

**Australian Computer Society**

**Policy Statement**

on

**SOFTWARE QUALITY  
ACCREDITATION**



*ICT Professionals Shaping Our Future*

[www.acs.org.au](http://www.acs.org.au)

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# **ACS POLICY STATEMENT ON SOFTWARE QUALITY ACCREDITATION 2004**

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### **Summary of ACS Position**

This policy provides guidance and recommendations by the Australian Computer Society (ACS) on adoption of quality assurance methodologies within the Australian software development industry.

The ACS strongly supports the adoption of quality and process improvement models for software development in Australia and considers that a total quality approach includes accounting for the skill of the ICT professionals involved, the standard and quality of the product developed and the techniques and processes employed in product development.

The ACS considers that it is imperative that the ICT sector be able to demonstrate its professional standards. Purchasers of ICT products and services, employers and insurers must have assurance that the ICT professionals working on projects have the qualifications, certifications, ethical framework and disciplinary mechanisms to perform their duties to a high standard. This assurance enables better management of risk and thus limits potential liability or loss.

The ACS recommends a multi-faceted approach to software quality assurance in Australia, involving:

- Process – all organisations involved in software engineering should implement sound, auditable, management and process improvement principles by adopting an effective third party quality assurance process such as ISO 9001:2000; ISO 15504, CMMI, or other appropriate standard according to the firm's needs and requirements.
- Product – appropriate product standards, actual or implied, must be met and appropriate product testing carried out.
- People – all ICT practitioners must be appropriately trained, professional and subject to the rigours of a professional association.

The ACS believes that there is a strong role for government in assisting software development firms to adopt appropriate software quality assurance methodologies to ensure that Australian quality is second to none and that Australia can compete internationally on the basis of its high quality and reliability in delivery.

To this end, the ACS recommends a two stage approach involving an audit of Australian small and medium software development firms to determine their needs, the impediments to, and potential costs of adopting process improvement methodologies, particularly for SMEs. This would provide information on which to develop targeted assistance programs.

The ACS considers that Australia has a world class software development sector and greater adoption of software assurance methodologies would benefit the industry enormously in positioning itself as a key offshoring destination to attract projects.

## **1. INTRODUCTION**

Australia has the opportunity to be an important player in the global market for software development. The Australian software development industry continues to face a significant challenge to its international competitiveness as global organisations successfully bid against Australian firms on the basis of having adopted recognised software quality assurance methodologies.

Quality assurance is a means for the Australian industry to demonstrate its strengths in the areas of architecture, testing and project management and to improve its attractiveness as an offshoring destination for overseas organisations.

## **2. BACKGROUND**

There are a number of software quality assurance processes that are designed to help optimise the quality of software project outcomes and give customers greater confidence when buying products. Evidence suggests that Australian small and medium business enterprises that have adopted these software quality assurance processes have enjoyed dramatic productivity improvements within their organisations and are able to deliver a more competitive service to customers.

## **3. SOFTWARE QUALITY ASSURANCE**

The ACS has been driving the debate on software quality through its Software Quality Association Special Interests Group and its Computer Systems and Software Engineering Board.

The ACS supports a multifaceted approach to achieving a total quality approach to software development, involving process, people and product, specifically:

- Adopting quality and process improvement models for software development processes;
- accrediting ICT professionals who manage, develop, test and service software; and
- achieving and maintaining product standards and appropriate product testing.

Achievement of all three elements is essential to software quality and integrity.

### **3.1 Software Assurance Models**

Software developers can achieve formal certification against various models and standards. The most popular are the ISO 9001:2000, which is a quality management standard; and ISO 15504 and the Capability Maturity Model Integration (CMMI). These are process improvement standards where an organisation is assessed against a scale of capability. ISO 9001:2000 can be adopted independently of either CMMI or ISO 15504 (which are alternatives to each other).

#### **a) ISO 9001:2000**

The most widely recognised quality management standard is ISO 9001:2000. This is an umbrella standard providing a framework under which a wide range of software development methodologies and software engineering standards may be used.

ISO 9001:2000 specifies requirements for a quality management system for any organisation needing to demonstrate its ability to consistently provide a product that meets client requirements and enhances customer satisfaction. It is used for certification, registration and contractual purposes by organisations seeking to demonstrate quality assurance in process development and supply. It is a general standard applicable to all industries and not just software development.

ISO 9001 applies eight management principles as a framework toward the development of a continuous improving organisation being: customer focus, leadership, involvement of people, process approach, systems approach to management, continual improvement, factual approach to decision making and mutually beneficial supplier relationships.

ISO 9003:2004 Software engineering – guidelines for the application of ISO 9001:2000 for computer software, supplements ISO 9001:2000 by providing additional guidelines associated with the acquisition, supply, development, operation and maintenance of computer software and related support services.

Achieving ISO 9001:2000 certification is relatively inexpensive compared to gaining compliance with either CMMI or ISO 15504.

**b) CMMI**

The Capability Maturity Model Integration (CMMI) defines the key elements of an effective process and provides a foundation for process improvement from an ad hoc, immature organisation to a mature continually improving one. CMMI has five levels of maturity or capability: initial, repeatable, defined, managed and optimising.

CMMI has become a de facto industry standard in the USA and is widely used in Government, industry and academia as a benchmark for firms to measure themselves against the capabilities of others in their industry.

In addition, key offshoring destinations such as India have embraced CMMI as a way of building competitive advantage. It is beginning to be adopted in Australia by a number of larger companies.

The cost of achieving CMMI accreditation can be a drawback for small and medium software developers. A Class A appraisal, necessary for achieving a benchmark and maturity rating, generally involves a team of 6 to 10 personnel on site for up to 12 days depending on the size and complexity of the organisation. It can also take up to 7 years to progress from level 1 to 5. However it should be noted that the external appraisal costs are relatively small compared with the internal costs of achieving and maintaining compliance. Adoption of CMMI involves payment of licence fees.

**c) ISO 15504**

ISO 15504 provides a framework for a consistent assessment of process capability and incorporates a reference model for process and process capability covering the entire software lifecycle. It allows the customer to compare organisations by harmonising and integrating the different software assurance approaches into an effective international standard.

ISO 15504 is also extendable, allowing development of processes that cover more than software development. While CMMI describes organisational maturity, ISO 15504 describes process capability. It allows assessment reporting on a scale from 0 to 5: incomplete, performed, managed, established, predictable and optimising. Each level reflects specific and incrementally significant issues in managing and improving software development and acquisition.

ISO 15504 is less expensive and resource intensive than CMMI and is therefore more suitable to small companies. ISO 15504 is predominantly used in Europe, particularly Germany. Adoption of ISO 15504 does not involve payment of licensing fees and usually requires a team of 2 assessors for 5 days.

### **3.2 Product Testing and Standards**

The ACS considers that product testing and compliance with software product evaluation standards is as important as adopting a software quality assurance model. It ensures that customer expectations and assurance on software quality standards are met and can significantly reduce the time and resources need to fix problems and provide support to customers.

Early detection of software faults is considerably cheaper than downstream detection of faults. Testing and compliance with product standards reduces business risk, which translates into a lower cost of doing business and provides for a more competitive product and improved customer service.

It is estimated that testing early in the software development cycle costs as much as 75 times less than fixing a problem in production and delivers an overall better product.

ACS strongly encourages professional software testing according to the requirements of software testing standards ISO 9126, ISO 14598 or ISO 17025. For safety critical systems, the relevant standard is IEC 61508.

### **3.3 Accreditation of ICT Professionals**

Currently only 15 per cent of ICT practitioners in Australia are members of a professional association. Professional members of the ACS are distinguished by the way they take responsibility for their output and are bound by a Code of Ethics and a Code of Professional Conduct. They typically have a degree in ICT, at least four years professional experience and undertake continuing professional development to maintain their skills and knowledge.

A total quality approach to software quality assurance involves ensuring the ICT professionals involved are appropriately skilled. Being subject to the disciplinary process required by membership of a professional association, such as ACS, is a way of achieving this and demonstrates to customers that all ICT practitioners involved in the design, delivery and maintenance of high consequence systems are appropriately skilled and up to the job.

Additionally, encouraging completion of education based certification programs for software development professionals has significant benefits to individuals and firms by providing a transportable and recognisable benchmark of skill and competency. Programs available locally and globally include:

- the Certified Software Test Professional Program;
- the British Computer Society Information System Examinations Board;
- the International Institute of Software Testing Certified Software Testing Professional;
- American Society of Quality Certified Software Quality Engineer; and
- Quality Assurance Institute Certified Software Test Engineer.

Purchasers of technology, employers and insurers need to have assurance that the ICT professionals working on projects have the qualifications, certifications, ethical framework and disciplinary mechanisms to perform their duties.

Accreditation of ICT professionals will assist in addressing indemnity issues, improve risk management strategies and present a more attractive profile for ICT professionals to the insurance industry to put downward pressure on insurance premiums.

#### **4. BENEFITS OF SOFTWARE QUALITY ASSURANCE**

Many of Australia's offshore software development competitors are actively taking up quality assurance models raising the question as to whether Australian software developers should be seeking a similar level of quality assurance to compete effectively, not only on the international market, but also on the domestic front.

Australia lags behind other countries in the proactive adoption of process improvement initiatives and compliance with software product standards and testing.

We operate in a global market where the key attributes for competition are price, quality and product innovation. Software quality assurance is designed to help achieve these attributes, deliver a consistently high quality for software project outcomes and give customers greater confidence they are buying a quality product.

Software development firms that have achieved CMMI level 2 have enjoyed dramatic productivity improvements and are able to deliver a more competitive service to their clients. Software Engineering Australia has estimated that if all software development firms achieved CMMI level 2, this would deliver a 40 percent improvement in efficiency and productivity within the Australian software industry. This claim has been supported by the European Software Institute.

Software process efficiency is critical to ensuring competitiveness, attracting work and enabling sustainable industry growth. While many Australian software users do not yet demand compliance with software assurance models from their suppliers, it is only a matter of time before they fall into line with the US and other major software markets that do.

Australia has a talented and innovative industry and according to a recent study by KPMG (KPMG Competitive Alternatives Study), is the cheapest country in the developed world to develop software, potentially making it a key offshoring destination for software development. It is now critical that Australia demonstrate its capability in high quality software development in a manner that is internationally recognised and readily benchmarked.

The ACS strongly recommends that Australian software development firms achieve ISO 9001:2000 accreditation or adopt a software assurance methodology (eg CMMI or ISO 15504) to kick-start their process improvement activity and adopt software testing protocols in accordance with an appropriate standard.

## **5. ROLE FOR GOVERNMENT**

Federal and state governments are providing assistance in a number of areas to encourage small and medium firms to adopt software quality assurance processes, including:

- a joint project between SEA and the Western Australian Government – the Software Mark Demonstration Project to assist 10 companies in improving their business practices and achieving CMMI level 2;
- a program under the Tasmanian Government's Intelligent Island policy to prove that small and medium firms can adopt CMMI;
- establishment of the Software Quality Accreditation Working Party by the Federal Government; and
- the Victorian Government initiative to assist its software development industry in achieving CMMI accreditation through its CMMI Assistance Program offered by Multimedia Victoria.

The ACS strongly encourages state and federal governments to continue to provide assistance programs to educate and encourage adoption of software assurance processes by small and medium software development firms. However we consider it should be undertaken in a more targeted way, involving a two stage process:

### **Stage 1**

An audit of small and medium software development firms to determine:

- how many currently have adopted or intend to adopt a software process improvement methodology;
- what the barriers are and how difficult is it for SMEs to adopt software process improvement methodologies;
- the cost and time it takes an SME to achieve implementation and assessment under a software development methodology to an appropriate level.

An audit of this nature is important because it provides a baseline upon which to develop and effectively implement assistance programs. For example, evidence from the Multimedia Victoria assistance program suggests that while firms are keen to adopt software quality assurance methodologies, staff need to be taken off line (i.e. billable duties) in order to undertake the necessary training and process development – difficult and costly for small and medium size firms.

## **Stage 2**

Based on the audit results, the ACS proposes a targeted model, aimed at addressing identified barriers, to assist SMEs in adopting a software process improvement methodology. This would involve federal and state governments and the firm concerned each paying a third of the costs, or federal and state governments providing interest free loans for a defined period to cover the cost of implementing process improvement practices.

## **6. CONCLUSION**

The Australian software development sector must build on its current competitive advantage and benchmark its capabilities against the international market by adopting software process improvement methodologies that are recognised worldwide. Demonstrating software process efficiency is becoming critical to winning business and ensuring sustainable industry growth.

Accreditation and certification of ICT professionals provides protection for purchasers of ICT services and allows firms to better manage risk, limit liability and put downward pressure on insurance premiums.

To this end, the ACS will continue to drive the debate on the benefits of software quality assurance. We will encourage ICT practitioners to join a professional association and promote the benefits of process improvement methodologies, testing and achieving recognised product standards to the software development industry.