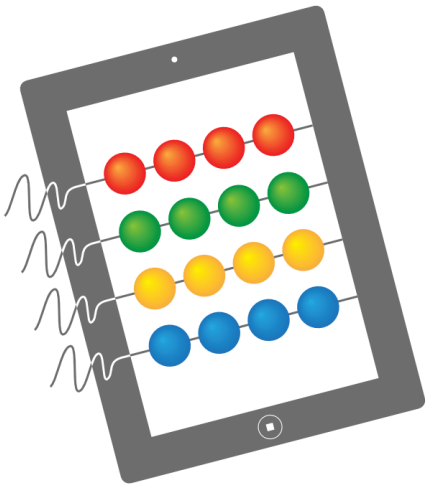
FP7 ICT STREP Project



LEARN PAD

Deliverable D2.1

Platform Architectural Description

http://www.learnpad.eu

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Abstract

The deliverable describes the high level architecture of the Learn PAd Platform in order to detail its macro components, and schematize their interconnection. The main use case scenarios evidencing the components interactions as well as the principal platform functionalities have been also described.

Keyword list

Learn PAd platform architecture, Learn PAd architecture components, Learn PAd scenarios

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Glossary, acronyms & abbreviations

Item	Description
BP	Business Process
BPMN	Business Process Model and Notation
CRUD	Create/Read/Update/Delete
GUI	Graphical User Interface
HTML	HyperText Markup Language
JSON	JavaScript Object Notation
KPI	Key Performance Indicator
PA	Public Administration
SPARQL	Simple Protocol and RDF Query Language
UI	User Interface
WP	Work Package
XML	Extensible Markup Language

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1. Introduction

1.1. Scope and summary

This deliverable describes the high level architecture of the Learn PAd Platform in order to detail its main components, and how they are interconnected. This information will be used as a blueprint to drive and coordinate the development and integration efforts throughout the duration of the project.

The focus of this architectural description is only about the decomposition of the Learn PAd Platform in macro components that enable to realize the main scenarios that have been identified so far, and their interactions. The internal architecture of these macro components will be refined in the next phases of the project.

The intended audience for this document is thus the Learn PAd consortium and, in particular, the partners who are going to provide functional components for the final product to be used in the demonstrators described in WP8.

The information contained in this document is subject to change in the future as the work on the different tasks of the project will progress. Updates and amendments to this document will be released in order to keep it consistent with the evolution of the activities on the different tasks of the project

1.2. How this document is organized

This deliverable is organized in the following chapters:

- **Introduction:** provides information about the intended audience of the document and its structure;
- **System overview:** provides a description of the Learn PAd platform, and the use cases it addresses;
- **System architecture:** provides the details about the Learn PAd platform architecture, its components and the interactions among them. Logical and Development architectural views[1] based on component and sequence diagrams are used to convey this information. Architectural decisions and open questions about aspects that are not yet clear will be mentioned as well in this section.
- **Conclusions:** provides a wrap up and future work.

[1] Kruchten, Philippe (1995, November). Architectural Blueprints - The “4+1” View Model of Software Architecture. IEEE Software 12 (6), pp. 42-50.

2. System overview

The Learn PAd platform will provide a social, collaborative and learning platform for civil servants. By using the Learn PAd platform, workers in the Public Administrations (PAs) will be engaged in a holistic learning, collaborative and assessment experience, wholly centered around a graphical intuitive representation of the Business Processes (BPs) that are in place and continuously evolve within the PAs, as well as of their surrounding context.

The LearnPAd platform complements the graphical representation with additional descriptive contents producing an enriched and machine-processable model. It maintains an up-to-date correlation between the information and the activities represented in the BP specification, as civil servants use the platform either for learning or for serving real requests.

2.1. Functionalities and scenarios

As described in Deliverable D1.1 “Requirements Report”, the Learn PAd platform addresses 15 main use cases:

- **UC3.1 - Models Business Process**
  This scenario describes one of the main entry point where modelers model the processes of the Public Administration, including all the related information, so that they can be then used by the Learn PAd platform and proposed to civil servants.

- **UC3.2 - Defines learning goals**
  This scenario describes the definition of the goals that should be achieved in order to keep track of how good the civil servants, and the Public Administration, are performing.

- **UC3.3 - Generate questionnaires**
  This scenario describes the definition of questionnaires (automatic or manual) that are used for assessing the progress of the civil servants.

- **UC3.4 - Assess model quality**
  This scenario describes how the system can be used to automatically verify structural properties of the models in order to help modelers in doing their job.

- **UC3.6 - Supports Browsing Process Documentation**
  This scenario describes how a civil servant can use the platform for browsing the documentation of the Public Administration processes that has been collaboratively created.

- **UC3.7 - Shares Business Process Knowledge**
  This scenario describes one of the main entry points where users can contribute to the evolution of the documentation of the Public Administration process by enriching it.

- **UC3.8 - Simulate**
  This scenario describes how civil servants can learn Public Administration processes by simulating them using different settings.

- **UC3.9 - Sets learning assignments**
  This scenario describes how to define learning assignments that can then be given to a civil

servant.

- **UC3.10 - Provides Recommendation for Learning**
  This scenario describes how the civil servant can receive recommendations about additional content for better understanding a given task of a process.

- **UC3.11 - Setting up the collaborative infrastructure**
  This scenario describes how the models are imported into the system.

- **UC3.12 - Adds comments**
  This scenario describes how the user can provide comments about how to improve the Business Processes in the Public Administration.

- **UC3.13 - Sends invitations to a simulation session**
  This scenario describes how the initial setup of a simulation is done, by inviting other people to join the session.

- **UC3.14 - Improving Business Processes by feedbacks**
  This scenario describes how feedbacks and comments about model improvements are taken into account by modelers.

- **UC3.15 - Enables monitoring of goal achievement**
  This scenario describes how the system can use collected data about user activities in order to assess the achievement of learning goals defined in the system.

These use cases, together with the project tasks identified in the Description of Work document have been taken as the starting point for identifying the components that define the high level Learn PAd platform architecture presented in the following sections.

3. System architecture

In this section we present a high level architecture of the Learn PAd Platform.

The guiding principle of this architecture is to have a modular system where components can be plugged-in as needed. This will give to implementors some flexibility in configuring the system with respect to their needs.

The following picture shows the main components that are part of the architecture. The architecture instantiates the black board architectural style where the shared data used by the different components is stored in a centralized place, and is accessible from there. Events are used to notify components about relevant changes in the data.

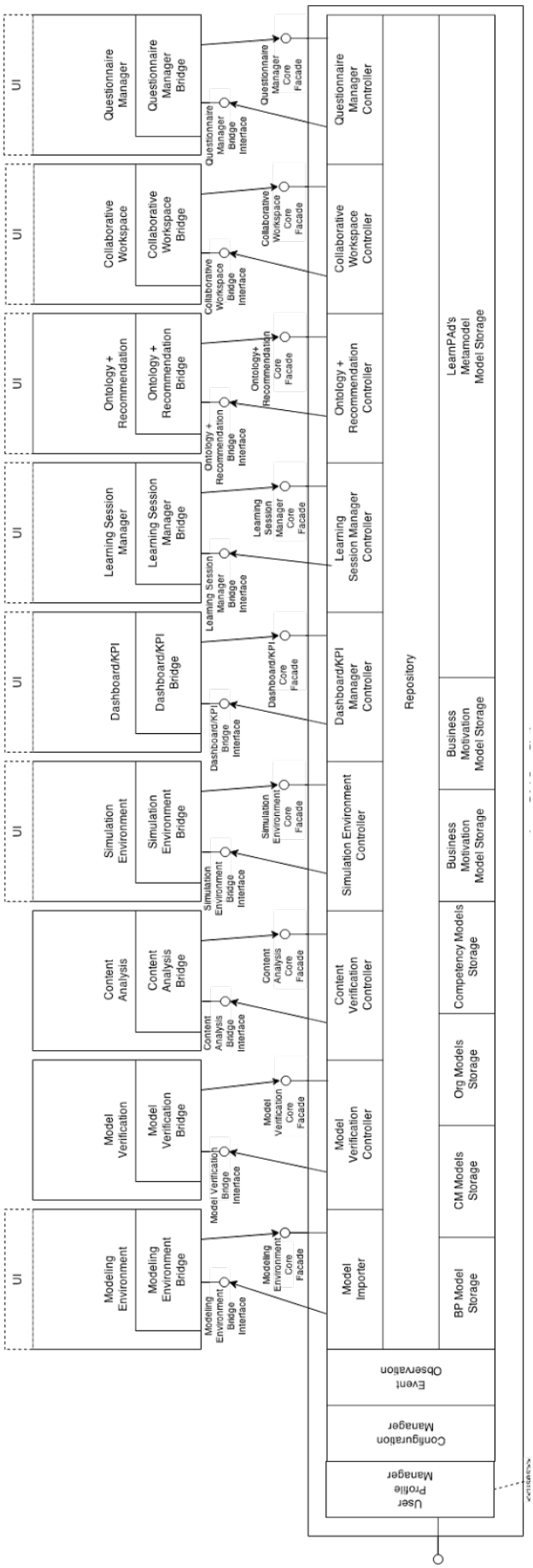


Figure 3-1 Learn PAd Core Platform

In this setting the Learn PAd Core Platform is the main component that provides the backbone for integrating the other *tools* that provide actual functionalities. It also captures the relevant interactions between them in order to make it easier to integrate new tools as needed.

The rationale behind this choice is to encapsulate as much as possible of the business logic of the Learn PAd system inside its core, so that it will be easier to integrate new components with the rest of the platform.

This architecture defines several component types, depending on the responsibilities of the component itself:

- **Controllers**
  These components provide the entry point for interacting with the Learn PAd Core platform. Each one of them exposes a subset of the functionalities provided by the whole core (facade), depending on the tool they are meant for communicating to.
  Controllers are also used for handling internal coordination, and can notify the corresponding tools (see later) when particular events occur in the core platform.

- **Bridges**
  A bridge allows a tool (see later) to interact with the Learn PAd core platform. It provides the adaptation layer that must be implemented to integrate an existing system with Learn PAd. It also exposes a bridge interface that is used by the Learn PAd core to communicate back to the tool specific events that might be interesting for it, or to invoke functionalities that these tools expose to the external environment.

- **Core Services**
  These components provide orthogonal services that can be used by all the other components in the Learn PAd Core Platform, and indirectly, by tools through the facade interfaces exposed by controllers.

- **Tools**
  These are the subsystems that provide the functional capability of Learn PAd. Some of them exposes a UI for letting the user interact with the system in a user friendly way. These tools can be pre-existing systems that have been adapted in order to be “plugged-in” Learn PAd. As described before, a bridge component is used for making these tools interact with the core platform, and for receiving notification from it.

Depending on how components are deployed, controllers and bridges can expose their external interfaces using RESTful endpoints or directly callable APIs (e.g., via direct method calls).

3.1. Component views

In this section we describe each component in the high level architecture, their purpose, the interfaces they expose, and how they interact with the rest of the system.

When a tool component is described (e.g., the Collaborative Workspace) then the section will be structured in the following way:

- **Description:** A high level description of the component and its purpose
- **Bridge interface:** A description of the interface implemented by the *bridge* associated to the tool, highlighting the relevant logical operations that the Learn PAd Core platform might call in order to notify the tool that a particular event has occurred, or to invoke a particular functionality of the tool itself.
- **Controller interface:** A description of the interface implemented by the *controller* associated to the tool, highlighting the relevant logical operations that the tool needs to call on the Learn PAd core platform in order to execute its business logic.
- **Generated notifications:** A list of events that can be generated by the interaction with the controller. This section lists the logical operations that can be called on the bridge interfaces that expose them.

3.1.1. Modeling Environment

The modeling environment is a subsystem where the *modeler* actually creates and modifies models that will be used by Learn PAd for configuring the functionalities/workspace provided to the *civil servants*. Typically these modeling environment are stand-alone application running on an independent server/host accessible mainly to modelers.

Modeling environment workspace core façade

- **Import model**
  - **Precondition:** A modeler has finished updating the models in the Modeling Environment and he's ready to publish them in the platform.
  - **Description:** This operation stores the model that contains the information about the current state of the business processes and related information in the Learn PAd platform. Models to be imported are sent using well defined formats as will be identified by WP3.
    This operation might also specify the type of the models to be imported (e.g., business process, organizational, etc.)

- **Retrieve feedback for model**
  - **Precondition**: A new feedback for the modeler has been created in the LearnPAd platform.
  - **Description**: This operation allows the modeling environment to retrieve all the feedbacks that are associated to a given model so that they can be taken into account.

- **Generate description for model**
  - **Precondition:** A model has been modeled
  - **Description:** This operation is invoked in order to automatically generate textual description of a model to be included as documentation.
- **Accept feedback**
  - **Precondition:** A feedback has been made and a modeler has incorporated the suggestions in the models.
  - **Description:** This operation is invoked when a feedback has been incorporated in the models in order.

Generated notifications

- **Model imported:** when a model has been successfully imported
- **Feedback accepted:** when a previously made feedback has been incorporated in the models.

3.1.2. Collaborative Workspace tool

The collaborative workspace tool is the environment that provides the entry point to the functional capabilities of the LearnPAd platform. It enables users to browse the available documentation associated to the models defined by LearnPAd (e.g., Business Processes, organization structure, etc.)
It provides also functionalities for collaboratively enriching this documentation, or to provide comments, feedbacks on the existing material.

Collaborative workspace bridge interface

- **Select Business Process**
    - **Precondition:** The request contains a valid reference to a Business Process from a list of the Business Processes available in the system.

    - **Description:** This operation is invoked when a user wants to access to a Business Process. It returns the structural information about the requested Business Process that is then rendered to the used using a well defined format, depending on the request (e.g., HTML in the case of a user accessing the Collaborative Workspace through a browser).

      The returned content contains all the information that has been specified in the models, including general documentation for the whole Business Process.

- **Select Business Process task**
    - **Precondition:** The request contains a valid reference to a task belonging to a Business Process available in the system.

    - **Description:** This operation is invoked when a user wants to access to Business Process task. It returns the structural information about the Business Process task that is rendered to the user using a well defined format, depending on the request (e.g., HTML in the case of a user accessing the Collaborative Workspace through a browser).

- **Request learning assessment material**
    - **Precondition:** The request contains a valid entity in the system that can have learning assessment material associated to.

    - **Description:** This operation is invoked when a user wants to receive the learning assessment material associated to an entity accessible through the Collaborative Workspace (e.g., a Business Process, or one of its tasks). The returned content is properly formatted depending on the user request (e.g., HTML in the case of a user accessing the Collaborative Workspace through a browser)

- **Add comment/resource**
    - **Precondition:** The request contains a valid reference to an entity to which associate the resource.

    - **Description:** This operation is invoked when a user wants to associate a new resource to some entity described by the Learn PAd metamodel. Usually these

resources can be new documents, FAQ, comments, etc. that refer to Business Processes, tasks. This operation represents one of the fundamental functionality of the Learn PAd platform, which is the enrichment of the models through civil user collaboration.

- **Agree/+1 contribution**
  - **Precondition:** The request contains a valid reference to a previously created resource.
  - **Description:** This operation is invoked by users in order to rate the given resource. The rating mechanism can be either a simple “+1” such as the one we find in popular social networks, or a value on a particular scale. The intent of this operation is to provide the user with a way to express his perception of the quality of a given resource.

- **Model Imported**
  - **Precondition:** A new model is imported in the Learn PAd core platform.
  - **Description:** This operation is invoked to notify the Collaborative Workspace when a model is imported in the Learn PAd core platform.

- **Content Verified**
  - **Precondition:** A previous request to analyse a document content has terminated.
  - **Description**: This operation is invoked to notify the Collaborative Workspace that a previously started document analysis has terminated and that the results are available.

Collaborative workspace core facade

- **Request information related to Business Process**
  - **Precondition:** The request contains a valid reference to a Business Process available in the system.
  - **Description:** This operation returns the set of entities that are associated to a Business Process. These entities can be associated documents, pages, and other resources associated to the tasks.

- **Get task information**
  - **Precondition:** The request contains a valid reference to a task belonging to a Business Process available in the system.
  - **Description:** This operation returns the information related to a task of a Business Process. This information contains all the elements related to a task that are available

in the Learn PAd metamodel[2] (e.g., structural information, associated documentation, etc.)

- **Request information related to task**
  - **Precondition:** The request contains a valid reference to a task belonging to a Business Process available in the system.
  - **Description:** This operation returns the set of entities that are associated to a Business Process task. These entities can be associated documents, pages, and other resources associated to the tasks.
- **Set content verification quality criteria**
  - **Precondition:** The request contains a valid reference to a document
  - **Description:** This operation allows to associate content quality verification parameters to a document. These parameters will be taken into account by the *Content Analysis Tool* to verify the document content quality.
- **Verify document content**
  - **Precondition:** The request contains a valid reference to a document
  - **Description:** This operation is invoked to start a document content analysis on a given document content. The operation is potentially asynchronous so that the caller is not blocked waiting for the analysis to be done.
- **Get content verification data**
  - **Precondition:** The request contains a valid reference to a document, and its content
  - **Description:** This operation is invoked to retrieve the content verification results of a previous analysis. The result is identified by the target document and by a fingerprint of the analysed content (e.g., its hash) in order to retrieve the correct results should the actual document changed in the meanwhile.
- **Request learning assessment material**
  - **Precondition:** The request contains a valid entity in the system that can have learning assessment material associated to.
  - **Description:** This operation is invoked for retrieving the learning assessment material associated to an entity available in system.
- **Resource rated**

[2] This will be clearly defined in Deliverable D3.2 “Design and Initial Implementation of Metamodels for Describing Business Processes in Public Administrations”.

    - **Precondition:** The request contains a valid reference to a resource in the Collaborative Workspace.

    - **Description:** This operation is invoked to notify the Learn PAd core platform that a new rating for a resource has been given by a user.

- **Resource created**
    - **Precondition:** A resource has been created in the Collaborative Workspace

    - **Description:** This operation is invoked to notify the Learn PAd core platform that a new resource has been created in the Collaborative Workspace. The notification contains also the type of the resource to allow other tools to react appropriately to the event.

- **Resource updated**
    - **Precondition:** A resource has been updated in the Collaborative Workspace

    - **Description:** This operation is invoked to notify the Learn PAd core platform that a new resource has been updated in the Collaborative Workspace. The notification contains also the type of the resource to allow other tools to react appropriately to the event.

- **Send measurement for Collaborative Workspace Event**
    - **Precondition:** An event that must be measured for calculating some KPI has occurred in the Collaborative Workspace.

    - **Description:** This operation is invoked to notify the Learn PAd core platform that an event that must be measured has occurred in the Collaborative Workspace. These notifications are typically related to the *Dashboard/KPI* tool that will use them in order to calculate the corresponding KPIs[3].

Generated notifications

- **Resource created** when a new resource is created within the Collaborative Workspace (e.g., a new document, a comment, etc.)
- **Resource updated** when an existing resource has been updated in the Collaborative workspace
- **Resource rated** when a resource has been rated
- **Feedback created** when a new feedback (i.e., a comment about proposed changes to be integrated in the models) has been created

[3] The list of what are these “interesting events” that should be measured is not yet defined. It’s very likely that it will contain things like “number of contributions per user”, “quality of user contributions”, etc.

3.1.3. Content Analysis tool

The content analysis tool provides functionalities for analyzing the textual content for the documentation associated to Business Processes created within Learn PAd. It defines and implements automated procedures to verify that the textual content that describes the tasks of a Business Process (e.g., documents created in the Collaborative Workspace) provides information that is consistent with respect to the Business Process model itself, and to automatically identify ambiguous sentences and vague terms in natural language requirements, and estimates quantitative indexes concerning the linguistic quality of the contents.

Content analysis bridge interface

- **Model Imported**
  - **Precondition:** A new model is imported in the Learn PAd core platform.
  - **Description:** This operation is invoked to notify the Content Analysis tool when a model is imported in the Learn PAd core platform.
- **Resource created or updated**
  - **Precondition:** A new resource is created or updated in the Collaborative Workspace, and it has a type that is recognized by the Content Analysis Tool (e.g., a document)
  - **Description:** This operation is invoked to notify the Content Analysis tool when a new resource is created in the Collaborative Workspace. This notification might be used to trigger automatic analysis of the content associated to the resource (if possible)
- **Verify document content**
  - **Precondition:** The quality criteria have been set for the requested document analysis.
  - **Description:** This operation is invoked when the verification of a document is required by the platform. This operation performs the verification according to the list of ID of Quality Criteria associated to the target document.

    This operation will make use of the following operation in the controller interface:
    - **Get Resource** to retrieve the actual content to be analysed.
    - **Get quality criteria for resource** to get the list of of Quality Criteria associated to the resource to be analysed
    - **Set content verification results** to send the results of the analysis.
    - **Set content verification status** to notify the status of the verification process.
- **Generate text for Business Process**
  - **Precondition:** The request contains a valid reference to a Business Process model in the Learn PAd platform
  - **Description:** This operation is invoked for automatically generating text that describes a Business Process.

Content analysis core facade

- **Get Business Process model**

    - **Precondition:** The request contains a valid reference to a Business Process available in the Learn PAd platform

    - **Description:** This operation retrieves the information about a Business Process stored in the platform, included its representation in a standard format.

- **Get document / resource**
    - **Precondition:** The request contains a valid reference to a resource created in the Learn PAd platform.

    - **Description:** This operation returns the representation of a resource such as a document, a comment, etc. that has been created in the Learn PAd platform including its content and metadata.

- **Get content verification quality criteria**
    - **Precondition:** The request contains a valid reference to a document

    - **Description:** This operation allows to retrieve the content quality verification parameters associated to a resource.

- **Set content verification results**
    - **Precondition:** A previously triggered content verification analysis has terminated.

    - **Description:** This operation is invoked for storing the results and the measurements related to content verification that are useful for calculating KPIs (e.g., if a user writes a very good quality content, this might generate a measurement about the content quality provided by the user). These results might include:
        - The quality criteria that have been used for the analysis, and its corresponding values computed by the analysis.
        - Quality suggestions to the user about what to improve the value associated to the different criteria. These suggestions can be something like “reduce ambiguity”, etc.
        - Markers: a set of metadata that can be used to spot which portions of the content are causing problems. Each marker is a couple (‘start’, ‘end’), where ‘start’ is the position of the first character of the text to be marked, and ‘end’ is the position of the last character to be marked. These markers are used by the system to provide feedback to the user

- **Set generated text for Business Process**
    - **Precondition:** The request contains a valid reference to a Business Process model in the Learn PAd platform

    - **Description:** This operation store the generated text associate to a Business Process model in the platform.

- **Set content verification status**
    - **Precondition:** a previously content verification request has been sent to the Content Analysis tool.

    - **Description:** This operation stores the status of a content verification job on a document. The status can be:
        - PROCESSING if the text generation is currently ongoing
        - COMPLETE if the text generation is completed

- **Set text generation status**
    - **Precondition:** a previously text generation request has been sent to the Content Analysis tool.

    - **Description:** This operation stores the status of a text generation job on a business model. The status can be:
        - PROCESSING if the text generation is currently ongoing
        - COMPLETE if the text generation is completed.

Generated notifications

- **Content verified** when the results of the content verification analysis are stored in the Learn PAd platform
- **Business process description generated** when the results of the text generation are stored in the Learn PAd platform

3.1.4. Model Verification tool

The model verification tool provides functionalities for analysing the Business Processes and eventually related model created within the modelling environment before importing in the Learn Pad platform. It defines and implements automated procedures to formal verify that models actually include all desired instances and respect predefined properties (i.e. deadlock and livelock). At the same time it is possible to include and extend the components in order to introduce further model verification approaches.

Model Verification bridge interface

- **Model Imported**
  - **Precondition:** a new model (or set of models) should be imported in the Learn PAd core platform.
  - **Description:** the method informs the component that a new model (or set of models) has been uploaded on the Learn PAd platform and it could be necessary to start some verification activity.

Model Verification core facade

- **Get Model**
  - **Precondition**: the request contains a valid reference to a model and eventually related models to make them available in the Learn PAd platform.
  - **Description**: the method permits to retrieve models from the repository according to the different typologies defined in WP3. The retrieval of models could be requested by analysis techniques that require the check of information available in different but related models.
- **Set Model Verification Status**
  - **Precondition**: a previously model verification request has been sent to the Model Verification tool.
  - **Description**: the method sets a flag associated to the model telling that the model has been verified, and the result of its analysis. This flag can be then used to filter models for which issues have been identified.

Generated notifications

- **Model verified** when the results of the model or a set of interrelated models verification analysis are stored in the Learn PAd platform.

3.1.5. Questionnaire Manager Tool

The questionnaire manager supports the generation of questionnaires from Business Process models; also it provides the functionalities for the Learn PAd platform to retrieve and publish a questionnaire. Notably the creation of a questionnaire could be either automatic or interactive. Also in the following each questionnaire is conceived as a template composed by a set of questions that should be submitted to a learner, where each question has (optionally) associated its expected answer.

Questionnaire Manager Bridge Interface

- **Model imported**
  - **Precondition :** a new model has been imported in the platform.
  - **Description:** it notifies the component that a new model has been imported in the platform. Since different kind of models may impact on the automatic generation of a questionnaire, several specialization of such functionality could be foreseen; among the others:
    - BP has been imported
    - organizational model by BPMN has been imported
    - cases model by BPMN has been imported
- **Model updated**
  - **Precondition:** a new version of an existing model has been imported in the platform.
  - **Description:** updates on the models may have impact on the questionnaires that have been automatically generated. Indeed a new generation process may take place. This functionality notifies the component that an update of some model has been uploaded in the platform. Since different kind of models may impact on the automatic generation of a questionnaire, several specialization of such functionality could be foreseen; among the others:
    - BPMN
    - organizational by BPMN
    - cases model by BPMN
- **Generate questionnaires By BP**
  - **Precondition :** a BP model exists and it has been imported in the platform
  - **Description:** it starts the generation process of the questionnaires for given a BP model. Launching the synthesis process may require some additional configuration. For example the following configuration may be provided:
    - number of questions per questionnaire
    - specific learning goals of the questionnaire
    - distribution of the questions concerning the cognitive dimensions (i.e. “Remember”, “Understand”, “Apply”, “Analyze”, “Evaluate”, “Create”)
    - distribution of the questions concerning the knowledge dimensions (i.e. “Factual”, “Conceptual”, “Procedural”, “Metacognitive”)
    - learning goals of the whole set of questionnaires
      - coverage of the questionnaires with respect to the cognitive dimensions (i.e. “Remember”, “Understand”, “Apply”, “Analyze”, “Evaluate”, “Create”)
      - coverage of the questionnaires with respect to the knowledge dimensions (i.e. “Factual”, “Conceptual”, “Procedural”, “Metacognitive”)
- **Interactive questionnaire generation by model**
  - **Precondition :** a BP model exists and it has been imported in the platform

    - **Description:** it creates a new empty questionnaire linking it to a given model. In addition, it starts the interactive generation procedure for such a questionnaire.

- **Add question to a questionnaire**
    - **Precondition:** an interactive questionnaire generation process has been launched.
    - **Description :** during the interactive definition of a questionnaire, it allows the definition of a question with its associated expected answer

- **Save a questionnaire**
    - **Precondition:** an interactive questionnaire generation process has been launched.
    - **Description:** it ends the interactive generation procedure and it is supposed to start the publication of the questionnaires.

Questionnaire Manager Core facade

- **Get a model:**
    - **Precondition:** a model exists and it has been imported in the platform.
    - **Description:** the functionality enables the component to retrieve a given model stored in the platform. This functionality enables the component to be proactive with respect to the generation of questionnaires. Since different kind of models may impact on the automatic generation of a questionnaire, several specialization of such functionality could be foreseen; among the others:
        - BPMN
        - organizational by BPMN
        - cases model by BPMN

- **Publish a questionnaire**
    - **Precondition:** some new questionnaires have been generated.
    - **Description:** it publishes a generated questionnaire over the platform. It also generates a notification about this specific event

- **Retrieve learning dimension by BP**
    - **Precondition:** the questionnaires generation procedure has been activated.
    - **Description:** it enables the component to retrieve learning dimension (possibly) associated with a given BP. Such information will concern both the cognitive dimension (i.e. “Remember”, “Understand”, “Apply”, “Analyze”, “Evaluate”, “Create”), and knowledge dimensions (i.e. “Factual”, “Conceptual”, “Procedural”, “Metacognitive”)

Generated notifications

- **Questionnaire Formulation Completed**, when a new questionnaire has been created and it is available to be published.

3.1.6. Dashboard/KPI tool

The Dashboard/KPI component is able to calculate KPI about different aspects of the learning experience, and to manage dashboards of KPI that can be displayed to the different types of user for having a cockpit of the current situation of a particular aspect of the learning process.
All the functionalities provided by this component have to be considered available at the following 3 different abstraction levels:

1. organizational
2. individual Business Process
3. individual learner

Also, the overall idea about the functionalities provided by this component is that they will be generic in order to allow flexibility/extensibility both on KPI and Measurements definition. Nevertheless, in order to show meaningful examples at this stage some measurement types are provided. Finally, the computation of the KPI is conceived to be triggered either via the user interface or periodically by the component itself.

The component refers to a Dashboard as a collection of KPIs. Eventually, each KPI is associated with a reference threshold representing the expected outcome for that indicator. In this sense a Dashboard uses KPI in order to define and to monitor a set of learning goals.

Dashboard/KPI bridge interface

- **Invitation sent**
  - **Precondition:** a learning session has been created.
  - **Description:** it notifies events supporting the measurement of the coaching activity from a Civil Servant. For example, meaningful indicators will count the number of invitation sent in order to :
    - fill a questionnaire
    - read a document
    - join a simulation
- **Comment/resource has been added**
  - **Precondition:** a new resource on the Collaborative Workspace has been uploaded, or a new comment has been posted.
  - **Description :** it notifies events supporting the measurement of the intensity of collaboration (e.g. number of people who are participating to a “discussion” …)
- **Resource rated**
  - **Precondition:** an existing resource on the Collaborative Workspace has been rated.
  - **Description :** it notifies events supporting the measurement of the quality of the resources provided within the Collaborative Workspace
- **Feedback Sent to the Modelers**
  - **Precondition:** a given model (e.g. a BP model) has been imported into the Learn PAd platform.
  - **Description :** it notifies events supporting the measurement of the impact that the discussions among the learners (i.e. the Civil Servants) have on a given model (e.g. a BP model) available into the Learn PAd platform
- **Model imported**
  - **Precondition:** a new model has been imported in the platform.
  - **Description:** it notifies the component that a new model has been imported in the platform. Since different kind of models may impact on the computation of the KPI, several specialization of such functionality could be foreseen; among the others:
    - BP has been imported
    - organizational model by BPMN has been imported
    - cases model by BPMN has been imported

- **Notify an Event**
  - **Precondition:** something happened within the platform.
  - **Description:** it defines an abstract functionality that deals with generic events. The rationale is to support the flexibility/extensibility both on KPI and Measurements definition.
- **Update KPI**
  - **Precondition:** a new version of an existing KPI is available.
  - **Description :** it notifies the component to update the definition of an existing KPI
- **Register a New KPI**
  - **Precondition:** a new KPI has been modeled.
  - **Description :** it notifies the component that a new KPI has been imported into the platform
- **Drop a KPI**
  - **Precondition:** a given KPI has been registered.
  - **Description :** it notifies the component to drop the definition of an existing KPI
- **List of Available KPIs**
  - **Precondition:** None.
  - **Description :** it returns the list of registered KPIs
- **Register a Dashboard**
  - **Precondition:** a new Dashboard has been defined.
  - **Description :** it notifies the component that a new Dashboard has been created
- **List of Available Dashboards**
  - **Precondition:** None.
  - **Description :** it returns the list of registered Dashboards
- **Select a Dashboard**
  - **Precondition:** a given KPI has been registered.
  - **Description :** it returns a specific Dashboard instance where all the values the KPIs it composes have been calculated

Dashboard/KPI core facade

The following logical functionalities are used for retrieving measurements generated by other components while performing their activities (e.g., Simulation Environment, Content Analysis, etc.). The following list cannot be considered complete yet:

- **Retrieve Model Verification Status**
  - **Precondition:** None.
  - **Description :** it returns the status of the verification process for a given model
- **Retrieve Content Analysis Status**
  - **Precondition:** None.

- **Description :** it returns the status of the content analysis process for a given resource

- **Retrieve Questionnaire Statistics**
  - **Precondition:** None.
  - **Description :** it returns the statistics available through the core platform about both:
    - a learner
    - a learning session

- **Retrieve Simulation Analytics**
  - **Precondition:** None.
  - **Description :** it returns the statistics available through the core platform about both:
    - simulations completed by learner
    - simulations started by learner

- **List of Resource Comments by BP**
  - **Precondition:** None.
  - **Description :** it returns the total number of comment linked to a given resource (i.e. a document related to a BP)

- **List of Number of Comments per Model**
  - **Precondition:** None.
  - **Description :** it returns the total number of comment linked to a given model (i.e. a BP)

- **Get Number of BP Imported**
  - **Precondition:** None.
  - **Description :** it returns the number of the BP stored in the platform

- **List of Resource Rates by BP**
  - **Precondition:** None.
  - **Description :** it returns a list of rates received by each resource of the given BP

- **Get List of Models**
  - **Precondition:** None.
  - **Description :** it queries the platform and it returns the list of models (e.g. BP) imported

3.1.7. Recommender tool

The Recommender tool is able to reason about the current content of the knowledge base of the Learn PAd Core Platform, and to create recommendations linked to entities or resources.

Recommender bridge interface

- **Model imported**
  - **Precondition:** a new model has been imported in the platform.
  - **Description:** it notifies the component that a new model has been imported in the platform. Since different kind of models may impact on the automatic generation of a questionnaire, several specialization of such functionality could be foreseen; among the others:
    - **BP has been imported**
    - **organizational model by BPMN has been imported**
    - **cases model by BPMN has been imported**

- **Resource Created for BP**
  - **Precondition:** the given BP exists.
  - **Description:** it notifies the component that a new resource is available for a given BP.

- **Get Context-Specific Suggestion**
  - **Precondition:** None.
  - **Description:** it returns a set of suggestions (e.g. related content, experts, cases, etc.) according to both the specific context provided. The formulation of a context may depend on the specific interaction of the Recommender tool has with the others components (i.e. mediated by the Learn PAd Core Platform). Among the others, the following example of suggestions could be considered supporting both the Simulation, and browsing of the process documentation:
    - get expert for a task
    - get expert for a BP
    - get relevant document for a task
    - get relevant document for a BP
    - get similar cases

- **Simulation of a BP started by a learner**
  - **Precondition:** a learner (i.e. Civil Servant) started a simulation.
  - **Description :** it notifies the component that a given learner (i.e. Civil Servant) started a new simulation of a BP

- **Learning Session about a BP has been Started by a learner**
  - **Precondition:** a learner (i.e. Civil Servant) started a simulation.
  - **Description :** it notifies the component that a given learner (i.e. Civil Servant) started a new learning session on a BP

Recommender core facade

The following logical functionalities are used for retrieving information generated by other components while performing their activities (e.g., Simulation Environment, Content Analysis, etc.).

The following list cannot be considered complete yet:

- **Retrieve Questionnaire Statistics**
  - **Precondition:** None.
  - **Description :** it returns the statistics available through the core platform about both:
    - a learner
    - a learning session
- **Retrieve Simulation Analytics**
  - **Precondition:** None.
  - **Description :** it returns the statistics available through the core platform about both:
    - simulations completed by learner
    - simulations started by learner
- **List of Resource Comments by BP**
  - **Precondition:** None.
  - **Description :** it returns the total number of comment linked to a given resource (i.e. a document related to a BP)
- **List of Resource Contributed by Learner**
  - **Precondition:** None.
  - **Description :** it returns the list of resources where a learner contributed
- **List of Number of Comments per Model**
  - **Precondition:** None.
  - **Description :** it returns the total number of comment linked to a given model (i.e. a BP)
- **Get Number of BP Imported**
  - **Precondition:** None.
  - **Description :** it returns the number of the BP stored in the platform
- **List of Resource Rates by BP**
  - **Precondition:** None.
  - **Description** : it returns a list of rates received by each resource of the given BP
- **Get List of Models**
  - **Precondition:** None.
  - **Description :** it query the platform and it returns the list of models (e.g. BP) imported
- **Get List of Learners**
  - **Precondition:** None.
  - **Description :** it query the platform and it returns the list of registered learners
- **Get List of Available Questionnaires**
  - **Precondition:** None.
  - **Description :** it query the platform and it returns the list of available questionnaires

3.1.8. Learning Session Manager Tool

The Learning Session Manager component provides the functionalities for creating and inviting people to attend learning session (see D1.1 - UC 3.9). This tool keeps track of the learning tasks that have been defined in the system and also of the session the users are involved in for performing these learning tasks. The tool also monitors the evolution of the sessions by tracking when and who performs learning sessions.

Learning session manager bridge interface

- **Questionnaire is available:**
  - **Precondition:** A questionnaire has been generated or imported in the system.
  - **Description:** This notification informs the tool that a new questionnaire has been produced. Notably such a questionnaire is conceived as a template composed by a set of questions that should be submitted to a learner, where each question has (optionally) associated its expected answer.
- **Subscribe a new learner:**
  - **Precondition:** A user has been assigned to the status of “learner” in the system.
  - **Description:** This notification informs the tool that a user of a platform can be considered as a learner. In this sense, it would be possible to keep track of the learning session where he/she is involved and also retrieve statistics about the questionnaires.
- **Drop an existing learner:**
  - **Precondition:** A user has lost its “learner” role in the system.
  - **Description:** This notification informs the tool that a user of a platform is not a learner anymore.
- **Export statistics by learner:**
  - **Precondition:** None.
  - **Description:** this operation requests the tool to report statistics about the learning session performed by a learner. For example the number of questionnaires he/she answered or the number of test passed. Notably this information can be used by the KPI tool to compute KPI for a given learner, and also by the Coach in order to monitor the execution of the learning assignments by learners.
- **Export statistics by learning session**:
  - **Precondition:** None.
  - **Description:** this operation requests the component to report statistics about all the learners participated to a given learning session. For example the number/list of learners that answered a given questionnaire or the total number of test passed for a given questionnaire. Notably this information can be used by the KPI tool to compute KPI for a given learner, and also by the Coach in order to monitor the execution of the learning assignments.

- **Start a learning session for the learner:**
  - **Precondition:** Learning assignments have been defined for a learner and the learner wants to do them.
  - **Description:** this operation requests the component to start a new learning session for a given learner. For example, this functionality it is used when a learner would like to start filling a questionnaire relative to a given Business Process.

Learning session manager Core Facade

- **Store learning session result**
  - **Precondition:** the learner has terminated the learning session.
  - **Description:** this operation stores the results of a learning session in the platform for further reference.

- **Retrieve a questionnaire:**
  - **Precondition:** None.
  - **Description:** this operation is used to query the platform in order to autonomously import sets of new questionnaires.

- **Send invitations to a civil servant**:
  - **Precondition:** A learning session has been defined in the learning session manager.
  - **Description:** this operation is used to send invitations to a learner (i.e. the Civil Servants) to invite him performing certain learning assignments, such as:
    - **invite learners to fill a questionnaire**
    - **invite learners to read documents**
    - **invite learners to simulate a business process**

Generated notifications

- **Learning session Invitations sent:** This notification is sent by the platform whenever it has correctly sent invitations to civil servants that a learning session is available.
- **Learning task executed:** This notification is sent whenever a learning task defined in a learning session has been executed.
- **Learning session started:** This notification is sent whenever a learner starts a learning session.
- **Learning session ended:** This notification is sent whenever a learner ends a learning session.

3.1.9. Simulation Environment tool

The simulation environment provides the subsystem where users can simulate Business Processes interactively.
Simulator is used by one or multiple civil servant(s) in order to learn processes.
Consequently the simulator assumes that models are valid, it provides facilities to enrich the model in order to make it runnable.

During the simulation, the environment tool provides facilities to monitor the execution of a business process and check if non-functional properties (such KPI or latency for example) are fulfilled by the user that is executing the simulation process.

Simulation environment bridge interface

- **Start Simulation**
  - **Precondition:** The simulation is activated and ready.
  - **Description:** This event is triggered in order to start the simulation.
- **Activate Simulation**
  - **Precondition:** The business process is imported in the Simulation Environment.
  - **Description:** This event is triggered in order to activate the simulation.
- **Update Resource**
  - **Precondition:** None.
  - **Description:** The Learn PAd Core Platform send/update the resources (KPI or other extra-info) useful for the simulation to the Simulation Environment.
- **Update Models**
  - **Precondition:** None.
  - **Description:** The Learn PAd Core Platform sends/updates the model(s) useful for the simulation to the Simulation Environment.
- **Get Simulation Results**
  - **Precondition:** None.
  - **Description:** The Learn PAd Core Platform gets results of one or more simulation(s) or monitoring sessions. Those results are available for improving Business Process, user profile, Dashboard KPI.
- **Get Simulation Trace For Learner**
  - **Precondition:** At least one simulation trace is available.
  - **Description:** The Learn PAd Core Platform gets results of one or more simulation traces.
- **Get Simulation Trace For BP**
  - **Precondition:** At least one simulation trace is available.
  - **Description:** The Learn PAd Core Platform gets results of one or more simulation traces.

Simulation environment Core Facade

- **Get Models**
  - **Precondition:** None.
  - **Description:** This operation allows to get one or more model(s) into the Simulation Environment.
- **Get Resources**

    - **Precondition:** None.
    - **Description:** Get additional data for one or more models or get additional resources for improving simulation.

- **Get User Profile**
    - **Precondition:** None.
    - **Description:** This operation retrieves the profile of a specific user.

- **Invite User**
    - **Precondition:** None.
    - **Description:** This operation allows the Simulation Environment to invite other users to join the current simulation.

- **Simulation Ready**
    - **Precondition:** All the business process, mocks, resources and data related to the simulation has been correctly loaded.
    - **Description:** The Simulation Environment notifies to the LearnPAd Core Platform that the simulation is ready.

- **Set KPI Data Collection**
    - **Precondition:** A simulation section has been concluded and results (data for KPI evaluation, others) collected.
    - **Description:** The notification of KPI data collections is sent to the Learn PAd Core Platform.

Generated notifications

- **Simulation End**
    - **Precondition:** None.
    - **Description:** This notification mentions the end of the simulation. This notification can be triggered also if the simulation session ends with a failure.

- **Help Required**
    - **Precondition:** None.
    - **Description:** This generated notification helps on a specific topic when it is needed to be displayed.

3.1.10. Core Services

In the previous section we described all the components that make up the LearnPAd system, including their bridge and core facade interfaces which must be provided the first by the tool itself in order to be integrated, and the second by the corresponding controller component inside the core platform
In this section we describe the remaining components that make up the Learn PAd Core platform. These components provide services that can be used by controllers in order to perform their tasks.

These services are the following:

User profile manager

This service is used to manage the role and profiles of the users that are accessing the LearnPAd platform. It also provides authentication and authorization functionalities in order to restrict certains operations provided by the controllers only to users in certain roles that have authentified themselves.
It can be integrated with already existing user service directory services that are deployed in public administration, in order to provide a unified user directory.

Interface

- **Authenticate**
  - **Description:** this operation allows other component to authenticate a user given his credentials
- **Get users**
  - **Description:** this operation retrieves the list of all the users registered to the Learn PAd platform.
- **Get user profile**
  - **Description:** this operation retrieves the profile of a user, with all the associated information, including his roles.
- **Has right**
  - **Description:** this operation checks if a user has the right to perform a certain action.

Configuration Manager

This service is used to manage the configuration of the Learn PAd core platform. It's an abstract layer for retrieving configuration properties of the core platform subsystems (e.g., database credentials, operational paramaters, etc.)

Interface

- **Register configuration source**
  - **Description:** this operation is used to register a configuration source (e.g., a file in a particular format) from where configuration property should be retrieved.
- **Get configuration property value**
  - **Description:** this operation return the value associated to a configuration property, as read by a configuration source that provides it.

Repository

The repository is the central component of the Learn PAd Core platform and it stores all the common data that are needed to the other services.
The repository consists logically of two parts: the Learn PAd Meta Model and its instances.

The actual way for storing these instances, at current time, is still a work in progress and will be detailed in next deliverables such as 5.1 and 3.2

Interface

- This component interface exposes operations for accessing the model instances. It contains standard CRUD (Create/Read/Update/Delete) operations for the manipulating models, and

some query operations for retrieving model instances that have a given characteristics (e.g., Get Business Processes for User, etc.)

The actual list of these operations will be refined in the following months when the Learn PAd metamodel will be detailed and implemented.

3.2. Runtime views

In this section we present the sequence diagrams associated to the main scenarios that are supported by the previously described architecture and components.

3.2.1. Scenario UC3.1, UC3.2 - Model business processes and learning goals

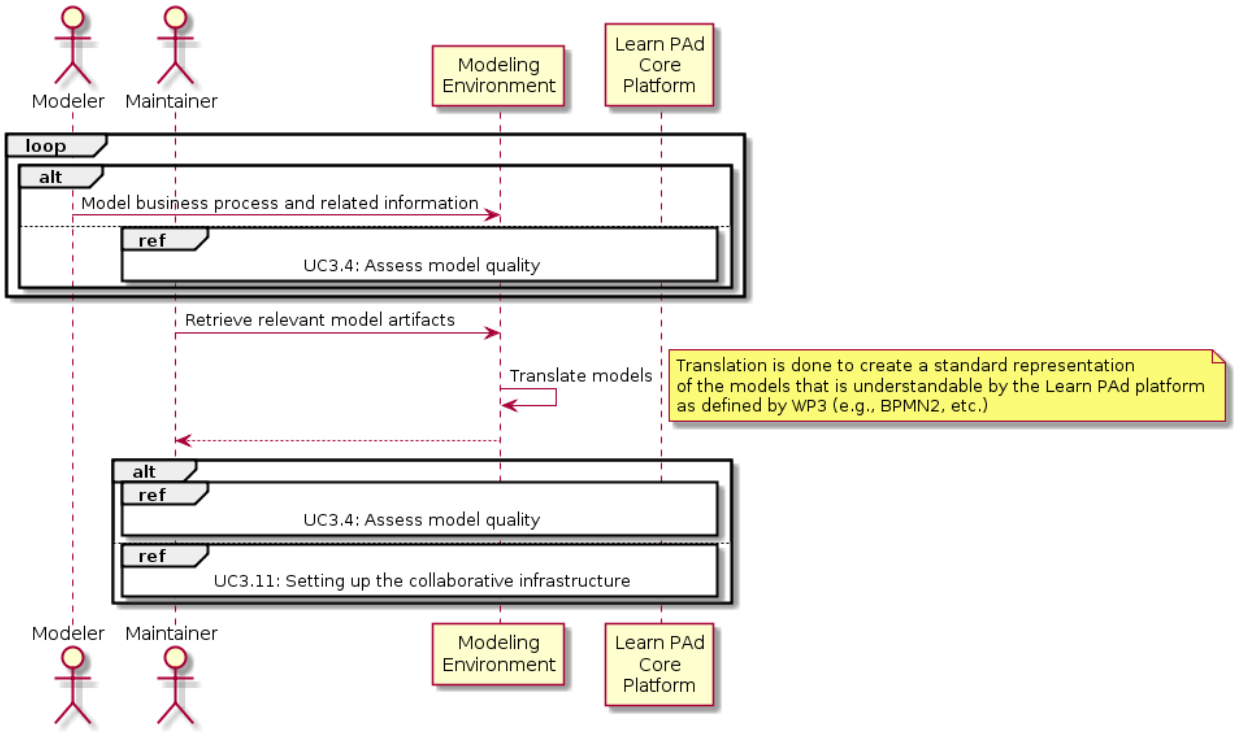


Figure 3-2 UC3.1 Model Business Process

This scenario shows how business processes (and other related models) are defined and used in the Learn PAd platform.

- Models are fundamentally created in a Modeling environment by a Modeler. The Modeler can interact with other actors such as an expert in order to correctly interpret what is the reality of the Public Administration.

  Modelers can incrementally check the quality of the models by asking the Learn PAd platform to analyse them in order to spot inconsistencies or structural problems, as described in *UC 3.4 - Assess model quality.*

- When models are ready, a Maintainer can ask to the Modeling Environment to get the artifacts associated to the models in a well defined format, as it will be defined in WP3. For example, business processes could be translated and exported from whatever format is used by the Modeling Environment to the BPMN2 standard, and similarly for the other artifacts. This translation operation defines the interoperability layer of the modeling environment with the Learn PAd Platform, in the sense, that the integration of a new modeling environment is done via this interoperable translation of model artifacts.

- Once the artifacts are exported, the Maintainer can either re-verify them or import them in the Learn PAd platform as described in the *UC3.11 - Setting up the collaborative infrastructure*

3.2.2. Scenario UC3.3.1 - Generate questionnaires after BP import

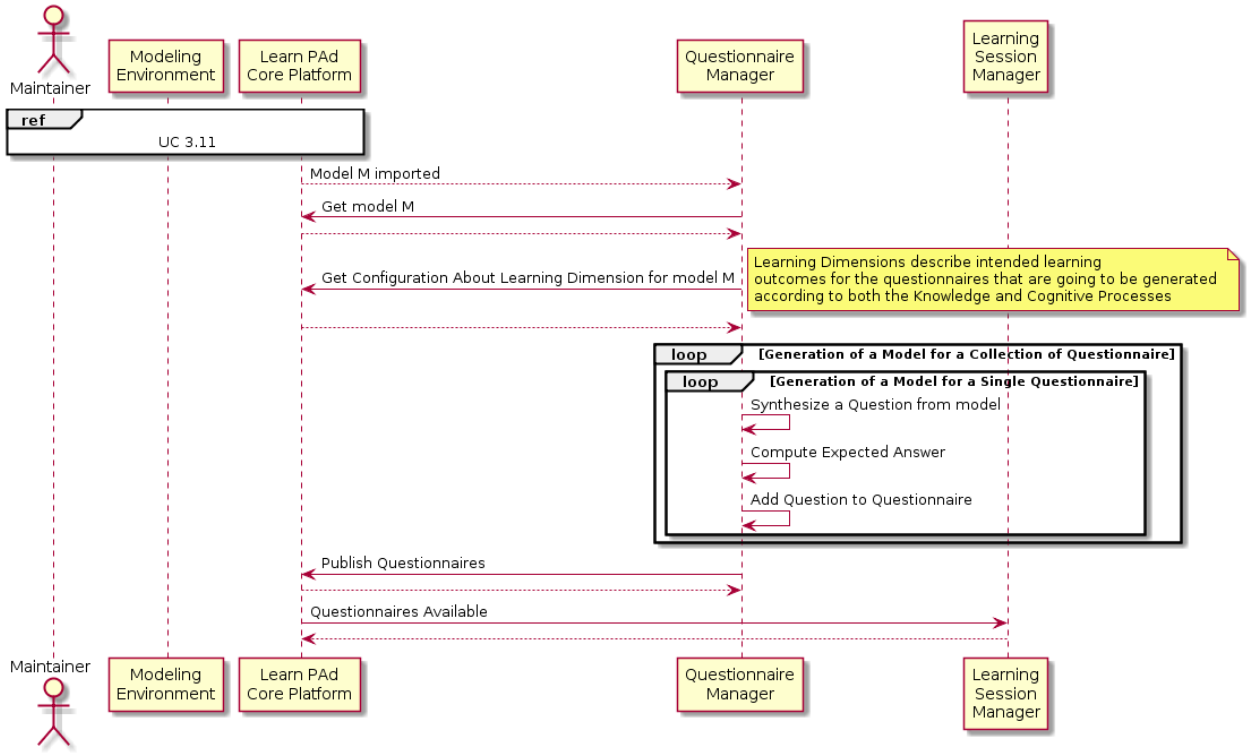


Figure 3-3 UC3.3.1 Generate questionnaires after BP import

The scenario refines the UC3.3 from D1.1. Specifically, it describes how the import of a new BP enables the automatic generation of a set of questionnaires about that model. The scenario refers to UC3.11 as precondition for its activation. When the set up of the collaborative infrastructure has been completed:

- the Learn PAd Core Platform notifies the Questionnaire Manager that a new BP model has been imported;
- the Questionnaire Manager retrieves the specific model by interacting with the Learn PAd Core Platform;
- the Questionnaire Manager interacts with the Learn PAd Core Platform in order to retrieve some (current) configurations about the generation process. For example such configurations could refer to the intended learning outcomes for the questionnaires that are going to be generated;
- the scenario proceeds with a collection of questionnaires. For each new questionnaire the Questionnaire Magener navigates the BP model according to both the strategies enabled on that specific instance of the component, and the configurations (e.g. the expected learning outcomes) retrieved by interacting with the Learn PAd Core Platform. Indeed, the Questionnaire Magener synthesizes a question from the BP model, it computes the expected answer, and it appends the question to the questionnaire.
- when the generation of the questionnaires is over, the Questionnaire Manager notifies the Learn PAd Core Platform to publishes the questionnaires;

- the scenario terminates when the Learn PAd Core Platform redirects the request to the Learning Session Manager component, which it is actually responsible for both creating and inviting learners to attend learning session.

3.2.3. Scenario UC3.3.2 - Generate questionnaires after a request by a coach

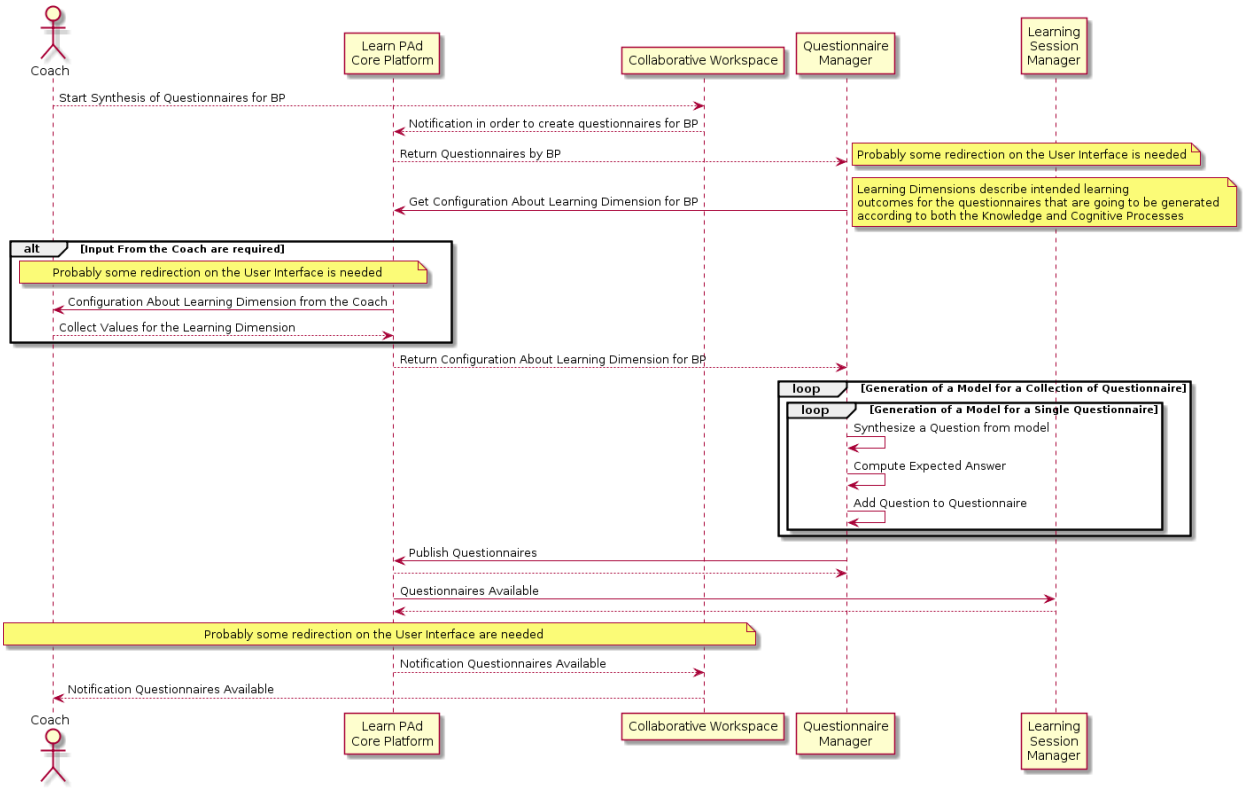


Figure 3-4 UC3.3.2 Generate questionnaires after a request by a coach

The scenario refines the UC3.3 from D1.1. Specifically, it models the case when a Coach interacts with the Questionnaire Manager in order to explicitly configure the automatic questionnaires generation process for a given BP. The initial interaction between the Coach and the Questionnaire Manager is supposed to be mediated by the Collaborative Workspace, and the Learn PAd Core Platform, which they may also deal with some redirection at the GUI level. Specifically, the interactions the Coach and the Questionnaire Manager could aim at retrieving those specific configurations about the intended learning outcomes for the questionnaires that are going to be generated, or the structure of the questionnaires as well.

For each new questionnaire the Questionnaire Magener navigates the BP model according to both the strategies enabled on that specific instance of the component, and the configurations (e.g. the expected learning outcomes, number of questions per questionnaires) provided by the Coach. Indeed, the Questionnaire Magener synthesizes a question from the BP model, it computes the expected answer, and it appends the question to the questionnaire.
When the generation of the questionnaires is over, the Questionnaire Manager notifies the Learn PAd Core Platform to publish the questionnaires.

The scenario ends when the Learn PAd Core Platform

- redirects the request to the Learning Session Manager component, which it is actually responsible for both creating and inviting learners to attend learning session;
- notifies the Coach that the synthesis has been completed, and the questionnaires have been published.

3.2.4. Scenario UC3.3.3 - Supports browsing process documentation

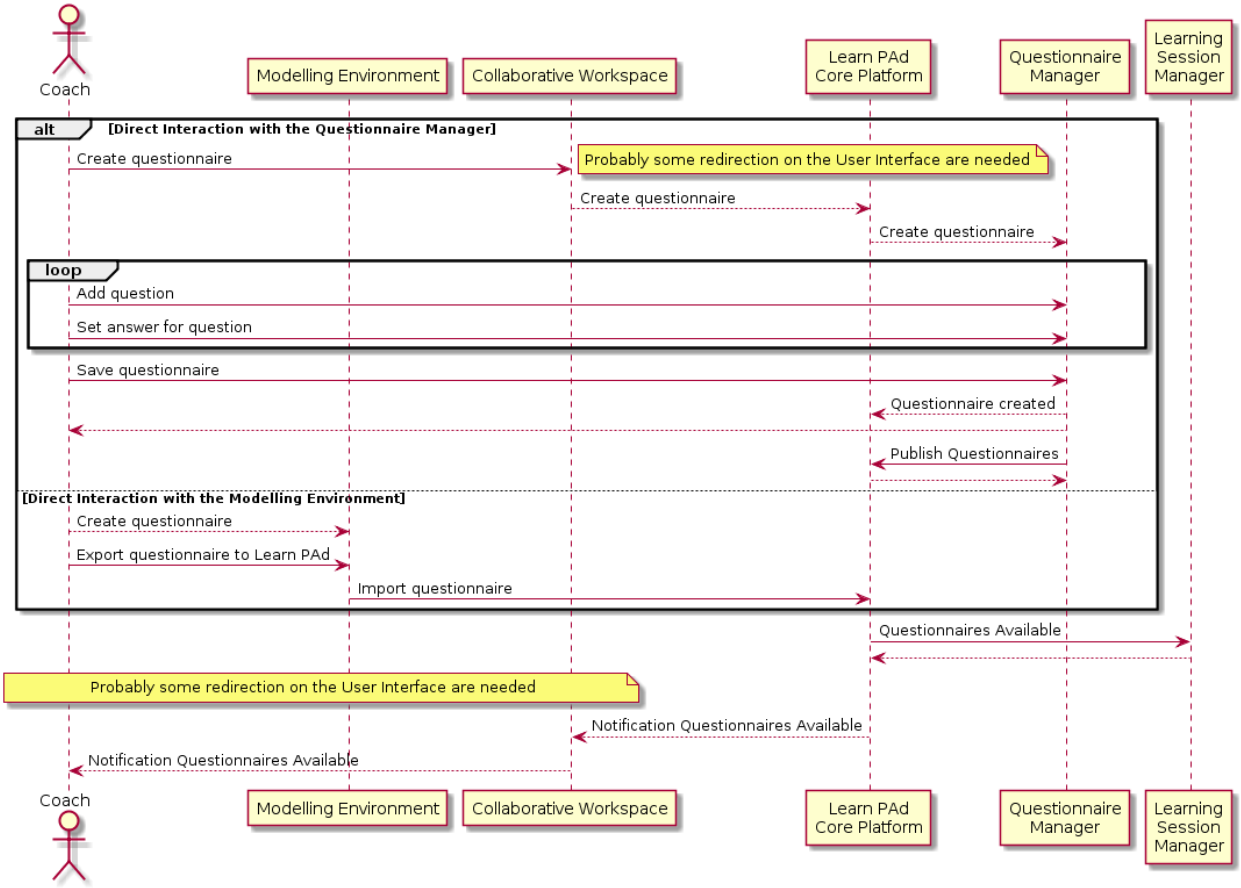


Figure 3-5 UC3.3.3 Interactive questionnaire generation by a coach

The scenario refines the UC3.3 from D1.1. Specifically, it models the case when a Coach interacts with the Questionnaire Manager in order to manually design a new questionnaire for a given BP. The scenario foresees two alternative cases:

- the Coach structures the questionnaire by interacting with the Questionnaire Manager: here the initial interaction between the Coach and the Questionnaire Manager is supposed to be mediated by the Collaborative Workspace, and the Learn PAd Core Platform, which they may also deal with some redirection at the GUI level.
  Specifically, such interactions foreseen:
  - the creation of a new questionnaire for a given BP
  - the definition of a set of questions, where for each question could be associated to an optional expected answer
  - the ends the interactive generation procedure by saving and publishing the questionnaire over the platform

- the Coach models the questionnaire by using a Modeling Environment :
  - the creation of the questionnaire is like any modeling activity
  - once the modeling questionnaire has been completed the Coach request the Modeling Environment to export it over the Learn PAd platform
  - the Modeling Environment query the Learn PAd Core Platform in order to import the questionnaire

For both the cases, the scenario proceeds when the Learn PAd Core Platform notifies the Learning Session Manager to actually publish the generated questionnaire. The scenario ends when the Learn PAd Core Platform notifies the Coach that the questionnaire has been published; this last interaction could be be mediated by the Collaborative Workspace which it may deal with some redirection at the GUI level.

3.2.5. Scenario UC3.4 - Assess model quality

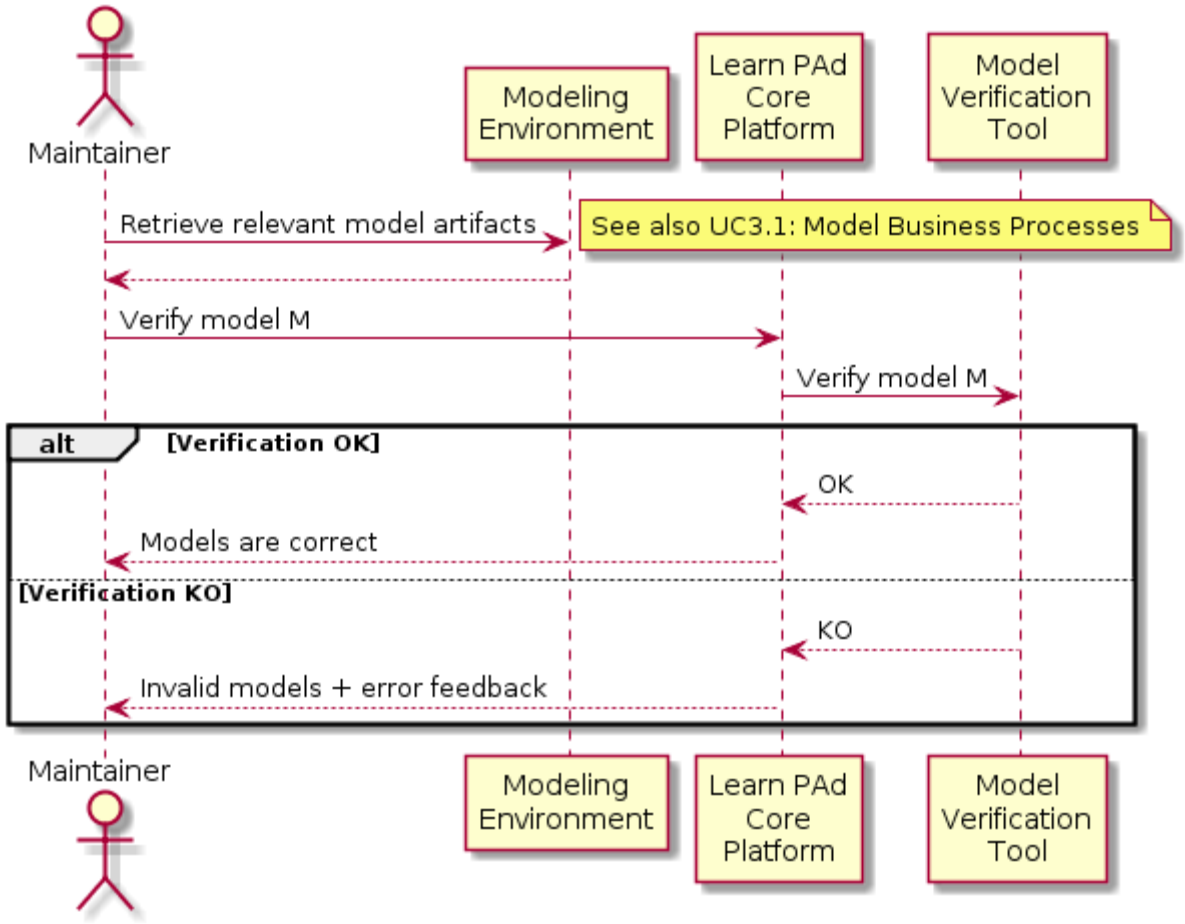


Figure 3-6 UC3.4 Assess model quality

This scenario describes how the Learn PAd platform supports model verification in order to help users spotting problems in the models they are manipulating:

- Once models are ready in the Modeling Environment, the Maintainer can export all the artifacts that represent them (see also UC3.1 : Model Business Processes)
- He can then send them to the Learn PAd platform in order to verify them.
- The results can contain, in case of problems, information about what is causing the issue. This information could be also imported in an automatic way in the Modeling Environment in order to provide modelers more effective feedback (e.g. directly in the UI).

3.2.6. Scenario UC3.6 - Supports Browsing Process Documentation

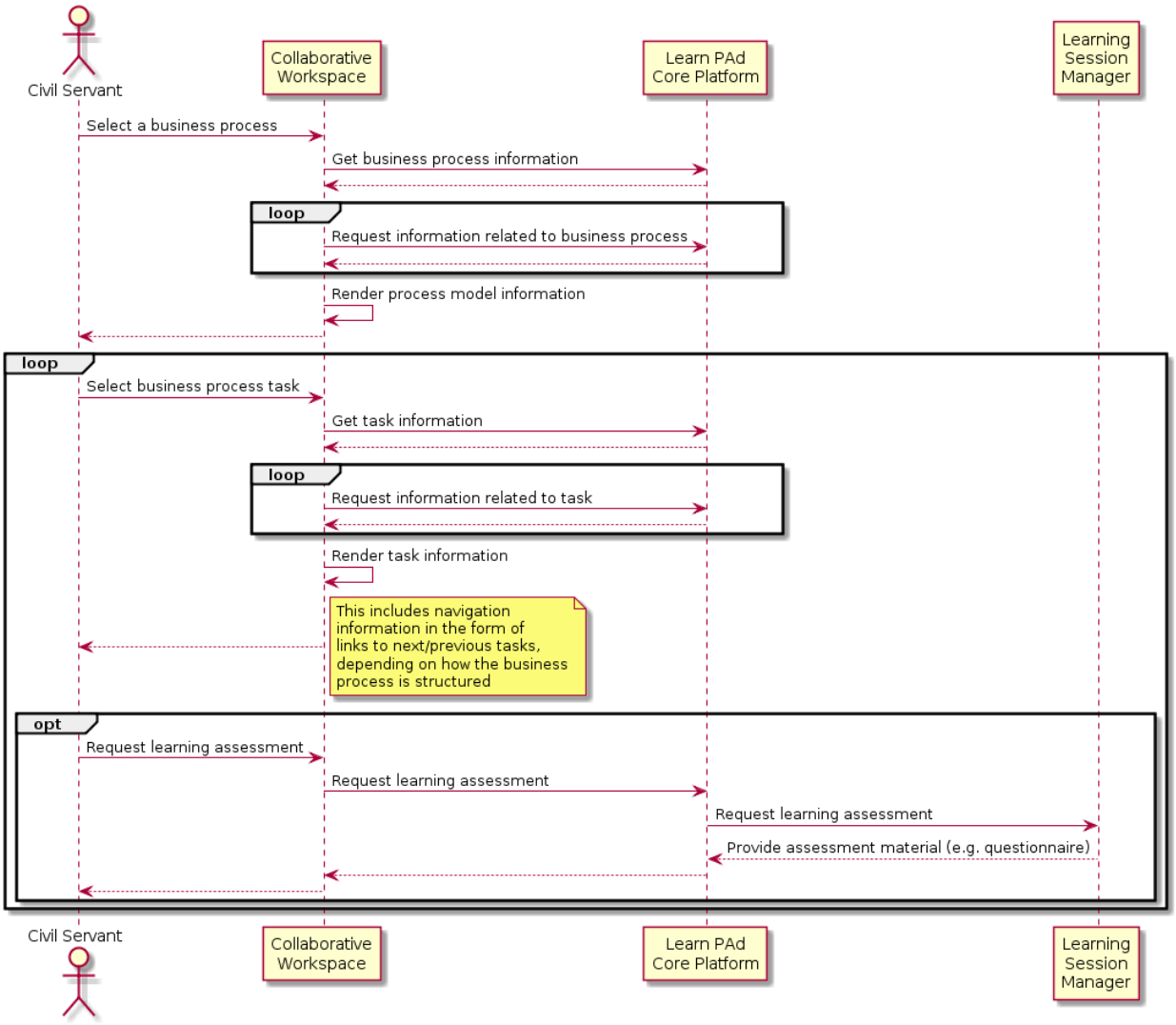


Figure 3-7 UC3.6 Support browsing process documentation

This scenario describes how the Civil Servant can use the Collaborative Workspace in order to navigate the information that has been provided with the models and by other civil servants that have collaboratively enriched it with new contributions (See next section)

- The scenario starts with a civil servant that has selected a Business Process among those available in the system.
- The Collaborative Workspace interacts with the Learn PAd core platform in order to retrieve all the information related to this Business Process model.
- The Collaborative Workspace is then able to package all this data in a convenient format that is compatible with the request performed by the civil servant. Usually this will be an HTML page because the Civil Servant will be very likely to access this page using a browser. However the information could be provided also using other structured formats like XML or JSON. The actual content represented using these formats will be defined in the following phases of the project when more information about the metamodels will be available.
- Once the Civil Servant has access to the data about the selected Business Process, he can navigate it by selecting one of the tasks that it is composed of.

- Similarly to what happened before, the Collaborative Workspace requests to the Learn PAd Core platform all the information related to the selected task.
- This information is finally packaged in a response that is sent to the Civil Servant, using a format that is compatible with the request. This response will also contain all the needed navigation information so that the civil servant can understand what are the next reachable model elements. Typically this navigation information will consist in hypelinks - if the returned format is HTML - or the needed information for retrieving the related model elements - if the returned format is XML or similar.
- The optional part of this scenario shows how a civil servant who is interested in assess his knowledge on a particular aspect (e.g., a Business Process) can request through the Collaborative Workspace the list of the assessment material that is associated to the given model element, so that he can practice it. Depending on the type of the assessment material, the civil servant might be redirected to other tools for actually performing the assessment (e.g., the questionnaire manager or the simulation environment)

3.2.7. Scenario UC3.7 - Shares Business Process Knowledge

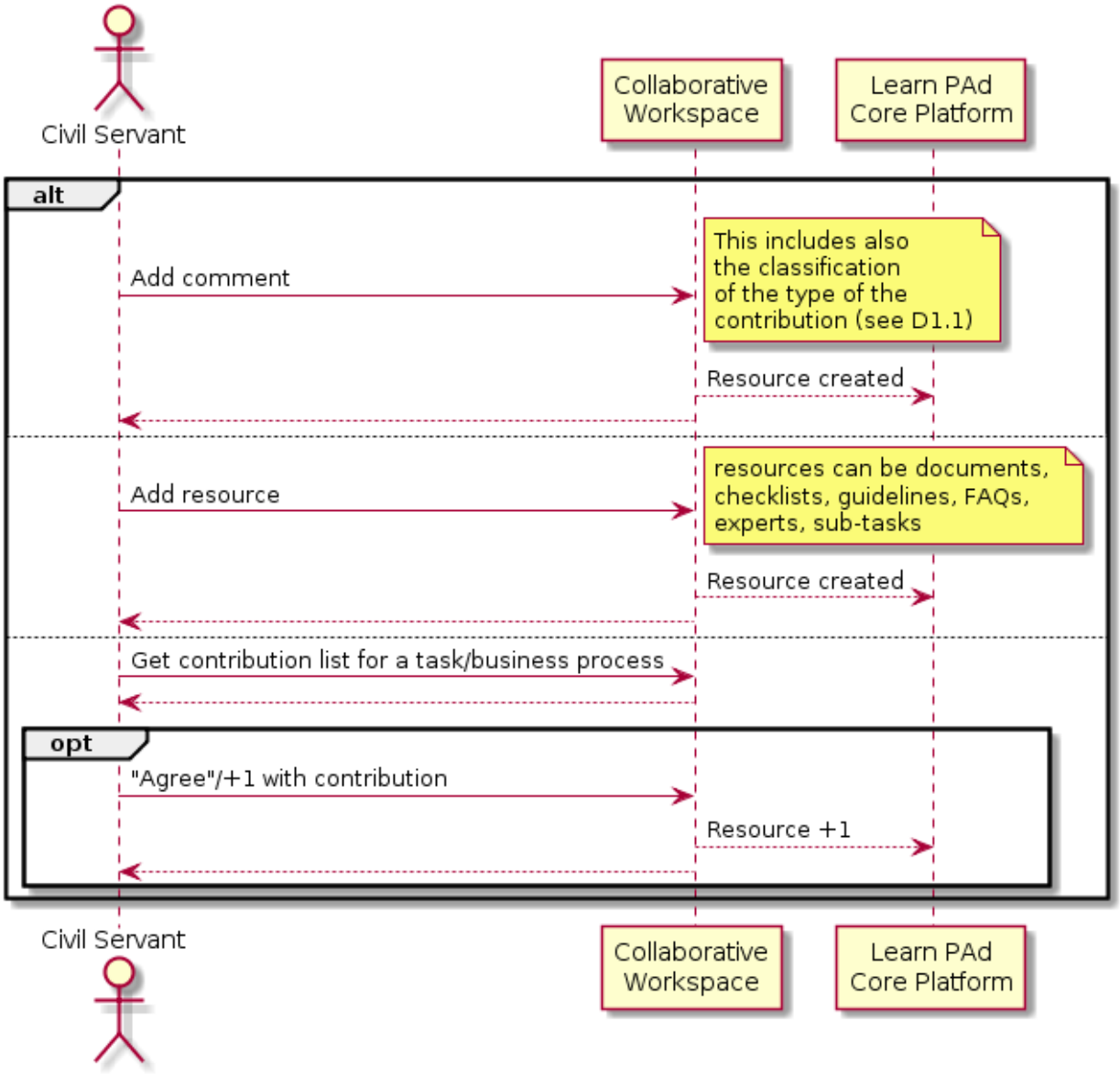


Figure 3-8 UC3.7 Share business process knowledge

This scenario describes how the Civil Servant can use the Collaborative Workspace in order to enrich a model element with additional information.

- The scenario starts with the Civil Servant that has navigated to a given model element, as described in the scenario “Scenario UC3.6 - Supports Browsing Process Documentation”
- At this point the Civil Servant is able to create new contributions associated to this model element. Contributions can be of different types, from documents to collaborative wiki pages, FAQ entries, etc.
- Besides creating new contributions the Civil Servant is also able to rate existing contributions. This is the third alternative of this scenario where a Civil Servant retrieves all the contributions that have been associated to a given model element (e.g., task or Business Process) and express a rating in the form of a “+1” or with a value on a particular scale.

3.2.8. Scenario UC3.8.1 - Access Simulation through the Collaborative Workspace

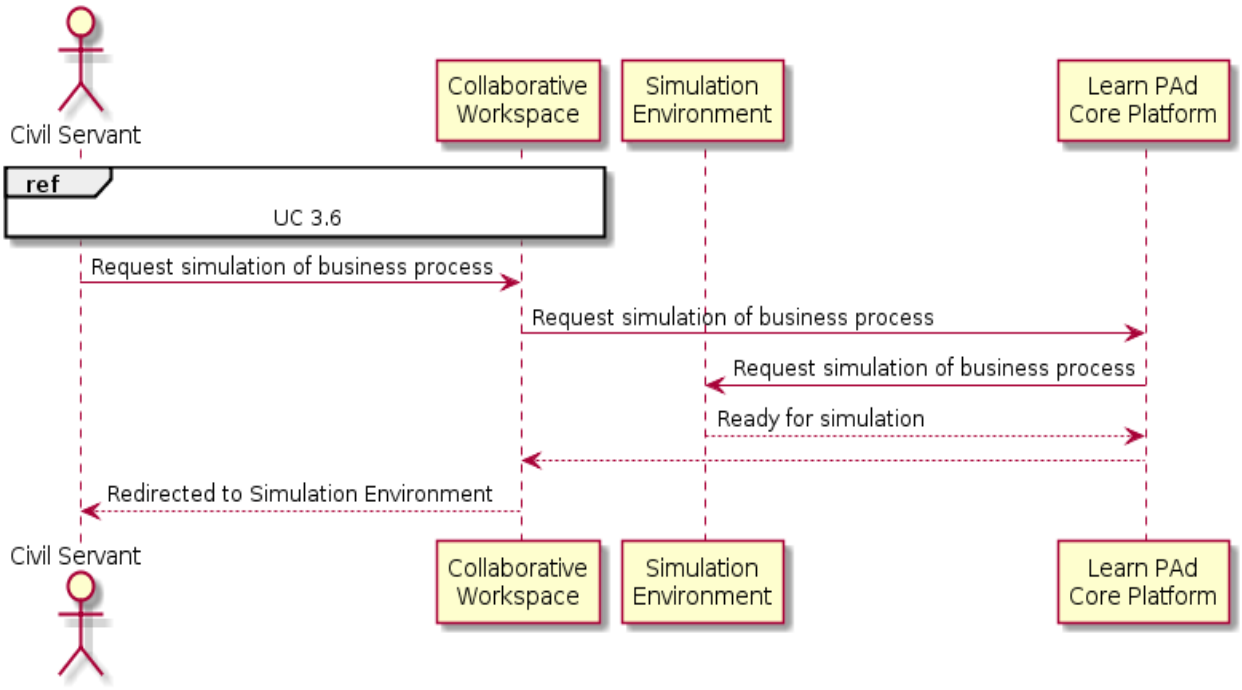


Figure 3-9 UC3.8.1 Access simulation through the Collaborative Workspace

This scenario refines the UC3.8-Simulate from the Deliverable D1.1. Specifically, it describes how the Civil Servants can use the Collaborative Workspace in order to request for the simulation of the Public Administration business process.

This sequence diagram refers to the scenario UC3.6 as a precondition. When the selection of the Public Administration process and the support browsing process documentation are completed:

- The Civil Servant requests to activate the simulation of Public Administration business process through the Collaborative Workspace.
- Then, the Collaborative WorkSpace redirects this request to the main component LearnPAd Core Platform.
- After interacting with Simulation Environment, Learn PAd Core Platform notifies to the Collaborative Workspace that the simulation of the requested business process is ready.
- Finally, the scenario ends when the Collaborative Workspace redirects the Civil Servant to the Simulation Environment in order to start the simulation part (see next section UC3.8.2).

3.2.9. Scenario UC3.8.2 - Simulate

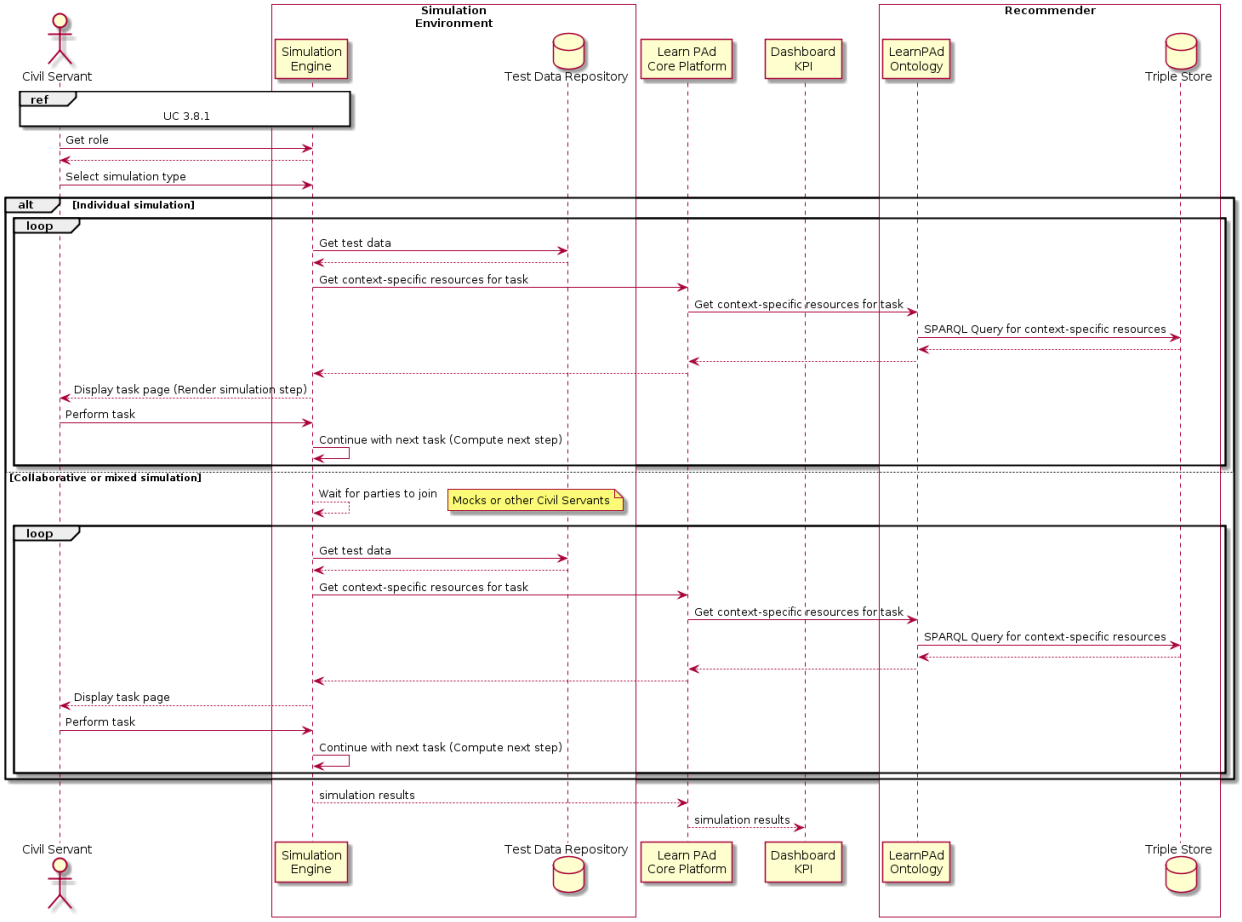


Figure 3-10 UC3.8.2 Simulate

This scenario refines the UC3.8-Simulate from the Deliverable D1.1. Specifically, it presents how Civil Servants can use the Collaborative Workspace in order to simulate the Public Administration business process.

This sequence diagram refers to the scenario UC3.8.1 as a precondition. The Civil Servant interacts with the Simulation Engine upon a simulation request.
The Civil Servant is allowed to select a specific role and which type of simulation he/she wants to execute: individual, collaborative or mixed simulation.
Only one type of simulation per time is allowed:

- In case of an *individual simulation*, for each task of the business process:
    - First, the Simulation Engine provides user with the information from the Test Data Repository and then asks to the Learn PAd Core Platform to retrieve the context.
    - Second, the Learn PAd Core Platform requests the information from the Learn PAd Ontology.
    - Then, the Learn PAd Ontology infers the information and for this technically executes SPARQL queries in a Triple Store.
    - Thereafter, the Simulation Engine displays the task's forms to the Civil Servant who will perform it.
    - Once the performance of the task is done, the Simulation Environment continues with the next task and so on.

- In case of a *collaborative simulation* or a *mixed simulation*, the Simulation Engine waits for all parties to join the simulation. These parties could be mocks or other Civil Servants (depending on the type of the simulation as detailed in D1.1). Then, for each task of the business process, we repeat the same procedure as in the individual simulation part which is presented above.

The scenario ends when the user executes all the tasks of the process. The simulator Engine sends the results, obtained in the simulation, to the Learn PAd Core Platform which forwards it to the Dashboard KPI in order to calculate the KPI about different aspects of the learning experience.

3.2.10. Scenario UC3.9 - Set learning assignments

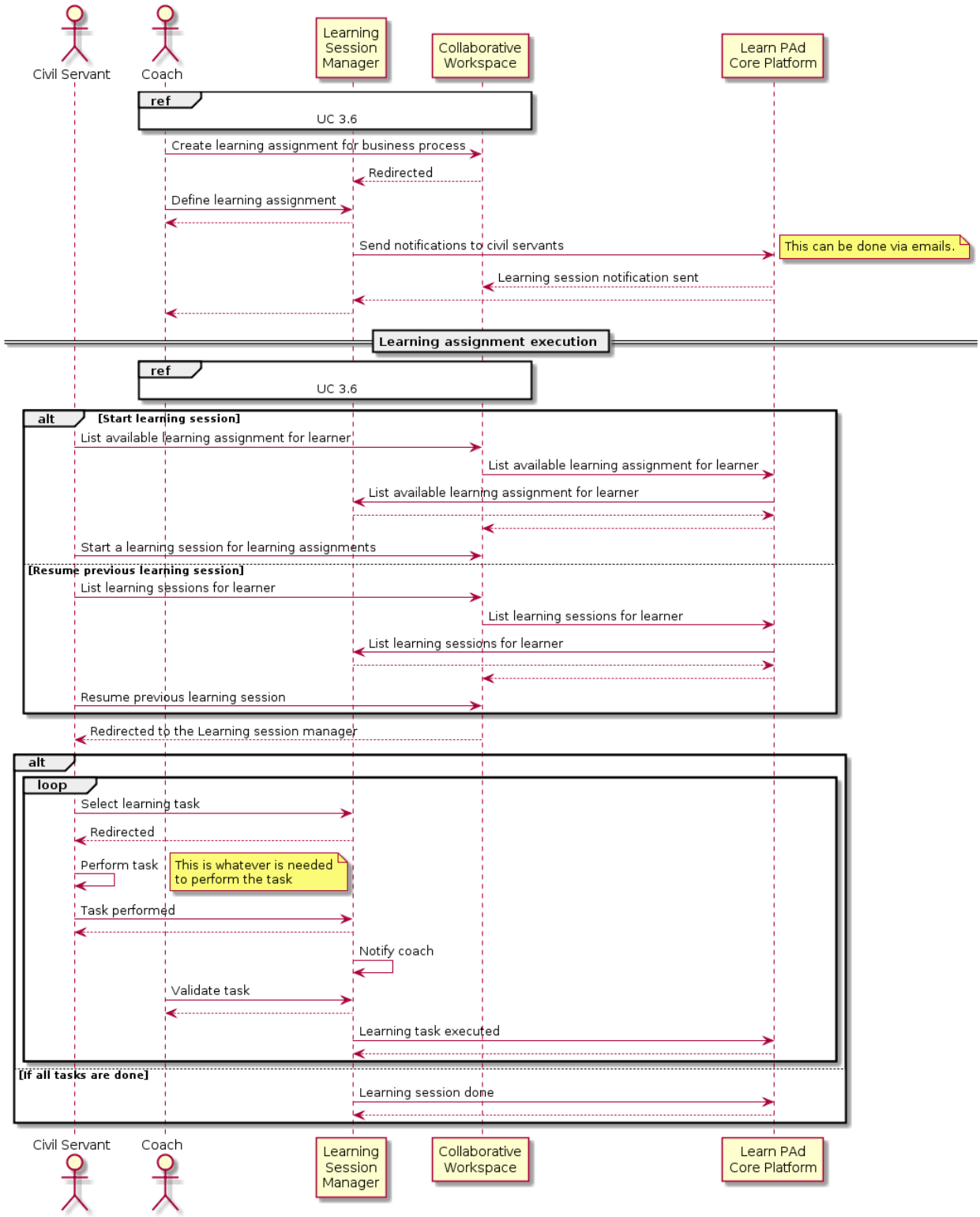


Figure 3-11 UC3.9 Set learning assignments

This scenario is divided in two parts. The first one described how a Coach can define learning assignments consisting of a set of learning tasks:

- This part of the scenario uses a reference to scenario UC3.6 as an entry point: the Coach is browsing the information about the business processes available in the system through the Collaborative Workspace. Once he finds the right business process he can create a learning assignment for it. He is then redirected to the Learning Session Manager.

- At this point the coach interacts with the Learning Session Manager for defining structuring the learning assignment, e.g., by providing the learning tasks associated to it, and the civil servants who should perform this assignment. A learning assignment might be of different types, such as answering a questionnaire, reading some documentation, or performing a simulation.

- Once he's done, invitations to perform the learning assignment are sent to the civil servants.

The second part of the scenario describes how a Civil Servant can start or resume a session:

- Also this part of the scenario starts with a reference to scenario UC3.6 as an entry point: in this case the civil servant is browsing the information about the business processes available in the system through the Collaborative Workspace.

- Associated to every business process there either a list of the learning assignments related to that business process that a Coach assigned to the Civil Servant, or a list of the learning session that the Civil Servant has already begun - a learning session defines logically the activity of a Civil Servant on a learning assignment in order to monitor it.

- The Civil Servant chooses either to start a new learning session on a learning assignment or to resume a previously started one and is redirected to the Learning Session Manager.

- At this point the Civil Servant can actually execute the tasks that have been defined in the learning assignment.

- Once he's done with a task, he can communicate the learning session manager that he is done, so that the coach can be notified of the event.

- The coach can then validate the good execution of the task. This validation information is also communicated to the core platform, so that other components can be notified (e.g., for updating KPI information)
- Once all the tasks are performed, then the session is closed and this is also communicated to the core platform, including related statistics, so that other components can be notified (e.g., for updating KPI information)

3.2.11. Scenario UC3.10.1 - Provides Recommendation for Learning

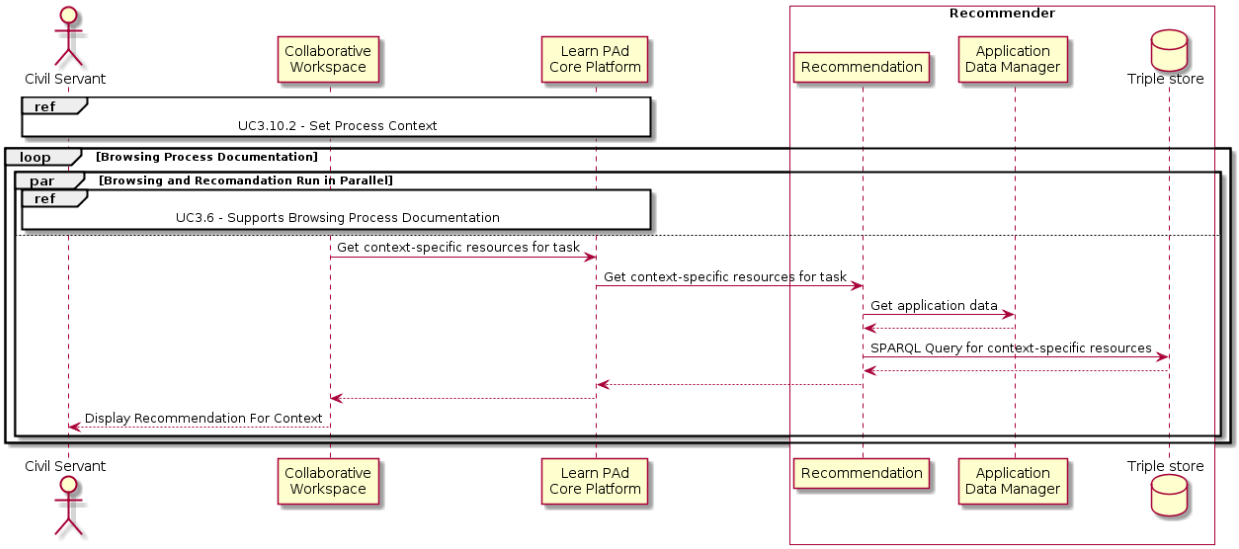


Figure 3-12 UC3.10.1 Provides recommendation for learning

The scenario contributes to the refinement of the UC3.10 from D1.1. Specifically, it describes how the Learn PAd components interacts in order to retrieve and exploit recommended resources (e.g. documents, experts, etc.) while browsing the process documentation from the Civil Servants.
The scenario refers to UC3.10.2 as precondition for its activation. When the set up of the the process context has been completed, and in parallel with the whole session where the Civil Servant browses the process documentation:

- the Collaborative Workspace queries the Learn PAd Core Platform in order to retrieve context-specific information that can be displayed/suggested to the CIvil Servant while he/she is navigating the process documentation
- the Learn PAd Core Platform redirects the request to the Recommender component which computes the suggestions. In it out of the scope of this deliverable detailing the specific architecture of the Recommender, nevertheless in the following some considerations on how to compute these suggestions are reported
    - The boundary interfaces of the Recommender component receives the request for context-specific resources
    - The Recommender looks for application specific data about the provided process context. In this sense, it queries some internal component in this scenario referred as Application Data Manager
    - By means of both the defined process context and the retreived application data, the Recommender queries a local triple store
- The context-specific resources obtained are returned to the Learn PAd Core Platform, which it redirects them to the Collaborative Workspace
- The Collaborative Workspace display the recommendation for the given context to the Civil Servant

3.2.12. Scenario UC3.10.2 - Set Process Context

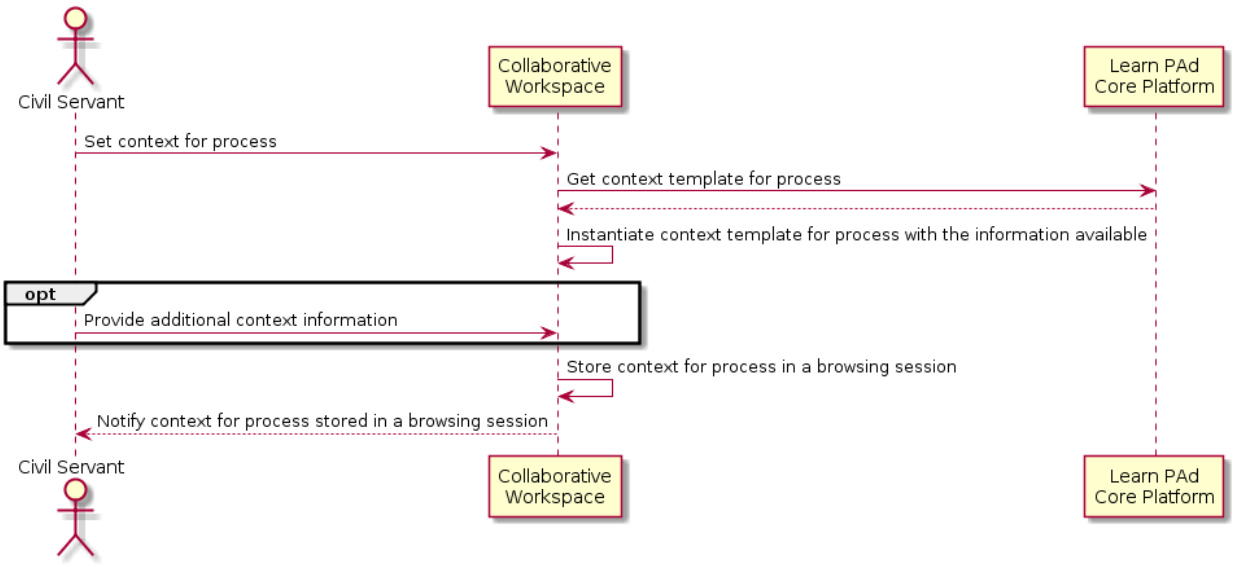


Figure 3-13 UC3.10.2 Set process context

The scenario contributes to the refinement of the UC3.10 from D1.1. Specifically, it describes how a Civil Servant can interact with the Learn PAd platform in order to instantiate those data that define the context for a given BP. The scenario is activated by a Civil Servant who requests the Collaborative Workspace to set the context for a process

- the Collaborative Workspace accepts the request from the Civil Servant
- the Collaborative Workspace invokes the Learn PAd Core Platform in order to retrieve the context template associated to the given BP. Specifically, a context template is a modelling artifacts associated to a BP which specifies the set of field (i.e. both name and type of the field) that once instantiated define a context for a BP.
- the Learn PAd Core Platform returns the context template
- the Collaborative Workspace creates a process context by instantiating the context template with the information already available in the browsing session
- if needed, the Collaborative Workspace interacts with the Civil Servant in order to collect some additional information needed in order to instantiate the process context
- the Collaborative Workspace stores the the context for the process in a browsing session. Such context will be used by others scenarios, such as UC3.10.1
- finally the Collaborative Workspace notifies the Civil Servant that the context for process has been set

3.2.13. Scenario UC3.11 - Setting up the collaborative infrastructure

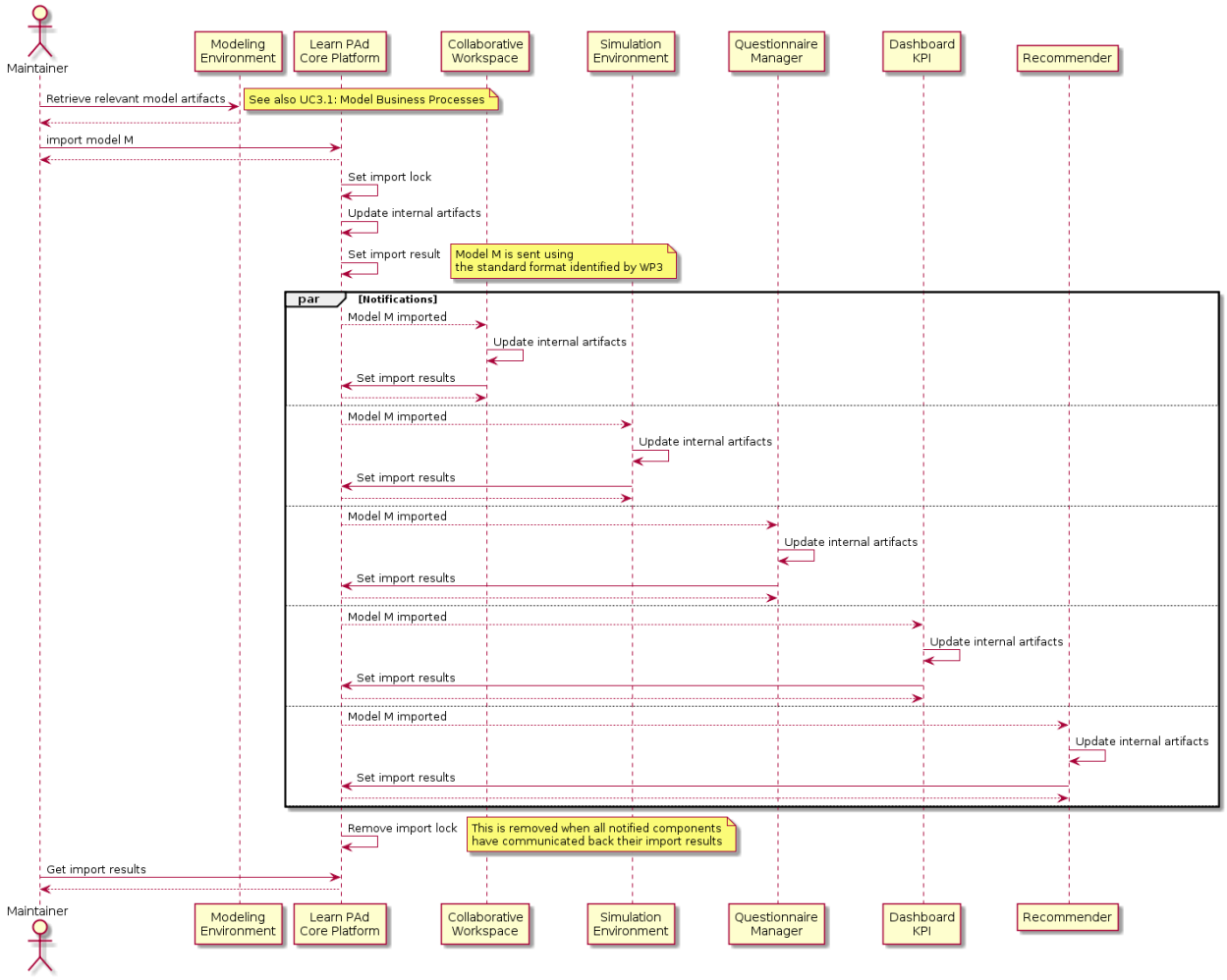


Figure 3-14 UC3.11 Setting up the collaborative infrastructure

This scenario describes the main setup of the Learn PAd platform, when models are imported and all the component configure themselves depending on the information defined in these models.

- The scenario starts when a maintainer decides to import models that have been modeled in the Modeling Environment (see UC3.1 - Model Business Processes)

- Models are then sent to the Learn PAd Platform using well known formats as they've been defined by WP3.

- The Learn PAd platform imports the model by updating its internal artifacts (i.e., the content of the repository) and then sends notifications to other components that a new model has been imported. During the importing process, in order to avoid data corruption, no other import operations will be allowed.

- Components can react to this notification by performing internal initializations and artifact updates. For example the Collaborative Workspace can generate/update the wiki pages associated to the models; the Questionnaire Manager can automatically generate some questionnaires and so on. During the import processing components might disable some kind of operations. For example, the Simulation Environment might prevent user to start

simulations or invalidate those that are ongoing.

- Once the import process has finished (i.e., all the components have terminated to update their artifacts) the lock on import operations is removed.

The Maintainer can then check whether the import operation was successful or not, and retrieve or correct the errors.

3.2.14. Scenario UC3.12 - Adds comments

This scenario matches the one already described in scenario UC3.7 - Shares Business Process Knowledge, where civil servants can comment on artifacts in the Collaborative Workspace and communicate these comments to other actors.

3.2.15. Scenario UC3.13 - Sends invitations to a simulation session

This scenario is covered by scenarios UC3.8.1 and 3.9, depending whether the Civil Servant wants to invite other participants proactively or if he is notified by the Learning Session Manager after that a coach has explicitly defined a learning assignment for him.

3.2.16. Scenario UC3.14 - Improving business processes by feedbacks

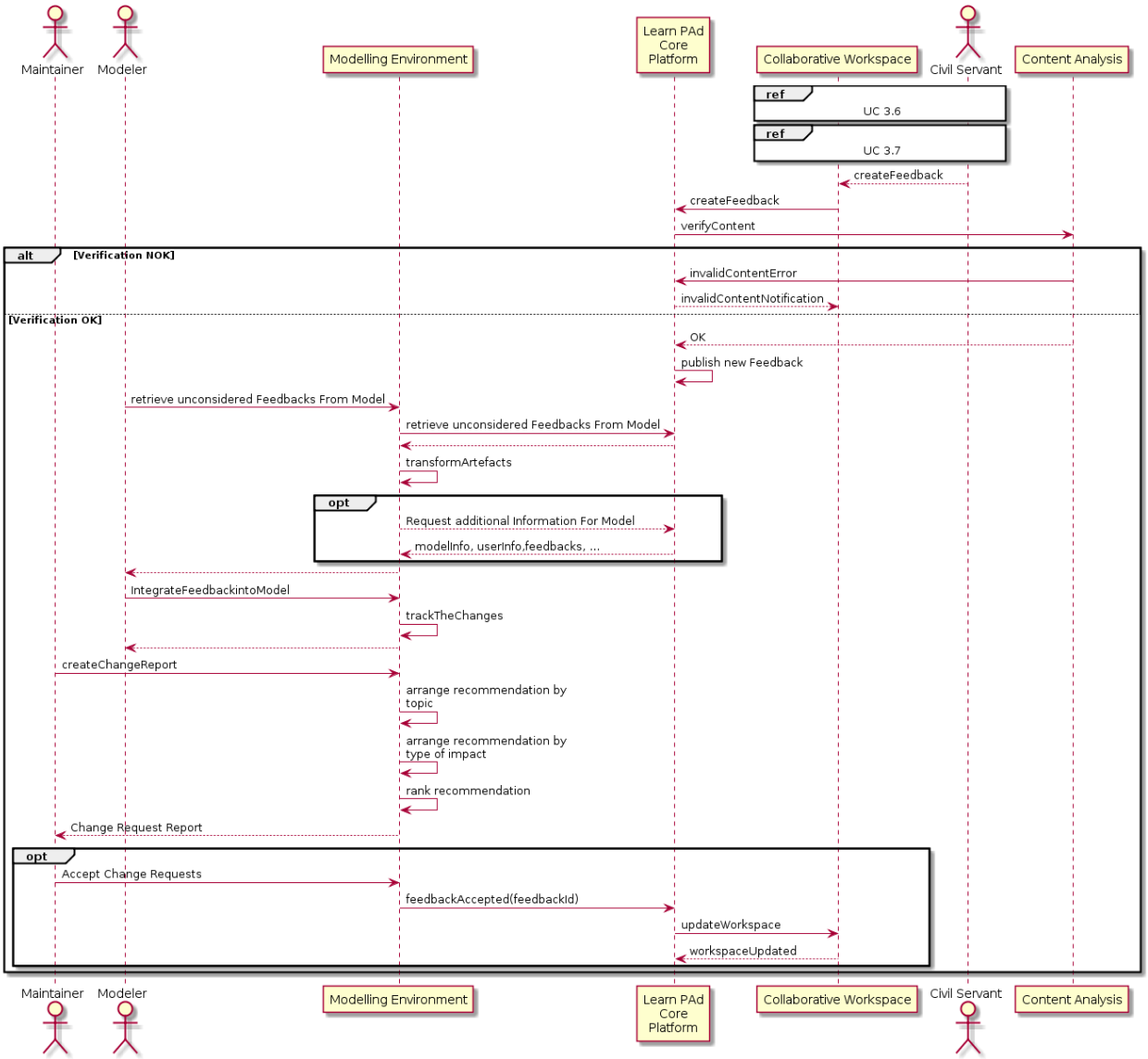


Figure 3-15 UC3.14 Improving business process by feedbacks

The scenario refines the UC3.10 from D1.1 by describing how both knowledge shared among the various Civil Servant, and the collaborative evolution of the resources available on the Learn PAd

platform can contribute to enhance some aspects of a BP. Specifically, the platform supports such improvement by implementing of a feedback mechanism between the Civil Servants and the actors involved for the modelling activities. The scenario refers to UC3.6 (Supports Browsing Process Documentation) and UC3.7 (Shares Business Process Knowledge) as precondition for its activation:

- the Civil Servants requests the Collaborative Workspace to create a feedback for the modeles about a given BP process
- the Collaborative Workspace collect the required information from the Civil Servants and it forwards the request to the Learn PAd Core Platform
- the Learn PAd Core Platform interacts with the Content Analysis in order to evaluate the quality of the proposed feedback
- if the verification does not pass, the scenario is aborted,
- if the verification passes
    - the Learn PAd Core Platform published the feedback on a public area similarly to what happen with the most common bug reporting system
    - in this case, when the Modeler can retrieve the unconsidered feedback on the Learn PAd platform, by querying the Modeling Environment component. Optionally this interaction may request to retrieve some additional data from the Learn PAd Core Platform.
    - once the feedback and the model have been loaded into the Modelling Environment, the Modeler can integrate the suggestion given by the Civil Servant
    - when the update of the model is over, the Maintainer (which is the responsible of the upload of a BP on a Learn PAd instance), can submit a change report and then if the changes are accepted, he/she can proceed with the upload of the model on the platform.

3.2.17. Scenario UC3.15 - Enables monitoring of goal achievement

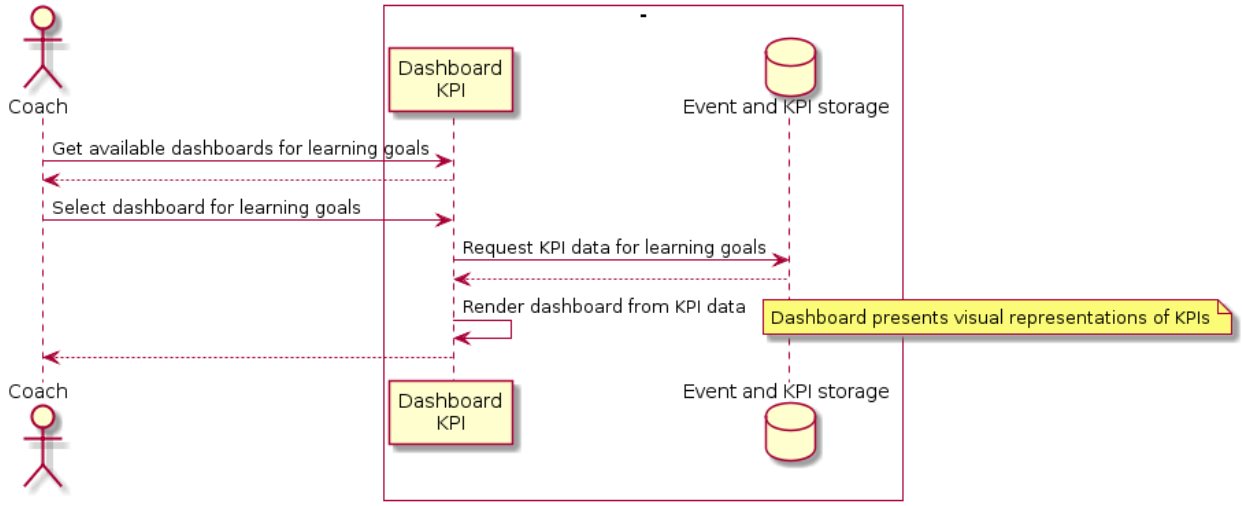


Figure 3-16 UC3.15 Enables monitoring of goal achievement

This scenario describes how a coach can interact with the DashBoard KPI component in order to retrieve information about the current learning goals defined in the platform, and that are evaluated by using KPIs associated to them.

- The scenario starts when coach wants to access to the information about the learning goals that are currently defined in the platform. This information has been previously stored by collecting the events that have been generated during the usage of the platform, and organized in dashboards (i.e., groups of learning goals and related KPI). At first he requests a list of the available learning goals to choose from.

- Then he select a particular dashboard he is interested in.

- The component performs a query to the storage where KPIs values have been stored and renders this information in a suitable format depending on the request (e.g., HTML if the user is accessing via a browser, or JSON/XML if the request was meant for consumption by another system)

3.2.18. Scenario - Content Verification

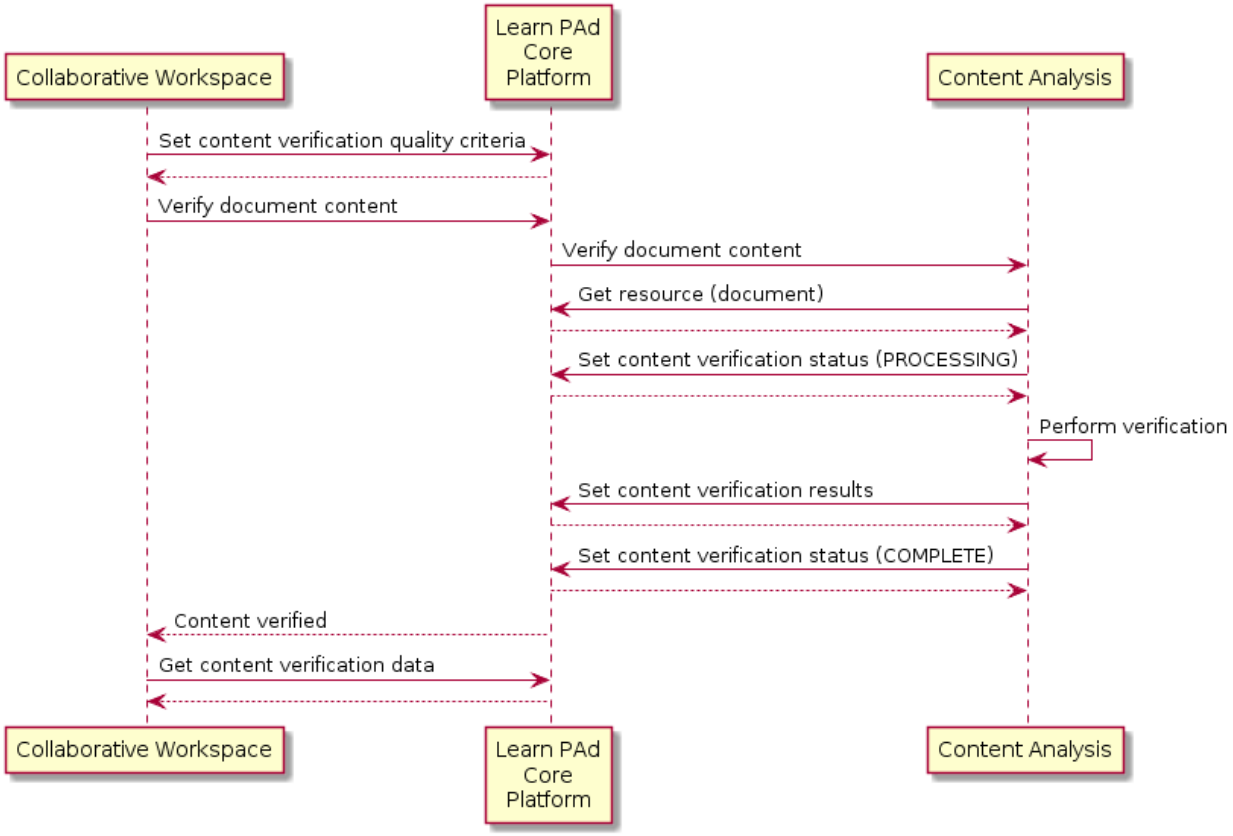


Figure 3-17 UC3.16 Content verification

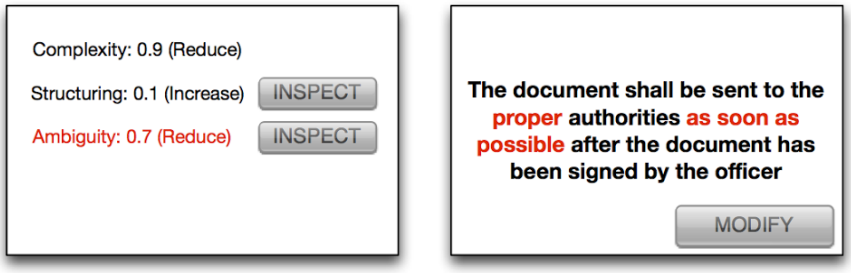
This scenario describes how a content analysis if performed.

- The Collaborative Workspace initiates the scenario because the user has requested to perform an analysis of the content of a resource. This is done by setting the quality criteria that the user wants to analyse. The functionality could use a UI that is available from the Collaborative Workspace where the user can select such criteria.

  These criteria can be stored permanently so that subsequent analysis might reuse them until the user decide to change them.

- Once the Verify document content request has been sent it is forwarded to the Content Analysis tool which retrieves the document to be analysed, its associated analysis criteria and performs the actual verification.

- A status associated to the document is set depending on the progress of the analysis.
- Once the analysis is over, a notification is sent.
- The results are then available and can be presented to the user also via a UI



This UI can display information about what could be improved and the portions of the text that are causing problems.

The user can then edit the problematic portions of the text, and in case redo a verification to check whether the content quality has actually improved.

4. Conclusions

In this deliverable we presented a first iteration of the description of the high level architecture of the LearnPAd core platform, with a particular focus on the definition of an initial set of operations that are needed in order to implement its functionalities.

There are still several open questions that will be refined in next iterations both through new information that will be provided by scheduled deliverables (e.g., those that will clarify the details of the models that will be taken into account), and by the beginning of prototypes implementation activities that will help us discover missing elements.