in the United States in 2009 (in U.S. dollars) which is conservatively estimated to be \$65 per hour¹ within a 40 hour work week annualized over 48 weeks.

Example 1: On-Boarding of New Personnel

Because almost every IT organization faces an on-boarding problem, any of the below variables can be adjusted to more closely approximate your situation, but most organizations will realize a substantial savings by implementing improved processes for this reason alone. In this example the improvement is incremental over time.

Amount	Formula and Calculations	Explanation and Assumptions
	Goal: Reduce the amount of time it takes for new hires (or departmental transfers) to understand their job and know how their role fits within the rest of the organization.	This opportunity reduces the amount of time spent reading and understanding how the organization operates, how projects are undertaken, the various roles involved in different types of projects, the specific tasks that a person (given one or more assigned roles) is expected to perform and where in the product life-cycle they will perform those tasks, and the standards to which they will be held.
	Calculated as the difference between the amount of time spent on-boarding a person without process improvement and the time spent on-boarding with a good process for each new hire per year for an average sized IT organization of 300 people.	Assumes a 10% annual turnover rate, an average on-boarding time frame of three weeks (before a person can begin being productive), and a time savings of 40% to 60% as the process gets better over time (meaning in the second year a new hire can start being productive in half the time with a well documented process in place).
\$93,600	2010 = (300 workers x 10% turnover x 3 weeks x 40 hours/week x \$65/hr x 40% time savings)	on-boarding time reduced by 40% in first year
\$117,000	2011 = (300 workers x 10% turnover x 3 weeks x 40 hours/week x \$65/hr x 50% time savings)	on-boarding time reduced by 50% in second year
\$140,400	2012 = (300 workers x 10% turnover x 3 weeks x 40 hours/week x \$65/hr x 60% time savings)	on-boarding time reduced by 60% in third year and then levels out at this threshold

Example 2: Reduced Time Spent in Meetings

This is a perpetual problem faced by all IT organizations. Time spent outside of meetings is time that can be applied to productive work. Now that doesn't mean the 10% time savings will be actually be spent on productive activities, but at least there's a chance it will.



Amount	Formula and Calculations	Explanation and Assumptions
	Goal: Reduce the amount of time it takes for team members to effectively communicate in project meetings.	This opportunity reduces the amount of time team members spend in meetings because the delivery process for their project type provides a common language and framework within which their project is undertaken. Misunderstandings and miscommunications are reduced because the process provides a baseline against which progress is measured and decisions are made.
	Calculated as a percentage of time saved in each meeting for each person in the IT organization (no one, it seems, is exempt from meetings, regardless of their role) per year for an average sized IT organization of 300 people.	Assumes a 10% time savings (six minutes per hour) with an average team member spending 6 hours per week in meetings (some team members will spend more than that, others may spend less, but the average is a very conservative 6 hours per week).
\$561,600	2010 = (300 workers x 6 hours/week x 48 weeks x \$65/hr x 10% time savings)	
\$561,600	2011 = (300 workers x 6 hours/week x 48 weeks x \$65/hr x 10% time savings)	
\$561,600	2012 = (300 workers x 6 hours/week x 48 weeks x \$65/hr x 10% time savings)	

Example 3: More Effective Governance and Portfolio Management

Now let's change the focus from savings at the individual level to the organizational level.

Amount	Formula and Calculations	Explanation and Assumptions
	Goal: Reduce the number of ill-advised projects and misappropriated resources.	This opportunity reduces the amount of time wasted on projects that should never have been undertaken because: <ul style="list-style-type: none"> • They didn't support the organization's strategic or tactical objectives • They disproportionately consumed too many resources for the benefit they provided • Their requirements were too vague or their perceived need by the business evaporated over time • They were poorly managed or too wasteful
	Calculated as the amount of raw dollars saved per year for an average sized IT organization of 300 people with an annual budget of \$50M.	Assumes that a well documented and implemented IT governance and stage gate process will reduce squandered money by 5% annually. Assumes the money not squandered will be put to good use by funding other projects that provide measurable value to the organization.
\$2,500,000	2010 = (\$50,000,000 x 5%)	
\$2,500,000	2011 = (\$50,000,000 x 5%)	
\$2,500,000	2012 = (\$50,000,000 x 5%)	

Example 4: Improved Service Support and Service Delivery

There are two components to this opportunity that can result in a cost savings:

- Reduced amount of time wasted by team members reporting and waiting for resolution to incidents, problems, service calls, and other service related factors



- Reduced number of Support Center staff needed to provide those services

As can be seen by the figures below, the second component generates the greater cost savings by far.

Component 1: Team Member Savings

Amount	Formula and Calculations	Explanation and Assumptions
	Goal: Reduce the amount of time team members spend reporting incidents, problems, and service-related items to the Service Desk as well as the uncertainty of what responses the Service Desk will or should provide while those team members are waiting for resolution.	This opportunity reduces the amount of time spent by IT personnel trying to figure out who to report various issues to and the procedures they need to follow to open service tickets. It also provides the end user with a better understanding of how long the Service Desk and other support personnel have to respond to and resolve the issue, thus allowing the end user to better plan their time while waiting for issue resolution.
	Calculated as the percentage of time spent identifying and following up on service issues reported by end users per year for an average sized IT organization of 300 people.	Assumes a 20% reduction in time spent by each member of the IT organization reporting and following up on service-related issues. Assumes two service-related issues per person per year, each of which takes 1 hour to report and follow up on average (this hour could be consumed over a period of time) until issue resolution.
\$7,800	2010 = (300 workers x 1 hour/issue x 2 issues/year x \$65/hr x 20% time savings)	
\$7,800	2011 = (300 workers x 1 hour/issue x 2 issues/year x \$65/hr x 20% time savings)	
\$7,800	2012 = (300 workers x 1 hour/issue x 2 issues/year x \$65/hr x 20% time savings)	

Component 2: Service Support Manpower Savings

Amount	Formula and Calculations	Explanation and Assumptions
	Goal: Reduce the amount of time a service support specialist spends logging, researching, escalating, resolving, and reporting service-related issues.	This opportunity reduces the amount of time spent by IT service support personnel by providing clear, well-documented steps and troubleshooting procedures, including escalation and reporting roles, responsibilities, and hand-offs necessary to resolve issues.
	Calculated as the percentage of time saved in managing service support issues per year for an average sized IT organization of 300 people.	Assumes a 24x7 six person service desk. Assumes a 20% reduction in time from initial issue reporting to post-resolution reconciliation.
\$149,760	2010 = (6 workers x 40 hours/week x 48 weeks/year x \$65/hr x 20% time savings)	
\$149,760	2011 = (6 workers x 40 hours/week x 48 weeks/year x \$65/hr x 20% time savings)	
\$149,760	2012 = (6 workers x 40 hours/week x 48 weeks/year x \$65/hr x 20% time savings)	

Step 3: Determine Costs of the Effort and Calculate ROI

Let’s assume that the four opportunities above were the only ones you needed for your business case. Even though these examples are fairly simple, together they provide concrete evidence that a process improvement effort can be quantified in terms of cost savings—some savings are more apparent than others, and some opportunities provide a greater savings than others. The more ammunition needed to



fund a process improvement project, the more opportunities should be identified and detailed in a business case.

In this step, first determine the cost of the process improvement effort. In the example below, it is expected to cost \$1,112,300 in 2009 for all aspects of process improvement including:

- Process Engineer consulting expertise
- Some dedicated time of in-house personnel
- Training resources and time away from work for trainees
- Pilot project mentoring and coaching
- Travel and related expenses
- Process improvement tools

Process Improvement Costs

Amount	Item	Formula and Calculations	Explanation and Assumptions
\$230,400	Consulting	2009 = 2 consultants x 40 hours/week x 24 weeks x 75% of time x \$160/hr	Two Process Engineer consultants working less than full time (75%) over six months to help assess current processes, install tools, help staff develop process components, document process in tools, facilitate sessions and meetings, deliver processes incrementally, and present results to senior management
\$374,400	In-House Personnel	2009 = 300 workers x 10% of staff x 40 hours/week x 24 weeks x 20% of time x \$65/hr	10% of staff to give 20% of their time for six months to develop, document, and review process materials, including facilitated sessions and meetings.
\$100,000	Training	2009 = 2 trainers x 500 hours/trainer x \$100/hr	Two trainers to develop and deliver training over a three month period prior to process rollout.
\$300,000	Mentoring/Coaching	2009 = 2 mentors x 1000 hours/mentor x \$150/hr	Two pilot projects to validate and improve the IT process with one mentor each for six months.
\$67,500	Travel	2009 = 300 workers x 10% of staff x 1.5 trips x \$1500 per trip	10% of staff will need to make 1.5 trips each at \$1500 per trip per person.
\$74,880 each out year	Process Maintenance	each year = 300 workers x 10% of staff x 40 hours/week x 48 weeks x 2% of time x \$65/hr 2010 = \$74,880 2011 = \$74,880 2012 = \$74,880	10% of staff to give 2% of their time to review, update, and improve process materials, including discussions and meetings.
\$40,000 each year	Tools	2009 = \$40,000 2010 = \$40,000 2011 = \$40,000 2012 = \$40,000	An average process improvement project may require \$40,000 in tool license fees per year.

Determine the Net Benefit

Summarize both the process improvement costs (from the table above) and cost savings (from Step 2) in the table below to calculate the bottom line net benefit. If a cost savings in 2009 can be shown (the



same year as the process improvement effort), then indicate that savings as a row within each opportunity detailed in Step 2.

Opportunity	2009	2010	2011	2012	Total
Process Improvement	(1,112,300)	(114,880)	(114,880)	(114,880)	(1,456,940)
On-Boarding of New Personnel		93,600	117,000	140,400	351,000
Reduced Time Spent in Meetings		561,600	561,600	561,600	1,684,800
More Effective Governance and Portfolio Management		2,500,000	2,500,000	2,500,000	7,500,000
Improved Service Support and Service Delivery: Team Member Savings		7,800	7,800	7,800	23,400
Improved Service Support and Service Delivery: Service Support Manpower Savings		149,760	149,760	149,760	449,280
Net Benefit					\$8,551,540

Composition of Good Processes

The ROI of improved IT processes has been demonstrated; now let's define what a "good" or "improved" process means. According to the Object Management Group's (OMG) best practice Software Process Engineering Metamodel (SPEM), a good process should be articulated in two basic areas: content and processes.

Content is described in terms of fundamental elements in four categories: roles, tasks, work products, and guidance. Role definitions help people understand their responsibilities and the skills they need to perform tasks assigned to them. Tasks, defined as a series of steps with a specific goal and purpose, are performed by roles and use work products (sometimes called artifacts) as inputs. During a task, inputs are transformed into outputs (also in terms of work products) with some value added to the entire process by the completion of the task itself. Work products are the intermediate and final outputs of the process, each of which makes a specific contribution to the development of the delivered product or service. Guidance exists to support roles, tasks, and work products in various ways, and may include policies, templates, examples, standards, checklists, concepts, white papers, supporting materials, etc.

Processes represent a stringing together of content elements to produce an end-to-end sequence of activities in multiple phases to achieve a desired result, usually a software application, software installation and configuration, or software upgrade and maintenance activity. Within a particular IT organization, multiple "delivery processes" can exist, one for each major type of project executed, with each delivery process referencing only the content (in terms of roles, tasks, work products, and guidance) that is appropriate for that particular type of project.

State-of-the-Art Tools

Given the net benefit in the example above, it's clearly in an organization's best interest to improve their IT processes. There are many ways to document and make processes available to an IT organization. For some IT shops, especially small ones, editing and organizing their current process on a shared Wiki is enough to gain some discernable benefit. For larger organizations, managing their process assets in an automated library is a more effective approach that allows various parts of the IT



organization to agree on and control their processes as the business evolves over time. For them, use of an automated tool to support this effort makes more sense.

IBM's Rational Method Composer (RMC) is a powerful and flexible process management platform that allows an organization to quickly author, configure, and publish a complete IT process in HTML format for use by the entire organization. It consists of a rich and extensive process asset library containing industry best practices in software and systems development, lifecycle management, and IT governance. Because RMC provides a common management structure and look and feel for all process content, it provides consistent, higher quality content across the IT organization. It presents a dependable process for all teams to follow, as well as a complete description of end-to-end work lifecycles (i.e. delivery processes); in short, it helps project team members understand what to do, when to do it, and how to do it.

RMC is built on the Eclipse framework, the de facto software development platform, which uses the concept of "plug-ins" to extend its capabilities. RMC is compliant with OMG's SPEM standard, which includes process building blocks called capability patterns that represent best practices for specific disciplines, practices, technologies, and development styles. These re-usable building blocks are part of a toolkit for quickly assembling delivery processes based on project-specific needs.

The output of RMC is a static HTML web site with lots of hyperlinks that is organized the way you want and one that fully documents your IT process. The published web site can be deployed to any web server or file server, thus giving anyone in your organization who has a browser and access to your intranet the ability to view at any time the most current delivery processes, templates, standards, policies, etc. without fear of accessing out-of-date material. The tool also outputs Microsoft Project templates that give project managers a jumpstart for their particular project type.

RMC supports rapid project initiation by allowing process engineers and project managers to quickly select, tailor, and assemble processes for specific development projects. It's a great way to prototype a process, publish it to the organization, and get near instantaneous feedback regarding its usability.

Always active in the open source community, IBM is a primary contributor to the Eclipse Process Framework project. The Eclipse Process Framework Composer (EPFC) tool forms the kernel of the commercial RMC product. In addition to content like RUP and IBM Practices, RMC differentiates itself from EPFC with several additional tooling capabilities such as the ability to publish a process not only as a web site but also in PDF and Microsoft Word formats. RMC comes packaged with the Rational Unified Process (RUP), a large practice-based library, and fifteen other plug-ins. EPFC plug-ins include OpenUP (the agile derivative of the Unified Process), EPF practices, Scrum, Extreme Programming (XP), Dynamic Systems Development Method (DSDM), and Agile Business Rule Development (ABRD).

RMC and EPFC fully support process improvement efforts and are two of the best tools available today.



Summary

This paper presented evidence and examples of how the cost of introducing IT process improvements can produce a clear return on investment. Following these three simple steps, it's possible to demonstrate in a business case how improving IT processes can significantly reduce costs and improve productivity in an IT organization:

- Identify process improvement opportunities
- Devise formulas for calculating cost savings
- Determine costs of the effort and calculate ROI

There is an industry best practice standard for what constitutes a good process, and RMC is based on the Software Process Engineering Metamodel. Both RMC and EPFC provide organizations with the power and ease of use to document, manage, and publish IT processes. All-in-all, these tools provide a great jumpstart for organizations that want documented processes to implement their IT cost savings initiatives.

¹ According to the United States Bureau of Labor and Statistics, an average IT employee earned \$39.85/hr in 2007. A fully loaded hourly rate is typically a multiple between 1.5 and 2.5 times higher than the salaried hourly component. Therefore, a \$40 hourly rate multiplied by 1.65 (which is at the conservative end of the standard multiple) yields a fully loaded rate of \$65 per hour, from which ROI can be accurately calculated.