Adaptation of ISO/IEC Software Engineering Standards for Very Small Enterprises

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• Mandate of ISO SC 7.
• Steps toward creation of a new ISO SC 7 Working Group.
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École de technologie supérieure – Engineering Programs

Over 4500 students, 125 professors, 25 general senior lecturers and 200 lecturers.

2200 paid industrial internships in over 900 companies in 2004.

Undergraduate Programs (7)
- Construction Engineering
- Production Engineering
- Electrical Engineering
- Mechanical Engineering
- Logistics and Operations Engineering
- Software Engineering
- IT Engineering

Over 700 students
Professors in the department have a mean industrial experience of more than 15 years.

Very Small Enterprises (VSE)

- VSEs are defined as having less than 25 employees.
- Scope includes also small project or department within a larger organization.
- Example – Greater Montréal Area.

<table>
<thead>
<tr>
<th>Number of employees</th>
<th>Number of Enterprises</th>
<th>Percentage</th>
<th>Number of Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 25</td>
<td>540</td>
<td>78%</td>
<td>5105</td>
</tr>
<tr>
<td>25 to 100</td>
<td>127</td>
<td>18%</td>
<td>6221</td>
</tr>
<tr>
<td>Over 100</td>
<td>26</td>
<td>4%</td>
<td>6056</td>
</tr>
</tbody>
</table>

Source: Laporte 2005.
VSEs and Standards

1. International standards were not written for and/or is hard to apply in small projects, small development organizations, or companies that have between 1 and 25 employees.
2. International Life Cycle Standard ISO/IEC 12207 and guide do not explicitly address the needs of VSEs.
3. Compliance with standards is difficult (if not impossible) for VSEs to achieve.
4. VSE’s have no or very limited ways to be recognized as an enterprise that produces quality software systems in their domain.
   - VSEs are cut off from some economic activities.
5. Implementation of current standards requires a significant critical mass in terms of number of employees, cost and time.
6. VSEs cannot see a net benefit in establishing a software process as defined by current standards.

IEEE User’s Survey

Implementation Difficulties

- Benefits of implementation not clearly understood
- Not enough useful examples
- Cost
- Lack of templates, implementation checklists.
- Compliance determination

Source: Kathy Land, 1997
IEEE Users’ Survey
Requested Support Items

• User training course
• Examples of deliverables
• Deliverable templates
• CASE tool support for documentation generation
• On-line or phone support
• Software Engineering Standards newsletter
• Software Engineering Standards users group
• Educators resource/support


ISO/IEC JTC 1/SC7- Terms of Reference

Standardization of processes, supporting tools and supporting technologies for the engineering of software products and systems.
SC7 - An Horizontal Committee

SOFTWARE and SYSTEMS ENGINEERING

APPLICATION DOMAINS (many TCs)

Project Management
Industrial Engineering
Quality Management (ISO TC 176)
Dependability Engineering (IEC TC 56)
Safety (IEC TC65), Security, other mission-critical
Computer Sciences and Engineering

Source: F Coallier

SC7 Structure

SC7

Secretariat

SWG 1 Business Planning Group

SWG 5 Architecture Management

WG20 Software Engineering Body of Knowledge

WG19 ODP and Modeling Languages

WG4 Tools And Environment

WG10 Process Assessment

WG21 Asset Management

WG23 System Quality Management

WG7 Life Cycle Management

WG2 System Software Documentation

WG6 Software Product Measurement and Evaluation

WG12 Functional Size Measurement

WG9 System Assurance

Adapted from: Prof. M. Azuma
Software Engineering Standards
Produced and Maintained

Standards Collection

Certification of Software Engineers

Products

Process Implementation and Assessment

Tools, Methods

8/24/2006
SC7 Meeting in Brisbane - 2004

• Canada raised the fact that small enterprises require standards adapted to their size and maturity,

• A meeting of interested parties was held with delegates from 5 national bodies (Australia, Canada, Czech Republic, South Africa, and Thailand),

• **Consensus:**
  – Make the current software engineering standards more accessible to VSEs;
  – Provide turn key material that require minimal tailoring and adaptation effort;
  – Provide harmonized products that integrate available standards:
    • Process standards
    • Work product and deliverables
    • Assessment and Quality.

SC7 Meeting in Brisbane - 2004

• **Consensus:**
  – Generate multiple profiles from elements of standards.
  – Align, if desirable, profiles with the notions of maturity levels presented in ISO/IEC 15504.

• **Establishment of a Special Interest Group to develop:**
  – A statement of requirements;
  – The outline of key deliverables, and the associated process to create them (e.g. how to create profiles);
  – A Terms of Reference for the work group;
  – An example of a simple profile
First Special Working Group Meeting
Thailand – March 2005

• Hosted by the Thailand Industrial Standard Institute (TISI) and the Thai Software Industry Promotion Agency (SIPA),

• **Representatives**
  – Australia, Belgium, Brazil, Canada, Czechoslovakia, Finland, South Africa, South Korea, USA and Thailand.

• **Outputs**
  – Project **vision and strategy**;
  – Draft **New Work Item** (ISO SC 7, Document N3288)
    • Project **Schedule**;
    • Product **Plan**;
  – Initial requirements document;

Examples of Issues and Proposed Solutions by Thailand about ISO/IEC 12207

SMEs are not ready to implement the whole 12207 standard. → Standard should be broken down into stages or levels in order to fit all sizes of SMEs.

Not all 12207 activities are suitable for SMEs’ operations. → Need to modify activities to suit SMEs’ operation – product and project based type of business.

There is no assessment model. → A set of checklist was developed for use by assessors.

Most software developers are not document-oriented. → Provide packaged templates and examples for rapid documenting.

Source: Thai Software Industry Promotion Agency
Thai Quality Software (TQS) Standard

- Introduced by the Association of Thai Software Industry (ATSI).
- Adapted from ISO/IEC 12207 Software Life Cycle Processes Standard to:
  - Instill discipline for software developers,
  - Guide in software engineering processes and assures quality software.
- Divided into 5 stages:
  - Software practices (ISO/IEC 12207)
  - Organizations are assessed for certification at each stage
- Currently (March 2005)
  - 43 software organizations have been certified TQS level 1, and 11 software organizations have been certified TQS level 2.
Target Market of a Future ISO/IEC Set of Technical Reports and Guides

- The collection should be based on the Software Engineering needs of the majority of the VSEs
  - Market driven.
- The collection should initially focus on lower levels of maturity
- The collection should be applicable to small teams or projects.
- The use of the collection should enable multiple VSEs to work together (teaming arrangements) or work with a customer (e.g. under contract).

Potential Benefits for VSEs

- The use of the documents should contribute to the reduction of risk
  - Business, cost, schedule and quality
- The use of the documents should facilitate alignment of the IT strategy to the business objectives.
- The documents should help understand and appreciate the value added (short and long term).
- The documents should offer guidance on quantifying the benefits of standards implementation.
  - The documents should include a measure of increased productivity and quality.
**Estimated Schedule of Activities**

**ISO JTC1 Process**
- **NWI v1**: 2005-03-18
- **NWI v2**: 2005-05
- **Project Approval**: 2005-11
- **WD1**: 2006-05
- **CD 1**: 2007-06
- **FCD**: 2007-11

**Shadow Process**
- **Prep. Pres. Mat.**: 2005-10
- **Analyse Surveys**: 2005-12
- **Prioritize Proc.**: 2006-09
- **Dev. Profiles**: 2006-09
- **Dev. Assessment**: 2006-09
- **Dev. Guidelines**: 2006-09
- **Pilot Roadmaps**: 2006-12
- **Validate WP**: 2007-03
SC7 Meeting in Finland – May 2005

• Proposal developed in Thailand was reviewed
  – Recommendation: To establish a new Working Group
• Resolution was approved to ballot the New Work Item Proposal
• Many countries voted in favour of the NWI Proposal
• Working Group 24
  – Mr. Tanin Uthayanaka (Thailand) was appointed Convener.
  – Mr. Jean Bérubé (Canada) was appointed Secretary.
  – Mr. Claude Y. Laporte (IEEE CS) was appointed Project Editor

Second Special Working Group Meeting
Thailand – September 2005

• Hosted by the Thailand Industrial Standard Institute and the Thai Software Industry Promotion Agency

• Representatives
  – Australia, Belgium, Canada, Finland, Japan, Luxembourg, South Africa, USA and Thailand.

• Outputs
  – Proposition to use International Standardised Profiles (ISPs) as a framework to develop documents (e.g. guides)
  – Proposed survey on VSEs exposure and needs for software development lifecycles;
  – Proposed business models to help classify VSEs
First SC7 Working Group 24 Meeting  
Italy – October 2005

- Countries committed to participate to Working Group 24  
  - Belgium, Canada, Czech Republic, Ireland, Italy, Japan, Korea, Luxemburg, South Africa, Thailand, UK, USA

- Outputs  
  - New Work Item – comments received during balloting,  
  - Project Requirements,  
  - Business Models,  
    - Custom on contract, Custom in-house, Commercial products, Mass-market software, Firmware.  
  - Strategy to create profiles.  
  - Users’ Survey,  
  - Strategic Plan,  
  - Web site for public review of documents produced.

- Next Step  
  - Perform Users’ Survey.


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- Working Group 24 Public site – (Under construction)  
  - http://www.jtc1-sc7.org/
Resources

- ISO/IEC TR 19559, Software Engineering Body of Knowledge (SWEBOK) (Free copy of TR)

- National Computing Centre – Toward Software Excellence

Bibliography


