

## Intellectual Infrastructure (the art of successful delegation)

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Being manager of a software development organization can be a stressful role. Failure rates among technology projects are higher than any other type of mainstream project. From scanning a few national newspapers from around the world, I quickly identified more than \$7 billion dollars worth of losses as a result of failed and troubled projects in 2008 alone [1, 2, 3, 4, 5, 6, 7]. Ranging from the technical issues that disrupted British Airways' move into Terminal 5 at Heathrow [1], to the failure of Waste Management Inc.'s \$100M Enterprise Resource Planning project [2], the costs can be high.

Almost every organization experiences the pain of a troubled project at some point and the stress for those involved can be extreme. As well as costing managers their jobs (as happened in the case of British Airways), failed projects have resulted in the collapse of complete organizations. Pivotal Integration Ltd of Scotland is a recent example. Pivotal's contract to implement a new ticketing system for the 2008 Edinburgh Fringe Festival (the world's largest arts festival) resulted in chaos when the system collapsed under the volume of transactions being processed. As well as threatening the financial future of the festival, the ongoing problem proved to be the final nail in Pivotal's coffin and the company was placed into receivership in August 2008 [8].

Such failures mean that improving success rates is one of the most urgent issues for those managing software development organizations. Through my years of studying failed projects I've seen organizations respond to that question in many ways. Typically the impetus for change arises from a major failure or an impending crisis. Failure shakes up the status quo and provides a focal point for action. The most common responses to such situations include;

1. The introduction of a Project Management role or Project Management Office
2. Formation of a process improvement taskforce
3. Adoption of a new methodology
4. Implementation of new tools
5. An increase in the effort spent on testing

Unfortunately organizations often find that such responses fall short of their original goals. Some initiatives peter out without delivering any tangible value and for those ideas that do get implemented the results often fall short of solving the problems. In part such failures are because managers find themselves in a continual cycle of firefighting that prevents them focusing their energies into ensuring an initiatives' success. But also the difficulty lies in a failure to fully understand the nature of the problem being solved and how the proposed solutions relate to it.

### *The need for expertise*

In last month's article (What makes technology projects so hard to do?) it was proposed that instead of viewing technology projects as a set of interdependent tasks, we should think of them as large scale, complex, decentralized decision making activities [9]. Although it may be a bitter pill for some to swallow, the hard truth is that ultimately it is the cumulative consequence of the decisions the team makes and the effect of the questions the team failed to ask that determines how a project unfolds. If a

team consistently makes good decisions the chances are they will succeed. If they repeatedly make bad decisions, the chances of success are much, much lower.

Making effective decisions requires expertise and technology projects are very much expert driven activities. Rather than relying on physical skills, dexterity or other human capabilities, technology projects are fuelled by the expertise participants bring to the table and their ability to combine their talents with those of others to create a product of value.

Although as an industry we often don't like to question the capabilities of individuals, it's hard to dispute that individual performance varies greatly. Many studies have shown that in terms of both productivity and quality the variance between the strongest and weakest individuals can be as high as ten to one [10, 11]. The same studies have also found an interesting effect. Rather than being evenly distributed, strong performers tend to be clustered in certain organizations. As a result, the performance variance between the strongest and weakest organizations is similar to that for individuals [11].

### *Intellectual infrastructure*

In recent years I've had the opportunity to visit a number of organizations in which strong clusters have formed. The clear distinction evident from those visits lies not with what the project teams do differently, rather the defining characteristics is in the way the organizations are managed. While managers in struggling organizations have little spare time for anything other than firefighting, those in stronger organizations are primarily focused on skills development. In many ways this observation highlights one of management's primary responsibilities. The creation of a pool of strong resources that has the capabilities needed to succeed.

The processes an organization uses for attaining, creating and maintaining expertise and the knowledge upon which it is based can be thought of as the organization's "*intellectual infrastructure*". Combining processes typically viewed as human resource concerns with other factors, the elements that make up the infrastructure include;

1. Hiring practices
2. Training, coaching and mentoring
3. The processes used for knowledge sharing and knowledge retention
4. Leadership and the setting of expectations
5. Performance feedback
6. The methods used for identifying and dealing with non-performance
7. Promotion practices and the support given to those moving into new roles
8. Organizational structure
9. Methodologies, processes and tools

Although organizations often see these processes as discrete activities, they are in fact part of an overall system. Knowledge and expertise are the output of that system and those capabilities subsequently become the primary input to the organization's projects through the formation of project teams.

Failure to build a strong infrastructure can leave an organization trapped in a firefighting loop. Despite the honest efforts of the project team and everyone involved, significant gaps in team's knowledge, skills and capabilities lead to the major errors and omissions from which firefights explode. Those firefights demand management intervention leading to a corresponding drop in the time managers have

available to perform their own roles. The resulting neglect of the organization's intellectual infrastructure perpetuates the ongoing cycle.

### *A different approach*

One organization I recently visited has tackled the challenge of building an effective intellectual infrastructure head on. The organization has a reputation for being one of the most capable software development centers in the region and my interest was to find out how they had achieved their success.

The interview was based around one simple question, how does your organization consistently attain successful results? One of the most striking aspects of the response was in the focus the organization placed on skills development rather than the more usual approaches such as process improvement, investment in tools or increasing spending on testing.

The organization's senior management had adopted the philosophy that quality and productivity are based on the capabilities of their staff and as a result the organization had focused considerable effort on building a strong intellectual infrastructure. Of particular importance to the organization were processes such as:

1. Making every effort to ensure they hired the right people
2. Ongoing skills development
3. Enhancing the knowledge the team has of the domain they are working in
4. Improving internal communications
5. Developing the skills needed to allow the team to collaborate effectively
6. Motivating staff
7. Developing a culture that supported their overall organizational goals
8. Developing leadership
9. Setting and managing expectations for their teams

The organization's hiring practice makes an interesting illustration. While many organizations perform just a single level of interview, the organization in question used a five step process. Blending formal demonstration of technical skills, management interviews, reference checks and an interview at the peer level, the process was designed to give the organization as much information as possible upon which to make an informed hiring choice. Although they acknowledged that a five step process was expensive and at times the extended duration the process took meant they missed out on a strong candidate, overall they judged that the damage done by hiring the wrong person more than offset any cost and potential risk.

Figure 1 below includes a comparison of some of the key practices in use by the most capable organizations I've visited and other organizations that continue to struggle. It's a table that represents a stark contrast in management thinking and although more research would be required to establish a correlation between management practices and project success rates, observations of the organizations I've visited certainly support such a hypothesis.

Figure 1 – Comparison of practices

Practice	Weakest organizations	Strongest organizations
<b>Hiring</b>	Single interview often rushed and poorly prepared. Years of experience equated to level of expertise. No direct verification of capabilities. No training in how to conduct interviews provided to those giving interviews	Multi-tier interview process plus (wherever possible) testing or other objective ways to validate actual performance. Those giving interview trained in how to conduct an interview
<b>Post hiring &amp; probation period</b>	Little or no oversight. No training for new hires. Probation period termination clause never used	Specific training for new hires to allow them to understand the organization. Proactive oversight during probation period. Probation period termination clause used if necessary
<b>Performance reviews</b>	Perfunctory reviews with little differentiation between strong and weak performers (everyone is average). Reviews often based on perception rather than physical review of actual deliverables. Benchmark performance standards are undefined	Reviews are conducted by those who have the skills to physically review the person's deliverables and a firm understanding of what represents good practice. Benchmark performance standards are clearly defined
<b>Handling of non-performance</b>	Ignored, downplayed or just never identified	Proactively addressed and tools put in place to help poor performers improve. Active processes in place to assist those who fail to make the cut move on gracefully or find roles they are better suited to
<b>Leadership and setting of expectations</b>	Little clear leadership and no expression of expectations	Effective technical, project management and organizational leadership established. Expectations clearly established and communicated frequently
<b>Knowledge retention / sharing</b>	No formal processes in place. Knowledge held in the minds of those who have been there longest. Knowledge gained through school of hard knocks	Formal programs to train new hires. Repositories of critical organizational knowledge maintained, on-going lunch and learns, etc
<b>Training</b>	Little investment and what investments are made focus on hard skills rather than soft skills	Significant levels of investment. Broad programs focusing on both hard and soft skills
<b>Coaching and mentoring</b>	Nil, or if program exists, it is largely dormant	Active coaching / mentoring programs
<b>Promotion</b>	Little pre-promotion preparation. No oversight or support following promotion	Formal succession planning and preparation for those moving to new roles. Ongoing support after promotion
<b>Senior mgt to staff level interaction</b>	Nil or a once a year high level presentation. Top down communications only	Regular sessions in which senior management interacts with staff. Top to bottom and bottom to top communications encouraged
<b>Management focus</b>	No oversight or reviews of those processes that make up the intellectual infrastructure. Processes are viewed as separate and discrete tasks. Management time largely absorbed by firefighting.	Periodical reviews of the processes that make up the intellectual infrastructure and their effectiveness. Processes that make up the intellectual infrastructure are viewed as one system and the system is actively managed.

### *Breaking out of the loop*

Clearly breaking out of the firefight loop is a win-win situation for everyone. Less firefighting means less stress, fewer dissatisfied customers, reduced costs and a healthier work environment. The problem for many lies in finding ways to get started. As with any change, getting going can be the hardest step and many organizations fall at the first hurdle by ruling out any changes because of costs.

The cost concern is actually something of a smokescreen. Organizations that raise the cost issue are usually unaware of the high rework costs inherent in their current practices. Research into the cost of rework shows that troubled organizations typically spend 40 to 50% of their development budget in rework and in some cases rework can reach a staggering 70% [12]. Even a small reduction in rework is often more than enough to offset any costs that may be incurred by undertaking a program of organizational change.

The second big objection comes down to time. With so many firefights, how can managers even start to think about making changes? Again the argument is something of facade and there are many low hanging fruit that can be had with very little effort. One manager I worked with held a weekly lunch and learn to help people share their domain knowledge. Another established a program so that newly hired developers spent their first few weeks in the Quality Assurance group. By executing test plans, new developers understood more about the application than some who had been with the organization for several years. That knowledge jump started their ability to become productive developers when they moved into to the development team. The number of ideas is almost limitless and any capable team will be able to generate their own list very quickly.

Starting small is in fact often the best way to go. Many that initiate programs of organizational change make the mistake of taking on more than they can really chew. Other than wasting resources, mission impossible initiatives often produce nothing more than the bitter taste of another good idea that failed to fly.

## *Conclusion*

Management can be thought of as the art of successful delegation and an organization's intellectual infrastructure represents the underpinnings upon which successful delegation is based. A strong infrastructure allows delivery responsibility to be delegated to the project teams where it rightfully belongs. A weak infrastructure leads to the firefights and management interventions that are unfortunately all too common.

Organizations that have built a strong intellectual infrastructure realise benefits beyond the simple reduction in the need to firefight. Staff often report higher levels of motivation, retention rates rise and word of mouth often draws the strongest candidates to respond to job posting. Those benefits bring further payback, such as the reduction in costs due to higher retention rates and the creation of a pool of talent that can act as role models for those still developing their skills. Over time the cumulative effect of a healthy infrastructure allows a cluster of capable and strong performers to develop.

As much as anything else, building a strong intellectual infrastructure is a philosophy rather than a creed. It's a direction in which to work rather than an edict that certain steps must be taken according to some rigid plan. There are many low hanging fruit that can provide the starting point for improvement. By taking baby steps and understanding the direction in which the destination lies, smart management teams are actively creating the conditions from which success will bloom.

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About Callead Consulting: Callead Consulting is a training and consulting organization focused on understanding why some projects fail and others succeed. Using simulation, modeling and analysis of both successful and failed projects from the past, Callead helps organizations turn yesterday's hindsight into the foresight needed for tomorrow. For more information visit [www.calleam.com](http://www.calleam.com)

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