The Application of International Standards in Very Small Enterprises

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Editor – ISO/IEC JTC 1/SC 7- Working Group 24

Ottawa SPIN
June 14th 2007
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• IT Standardization - Overview
• Mandate of ISO/IEC JTC1/SC 7 *
• Establishment of Working Group 24
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* International Organization for Standardization/International Electrotechnical Commission Joint Technical Committee 1/Sub Committee 7
Engineering School - École de technologie supérieure

Over 4500 students

2500 paid industrial internships in over 900 companies each year.

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

Graduate Programs
- Software Engineering
- Information Technology
- Programs in other Disciplines

- 700 students
- Professors in the department have a mean industrial experience of 15 years.

www.etsmtl.ca
# Undergraduate Software Engineering Program

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<th>Software Requirements</th>
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<td>Interactive Multimodal Systems</td>
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<td>Design of Real-Time Computer Systems</td>
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<td>Systems Security</td>
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<td>Analysis and Design of</td>
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<tr>
<td>Telecommunications Software</td>
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</table>
Size of Enterprises

- European Union
  - 99.8% are SMEs (less than 250 employees)
  - 93% are micro enterprises (less than 10 employees)
- Micro enterprises account for 70% to 90% of enterprises in OECD* countries (57% in US)
- Greater Montréal Area - Software Enterprises.

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

50% of enterprises have less than 10 employees
Source: Montreal International, 2006

* OECD: Organisation for Economic Co-operation and Development
Example from Japan

- A software defect from one of the producers went into a product
  - Resulted in 300 Million $ lost by the manufacturer

K. Shintani, Small Settings Workshop, SEI, 2005
Very Small Enterprises (VSE) and International Standards

1. International standards were not written for and/or are hard to apply in VSEs (less than 25 employees).
2. ISO/IEC Standard 12207* and its 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.

Centers and Initiatives for SMEs and VSEs

- **Europe**
  - Ireland - Centre for Software Process Technologies (CSPT)* (EPA)
  - Belgium - Centre d’Excellence en Technologies de l’Information et de la Communication (CETIC)
  - Luxembourg - Public Research Center Henri Tudor
  - UK – National Computing Center *
  - European Software Institute – IT Mark
- **Australia** - Software Quality Institute (Rapid)
- **Latin Countries**
  - COMPETISOFJT Project – 13 Latin American countries, Spain, Portugal.*
  - Columbia – ParqueSoft *
- **Asia**
  - Thailand - Association of Thai Software Industry
  - Hong Kong – Productivity Council
- **North America**
  - ÉTS – Technology Transfer Center for small and very small software enterprises
  - Software Productivity Center (SPC) - Vancouver
  - Software Engineering Institute - Improving Processes in Small Settings (IPSS) *
Concern areas for different company sizes in Northern Ireland

- **Small < 20 employees**
  1. Managing risks
  2. Task Estimation
  3. Productivity
  4. New technology
  5. S/w rework
  6. Planning projects
  7. Tracking projects
  8. Ensuring quality
  9. Process Adherence
  10. Maintaining s/w
  11. Consistency across teams
  12. Managing Requirements
  13. Team Communication
  14. Developing Requirements
  15. Tracking/ Clearing Faults

- **Medium/Large > 20 employees**
  1. Consistency across teams
  2. Task Estimation
  3. Productivity
  4. Team Communication
  5. Process Adherence
  6. Developing Requirements
  7. Ensuring quality
  8. Managing risks
  9. Managing Requirements
  10. Tracking projects
  11. S/w rework
  12. Planning projects
  13. Maintaining s/w
  14. New technology
  15. Tracking/ Clearing Faults

• “to enable firms (SMEs) in the UK software supply industry to compare their approach with best practice, improve their software processes and thereby improve competitiveness.”

• supported by UK Department of Trade and Industry (DTI) and industry bodies

Kevin Daily, Senior Consultant, QAI Europe Ltd
Danny Dresner, Manager, ICT Research Projects, National Computing Centre Ltd (UK)
COMPETISOFT Project

- To provide Latin-American countries with a reference framework for the improvement and certification of their software processes,
- To be more competitive in the global market,
- Participants: 13 Latin American countries, Spain, Portugal,
- Pilot projects: 6 organisations over 4 months.
• Non-profit organization established in Columbia in 1999
• Purpose
  – Create and develop enterprises providing goods and services to the information technology
• Integrates 11 sites in Columbia
• Houses more than 200 VSEs
  – Over 120 VSEs under the same roof in Cali
  – 1000 Software Engineering Professionals,
  – About 200 professionals provide support in technical, administrative and business development processes
    • Q.A., Test, Finance, Communication, Contract, Publication, etc.
  – Cost of expertise is pay-as-you-use and shared between VSEs.
Scope of CMMI in Small Settings Project

Small Companies (<100)

Small Organizations (<50)

Small Projects (<20)

S. Garcia, Montréal SPIN, 2005
Improving Processes in Small Setting (IPSS)

• Part of the International Process Research Consortium (IPRC)
• To explore the unique challenges of improving processes in small settings.
  – Establish an effective method or methods for process improvement in several different examples of small settings
  – Codify the method(s) for use by others
• Process improvement initiative - IPSS Phase 1
  – A small business operating within a large software/system development program
  – A small or short-term project operating within a large organization
  – A small business improving for competitive advantage

Caroline Graettinger, May 2007
www.sei.cmu.edu/iprc/ipss.html
http://www.sei.cmu.edu/publications/books/process/cmmi-survival-guide.html
IT Standardization – an Overview
What is a Standard?

Guideline documentation that reflects agreements on products, practices, or operations by nationally or internationally recognized industrial, professional, trade associations or governmental bodies

or

is accepted as a de facto standard by industry or society.
Types of Standards

- **Organizational Standards**
  - Such as internal company standards
- **Market Standards** (de Facto)
  - Such as Microsoft Windows, or the CMMI
- **Professional Standards**
  - Developed by Professional organizations (such as IEEE)
- **Industrial Standards**
  - Developed by industrial consortia (such as OMG, railway)
- **National Standards**
  - Developed by national standards organization (such as FDA)
- **International Standards**
  - Developed by formal international standard organization

Adapted from F. Coallier
Consensus

• Key concept in the development of international standards
• ISO defines consensus as:
  General agreement, characterized by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process that involves seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments.

Consensus

Consensus means:

1. All parties involved were able to voice their views,
2. The best effort was made to take into account all of the above views and resolve all issues (meaning all comments tabled during a ballot),
3. Nearly all or (ideally) all the parties involved can at least live with the final result.

Adapted from F. Coallier
Normal (ISO) Standardization Process

- **Stage 0** - preliminary stage
  - A study period is underway.
- **Stage 1** - proposal stage
  - An New Project is under consideration.
- **Stage 2** - preparatory stage
  - A Working Draft is under consideration.
- **Stage 3** - committee stage
  - A Committee Draft / Final Committee Draft is under consideration.
- **Stage 4** - approval stage
  - An Final Draft International Standard is under consideration.
- **Stage 5** - publication stage
  - An International Standard is being prepared for publication.

Adapted from F. Coallier
Available Processes

International standards can come into being through different processes:

– As a proposal that is then developed in working groups (3-5 years);
– As a proposal with a base document which can be internally fast-tracked, e.g. processed through a compressed schedule (about 2 years);
– As a proposal with a complete document that can be fast-tracked by JTC 1 (4 month ballot) (< 1 year);
– As a proposal with a complete document that can be proposed by external (but recognised) organisations and fast-tracked as a 4 month ballot - known as the PAS process (1-2 years).

Adapted from F. Coallier
Added Value of International Standards

In addition to the Brand:

• They represent an international consensus attained through a very rigorous and uniform process
• Usually represent a set of conventions and/or technical requirements or practices that are relatively stable
• The development process makes it relatively difficult and costly for special interests to take over a given standardization project, especially if the topic is controversial.

Adapted from F. Coallier
Business Benefits of Standards

• Regulation
  – Cost effective compliance
  – Customer assurance
  – Reduce product liability
  – Risk management
  – Governance

• Cost Optimization
  – Reduced transaction costs
  – Product/process interoperability
  – Flexibility in supply chain
  – Best practice & management systems

• Maximizing Revenue
  – Improve speed to market
  – Product acceptance
  – Product life cycle management

• Business Opportunities
  – Develop new markets & future sales
  – Influence technology change
  – Influence industry evolution
  – Structure regional/international competition

STANDARDISATION & SMEs
http://www.normapme.com/
The Meaning of ISO

ISO IS NOT AN ACRONYM

GREEK WORD ΙΣΟΣ MEANING EQUAL

Adapted from Jean-Robert Dufour
ICT Standardization

In 1988, ISO and IEC created a Joint Technical Committee, Joint Technical Committee 1 (JTC 1) with the following mandate:

Standardization in the field of Information Technology.

Information Technology includes the specification, design and development of systems and tools dealing with the capture, representation, processing, security, transfer, interchange, presentation, management, organization, storage and retrieval of information.
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<td>Cultural and Linguistic Adaptability and User Interfaces</td>
<td>SC 02 - Coded Character Sets</td>
</tr>
<tr>
<td></td>
<td>SC 22/WG 20 – Internationalization</td>
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<td>SC 35 - User Interfaces</td>
</tr>
<tr>
<td>Data Capture and Identification Systems</td>
<td>SC 17 - Cards and Personal Identification</td>
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<tr>
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<td>SC 31 - Automatic Identification and Data Capture Techniques</td>
</tr>
<tr>
<td>Data Management Services</td>
<td>SC 32 - Data Management and Interchange</td>
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<tr>
<td>Document Description Languages</td>
<td>SC 34 - Document Description and Processing Languages</td>
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<tr>
<td>Information Interchange Media</td>
<td>SC 11 - Flexible Magnetic Media for Digital Data Interchange</td>
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<td>SC 23 - Optical Disk Cartridges for Information Interchange</td>
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<tr>
<td>Multimedia and Representation</td>
<td>SC 24 - Computer Graphics and Image Processing</td>
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<td>SC 29 - Coding of Audio, Picture, and Multimedia and Hypermedia Information</td>
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<td>Networking and Interconnects</td>
<td>SC 06 - Telecommunications and Information Exchange Between Systems</td>
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<td>Office Equipment</td>
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<tr>
<td>Programming Languages and Software Interfaces</td>
<td>SC 22 - Programming Languages, their Environments and Systems Software</td>
</tr>
<tr>
<td></td>
<td>Interfaces</td>
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<td>Security</td>
<td>SC 27 - IT Security Techniques</td>
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<td>SC 37 - Biometrics</td>
</tr>
<tr>
<td>Software and Systems Engineering</td>
<td>SC 07 - Software and System Engineering</td>
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</tbody>
</table>
ISO/IEC JTC 1/SC7- Terms of Reference

Standardization of processes, methods and supporting technologies for the engineering and management of software and systems throughout their life cycles.
Evolution of SC7 Portfolio of Standards

- Standards Published
- Standards Maintained


Standards Published vs. Standards Maintained over the years.

SC7 Secretariat Report
Guide to the Software Engineering Body of Knowledge (SWEBOK)

• Objectives
  – Characterize the content of the software engineering discipline,
  – Promote a consistent view of software engineering worldwide,
  – Set the boundary of software engineering with respect to other disciplines,
  – Provide a foundation for curriculum development and individual licensing material

www.swebok.org
SWEBOK – Knowledge Areas

1. Software Quality
2. Software Requirements
3. Software Design
4. Software Construction
5. Software Testing
6. Software Maintenance
7. Software Configuration Management
8. Software Engineering Management
9. Software Engineering Process
10. Software Engineering Tools and Methods

ISO/IEC TR 19559
ISO/IEC Certification of Software Engineering Professionals

• To respond to the need for portability of software engineering professional certifications,
• To facilitate the exchange of professionals between different countries,
• To provide the processes needed to establish, administer, and maintain a certification scheme,
• Certification body will administer:
  – The certification activity, including all procedures and activities intended to demonstrate the qualifications of software engineering professionals.
• SWEBOK will serve as a reference model for software engineering professional certifications.
SC7 Structure

WG20 Software Engineering Body of Knowledge
- WG22 Vocabulary
- WG23 System Quality Management
- WG24 SLC Profiles and Guidelines for VSE

WG19 ODP and Modeling Languages
- WG4 Tools And Environment
- WG25 IT Service Management
- JWG ISO/TC 54 CIF Usability

WG7 Life Cycle Management
- WG10 Process Assessment
- WG21 Asset Management
- WG26 Tests

SC7
- Secretariat

SWG 5 Standards Management Group

SWG 1 Business Planning Group

Adapted from Prof. M. Azuma
Establishment of Working Group 24

- **SC7 Plenary Meeting - Australia – 2004**
  - Canada raised the fact that small enterprises require standards adapted to their size and maturity
  - Establishment of a Special Interest Group

- **Two Workshops - Thailand – 2005** *
  - Sponsored by the Thai Industrial Standard Institute and the Thai Software Industry Promotion Agency,
  - Representatives
    - Australia, Belgium, Brazil, Canada, Czechoslovakia, Finland, South Africa, South Korea, USA and Thailand.

- **SC7 Plenary Meeting - 2005 – Finland.**
  - Proposal to establish a new WG was tabled
  - Twelve countries offered their support to staff WG 24

- **WG 24 Meetings**
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 checklists was developed for use by assessors.

Most software developers are not document-oriented. → Provide packaged templates and examples for rapid documentation.
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
  - Organizations are assessed for certification at each stage
- Currently (March 2005)
  - 43 software organizations have been certified TQS level 1,
  - 11 software organizations have been certified TQS level 2.
5. PRIMARY LIFE CYCLE PROCESS

CONTRACT VIEW

5.1 Acquisition process

5.2 Supply process

Planning

ENGINEERING VIEW

5.3 Development process

Process implementation

Software requirements analysis

Software architectural design

Software coding & testing

Software implementation

5.4 Operation Process

5.5 Maintenance Process

Software acceptance support

Process implementation

Modification implementation

OPERATING VIEW

5.4 Operation Process

6. SUPPORTING LIFE CYCLE PROCESS

6.2. Configuration management

QUALITY MANAGEMENT VIEW

6.3. Quality assurance process

7. ORGANIZATIONAL LIFE CYCLE PROCESS

MANAGEMENT VIEW

7.1. Management Process

Initiation & scope definition

7.2. Infrastructure Process

7.3. Improvement Process

7.4. Human Resource Process

7. ORGANIZATIONAL LIFE CYCLE PROCESS

MANAGEMENT VIEW

7.1. Management Process

Initiation & scope definition

7.2. Infrastructure Process

7.3. Improvement Process

7.4. Human Resource Process
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/capability.
• The collection should be applicable to small teams or projects.
• 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.
WG 24 - Strategy

1. Aim at lower capability level VSEs *
2. Develop Profiles
   – By assembling, from existing ISO standards, what is needed for VSEs.
     • International Standard Profiles (ISP)
3. Use Existing Frameworks
4. Develop Guides and Templates
5. Conduct Pilot Projects
6. Publish Documents
   – Standard, technical reports, etc.
Capability Levels - ISO/IEC 15504

Capability Levels

Process Attributes

5.1 Process innovation
5.2 Continuous optimization
4.1 Process measurement
4.2 Process control
3.1 Process definition
3.2 Process deployment
2.1 Performance management
2.2 Work product management
1.1 Process performance
VSE Proposed Model

ISO90003

ISO/IEC 12207

ISO/IEC 15288

ISO/IEC 15504-5 Annex B (Generic and Specific Work Products)

CMMI - Staged Representation, CMM - SW LOGOS, ISO/IEC 15504-2

Levels for SME (Descriptions)

Leveled Profile for SME (Composed Parts with Purposes and Outcome)

Guidelines for implementation and assessment of Leveled Profile

ISO/IEC 15504-5 Assessment Model

ISO90003, etc.
Accomplishments of WG 24

- Decided to prioritize development of profiles and guides for enterprises with 25 employees or less (total staff).
  - Profiles and guides should also be usable for projects and departments, within a large organization, of 25 employees or less.
- Conducted a survey to obtain needs of VSEs.*
- Decided to use new Mexican Standard as input document for the development of profiles, guides and templates.*
- Decided to develop separate profiles for VSEs:
  - Less than 10 employees (micro enterprises)
  - From 10 to 25 employees.
- Developed a first profile for *Entry Level VSEs.*
- Communicated
  - Public Web Site
  - Conferences and Publications
    - [http://profs.logti.etsmtl.ca/claporte/English/VSE/index.html](http://profs.logti.etsmtl.ca/claporte/English/VSE/index.html)
Survey of VSEs

• Objectives
  – Ask VSEs about their utilization of standards
  – Identify problems and potential solutions to help VSEs apply standards and become more competitive.

• Method
  – Web-based Survey
  – Questionnaire translated in 9 languages
    • English, French, German, Korean, Portuguese, Russian, Spanish Thai and Turkish.
  – Invitation to respond broadcasted
    • WG 24 Network
    • Centers and initiatives focused on SMEs/VSEs,
      – SIPA (Thailand), CETIC (Belgium), Parquesoft (Colombia).
    • SPINs (Software Process Improvement Network) *
## Responses per Country

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of Responses</th>
<th>Country</th>
<th>Number of Responses</th>
<th>Country</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>2</td>
<td>Finland</td>
<td>13</td>
<td>New Zealand</td>
<td>1</td>
</tr>
<tr>
<td>Australia</td>
<td>10</td>
<td>France</td>
<td>4</td>
<td>Peru</td>
<td>4</td>
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<tr>
<td>Belgium</td>
<td>10</td>
<td>Germany</td>
<td>1</td>
<td>Russia</td>
<td>4</td>
</tr>
<tr>
<td>Brazil</td>
<td>72</td>
<td>India</td>
<td>57</td>
<td>South Africa</td>
<td>10</td>
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<tr>
<td>Bulgaria</td>
<td>3</td>
<td>Ireland</td>
<td>10</td>
<td>Spain</td>
<td>4</td>
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<tr>
<td>Canada</td>
<td>10</td>
<td>Italy</td>
<td>2</td>
<td>Taiwan</td>
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<td>Chile</td>
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<td>Japan</td>
<td>3</td>
<td>Thailand</td>
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<td>Colombia</td>
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<td>Korea (South)</td>
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<tr>
<td>Czech Republic</td>
<td>3</td>
<td>Luxembourg</td>
<td>3</td>
<td>United Kingdom</td>
<td>2</td>
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<tr>
<td>Dominican Republic</td>
<td>1</td>
<td>Mexico</td>
<td>20</td>
<td>United States</td>
<td>3</td>
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<tr>
<td>Ecuador</td>
<td>9</td>
<td>Morocco</td>
<td>1</td>
<td></td>
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</tr>
</tbody>
</table>

435 responses from 32 countries
Number of Employees in Enterprises Surveyed

- 0-9: 36%
- 10-25: 17%
- 26-49: 16%
- 50-249: 9%
- 250++: 22%
Types of Software Development

![Bar Chart]

- Customized
- In-house
- COTS
- Specialized Product
- Embedded
- Integrated
- Other

Number of Answers

Department of Software and IT Engineering

Université du Québec
École de technologie supérieure
48
Models, Approaches or Standards Used

Number of Answers

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

SECM  INCOSE  MBNQA  ITIL  ISMS  ISO  SEI  National Standard  Other

Models, Approaches or Standards Used

- SECM
- INCOSE
- MBNQA
- ITIL
- ISMS
- ISO
- SEI
- National Standard
- Other

- Department of Software and IT Engineering
- Université du Québec
- École de technologie supérieure
Origin of Request for Implementation

Number of Answers

- Domestic market
- Export market
- Customer
- Industry
Activities that Failed or Caused Problems

Number of Answers

Gap analysis (analysis of the standard to be chosen)  Planning and organizing  Defining the processes  Writing the procedures or other documents  Data collection, analysis and corrective action  Other
Why don’t VSEs use Standards?

- Not required: 28%
- Lack of support: 14%
- Lack of resources: 10%
- Too time-consuming: 15%
- Standard(s): 9%
- Other: 10%

* Difficult, Bureaucratic, not enough guidance.
Needs of VSEs

- **Certification and Recognition**
  - Only 18% of VSEs are certified
    - 53% of larger surveyed companies are certified
  - Over 74% indicated that it was important to be either recognized or certified
    - ISO certification requested by 40%.
    - Market recognition requested by 28%
    - Only 4% are interested in a national certification

- **Needs Regarding Documents**
  - 62% are asking for more guidance and examples
  - 55% are requiring lightweight and easy to understand standards provided with templates.
Benefits anticipated by certification

- Increased competitiveness,
- Higher customer confidence and satisfaction,
- Higher software product quality,
- Increased sponsorship for process improvement,
- Decreased development risk,
- Marketing facilitator (e.g. better image),
- Higher potential to export.
The Survey - Weaknesses

• **The Sample**
  – Survey was initiated through WG24 contacts
    • Not a true random sample

• **Geographical Distribution of the Responses**
  – Strong representation: Latin America (50%)
  – Weak representation: Europe (11%), US (0.6%)

• **Application Domain**
  – Strong representation
    • 40% of life/mission-critical systems
    • 34% of regulated developments.
Top Management
• Business Management

Management
• Process Management
• Project Portfolio Management
• Resource Management

Operations
• Specific Projects Management
• Software Development and Maintenance

ISO 9001:2000 92%
ISO/IEC 12207 95%
CMMI Level 2 77%
PMBOK (PMI) 90%

## CMMI Level 2 Coverage by Moprosoft

<table>
<thead>
<tr>
<th>Domain</th>
<th>Fully</th>
<th>Largely</th>
<th>Partially</th>
<th>Not Covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements Management</td>
<td>70%</td>
<td>20%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>Project Planning</td>
<td>66%</td>
<td>17%</td>
<td>13%</td>
<td>4%</td>
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<tr>
<td>Project Monitoring and Control</td>
<td>70%</td>
<td>20%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>Measurement and Analysis</td>
<td>61%</td>
<td>17%</td>
<td>22%</td>
<td>0%</td>
</tr>
<tr>
<td>Process and Product Quality Assurance</td>
<td>72%</td>
<td>0%</td>
<td>21%</td>
<td>7%</td>
</tr>
<tr>
<td>Configuration Management</td>
<td>55%</td>
<td>0%</td>
<td>28%</td>
<td>17%</td>
</tr>
<tr>
<td>Supplier Agreement Management</td>
<td>70%</td>
<td>0%</td>
<td>18%</td>
<td>12%</td>
</tr>
</tbody>
</table>

- 84 practices are Fully covered
- 13 practices are Largely covered
- 22 practices are Partially covered
- 7 practices are Not covered
CMMI Level 3 Coverage

- Requirements Development, Technical Solution and Product Integration
  - Addressed in Software Development and Maintenance
- Verification and Validation
  - Included in every process
- Organization Process Focus, and Organizational Process Definition
  - Addressed by Process Management.
- Organizational Training
  - Addressed by Human Resources and Work Environment.
Set of Documents in Production by WG 24

- **Two types of ISO Documents**
  - International Standard Profiles (ISP)
  - Technical Reports (TR)

- **General Documents**
  - Overview (TR)
  - Framework and Profile Taxonomy (ISP)
  - Assessment Guide (TR)

- **Documents for Specific Profiles**
  - Specifications (ISP)
  - Management and Engineering Guide (TR)
    - Deployment Packages *
      - Package transferred to a VSE in ~ 3 hours
      - e.g. version control
Entry Level Profile (Draft Stage)

• When a VSE wants to establish good practices for a project, it has to:
  – Plan and monitor the project to have the control over its cost and time,
  – Adopt practices for requirements, analysis, design, construction, verification, validation and testing activities to develop the software product which satisfies the customer,
  – Create project repository to store and control the work products.

• The assumptions, to be able to use this profile, are:
  – Project Contract and/or Project Description
  – Human resources assigned and trained
  – Project Manager Assigned
  – Goods, Services and Infrastructure available
Entry Level Profile – Content (Draft Stage)

1. Purpose
2. Objectives
3. Roles
4. Inputs
5. Activities
6. Outputs
7. Verifications and validations
8. Incorporation to Project’s Repository
9. Infrastructure Resources
10. Description of content
    – e.g. inputs, outputs.
Entry Level Profile - Project Management

• **Purpose**
  – Establish and carry out the activities in a systematic way, which allows complying with the project’s objectives in the expected time and costs.

• **Objectives**
  – Achieve the project *Objectives* within the time and cost through the coordination and management of its resources.
  – Keep the *customer* informed through project progress meetings.
  – Attend the customer *Change Requests* through their reception and analysis.
  – Establish and maintain the *integrity* of the work products/items of a process or project and make them available to concerned parties.
Entry Level Profile - Project Management
Entry Level Profile - Software Development

• **Purpose**
  – The systematic performance of the requirements elicitation, analysis, design, construction, integration and tests activities of new or modified software products according to the specified requirements.

• **Objectives**
  – Achieve that output products are consistent with the input products in each phase of a development cycle through verification, validation or test activities.
  – Support the performance of subsequent cycles or future maintenance projects through the Software Configuration integration of the current cycle.
  – Perform the activities of the phases of a cycle through the accomplishment of the current *Project Plan*. 
Entry Level Profile – Software Development
Deployment Packages for VSEs (Draft Stage)

- **Technical description** (1-3 page)
  - Link to the framework
  - Activity description
    - text and graph (e.g. ETVX notation)
  - Reference to ISO/IEC standards (e.g. 12207, 15504)
- **Competencies required**
  - Knowledge and skills
- **Template(s)**
  - Empty and Filled with examples
- **Checklist(s)**
  - To facilitate implementation, assessment and self-assessment,
- **Software tools**
  - Ideally from Open source
  - Application guide (i.e. User guide, installation guide)
- **Training material**
- **Evaluation form**
  - To provide feedback to the developers of the deployment package
Examples of Deployment Package

Requirement Analysis and Management

Version Control
Change control

Testing
Next Steps

• Pilot Projects
  – Asia
    • China (CESI), Hong Kong, Japan, Thailand (SIPA).
  – Europe
    • Belgium (CETIC), Finland, Ireland, Luxembourg (Tudor), France (Brest),
  – Canada
    • Québec (ÉTS, CRIM)
  – Latin America
    • Participants of COMPETISOFT (15 countries)
  – European Software Institute (ESI)

• Facilitate participation from some countries
  – Countries/delegates that cannot afford to attend ISO meetings
  – Accelerate development and get feedback from pilot projects
  – Web/Skype meetings
  – WG 24 meeting in Mexico in 2008
Contact Information

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  – E-Mail: Claude.Y.Laporte@etsmtl.ca
  – Web: www.logti.etsmtl.ca/profs/claporte

• Public site
  – www.logti.etsmtl.ca/profs/claporte
  • Very Small Enterprises

• Survey Site
  – www.sc7-wg24.net
  – Username: isosurvey
  – Password: vse
Acknowledgments

• Members of WG24
• Those who helped translate the survey and invited VSEs to respond to it.
• Mrs. Karine Bluteau, a software engineering graduate student at ÉTS, for the development and support of the survey site.
References


• ISO/IEC TR 19559, Software Engineering Body of Knowledge (SWEBOK) (Free copy of TR)
Back-up Slides
Role of Respondents

- Director: 21%
- Manager: 31%
- QA: 11%
- Coordinator: 1%
- Consultant: 4%
- Blank: 1%
- Other: 1%

Department of Software and IT Engineering
Application Domains

Number of Answers

- Life or mission-critical systems
- Regulated
- Non-critical
- Other

Department of Software and IT Engineering
ISO Standards Used

Number of Answers

12207 15288 15504 15939 9001:2000

University du Québec
École de technologie supérieure
Department of Software and IT Engineering
Planned Implementations

- CMMI: 100
- SPICE/15504: 10
- ISO9001: 90
- National Standard: 20
- Other: 30

Number of Answers
How does TSE operate?

Two key components for its users -

- a **routemap** through current best practice and developing software process standards
- a **self assessment tool** by which an SME can measure its current practice and subsequent progress towards software excellence (improvement)

Kevin Daily, Senior Consultant, QAI Europe Ltd
Danny Dresner, Manager, ICT Research Projects, National Computing Centre Ltd (UK)
TQS Level V mapping with ISO 12207

5. PRIMARY LIFE CYCLE PROCESS

**CONTRACT VIEW**

5.1 Acquisition process
- Initiation
- RFP preparation
- Request for Proposal (RFP) preparation

5.2 Supply process
- Initiation
- Preparation of response
- Planning

**ENGINEERING VIEW**

5.3 Development process
- Process implementation
- System requirements analysis
- System architectural design
- Software requirements analysis
- Software architectural design
- Software detailed design
- Software integration
- Software detailed integration
- Software qualification testing
- Software coding & testing

5.4 Operation Process
- Process implementation
- System implementation
- Operational testing
- User support

5.5 Maintenance Process
- Process implementation
- System implementation
- Problem & modification analysis
- Process improvement
- SW retirement

5.6 Operation Process
- Process implementation
- System implementation
- Operational testing
- User support

**OPERATING VIEW**

6. SUPPORTING LIFE CYCLE PROCESS

6.1. Documentation Process
6.2. Configuration management
6.3. Quality assurance process
6.4. Verification process
6.5. Validation process
6.6. Joint review process
6.7. Audit process
6.8. Problem resolution process

**QUALITY MGT VIEW**

6. Supporting Life Cycle Process

**MANAGEMENT VIEW**

7. ORGANIZATIONAL LIFE CYCLE PROCESS

7.1. Management Process
- Initiation & scope definition
- Planning
- Execution & control
- Review & evaluation
- Closure

7.2. Infrastructure Process

7.3. Improvement Process
- Process establishment
- Process assessment
- Process improvement

7.4. Human Resource Process
Offshore Vendor

On-Site Leader

40% of Team

$2,000 + 25 hrs + time zone difference

Offshore Leader

60% of Team

80% of Team

20% of Team

On-Site Leader

$450 + 4 hours

On-Site costs X 4

$0.19 / Minute

$0.59 / Minute

Mobile Project Leader

On-Site costs X 2

80% of Team

20% of Team

40% of Team

Offshore Vendor Mexico