TickIT and consultants: how to get IT without them

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ABSTRACT

The purpose of this paper is to show how a small, independent company's quality management system was successfully certificated to TickIT/ISO 9001, without the use of external management consultants. The TickIT certificate in question covers the entire business scope, including software development and maintenance (both of products and bespoke systems), large research and development contracts, consultancy and IT training.

Not only was TickIT implemented successfully: the scheme lived up to its promise and continues to deliver measurable business benefits to the company. The main benefits include shortened lead times, higher productivity and business turnover, and increased market share. At the same time, human resources spent in QA have reduced since certification, and currently stand at around six per cent.

However, despite avoiding the use of management consultants, it has become apparent in the four years since QA implementation began that a significant amount of heavy going could have been avoided if the organisation had taken advice at key stages. This paper identifies those stages and concludes that judicious and independent advice would have saved time and money.

CONTEXT

ULIS

The University of Leeds Innovations Ltd. (ULIS) was founded in 1971 with the mission of developing the University's links with industry for the benefit
of both. ULIS consists of various business divisions, one of which is the CAD-CAM Data Exchange Technical Centre or CADDETC (pronounced "kuh-det-si"), the subject of this paper.

CADDETC
CADDETC was established in 1986 as a world focus for product and process data sharing and exchange. It is a leading UK consultancy in the area of engineering data exchange (CAD/CAM, EDI), engineering product information modelling (e.g. Express), and engineering product model standards (e.g. STEP).

Software background
CADDETC develops software for sale to specific customers (bespoke), a range of potential customers (products), and internal tools for its services, such as conformance testing. Software for customers includes editors and compilers for product modelling languages, diagnostic/corrective tools for problems in data exchange file transfer, and CAD system translators. Software is also prototyped for European standards research collaborations.

Development platforms include VAX Ada (ported to all platforms), C on Sun/SPARC and, more recently, C++ development on Apple Macs.

My experiences of TickIT implementation were gained whilst working as the Quality Engineer responsible for software development at CADDETC. In November 1992 CADDETC became TickIT certificated at the first attempt. The scope was 'software development, supply and maintenance; consultancy, testing and educational services exploiting electronic product information.' [1]

TickIT
TickIT is an accredited certification scheme for quality management system (QMS) construction and certification using ISO 9001 [2]. The TickIT Guide [3] interprets ISO 9001 with ISO 9000-3 [4]. It further embraces the certification process by including instructions on QMS preparation, a guide to software quality for purchasers of software systems and criteria and guidelines for assessors and lead assessors. The latter measure lays the firm basis for TickIT’s accredited status.

TICKIT WITHOUT CONSULTANTS

Between April 1992 and January 1993, CADDETC experienced, in order, re-location, merger, change of trading name and a reversion to the original
name. Both the General Manager and 50% of the staff were lost through voluntary and enforced redundancy. But by dint of its TickIT QMS, CADDETC survived all these things. Throughout 1993, and increasingly in 1994, it began to win business on the strength of its procedures: “The quality system is enabling us to win major contracts in the face of stiff opposition. Software developments are managed effectively within an overall project management framework, and technically, the software speaks for itself: one bug reported for 100,000 lines in a recent major development.” (Julian Fowler, Principal Consultant, CADDETC).

Moreover, it is the author’s view that without its quality system, the business may have died. The TickIT-certificated QMS at CADDETC was valuable for the boot-strapping required to conquer recession; now it is a business asset.

Human resources
The CADDETC Quality Assurance Section comprised two full-time members of staff; the Head of Quality Assurance and the Quality Engineer. The effort was supplemented by occasional, full-time Quality Assurance Officers (undergraduates and recent graduates looking for temporary work). Other staff spent up to 10% of their time on QA implementation.

Following an ill-fated merger with ULIS stable-mate Harmonix, staff numbers went from 30 in 1989 to 41 full-time technical staff by April 1992. Recession and cut-backs in DTI funding caused substantial redundancies, and the QA Section was closed. There are currently 13 employees, one of whom acts part-time as Quality Representative.

Summary of NAMAS and ISO 9001 achievements
NAMAS and conformance testing QA implementation began when NAMAS (the National Measurement Accreditation Service) accredited CADDETC’s test laboratory in 1991 (NAMAS test laboratory 0650/0650 SI) for conformance testing IGES (Initial Graphics Exchange Specification) data exchange software.

Conformance testing is not credible without accreditation, and CADDETC lead the field within the Commission of the European Community’s Conformance Testing Services Two programme (CTS II) to achieve a domestically-accredited IT conformance test laboratory. The development of CAD/CAM systems data exchange interfaces, and the establishment of a conformance testing service with its QMS was fully funded by a substantial grant from the DTI.
ISO 9001 and TickIT Following NAMAS accreditation the QA section managed the ISO 9001 certification and continued to devise quality manuals which were the key to the important process of interpretation. The Section also sought out the draft ISO 9000-3 and the nascent TickIT Guide, devised a generic software life cycle model, a project life cycle model, an electronic document production, review and storage system; auditing, purchasing, corrective action, project management and acceptance testing procedures, and began the process of developing external consultancies.

In addition, the merged Harmonix staff mentioned above were successfully assimilated into the QMS within months and were part of the successful TickIT assessment.

CADDETC is now winning contracts on the basis of the TickIT quality procedures. However, by far the most significant metric of the QMS’s success is that 13 people now turn over the same amount of business it once took 30 to do. In other words, the company is leaner, fitter and project lead-times are amazingly short. This would be impossible without a responsive and ever-improving QMS.

Route to QMS accreditation and certification
CADDETC’s route to formal quality systems was as follows:

1. 1989: Commitment to NAMAS-accredited QMS for software conformance testing. Resources for two-man QA section made available.

2. 1990: Decision taken to extend existing system to whole company and seek ISO 9000 certification.


TICKIT WITH CONSULTANTS

The role of consultants
The correct role for the IT quality management consultant is portrayed accurately and realistically in two existing TickIT publications:

2. TickIT case studies [6]

In the video, the fictitious consultant hired by “Universal Software Systems” makes it clear that his role is to advise and ‘scope’ – not to implement in any sense.

The British Rail Business Systems Computing case study regards the advice of a consultant as essential, adding the cautionary note that it is important to choose a consultant who will only offer guidance and not write the QMS. As David Luxford, the manager at BR’s Reading Development Centre points out “The more the consultant does, the less your staff feel they own it.”

How advice could have helped
At many stages in the development of CADDETC’s quality system, the impartial experience of a quality management consultant would have been invaluable. Many elaborations (and probably quite a few over-simplifications) would have been avoided if the organisation had hired a few day’s advice. This section considers some of these instances, and suggests advice which a quality management consultant might have given.

1. Choosing TickIT in the first place The QA section spent a lot of time and effort successfully convincing senior management that TickIT was the applicable, accredited sector scheme for CADDETC’s mix of software, consultancy, testing services and international R&D projects. So was TickIT the right choice? Yes; definitely. However, a consultant’s advice would have allowed management to make a more informed choice: TickIT involves extra costs and effort compared to a non-TickIT certification (a recent quotation to the author from Bureau Veritas for non-TickIT certification was 12% cheaper than one from their TickIT specialists. Both quotations concerned the same business profile.).

2. Choosing a scope which covered all company products and services There was always a commitment from company managers that the quality system must embrace absolutely everything the company did. This attitude is understandable; one Department does not like to be excluded from a scheme seen to be gaining awards and kudos for all the others. Also, management argued, would it not make sense to get it all done at the same time? A consultant might, however, have pointed
out that TickIT was applicable when software development forms a significant contribution to the overall product to the customer. A course of action, then, may well have been certification of software developments only, and extension of the QMS scope to the rest of the company's activities when software had piloted the certification.

3. **Basing an ISO 9001 quality system on an existing NAMAS system**  
With a NAMAS accreditation in place, a judicious harmonising of the different requirements of the two standards was needed to produce an effective hybrid QMS: unlike ISO 9001, a quality system which complies with NAMAS standards M10 [7] and M11 [8] emphasises consistency, impartiality, repeatability and confidentiality of test results. A NAMAS QMS would share common elements (quality manuals, authorised procedures, document control, quality audits, management review, sub-contracting control) with TickIT, but a NAMAS-based system is essentially different: it is not firmly rooted in competing and winning; meeting business needs and customer expectation. The harmonising of the NAMAS and TickIT requirements was slow to take place. In 1989 CADDETC was prototyping its quality system around a complex R&D project (quality-assured conformance testing for CAD system translators) in which resources for QA had been generously budgeted: the system was therefore not being designed with commercial, business-benefit operation in mind. A consultant may have warned of the finite nature of DTI grants, and recommended expansion planning for harder, smaller, commercial projects. A consultant may also have noted that the system was too complex for future commercial and administrative needs, and recommended more flexible arrangements for non-NAMAS operations.

4. **Document control** Between 1989 to 1991, many documents were developed for conformance testing technology, and quite rightly, strict change control was exercised over the documents; reviews were minuted, and even the reviews were reviewed. Unfortunately, quality system and commercial documents were subjected to the same rigours. There were several problems associated with this:

(a) controls were being imposed on system documentation beyond the normal requirements: documents should be useful, up to date, authorised, and available where needed. There is no further requirement.

(b) non-technical staff could not understand the need for lengthy, formally convened meetings to approve changes to a document.

(c) commercial staff could not afford the time to adhere to a system of formal reviews, closure reviews, working status, draft status
and complete status releases, and so ignored the system as often as possible. This meant that all the useful aspects of the document control system were ignored as well.

(d) there was a significant overhead in maintaining control of documents.

An independent management consultant would have seen the crux of the problem: a system of document control which was suited to the requirements of academically-orientated and complex development had been extended to serve commercial, administrative and managerial needs. The same system could not meet the differing sets of requirements. In the event, the widespread recording of document reviews only began to take place when the writing of review reports was streamlined and the storage of documents became computerised and automated.

5. 'Doclib' Between 1989 and 1990 a whole man-year of a senior engineer’s time was spent in developing a highly sophisticated document database on which most document control procedure was to be based. Document identification, review and storage were developed simultaneously and the procedures were intended to be integrated with the software. Problems occurred because the database was slow, sporadically available to technical and commercial staff and totally unavailable to administrative staff. It had not been formally specified or documented (‘a plumber’s tap always leaks’), and was rapidly outdated by changing requirements. An ‘interim’ flat-file database eventually received widespread use. Independent advice would have warned against an ambitious, bespoke system which could not react to procedures which were in early stages of development.

6. Software jealousy For around two years the company’s software efforts were split between a group doing internal developments for conformance testing software, and a group commercialising and developing the spin-offs. The commercial group responded to the market and began their own developments from scratch. There was a large incidence of wheel-re-inventing. This problem was known to the QA section and many responses were tried, but the wasteful rivalry was only resolved when the two groups were merged under a Software Resource Manager. It is hard to know whether an experienced consultant would do other than acknowledge the political problem and note the functional differences.

7. The results of a long period without advice Until CADDETC began negotiations with the certification body Det Norske Veritas in 1991,
it had received no authoritative, objective appraisal of its QMS. If a control was too stringent, there had been no way of knowing. If a quality manual was 50 pages long, when it may as well have been 15, there had been no way of knowing. The CADDETC manual had contained 50 pages, but shed 35 and is now a terse, lean document: but this was due to two years of use. CADDETC procedures now reflect what actually happens, instead of attempting to armour-plate each activity against every possible exigency. Consultancy at regular intervals would have confirmed progress and identified blunders.

CONCLUSION

The happy consequence of not receiving independent and informed advice is that people learned the hard way, and the author is fortunate to have profited from this often costly experience.

It is certainly possible to implement TickIT successfully without external help. To do it, an organisation must be prepared to commit a lot of internal resources to QA. But as this paper has hopefully shown, independent, external advice can save so much time and money it would be foolish to ignore it.

ACKNOWLEDGEMENTS

I gained my experience with TickIT under the leadership of Dr Bill Nairn, Head of Quality Assurance, ULIS Ltd. I am also indebted to John Nowicki from the USA for his patient technical advice and wide experience of software. Throughout CADDETC’s journey to TickIT certification I received thoughtful counsel from John Slater, TickIT Scheme Project Manager. All at CADDETC found working with Lead TickIT auditor Bal Matu a worthwhile and pleasant experience.

References

[2] ISO 9001 Quality systems – Model for quality assurance in design/development, production, installation and servicing (equivalent to BS 5750 Part 1; equivalent to EN 29001) ISBN 0 580 15943 4


[8] M11 NAMAS Regulations. Regulations to be met by calibration and testing laboratories. Available from NAMAS Publications Tel. 081-943-7135