



# Quality level agreements

## INFocus

THIS MONTH we have a focus on big issues, with Triona MacGrath-Newton explaining how quality level agreements work, for both customers and vendors.

Bryan Glick outlines the very real benefits of CERN's Large Hadron Collider experiment and other projects at the bleeding edge of research.

## VALUEPoints

**QLAs:** Properly defined agreements, based on measurable from standards such as IEEE 1012, can set out specific criteria for all aspects of project quality

**CERN:** Advancements in collaboration, data storage and parallel computing have many benefits for more conventional business applications

As a development company you've delivered and now your customer is asking for more features. As a customer, you're still spending time and money on a system where you have doubts on the overall quality. Consider quality level agreements (QLA) to help you agree on targets without breaking the bank and in an age of outsourcing each stage of a project life-cycle, it provides a governance method to which all vendors can adhere. Quality level agreements (QLA) are incentive driven agreements which quantify objectives into clear and measurable targets that must be adhered to throughout a product's life with rewards for fulfilment and penalties for breaches.

### CAD

Over the past number of years there have been a number of high profile dramatic computer aided disasters. Two separate attempts were made to computerise the London Ambulance Service dispatch system, to locate vehicles and to automatically communicate with vehicles. Both of these resulted in a regression to a manual system for a time. Included in the reasons for failure were omissions in assumptions; requirement prioritisation; developed software; performance testing; system testing and quality reporting.

Heathrow's Terminal 5 baggage handling system was offline from its inception for three days which resulted in regression to manual baggage handling. Included in the reasons for these

issues were requirement prioritisation; risk prioritisation and construction work delays squeezing system test and performance testing windows.

A typical development life-cycle follows the pattern of outlined in figure 1. Quality Governance is implemented over the project as a whole and at each stage of the lifecycle.

### Business case

During the business case phase the customer should define clear business requirements that are an extension of business demand. Part of the quality levels for this phase is a definition of the testing strategy, including all the entry/exit criteria which will ultimately govern quality. At this stage the requirements can be validated according to the IEEE 1012 standard criteria of completeness; accuracy and testability. So the quality levels implemented at this stage include assessing the percentage adherence to the requirement validation criteria defined in the exit criteria for this phase.

An example of a completeness requirement that is often omitted at this stage is performance criteria that were clearly stated so the vendors know what they have to deliver. Thus some sample quality levels exiting the business case phase are that the business analyst vendor has completed the requirements, development and interface development vendors define the coding standards that will be adhered to and test analyst vendors define the test

TRIONA MacGRATH-NEWTON outlines the specifics for implementing quality assuring project structures

strategy and assess the requirements.

The business case phase QLA is that the requirements score 95% according to the IEEE 1012 standard. If they fall below this target, the vendor reduces the cost of this phase by 10%. If they exceed a score of 98% the vendor receives a bonus of 5% of the cost.

### Design requirements

During the design phase the design documents are written based on the requirements. Sample design phase entry criteria would include that the requirements are written, the test strategy is written and the requirements are assessed.

The design quality could be measured against the number of change requests raised once the initial design has been signed off. This quality is further assessed through formal inspection reviews of the design documentation to assess the adherence to the business case requirements and overall project drivers. A sample exit criterion would be that the design documents are written and assessed as having no medium, high or critical document issues exist.

The design phase QLA is that the number of change requests should not exceed 1 per 20 day block of design work. If this target is exceeded, the vendor must

pay 1% of the design cost for each additional change request over the target. If there is no more than one change request for each 30 days of design effort the vendor gets a 5% bonus.

### Build time

During the Build phase the development is implemented on the core system, along with the development of interfaces and databases and the creation of environments. Some quality levels implemented from early in the code development are static analysis tools to measure code quality; code coverage and adherence to coding standards where the development vendor is responsible for ensuring the assessed code quality adheres to the quality level agreed during the business case phase. Ultimately this leads to improved development quality by requirement driven development rather than defect driven development.

### Code quality

The build QLA can be based on a code quality standard and the target to achieve is 95%. The penalty might be 10% of the development cost if below this standard and the bonus might be 5% of the development cost if the measured quality is 98% of the target or greater.

Traditionally, the test phase refers to dynamic testing which exercises

business flows, developed code, integration with new and existing interfaces, database integrity and coherence of the environment among other factors.

Prior to the start of the formal test phase, the business validates the dynamic test requirements initiated in the business case phase, written in the design phase and refined in the build phase. Development vendor quality may be measured against the volume, priority, severity and turnaround time on defects raised. As defects are raised the quality level may be further assessed through the level of defect re-introduction and resolution rejection. The test phase also enables assessment of the business analysis vendor through the number of new change requests. Examples of test phase exit criteria include that all business processes have been exercised; the performance criteria defined during the business case phase are adhered to; all defects have been assessed and the outstanding defects are of low priority. The quality of the test vendor can be assessed by the requirements coverage of the executed tests; the turnaround on the retest of failed and blocked on resolution release and the percentage defects identified per business module.

### Test QLA

The QLA for the testing phase might be that the test case failure rate is 10%. The penalty is 1% of the development cost for each 1% failure above this target. The bonus is 5% of the development cost if the test case failure rate is 5% or less.

Bringing the system to live presents an opportunity to assess the quality level of the entire project. The numbers of critical and high defects identified in production assess the overall project quality. There should be none. After the project completion the quality level of further projects can be enhanced through implementation of the recommendations identified in a lessons learned exercise to review the entire project lifecycle.

The QLA for live is a target of one critical fault per month during live running. The penalty is 1% of the testing cost for each additional critical failure. The bonus is 5% of the testing cost for no critical failures

### Capability maturity

The quality governance of the entire project needs a number of processes implemented to ensure adherence to the capability maturity model. From the business case to the live phase, issues are identified. These issues need to be

tracked via a defect tracking and resolution process. The quality level can be improved by enabling defect identification by all contributors to a project rather than the traditional view of test only ownership.

While formal inspection reviews are the preferred option to review documentation during the design phase, the quality can be improved by additional reviews. A walkthrough of the design document by the author can improve the quality of draft versions by highlighting ambiguities for example. The documentation produced should be reviewed on an ongoing basis.

As previously mentioned, static analysis tools can be used to increase the quality of code during build. This process should continue through test and production to ensure build quality remains high where the timeline is reducing. Whether a project stems from an upgrade to an existing system or the implementation of an entirely new system through the retirement of a legacy system, the business processes often remain unchanged. To reduce any possible quality degradation, dynamic testing of regression tests should be automated rather than executed manually and hence running the risk of manual input errors.

### Stakeholders

Quality levels are the responsibility of all projects participants (vendors and clients alike) from business analysis to systems integrators, developers, release managers, database administrators and ultimately testers and end-users. In the London Ambulance Service and Heathrow Terminal 5 baggage systems, quality level agreements may have mitigated the issues that occurred on the release date by earlier detection. Through the documentation of quality level agreements and adherence to quality level agreements at every phase, the health of a project can be easily assessed at every stage and risks are minimised by early identification.

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### References

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*Over the past number of years there have been a number of high profile dramatic computer aided disasters - two separate attempts were made to computerise the London Ambulance Service dispatch system'*



Figure 1: This is a typical development life-cycle pattern. Quality governance is implemented over the project as a whole and at each stage of the lifecycle.

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