# Non-formal Education Architecture Modeling

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*Abstract*—**Nowadays, professional life, education and leisure time are characterized by increasing change and diversity. People with different skills, knowledge, cultural background, cognitive and psychological abilities prefer learning in an unique way, because Information Communication Technology (ICT) environment provides new opportunities for them. The paper covers discussion on formal, informal and non-formal education forms, which are the lifelong learning notions as well as ideas of the learning society. The main goal of the paper is to explain the non-formal learning concept and its system architecture model as an additional educational option at university level.**

*Keywords-enterprise architecture; non-formal education; ArchiMate; university learning; system modeling.*

## I. INTRODUCTION

The lifelong learning approach focuses on fostering interchange of knowledge among educational institutions and on constant modernization of institutional solutions in the areas of management and financing higher education. The approach supports innovativeness of education and reinforces social cohesion of different university governance systems in different countries. It is oriented towards openness, peering, sharing and acting globally. Openness of education is associated with transparency, flexibility, expensiveness, engagement and free accessibility. Peering means that people are involved in the process of self-development. They are self-organizing to learn, design goods and services, create knowledge and produce shared experiences [18]. The peer activities rely entirely on self-support, egalitarian communities of individuals, who come together voluntarily to produce a shared outcome. Traditionally, people argue that when they are acting globally, they should control and protect proprietary resources and innovations through patents, copyright and trade marks [8]. However, digital products are easy to share, mix and replicate, therefore, new models of intellectual property governance are needed [6]. Internet permits acting globally to monitor e-learning opportunities offered by different institutions and it enables tapping into global knowledge resources [15]. The paper covers analysis of non-formal education. Although the most common way is formal education supported by Web 2.0 education, in this paper formal, non-formal and informal education forms are considered as complementary one to another [19]. The paper is not oriented towards comparison of these forms, although they all are provided

and managed by university staff. The next part of the paper covers discussion on andragogy, heutagogy, formal, informal and non-formal education. To present the non-formal education system architecture model, the third part includes a short presentation of the enterprise architecture definition and standard. The last part of the paper contains an architectural model of non-formal education. The model is visualized in ArchiMate 4.0 beta version language.

## II. FORMAL, INFORMAL AND NON-FORMAL EDUCATION

In the learning process, participants obtain recommendations for learning goals from the system in three ways:

- formal learning, where learning goals are generated from the domain knowledge,
- informal learning, where the recommendations are provided by the Web 2.0 community of learners,
- non-formal education including random suggestions on learning goals, loosely related to formal education goals, but enabling the knowledge development.

The distinction among that three forms is not only an administrative point of view. Formal education is linked with schools and training institutions, non-formal with community groups and other organizations, and informal covers interaction with friends and work colleagues. All these forms accompany human beings from birth to death; however, the perception of their value is changing.

Particularly important in this paper, adult learners are coming in the educational process with concrete and immediate goals, e.g., professional, social and personal development. Learners have specific expectations from the learning process and when this process meets their expectations, then their motivation for learning increases. They have a wide spectrum of prior knowledge and specific life experiences, so they prefer the educational institutions to be related to these experiences. In the context of informal and non-formal education for adults, the heutagogy development seems to be useful. According to Blaschke [2], heutagogy is defined as self-determined learning rooted in andragogy. In that approach, learners are highly autonomous and self-organized. There is a focus on development of student capacity and capability with the goal of teaching students who are well-prepared to work in a complex knowledge environment. The heutagogical

approach is considered as a theoretical background to be applied to emergent technologies in distance education and for steering distance education practice. Heutagogy is characterized by learner control and self-responsibility in learning, so students are defining their objectives of learning, they have intrinsic motivation, and they are able to incorporate their experiences.

In formal learning processes, in European Union (EU) countries, schools and universities are required to respect the Bologna Process requirements concerning the university education. Therefore, each university ought to implement European Credit Transfer System (ECTS), European Qualification Framework (EQF) and National Qualifications Framework (NQF). NQF is an instrument for the classification of qualifications according to a set of criteria for specified levels of learning. The Bologna Process requirements were implemented to improve the transparency, access, progress and quality of qualification in relation to the demand on the labor market [7]. The basic concept in formal education, i.e., competence is defined as knowledge, skills and attitudes. In the context of EQF, competence should be described in terms of responsibility and autonomy. In the Bologna Process learning environment, the student learning outcomes (SLOs) are also the important drivers of the educational process and as such they require evidence. The SLOs describe what a student is expected to learn as a result of participating in academic activities [4]. Beyond SLOs, student progress outcomes (SPOs) are implemented to reflect student progress in course sequence and in degree programs.

In contrast to formal learning, informal learning is organized by students. It has no objectives in terms of learning outcomes or acquisition of any competences. It includes socialization, support, gathering opinions, consultancy, and self-directed learning. In contrast with the traditional view of teacher-centered learning via knowledge acquisition, informal learning is peer-to-peer learning. So, students read self-selected books and e-books, participate in self-study programs, watch YouTube videos, navigate Internet support materials, seeking advices from peers, participate in virtual communities of practice. Informal learning occurs in community, even if participants only observe, play or take part in social events. In informal learning process, students do not receive grades nor certificates of completion. There are other important opportunities, i.e., opportunity to listen the lectures provided by a famous professor or expert. Informal learning is a way to globalization of education, because of the open access to the same course materials and e-books in all the world.

Non-formal learning at university covers various less-structured learning events, such as night university visiting, open lectures, community sport events, conferences, seminars, summer schools, and company visits. That forms of education do not have curricula, accreditation or certification as it is in formal learning, but they are more structured than informal learning approaches. Non-formal learning is a method of communicating with people, of motivating them to participate, and of helping them to acquire the necessary skills. In non-formal education process, knowledge is developed by practice rather than by lecturing. It is strongly based on volunteer works and voluntary participation. It is costly, but the costs can be considered as promotion and marketing costs, funded by sponsors.

The non-formal education covers seminars for vocational and technical skills development, individual and group instruction in functional literacy, community assemblies, forums, work conferences, for example on taxation, fire prevention, drug abuse prevention, or on security. That education focuses on propagation of desirable values, customs, and traditions. The goals of non-formal education is to increase formal education participation rate, exchange of views and experiences, using alternative learning schemes, like street schools, involving street children in the education process.

The Danish non-formal education system is one of the oldest in Europe, because it is known since the 19th century. It is based on the concept of "*Folkeoplysning*" introduced by the Danish educational philosopher, N.F.S. Grundtvig. The concept means sociocultural activities, youth and adult learning, and folk education. Another challenge for non-formal education was the use of the new technologies in group work. The ICT provided many opportunities for individual learning, as well as for group work. The Open University in the United Kingdom, the Centre National d'Enseignement a Distance in France and the Universidad Nacional de Educacion a Distancia in Spain produce a large quantity of multimedia educational material. Video conferencing and video seminars on the Internet are examples of the new technologies applied in non-formal education. The new methods of communication allow organizations from different countries to establish closer contacts with the aim of exchanging ideas and materials.

Non-formal education includes activities developed under Corporate Social Responsibility (CSR), which refers to business practices involving initiatives that benefit society [14]. Therefore, an organization's internal practices can influence their employees, customers, partners and environment in a positive manner. Business organizations can take that approach to deliver better education services and in this way they improve their positive image among customers and for society. For example, University Social Responsibility (USR) can increase graduate involvement in university problem solving. The USR is to enable access to joint event funding opportunities, to enhance the university influence in the industry and in the community, and to differentiate the university from its competitors, i.e., other universities.

## III. ENTERPRISE ARCHITECTURE OF NON-FORMAL EDUCATION

The term "enterprise" can be considered as an overall concept to identify a company, business organization, university or governmental institution [10]. An enterprise is defined as a social entity, which is going to achieve a

certain goal [12]. For an enterprise, architectural framework as a conceptual structure related to a certain system type consists of areas of concern and a necessary and sufficient set of design domains.

The ISO/IEC 42010:2007 shows that architecture is the fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution [12]. The goal of enterprise architecture (EA) is to create a unified ICT environment across the firm or all of the firm's business units with links to the business side of the organization, to promote alignment, standardization, reuse of existing ICT assets, and the sharing of common methods for project management and software development across the organization [17]. The EA provides a holistic expression of the enterprise's strategies and their impact on business functions and processes, taking the firm's sourcing goals into explicit consideration [9]. The EA gives the user an opportunity of faster delivery of new functionalities and modifications of applications, as well as it enables an easier access to higher quality, more consistent and more reliable information [16]. The EA identifies opportunities for integration and reuse of IT resources and prevents the development of inconsistent processes and information [11]. Especially important to users is the capability of integrating the information among applications and across data warehouses and data marts [13].

As it was mentioned at the beginning, the goal of the paper is to visualize the non-formal education architecture. According to Dumitrescu, non-formal education is a partner in the lifelong learning process [5]. It is strongly based on external sponsoring by the local, national and international institutions. The non-formal education activities can be realized outside, as well as inside the formal education institutions. In the last case, the educational activities are governed by the school managers. The non-formal education can be also carried out within companies, by professional associations, or by self-motivated individuals. In the architecture model presented in Figure 1, non-formal education is assumed to be realized within university organization, so university staff and students are involved in the educational processes as organizers as well as a beneficiary of the educational process results. Presented in the paper, non-formal education model is visualized in ArchiMate 4.0 beta version language, therefore some additional explanations must be added. The non-formal education is assumed to be realized as a system of projects and the project management methods can be applied for them. The ArchiMate language allows only for a very general outline of business processes, therefore, the non-formal education business process model is visualized in BPMN language Bizagi tool (see Fig. 2). The ArchiMate language is an open, independent, and general modeling language for enterprise architecture. The primary focus of ArchiMate language is to support stakeholders to address concerns regarding their business and the ICT systems. The ArchiMate metamodel consists of three layers: the Business layer, the Application layer and the Technology layer. According to the EA model, the technology supports usage of applications, which in turn support the business. In this model, non-formal education is considered as a system of events, which are realized for local community. The system of events covers seminars, workshops, performance, exhibitions, excursions, conferences, meetings, community assemblies, forums, demonstration classes, and sport competitions. The audience of the event is selected according to the event project goals. Some events are organized for children, other for older people or for teenagers. The events are organized by university staff and students, who are working as volunteers. If it is necessary, the events are financially supported by external institutions. Anyway, for each event the coordinator is selected and responsible for the event tasks realization for the final success. Each event can be managed as a project, therefore the canvas model can be specified for the non-formal education events (see Fig. 1).

| Key Partnerships | Key Activities | Value Propositions | Customer Relationships | Customer Segments |
|---|---|---|---|---|
| Sponsors; ICT solution providers; Web service developers; Event facilitators; Academic & Administrative Staff; Web portal administration; | Event management; Web portal requirement engineering; Event realization, control & evaluation; Event scheduling | Values in public services process; Life style changes; Long-life learning habits; Learner satisfaction; Non-formal education acceptance, efficiency & effectiveness | Analytics of educational services; Relations among learners & academic staff | Learners; University Academic Staff; Students; Learner associations & assemblies; Political parties; Governmental institutions; |
| | **Key Resources** Software & hardware; Donation support; Non-formal education event documentation archives; | | **Channels** Non-formal education promotion portal; Chat room, forums & blogs; Websites of mentors & associations; Printing publicity & emailing; | |
| **Cost Structure** Web portal development, implementation, administration, & maintenance; Catering, transport & hotel costs; Event promotion costs; | | **Revenue Streams** Learning time reduction; Learning process simplification; Participant satisfaction; Social relation development; Life status improvement; lower effort & lower costs of formal education; University Social Responsibility development; University - Business Alignment; | | |

Figure 1. Business Canvas Model for Non-Formal Education Development.

In general, the business canvas model can be the first step in the discussion on non-formal education strategy development as well as on the management of educational events. There are many different ways of categorizing or

grouping events, including by size, form and content [3]. The events may have characteristics similar to project dimensions. i.e., learning objectives, time, financial and human resources, location, risk, benefits, long-term impact, audience, publicity, promoting. The event management process is modelled in Figure 2. Similarly, as for projects, the event life cycle consists of the following activities: organizing, analysis, identification, evaluation, design, promotion, realization, shutdown.
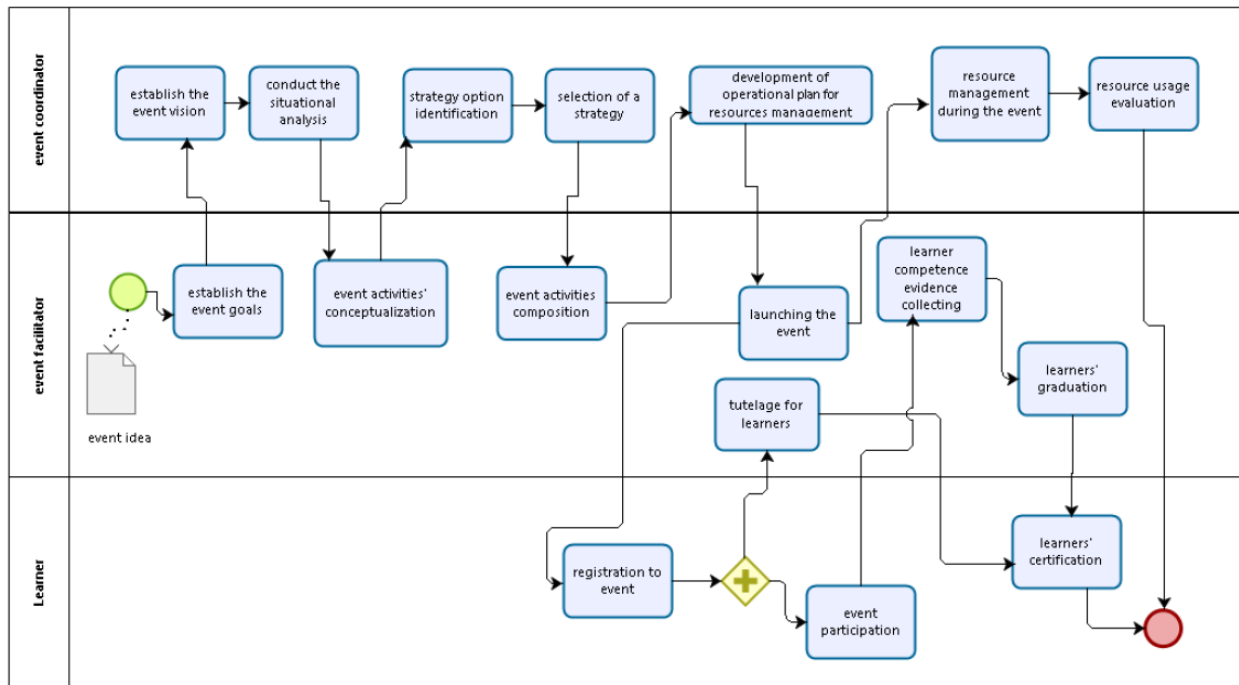


Figure 2.    University Non-Formal Education  Process Model.

In the proposed EA model, the exceptional role of learning facilitator is specified. The role covers:

- Giving information and opinions.
- Seeking information and opinions.
- Proposing goals and suggesting ways of initiating actions.
- Giving directions and developing plans on how to proceed.
- Summarizing related ideas, suggestions and major points discussing.
- Linking ideas and activities by relating them to each other.
- Examining the feasibility and workability of ideas, evaluation of alternative solutions, and applying them to real situations to see how they will work.
- Encouraging everyone to participate, and helping in communication among event team members.
- Monitoring and supporting the non-formal education process by which the group is working.
- Helping the team members be aware of standards and goals of non-formal education.
- Building trust, reducing the risk aversion, and encouraging individuality.
- Persuading and supporting people to reconcile disagreements.

In the communication processes, facilitators are not oriented towards argumentation, but rather on creation of mutual understanding. However, for successful event realization the coordinator is needed. That role is similar to the role of project manager [1].

Beyond the process model in Figue 2 , in Figure 3 the non-formal education architecture model is available. The ArchiMate model covers the following layers:

- BUSINESS containing the following elements:
  o Business actor (i.e., Participant, Event Coordinator).
  o Business role (i.e., Patron of Plans & Programs of Events).
  o Business service (i.e., Program & Events Planning, Event Cost Management, Non-formal Education Management, Events' Collecting in Programs, SLOs Specification for Event, SLOs Specification for Programs, Participant Enrolment Controlling, Event Outcomes Controlling, Event Management Support Service).
  o Business object (i.e., Student Evaluation Protocols, Event Description Card, Library Report, Event Evaluation).
- APPLICATION including the following elements:
  o Application components: University Event Politics and Regulations, Participant

Enrolment System, Participant Evaluation's Registration System, SLOs Event Registration System, Event Controlling System, Student's Portfolio Registration System, Information Technology Support, Library Management System.

- TECHNOLOGY covering as follows:
  - Node (i.e., Application Server, Data Server).
  - System Software: Participant Enrollment and Event Base, University Library, Learning Event Base, Student Management System, Learning Course Controlling System, Information Technology (IT) Management System.
- MOTIVATION including the elements:
  - Stakeholder (i.e., Event Participant, Sponsor, Facilitator, Innovator, Employer).
  - Driver (i.e., Event Participation, Knowledge Management and Dissemination).
  - Principle (i.e., Guides for Event Organizers).
  - Assessment (i.e., University Accreditation Commission Assessment).
  - Requirement (i.e., Programs, Plans and Event Proposals).
  - Constraint (i.e., Competition among events, National Legal Acts).

- Goals (i.e., Participant Satisfaction, Appropriate Competencies for the market position).
- Deliverable (i.e., Event Guidelines and Description, Student Portfolio, Participant Enrollment Report).

Taking into account the above specification, some comments should be added. Student Learning Outcomes (SLOs) in non-formal education concern mostly social competencies. Students participating as volunteers in events receive certificates as evidence of the engagement. The general non-formal education process includes a sequence of sub-processes (see Fig. 2). All the sub-processes are realized to ensure satisfaction of participants of the events. The non-formal education model in Fig. 3 includes a general vision of the ICT systems for the education management support. The model permits on a holistic view of problems and it can be utilized in an iterative approach for non-formal education improvement. The model can be useful to emphasize the alignment issues among the non-formal education staff requirements and the ICT providers' solutions. For making the good investments, the EA developers can use the model to discover opportunities, identify options and compare solutions of non-formal education organization. They can identify, which research works will be the best support the non-formal education services.
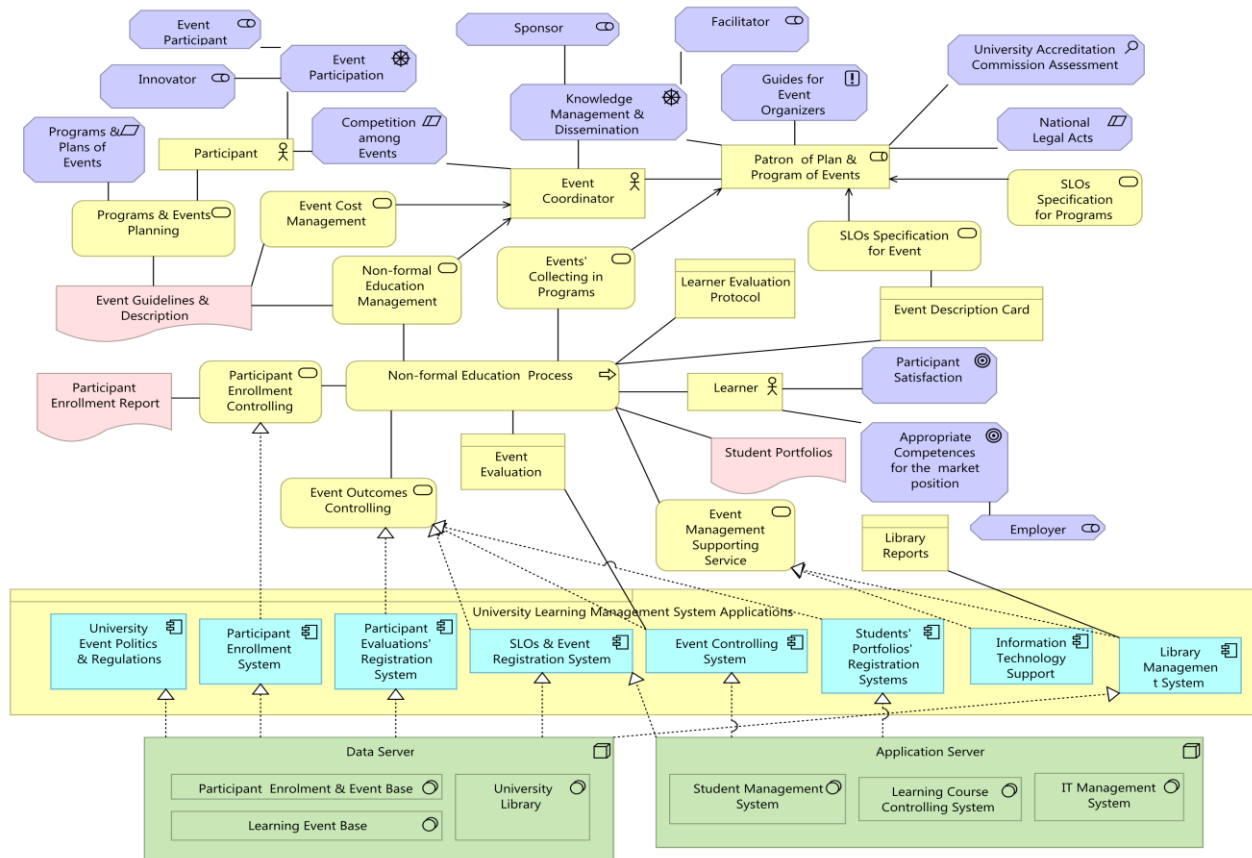


Figure 3.   Non-formal Education Architecture Model

## IV. CONCLUSION AND FUTURE WORKS

Generally, the non-formal education events should be helpful to tackle problems associated with Europe's ageing population. They allow to reject the opinions that separate strategies of knowledge creation and sharing should be developed for students and for adults, although university is promoted as open for all generations of people. Finally, the following conclusions can be specified:

- Formal, informal and non-formal education forms can be developed simultaneously by one educational organization, e.g., university.
- They are not competitive, but rather complementary to one another.
- They all are supported by ICT, however, their development depends on the university priorities:
  o Basic formal education relies on the Bologna Process principles, which are considered as mandatory for university boards.
  o Social networking on the Internet is developed as informal learning.
  o University Social Responsibility is supported by non-formal education.
- Non-formal education is financially supported by third parties and can be considered as a set of events.
- Non-formal education process modelling and its system architecture development can be useful for the events management and auditing.
- Analysis of activities included in the non-formal process model allows for the formalization of that activities
- Non-formal education architecture modelling is to increase a successful repeatability of that events.

The future works will focus on the following topics:
- Profiling of events of non-formal education.
- Planning non-formal education events offline and online.
- Management of events by ICT support.
- Event management methodological approach analysis and improvement opportunities.

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