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Using ArchiMate to Model International Standard for Software Life Cycle Processes

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https://cs.wikipedia.org

https://stavbaweb.dumabyt.cz/rajska-budova-vse-3288/clanek.html

Aim of the presentation

- introduce the ISO/IEC 29110 standard
- present activities towards diffusion in the Czech Republic
- present mapping between the ISO/IEC 29110 Basic Profile and ArchiMate
- present the ISO/IEC 29110 Basic Profile ArchiMate Model

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
  - ISO/IEC 29110 Diffusion in the Czech Republic
- Reasons for modeling standard in ArchiMate
- ISO/IEC 29110 Basic Profile ArchiMate Model
- Conclusion

Software Process Improvement (SPI)

- initiative towards improving a status of software development
- focuses on improving the time, cost and quality of engineering and management practices in software organizations
- SPI initiatives in software organizations are frequently performed based on well defined reference models such as CMMI and ISO/IEC 15504 (ISO/IEC 33000)

Need for „lightweight SPI standard“

- 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

Certification and Recognition

Only 18% small companies (-25 people) are certified

Over 53% of larger companies are certified

Over 74% indicated that it was important to be either recognized or certified

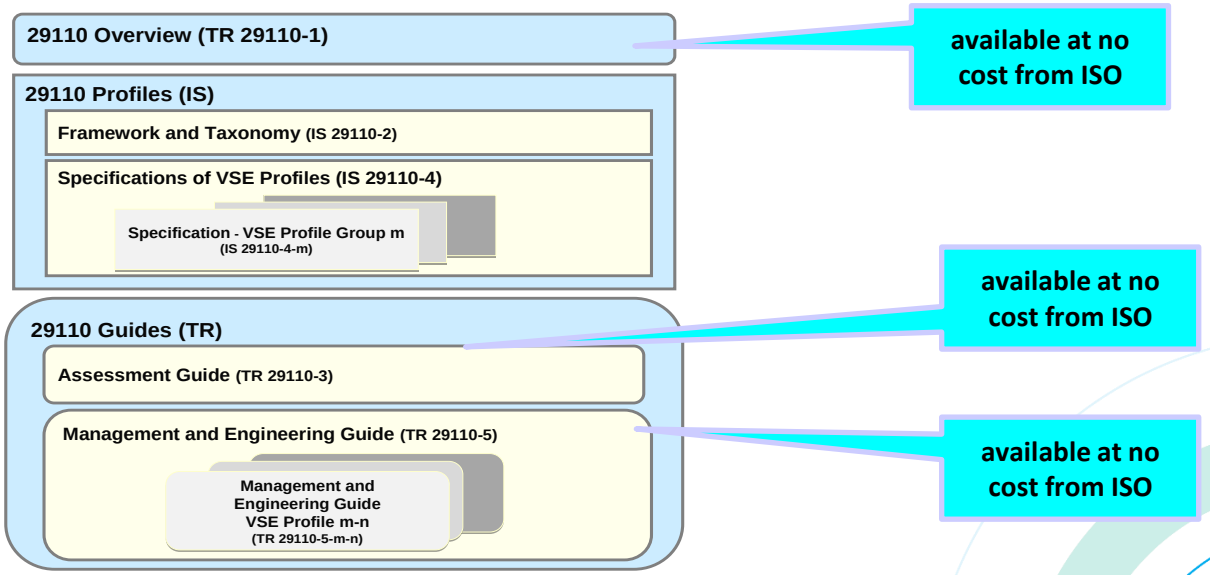
ISO certification requested by 40%.
Market recognition requested by 28%
Only 4% are interested in a national certification

ISO/IEC 29110 Systems and Software Engineering – Lifecycle Profiles for Very Small Entities (VSEs)

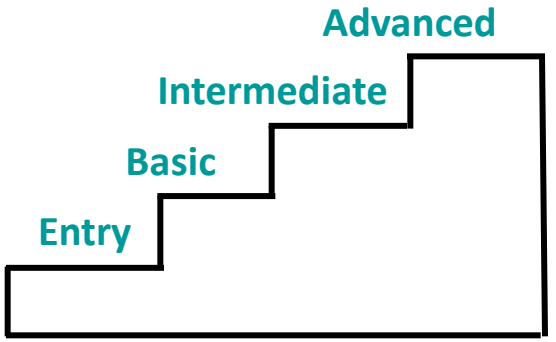
ISO/IEC 29110 Systems and software engineering - Lifecycle profiles for Very Small Entities (VSEs)

- Published in 2010

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



ISO/IEC 29110 concept of VSE Profiles

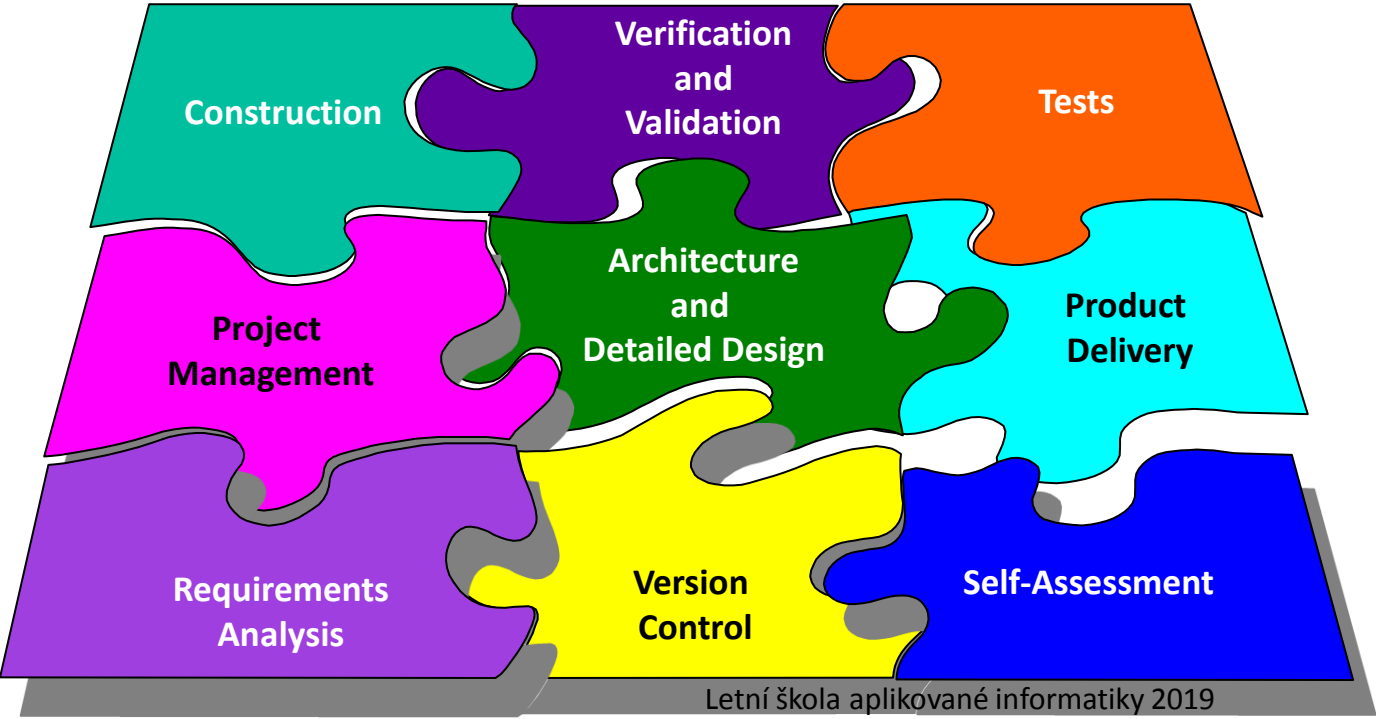


Generic profile group - VSEs that do not develop critical software
4 profiles

- **Entry** profile – 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

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



Current Development of the Standard

In the area of **Software Engineering**

- all 4 Profiles are published

In the area of **Systems Engineering**

- Entry Profile and Basic Profile are published.

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. **Service Delivery Guidelines** have already been published

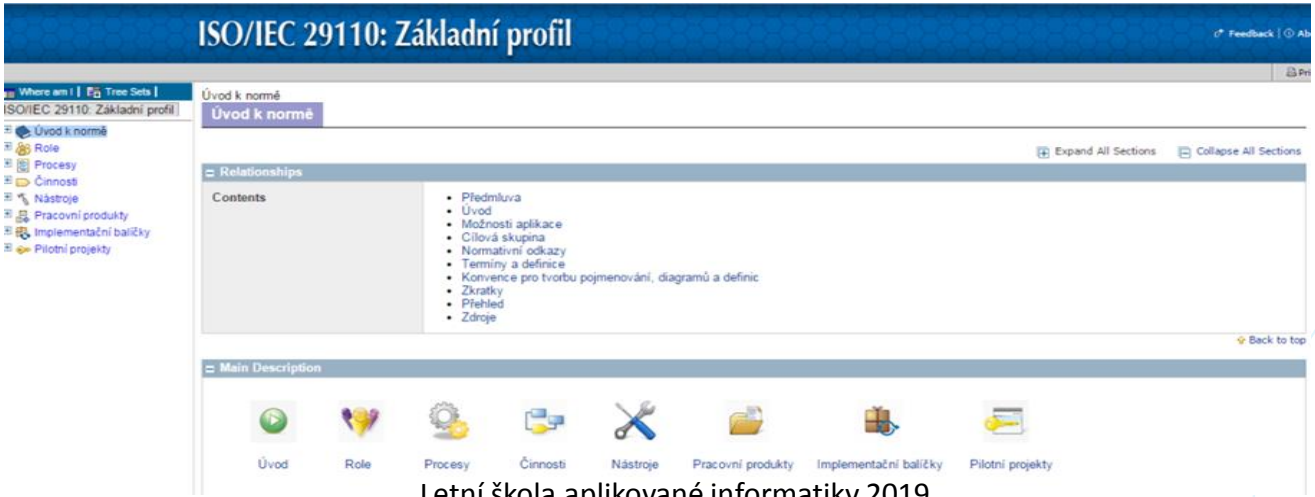
ISO/IEC 29110 Diffusion in the Czech Republic/1

- Entry and Basic Profile for software engineering were translated into Czech language
  with the help of students of the graduate SPI course
- All deployment packages for software engineering were translated into Czech language
- All these resources were published on the website https://spicenter.vse.cz/iso-iec-29110/
- Wikipedia page was translated into Czech language
- Methodology for ISO/IEC 29110 Profile Implementation in Eclipse Process Framework Composer was developed and published

Buchalcevova, A. (2017). Methodology for ISO/IEC 29110 Profile Implementation in EPF Composer. *International Journal of Information Technologies and Systems Approach (IJITSA)*, *10*(1), 61-74.
Can be accessed at: https://nb.vse.cz/~buchalc/clanky/epfc.pdf

ISO/IEC 29110 Diffusion in the Czech Republic/2

- Entry and Basic profiles for software engineering were implemented in the Eclipse Process Framework Composer and published on the website
  https://spicenter.vse.cz/cesky-preklad-normy-iso-iec-29110/



ISO/IEC 29110 Diffusion in the Czech Republic/3

- ISO 29110 is taught within undergraduate and graduate university courses (at the Prague University of Economics, program Applied Informatics)
- two pilot projects have been conducted
  1. implementation of the Testing Deployment Package for Basic profile in 2010
  2. implementation of the Project Management Deployment Package for Basic profile in 2017

Recent Activities

- ISO/IEC 29110 **Basic Profile Metamodel in UML class model** was developed
- **mapping** between the ISO/IEC 29110 Basic Profile Metamodel and **ArchiMate** modeling language was defined
- **ISO/IEC 29110 Basic Profile ArchiMate Model** was developed in a modeling tool and can be used by VSEs, assessors and standard developers

described in a journal paper

Buchalcevova, A. (2019). Using ArchiMate to Model ISO/IEC 29110 Standard for Very Small Entities. *Computer Standards & Interfaces*.

Can be accessed at

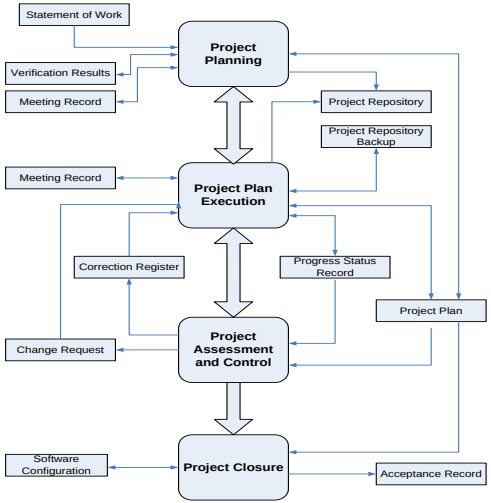
https://authors.elsevier.com/a/1Z0jk3HJl-HXgQ

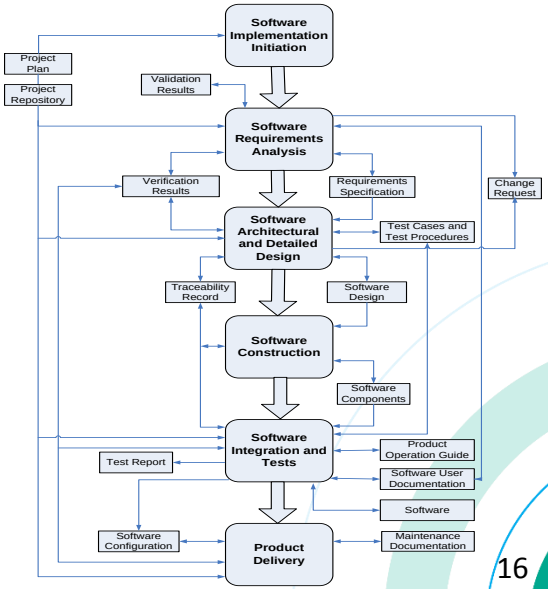
Future Activities

- pilot project implementation of the Requirements Management Deployment Package for Basic profile is prepared
- within this pilot project
  - the ISO/IEC 29110 Basic Profile ArchiMate Model will be completed
  - and evaluated
- evaluation of the Part 5-4: Agile Software Development Guidelines within pilot project is prepared

Reasons for modeling ISO/IEC 29110/1

- standard currently uses visualization just rarely
- just 2 figures in the form of unformal images





Benefits of Using ArchiMate to Model ISO/IEC 29110 Standard

- general benefits of visualization and use of the modeling tools
- specific benefits associated with the ISO/IEC 29110 standard

General benefits of visualization

- tool for coping with complexity
  - view a system from multiple perspectives,
  - improve system understanding,
  - discover causes and effects using model traceability,
  - identify potential consequences of a change.

Benefits of ArchiMate

- inter-relating various layers - Business, Application, and Technology through services,
- modeling various states - as-is and to-be,
- modeling motivation and strategy,
- once the modeling tool and modeling notation are mastered, the process of making and changing diagrams is quick and agile
- diagrams provide an efficient way to communicate ideas among team members and different stakeholders.
- ArchiMate tools mostly use repository for recording model elements. This enables model analysis, re-use and further documentation
- many modeling tools are available on-line as cloud-based software, which enables to work together with colleagues from anywhere

Specific benefits of modeling ISO/IEC 29110

- benefits for standard developers
- benefits for standard users
  - Very Small Entities
  - assessors

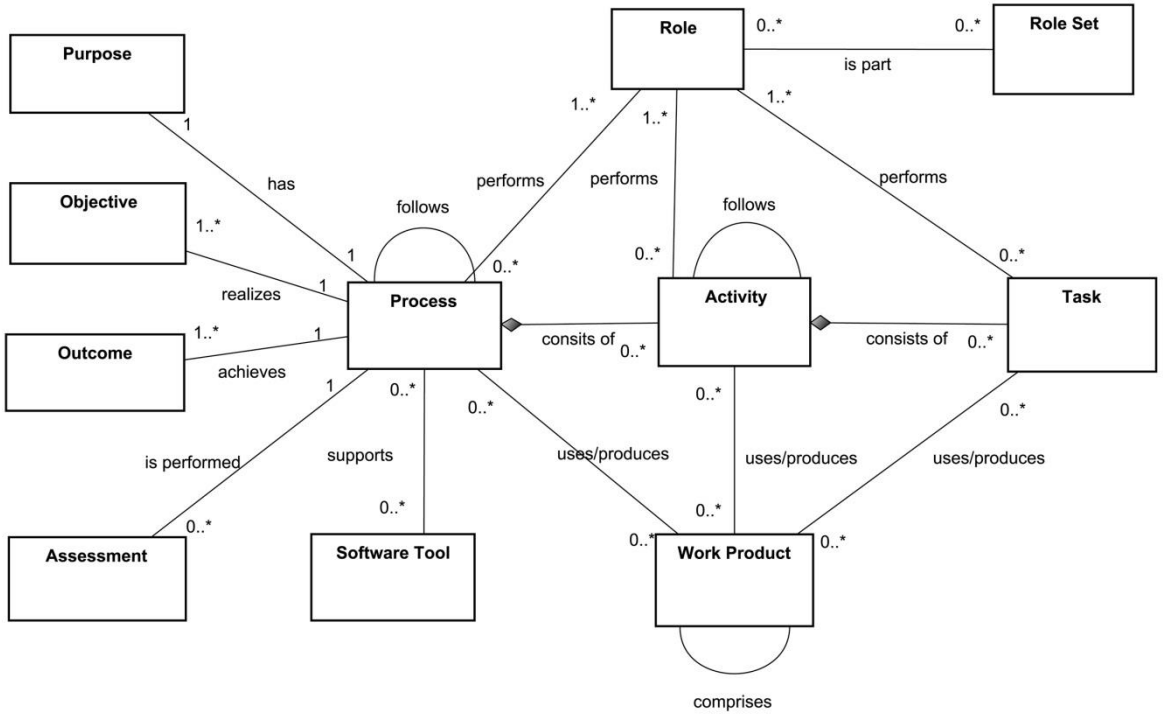
Benefits for standard developers

- cataloging of elements and ensuring a consistency among all parts
- all diagrams are depicted in the standard notation
- concept of views enables to model the standard in various levels of detail and from various viewpoints
- use of modeling tools facilitates tracing of elements through layers and views and helps in ensuring the consistency
- ArchiMate's support for **modeling multiple layers** represents a possibility to model software engineering, systems engineering and service areas of the ISO/IEC 29110 standard in a unified form

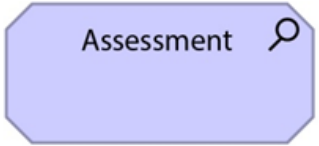
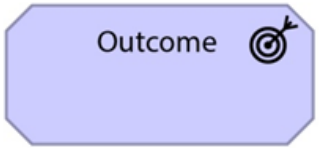
Benefits for standard users

- capturing standard structure in a unified form
- using the same notation and same modeling tool for all the diagrams
- creating views for various stakeholders
- easier customisation of processes

ISO/IEC 29110 Basic Profile Metamodel



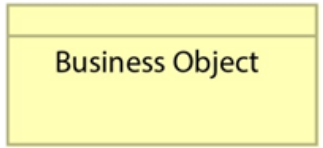
Mapping Basic Profile Elements to ArchiMate/1

Basic Profile Element	Description	ArchiMate Element Name	ArchiMate Element Notation
Activity	a set of cohesive tasks of a process	Business Process	
Assessment	disciplined evaluation of an organizational unit's processes against a process assessment model	Assessment	
Objective	specific goal to ensure the accomplishment of the process purpose	Goal	
Outcome	observable result of the successful achievement of the process purpose	Outcome	

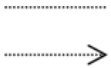
Mapping Basic Profile Elements to ArchiMate/2

Basic Profile Element	Description	ArchiMate Element Name	ArchiMate Element Notation
Process	a set of interrelated or interacting activities that use inputs to deliver an intended result	Business Process	
Purpose	general goal and result expected of the effective implementation of the process	Goal << Purpose >>	
Role	name and abbreviation of the function to be performed by project team members	Business Role	
Role Set	a set of roles	Business Collaboration	

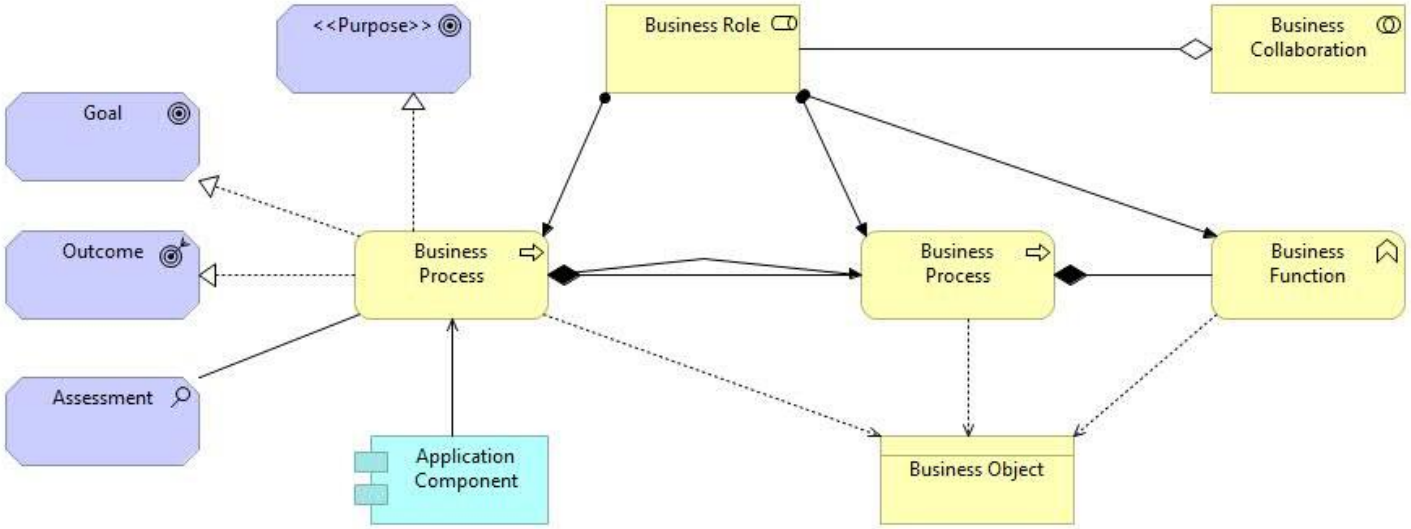
Mapping Basic Profile Elements to ArchiMate/3

Basic Profile Element	Description	ArchiMate Element Name	ArchiMate Element Notation
Software Tool	software application used for providing a process	Application Component	
Task	requirement, recommendation, or permissible action, intended to contribute to the achievement of one or more outcomes of a process	Business Function	
Work Product	artefact associated with the execution of a process	Business Object	

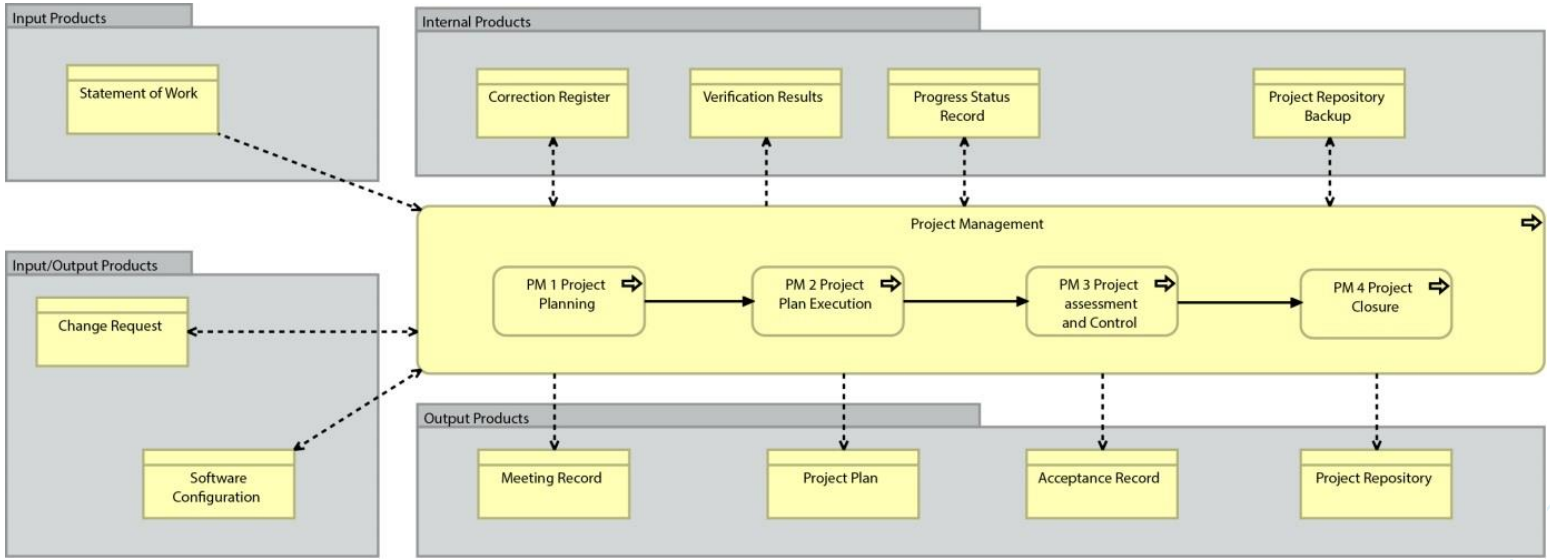
Relationships Mapping

Relation Name in Basic Profile Metamodel	From Basic Profile Element	To Basic Profile Element	Strongest ArchiMate Relation	ArchiMate Relation Notation
has	Process	Purpose	Realization	
has	Process	Objective	Realization	
achieves	Process	Outcome	Realization	
is performed	Assessment	Process	Association	
consists of	Process	Activity	Composition	
supports	Software Tool	Process	Serving	
consists of	Activity	Task	Composition	
performs	Role	Task	Assignment	
is part	Role	Role Set	Aggregation	
uses/produces	Task	Work Product	Access	
comprises	Work Product	Work Product	Composition	

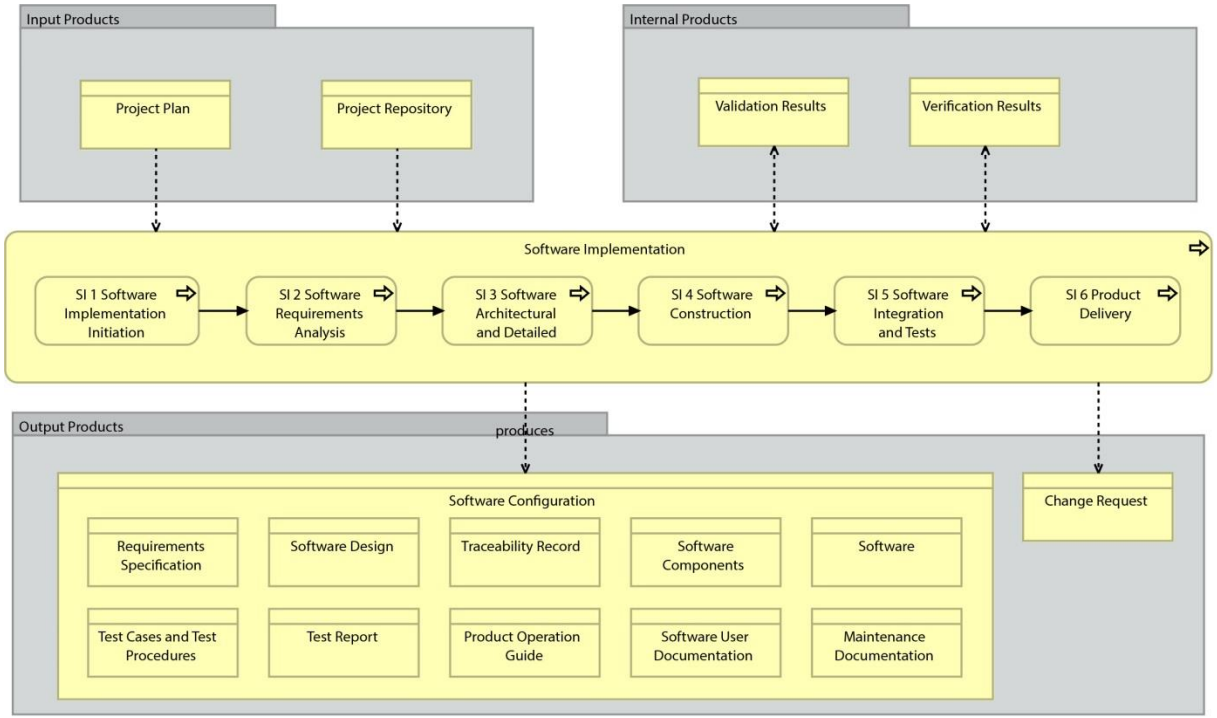
Basic Profile Metamodel modeled in ArchiMate



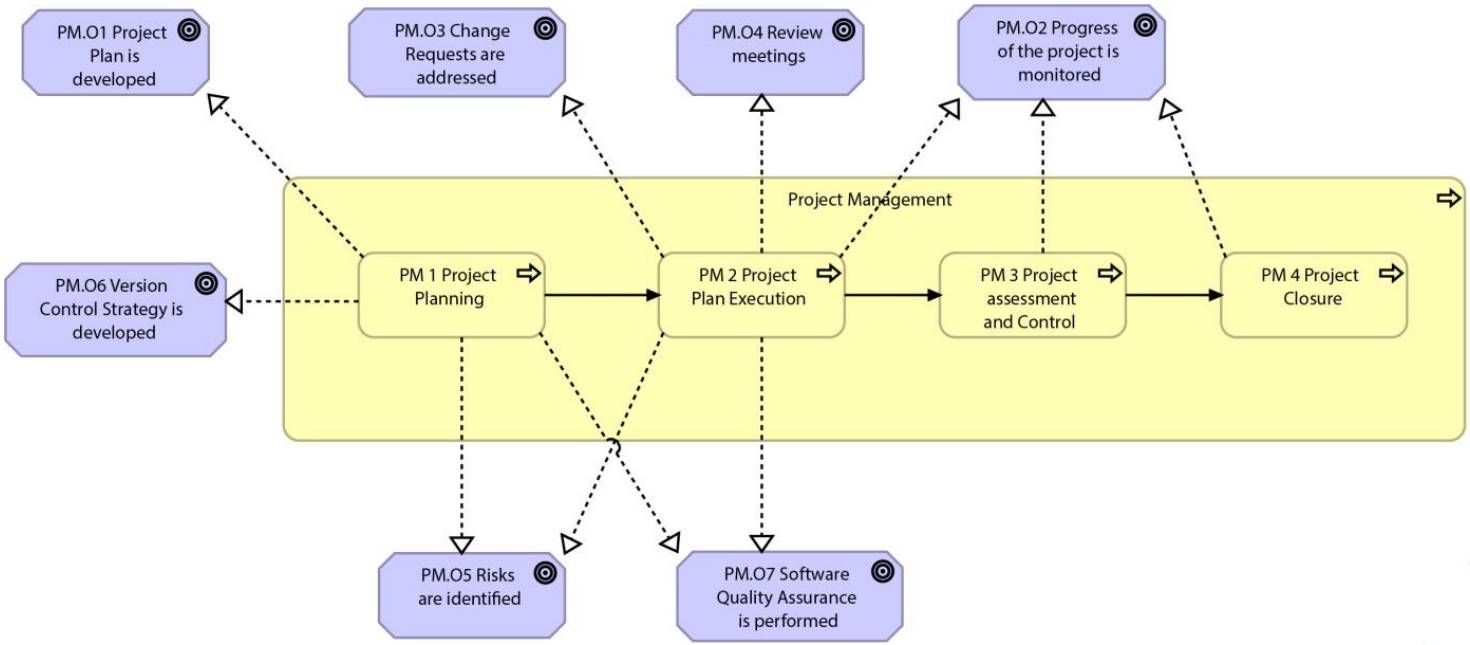
Project Management Process



Software Implementation Process



Objectives of Project Management Process



Conclusion

- To help small companies with software process improvement, the ISO/IEC 29110 standard “Systems and Software Engineering – Lifecycle Profiles for Very Small Entities (VSEs)” has been developed
- Initiatives towards a broader diffusion of the standard in the Czech Republic were presented
- Using the standard modeling notation should improve the quality of the standard and enable VSEs to effectively customize the standard as well as all supporting materials such as deployment packages by using widely accessible modeling tools

THANK YOU FOR ATTENTION

QUESTIONS ?