Engineering for Industry

International Standards and Guides for Very Small Entities Historical Perspective and a Look Ahead

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Editor of ISO/IEC JTC1 SC7 Working Group 24

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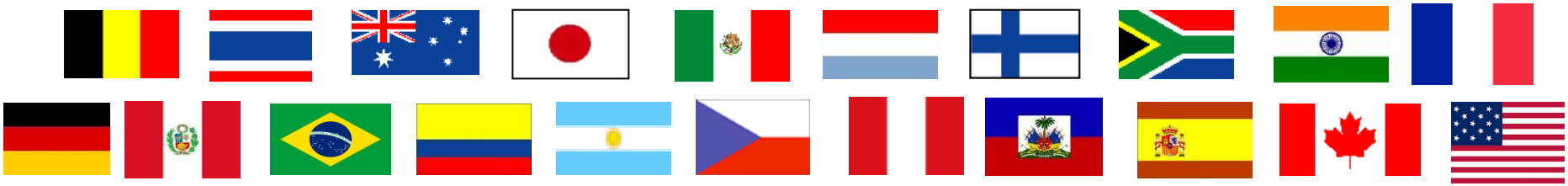

INCOSE International Council on Systems Engineering

AFIS Association Française d'Ingénierie Système

IEEE

Content

- **Introduction**
- **Needs for Standards for Very Small Entities (VSEs)**
- **Approach used by ISO Working Group 24 to develop ISO/IEC 29110**
- **Presentation of the ISO/IEC 29110 Standards and Technical Reports**
- **Ideas for the Future**
- **Conclusion**

VSEs = Very Small Entities are enterprises, organizations, projects or departments having up to 25 people.

Observations, Vision and Strategy

- **Observations**
  - Most international engineering standards have not been designed having in mind VSEs;
  - VSEs' negative perceptions of international engineering standards were primarily driven by negative views of cost, documentation and bureaucracy;
  - In many VSEs software processes were ad hoc and chaotic;
  - Worldwide, VSEs' software products are very important to the economy.
- **Vision**
  - VSEs worldwide are using, in their daily development activities, international engineering standards, adapted to their needs, which guide them develop required products, constantly improving their performances and their competitiveness.
- **Strategy**
  - Participate actively to the development of international engineering standards adapted for VSEs;
  - Promote the development of means to accelerate the adoption and implementation of new standards by VSEs;
  - Promote the development of educational material to teach the standards to undergraduate and graduate engineering students;

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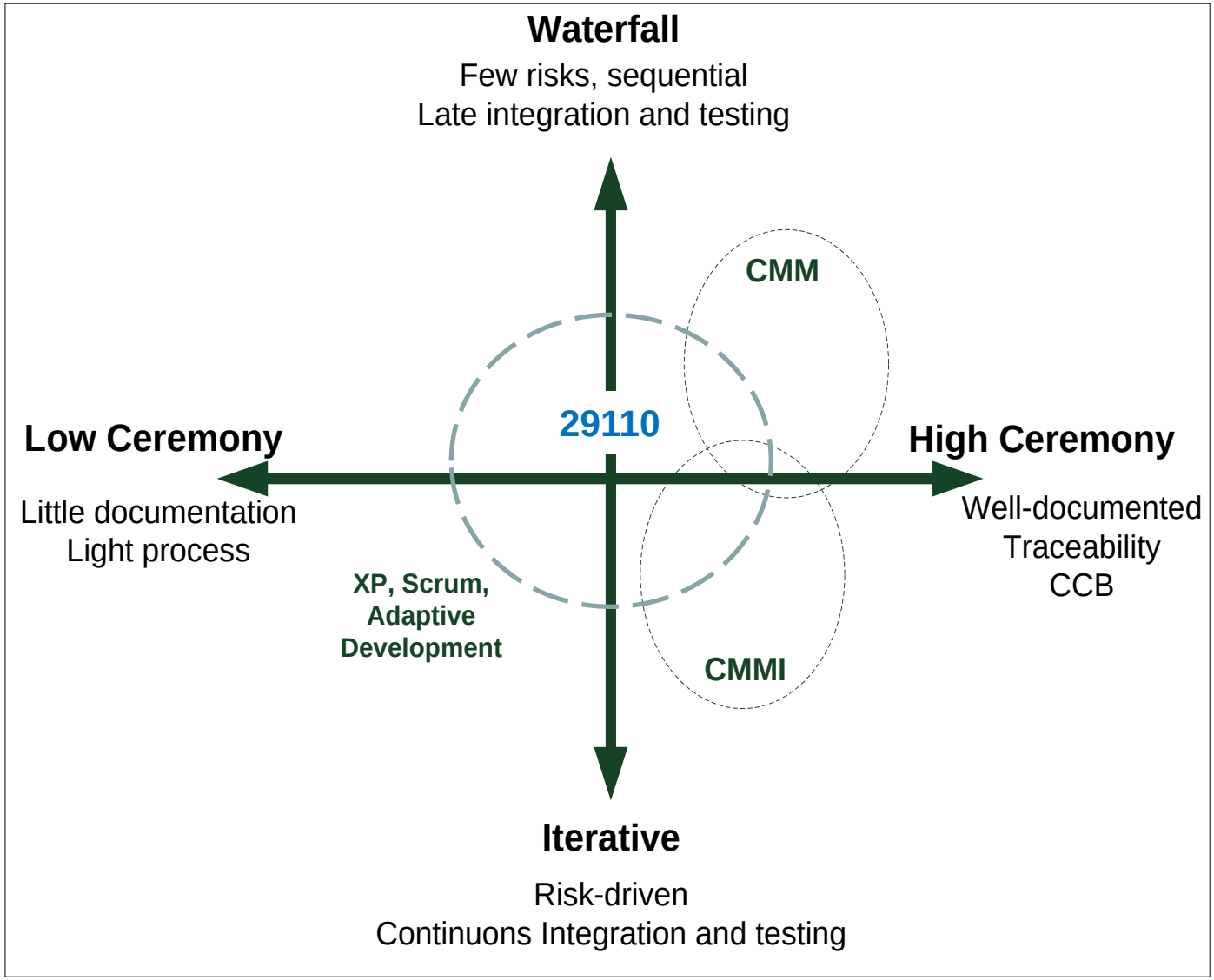
Spectrum of Development Approaches



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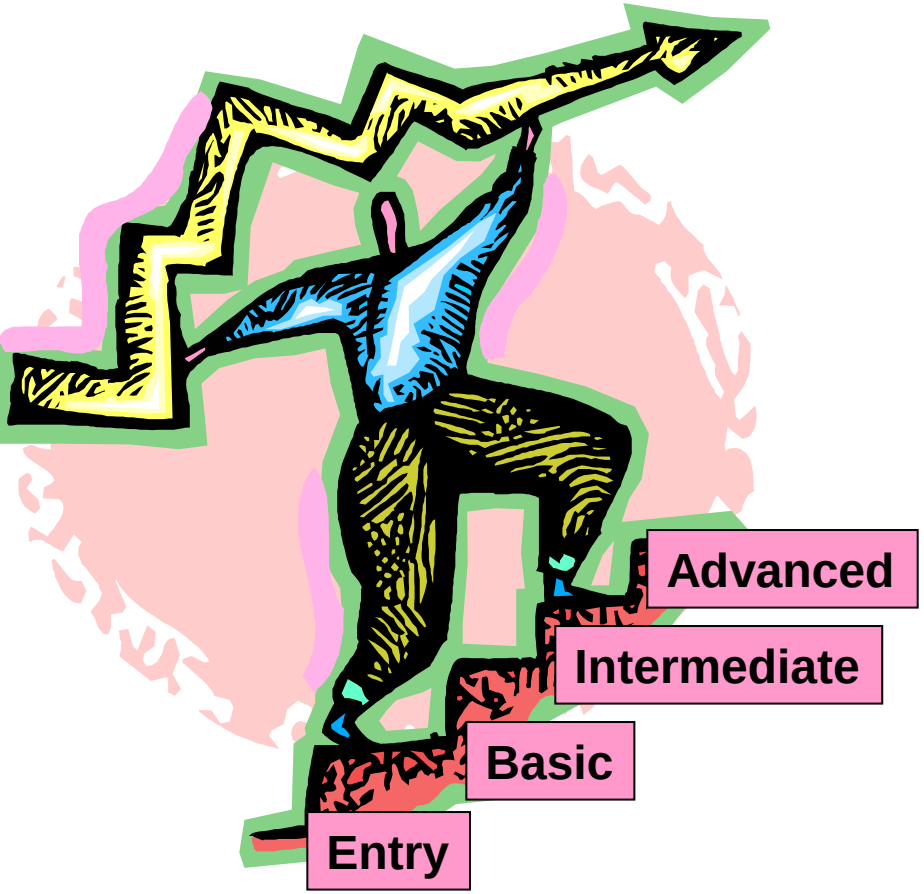
Adapted from (Kroll & Kruchten 2003)

The Generic Profile Group for VSEs Developing Systems or Software Products



- **Entry -** Targets VSEs typically developing 6 person-month software projects or start-ups VSEs;
- **Basic -** Targets VSEs VSEs developing a single application by a single work team
- **Intermediate** – Targets VSEs involved in the development of more than one project in parallel with more than one work team
- **Advanced** – Targets VSEs which want to sustain and grow as an independent competitive system or software development business.

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ISO/IEC 29110

ISO 29110 Documents Targeted by Audience

29110 Overview (TR 29110-1)

For VSEs and customers

29110 Profiles (IS)

Framework and Taxonomy (IS 29110-2)

Specifications of VSE Profiles (IS 29110-4)

Specification - VSE Profile Group m
(IS 29110-4-m)

For Standard producers, tool vendors, methodology vendors

List the Requirements i.e. '**What** to do'

29110 Guides (IS/TR)

Assessment Guide (IS/TR 29110-3)

For Assessors, customers and VSEs

Management and Engineering Guide (TR 29110-5)

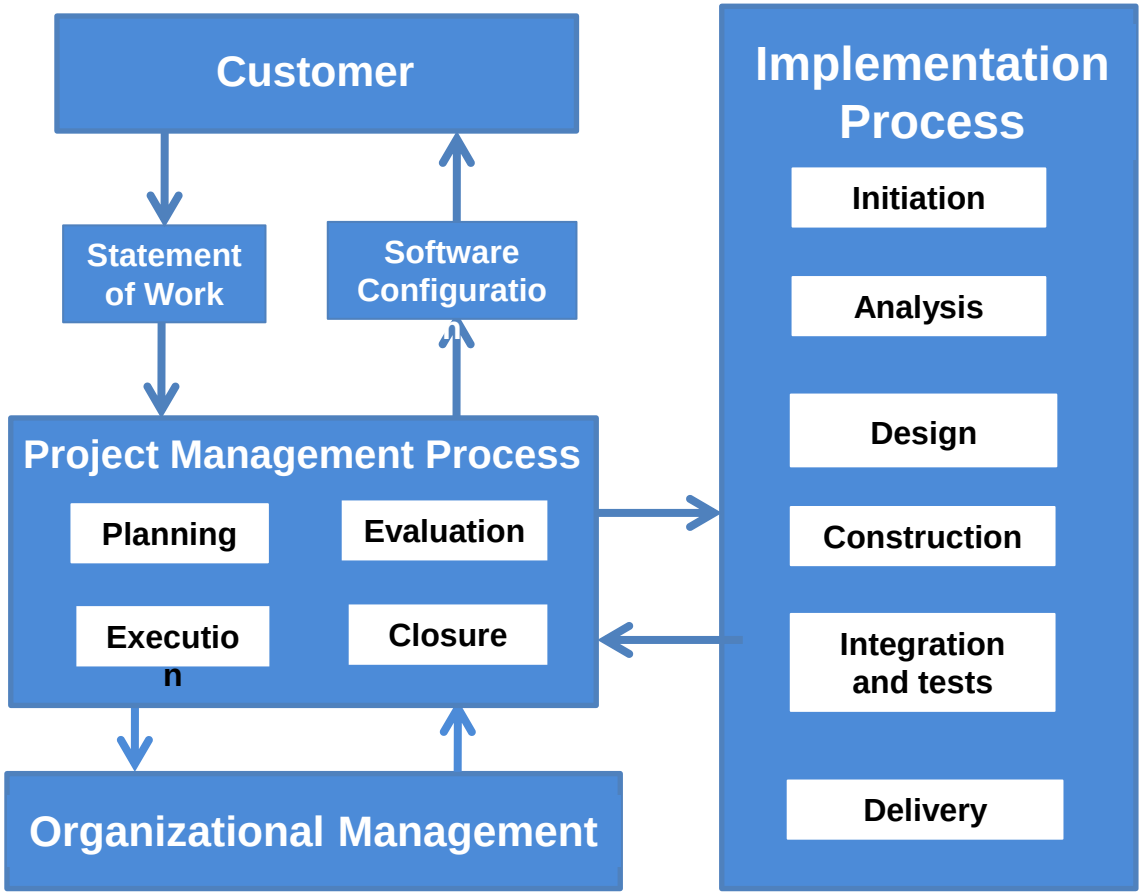
Management and Engineering Guide VSE Profile m-n
(TR 29110-5-m-n)

For VSEs and customers

'**How** to do'

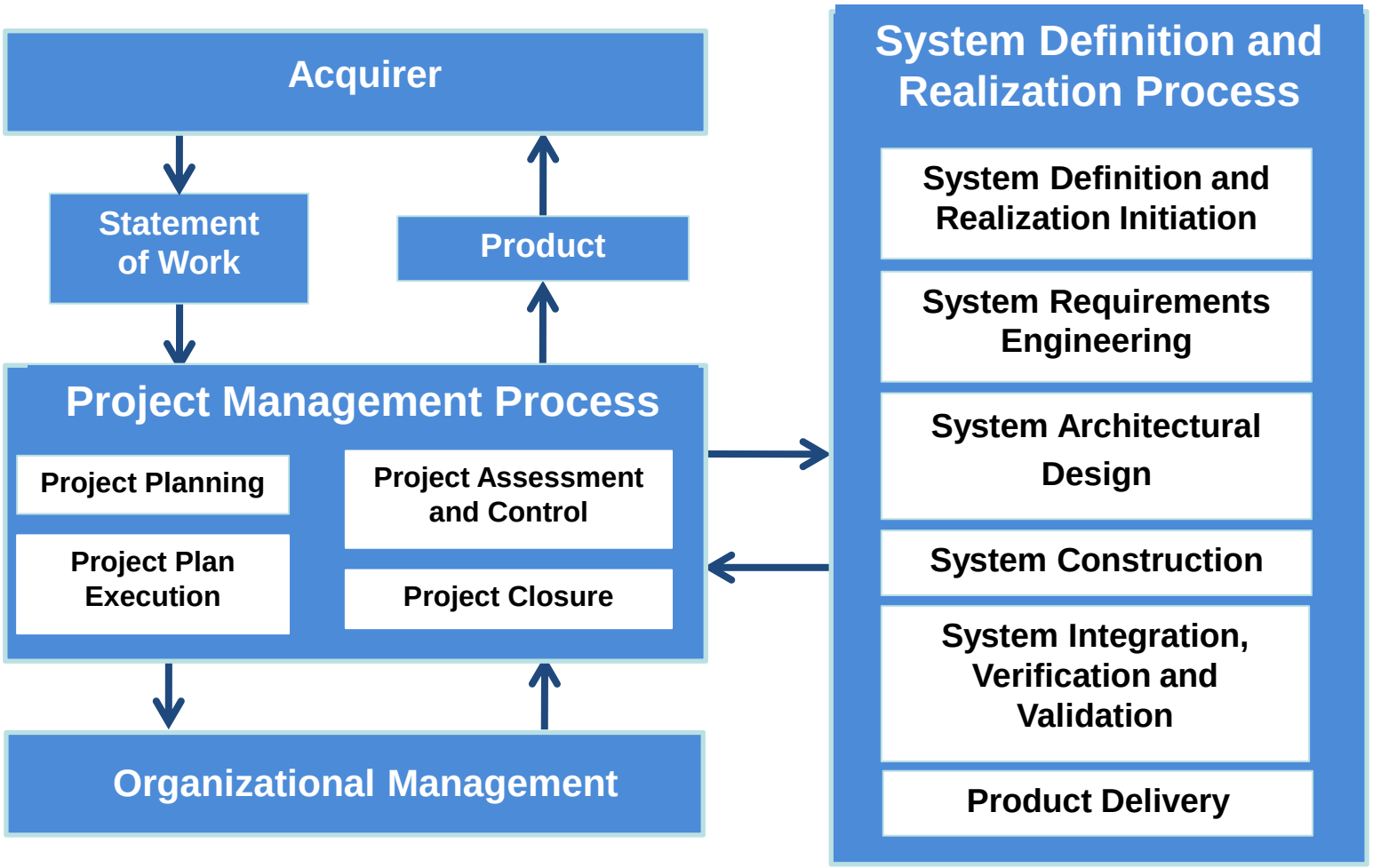
TRs are available from ISO at no cost
http://standards.iso.org/ittf/PubliclyAvailableStandards/index.html

ISO/IEC 29110
Software Management and Engineering Guide



ISO/IEC 29110 is not intended to preclude the use of different lifecycles such as waterfall, iterative, incremental, evolutionary or agile.

ISO/IEC 29110
System Management and Engineering Guide



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Software Implementation Process
One Task of the Requirement Analysis Activity

Role	Task	Input Product	Output Products
CUS AN	**SI.2.4** Validate and obtain approval of the *Requirements Specification*	*Requirements Specification [verified]*	*Validation Results* *Requirements Specification [validated]*
	Validate that *Requirements Specification* satisfies needs and agreed upon expectations, including the user interface usability. The results found are documented in a *Validation Results* and corrections are made until the document is approved by the CUS.		

ISO/IEC 29110 - Document Content

- **Change Request**

Name	Description	Source
Change Request	Identifies a Software, or documentation problem or desired improvement, and requests modifications. It ***may*** have the following characteristics: - Identifies purpose of change - Identifies request status - Identifies requester contact information - Impacted system(s) - Impact to operations of existing system(s) defined - Impact to associated documentation defined - Criticality of the request, date needed The applicable statuses are: *initiated, evaluated, and accepted*	Customer Project Management Software Implementation

ISO/IEC 29110

Ideas for the Future – 1 *

1. **Combine Management and Engineering Guides**
   - all SW Generic Profile Guides in one document
   - all SE Generic Profile Guides in one document

2. **Get large organizations to do business with VSEs that have implemented ISO 29110**

3. **Get large organizations to request ISO 29110 evaluation/audit certification from their suppliers**

4. **Develop a Guide to help VSEs in obtaining/negotiating with large organizations**

* Once the current program of work of WG24 is completed

Ideas for the Future - 2

5. **Get Universities and technical colleges to teach ISO 29110 at the undergraduate and graduate levels**
   - e.g. in software quality assurance, process improvement courses

6. **Develop ISO 29110 Guides/Profiles for specific domains**
   - e.g. medical device developers, automotive domain

7. **Develop a Guide, adapted for each SE or SW profile, for VSEs involved in domains where security is important**
   - e.g. using ISO 27000 series (IT security)

Ideas for the Future - 3

8. Develop Alliances with Professional Associations

- Example of an Alliance/collaboration with INCOSE/AFIS
  - 'Member' of WG24 since 2005
  - INCOSE VSE WG established in 2009
    - ISO 29110 presented at International Workshops, symposia and local chapters
    - Development of ISO 29110 Systems engineering set of Deployment Packages
    - AFIS/EMEA Workshop, Paris, October 7-9 2015
    - Webinar for INCOSE members – Nov 18th 2015
    - ISO 29110 in Systems Engineering Body of Knowledge
    - VSE WG and Healthcare WG alliance
      - » e.g. Develop a Deployment Package based on the SE Basic Profile, a Guide based on the SE Basic profile, a Profile Specification, a certification

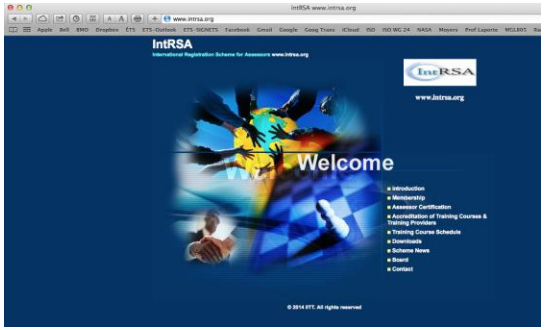
Ideas for the Future - 4

9. Develop Alliances with Professional Associations and Communities

- ‘Broadcast’ ISO 29110 to other communities
  - e.g. Eclipse/Polarsys
    - Embedded Word Exhibition and Conference, Germany (February 23-25, 2016)

www.embedded-world.eu

  - e.g. Agile Events, Chambers of Commerce
- SPICE and International Registration Scheme for Assessors



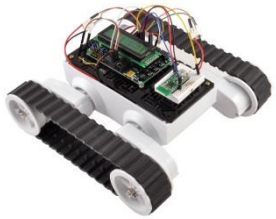
http://www.intrsa.org

- Project Management Institute (PMI)
  - e.g. Agile Practice Community

Ideas for the Future - 5

10. Develop Workshop Material

- Example: AFIS/EMEA Workshop conducted October 7-9, 2015
  - VSE workshop attended by 30 people
    - Mainly from large organizations (e.g. Airbus)
  - Ideas discussed
    - Propose ISO 29110 to subcontractors
    - ISO 29110 can be used as an inspiration for tailoring large corporate processes
- Develop Case study material (documentation, code, etc.)
  - An example using all Deployment Packages
    - e.g. PolarSys Robot



11. Collaborate with tool developers to enable support for ISO 29110

- e.g. project management, repository management

Conclusion

- ISO 29110 has been specifically developed for VSEs (company, organization (e.g. government agencies, not-for-profit organizations), project, department) developing systems and/or software,
- ISO 29110 is intended to help VSEs which have neither the expertise, nor the budget or the time to adapt existing standards (e.g. ISO 15288/12207) to their needs,
- ISO 29110 brings benefits to VSEs, their clients and their business partners,
- Efforts need to be invested to promote ISO 29110 (in academia) to teach at undergraduate/graduate students,
- Efforts need to be invested to promote ISO 29110 in large organizations (there are VSEs in large organizations)
- Efforts need to be invested to ‘Broadcast’ ISO 29110 to many ‘unreached’ communities (agile) and domains (e.g. medical).

Contact Information

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  - **Web: http://profs.etsmtl.ca/claporte/English/index.html**

- **Public site of WG 24**
  - **Free access to Deployment Packages, presentation material and articles:**
    - **http://profs.logti.etsmtl.ca/claporte/English/VSE/index.html**

감사합니다 Natick

Grazie Danke Ευχαριστίες Dalu Obrigado

Thank You Köszönöm

Tack

Спасибо Dank Gracias

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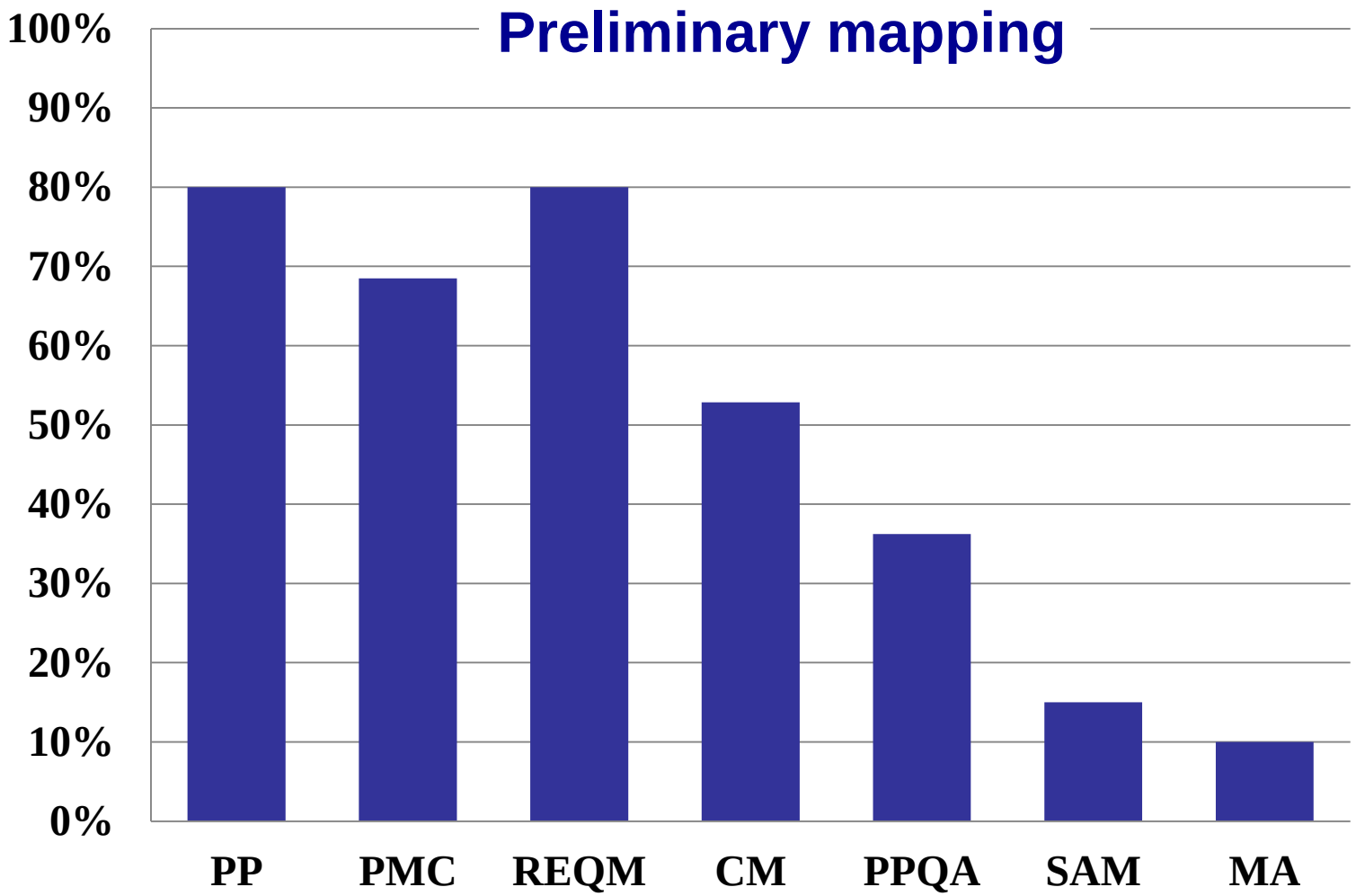
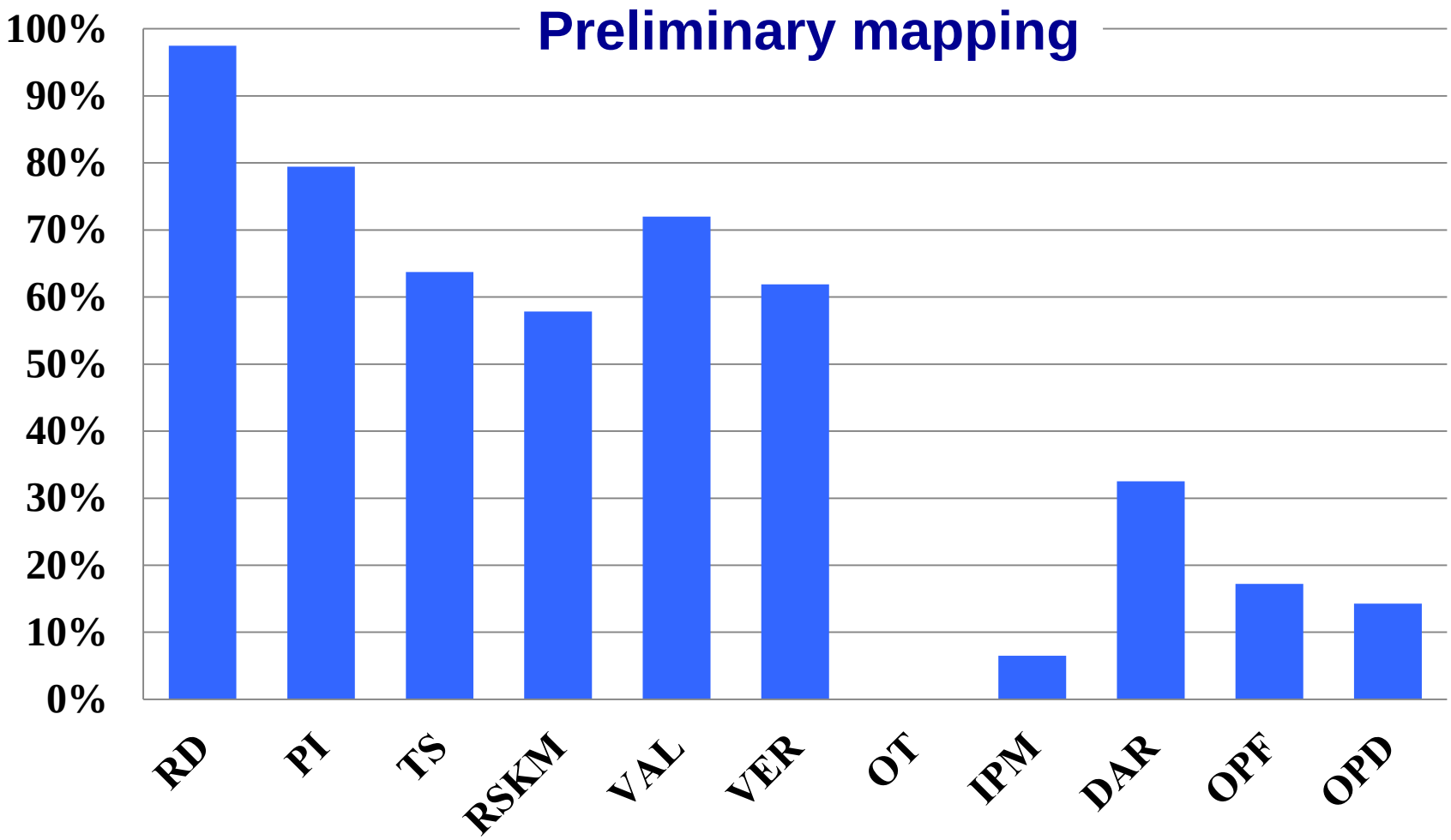
Coverage of CMMI-Dev Level 2 Specific Practices by ISO 29110 – Systems Engineering - Basic Profile



Personal communication (N. Tremblay 2015)

Coverage of CMMI-Dev Level 3 Specific Practices by ISO 29110 – Systems Engineering - Basic Profile



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