

Process Improvement ROI

DCG provides return on investment analysis for proposed project initiatives using either actual client data or comparative client data drawn from industry best practices.

For the purposes of discussion, the following industry case studies are illustrative of the potential ROI from implementing function point analysis as a best practice in estimating and application management.

Analysis 1: Estimation ROI

Running a profitable business is, at heart, an apparently simple process of buying goods and services at a known cost then selling them at a higher price. Of course, the difference between success and failure is dependent on how well you manage the difference between cost and price. Historically, predictable costs have been a problem where the goods or services include software. When it comes to IT organizations and their estimating practices there are different views on how they assess the effectiveness and importance of estimating. Generally speaking there are three perspectives that IT organizations have with regard to estimating.

Estimating isn't a problem

First we have the organization that doesn't view estimating as a problem or has deemed it an insoluble problem. For example - During the development lifecycle milestones are monitored for schedule and budget compliance. Often times when there are slippages in the schedule or cost overruns the immediate issues are addressed and new milestone schedules are created. Upon delivery of the software, if it is significantly late or over budget then a post-implementation review is conducted. Experience shows that at this point in the lifecycle contributing factors can be numerous: an unrealistic schedule, ambiguous user requirements, the availability of appropriate resources, etc. However, in this scenario, we seldom hear anyone identifying the organization's inability to estimate properly as being one of the core problems to missed schedules and cost overruns. Estimating simply isn't considered among the various problems attributed to poor delivery of software. Since the first step towards improvement is to recognize there is a problem, there is a level of awareness that much be reached before this type of organizational environment can progress.

I want it delivered now

This dynamic shows itself, not so subtly, when management doesn't really want an estimate at all; they want the software delivered when they want it delivered.

How many times have we seen a situation where the sales/marketing group, the business users or even our own senior management has requested a software solution that has a fixed delivery date already attached to it? And even though the user or senior manager may ask for an estimate they really aren't interested in the response unless they are told what they want to hear. In this type of management environment, the IT organization doesn't invest much time in their estimating practice because they don't realize the power of good estimation as a vehicle to properly manage the project and/or their customer's expectations.

We don't have time to get the estimate right

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This third perspective involves an organization that wants to improve its estimating capability but is unwilling to make the resource investment to make necessary improvements. The organization may understand the value of properly estimating the project deliverables, and they may even understand at some level what it would take to do it right, but they simply don't want to make the investment necessary to achieve a higher level of estimating accuracy. Their perception is that they don't have the time or resources to get the estimate process right, and yet they end up taking the time and resources to correct the problems resulting (in part) from a lack of properly estimating. Performing a cost analysis may well prove to themselves that the investment to improve their estimating model is well worth the effort.

It makes financial sense to invest in developing an accurate estimation process as is illustrated in the following examples drawn from an actual project history.

Analysis 1: Estimating to Control Costs and client expectations...

A software development company is performing t&m projects for a client on a supplemental staffing contract. A team of 10 developers and 1 project manager are assigned on a dedicated basis. 11 FTES are providing a contracted 160 hours per month per FTE of service for a total of 1760 hours. At a contracted cost of \$50 per hour, the monthly contract value is \$88,000 and the yearly cost is \$1,056,000. In summary:

FTES	11
Hours per Month	160
Total Hours per month	1760
Blended Cost / Hour	\$ 50
Monthly Cost to Client	\$ 88,000
Annual Cost to Client	\$ 1,056,000

Functional requirements stream in from the client. These requirements represent change orders to existing systems, development for new system functionality and bug fixes. Projects are defined from these requirements and assigned to the developers.

With experience based estimation, industry research shows that a 20% to 50% variance is the typical performance. That is on average, projects are usually underestimated and usually by 20% to 50%. Therefore, using the figures above and making a conservative assumption that at least ½ of the projects will be underestimated by a minimum of 30%, this dedicated team's 30% estimation actual performance would result in an extra 264 hours of work per month.

FTES	11		30% Estimation Performance
Hours per Month	160		
Total Hours per month	1760		264
Blended Cost / Hour	\$ 50		\$ 50
		Monthly Cost to	
Monthly Cost to Client	\$ 88,000	Developer	\$ 13,200
		Annual Cost to	
Annual Cost to Client	\$ 1,056,000	Developer	\$ 158,400

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The cost of \$158,400 dollars is either passed to the client potentially resulting in negative client reaction or absorbed by the developer reducing their profit margins or a combination of both.

For the case of this example, we will assume that all the \$158,400 is paid in overtime pay as an extra cost to the developer for poor estimation performance.

The cost of training and consulting to implement a function point based estimation process that can reduce the estimation error from 30% to 10% can range from as little as \$5,000 to \$20,000. Using a conservative figure of \$20,000 to improve estimation performance to 10% variance, what is the ROI using the numbers above?

FTES	11	30% Estimation	10% Estimation
Hours per Month	160	Performance	Performance
Total Hours per month	1760		264 88
Blended Cost / Hour	\$ 50	\$	50 \$ 50
		Monthly Cost	
Monthly Cost to Client	\$ 88,000	to Developer	\$ 13,200 \$ 4,400
		Annual Cost to	
Annual Cost to Client	\$ 1,056,000	Developer	\$ 158,400 \$ 52,800
		Actual Paid Overtime	\$ 158,400 \$ 52,800
		Reduced Paid Overtime due to improved estimation	\$ 105,600
		FPA Estimation Investment	20,000
		Return on Investment	5.28

In the table above, by improving estimation performance to a 10% variance, the number of hours underestimated is reduced to 88 hours a month to an annualized cost of \$52,800. This represents a savings of \$105,600 dollars and a single year ROI of 5.28, on the investment of \$20,000.

The ultimate goal of estimation is to not to simply reduce losses but to gain client confidence in developer assurances and estimates. High performance estimation is the goal to produce a culture and environment where underestimation is the exception rather than the rule.

Analysis 2: Estimating Outsourcing Control Costs and client expectations...

Using the above scenario, the software developer may opt to outsource estimation to a third party as a service to the project team. The cost structure is different because there is no training of developer personnel. A third party, such as DCG, becomes a delivery quality assurance partner to the developer.

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Functional requirements stream in from the client. These requirements represent change orders to existing systems, development for new system functionality and bug fixes. Projects are defined from these requirements and assigned to the developers. These requirements are also provided to DCG Function Point Estimators who in turn provide a function point based estimate for each project (that is of sufficient size) to estimate.

The estimation performance improvement is the same, the cost is different.

The cost of outsourcing estimation that can reduce the estimation error from 30% to 10% can range from as little as \$1,200 to \$3,800 per project estimate based on the size of the project.

Using a conservative figure of 50 projects that would improve estimation performance to 10% variance, what is the ROI using the numbers above?

FTES	11	30% Estimation	10% Estimation
Hours per Month	160	Performance	Performance
Total Hours per month	1760		264 88
Blended Cost / Hour	\$ 50	\$	\$ 50
		Monthly Cost to	
Monthly Cost to Client	\$ 88,000	Developer	\$ 13,200 \$ 4,400
		Annual Cost to	
Annual Cost to Client	\$ 1,056,000	Developer	\$ 158,400 \$ 52,800
Number of Projects	75		50 50
Cost per project	\$ 14,080	\$	\$ 3,168 \$ 1,056
		Cost Savings per project	\$ 2,112
		Total Cost Savings all projects	\$ 158,400
		FP Factory Outsource Estimation Cost per project	\$ 1,250
		Total Cost Savings all projects	\$ 93,750
		Return on Investment	1.69

In the table above, by improving estimation performance to a 10% variance, the number of hours underestimated is reduced to 88 hours a month to an annualized cost of \$52,800. This represents a savings of \$93,750 dollars and a single year ROI of 1.69 when using outsourced estimation services.

The ultimate goal of estimation is to not to simply reduce losses but to gain client confidence in developer assurances and estimates. High performance estimation is the goal to produce a culture and environment where underestimation is the exception rather than the rule.

Analysis 3: Estimating to Compete...

A software development company is competing with a larger competitor for a large custom software development fixed-price contract. The smaller software development company knows its quality is equivalent or better than the competitor and its cost structure is lower. However, the

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prospective client is considering both bids on both quality and price. Both competitors have been provided several large volumes of functional and design documentation.

The larger development company has bid \$20,000,000 dollars based on an analysis of functional and design documents.

The smaller competitor, using an outside firm to perform a function point analysis, as a cross check to internal function point analysis, developed an estimate of \$8,000,000. The smaller competitor delivered its estimate along with documentation of the objective third party function point count and estimate. The smaller competitor eventually delivered the entire project for a total internal cost of \$5,000,000 making a \$3,000,000 profit.

The cost of the objective third party function point count and estimate was \$3,500 dollars. The final project profits were \$3,000,000 for an ROI of 857 to 1.

Analysis 4: Application Management ROI

Many large organizations outsource their software development and maintenance to third party providers. A common Service Level Agreement (SLA) metric used to measure value delivered is hours per FTE. If the contract says, 100 Full Time Equivalent personnel (FTEs) are to deliver 8 hours a day, 40 hours per week of value, then the metric is hours and the verification method depends on timesheet accounting and audit. In a month of 4 weeks, the 100 FTEs better have delivered 16,000 hours (100 x 40 x 4)

However, hours provided may not always be the best measurement of value delivered by developers. In many large outsourcing contracts, developer productivity is measured by hours per function point and this is used to determine value delivered. How developer productivity is measured is a separate discussion so we are assuming for argument purposes that we know the figure, and in this discussion, it is 10 hours per function point.

For example, if an application enhancement is sized at 100 function points and the vendor productivity is assumed to be 10 hours per function point, then the hours to deliver 100 function points is 1,000 hours. If a new application development is sized at 1,500 function points (large development), then using the same vendor productivity, the hours to deliver is 14,000.

In thinking about justifying the cost of engaging an independent third party FP counting capability, the table below illustrates the value of “accurate” counting by a third party.

DCG experience has shown that outsource software vendors almost invariably over count function points intentionally or otherwise. In addition, from the client side, self-trained, uncertified function point counters within an organization also typically over count.

Here are two cases for consideration.

Case 1: Let’s look at a case where a client has outsourced a large portfolio of applications to a third party vendor. If the vendor counts at +10%, the dollars at risk for a client might look something like the following table (this example is a large portfolio with an even mix of small, medium and large applications both COTS and custom):

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Number of applications in portfolio (example)	1,200
FP's per application (Industry Average)	1,500
Total number of FP's (Example)	1,800,000
Outsource Vendor FP Count "Top-end" Deviation from Average	10%
Hours per FTE per year	2,000
Blended hourly rate for development staff (Example-assumed cost to client)	\$45
Development Productivity (hrs/FP) (Industry Average for Mainframe environment)	10
Development Cost (\$/FP)	\$450
New development per year (as % of base)	5%
New development per year (FP's)	90,000
Extra Development FP's claimed through "Top-end" counting	9,000
Extra development cost per year	\$4,050,000

In this situation, the extra cost per year of \$4,050,000 and is significant.

For illustration purposes, assume that DCG is providing third party auditing of the counts. DCG can typically audit a 1,500 FP application count between 3 to 5 days. Assuming a worst case scenario (not likely) where DCG audits all 90,000 of the New Development FP's (we usually do a statistically significant sample), then DCG would audit 60 separate counts each taking 5 days. This is a total of 300 days of audit consulting and using the top rate of \$1,200 a day, the total cost would be \$360,000.

The auditing "trims" the 9,000 overcount. Again, for illustration purposes let say the audit only trims the overcount by 50% or 4,500 function points thereby reducing the cost by \$2,025,000. **The ROI for investing \$360,000 to save \$2,025,000 is 5.6 to 1.**

Case 2: Let's look at the case where a client invests in itself to develop a function point count capability and uses a third party firm for calibration insurance. Calibration insurance means making sure that internal function point counting skill sets are calibrated to accurate function point counting standards.

For example, for a portfolio size of the example above, DCG experience has shown that a ballpark estimate of \$25,000 to \$75,000 train and develop internal function point capability is a reasonable figure.

Assume that after 6 to 8 months the client internal staff is competent. DCG, as the third party audit firm to calibrate the counts, would be engaged to count a fraction of the new development function points, say 10%, or 9,000 while the trained internal staff counts up to 20% of the 90,000 or 18,000. Therefore 30% of the new development is counted for a statistically significant sample.

Assume the 9,000 "overcount" is trimmed by 40%, for illustration purposes, to 5,400 function points thereby reducing the cost by \$1,620,000. The first year DCG cost would be \$36,000 while

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the client internal training cost would be worst case, \$75,000. The total first year cost would be \$111,000. **The ROI for investing \$110,000 to save \$1,620,000 is 14.6 to 1.**

After year one, the ROI gets better because the initial training cost is gone and your costs are internal staff and annual DCG auditing.

Obviously this is a simple ROI example, but it is illustrative of the value and benefit of using function points in measuring units of work in a fair and objective manner.

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