Modelling for Learning in Public Administrations – The Learn PAd approach

Guglielmo De Angelis, Alfonso Pierantonio, Andrea Polini, Barbara Re, Barbara Thönssen, and Robert Woitsch

Abstract This chapter describes a modeling method that has been conceived to support learning within public administrations. The modeling method foresees the description of both procedures in the public administrations, and the working context of the civil servants. The approach relies on sevelar model types that are used to organize and to relate the knowledge needed by civil servants in order to perform their daily activities. Each model instance describes a view on the concerns expressed by the model type it conforms. These descriptions intends to provide an easy way for learners to retrieve relevant knowledge when they need to learn specific aspects of a procedure, and to enable the collaborative emergence of knowledge related to the procedures themselves. The method has been conceived and developed within the FP7 EU research project Learn PAd.

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1 Introduction

In modern society public administrations (PAs) are undergoing a transformation of their perceived role from controllers to proactive service providers, and are under pressure to constantly improve their service quality while coping with quickly changing context (changes in law and regulations, societal globalization, fast technology evolution) and decreasing budgets. Modern trends in Information and Communication Technologies (ICT), and in particular in relation to wide usage of social networks, introduce new ways of delivering services to citizens, and often impose profound reorganizations of PA offices. Clearly a wise introduction of such technologies can drastically improve the reputation of the PA perceived by the citizens, and can also ameliorate the working context for the civil servants. Nonetheless civil servants are nowadays challenged by these changes, and possible re-organizations of a PA office asks them to understand and put in action novel procedures and rules within tight time constraints.

In such a context traditional approaches to learning seem to be rather ineffective and they need to be complemented with novel learning approaches and solutions. In such a context the Learn PAd[1] EU research project has defined a novel learning approach and platform that are strongly based on the usage of models. In particular models are used to organize the knowledge needed to correctly perform the activities foreseen by the procedures in which a civil servant acts. Investigations made within the project permitted to identify different model types considered particularly relevant to permit the inclusion of all information needed for an effective learning. In particular the following model types have been indentified and included in the approach:

- Business Process (BP) models, that permit to represents how activities should be performed in sequence, and the conditions for their execution
- Case Management (CM) models, that permit to represent knowledge intensive activities in which it is the organization in a flow of a set of activities should be let to the knowledge and experience of the civil servant. Interestingly the relation between CM models and BP models in investigated in Chapter **(reference to Knut chapter in the same book**
- Organizational models, that permit to represent people, roles, and their responsibilities within the organization
- Documents and Knowledge Models, that on one hand permit to represent the structure and objective of documents to be filled, checked, delivered etc and on the other hand permit to describe more precisely the knowledge related to the defined models
- Competency models, that permit to represent the competencies needed to preform some activity and as well as the competencies acquired by a civil servant
- Business Motivation models, that permit to describe business strategies and learning goals of the organizations useful to assess possible improvements in knowledge of CSs

[1] see: `http://www.learnpad.eu`

- KPI models that permits to represent the learning goals and the KPIs to measure them

The model types listed above are bound together by the definition of suitable links that, as detailed in the following of this chapter, permits to relate concepts in one model to other concepts in other models.

The learning approach devised by the Learn PAd project use models both to better organize the knowledge and to derive a collaborative space, within a collaborative platform, that can be accessed by the civil servants to create and share knowledge on the activities they have to perform. In particular the collaborative space is automatically generated from the models and will permit to the civil servants to directly refer to knowledge related to the different aspect of the models.

The following of this chapter reports how within the project the approach has been defined, as well as the meta-models defined to support the different model types. The resulting modeling environment has been made available thanks to the OMiLAB platform.

2 Method Description

The Learn PAd modelling method applies business process management for process oriented learning, hence the core concepts focuses on business process management. As Learn PAd uses the business processes for learning aspects, the idea is to use also the model-based approach for learning related modelling and identify applicable relations between the business processes that represent the object under observation as well as the learning models that describe the Learn PAd approach.

Business processes and learning models are both representatives of concept models hence have a tight relationship with semantics. Therefore, the integration of so-called modelling utilities such as ontologies or more human oriented knowledge acquisition tools, seems appropriate.

This results in a hybrid modelling approach; combining (a) business process related, (b) learning management related and (c) so-called modelling utilities together.

Fig. 1 depicts current high level conceptual architecture on the Learn PAd modelling method, highlighting the conceptual environment of the Learn PAd modelling method.

Business Process Related Modelling: The major aspect in business process-oriented learning is the appropriate representation of a business process within the public administration. Beside the typical standard approach in using BPMN 2.0[1] for covering the business process management, Learn PAd additionally requires to specify relevant knowledge and skill profiles. In particular the business goals, strategies and business motivations, the organizational structure, the document and knowledge models are seen as the context of the business process model in Learn PAd.

In order to enable collaboration mechanisms for models on the Wikiplatform, the corresponding concepts for such collaborative concepts need additionally to be reflected in the business process modelling language.

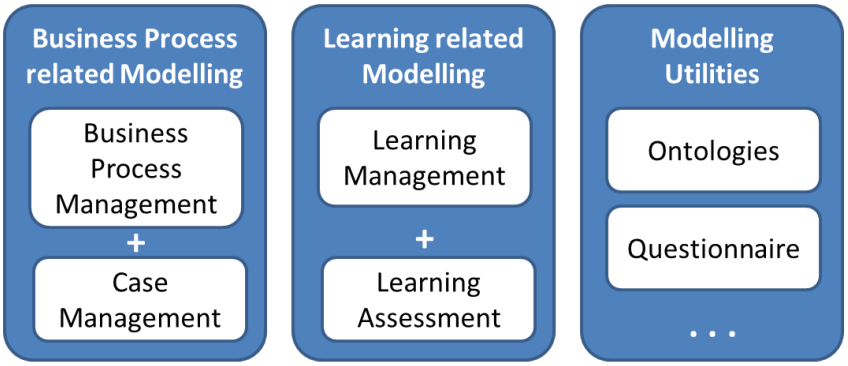

Fig. 1 High Level Building Block of Learn PAd Modelling Method

PAs usually deals with a wide set business process kind: ranging from well structure processes (e.g BPMN-like notations), to weakly structured processes (e.g. CM-like notations such as CMMN[2]). Indeed, the Learn PAd modelling method has to cope with hybrid process-oriented modelling notations.

Learning Related Modelling: Learning related modelling deals with the specification of learning goals, definition of the learning content and the teaching path in presenting the content in the ideal way for each individual learner. Typical aspects are learning goal, curricula, skill profiles, teaching content and the packaging towards a learning management platform. Current state of research is to continuously asses the learning progress and hence combines the teaching path with assessment models that specify the goals that need to be achieved and also the assessment method. Depending on the level of detail, the learning management will be performed using the ECAAD method. Conceptual linkage is foreseen, so that Learn PAd business processes are seen as content packages of the ECAAD method, as well as different business processes models correspond to different phases of the learning process in ECAAD.

Modelling Utilities: Modelling Utilities are modelling concepts that may or may not be used and hence can be flexibly added to the meta model. Current identified aspects are ontologies for semantically lifted log mining or questionnaires models for a model-driven development of tests.

Although those modelling utilities are not mandatory, the Learn PAd modelling method foresees as possible interaction, such as using the so-called “semantic lifting” approach to integrate ontologies, or to investigate a “graph rewriting” to export and transform relevant parts of the business process to questionnaire models.

Understanding the Learn PAd modelling method within its conceptual environment, it is now possible to distinguish between concepts that must be included into the Learn PAd modelling method (e.g. such as BPMN, CMMN, Roles and knowledge), concepts that are may be included as nice to have (e.g. such as business motivation, Key Performance Indicators, or skill profiles) and concepts that are not

appropriate to be put into the Learn PAd modelling method (e.g. learning goals, learning assessment indicators, questionnaires).

After defining the scope of the Learn PAd meta-model, the next section introduces the method conceptualization in more detail.

3 Method Conceptualization

The Learn PAd project focusses on business process oriented workplace learning. This includes models of organizational structures and procedures, models of resources, models used for monitoring and assessment of business performance and learners' achievement. To this end, modeling the different facets of a business process is key for expressing the relations among the several model types and model objects and for representing them in a machine understandable way also cognitively adequate for humans.

One of the main contributions of the project is indeed represented by the possibility to provide precise definitions of almost any aspect of a business process in the context of PAs: enhanced models for business processes which contains additional information about knowledge entities, performance indicators, competencies, organization, etc. This can be regarded as a dedicated architecture framework [7] for creating, interpreting, analyzing and using business descriptions within the context of Public Administrations. In this respect, a comprensive meta-model consisting of a *orthographic* [4][2] set of coordinated modeling languages has been devised in order to endow typical data and flow descriptions with additional aspects ranging from the specification of the skills necessary for consistently assign a responsibility, to what are the resources useful for an administration to achieve its goals.

In particular, Fig. 2 gives an example of how the Learn PAd models can be structured by Zachman's enterprise architecture framework [11]. Focus is on the *how-aspect* showing the models for the various perspectives, starting on top with a service catalogue defining the services administrations must provide. Followed by the conceptual meta-model providing the relevant business concepts. The relations, however, are implicit and hence, the number of a process, defined in a service catalogue on the *scope concepts* level may occur in the process description on the *business concepts* level but that relation is not formalized and therefore hard to trace. The same holds true for the relation between a process model on the *system logic* layer and the process description. In addition to the *vertical relations*, the *horizontal relations* between *business objects* have to be considered. For the sake of better reading only relations between models on the system logic layer are depicted in Fig. 2.

The consequent holistic view is possible in Learn PAd thanks to a multi-view specification, whose definition is given in terms of meta-models and relationships among them as illustrate in Fig. 3. Hence, dependencies between the meta-models

[2] The term *orthographic* is intended for denoting a minimal, least coupled set of orthogonal viewpoints.

become clearly visible and can be utilized for improving collaboration and better supporting workplace learning by increasing transparency. Since in Learn PAd the conceptual model is represented in an ontology knowledge about the interrelations between models can be used for actively guide a learner for example by recommending to access knowledge related to a task she is performing.

In particular, each meta-model permits the description of a different viewpoint in the process model. Each viewpoint is then interconnected according with weaving models [5] necessary to maintain the different modeling views consistent.

Moreover, they provide a navigation map that permits to access any information related to the process, as for instance the competency profile needed for executing a given activity. Even more important, as the weaving models are represented in an ontology all object types are semantically and hence, unambiguously described. This is of crucial relevance in those cases where the language specification leaves the semantics of given concept open. As for instance the BPMN [1] specification

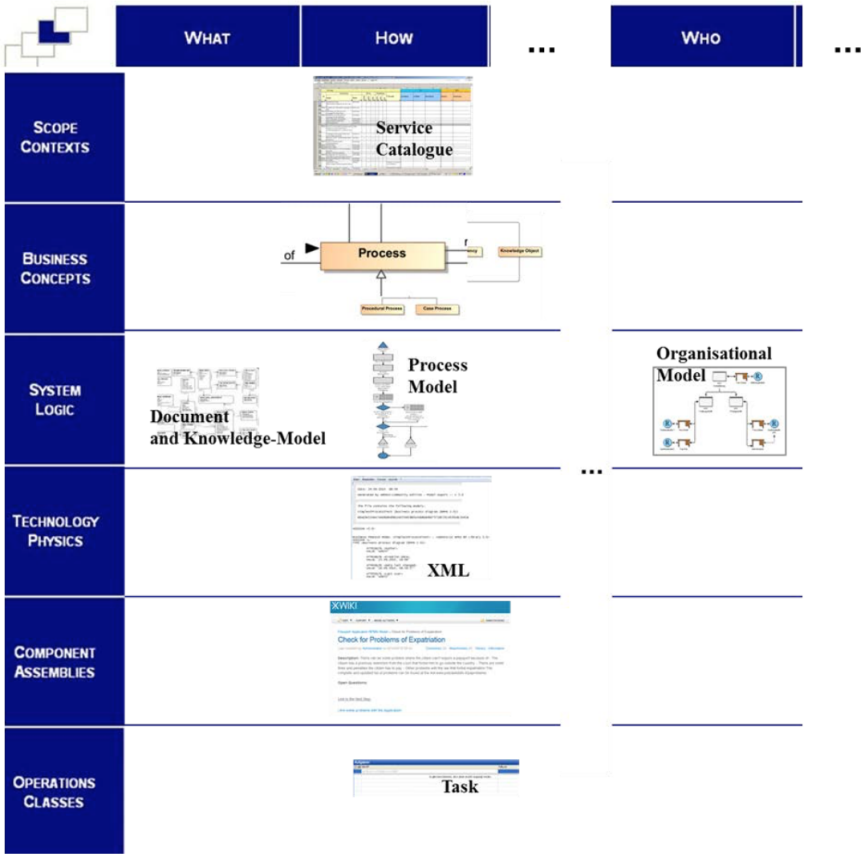

Fig. 2 The Learn PAd models structured by Zachman's matrix

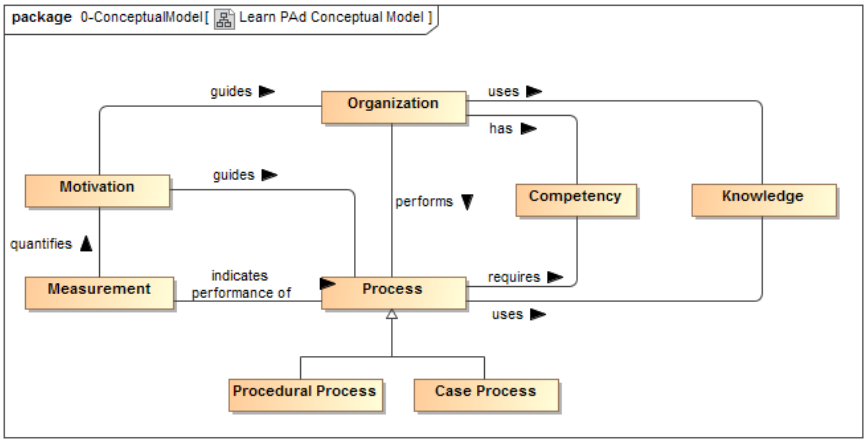

Fig. 3 The Learn PAd Meta-Model

presents some ambiguities [9] since the pool and lane concepts can denote various business aspects as for example an organization, a role or an IT-system.

A process is typically perceived as a sequence of activities that the administration executes in order to produce a service for the end-user. These activities are most of the time knowledge-intensive and require transparency and information tracing. In addition, the responsibility of their enactment is assigned to organizational units within the administrations which pursue given goals. Therefore, in order to better support the learner the typical business process modeling has been intertwined with additional modeling structures to make knowledge relevant in a given process explicit and to actively recommend context-specific learning material.

Each component meta-model focuses on a different aspect of the business processes. Each cell of the matrix in Fig. 2 shows the provided meta-model. Furthermore, for one model type several modelling language are supported. In particular, the business process model type can be expressed in BPMN 2.0 or in CMMN [2]. That is, besides procedural processes also case processes are supported. Learn PAd also enhances BPMN 2.0 by a new object type called knowledge intensive subprocess which allows for relating to CMMN. Other aspects which are relevant for the Learn PAd objectives are related to the necessity to model business goals and success factors. Also the way an organization is arranged and how this organizational structure is capable of enacting the process is another aspect which has been considered. The following component meta-models have been defined by adapting current industrial standards of modelling languages:

– business motivation meta-model[3] (BMM) [3],
– business process management and notation (BPMN) [1], and

[3] In order to stress the distinction between model and meta-model we prefer to use the term meta-model also for denoting standards like OMG's BMM, which we call Business Motivation Meta-Model.

– case management and notation (CMMN) [2].

The adaptation consists in avoiding redundancies and eliminating those constructs considered unnecessary in the contexts of Learn PAd. It is worth noting that simplifying modeling standards to keep them manageable is more the rule than the exception in PAs, as for instance with BPMN 2.0 which is often adopted in administrations by only considering a fragment of it. Adpation also means - as detailed above - enhancing a meta-model to reduce ambiguity or to provide more flexibility.

The remaining component meta-models have been defined in Learn PAd from scratch

– competency meta-model (CM)[4],
– document and knowledge meta-model (DKM),
– key performance indicator meta-model (KPI), and
– organization meta-model (OM).

and refer to the modeling of competencies, resources, measurements, and organizations necessary to accomplish the process activities. In order to specify the correspondences across the different model kinds describing the manyfold nature of a process, concepts belonging to two or more meta-models are cross-linked by means of weaving models.

As an example, please consider the *lane* concept in Fig. 4. As said, its semantics is at some extent too loose for an accurate enactment of a given business process according to the corresponding BPMN specification. In order to restrict its employ-

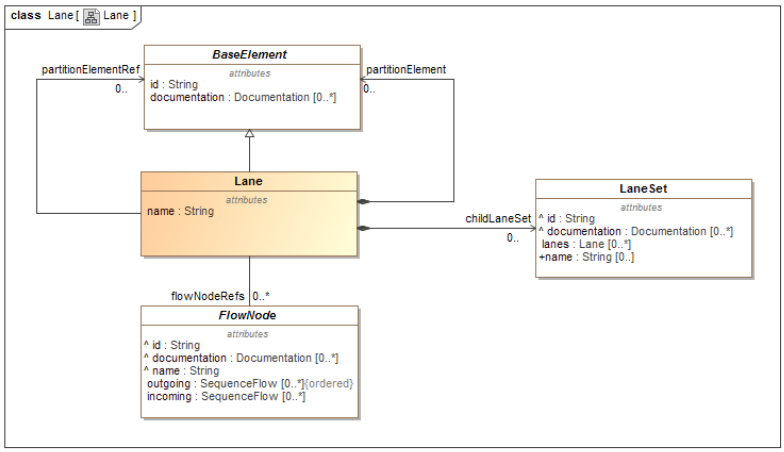

Fig. 4 The Lane concept

ment to the intended ones only, it can be anchored to the corresponding concepts

[4] The competency meta-model is based on the European Qualifications Framework EQF; https://ec.europa.eu/ploteus/de/node/1440.

in the respective meta-models, for example to the organization meta-model as illustrated in Fig. 5, where a lane may accomodate activities whose responsibility belongs to an entire *organizational unit*, to a *performer*, or to a given *role* in the organization. For the sake of clarity, in Fig. 14 a small fragment of the organiza-

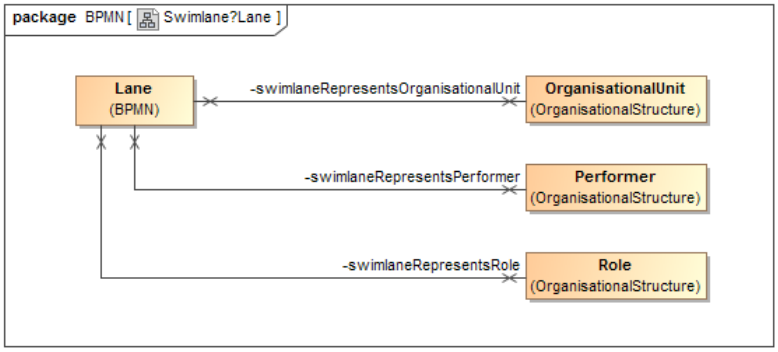

Fig. 5 The Swimlane-Lane weavings

tion meta-model is given where the organization unit is described in terms of its goals and the resource it can rely on. Due to the representation of the meta-models

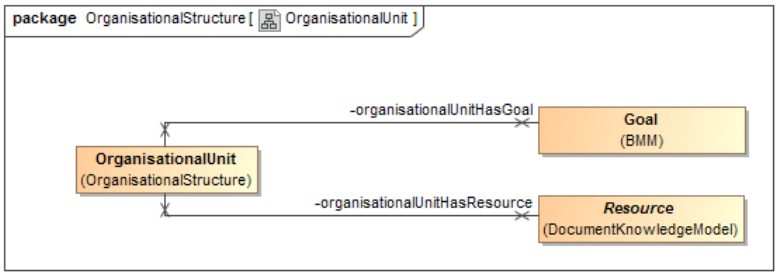

Fig. 6 The Organizational Unit concept

in an ontology concepts are unambiguously defined and machine executable. Furthermore, embedded in a comprehensive enterprise ontology concepts are refined according the ArchiMate standard [7], as depicted in Fig. 7. To give an example of how the concepts are elaborated in the ontology for the concepts *organisation* and *motivation* the refined concepts are depicted. The ontology used in Learn PAd, called ArchiMEO is based on the ArchiMate standard, that is, all concepts and relations defined in ArchiMate 2.1 are formally represented in RDFS 3.0. The ontological representations of the refinements of concepts and relations are considered Learn

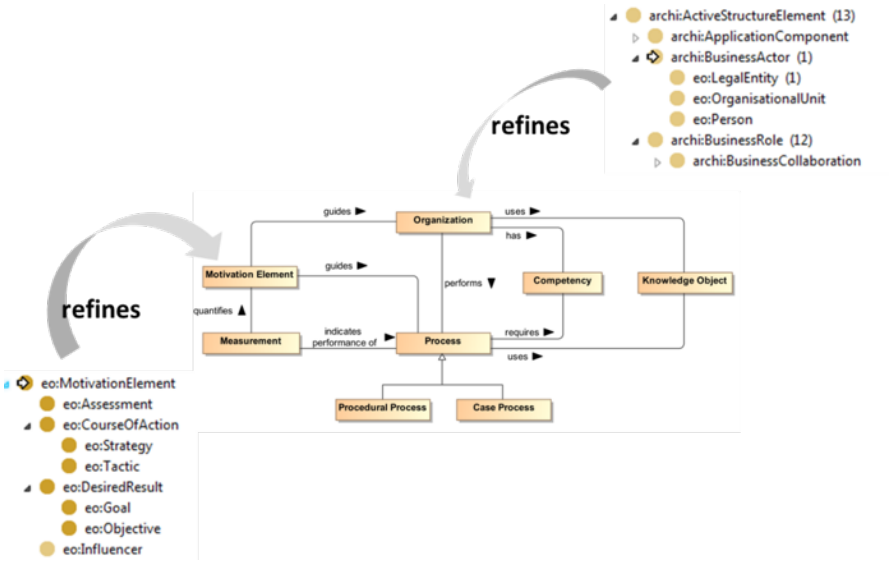

Fig. 7 Example of refinements for concepts

PAd specific enhancements. The ontology is used for determine context-specific recommendations for learners based on their EQF level and learning preferences.

4 Proof of Concept

The modelling approach presented in this chapter has been applied to develop the artefacts needed by the demonstrators of the Learn PAd EU research project. Specifically a set of models have been designed by means of a modelling tool prototype that is described in Section 4.1. Section 4.2 instead reports the models derived using the tool consiedering the case of and Italian PA office in which civil servants have to put in place activities in relation to budget reporting for a financed EU research project.

4.1 Tool prototype

The Learn PAd modelling tool has been collaboratively developed on the ADOxx.org platform, using ADOxx as the meta model platform and using features and sample

scenarios to improve the functionality of the Learn PAd modeller. It can be downloaded from the Learn PAd developer space at: www.adoxx.org[5]

The main goal of the modelling tool is to enable the graphical editing of artefacts conforming the Learn PAd meta-models. Nevertheless, some scenarios on process-oriented learning revealed additional features for the modelling environment supporting also the collaboration for the evolution and enhancement of the business process model.

Model Type Implementation

In addition to the implementation of model types as collections of modelling classes, the model types have been grouped in (a) Business Motivation, (b) Processes, (c) Organisation, (d) Case Management, (e) Competence Management, (f) Document and Knowledge Products as well as (g) KPI related model types.

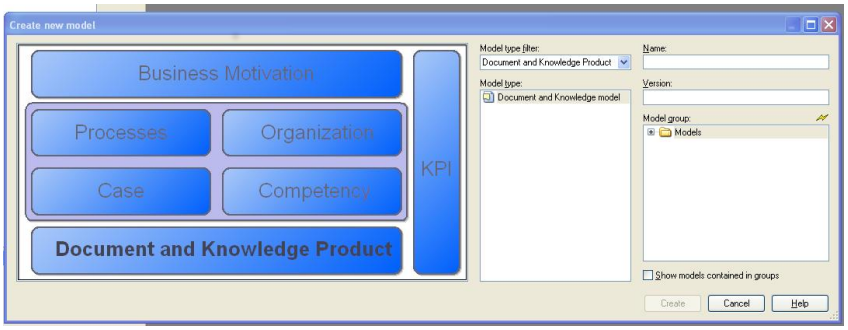

Fig. 8 Graphical Representation of Model Types

Each of the groups contains the relevant modelling types; the user interface introduced in Fig. 8 depicts an intuitive entry point into the complex Learn PAd modelling language. Each of the model types is a collection of modelling classes, hence in the following some interesting modelling classes are described.

Modelling Classes Implementation

This section describes the implementation of modelling classes within their corresponding model types. In the following not the full modelling language is shown in form of the prototypes, but only relevant model types that indicate the core of the process oriented learning but also the Learn PAd specific additions.

[5] see: https://www.adoxx.org/live/web/learnpad-developer-space/learn-pad-modelling-environment

Business Process Model The core of process oriented learning is the business process as the central object of concern. Although BPMN 2.0 was selected as the current business process modelling notation standards, Learn PAd requires additional attributes and references.

As BPMN is only used for human interpretation in the Learn PAd, only the core set of BPMN 2.0 had been used. However, in order to overcome the weaknesses of BPMN that does not defined the relationship with other modelling aspects, such as the organizational diagram, cases or documents, such references needed to be added to the modelling language.

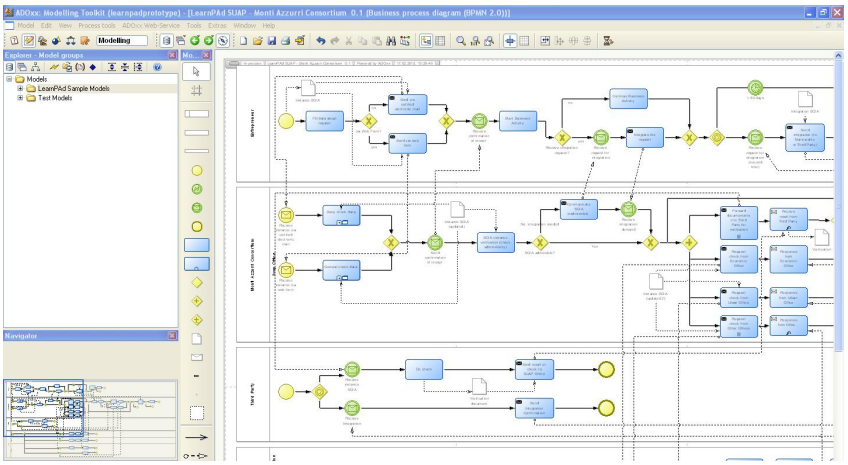

Fig. 9 Business Process Modelling Notation within the prototype

Fig. 9 depicts the typical modelling user interface of modelling tools developed on ADOxx. The class representation on the right side, are following the graphical notation of the BPMN specification. The menu and icon bar on top provide the modelling features, the explorer on the left side enables the management of models, whereas the navigator at the left bottom corner supports the modelling in large processes. The model bar in the left center of the figure provides all necessary BPMN objects, whereas different view modes are filtering the modelling classes and hence provide the relevant set of modelling classes.

Case Management Model Case management can be seen as an alternative to business processes by covering the unstructured or semi-structured parts of the business process. Recently the CMMN specification had been published that defines a notation for modelling so-called cases, that do not necessarily require a sequence, but can be worked out in any order. The relation between business processes and case models, has been realized by a similar concept as the sub-process, where the structured part of the process is represented in the BPMN notation, and the unstructured part is presented in case models like indicated in Fig. 10.

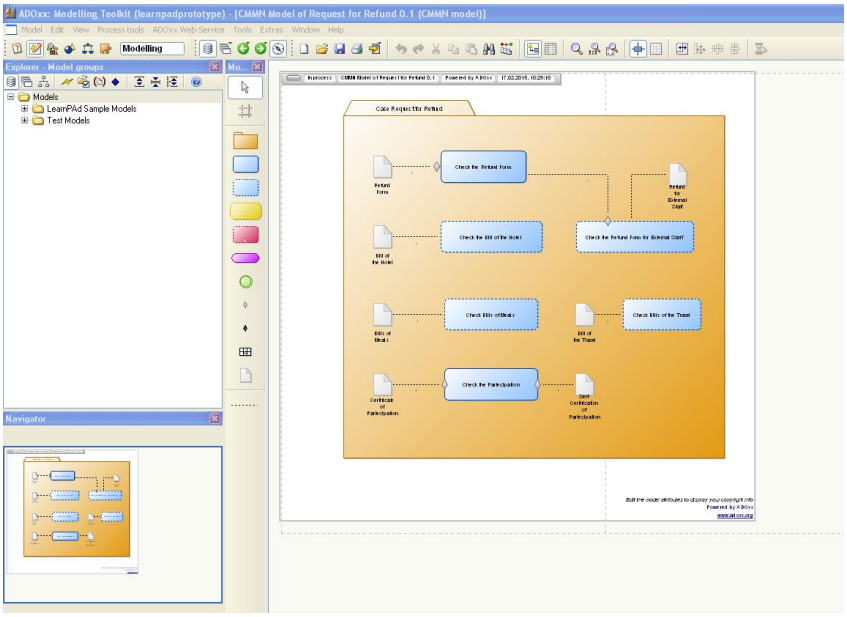

Fig. 10 Case Management Notation

Another interesting implementation is the document and knowledge model, where the modelling class "document" gets enriched with the modelling class "knowledge source" and "knowledge resource". This enables to describe not only the atomic knowledge representation in form of a document, but also a collection of documents in form of a "knowledge source" as well as the inclusion of implicit knowledge – such as expert knowledge or community opinion – in form of "knowledge resources".

Implementation of the modelling features Basic features in graphical modelling are (a) graphical representation, (b) query, (c) simulation and (d) transformation; hence although Learn PAd uses the basic feature of all of them, there are features that are especially important in the context of human interpretation. In order to support learners with the graphical representation of business processes, the different graphical representation features as well as the collaborative modelling are of high importance.

Therefore the following special features on graphical representation of models are introduced:

- *People-Like View*: to support the graphical representation in a user friendly way without using typical representation of concept modelling.
- *Bar Display View*: to display all relevant influence factors of the business process with additional bar displays.
- *Comments Sidebar*: to support collaborative changes using comments to objects, like track change comments.

People-Like View The People-Like view allows for an easily interpretable, pictorial representation of tasks within a business process. Having modelled a given business process, the user can toggle the People-Like View on, transforming the typical concept model graphical representation into a series of cartoon-like images with a domain specific depiction of the task that needs to be performed. For example the following chain of tasks is transformed on activation of People-Like View as illustrated in Fig. 11

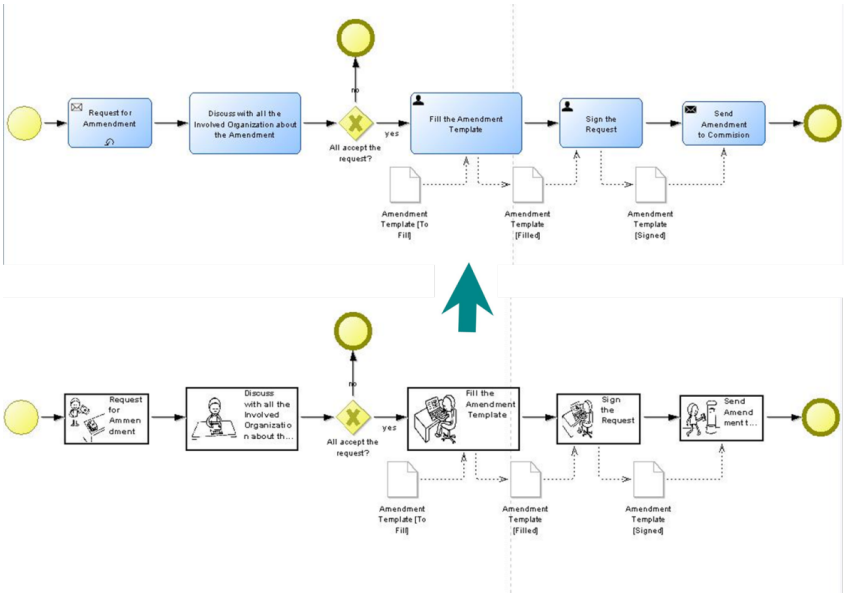

Fig. 11 People-Like View Representation of a Business Process

Comments Sidebar The Comments Sidebar enables the collaborative commenting of modelling objects. On activation of the Commenting Sidebar, the drawing area is divided into an area where modelling is performed and an area where comments for each object are displayed; the bar itself can be placed horizontally – as shown in Fig. 12 – or vertically.

When commenting is enabled, each modelling object receives two tabs at the top-right corner, one in form of a pencil to comment the object and one in form of an "×" to delete the associated comment.

Upon entry of a comment, the comment is displayed in the comment bar next to the object, depending on the orientation of the commenting Sidebar. The comment also displays the user that made the comment and the time and date when the comment was made.

In addition to the aforementioned visualization extensions, specific transformation modules has been also developed in order to interact with the others *task-specific* software component envisioned by the Learn PAd ecosystem [6]. Any of

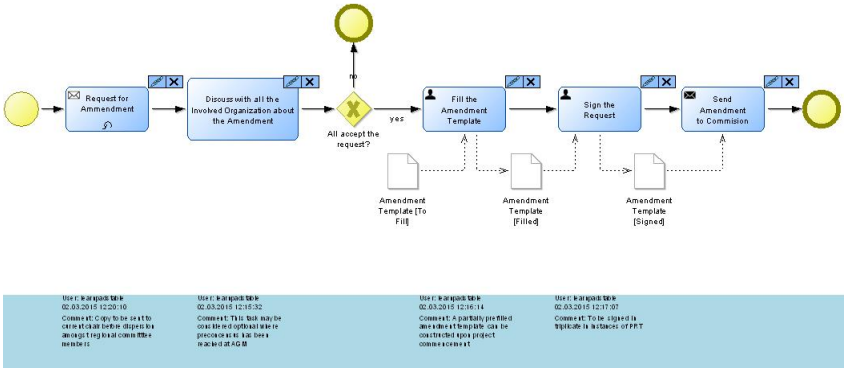

Fig. 12 Commenting Sidebar at a business process

this interaction is mediated by the a so-called Learn PAd Core Platform. Specifically the transformation modules enable to:

- Push New Model Set into Core Platform: This ends the modelling cycles and uploads the business process and all related information into the process-oriented learning platform.
- Retrieve Feedbacks about Model Artefacts from the collaborative platform: This collaboration features imports Wiki comments from the learning platform into the modelling environment in form of the aforementioned comment sidebar.

4.2 Case study

Since 1984 the European Commission (EC) finances research and innovation within the European Union (EU) through the "*Framework Programmes for Research and Technological Development*" generally referred as FP. The participation to a EU financed project obliges the beneficiary in grant management and related budget reporting activities as an evidence of the tasks performed within the project. This results in a quite complex scenario that we considered to validate the proposed modeling and learning solution. In the following we refer to the European Project Budget Reporting (EPBR) in relation to the activities that an Italian public research body (in reference to its administrative offices) has to put in place in order to manage the administrative procedures related to the participation to a European research project. Within Public Administrations it is often the case that the participation to successful project proposal requires to involve people from the administrative offices to support the formal reporting of performed activities (i.e. man months, budget). In particular we focus here on a more precise scenario, that is the case when an Italian university takes the roles of coordinator for the whole project.

The models shown below has been designed applying the storytelling methodology [10]. The methodology expects to involve the stakeholders in describing, using natural language, their daily routine reporting critical activities, and providing possible improvements. The objective is to capture knowledge via stories. In respects to other methodologies that for instance use interviews, the approach has the advantage to permit a more easily enlightening of details associated with specific working contexts. The team involved in the meeting was composed by one Modeler, five Tellers and one Facilitators. The modeler was a researcher from the University of Camerino with a strong background in BP modeling and software engineering, Tellers were the employees of the university involved in the EPBR, in particular we involved employees from the economical department, the administration department, the IILO office and a couple of researchers from the school of science and technology with previous experience in the participation to EU research project. The Facilitator was a researcher with a strong background in BP modeling and at the same time delegate for budget reporting of some running European and national projects. BP and Learn PAd related models have been derived according to the storytelling approach and finally, in order to validate the goodness of the model a dedicated meeting involving the same stakeholders was arranged. More in general the modeling activity was incremental, it started from a very simple BP and than according to the discussions and refinement performed during the meeting the version of the BP presented in the following was finally released.

The BP is triggered by the reception of the notification acceptance of the project by EU. To continue, the authorization of the involved school has to be asked also in order to fix the Principal Investigator. Then, a bank account to manage the budget of the project has to be created; in particular due to the Italian law an N-IBA account must be created (standard IBAN is forbidden by the law). Each new project has to be added as a new entry to the to U-GOV tool that is a software to financially manage all the projects in which the university in involved. At this point the Consortium and the Grant agreement are signed. All the projects of Italian universities have to be approved by the Minitry for Primary Education, Universities and Research (MIUR), then the project must be inserted in the related database, and a specific project-code named CUP has to be requested to the Ministry of Economical Development (MISE). After 60 days from the signature of the Grant agreement prefinancial founding are provided by the European community, and then distributed to the project partners according to the project budget plan. At this point project activities typically start and then the university has to manage the project activities according to the grant agreement that include the need to provide periodic reports, and possibly to make amendments to the contact if differences emerge with respect to the signed contract. At the end of the project a final project report must be sent to the EU commission. Figure 13 reports the process resulting from the conducted analysis.

The described Business Process use the following data-object that are described in the corresponding Documents and Knowledge models:

- **Research Project Form**. It is the data object including all the information about the EU project that must be reported to the school council for project approval.

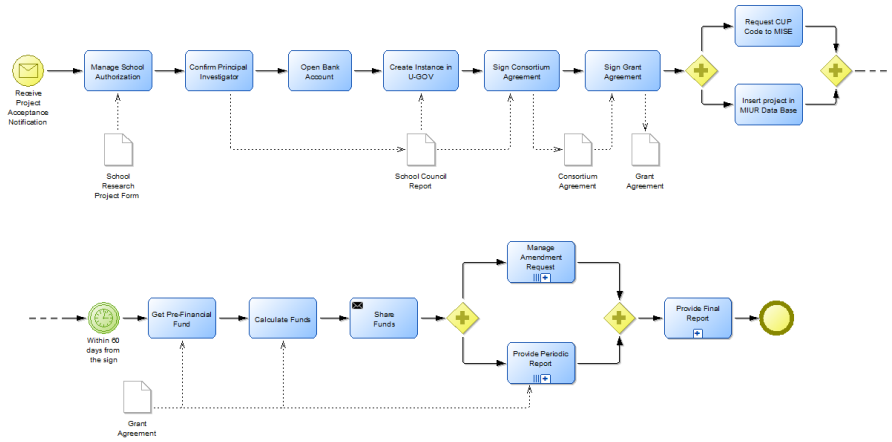

Fig. 13 Grant management process for the project coordinator

The form includes all the information regarding the project, such as the name, code, partner, budget, abstract, etc..

- **School Council Report**. It is the data object reporting the decision taken from the school council about an EU project. The decision of the council authorize, or not, the researchers to take part to the EU founded project.
- **Consortium Agreement**. It is the data object reporting the legal instrument reflecting the relationship among the partner of the consortium, and should include all the clauses needed for a smooth execution of the project and to possibly solve disputes among partners. It is consistent with the Grant Agreement and it presents preliminary clauses (title, preamble, etc.), technical provisions, financial structure and management structure, Intellectual Property, dispute resolution system and final clauses (applicable law termination).
- **Grant Agreement**. It is the data object representing the legal instrument reflecting the relationship between the EU Commission and the project coordinator, acting on behalf of the project partners. The data-object reflects a standard template consolidated by the EU commission and it reports the terms and conditions referring to accession to the grant agreement of the other beneficiaries, duration and start date of the project, reporting period, pre-financing, etc.

With reference to the organizational view the University of Camerino shows a quite complex structure that includes many different divisions. From the administration point of view the general regulation of the athenaeum precisely establishes the functional organization of services, divisions and offices. In particular it details the competence, the attributions and the responsibilities of each office. Few of them are involved in the EU budget reporting activities, as reported in the following and illustrated in Figure 14. First of all the Financial and Assets division. This is delegated to manage the overall budget considering the whole university. Than the re-

search and technology transfer division is delegated to manage all financial aspects related to research/technological activities as well as possible outcomes of research and corresponding interactions with external companies. This division includes two sub-division: (i) the Schools Management division that is responsible for managing all the financial activities, while (ii) the International and Industrial Liaison Office is responsible for promoting the research and the technological activities of the university. It is worth mentioning that for each division there is only one responsible and other employees playing different or simlar roles. Each employee belongs to a single office and has specific competence and expertise as requires by her/his role.

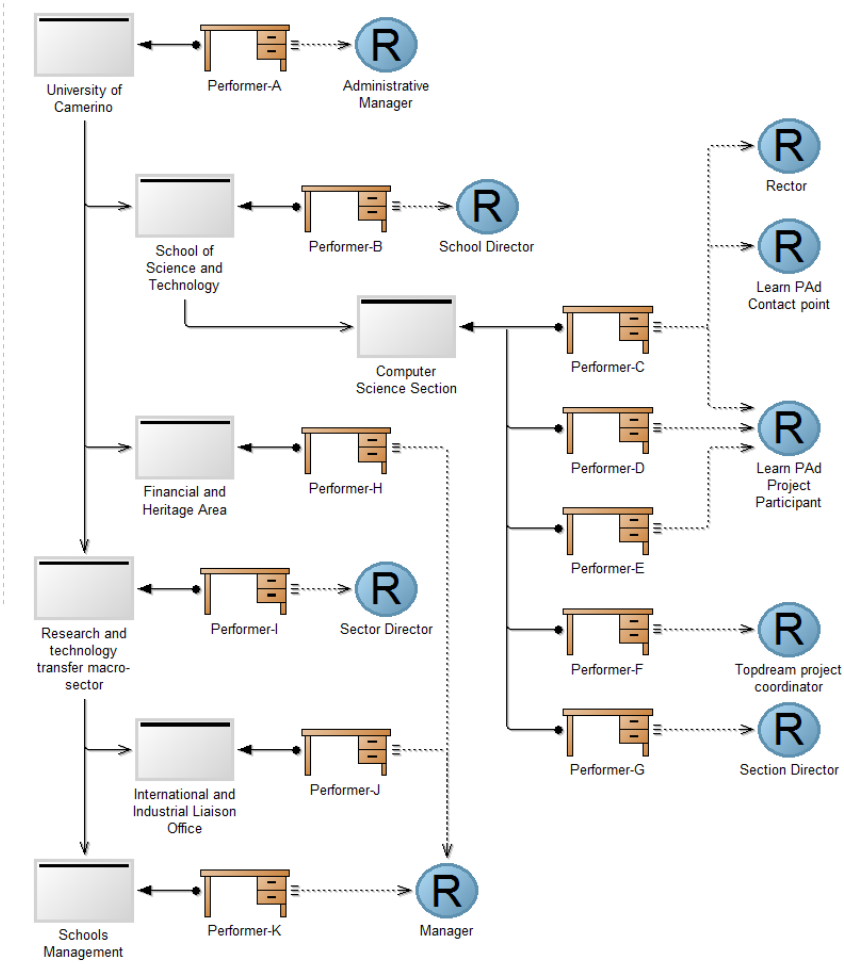

Fig. 14 Excerpt of the Unicam Organization Chart

For each activity in the process we have also defined the needed competences to perform the activity.This work has been driven by classification of skills using three different categories. In particular we have distinguisched among (i) Analytical skills: referring to selection and gathering of information related to a working activity (i.e. problem finding); (ii) Diagnostic skills: referring to comprehension-evaluation of the working activities to be performed (i.e. problem setting); and (iii) Implementation skills: referring to final accomplishment of activities and tasks for transformation or realization of professional results (i.e. problem solving). We have also considered the levels of European Qualification Framework (EQF) as it is widely used and adopted, and hence it has been used to improve the Learn PAd competence model. The EQF is envisaged as a meta-framework that allows to position and compare learning outcomes/competency levels. Finally we included learning goal that have to be reached by the civil servant using the platform. They are proper management of user requests, check regularity/irregularity of the requests, coordination of the administrative procedure in respect of timing and modality provided by the norms, check regularity of data and declarations, and draw up an administrative act. Finally KPI have been defined to check if the learning goal are reached. The models derived as consequence of the described activities are reported in a publicly available deliverable [8]. The models have been used to train employees in the Unicam offices and experiments on the effectiveness of the approach are currently running.

5 Conclusion

This chapter described a modeling approach that intends to foster the usage of models for training of civil servants. The meta-model described in the chapter has been implemented on ADOxx and available feature extensions had been added to improve the modeling tool for Learn PAd. The development of the tool had been collaboratively performed in the development space of ADOxx.org, which enables a transparent and collaborative development from the initial requirement list, to the various prototypes till reaching to the current status of the prototype.

The modeling environment has been already used to derive the models for the demonstrators foreseen by the Learn PAd research project. This chapter reported some of the model derived in relation to the development of one of the demonstrators foreseen by the Learn PAd project.

References

1. Business Process Model OMG. Notation (BPMN) 2.0. Object Management Group: Needham, MA, 2494:34, 2011.
2. OMG. Case Management Model and Notation (CMMN), V 1.0. Technical report, Object Management Group OMG, 2013.

3. OMG. Business Motivation Model (BMM). Technical report, Object Management Group OMG, 2014.
4. Colin Atkinson and Dietmar Stoll. Orthographic modeling environment. In *Fundamental Approaches to Software Engineering*, pages 93–96. Springer, 2008.
5. Marcos Didonet Del Fabro, Jean Bézivin, Frédéric Jouault, Patrick Valduriez, et al. Applying generic model management to data mapping. In *BDA*, 2005.
6. G. De Angelis F. Mancinelli, editor. *Platform Architectural Description*. Number Del. D2.1. The Leand PAd Consortium, 2014.
7. MqE Iacob, H Jonkers, M Lankhorst, E Proper, and DAC Quartel. Archimate 2.0 specification. 2012.
8. B. Re, editor. *Demonstrators BP and Knowledge models*. Number Del. D8.1. The Leand PAd Consortium, 2015.
9. Jan C Recker, Marta Indulska, Michael Rosemann, and Peter Green. How good is bpmn really? insights from theory and practice. 2006.
10. Flávia Maria Santoro, Marcos RS Borges, and José A Pino. Acquiring knowledge on business processes from stakeholders' stories. *Advanced engineering informatics*, 24(2):138–148, 2010.
11. John A Zachman. Concepts of the framework for enterprise architecture. *Los Angels, CA*, 1996.