Introduction

With the development of Web applications that support the Portfolio concept, the latter became widely utilized by learners, educators, institutions and other audiences. In 2006, Jafari et al. made a comprehensive ePortfolio literature overview covering the ePortfolio concept from a wide variety of aspects. Numerous researchers tried to define an effective ePortfolio classification but until today no unique view has been established. In addition, many institutions use ePortfolio in different ways and at different levels of maturity, ranging from those providing an ePortfolio application only sporadically to those that have developed their ePortfolio implementation strategy and put it in practice so as to utilize as many ePortfolio functionalities as possible. However, both ePortfolio literature and practice reveal that there are still too many institutions and individuals using ePortfolio without either a profound insight into this phenomenon or any measurement of its performance. Therefore this paper raises a few essential questions that need to be addressed in the process of using ePortfolio from the individual and institutional perspective.

At the beginning we define the following three research questions:

1. What is the state of the art of the ePortfolio usage?
2. What are the most important issues and trends in the ePortfolio’s current state and future development?
3. What are the promising novel elements emerging in ePortfolio environments?

In order to answer these questions we shall first discuss ePortfolio types and then define a substantial number of criteria to analyze 91 ePortfolio systems found on the Internet.

Types of ePortfolio

For the purpose of the research in this paper, the following conclusions will be used as a point of departure in establishing unique criteria for comparing ePortfolio types:

1. Most ePortfolio classifications rely on a single common criterion: its purpose. By looking at the ePortfolio purpose and its role in LifeLong Learning (LLL) it will be assumed that this is the only meaningful classification usable in terms of ePortfolio. An institution that reached Level 5 according to the ePortfolio maturity levels can define a different classification type for its own purpose, but those possible types will not be the object of our analysis.

2. Considering the purpose of ePortfolio as a classification criterion and the diversity of the existing classifications (McGrath et al., 2004; IMS GLC, 2005; JISC, 2006; Stevenson, 2006; Stefani et al., 2007; ), three main types of ePortfolios will be established here and used in this paper hereafter:

   1. **Assessment ePortfolio**: Demonstrate an individual’s competences and skills for well-defined areas. The purpose is to evaluate an individual’s competency as defined by program standards and/or outcomes in the case of an educational institution. An individual can publish his/her work and educators as well as peers can leave their feedback.

   2. **Development ePortfolio**: Demonstrate the advancement and development of skills over a period of time. It is a direct support to Personal Development Planning.

   3. **Showcase ePortfolio**: Demonstrate exemplary work and skills. Individuals typically show this portfolio to potential employers, peers or educators. For example, it can be one's CV.

   In addition, a **Hybrid ePortfolio** can be established by combining all the three types of ePortfolio. This is the most widely used ePortfolio today. For example, a job application ePortfolio is a type of the Hybrid ePortfolio because it contains a CV as a Showcase ePortfolio and a set of artefacts by which certain work is demonstrated or proven and according to which an individual will be assessed by the employer (characteristics of the Assessment ePortfolio).

   It has to be noted, however, that these types are not to be taken for granted. In most cases individuals will create an ePortfolio without being aware of the type they are creating. Even if someone intends to create a Showcase ePortfolio, that same ePortfolio can also be used to assess that individual. In that particular case it will become an Assessment ePortfolio.
Methodology

In this paper 91 ePortfolios found on the Web were analyzed to examine various ePortfolio aspects covered in the following chapters and provide data necessary for gaining insight into the trends in ePortfolio usage. The ePortfolios were identified using search engines by means of keywords *Portfolio, e-portfolio, ePortfolio, reflection and artefact*. The worldwide ePortfolio sample encompasses a variety of ePortfolios in terms of their content, ownership, Web application used, level of implementation and level of maturity. In general, the analyzed systems are individual ePortfolio systems that belong to individuals that come from various spheres of human endeavour ranging from educational institutions, financial and management industry to music, art and informatics, with some examples of student ePortfolios included as well. For the purpose of this paper the following evaluation categories have been created based on judicious selection of elements available in the extensive ePortfolio literature (e.g. Barret, 1998; Bisovsky & Schaffert, 2009; Blackburn & Hakel, 2006; Brant, 2006; Challis, 2005; Doig et al., 2006; Emmet et al., 2006; Hartnell-Young, 2006; Hickerson & Preston, 2006; Himpsl & Baumgartner, 2009; Jafari, 2004; López Fernández, 2008; Riedinger, 2006; Stefani et al., 2007; Zhang et al., 2009, etc.) as well as on personal experience (Balaban, 2010) in ePortfolio implementation:

1. **Type of ePortfolio** (6 criteria) – evaluation category which examines the basic type of the analyzed system according to the classification proposed in the previous chapter;
2. **Individual/institutional dimension** (3 criteria) – evaluation category which attempts to determine whether the analyzed system belongs to a standalone individual, an individual within a certain institution or the institution itself;
3. **Reflectiveness dimension** (8 criteria) – evaluation category which examines the major characteristics of reflective learners, that is, the relation between proactive reflection of one’s own educational goals (and its outcomes) and life achievements in general;
4. **LifeLong learning (LLL) support** (12 criteria) – evaluation category which examines the elements of the ePortfolio system that support, facilitate and justify the efforts in establishing a LLL framework;
5. **EPortfolio maturity level** (5 criteria) – evaluation category which examines the maturity level of the ePortfolio system according to the classification by Love et al. (2004);
6. **Technical details** (9 criteria) – evaluation category which partially examines essential and most outstanding technical and technological characteristics of the analyzed system;
7. **Security issues** (3 criteria) – evaluation category which examines the security aspect of the analyzed system in the most general sense by verifying its openness and the existence of mechanisms for determining artefact authenticity;
8. **Employability** (4 criteria) – evaluation category which examines the elements of the analyzed system important for establishing a relationship between potential employers and employees.

A detailed overview of all the categories along with evaluation criteria is provided in Table 1. In the following chapters of this paper the results of the analysis are presented.
Table 1. Categories and criteria for ePortfolio system evaluation

<table>
<thead>
<tr>
<th>Category</th>
<th>Type of ePortfolio</th>
<th>Eportfolio independence</th>
<th>Reflectiveness</th>
<th>LifeLong Learning</th>
<th>Maturity level</th>
<th>Technical details</th>
<th>Security issues</th>
<th>ePortfolio and employability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development</td>
<td>Individual (standalone)</td>
<td>Simple description of artefact</td>
<td>Artefacts from preschool</td>
<td>Scrapbook (Level 1)</td>
<td>ePortfolio software is used</td>
<td>Open ePortfolio (credentials not needed)</td>
<td>Description of target audience</td>
<td></td>
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<tr>
<td>Showcase</td>
<td>Individual (within an institution)</td>
<td>Profound description of artefact / elaboration of artefact’s meaning</td>
<td>Artefacts from elementary school</td>
<td>CV (Level 2)</td>
<td>No ePortfolio software is used</td>
<td>Closed ePortfolio (credentials needed for comments and other activities)</td>
<td>Description of job skills</td>
<td></td>
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<tr>
<td>Assessment</td>
<td>Institutional</td>
<td>Elaboration of artefact’s creation and evolution (history)</td>
<td>Artefacts from high school</td>
<td>Academic collaboration (Level 3)</td>
<td>Commercial / non-commercial</td>
<td>Name of the software used (if any)</td>
<td>Evidence to support described skills</td>
<td></td>
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<tr>
<td>Hybrid</td>
<td></td>
<td>Description of individual’s attitudes and opinions</td>
<td>Artefacts from undergraduate study</td>
<td>Mentoring leading to mastery (Level 4)</td>
<td>Complex evidence system for Assessment, Evaluation and Reporting (Level 5)</td>
<td>Artefact authenticity verification mechanism</td>
<td>Specific CV views (Europass CV)</td>
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<tr>
<td></td>
<td></td>
<td>Description of connections between individual’s work / education / achievements and goals</td>
<td>Artefacts from graduate study</td>
<td>Evidence of completion of certain educational level (certificates)</td>
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<td></td>
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<td>Elaboration of new ideas (in life, career and elsewhere)</td>
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<td></td>
<td></td>
<td>Elaboration of individual / institutional goals</td>
<td>Artefacts from postgraduate study / career</td>
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<td></td>
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<td>Elaboration of ePortfolio’s intention / purpose</td>
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<td>Language skills description</td>
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<td></td>
<td></td>
<td>Evidence of informal learning</td>
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<td></td>
<td></td>
<td>Description of LLL goals</td>
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</tbody>
</table>

Results

The analysis showed that the largest number of the analyzed ePortfolio systems (60, that is, 65.9%) belong to the Showcase type. The second most frequently represented type are Hybrid systems (20, that is 22%). Among Hybrid combinations, the most common type (11) is the Showcase&Development systems combination. The second most common Hybrid combination is the Assessment&Showcase, with 3 examples of such systems. The third most frequently represented type (8, that is, 7.7%) are Development systems. Finally, the least represented type (3, that is, 3.3%) are Assessment ePortfolio systems used exclusively for that purpose.

The category for the assessment of the ePortfolio maturity level (Love et
al., 2004) yielded some very interesting results. The largest number of the analyzed ePortfolio systems (42, that is, 46.2%) belong to CV systems (Level 2). Elements of academic collaboration between various parties in the process of instruction and learning was recorded in 18.7% of the cases.

The number of systems in which a relationship between the teacher and the student (Level 4) is evident and a mechanism of cooperation between them exists leading to student progress through mentoring is fairly low (7, that is, 7.7%).

**EPortfolio independence**

Since the purpose of ePortfolio is to support LLL, it should be independent of the institution that an individual is currently a member of (as a student, employee, etc.). What is the most common situation (i.e. state of the art) in this respect today? Our analysis of ePortfolio systems by using the criteria from the second evaluation category showed that 52.7% of the systems belong to individuals within a particular institution, whereas 45.1% of the systems belong to standalone individuals. Only 2.2% of the analyzed systems belong to institutional ePortfolios.

![Figure 2. The ePortfolio independence comparison](image)

**Structure and quality of artefacts**

During the examination of the reflectiveness dimension, which is one of the most important evaluation categories, it was recorded that as many as 82.4% of systems contained simple descriptions of artefacts, whereas a total of 36.3% of the analyzed systems contained detailed explanations of the relevance of artefacts for the system owner. An accurate account of the origins and evolution of particular artefacts was provided by 16.5% of ePortfolio owners. Such positive assessment of reflectiveness is considerably accounted for by the fact that 49.5% of the analyzed systems contained descriptions of users' attitudes and ideas on various topics. A significant reflective element of the relationship between an individual's goals and career, education and achievements in general was recorded in 17.6% of the systems. In 36.3% of the analyzed systems new ideas and innovative solutions pertaining to various domains (personal sphere, professional sphere, education etc.) were elaborated and presented. Furthermore, it was found that as many as 65.9% of the systems contained descriptions of Portfolio owners' individual goals. However, the rather discouraging fact that a clear and accurate description of the system's type / purpose was provided in only 15 cases (that is, 16.5%) needs to be mentioned as well. When the LLL category is considered, several interesting results need to be pointed out related to artefacts. For instance, 56% of the analyzed systems contained artefacts originating from the authors' postgraduate study, that is, their employment period. Furthermore, 48% the analyzed systems contained artefacts originating from the authors' graduate study. It is a discouraging fact that a description of the curricula followed during the ePortfolio authors' education was found in only 13.2% of the systems. Only 9.9% of the observed systems contained information on a specific type of extracurricular activities/hobbies, whereas a description of ePortfolio owners' language skills was recorded in as few as 7.7% of the analyzed systems. Evidence of informal learning was found in 26.4% of the systems, while only 17.6% of them contained a description of long-term goals related to LLL.

**Technical details and security issues**

This section presents an analysis of the technical features that indicate the essential technical and technological characteristics of the ePortfolio platform. Related security issues are discussed in terms of system openness and the existence of mechanisms for verification of artefacts authenticity.

Only 13.2% of the analyzed systems are based on a software ePortfolio platform (e.g. Mahara, Elgg, Epsilen, eFolios), whereas most of them (86.8%) are developed on free Internet technologies such as Wordpress, Scrapblog, TaskStream and Google Sites. A great majority of the analyzed systems (86.8 %) contain an internal artefact storage and manipulation system. External links to artefacts stored on other Web sites were found in 37.4% of the analyzed systems. Furthermore, in 7.7% of the observed systems broken links were encountered.
When security issues are concerned, the fact should be mentioned that a great majority of the analyzed systems are open for access, that is, no log-in data is required to access them. Only 4.4% of the systems were closed-type, or some of their views required login. The most alarming fact in the entire analysis is that none of the systems contained a mechanism for artefacts authenticity verification.

**Employability issues**

The category of evaluation of elements relevant for the employment process revealed that 44% of analyzed systems contained descriptions of ePortfolio owners’ professional skills. In 38.5% of the systems there was evidence supporting the stated professional skills. Moreover, as many as 50.5% of the analyzed systems contained a certain type of an official CV. These data suggest that ePortfolio is being increasingly used in employment and presentation of references. Nevertheless, if this finding is related to the aforementioned security issues, it turns out that the presence of professional skills in ePortfolio descriptions is not adequately supported by security mechanisms verifying them. Possible solutions include the introduction of a digital signature system, which is fairly costly and therefore unaffordable for a great number of institutions, or the development of an alternative solution such as one’s own artefact verification method. The latter was proposed and accurately described in Balaban&Kisasondi (2009).

**Discussion**

With respect to the extensive analysis presented in previous chapters the following conclusions can be made: in general, ePortfolio systems are based on free Internet technologies, most of which are not even specialized ePortfolio applications; access to ePortfolios is partially or fully open to all the interested parties; most analyzed ePortfolios belong to the Showcase type, i.e. a kind of rather sophisticated personal CVs. Such findings also invite several challenges to be addressed. First of all, most of the artefacts lack any authentication proof and little attention is given to intellectual property rights, both of which are important considerations when referring to the employability issue. On the other hand, about half of the analyzed ePortfolios include reflections on artefacts and opinions regarding various achievements and progress. Nevertheless, although they represent a contribution to LLL concepts of individual and institutional development, they tend to lack a clear vision and purpose. In general, ePortfolio is extensively employed in a way to cover all the aspects of formal learning, which leads to the conclusion that it is widely used as a pedagogical tool. One of the tasks in formal education should be to teach students how to reflect and use that knowledge in other types of learning (e.g. informal and / or non-formal learning to evidence their accomplishments). The artefact quality analysis showed that reflections are being increasingly more used, which apparently presents a foundation for exploiting the potential of reflections even further.

Moreover, regarding the ePortfolio development, several emerging trends can be identified. Firstly, Assessment and Development ePortfolio types are becoming more (although still not sufficiently) widely used and sophisticated. This can be accounted for by the fact that the need for using ePortfolios in such a manner has not yet been embraced in higher education. Furthermore, ePortfolio is used as a platform for presenting, elaborating and testing innovative novel ideas in the professional and personal development domain. Finally, informal and non-formal learning evidences have arisen as natural objects in ePortfolio environments that support personal development plans.

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