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# **Ontology based alignment of classic and agile project management for an IT enterprise**

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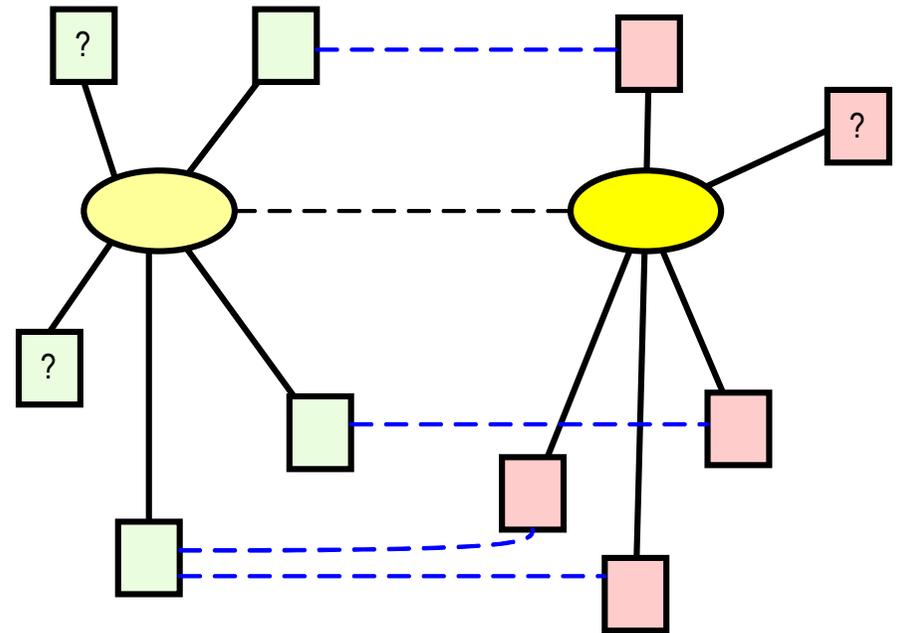
# Motivation and goals

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- ❑ In IT enterprises different projects may be conducted using different project management methodologies. Such situation may be caused by customer requirements, different team experiences and competencies, enterprise environmental factors or organizational process assets.
- ❑ From the viewpoint of the enterprise executive managers it is important to have a certain level of alignment of different methodologies for
  - Analysis, comparison and assessment of currently running projects
  - Easy switching between different methodologies on team and management level
  - Clarifying and providing common understanding of project management terms, roles and activities for different methodologies.
- ❑ We propose to align classic and agile project management methodologies based on matching (alignment) of ontologies. We plan to achieve it in two steps:
  - building ontological models of selected methodologies,
  - performing ontology matching that can be done partially manually and with the support of ontology matching techniques.
- ❑ We focus on two popular methodologies
  - **PMBOK** - classic methodology based on project plans
  - **Scrum** –iterative and incremental agile methodology based on product value

# Ontology Alignment

- Ontology alignment is the process of determining correspondences between concepts belonging to two ontologies  $O$  and  $O'$ . The term ontology alignment or ontology matching also refers to specification of such correspondences.
- The formal definition of ontology alignment defines it as a set of tuples:  $(e, e', R, n)$ , where
  - $e$  and  $e'$  are entities (classes, properties, individuals) belonging to ontologies  $O$  and  $O'$ .
  - $R$  is the relation between  $e$  and  $e'$ 
    - equivalence ( $=$ ),
    - subsumption ( $\geq$ ),
    - disjointness ( $\perp$ )
    - overlapping ( $\bullet$ ).
  - $n$  is the confidence factor, typically in range  $[0,1]$



# Alignment Techniques

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- ❑ **Name-based** An alignment is established by comparing strings: entity names, labels, comments. Several metrics are used to calculate string distances between entity names. For distances above a certain threshold an appropriate tuple with the confidence factor equal to the calculated distance is added to the alignment.
- ❑ **Structure based** methods determine the correspondence of entities by analyzing their internal structure (relations and data types used to express properties) as well as their position in the ontological hierarchy.
- ❑ **Extensional techniques** can be applied if individuals are available. Ontological classes are matched based on relations between sets of individuals (equality, inclusion, overlapping and disjointness).
- ❑ **Semantic-based** techniques consist in determining the correspondence of entities of two ontologies by comparing their meaning with respect to an external formal specification (external ontology).

# Architecture of PMBOK and Scrum ontologies

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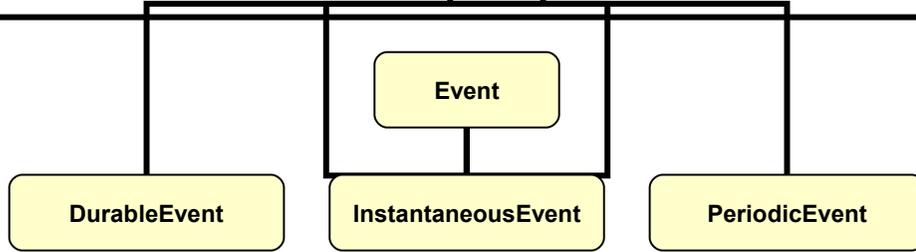
- ❑ PMBOK and Scrum ontologies have similar architectures:
  - Common domain
  - Some concepts identified to enable structure based matching (e.g. processes in Scrum)

| Groups of classes  | Concept specified in methodology description? |                |
|--------------------|---|----------------|
|                    | PMBOK   | Scrum          |
| Role               | Yes   | Yes            |
| Artifact           | Yes   | Yes            |
| Process            | Yes   | No, identified |
| Event              | Yes   | Yes            |
| ToolsAndTechniques | Yes   | No, planned    |

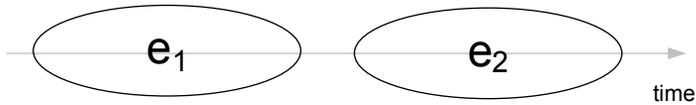
We plan to

- ❑ Build manual mappings
- ❑ Use structure based techniques
- ❑ For some cases semantic based, e.g. WBS refers to WorkToDo, ProductBacklog refers to WorkToDo
- ❑ Name-based for ToolAndTechniques

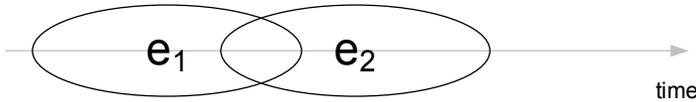
# Events and their properties



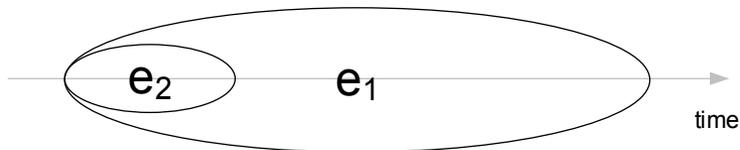
$e_1$  before  $e_2$ ,  $e_2$  after  $e_1$



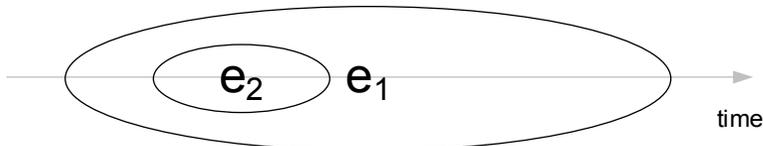
$e_1$  overlaps  $e_2$  ( $e_2$  overlaps  $e_1$ )



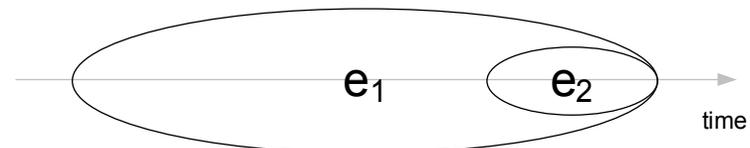
$e_2$  starts  $e_1$



$e_2$  during  $e_1$



$e_2$  finishes  $e_1$



Properties (optional):

- **hasAgent** – participant (role)
- **hasLocation** – place, where the event occurs
- **hasObject** – specification of the object taking part in event
- **causes, isCausedBy** – casual relations

Temporal properties:

- **hasDuration**
- **hasFrequency**
- **hasOccurrenceTime**

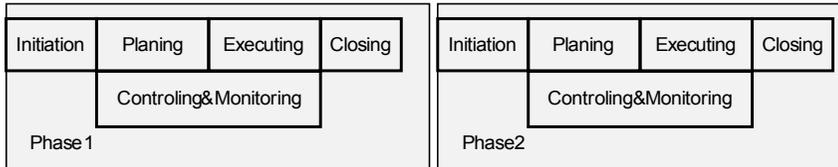
Temporal relations:

**after, before, overlaps, starts, during, finishes**

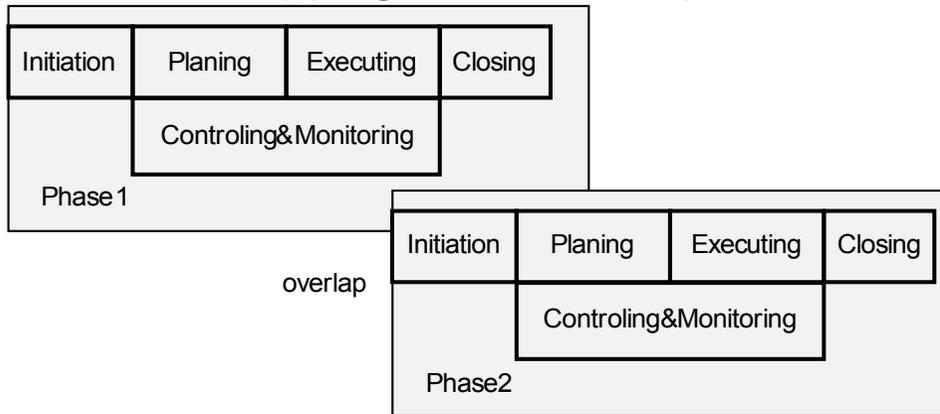
# Events and their relations in PMBOK and Scrum

## PMBOK

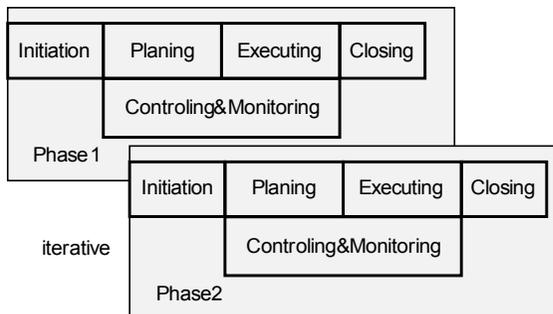
### Sequential execution of phases



### Overlapping execution of phases

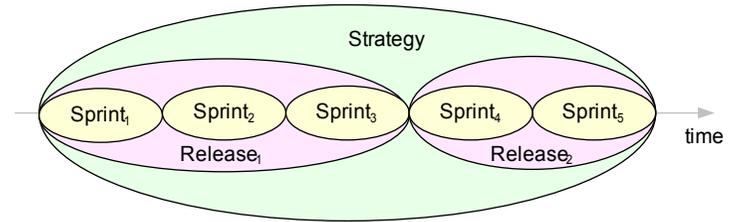


### Iterative execution of phases

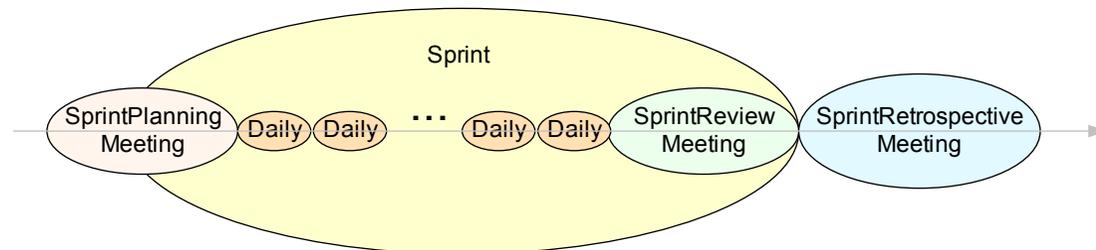


## Scrum

### Containment of planning horizons



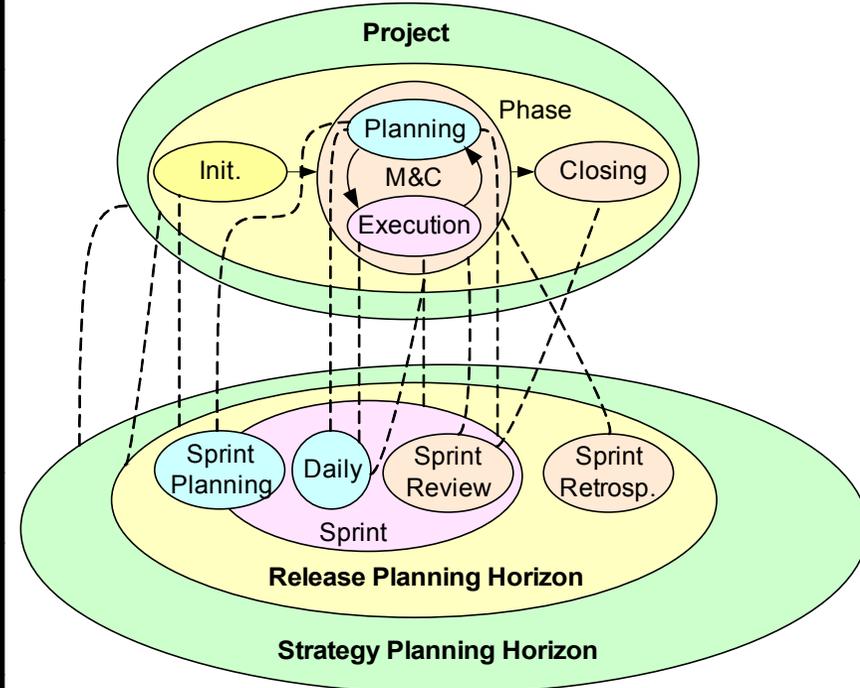
### Relations between Sprint, Daily and meetings



# Proposed mapping 1

- A phase leads to an external release, one-phase project delivers only one release, whereas multiphase project can deliver multiple releases. Consecutive overlapping Planning and Executing events of PMBOK correspond to a Sprint and Daily events.

|                            |   |
|----------------------------|---|
| PMBOK                      | Scrum   |
| <b>Project</b>             | <b>Strategy Planning Horizon</b>                              |
| Phase                      | Release Planning Horizon                                      |
| Initiating                 | Release Planning Horizon                                      |
| Planning                   | Multiple:<br>Sprint Planning Meeting<br>Sprint, Daily         |
| Executing                  | Sprint, Daily   |
| Monitoring and Controlling | Daily, Sprint Review Meeting,<br>Sprint Retrospective Meeting |
| Closing                    | Sprint Review Meeting<br>(related to release shipment)        |



# Proposed mapping 2

- ❑ The second mapping assumes an equivalence between a Project and ReleasePlanningHorizon. The goal of a project is an external release. In this case the StrategyPlanningHorizon is not mapped directly, it is related to a product development achieved by several projects. A project phase is mapped to a Sprint, and events occurring during the phase are linked with overlapping relation to Scrum daily activities.

| PMBOK                   | Scrum  |
|-------------------------|--|
| No match                | StartegyPlanningHorizon                                  |
| Project                 | ReleasePlanningHorizon                                   |
| Phase                   | Sprint   |
| Initiating              | SprintPlanningMeeting<br>ReleasePlanningHorizon          |
| Planning                | SprintPlanningMeeting<br>Daily                           |
| Executing               | Daily  |
| MonitorngAndControlling | Daily<br>ScrumReievMeeting<br>SprintRetrospectiveMeeting |
| Closing                 | ReviewMeeting  |

