

The testing project and its infrastructure

Regular columnist **Felix Redmill** on the real reason things go wrong: built-in risks

Software testing, from unit to system testing, and in some cases also including acceptance testing, is usually considered to be a component, or sub-project, of a system development project. But, just as a sub-system is recognised to be a system in its own right when it is the focus of interest, so a testing sub-project is a project in its own right. Certainly it should be perceived as such by the test team and test manager. Yet, within an organisation, the test team is often treated as an in-line group and its manager as an in-line manager.

So what? Why is it important for testing to be perceived as a project in its own right? Because it needs to be managed as a project. It is not a routine function; it is subject to disruptions to its plans at short notice when developers do not deliver software on time; and it therefore requires frequent re-planning and dynamic management of staff, resources and contingency activities. Further, as late delivery of software to the test team may not be accompanied by an extension of the time in which to test it, even the testing objectives may have to change.

In a project, two significant resources are the budget and the time allowed for the delivery of the product - the tested software. But budget and time are also constraints, and in modern projects, in which productivity expectations are often unreasonably high, they are likely to be constricting. At the best of times, small errors can escalate into large problems with substantial undesirable results, but under tightly limiting circumstances the potential for this to occur is amplified. There is little leeway for error.

Adequately trained and experienced technical people usually do a good job. When they make mistakes, they usually discover and correct them, thus arriving at a satisfactory resolution even if some time has been lost. Typically, the more frequent and far-reaching project problems result from management issues and, most frequently, from deficiencies in the 'project infrastructure', which may be defined as possessing three components: the people, communication, and documentation infrastructures, and these form the subject of this article.

In one project, a problem occurred that only the director who had sponsored the project could resolve. But the project manager discovered that the director was abroad and would not be back for a week. When he returned, the director was too busy to hear about his project, and when he took time for it he complained at being expected to involve himself in it. He had authorised the project, he said, and that was the limit of his participation. It hadn't occurred to him that his project's strategic problems were his responsibilities and that his involvement needed to be permanent. The project manager had not drawn up the people infrastructure or formally informed the project participants of their roles, and the director was not the only senior manager who was unaware of his responsibilities to the project. Senior managers had been invited to Project Board meetings, but the project manager had accepted their absence without complaint, so their conviction that they were not needed was reinforced. In the end, with the director's authority appropriately focused, the problem was solved in half a day, but the delay had cost the project a great deal more than that.

The project manager's comment was that such things could happen in any project and were unforeseeable. Such things can indeed occur in any project, but, far from being unforeseeable, what happened was entirely predictable. The problem did not start with the director's unavailability but with the project manager's failure to put an infrastructure in place. The trouble is that many, if not most, project managers do not think in terms of infrastructure.

A testing project is as much in need of a defined infrastructure as any other. Regarding people, there are the test team and the test manager, all of whom should know their responsibilities. If the testers are graded by seniority or salary bands, the implications that these have on project responsibilities should be explicit. Then there are the less obvious project participants. Suppose that some software is delivered too late for its testing to be carried out as planned; who decides on what action to take? Should the test plan be reduced, and if so, how? Should the time be extended? Perhaps the decision will depend on the criticality of the software in question, but

it is not usual for such risk-based planning to have been done. In some circumstances, responsibility for the decisions may rest with the overall project manager (and if so, why did he or she not ensure that the software was developed on time in the first place? But that's another issue). If the test or project objectives need to be changed, definition and authorisation of the changes may rest with an appropriate director, and in some cases a senior customer representative may need to be called in. They therefore should be aware of their long-term responsibilities to the project so as to make themselves available at short notice if a problem arises, and to keep themselves appropriately briefed at all times. If test planners need to be involved, special provision may have to be made for their recall if they have already moved to other projects. Such possibilities should be foreseen by the project manager.

The appropriate involvement of each participant should be established at the Initiation stage of a project, and the basis for doing this is to define the respective responsibilities - and the relationships between participants - within the project. Then all participants should be informed of what is expected of them and their agreement formally obtained. Is this too formal an approach to project management? Not at all; only proper formality at the start will achieve smooth running later. Getting the specification right for the 'people part' of the project is as important as preparing the technical specification. It is not sufficient for the test project manager to assume that the people infrastructure for testing has been put in place by the overall project manager. In most cases it will not have been.

Defining the people infrastructure informs the design of the communication infrastructure. If a director may have to make crucial decisions at short notice, he or she needs appropriate information, not only at the time of the decision but throughout the project. But what form should the information take? Most senior managers demand frequent - weekly or monthly - project reports, but they should also guarantee their attendance at certain types of project meetings. Discussing progress and problems, and making decisions on matters arising, cannot satisfactorily be replaced by the exchange of documents.

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Reference to a director is merely an example. Each project participant requires certain information in order to discharge formal responsibilities and certain further information for interest and motivation. How should the relevant information be communicated in each case? Which participants need to be in touch with which others? Are meetings necessary or should documents be used - and, if the latter, what form should they take? What meetings should be held periodically throughout the project, and what meetings may need to be called ad hoc? What documents are required for recording, transferring and storing information? Asking and answering such questions at the project's Initiation stage informs the project manager's design of the communication infrastructure so that it facilitates the collection of appropriate information, its timely transfer to those who need it, the making of decisions, and the solving of problems as they arise. At the same time, the communication infrastructure should be designed to preclude the wasteful collection and transfer of unneeded information.

A high proportion of project information is recorded and transferred in documents, and the document infrastructure too needs to be planned and designed. Why have a ten-page report when all that is required is a single-page brief? Most people would agree that this would be absurd. Yet time is persistently squandered on creating and managing unnecessary documentation. If a junior member of staff is called on to prepare a document that will be read by 'the director', he or she is likely to invest (and almost certainly waste) a great deal of time in its preparation. Only if the purpose of the particular type of document is defined as being for briefing only, and its length as being of no more than one page, will the writer waste less time over it.

And so it is with all types of document. For each type of meeting within the project, should minutes be taken, and, if so, should they record all discussion or only agreed actions? It is useful, at the start of a project, to design a template for each type of document to be produced, showing the required headings and giving guidance on the expected nature and volume of content. When, during the project, new types are found to be necessary, they too should be defined. Many test teams are small, and test managers may put progress reports onto a notice board rather than copying them to all team members. Such informality is not out of place, as long as it is the practice defined by the project manager and understood and expected by all team members.

Document definition is not limited to purpose, length and content. Numbering and filing systems are also essential. Such things are often considered so trivial that they indefinitely retain a low priority and are never implemented, and it is not unusual for severe problems, occurring six months or more into a project, to have their origins in their lack. Then, as with the people infrastructure, the project manager and others may shrug and remark that such things could never have been foreseen.

A distribution system, defining whom each type of document should be sent to, and the mode of dispatch, is also a necessity. Without it, mistakes are likely, many resulting in confusion, late decisions, and project delays. In some cases, a recall system is useful as well. Recalling (and perhaps destroying) obsolete versions of some documents, for example standards, can go a long way towards obviating the need to repeat a stage of the project because out-of-date guidance was used.

A document infrastructure is particularly important in a testing project because informa-

tion (much of it in the form of documents) must be transferred not only within the project but also across the project boundary into the larger parent development project. Often test results must be documented in different forms: in overview for senior managers, in detail for developers, and somewhere in between for the project manager. A format and a protocol are also required for sending feedback to developers, particularly if it may include complaints.

All the informational relationships in the project need to be planned or predicted by the test project manager and used in the definition and implementation of the three components of the project infrastructure. Creative imagination can be as important an attribute to a project manager as leadership.

A project arises out of the need to achieve certain objectives - in a testing project, the testing of software. But only the least effective project management is limited to scheduling and directing technical activities. A significant part of a project manager's job is to design and implement an appropriate project infrastructure to *facilitate* their accomplishment, and to monitor its operation for both efficiency and effectiveness. If senior management understood this, they would not have to wait for a late or inferior product before knowing that a project is in trouble; they would make early judgements on the quality of the project infrastructure. Indeed, they would train project managers to think in terms of infrastructure.

A good project infrastructure smoothes the path of testing. Without it, things go wrong - things that those who do not understand the infrastructure's importance believe to be unpredictable. Projects come to grief because of the risks that we build into them, and the worst of these are often caused by the lack of infrastructure management.