Applying Software Engineering Standards in Small settings

Recent historical perspective and Initial Achievements

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- Introduction
- Mandate of ISO/IEC JTC1/SC7
- History of the establishment of a new SC 7 Working Group
- Achievements to date
- First Meeting of Working Group 24

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Very Small Enterprises (VSE)

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

Number of employees	Number of Enterprises	Percentage	Number of Jobs
1 to 25	540	78%	5105
25 to 100	127	18%	6221
Over 100	26	4%	6056

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VSEs and Standards

- 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.

- International Life Cycle Standards, ISO/IEC 12207 and ISO/IEC 15288 and their associated guides, do not explicitly address the needs of VSEs.

- Compliance with those standards is difficult (if not impossible) for VSEs to achieve.

- 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.

- Implementation of current standards requires a significant critical mass in terms of number of employees, cost and time.

- VSEs cannot see a net benefit in establishing a software process as defined by current standards.

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Source: New Work Item Proposal

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IEEE User's Survey
Implementation Difficulties

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

Source: Kathy Land, 1997

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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
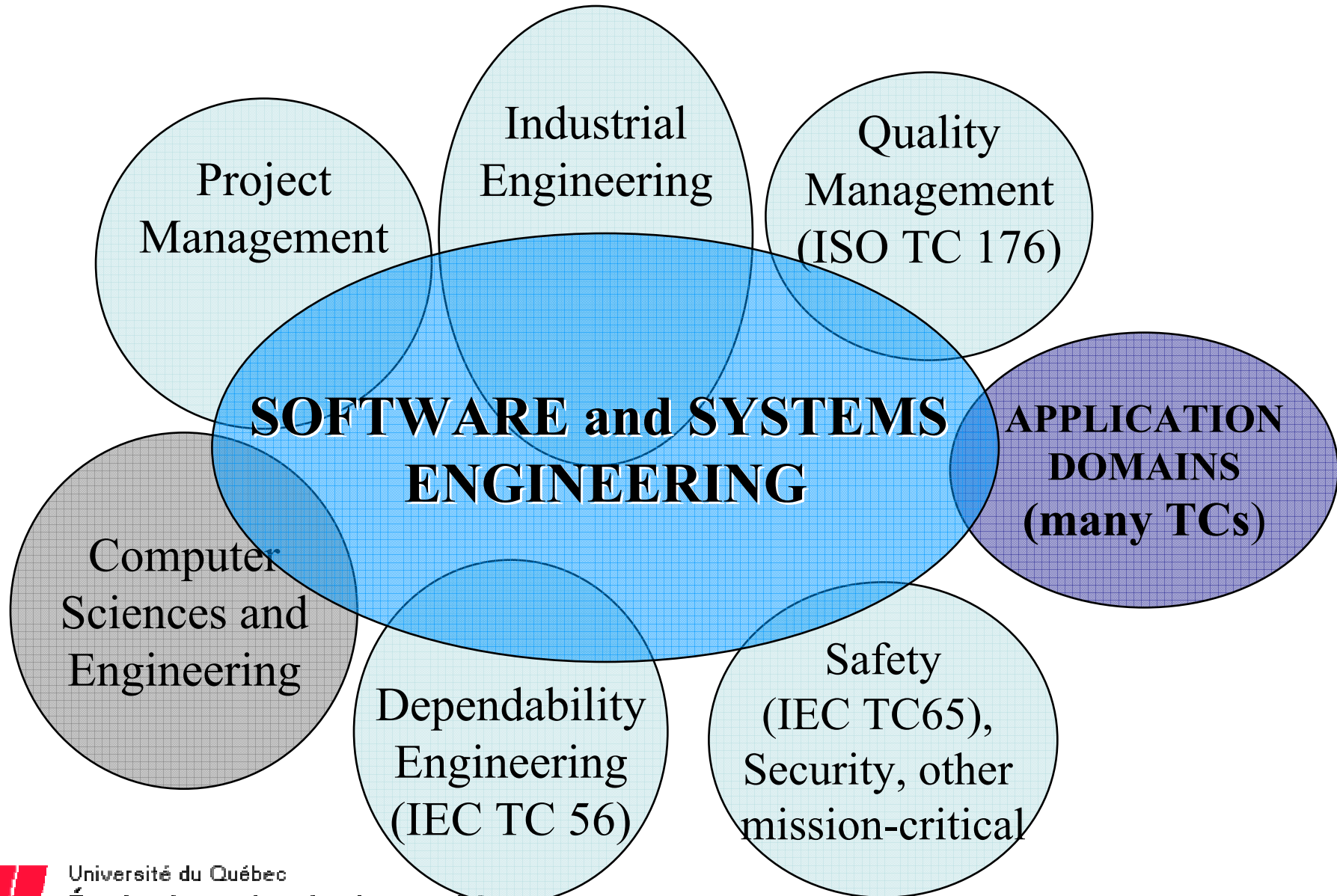- Educators resource/support

Source: Kathy Land, 1997.

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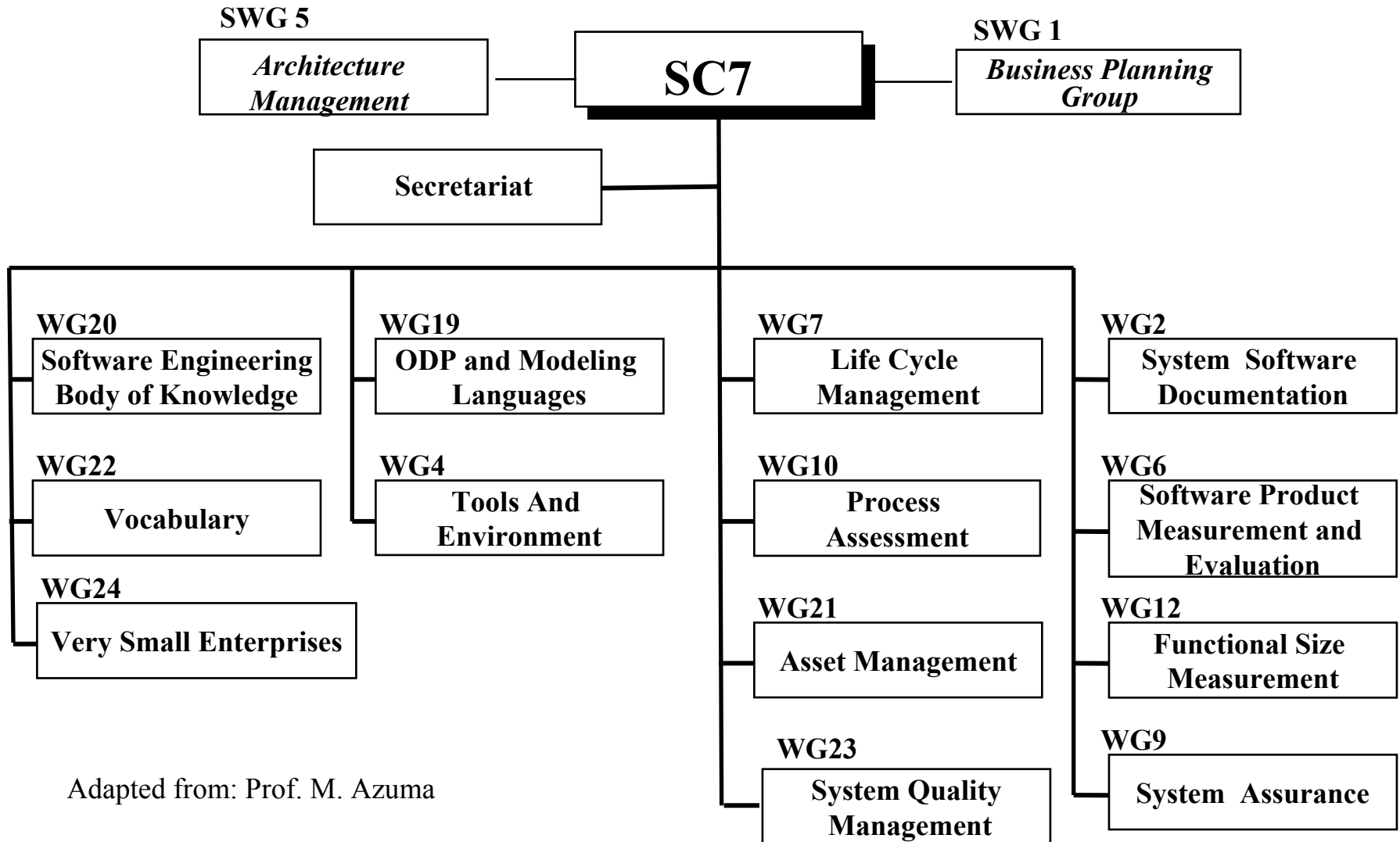
ISO/IEC JTC 1/SC7
Terms of Reference

Standardization of processes, supporting tools and supporting technologies for the engineering of software products and systems.

SC7 - An Horizontal Committee

Project Management

Industrial Engineering

Quality Management (ISO TC 176)

SOFTWARE and SYSTEMS ENGINEERING

APPLICATION DOMAINS (many TCs)

Computer Sciences and Engineering

Dependability Engineering (IEC TC 56)

Safety (IEC TC65), Security, other mission-critical

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Source: F Coallier

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SC7 Structure

SWG 5

Architecture Management

SC7

SWG 1

Business Planning Group

Secretariat

WG20
Software Engineering Body of Knowledge

WG19
ODP and Modeling Languages

WG7
Life Cycle Management

WG2
System Software Documentation

WG22
Vocabulary

WG4
Tools And Environment

WG10
Process Assessment

WG6
Software Product Measurement and Evaluation

WG24
Very Small Enterprises

WG21
Asset Management

WG12
Functional Size Measurement

WG23
System Quality Management

WG9
System Assurance

Adapted from: Prof. M. Azuma

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Standards Produced
and Maintained by SC7

Standards Collection

Foundation

19759	12182

Software Body of Knowledge (SWEBOK) — *Vocabulary*

Systems Engineering

15288
19760

Software Engineering

12207
15271
90003

Process Implementation and Assessment

15504

Process Assessment

Product

Product packaging

9127

Documentation

15289

Product Evaluation

12119

Software Quality

9126
14598
14756

Software Functional size measurement

14143
19761
20926
20968
24570

3535	6592	15846	16085	19770	14764	16326	15939
14759	9294		15026				
	15910						
	18019						

SC7's legacy — Documentation — Configuration Management — Risk & Integrity — Asset Management — Software maintenance — Project Management — Measurement

Tools, Methods

5806 – 5807 – 6593
8631 – 8790 – 11411

SC7 Legacy Standards

14102
14471
15940
18018

Tools and environment

10746, 13235
14750, 14752
14753, 14769
14771, 15414
15935, 19500

Specifications

14568
15474
15475
15476

CDIF

15437
15909
19501
8807

Modeling

From SWG5

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SC7 Meeting in Australia - 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.

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SC7 Meeting in Australia - 2004

- **Consensus**
  - Generate multiple profiles from elements of ISO 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.

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1st 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**
  - Draft New Work Item
    - Schedule;
    - Product Plan;
  - Initial requirements document;
  - Project vision and strategies;

Examples of ISO/IEC 12207
Issues and Proposed Solutions

SMEs are <u>not ready</u> to implement the <u>whole</u> 12207 standard.
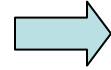
⟹ Standard should be <u>broken down</u> in to <u>stages</u> or levels in order to <u>fit all sizes</u> of SMEs.

<u>Not all 12207 activities</u> are suitable for SMEs' operations.
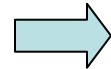
⟹ Need to <u>modify</u> activities to suit SMEs' operation – product and project based type of business.

There is no <u>assessment model.</u>
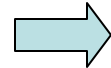
⟹ A set of <u>checklist</u> was developed for use by assessors.

Most software developers are <u>not document-oriented.</u>

⟹ Provide <u>packaged templates</u> and <u>examples</u> 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.

TQS Level I Mapping with ISO/IEC 12207

5. PRIMARY LIFE CYCLE PROCESS

CONTRACT VIEW

5.1 Acquisition process

5.2 Supply process

Planning

OPERATING VIEW

5.4 Operation Process

ENGINEERING VIEW

5.3 Development process

Process implementation

Software acceptance support

Software requirements analysis

Software architectural design

Software coding & testing

5.5 Maintenance Process

Process implementation

Modification implementation

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
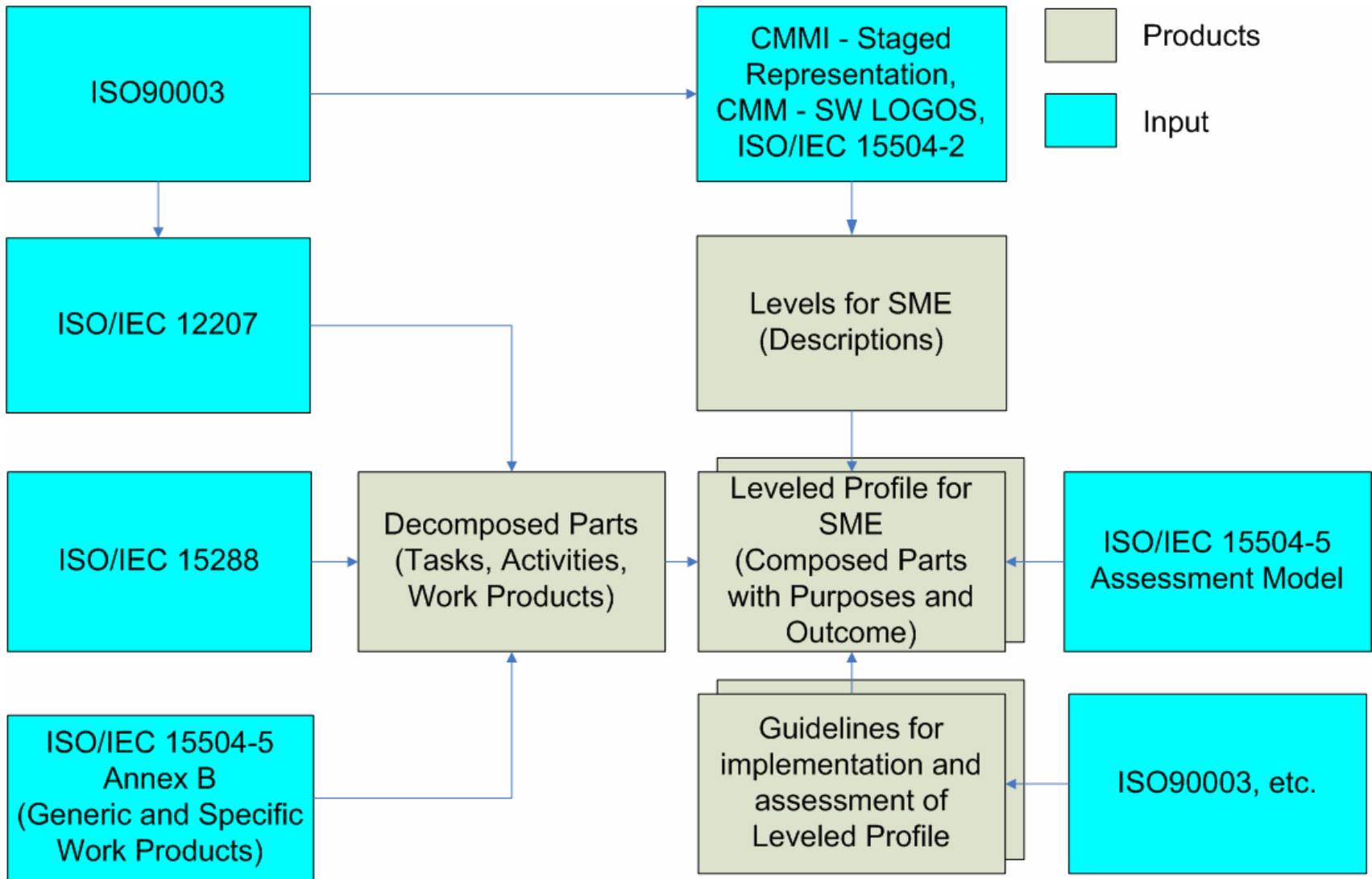
7.4. Human Resource Process

Target Market of a Future ISO/IEC Collection of Standard and Associated Guides

- The collection should be based on the SE 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 (small-scale software development).

- The use of the collection should enable multiple VSEs to work together (teaming arrangements) or work with a prime contractor.

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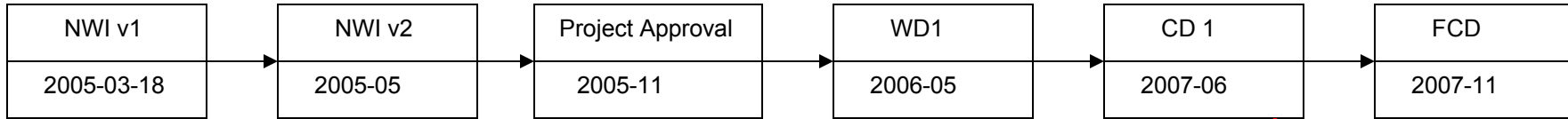
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Potential Benefits for VSEs

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

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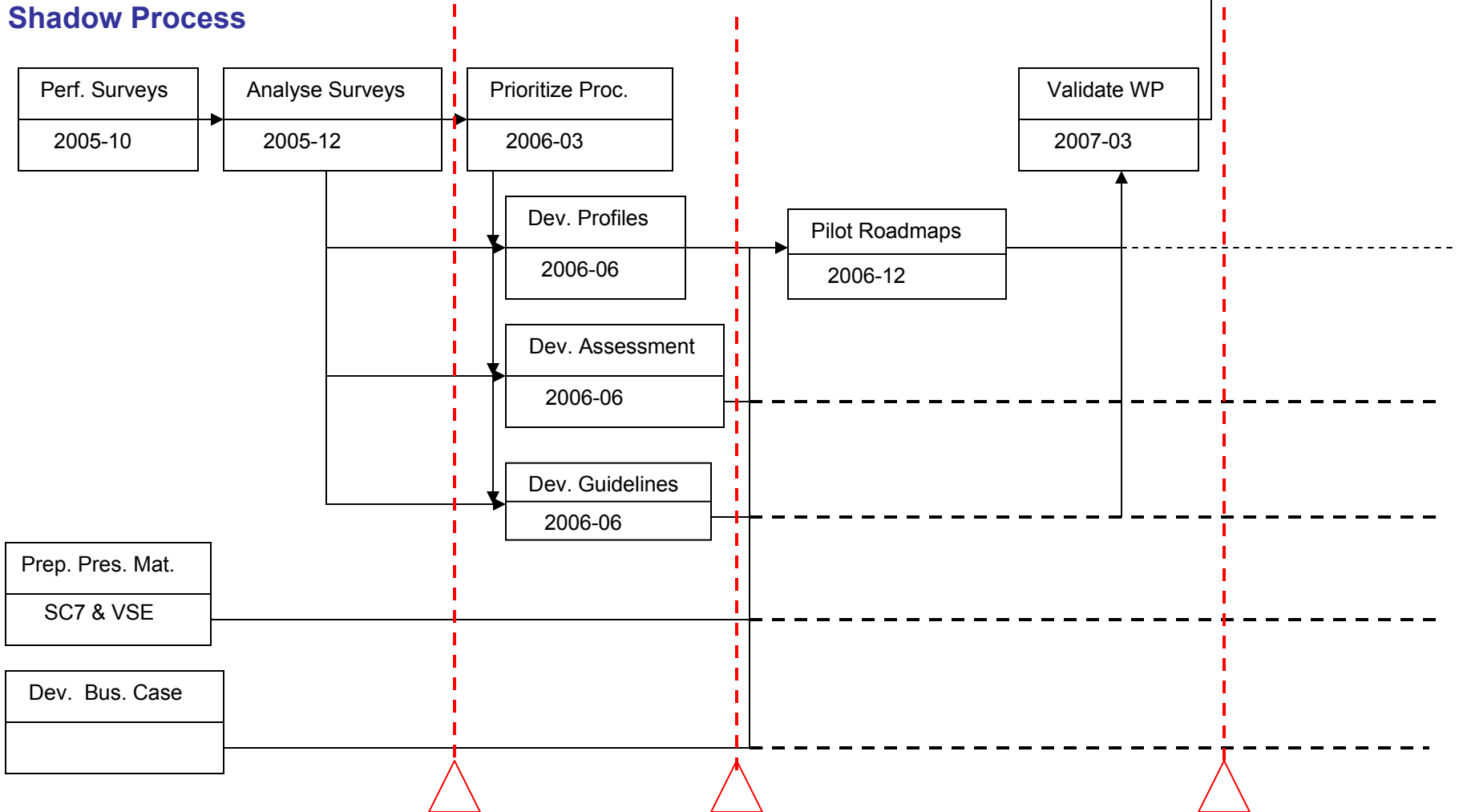École de technologie supérieure
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VSE Proposed Model

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Source: New Work Item Proposal

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Estimated Schedule of Activities

ISO JTC1 Process

NWI v1	NWI v2	Project Approval	WD1	CD 1	FCD
2005-03-18	2005-05	2005-11	2006-05	2007-06	2007-11

Shadow Process

Perf. Surveys	Analyse Surveys	Prioritize Proc.			Validate WP
2005-10	2005-12	2006-03			2007-03

Dev. Profiles	Pilot Roadmaps
2006-06	2006-12

Dev. Assessment
2006-06

Dev. Guidelines
2006-06

Prep. Pres. Mat.
SC7 & VSE

Dev. Bus. Case

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
  - *Software Life Cycle Profiles and Guidelines for use in Very Small Enterprises (VSE)*
- 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

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2nd 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**
  - Requirements for International Standardised Profiles (ISPs) and supporting documents (e.g. guides);
    - **Profile**
      - A set of one or more base standards and/or ISPs, and, where applicable, the identification of chosen classes, conforming subsets, options and parameters of those base standards, or ISPs necessary to accomplish a particular function
        » Source: ISO/IEC TR 10000-1
  - Annotated initial Survey on VSEs exposure and needs for software development lifecycles;

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2nd Meeting - Thailand – September 2005

- **Outputs**
  - Proposed approaches to document development and architecture;
    - Proposed business models;
    - Proposed situational factors
  - Proposed agenda for the WG 24 Bari interim meeting;
  - Proposed strategic plan for WG 24;
  - Proposed goals of the standard.

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  - Bari (Italy), October 24-28.
  - Commitment to participate to Working Group 24:
    - Belgium, Canada, Czech Republic, Ireland, Italy, Japan, Korea, Luxemburg, South Africa, Thailand, UK, USA.

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