ISO JTC1 IEC
INFORMATION TECHNOLOGY STANDARDS

The Application of International Standards in Very Small Enterprises

Claude Y Laporte
Professor

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

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Université du Québec
École de technologie supérieure
Department of Software and IT Engineering

Content

- **Introduction**
- **IT Standardization - Overview**
- **Mandate of ISO/IEC JTC1/SC 7 ***
- **Establishment of Working Group 24**
- **Results of Survey**
- **Accomplishments to Date**
- **Deployment Package**
- **Next Steps**

* 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

→

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

Graduate Programs

- Software Engineering
- Information Technology
- Programs in other Disciplines

→ **175 students**.

Undergraduate Software Engineering Program

Software Requirements
Software Design
Software Architecture
Advanced Object-Oriented Programming
Distributed Object-Oriented Architecture
Data Structures and Algorithms
Software Quality assurance
Quality Control and Metrics
User Interface Analysis and Design
Systems Security
Analysis and Design of Telecommunications Software

Introduction to Databases
Introduction to Parallel Processing
Compilation Techniques
High Performance Databases
Principles of Operating Systems and Systems Programming
Formal and Semi-Formal Languages
Introduction to Distributed Systems
Telecommunication Networks
Algorithms Analysis
Interactive Multimodal Systems
Design of Real-Time Computer Systems
Capstone Project

Size of Enterprises

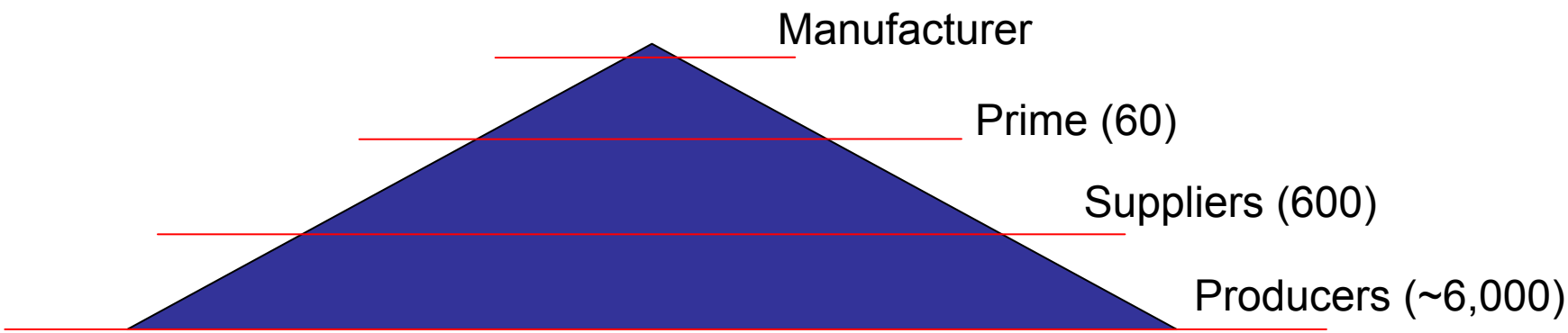
- European Union
  - 99.8 % are SMEs (less than 250 employees)
  - 93 % are micro enterprises (less than 10 employees)
- Micro enterprises account for 70 % to 90 % of enterprises in OECD* countries (57 % in US)
- Greater Montréal Area - Software Enterprises.

Number of employees	Number of Software Enterprises	Percentage
1 to 25	540	78 %
25 to 100	127	18 %
Over 100	26	4 %

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.

* **ISO/IEC 12207- Standard for Information Technology - Software Life Cycle Processes.**

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
  - COMPETISOFT 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

McFall, Wilkie, McCaffery, Lester & Sterritt, 2003.

Helping your business grow through knowledge

TOWARDS SOFTWARE EXCELLENCE

TSE

- "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."

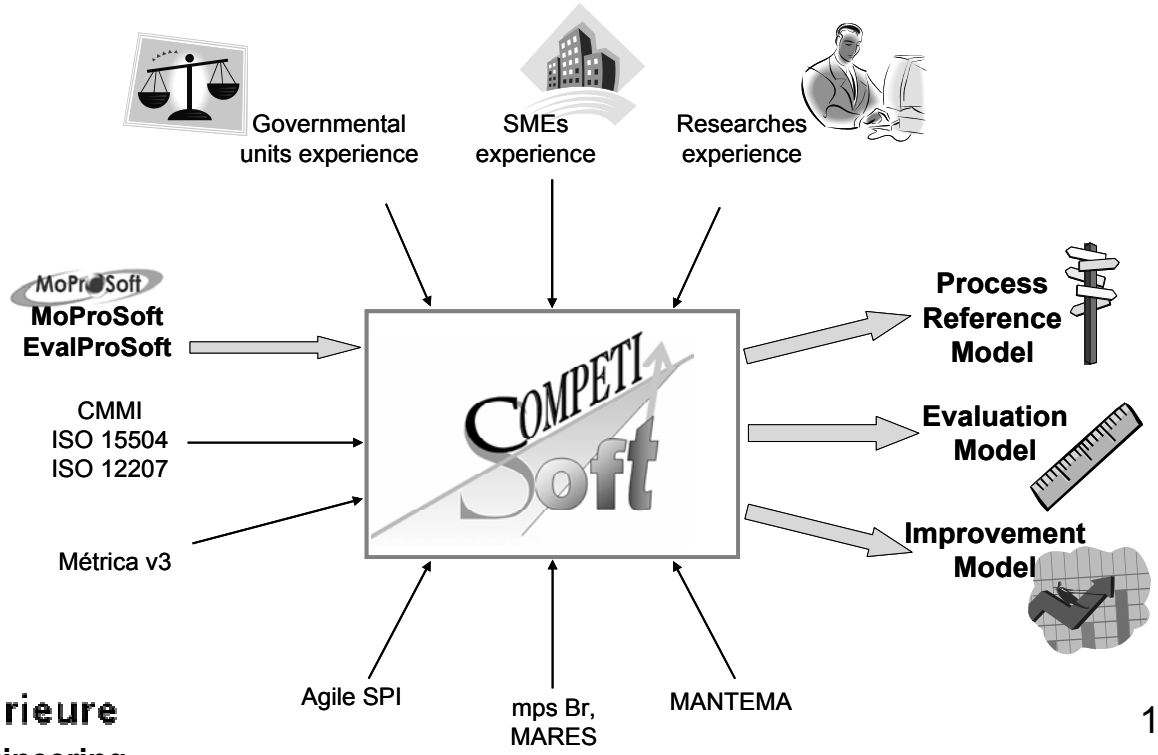
- supported by UK Department of Trade and Industry (DTI) and industry bodies

NCC National Computing Centre

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

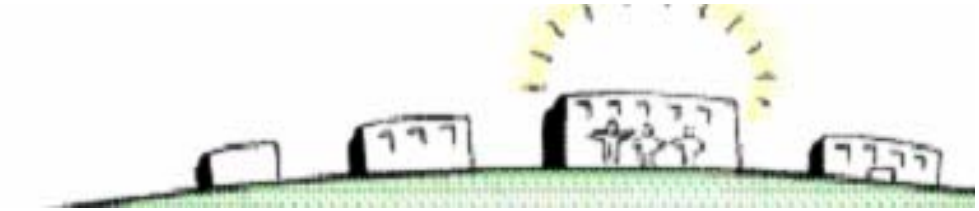
COMPETISOFT Project

- 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.



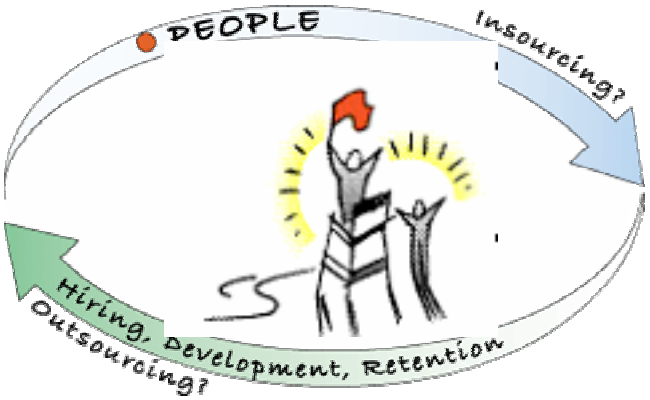
- Non-profit organization established in Columbia in 1999
- Purpose
  - Create and develop enterprises providing goods and services to the information technology
- Integrates 11 sites in Columbia
- Houses more than 200 VSEs
  - Over 120 VSEs under the same roof in Cali
  - 1000 Software Engineering Professionals,
  - 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

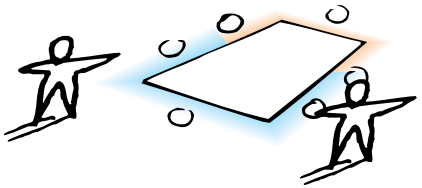


Small Companies (<100)

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.

Procedures for the Technical Work of ISO/IEC JTC 1 <www.jtc1.org>.

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.

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.

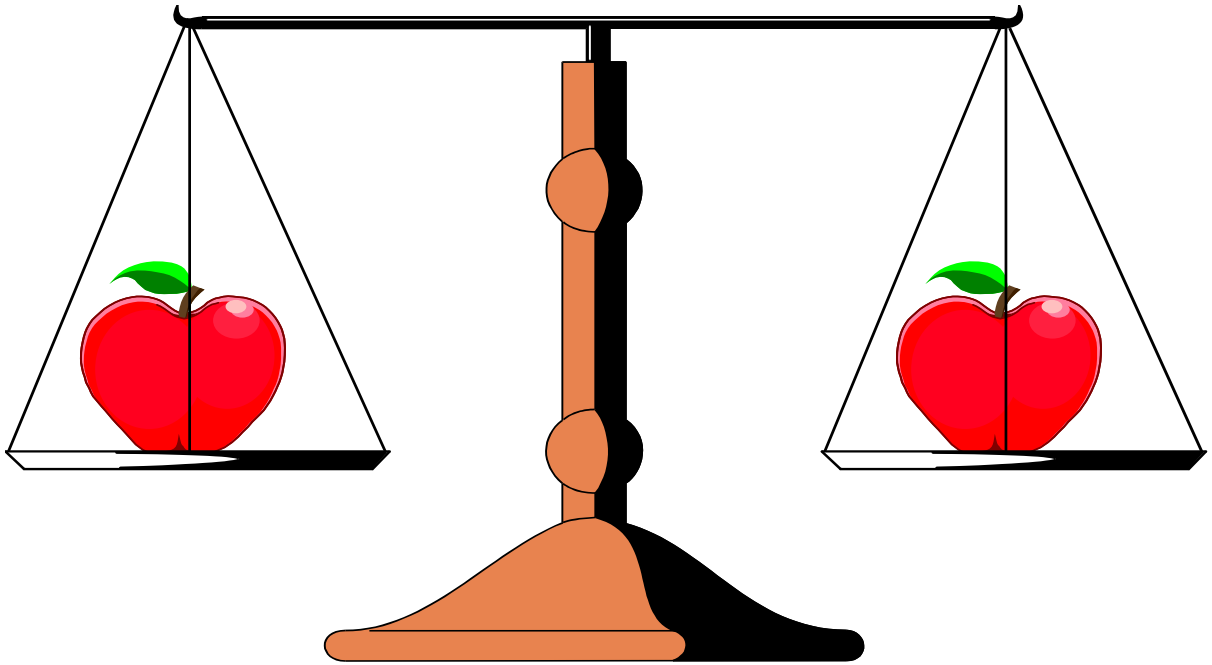
Adapted from F. Coallier

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

The Meaning of ISO

ISO IS NOT AN ACRONYM



GREEK WORD ΙΣΟΣ MEANING <u>EQUAL</u>

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.

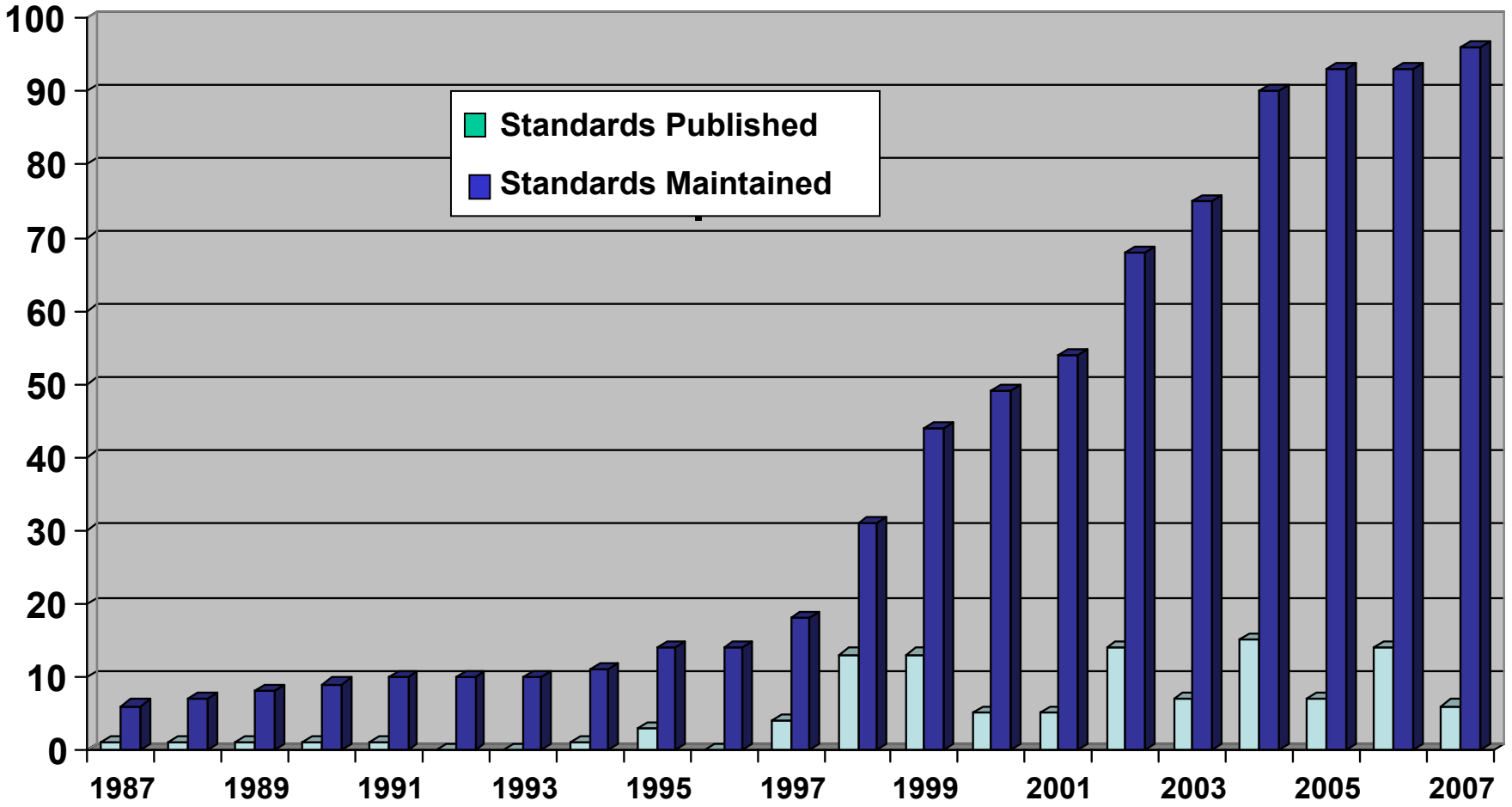
Technical Areas	JTC1 Subcommittees and Working Groups
Application Technologies	SC 36 - Learning Technology
Cultural and Linguistic Adaptability and User Interfaces	SC 02 - Coded Character Sets SC 22/WG 20 – Internationalization SC 35 - User Interfaces
Data Capture land Identification Systems	SC 17 - Cards and Personal Identification SC 31 - Automatic Identification and Data Capture Techniques
Data Management Services	SC 32 - Data Management and Interchange
Document Description Languages	SC 34 - Document Description and Processing Languages
Information Interchange Media	SC 11 - Flexible Magnetic Media for Digital Data Interchange SC 23 - Optical Disk Cartridges for Information Interchange
Multimedia and Representation	SC 24 - Computer Graphics and Image Processing SC 29 - Coding of Audio, Picture, and Multimedia and Hypermedia Information
Networking and Interconnects	SC 06 - Telecommunications and Information Exchange Between Systems SC 25 - Interconnection of Information Technology Equipment
Office Equipment	SC 28 - Office Equipment
Programming Languages and Software Interfaces	SC 22 - Programming Languages, their Environments and Systems Software Interfaces
Security	SC 27 - IT Security Techniques SC 37 - Biometrics
Software and Systems Engineering	**SC 07 - Software and System Engineering**

ISO JTC1 IEC
INFORMATION TECHNOLOGY STANDARDS

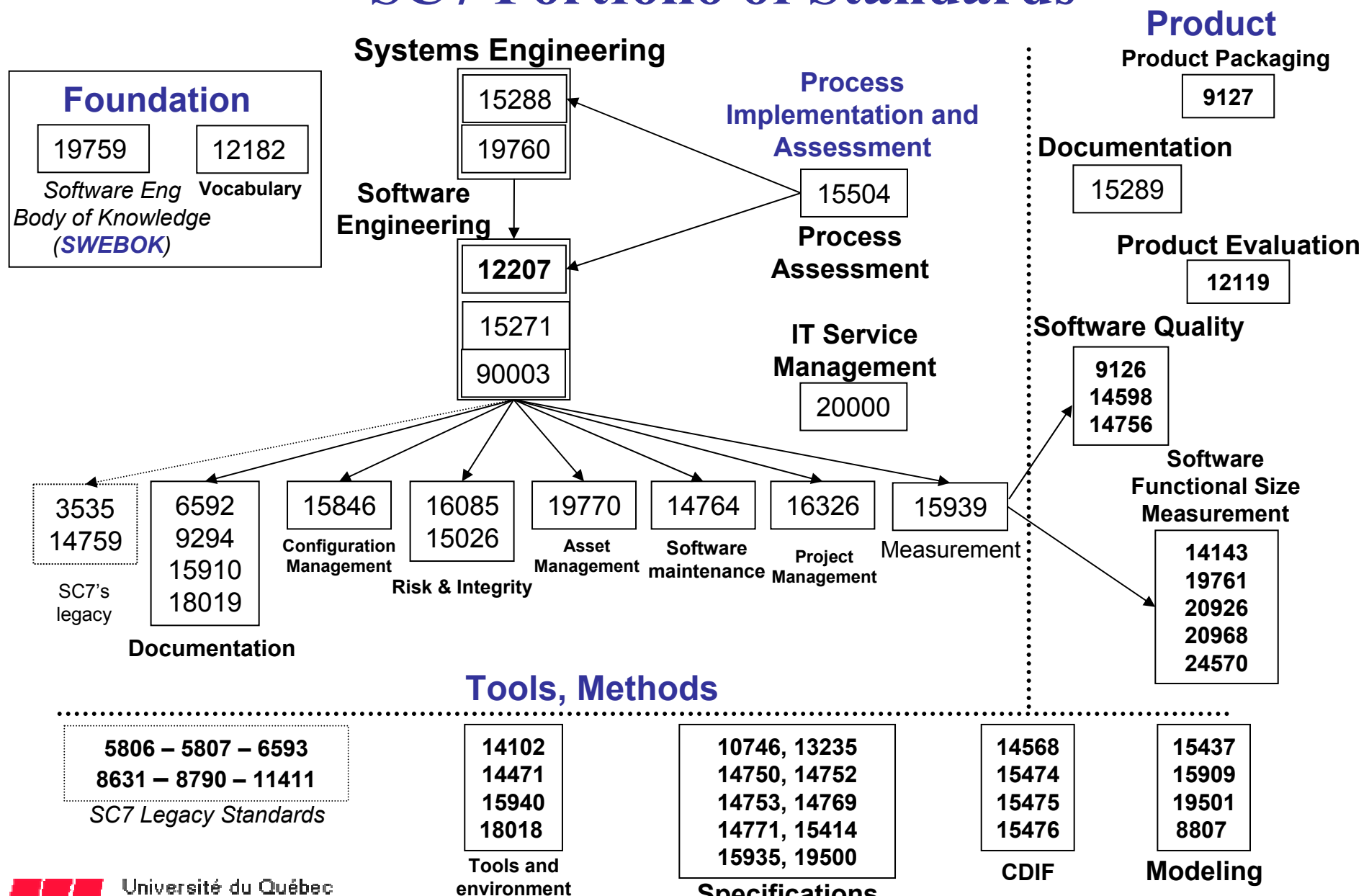
ISO/IEC JTC 1/SC7- Terms of Reference

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



SC7 Portfolio of Standards



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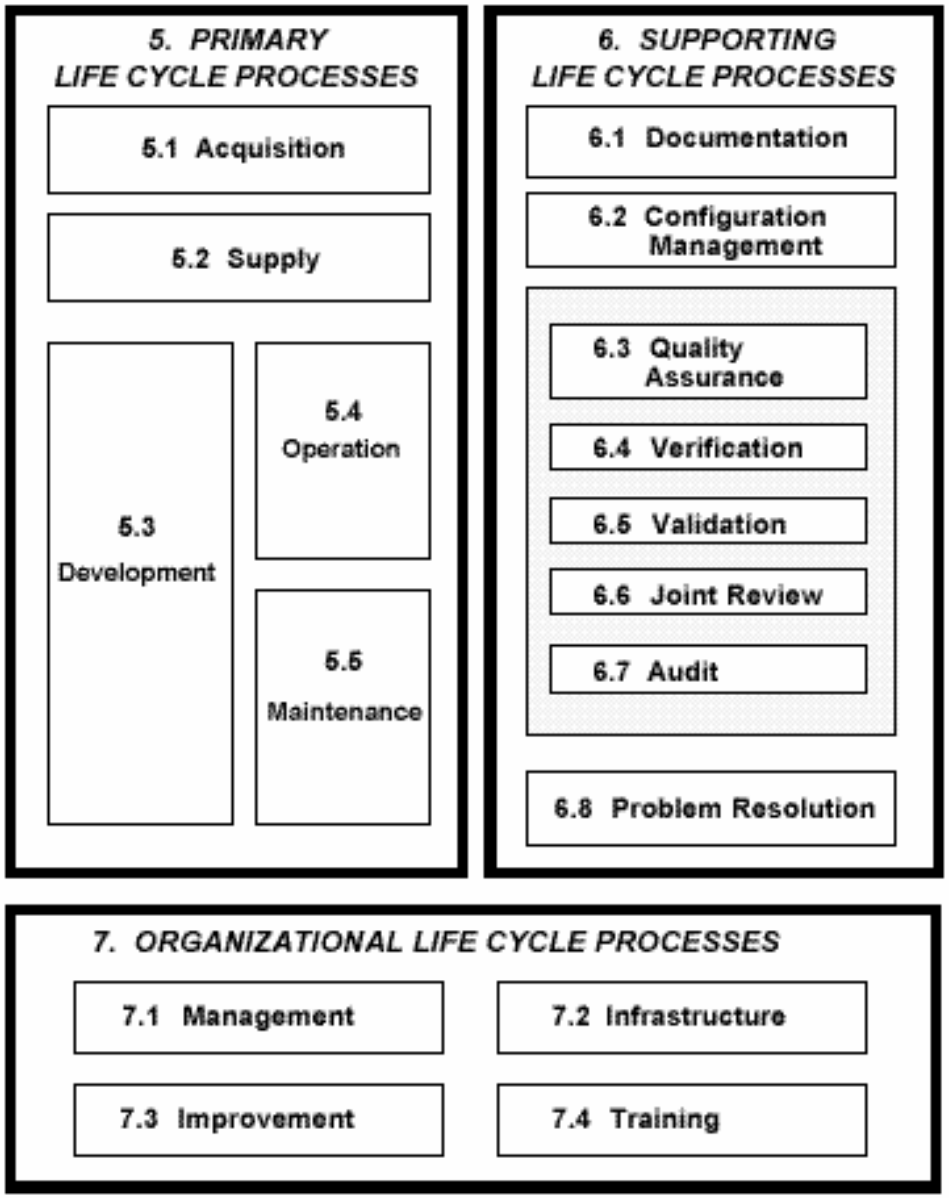
Adapted from SWG5

12207 Life-Cycle Processes



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

ISO/IEC TR 19559

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

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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.

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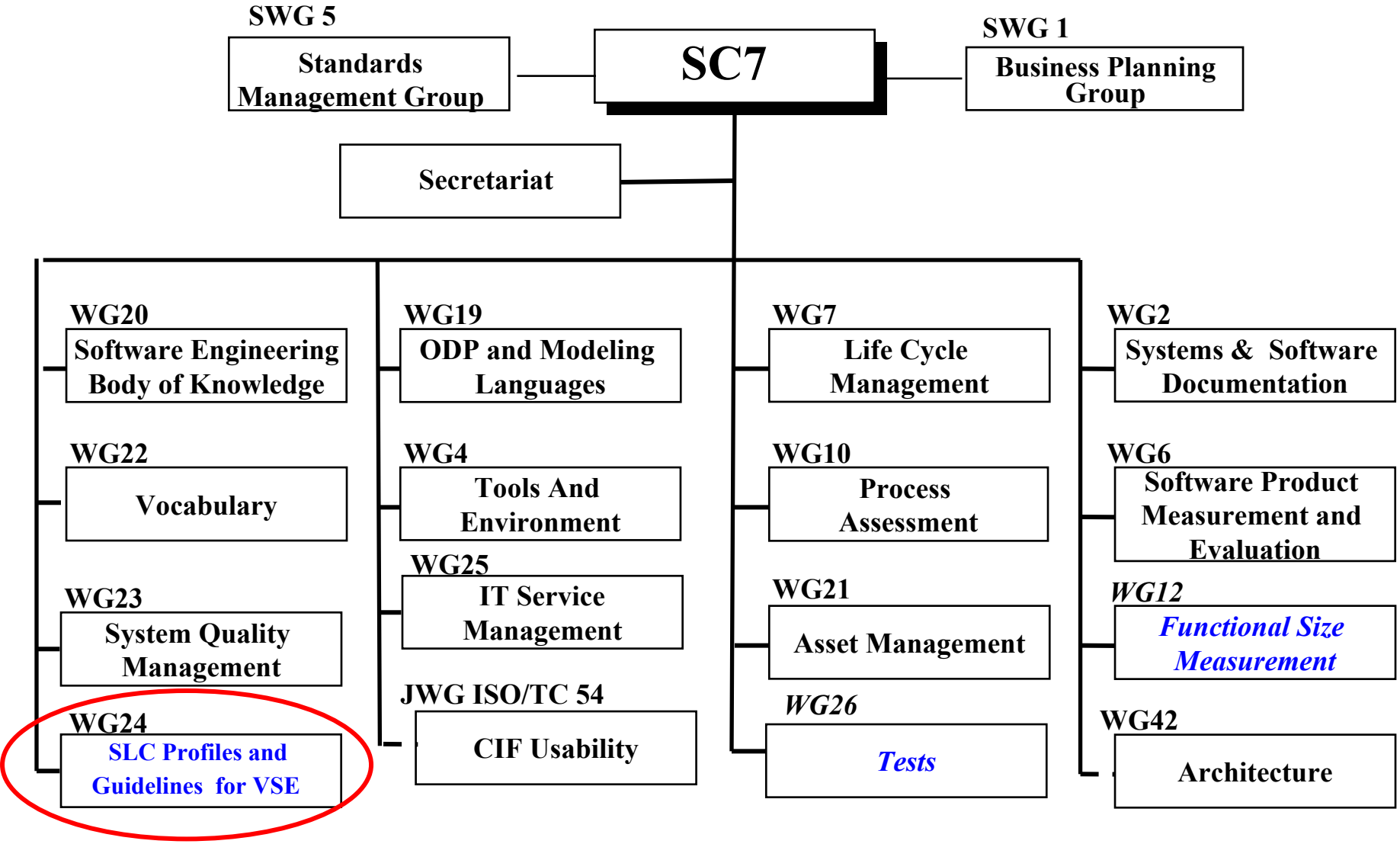
ISO/IEC TR 19559

SC7 Structure



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**
  - Italy (2005), Thailand - Luxembourg (2006), Russia – Canada (2007), Germany (2008), India (2009).

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 in to 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

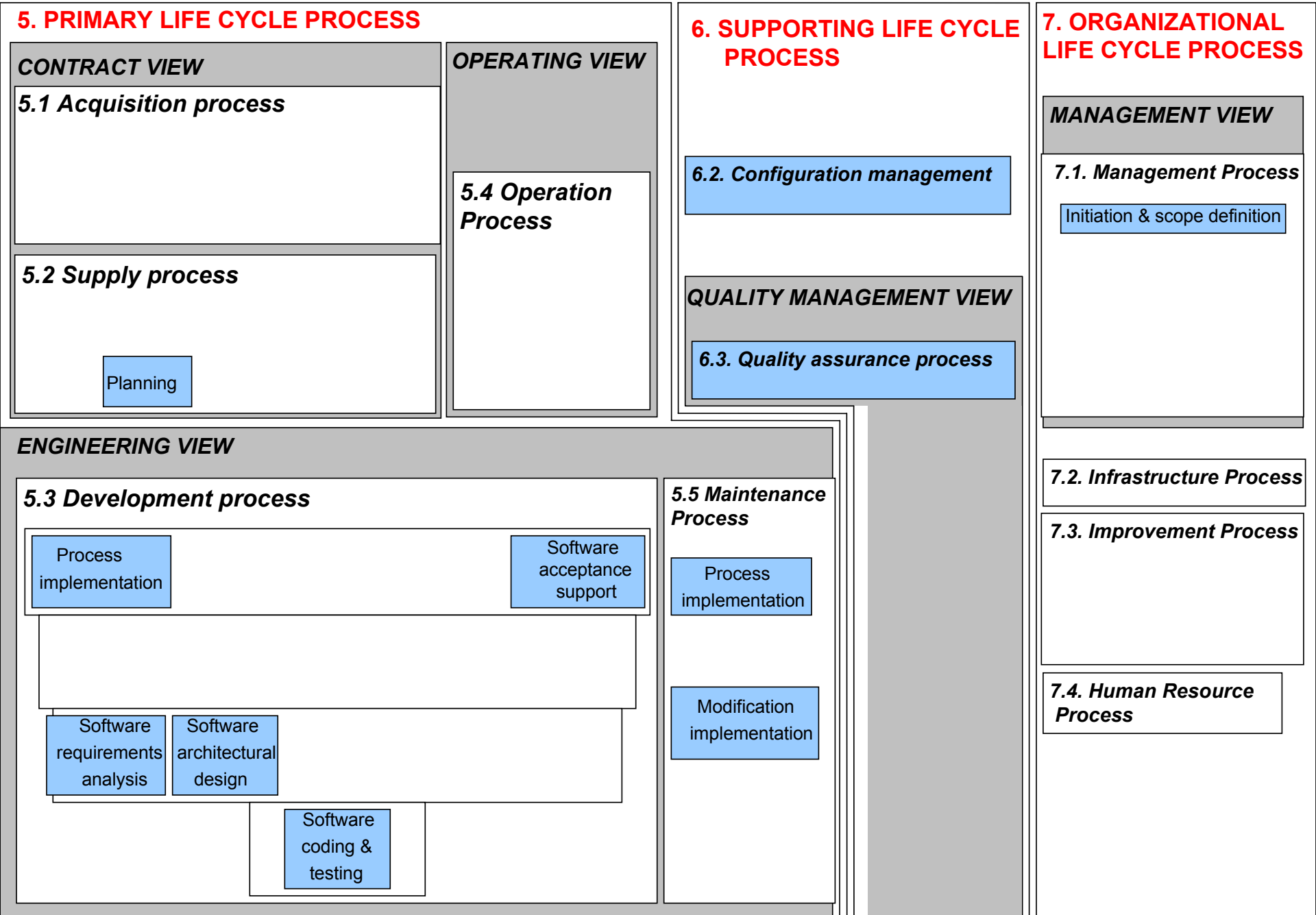
Source: SiPA

สำนักงานส่งเสริมอุตสาหกรรมซอฟต์แวร์แห่งชาติ (องค์การมหาชน)
Software Industry Promotion Agency (Public Organization)

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.

TQS Level I Mapping with ISO/IEC 12207



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).

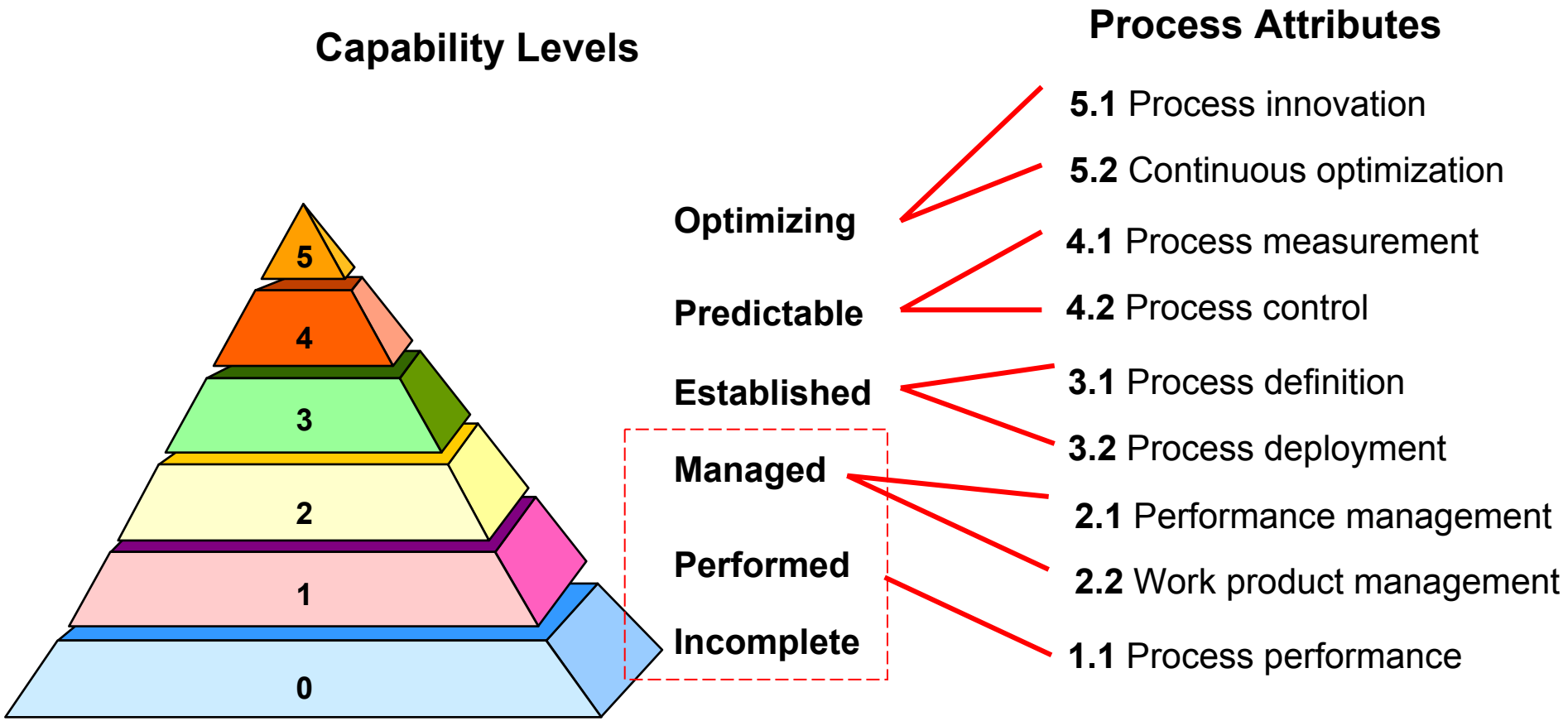
Potential Benefits for VSEs

- 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.

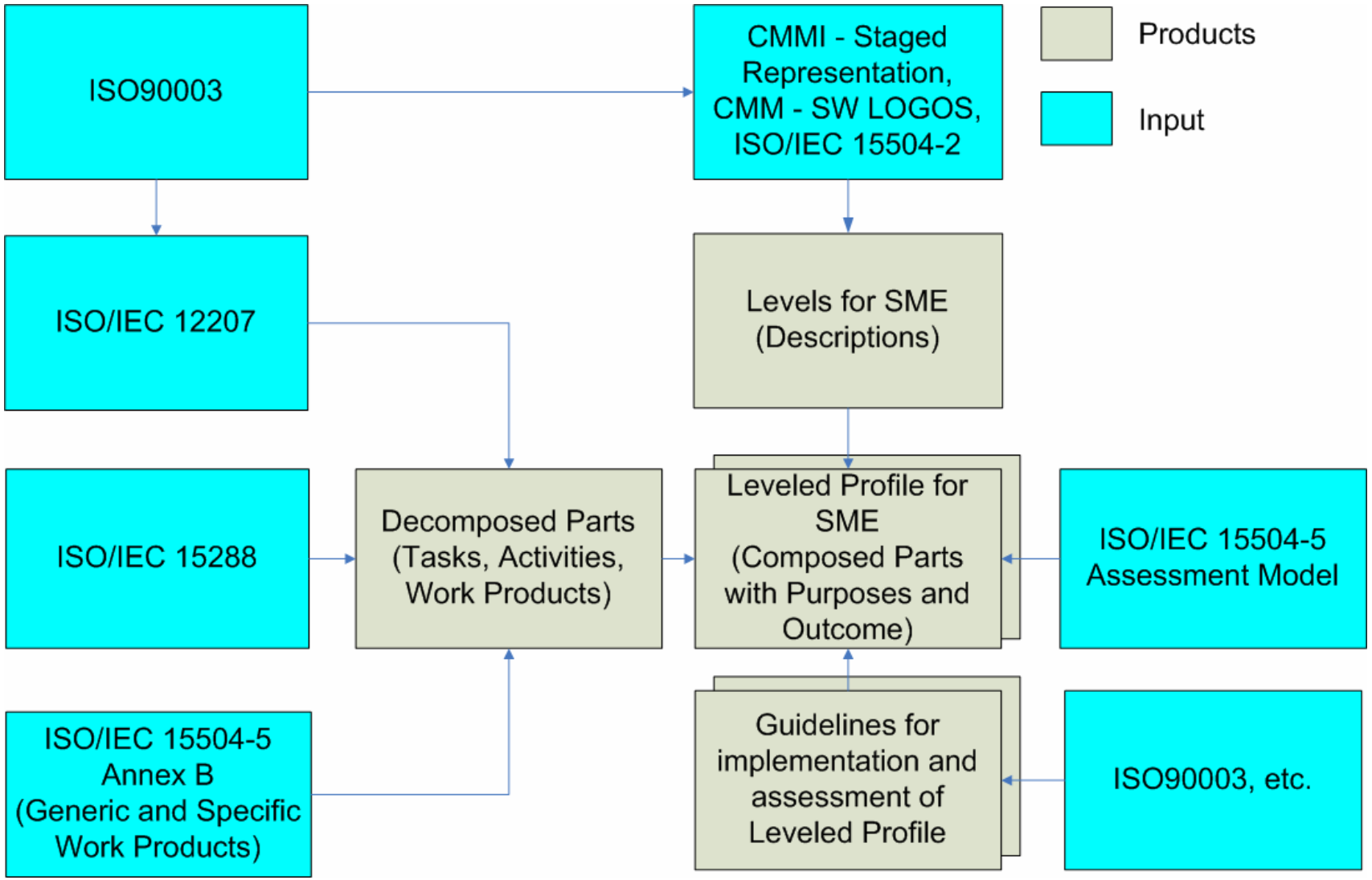
WG 24 - Strategy

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



VSE Proposed Model



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

Survey of VSEs

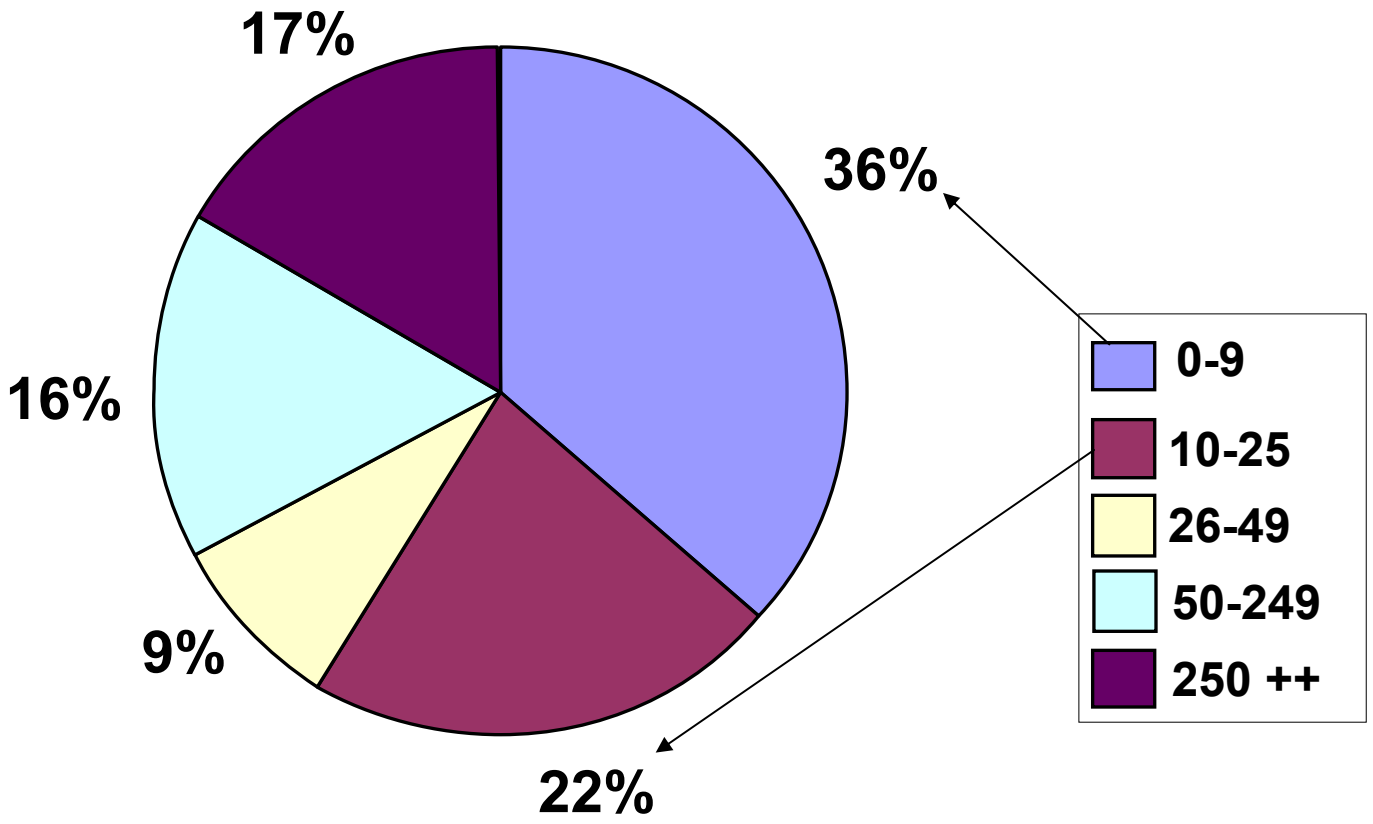
- **Objectives**
  - Ask VSEs about their utilization of standards
  - Identify problems and potential solutions to help VSEs apply standards and become more competitive.
- **Method**
  - Web-based Survey
  - Questionnaire translated in 9 languages
    - English, French, German, Korean, Portuguese, Russian, 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

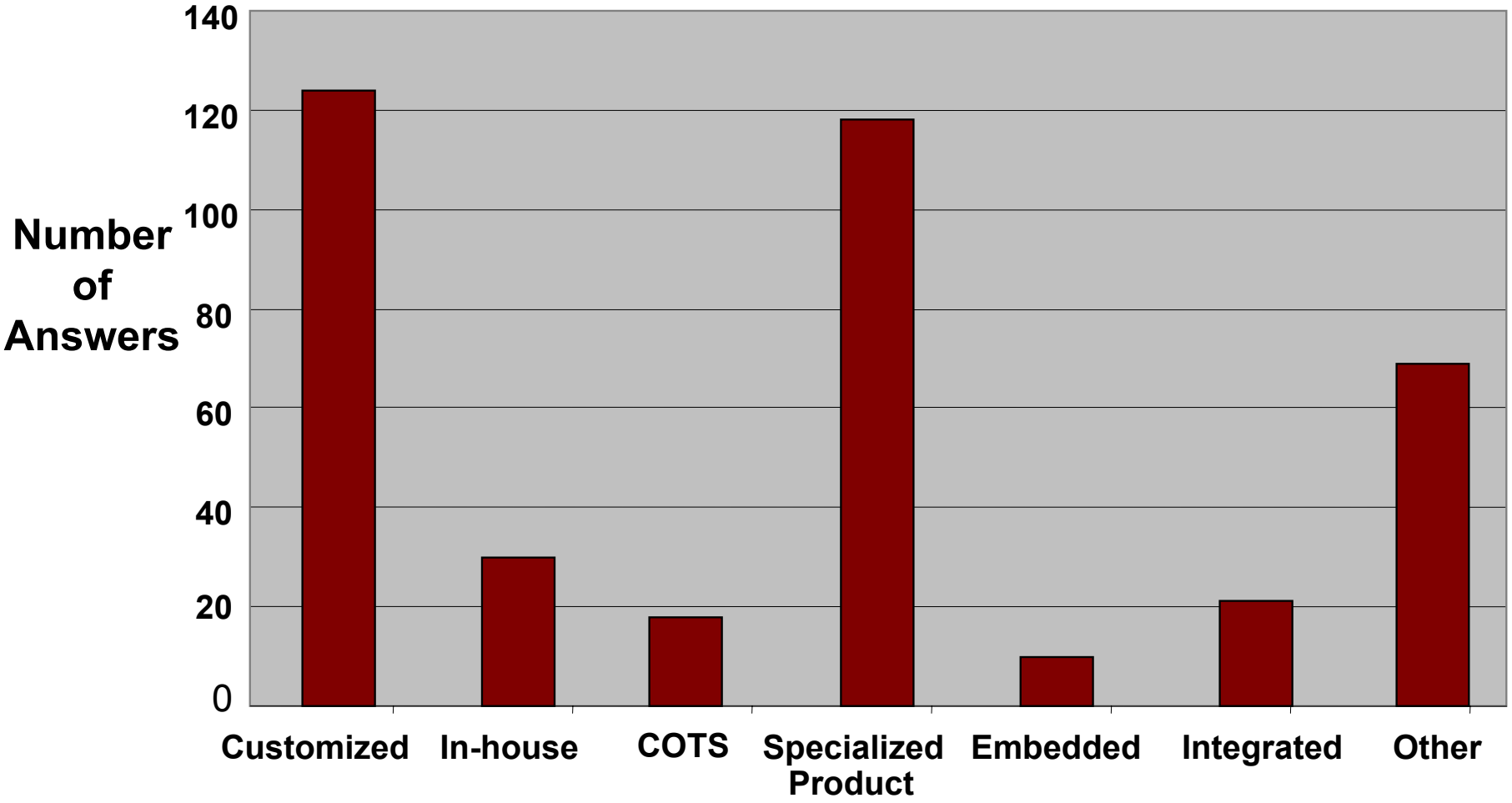
Country	Number of Responses	Country	Number of Responses	Country	Number of Responses
Argentina	2	Finland	13	New Zealand	1
Australia	10	France	4	Peru	4
Belgium	10	Germany	1	Russia	4
Brazil	72	India	57	South Africa	10
Bulgaria	3	Ireland	10	Spain	4
Canada	10	Italy	2	Taiwan	1
Chile	1	Japan	3	Thailand	59
Colombia	109	Korea (South)	4	Turkey	1
Czech Republic	3	Luxembourg	3	United Kingdom	2
Dominican Republic	1	Mexico	20	United States	3
Ecuador	9	Morocco	1		

435 responses from 32 countries

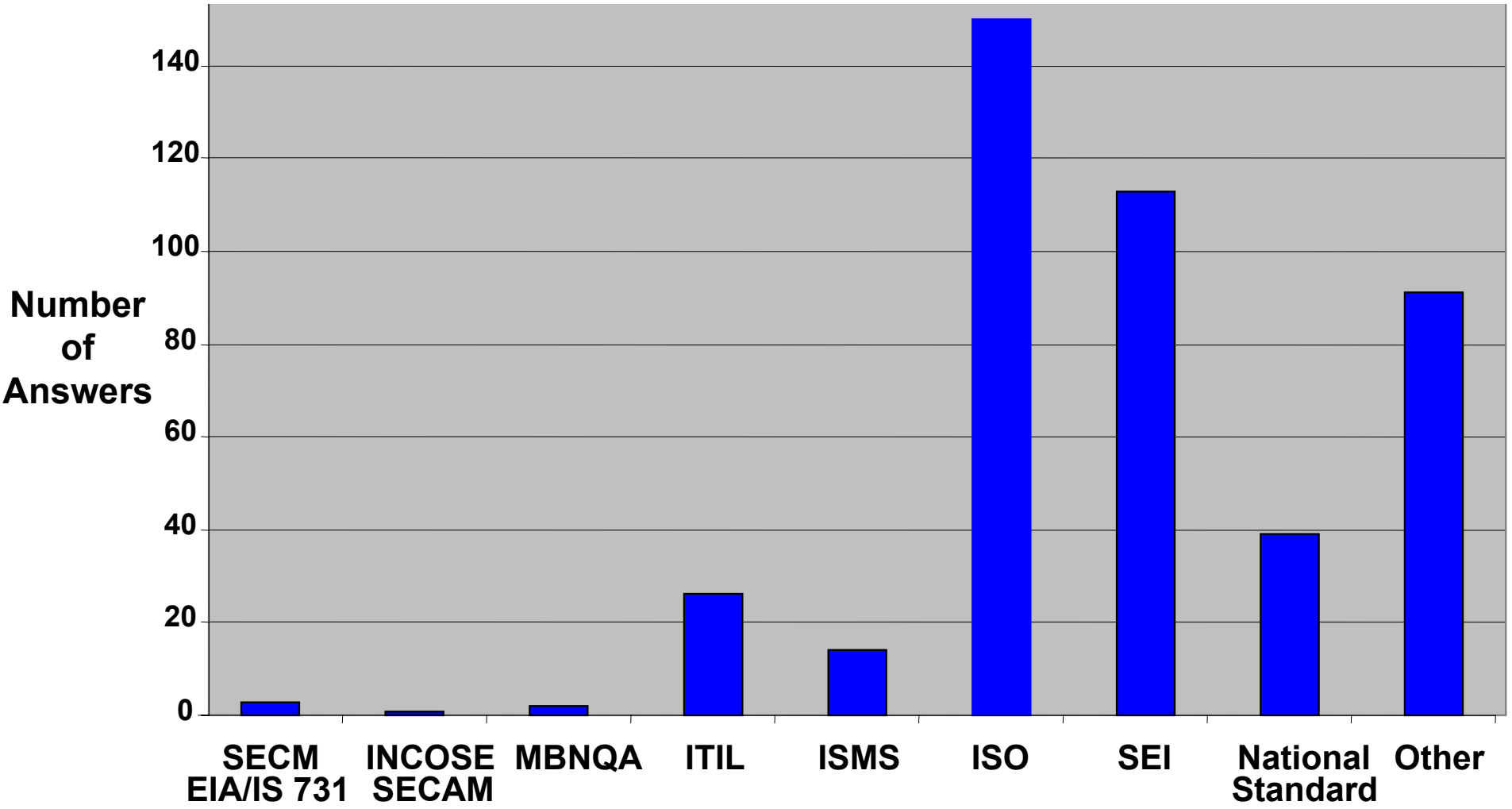
Number of Employees in Enterprises Surveyed



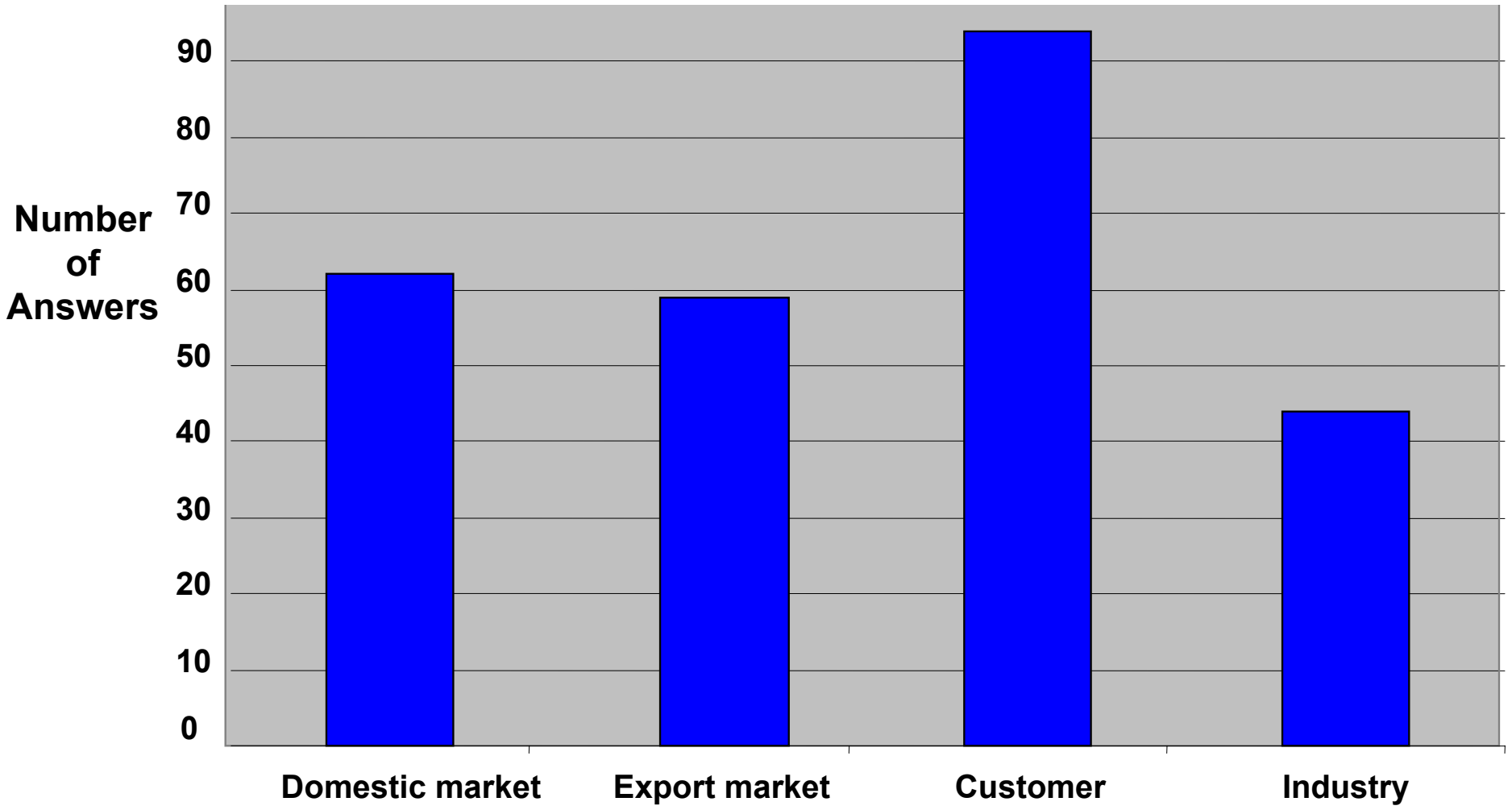
Types of Software Development



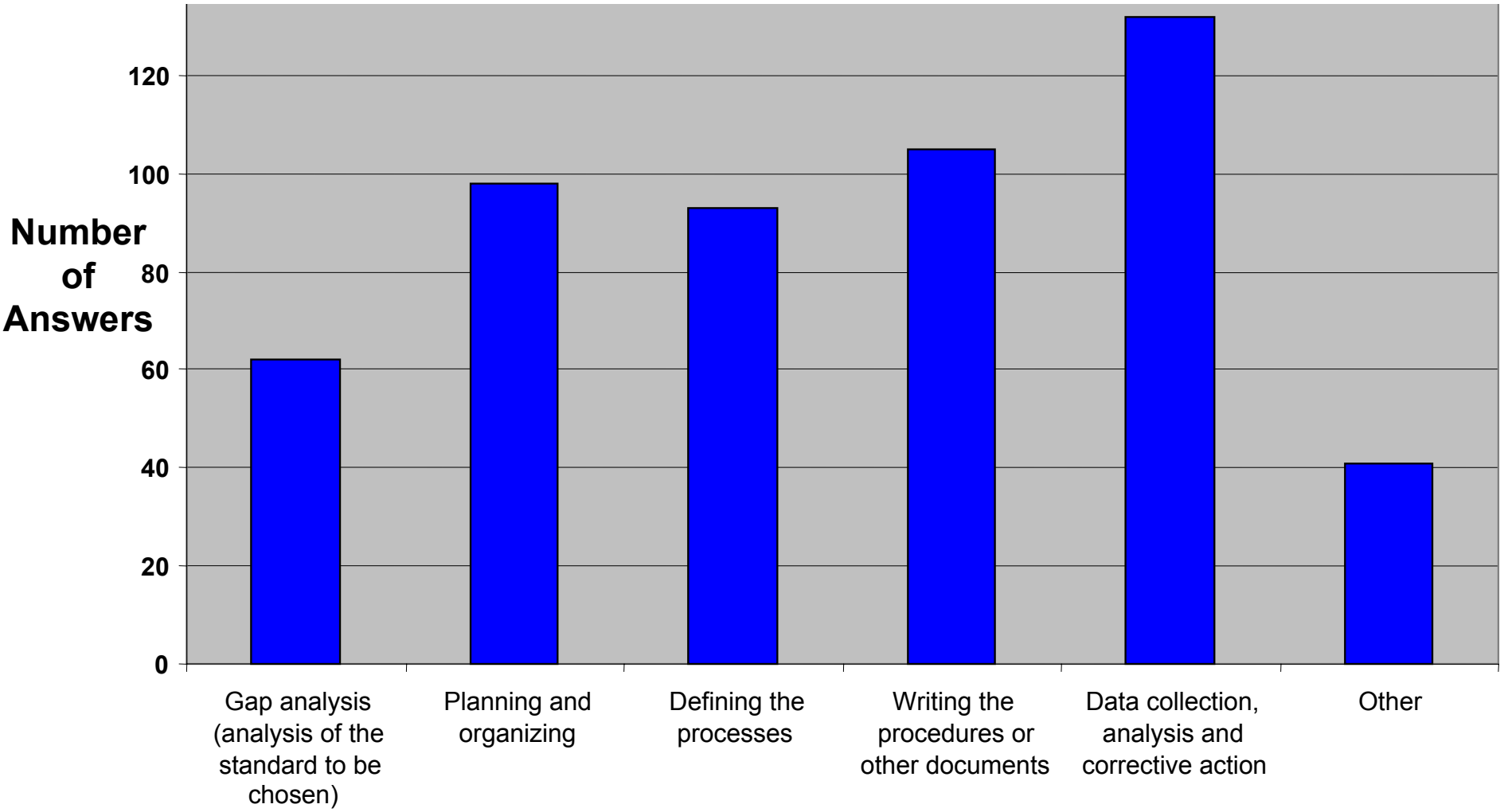
Models, Approaches or Standards Used



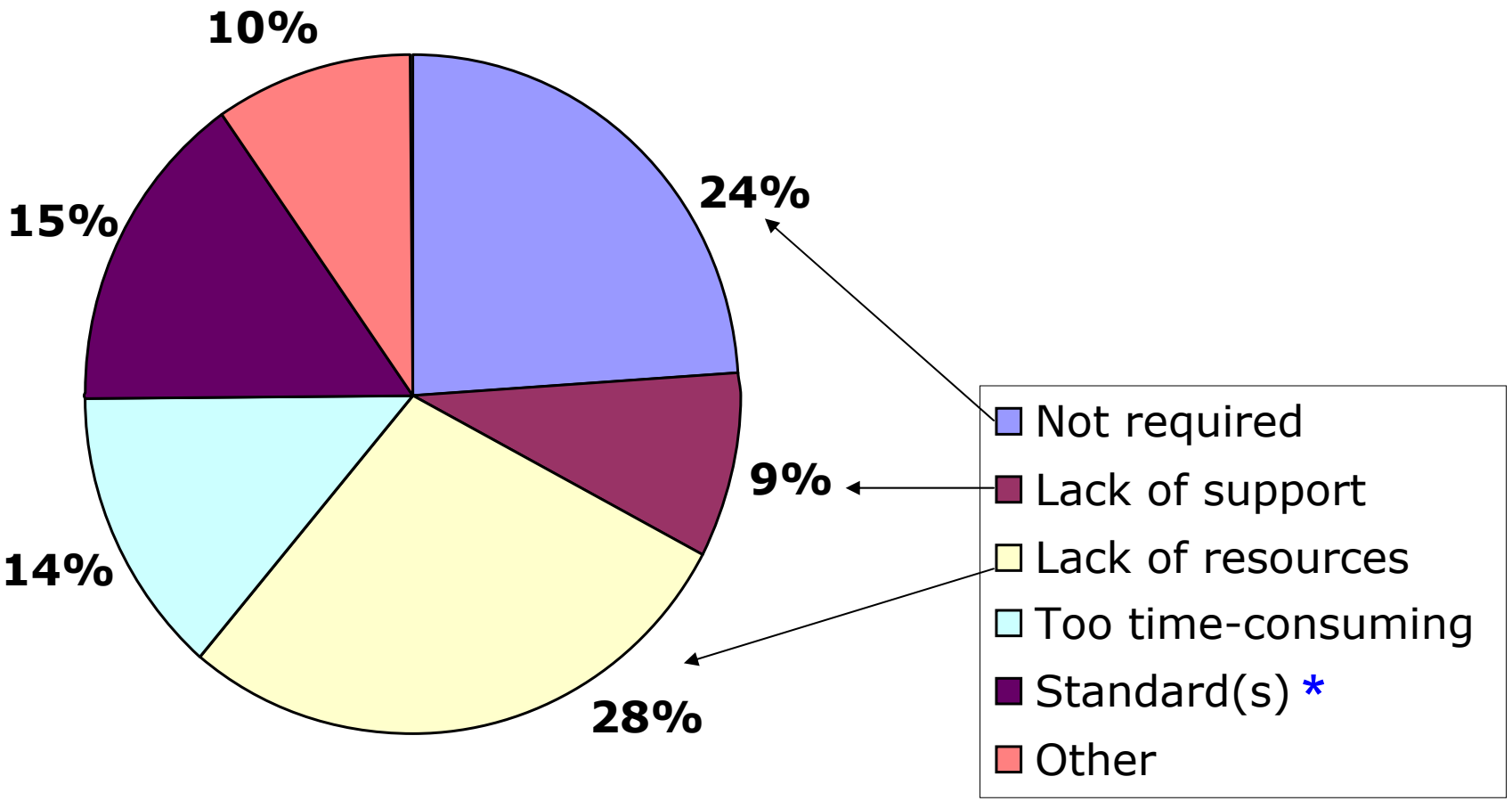
Origin of Request for Implementation



Activities that Failed or Caused Problems



Why don't VSEs use Standards ?



* 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.

Mexican Standard

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%

Vazquez, A., A Software Process Model for Very Small Enterprises. Presentation to ISO/IEC JTC1 SC7 WG24, Bangkok, May 2006.

CMMI Level 2 Coverage by Moprosoft

	Fully	Largely	Partially	Not Covered
Requirements Management	**70%**	**20%**	10%	0%
Project Planning	**66%**	**17%**	13%	4%
Project Monitoring and Control	**70%**	**20%**	10%	0%
Measurement and Analysis	**61%**	**17%**	22%	0%
Process and Product Quality Assurance	**72%**	0%	21%	7%
Configuration Management	**55%**	0%	28%	17%
Supplier Agreement Management	**70%**	0%	18%	12%

- 84 practices are Fully covered
- 13 practices are Largely covered
- 22 practices are Partially covered
- 7 practices are Not covered

CMMI Level 3 Coverage

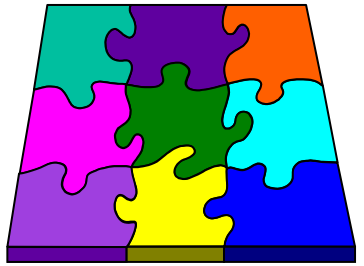
- Requirements Development, Technical Solution and Product Integration
  - Addressed in Software Development and Maintenance
- Verification and Validation
  - Included in every process
- Organization Process Focus, and Organizational Process Definition
  - Addressed by Process Management.
- Organizational 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

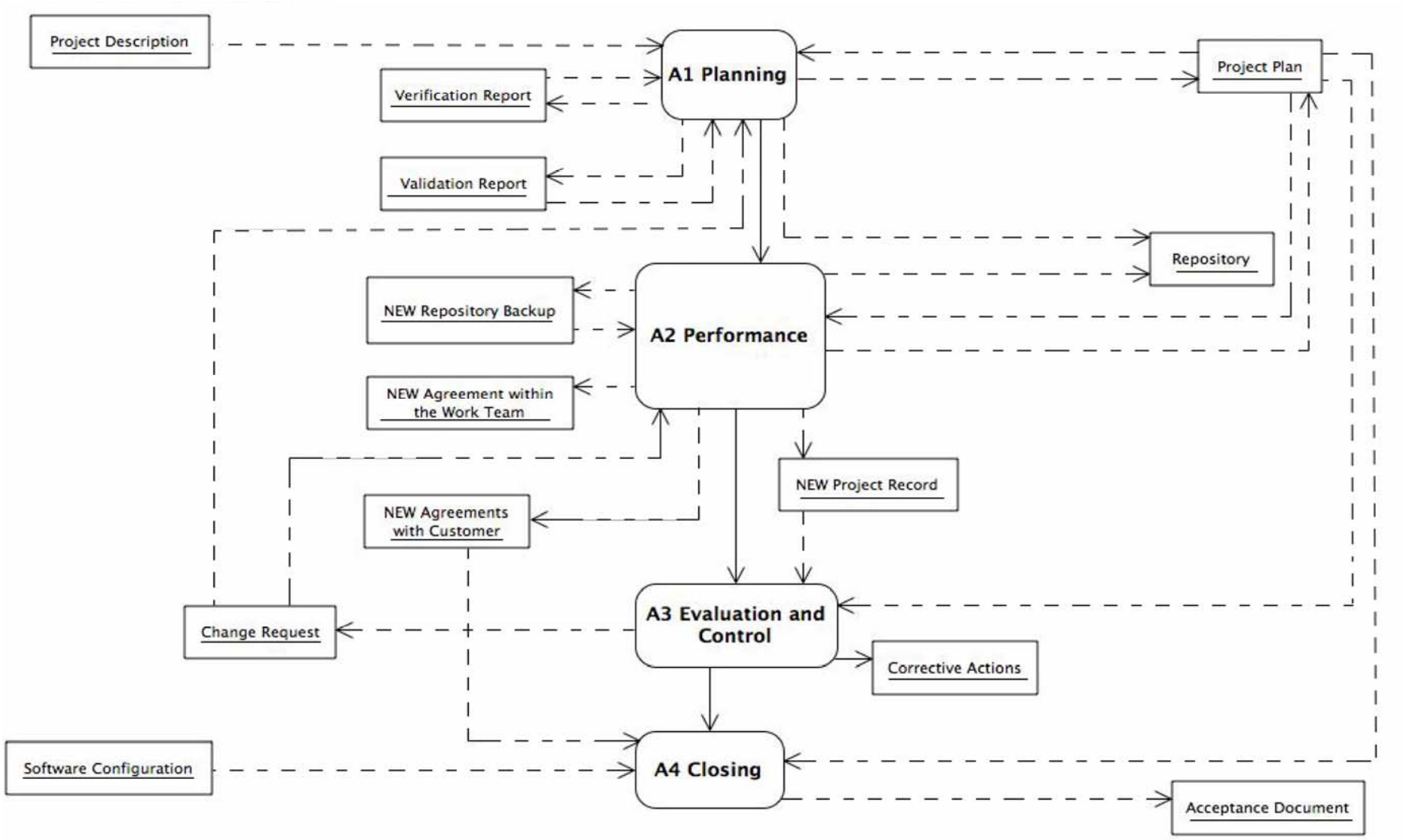
Entry Level Profile – Content (Draft Stage)

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.

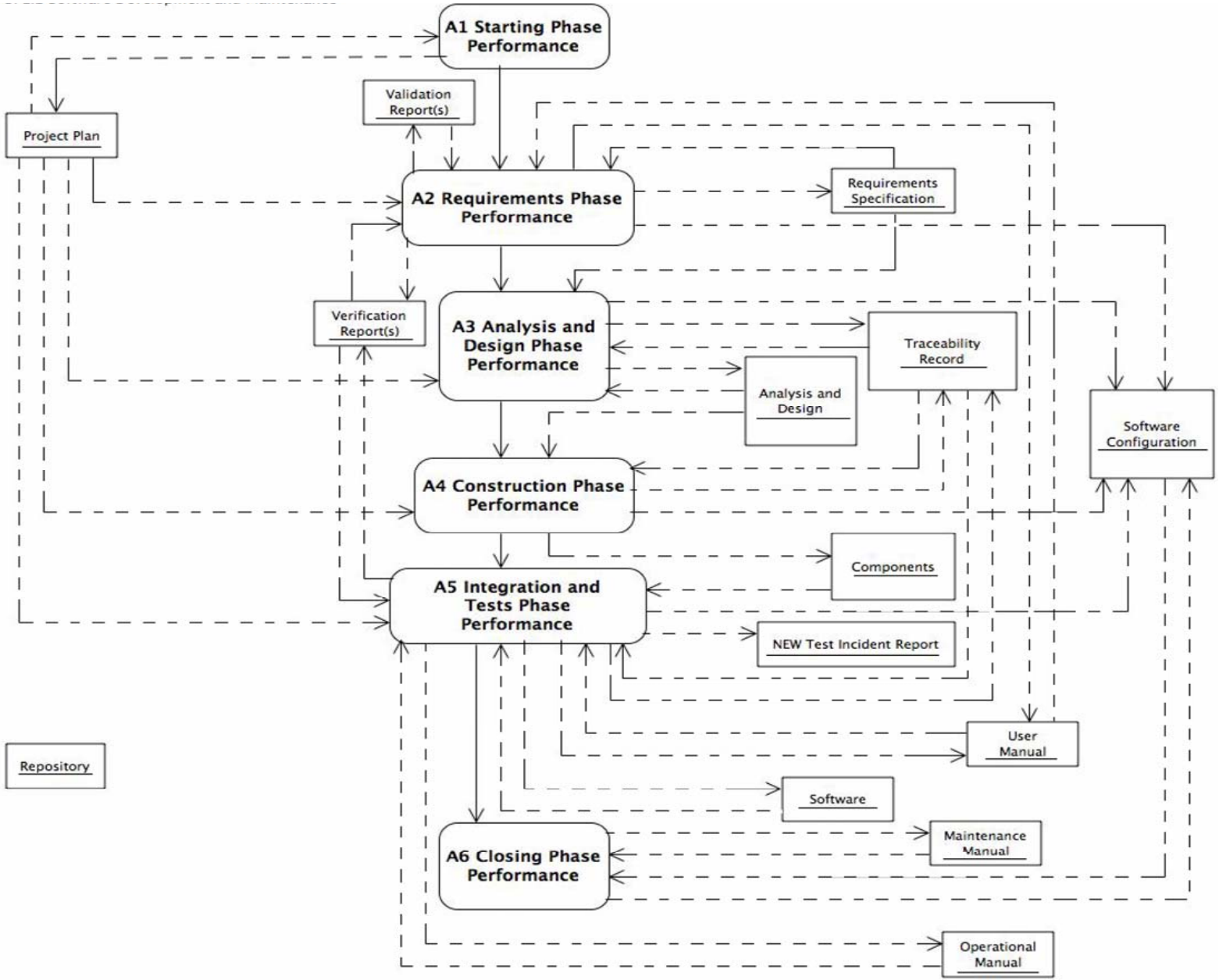
Entry Level Profile - Project Management



Entry Level Profile - Software Development

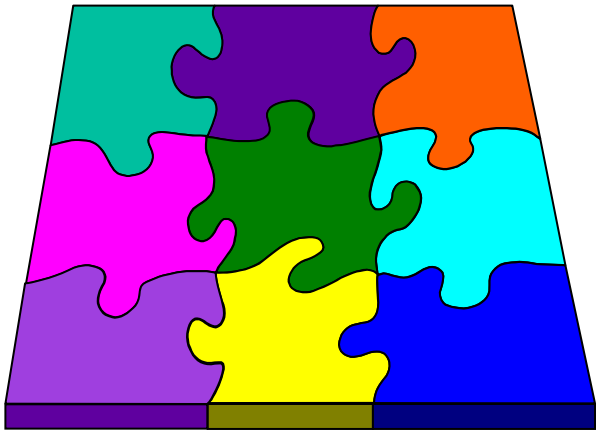
- **Purpose**
  - The systematic performance of the requirements elicitation, analysis, design, construction, integration and tests activities of new or modified software products according to the specified requirements.
- **Objectives**
  - Achieve that output products are consistent with the input 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

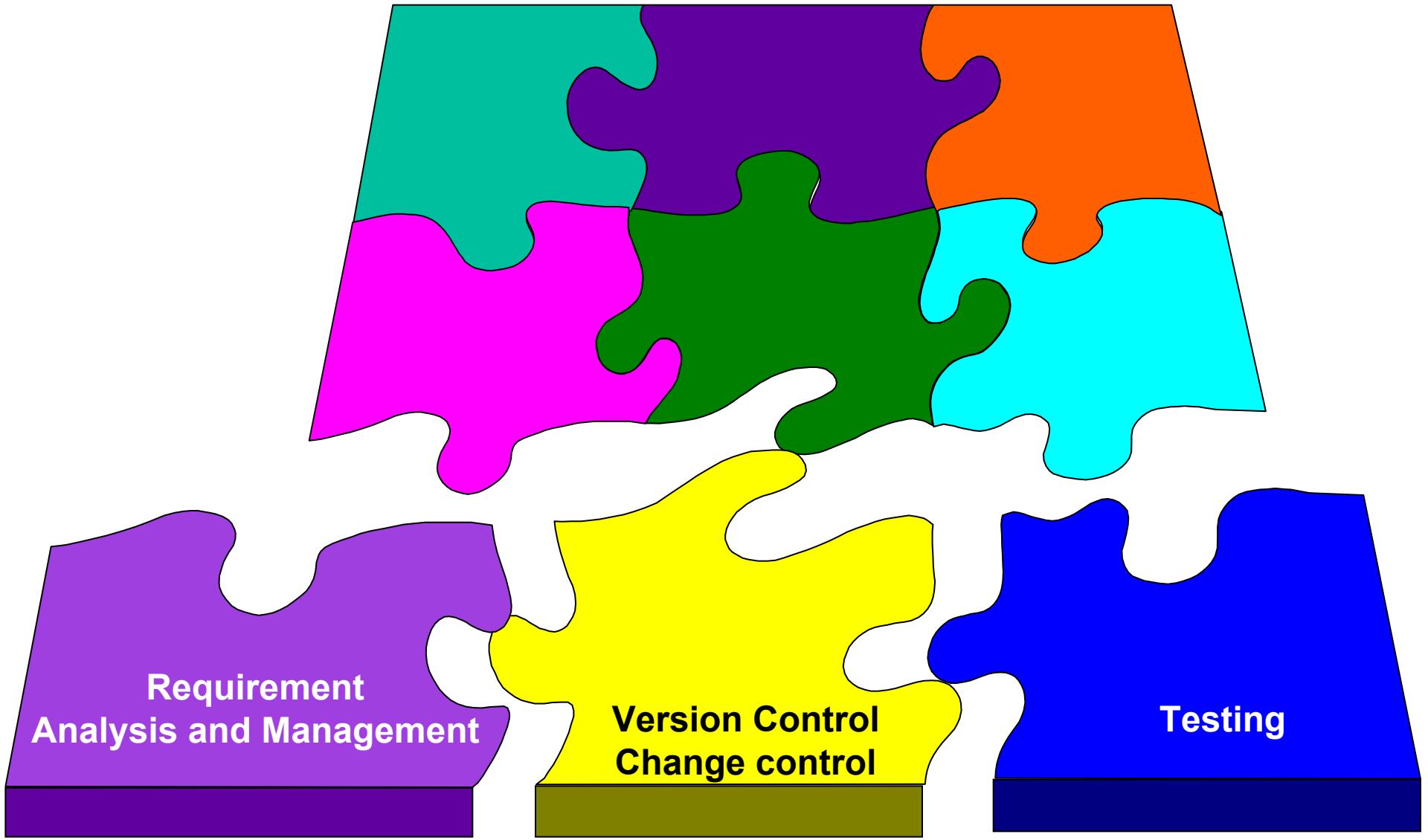


Deployment Packages for VSEs (Draft Stage)

- **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



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

- **Claude Y Laporte**
  - **Voice: + 1 514 396 8956**
  - **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

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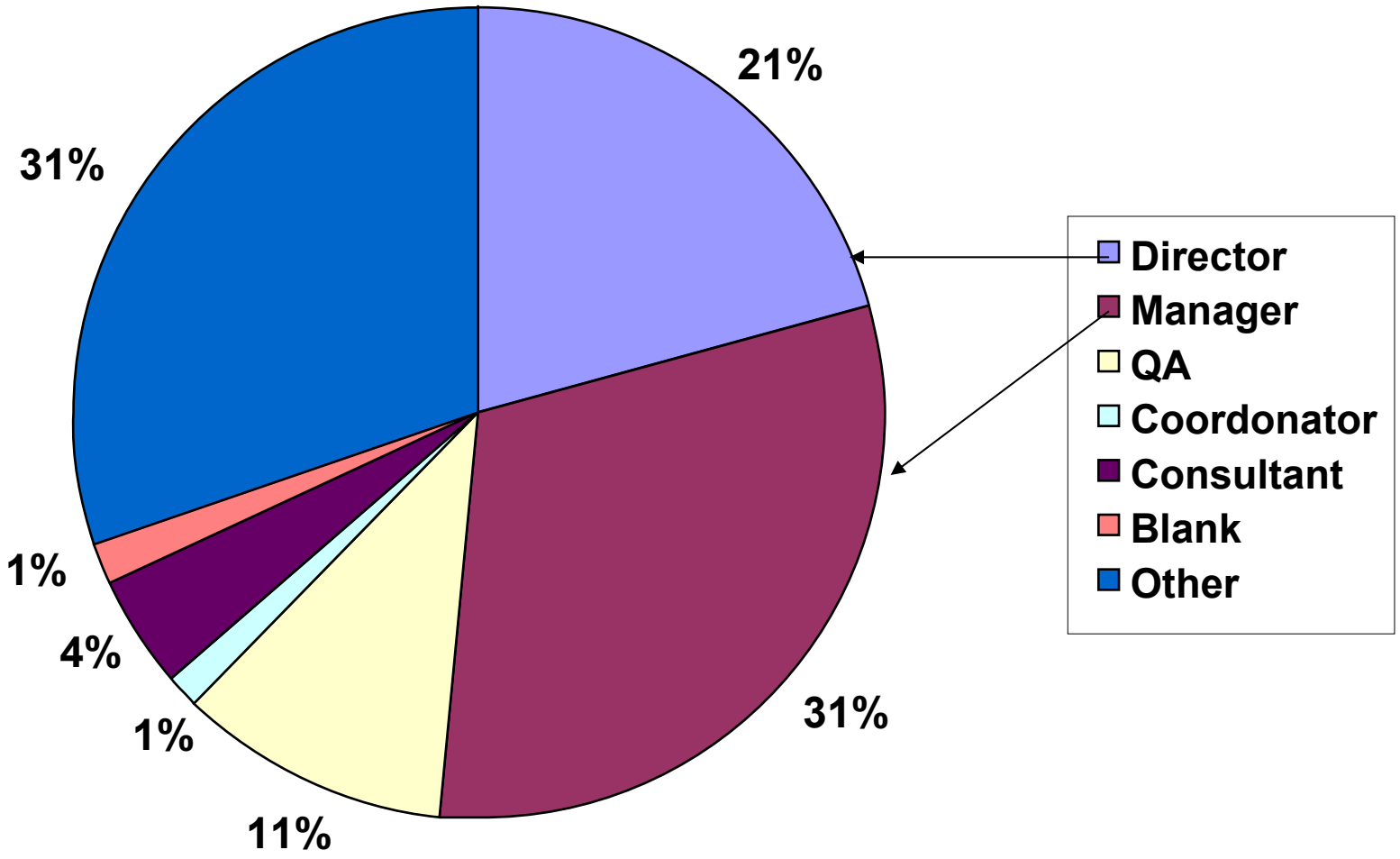
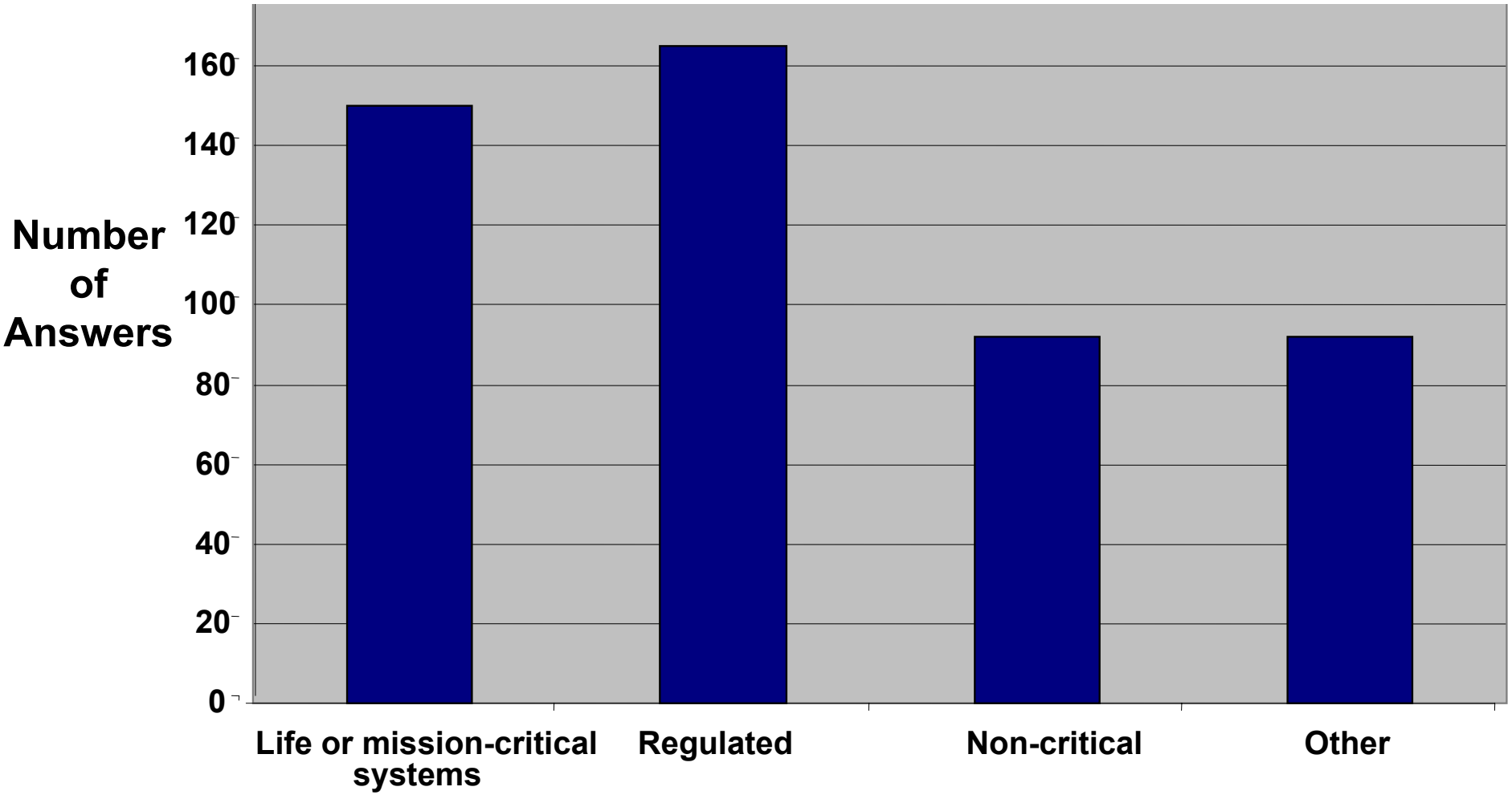
- ISO/IEC TR 19559, Software Engineering Body of Knowledge (SWEBOK) (Free copy of TR)
  - http://isotc.iso.org/livelink/livelink/fetch/2000/2489/Ittf_Home/PubliclyAvailableStandards.htm

Back-up Slides

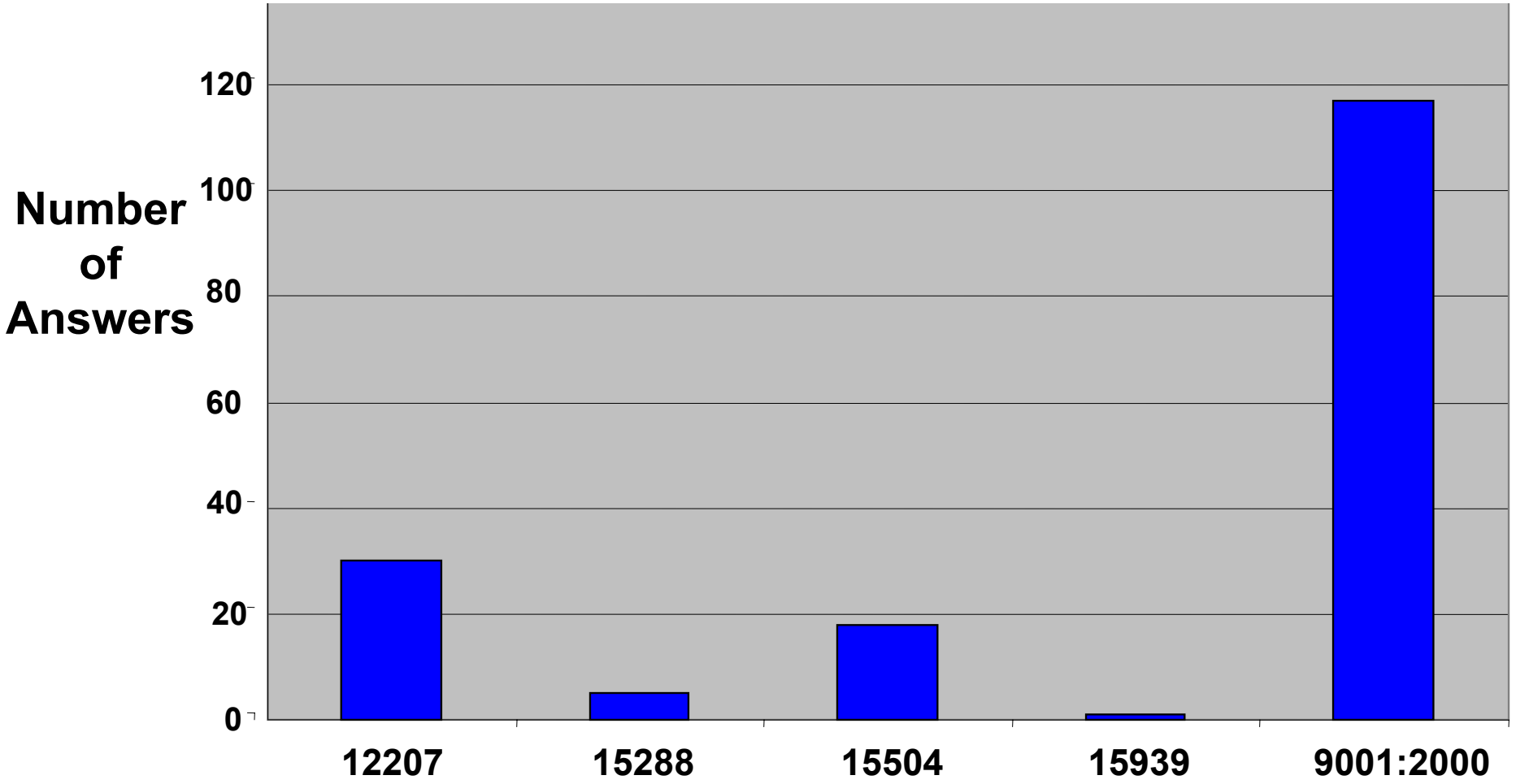
Role of Respondents



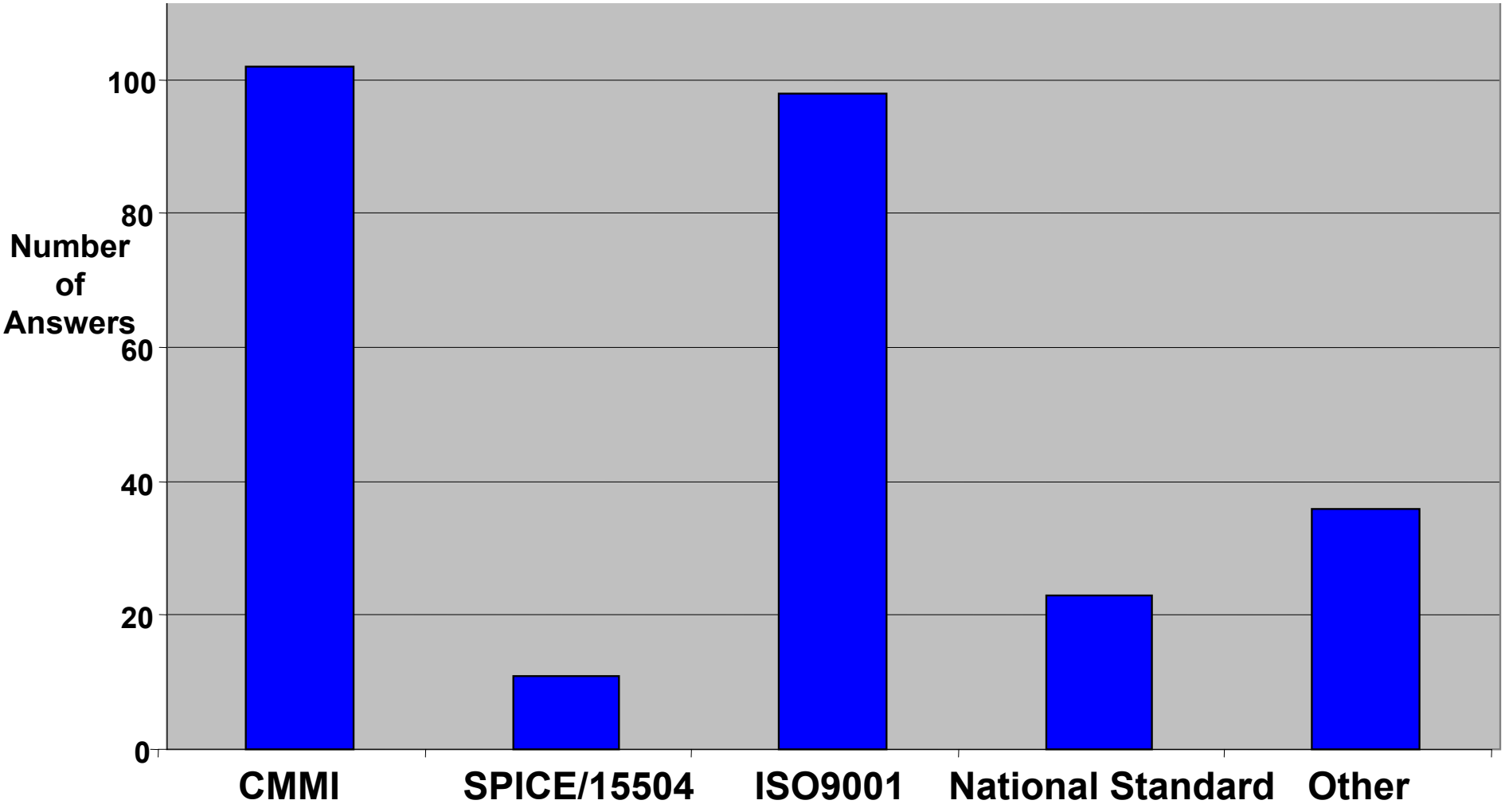
Application Domains



ISO Standards Used



Planned Implementations



Helping your business grow through knowledge

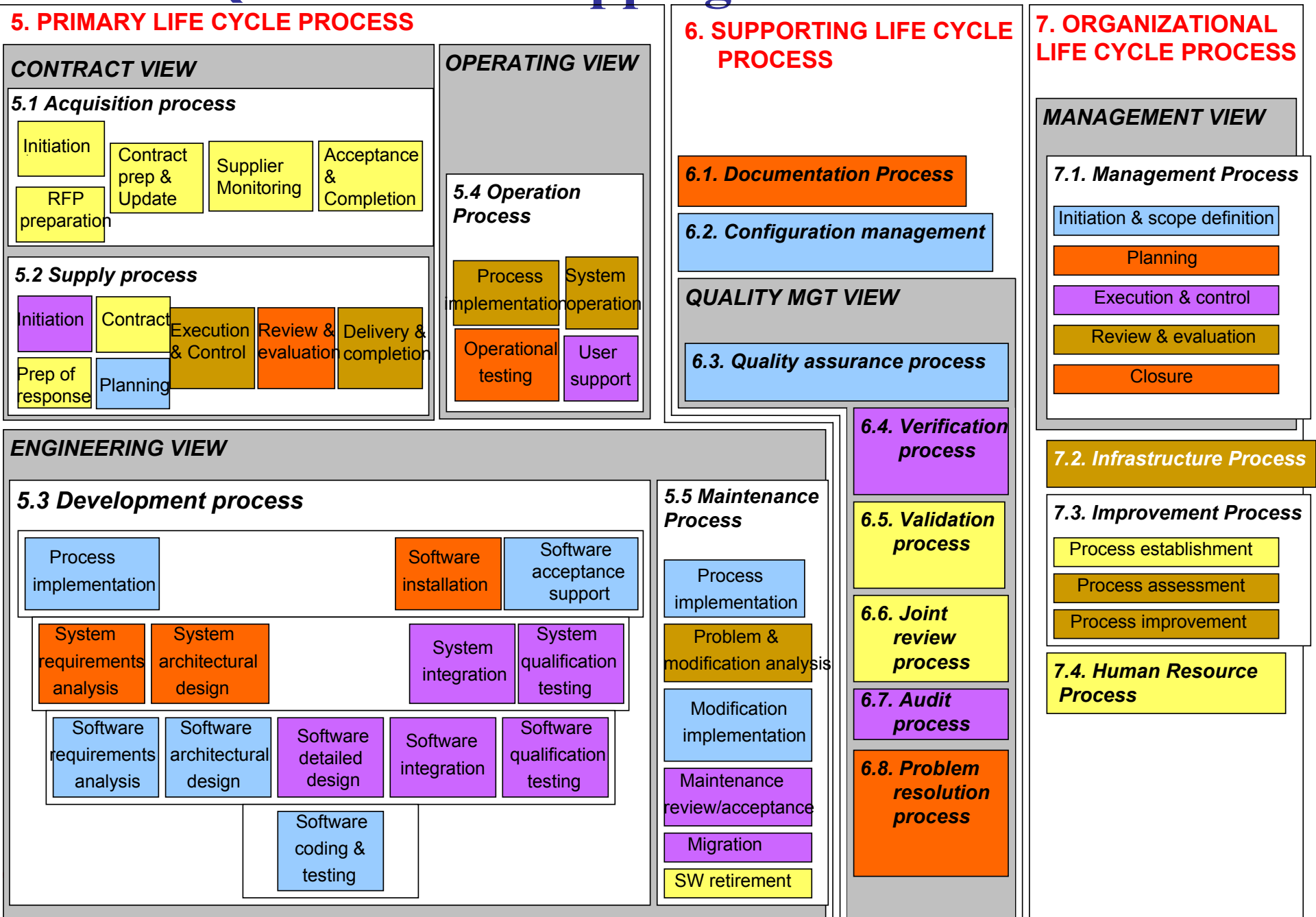
How does TSE operate?

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



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