How Small Companies Can Improve their Software Development Processes for Gaining Competitive Advantage

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Katedra informačních technologií

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VŠE Praha

Department of Information Technologies

Prague University of Economics

is currently one of the most prestigious informatics departments in the Czech Republic

The department is in charge of lectures in the field of informatics, where about 600 new students are accepted annually.

The goal of the department is to educate top specialists and undertake research activities in the application of information technologies. This goal leads to a number of activities in both, the educational and the scientific areas.
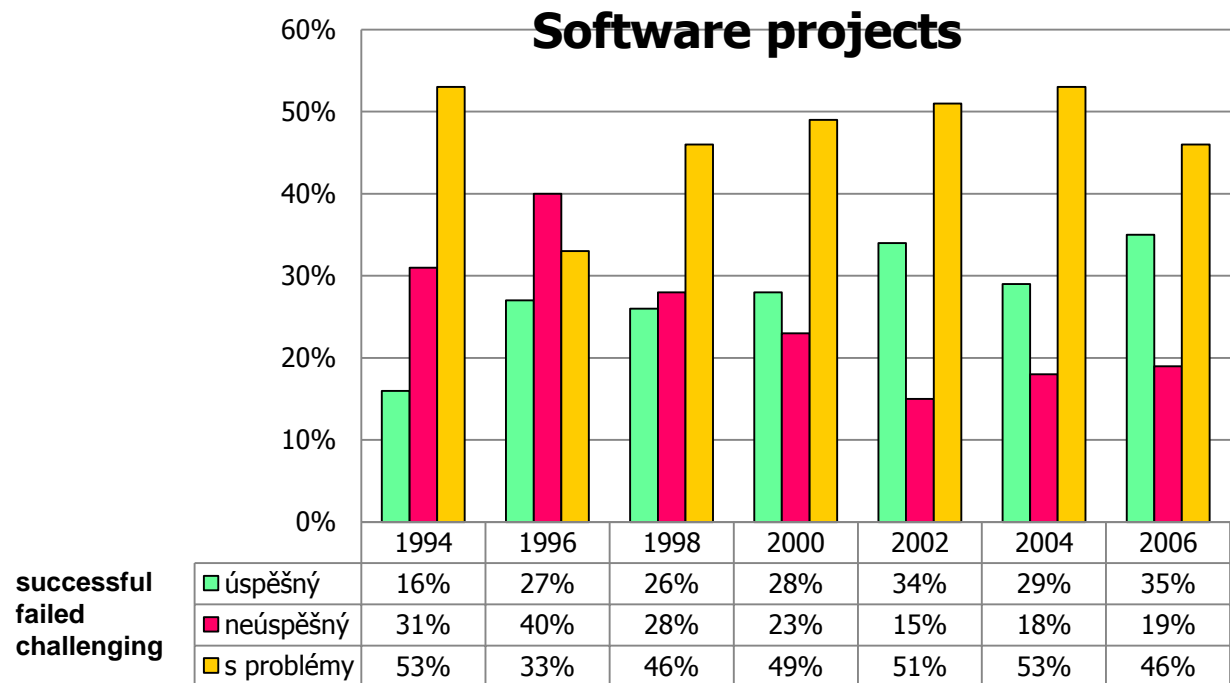
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Outline

- Introduction
- ISO/IEC 29110 standard "Systems and Software Engineering - Lifecycle profiles for Very Small Entities (VSEs)"
  - Structure of the Standard
  - Current Development of the Standard
- Initiatives towards a Diffusion of this Standard in the Czech Republic
- Conclusion

The key role of software systems in today's society lies in contradiction to a success of software projects.
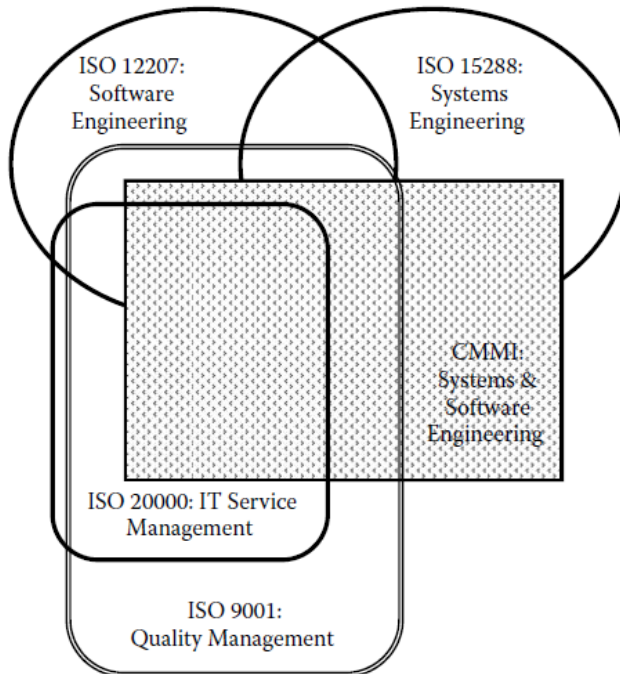
- According to the Standish Group's research only **35% of all application development projects** satisfied criteria of successfulness
    - project finished in time,
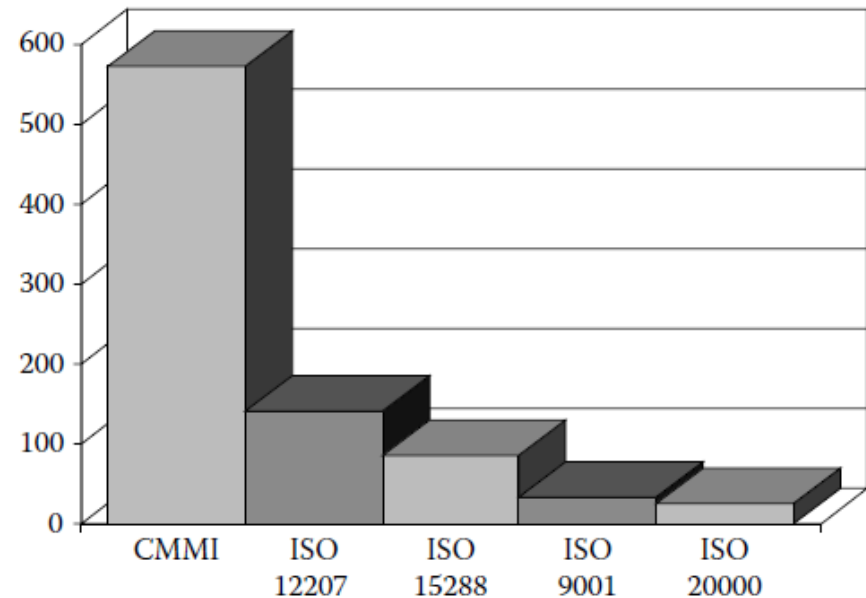   - according to the budget,
    - with all specified functions.

Software projects

successful failed challenging	1994	1996	1998	2000	2002	2004	2006
úspěšný	16%	27%	26%	28%	34%	29%	35%
neúspěšný	31%	40%	28%	23%	15%	18%	19%
s problémy	53%	33%	46%	49%	51%	53%	46%

source: CHAOS Summary 2008

Software Process Improvement (SPI)

- **represents a way of improving a status of software development**

- International standards like ISO/IEC 12207, ISO/IEC 15289, ISO/IEC 15504, and ISO 9001 play an important role in SPI initiatives
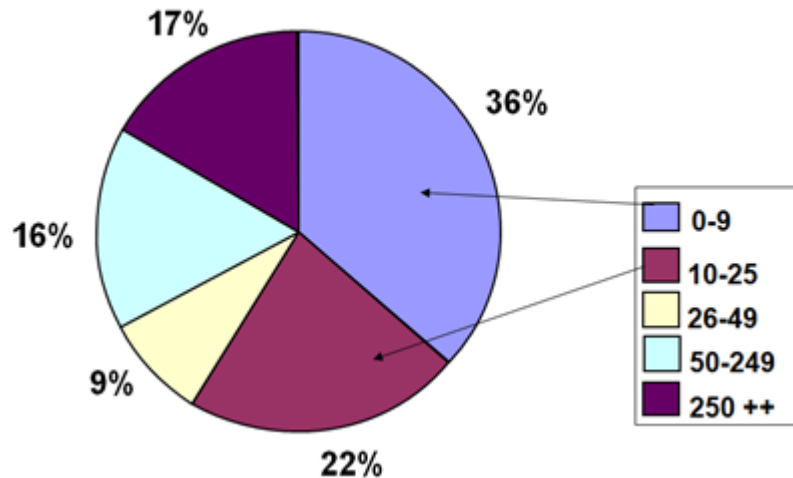
Domains

Number of pages

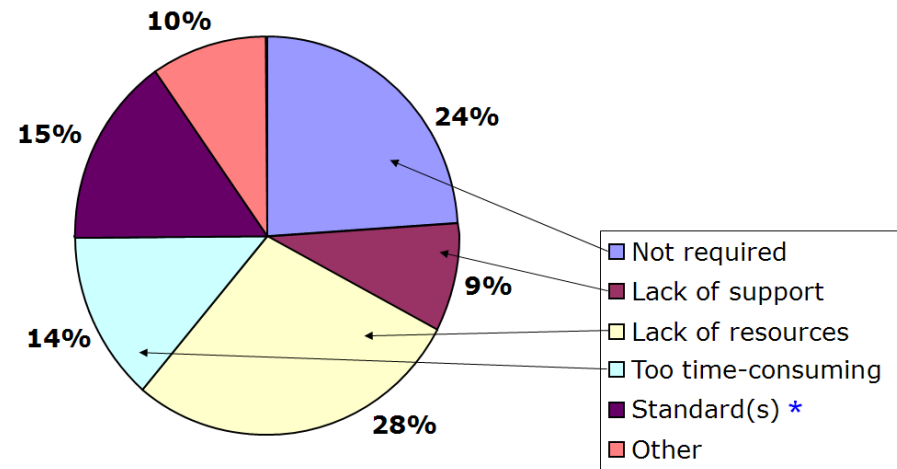source: Mutafelija, B. Stromberg, H, 2009

Need for „lightweight SPI standard"

- According to worldwide conducted surveys **very small companies developing software have a significant influence on the economy**
- most of them **do not implement any international standards** or models like ISO/IEC 12207 or CMMI
- International survey during 2006
  - 425 responses from 32 countries
  - Objectives
    - Identify utilization of standards in small companies
    - Identify problems and potential solutions to help small companies apply standards and become more capable and competitive
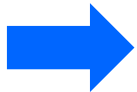
Number od employees

Legend:
- 0-9
- 10-25
- 26-49
- 50-249
- 250 ++

36%, 22%, 9%, 16%, 17%

Why don't VSEs use Standards?

Legend:
- Not required
- Lack of support
- Lack of resources
- Too time-consuming
- Standard(s) *
- Other

24%, 9%, 28%, 14%, 15%, 10%

* Difficult, Bureaucratic, not enough guidance.

Need for „lightweight SPI standard"

- **Certification and Recognition**
  - **Only 18% are certified**
    - Over 53% of larger 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 Documentation**
  - 62% are asking for more guidance and examples
  - 55% are requiring 'lightweight' standards that are easy to understand and apply and come with templates
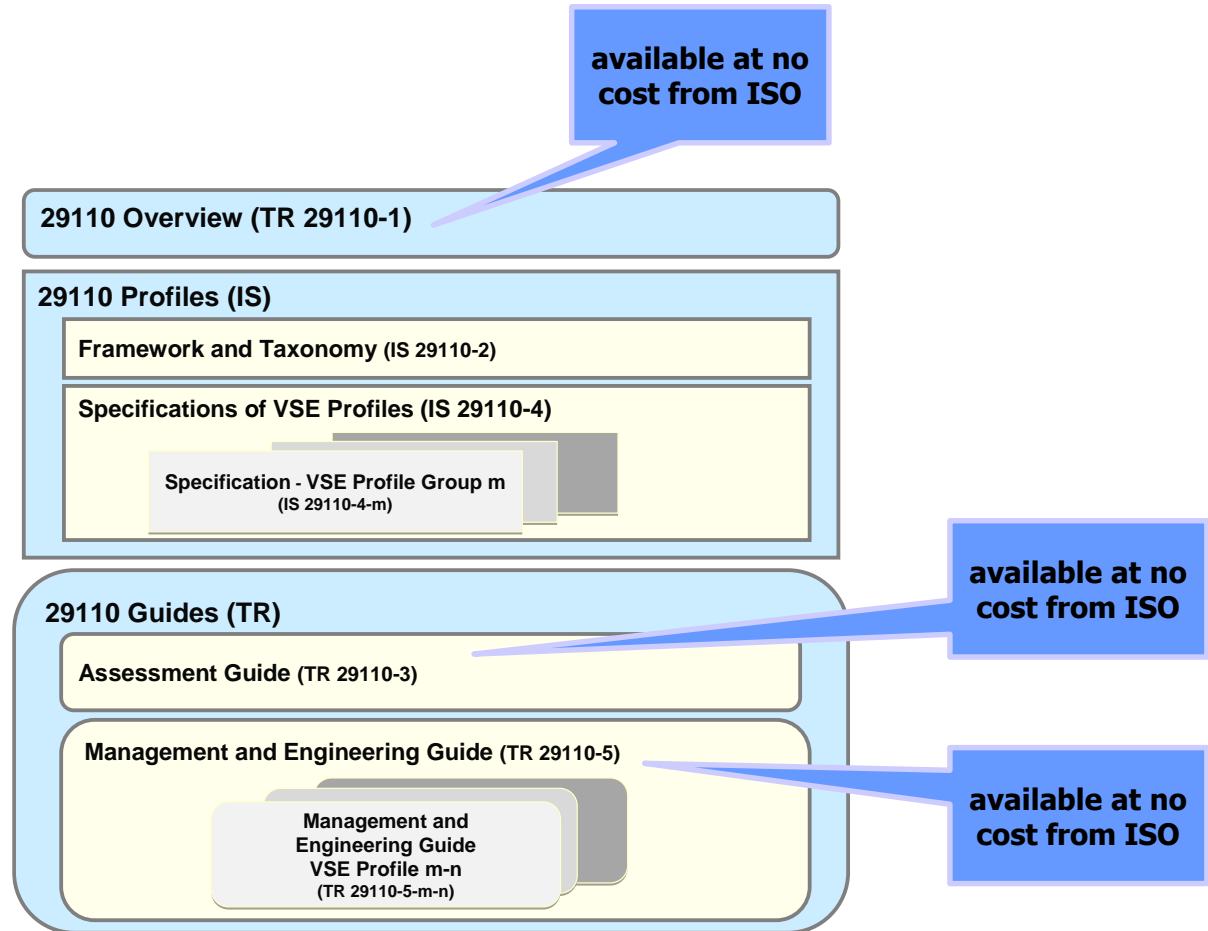
ISO/IEC 29110   Systems and Software Engineering – Lifecycle Profiles for Very Small Entities (VSEs)

Software Life Cycle Processes for Very Small Entities

- Published in 2010

available at no cost from ISO

29110 Overview (TR 29110-1)

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)

Very small entity (VSE) - an entity (enterprise, organization, department or project) having up to 25 people"

29110 Guides (TR)

Assessment Guide (TR 29110-3)

available at no cost from ISO

Management and Engineering Guide (TR 29110-5)

Management and Engineering Guide VSE Profile m-n (TR 29110-5-m-n)
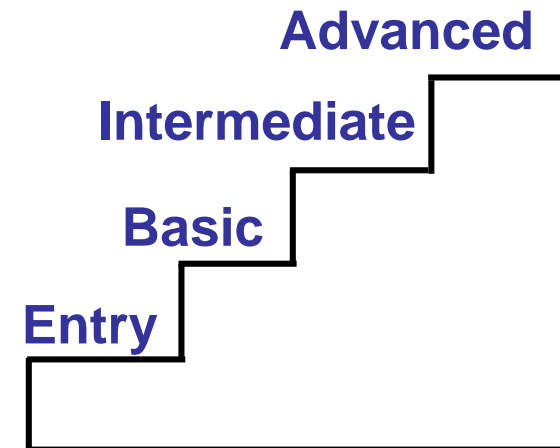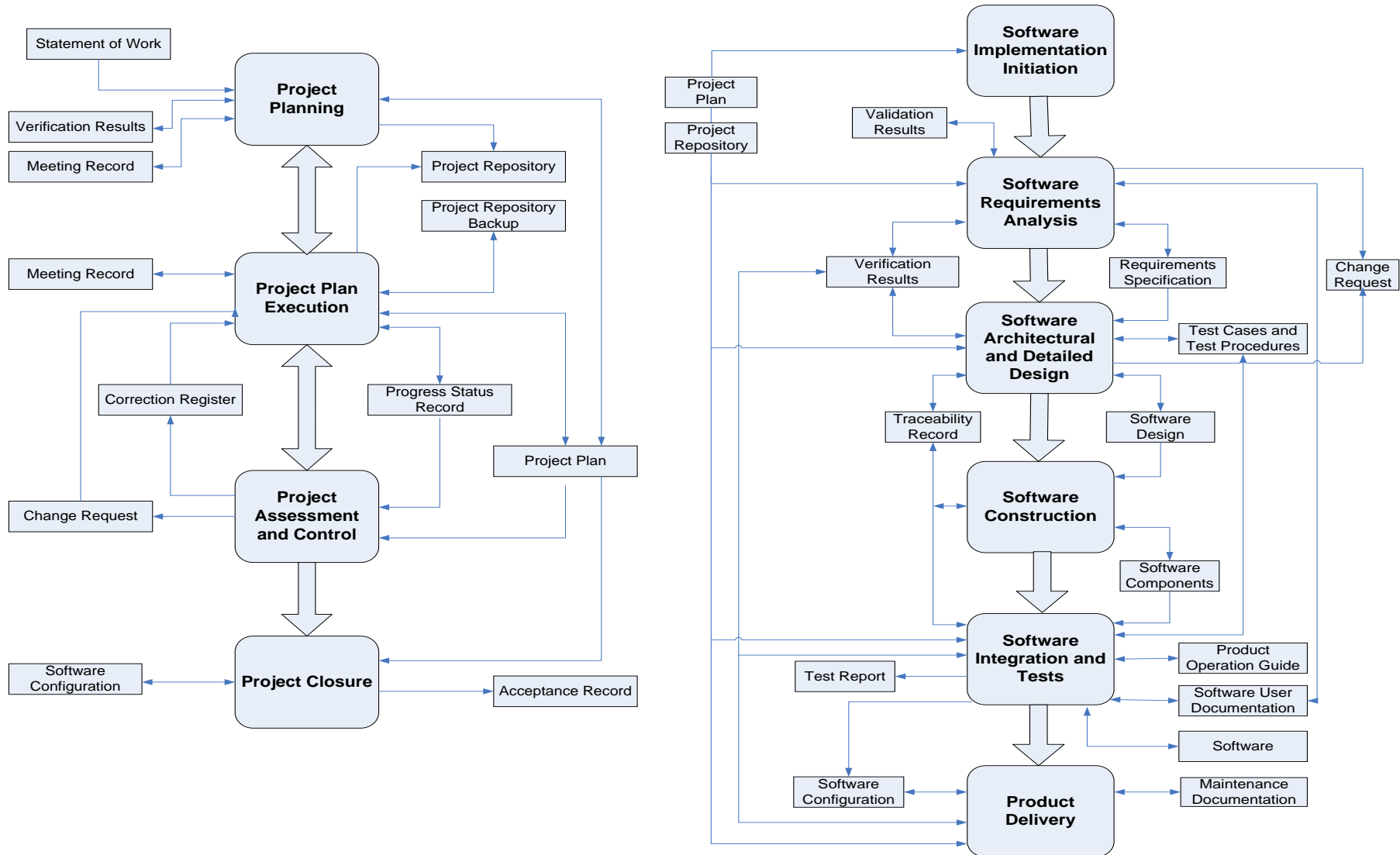
available at no cost from ISO

ISO/IEC 29110 concept of VSE Profiles

- Generic profile group - VSEs that do not develop critical software
- 4 profiles - Entry, Basic, Intermediate, Advanced
  - Entry profile - small projects, e.g. at most six person-months effort or start-up VSEs
  - Basic profile - for a single project with no special risks or situational factors
  - Intermediate profile - for VSE, which has more than one project at a time
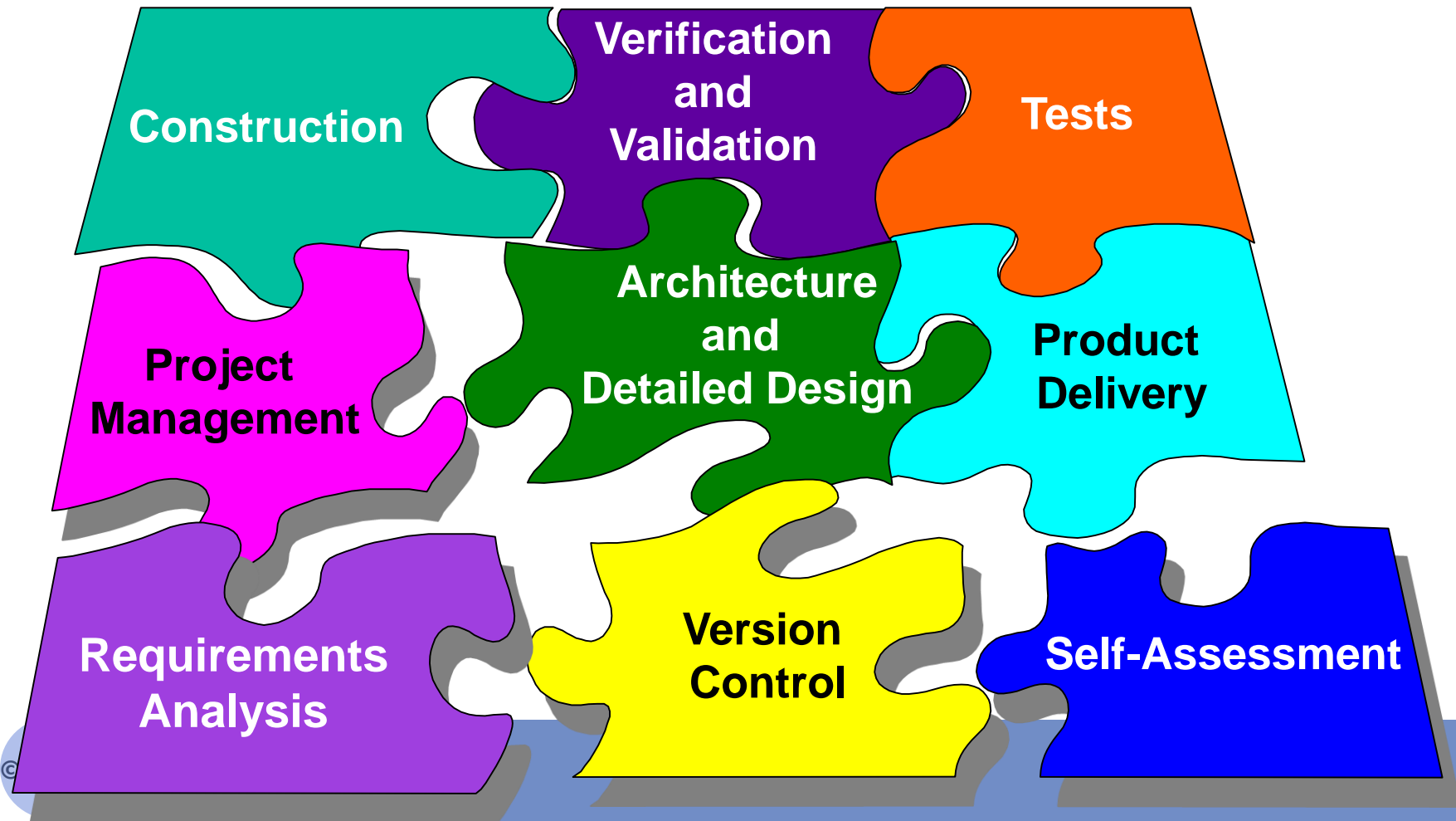 - Advanced profile - is going to support VSEs with business management practices

Advanced

Intermediate

Basic

Entry

Deployment packages

- Acts as a detailed methodology that guides company through the process of profile implementation
- Deployment package includes process descriptions, activities, tasks, roles and products, templates, checklists, examples, reference and mapping to standards and models, and a list of supporting tools

Construction

Verification and Validation

Tests

Project Management

Architecture and Detailed Design

Product Delivery

Requirements Analysis

Version Control

Self-Assessment

In the area of **Software Engineering**

- the Intermediate Profile is being prepared
- Part 3 of the standard used for assessment and certification carries on with its elaboration
  - a standard for Conformity Assessment (29110-3-2)
  - a standard for Capability Assessment (29110-3-3)

In the area of **Systems Engineering**

- the Entry Profile is being elaborated and should be set for publication by ISO in 2015

The ISO/IEC 29110 standard is being **restructured and renumbered** to better correspond to a categorization of systems engineering

New methods and technologies such as agile development and cloud computing are incorporated.

The Working Group 24 has also initiated several activities in the area of **services** and considers developing a subset of the ISO/IEC 20000 standard for VSEs.

International certifications

- enable companies to become more credible, competitive and to gain access to national as well as international markets.

   This applies especially to VSEs

Requirements for the certification for VSEs

- should not be too expensive and long-lasting

Pilot certification in several Brazilian VSEs

- the process took about 4 man-days of auditor's work

The first auditor course was conducted in English in Dublin in November 2013.

- a key factor in their **competitiveness within the global market**.

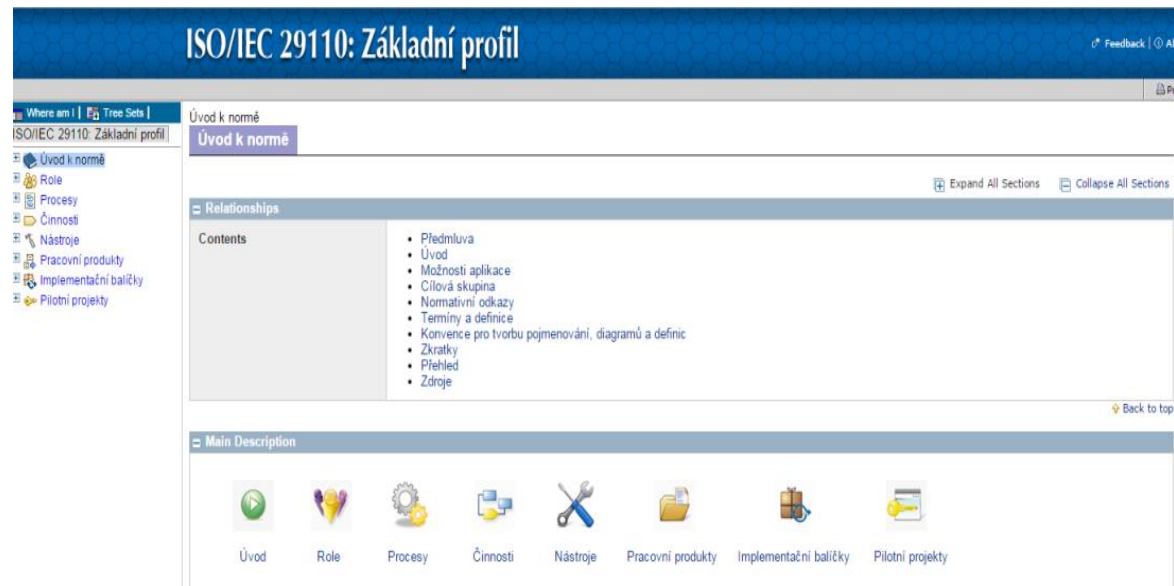Applying these standards brings along a number of potential benefits for a company:
- Enhancing software management,
- Meeting deadlines and budgets,
- Achieving quality goals,
- Managing employee training and turnover,
- Attracting new customers or fulfilling requirements of existing partners,
- Reinforcing partnerships and co-development in an international environment

The Czech Republic
- lacks a government support aiming at improved process quality in systems and software development
- the government does not even require a certain level of these processes e. g. in government contracts

The Initiatives towards a Diffusion of ISO/IEC 29110 Standard in the Czech Republic

- Parts of the standard available for free were translated into Czech language
  - With the help of students of the graduate course "Software process improvement"
- All deployment packages were translated into Czech language
- All resources were published on the website http://spicenter.vse.cz/
- Wikipedia page about this standard was translated into Czech language http://cs.wikipedia.org/wiki/ISO_29110
- Students implemented Entry and Basic profiles in the Eclipse process framework composer tool and published them in the form of easily accessible methodology which is part of the website

The Initiatives towards a Diffusion of ISO/IEC 29110 Standard in the Czech Republic

- University courses on the undergraduate and graduate level

- The Faculty of Informatics and Statistics of the Prague University of Economics is in the process of building the Center for very small entities in the Czech Republic as a part of the netcenter for VSE – the global net of centers for very small entities

- Public course about this standard was prepared
  http://fis.vse.cz/czv/odborne-kurzy/

Conclusion

- The results of several surveys show that small companies consider implementing international standards for software processes quite difficult as they lack sufficient resources in terms of number of employees, budget and time.

- To address this global issue, the ISO/IEC 29110 standard "Systems and Software Engineering – Lifecycle Profiles for Very Small Entities (VSEs)" is being developed by the ISO community.

- The structure of the standard and its main concepts were presented.

- Also the initiatives undertaken towards a broader diffusion of the standard in the Czech Republic were presented.

Thank you for attention

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