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OPEN BADGE CONCEPT IN EDUCATION – BENEFITS AND CHALLENGES

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Abstract

Digital learning badges offer new possibilities alongside conventional certificates. The Open Badge concept is one of the most common implementations of learning badges in use. The concept was piloted and the services required by it were developed in a project carried out in Finland in 2014. This research highlights the utilization opportunities noted in connection with the Open Badge concept and also challenges related to it. The paper also discusses some applications created during the project that enable the utilization of the concept.

Keywords: Open Badge, Digital Badge.

1 INTRODUCTION

Open Badge is a learning badge which is a system-independent, electronic and visual way to describe competences and skills. Open Badge depicts an image, and the metadata attached to it describes the badge holder's competences. The learning badge contains, among other things, a description of the skills learned by its earner, information about the issuer, the date of its issuance and its validity. The earner of this badge can utilize the digital aspect of the badge by for example distributing it in social networks or adding it to his/her electronic CV or ePortfolio.

Educational organizations are not the only potential users of skill badges. For example, for companies providing product training, the Open Badge concept offers many opportunities: from modernization of training to marketing and productization of education. Deployment of digital learning badges will give the education provider the opportunity to better open its educational contents to customers. The possibilities that digitalization brings with it, including chaining of badges, their validity open for scrutiny and distribution opportunities, give added value in many situations related to demonstration of one's skills. Great potential, especially from the viewpoints of productization of education and marketing, can be envisaged. There are also many challenges related to the Open Badge concept; one of the biggest of these is how to deploy the concept. During deployment, attention must be paid to many things. These include issues like who can issue those badges, how to verify the skills and competences created, how to manage the practical aspects related to their issuance, what kind of added value is provided to the parties involved, and so on.

On the practical level, making use of the Open Badge learning badges is still undergoing expansion, because up to the present moment organizations have lacked tools with which to manage the learning badges issued by them. The Open Badge Factory project, consisting of many subprojects, was carried out in Finland during 2014. One of the subprojects was working on the Open Badge Factory (OBF) cloud service to create, manage and issue learning badges in accordance with the Open Badge concept. In the other subprojects, the university, companies and an adult education institution, which acts as an umbrella for non-governmental organizations, piloted the concept and the Open Badge Factory service in their own environments from the perspective of their own training programs.

In its own subproject, in addition to piloting, the University of Jyväskylä carried out research covering the whole value network. The research produced a vision about the utilization potential of the Open Badge concept. On the other hand, the research also gave some ideas about the possible challenges and issues to be focused on when deploying the concept. This paper presents results of the piloting carried out conjointly with the Open Badge Factory project and experiences from the perspectives of the parties involved. The paper also presents technical solutions for the creation, issuing and receiving of badges.

2 OPEN BADGE CONCEPT

The most common way to implement learning badges is the Open Badge concept by the Mozilla Foundation and the Open Badges Infrastructure (OBI) standard created by it. Mozilla's standard is open and free of cost. The Open Badge concept was developed to show competences with the help of digital learning badges. In accordance with the concept, a learning badge is a digital image to which metadata indicating competence is attached. With the help of metadata, it is possible to show a person's skills and competences. Learning badges are well suited for describing skills and competences acquired also through informal learning.

All kinds of metadata can be affixed to a learning badge (Fig. 1). Typically, the added information consists of the details of the issuer of the badge and the criteria on the basis of which the badge was issued as well as evidence substantiating the competence. The metadata usually also includes the date of issue of the badge and when required also its date of expiry. The metadata is in the form of hypertext; thus it can contain information that is quite variable and also for example links to external sources of knowledge.



Figure 1. Metadata of a badge conforming to the Open Badge concept.

The issuer of the Open Badge is the organization providing education. It can be for example an educational institution, a company or other entity through the activities of which competence is created. The Open Badge standard does not have limitations on how the badge is issued. The badge can be issued for example after some performance or perhaps based on an application. The issuance of the badge is limited mainly by the applications used for the issuance. For the Open Badge Factory service, tools have been built for creating the forms used in the application of open badges. Badges complying with the Open Badge standard can also be chained. In that case, after the completion of part badges, which have been specified beforehand, a more valuable badge that indicates wider competence is automatically issued. These kinds of badges are known as metabadges or Milestone badges.

In accordance with the Open Badge concept, the earner of the learning badge can either accept or reject the badge. The earner collects the badges earned to a service on the web. The Open Badge concept includes the Mozilla Backpack service for the storage of badges. The service providers themselves can, however, also develop storage solutions. This makes it possible, for example, to develop country- or organization-specific storage solutions. The earner of the badges can him/herself decide where and how to publish the badges. The publication of the badges is easiest through the service where the badges are stored. Thus the technical implementation of the service nevertheless limits the publication in practice. Typically, badges can be published in social networks (depending on the storage solution, for example in Facebook, LinkedIn, Twitter, Google+ or Pinterest). Badges can also be added to ePortfolio or an electronic CV. They can also be added to an ordinary web-page. For the presentation of badges, it is possible to construct a separate display application, which can be customized for a mobile device.

3 OPERATIONAL ENVIRONMENT

The data for the research was collected in connection with the Open Badge Factory project. It consists of the experiences in connection with the project between the latter part of 2013 and the beginning part of 2015. The data was collected by interviewing the organizations participating in the project and by observing the progress of the pilots created by the organizations. The operational environment in the project pilots was the Open Badge Factory service for the creation and management of the

badges. In addition, near the closing stages of the project, a participating company published the Open Badge Passport service directed for the badge earners. During the pilots, a clear need for that service was detected. This chapter provides further details of the project consortium and of the fundamental solutions it has achieved: the Open Badge Factory service and Open Badge Passport.

3.1 Project Consortium

Lack of services for the creation and management of badges has hampered the deployment of the Open Badge concept. To fill this gap, the Open Badge project consortium was launched in 2013 in Finland. The project was funded by Tekes. Tekes is the most important publicly-funded expert organization for financing research, development and innovation in Finland. The project consortium was formed of several part-projects. One of the part-projects developed applications related to the creation, management, issuance and earning of badges conforming to the Open Badge concept. Other part-projects piloted the developed solutions and the Open Badge concept in the piloting organizations' own operational environments. Each piloting organization thus tried to deploy the badges in connection with their own education.

The piloting organizations included a university, two companies providing product and customer training and a national adult education institute. The university, in addition to its own piloting, conducted research related to the piloting of a value network. One of the two participating companies is an expert company in the field of social and health care. The company mainly produces software, but in addition it organizes training related to its software. The company pilots the suitability of the concept for customer training by deploying the badge in some of their product training programs. The other company is a retailer specialized in learning technology solutions. Among other things, the company offers training and support services related to the educational use of equipment and technologies. With its Open Badge concept, this company seeks to make its educational services more efficient for example by using game-like elements. An adult education institute acts as the umbrella organization for several dozens of member organizations. They aim to highlight the competences achieved in the organizational field and provide a new tool with the help of which the learner can display his/her competence and share information in the organizations' voluntary activities.

3.2 Open Badge Factory

Open Badge Factory (OBF) is a platform-independent cloud service for the creation, management and issuing of learning badges conforming to the Open Badge standard. In the internet, it is possible to find cost-free and even fairly reliably services for the creation and management of learning badges. Open Badge Factory, however, is currently one of the best solutions when it comes to usability and variability. For many of the solutions that are compliant with the standard, it brings added value by providing additional properties for them. OBF offers among other things badge pathways with milestone badges, a comprehensive reporting system, tools for managing badge expiry, integration with Moodle, Mahara and TotaraLMS as well as open API for third-party plugins and a set of roles for managing badge design and issue as a collaborative workflow.

During the project, a pilot OBF version, which was used in the pilots of the project consortium, was released. During the year of 2014, the pilot version of the service was available for test use also for willing organizations outside the project. A payable production version of the OBF service will be released in August 2015.

The key property of OBF is its open API, which makes it possible that badges can be issued from any system with the help of the OBF plugin. An organization can easily administer its badges from one location but, nevertheless, issue them from another location, for example from an learning platform used by the issuing organization. Using Open Badge Factory's issuer plugins, you will be able to issue your badges in Moodle and other systems such as Totara LMS, Optima and Mahara. With the help of the open interface, customer organizations can implement, if they so desire, their own plugins for their systems. Thus issuing of the badges could take place through an organization's intranet or through its CRM or HR systems. The benefit of the centralized management of badges is that the badges will be usable even if the organization decided to substitute their present LMS or CRM/HR system or other issuing system with a new one. Fig. 2 shows the Open Badge Factory system.

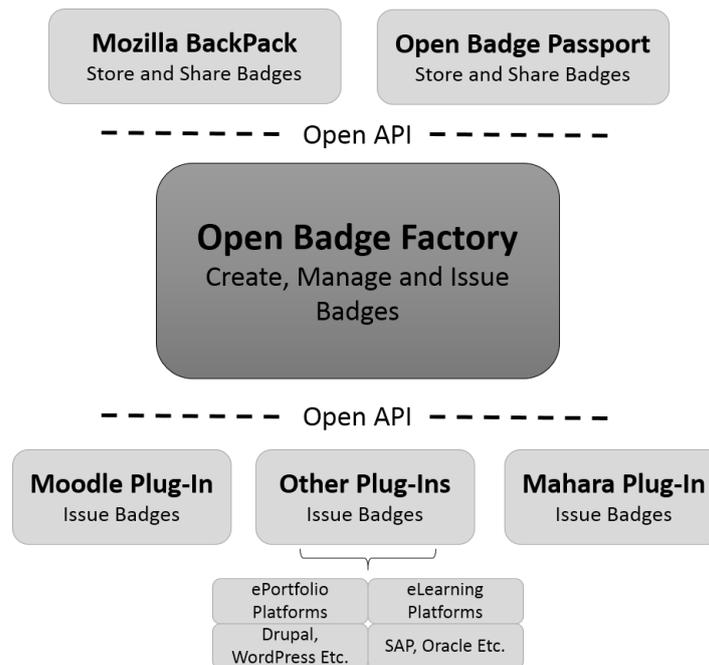


Figure 2. Open Badge Factory interfaces

Organizations using OBF are verified in connection with the deployment of OBF. The service provider verifies that it is a valid organization and that the person getting a user account belongs to the organization he or she claims to belong. The badges issued through OBF must be accompanied with a note stating that the issuer has been verified. This aims to increase trust to the badge.

The operation of the OBF service is based on user levels. There are three user levels. At the top level, the administrator maintains the client organization's own environment in the OBF service. The administrator can create, remove and issue badges as well as define user rights for other users. Creator-level users can create and issue badges and examine user statistics, whereas issuer-level users, as their name indicates, can only issue badges.

There are two ways to issue badges in the OBF service. The traditional way is to issue a badge is to grant it for a certain accomplishment. This can happen for example after the completion of a course. Another alternative is that the learner applies for a badge. For the application, the creator of the badge can create an electronic form in OBF. The form, if so desired, can be quite complex in order to comprehensively test the competences of the applicant. In connection with the form, it is also possible that the applicant of the badge will be asked to provide external files to verify his/her competence. For example, practice work or certificates from earlier studies could be some of the files of this kind.

OBF provides support for badge chaining to form a so-called milestone badge. The milestone badge is automatically issued when the learner completes the part-badges specified in OBF. With the help of the milestone badge, game-like elements can be brought to the study to form some types of study paths. In accordance with the standard, the badges can also be given a validity period. OBF offers an additional validity-related property that increases the utility of the validity period. A reminder message of some kind may be added to a badge equipped with the validity property, and when the validity period of the badge is about to expire, the message is sent to the owner of the badge.

OBF also provides a collection of monitoring and reporting tools, with which it is possible to keep the eye on the amounts of issued badges and, among other things, on how the badges have been used and viewed. The usefulness of the badge system can be evaluated and further developed with the help of statistics.

3.3 Open Badge Passport

The Mozilla Foundation runs a service for badge storage and presentation. The service belongs to the Open Badge concept and is known as the Mozilla Backpack service. Backpack is a cost-free service with which the user can publish badges to his/her ePortfolio or social media services. The service uses the Mozilla Persona authentication platform to link the badges to a certain user. The use of the authentication is quite difficult. In addition, it has been found difficult, in a technical sense, to receive

and distribute badges. At the moment, Backpack functions mainly as a storage for badges. Backpack, in fact, was meant to serve as a reference backpack to be used as a model for other backpack providers.

The Open Badge Passport service facilitates the reception, organization and distribution of badges. For private use, the service is free and platform-independent. To receive a badge is really simple; it can even be automated so that the badges from an accepted issuer are automatically sent to the service without a separate acceptance. In this way, the difficult multi-stage reception of a learning badge is entirely left out in Mozilla's Backpack.

In addition, Open Badge Passport offers tools with which the user can draw up a digital CV or a some kind of mini-portfolio and publish it as a web-page. Open Badge Passport also offers communal properties, such as the possibility to search for and see badges earned by other users. The passport is compatible with Mozilla's Backpack; thus, the user can move his/her learning badges between Backpack and Open Badge Passport.

4 POSSIBILITIES AND CHALLENGES OF THE OPEN BADGE CONCEPT

During the Open Badge Factory project many possible application targets for the Open Badge Concept arose. The pilots carried out during the projects, also generated thoughts about the kinds of challenges related to learning badges and what should be taken into account in their deployment. The pilots began at the latter half of 2014 and partially continued to 2015. It wasn't possible, therefore, to get actual experience about the effects of the pilots yet.

The benefits highlighted in this chapter, marketing, productivization of educational programs, increasing the visibility of hidden learning, utilization of validity periods, education register and study motivation were brought to the fore in connection with the project pilots. The pilots themselves highlighted challenges such as resource requirements, updatibility of the badges and their usefulness, difficulties in earning and distributing them as well as their inflation and comparability.

The concept was piloted in companies, higher education institutions and associations. The starting points and requirements of the piloting targets are strongly represented in the matters considered. In addition to the possibilities discussed here, there are naturally many other potential application targets related to the learning badges. These include accepting credits for previously acquired expertise when moving from one school level to another or acknowledging a person's every-day and informal know-how accumulated at work or with hobbies.

4.1 Marketing

The Open Badge concept has a very significant marketing potential attached to it. As the badge earners spread the badges in their own social networks, at the same time they market the education for which the badge was issued. Thus, when the concept becomes more widespread and the number of those with a badge attesting to the completion of training increases, also the awareness of the education provided will increase. Once the badge earners can identify each other in the network, a large peer network will form.

Companies especially can use the badges to show participation in their events, for example in exhibitions. These kinds of badges, rather than being indications of competence, indicate the earner's interest. Again, when the earners of the badges spread their badges in social networks, it makes the companies better known. Moreover, a company can make use of the information about whom the badge was issued. From the company's viewpoint, the badge earners form a certain kind of special group which is interested in the company's products and which may also contain potential customers.

It is important, from the marketing perspective, that the badge earners receive and spread the badges they have earned. Spreading and earning of badges is examined, in more detail, from the viewpoint of the additional value they bring and from the viewpoint of technical usability in Sections 5.3 and 5.4.

4.2 Productivization of Training Programs

Deployment of badges, at its best, guides the education provider in describing, structuring and clarifying the contents and structures of training courses.

The metadata contained in badges enables detailed presentation of the learning contents. With the help of metadata, the education provided can thus open the educational contents to customers better

than before. When designing badges, it is often necessary to rethink the competence descriptions for the trainings. In this way, the students will get a better idea of the matters to be learnt in those programs. Obviously, when customers have a clearer idea about the skills that can be learnt in a training program, the program will become more desirable to those customers.

In some cases, it might make sense to modify the structure of the program in such a way that it would make the issuing of badges for it easier. Deployment of badges may for example steer the training organizer to modularize the education contents into smaller entities that are related to the badges. This kind of solution is also supported by so-called milestone badges, which are formed from badges issued for smaller modules. Having earned several smaller badges, the customer will automatically receive a milestone badge, which indicates competence in some wider area.

4.3 Making Hidden Learning Visible

By hidden learning we mean learning that is not shown in traditional certificates. Within formal learning, in connection with education that is in line with the curriculum, students acquire many competences that have not been registered as actual learning targets. Consequently, these competences are not shown in degree certificates, either. Nevertheless, these kinds of competences are expected from people graduating from study institutions. Hidden learning can also be created in connection with more than one course. Identification of cumulative learning of this kind is very challenging. Typical examples of these kinds of skills which have been created as course side products and accumulated in connection with the course's work methods include interaction and group work skills, ability to produce technical documents and skills to operate technological applications.

Digital learning badges suit well for bringing out hidden learning. With the help of the badges, the student can supplement his/her degree certificate, for example when applying for a job, in accordance with its requirements.

4.4 Utilization of the Validity Period

A validity period can be defined in the Open Badge metadata. The validity period can be utilized in such a way that the badge just expires at a certain date, after which the viewer of the badge will be informed that the badge is no longer valid. However, the expiry date can also be actively utilized, in a beneficial way, to improve the student's motivation to seek retraining. To make efficient use of the validity period, the badge should give information about its approaching expiration sufficiently early. Instructions and for example contact details for the renewal of the badge can be given with the notification. This way of operation is well-suited for example for further education programs or companies' product or customer training, which often have a validity period.

The system for the creation and issuance of the badges therefore must provide support for the validity period and, above all, it should allow one to specify, in the metadata, the course of events expected when the badge's validity period is approaching its end.

Apart from the company that provides training, also a customer organization using the training programs can exploit the opportunities the badge's validity period brings with it. If the badges' validity period can be shown for example in a training register or the badges tell about their expiry sufficiently early, the customer organization can better anticipate its training needs.

4.5 Educational Register

One important added value that can be obtained with the badges is to have a kind of electronic training register available for the use of customers. Often, customer organizations of the education provider do not themselves have any educational register. It is possible to build an electronic register for customer organizations. Their staff having participated in the training can then place the learning badges earned to it. Using this kind of register, the customer organization could easily find out the kinds of skills and competences there are in the organization and also when the badges with a validity period would expire. In this way, the customer organization would be able, in good time, to prepare for the education needs of the future.

An electronic competence register requires that the system used for the distribution and storage of the badges have properties that support these functions. At the moment, these kinds of solutions can hardly be found on the markets, in spite of their obvious benefits. However, in future, for example in connection with Open Badge Passport, the creation of organization-specific learning badge passports

is under way, either as a part of the Open Badge Passport cloud service or as a separate organization-specific services. In this way, a company, a large organization or industry, among others, would be able to get their own learning badge passport for their staff or activities.

4.6 Study Motivation

In addition to making marketing more efficient, from the viewpoint of education, learning badges are useful, especially in supporting learners' motivation and commitment to study [1], [2] [3], [4], [5]. Digital learning badges contain game-like elements. These elements include the ability to compare one's badges to those of others and aspire towards badge levels that can be achieved. These elements can be made good use of if we desire to make education more game-like.

With learning badges, the learner can be rewarded even for smaller sub-components. With the help of these badges, it is possible to divide the subject to be learned into chunks and structure it into suitably challenging parts. With the help of the badges, students' target setting can be clarified and thus support can be given for students' learning paths. Badges can be chained into metabadges, several smaller badges thus forming one larger badge. The students can try to obtain a larger badge by completing smaller parts. In this manner, it is possible to specify the different stages with the help of which some larger whole or wider aim can be reached.

To this we can add that it is possible, with the help of the badges, create a sense of fellowship with those working towards similar aims. By distributing badges, students can network and also identify each other in social media. It has been observed that grouping is of certain importance in learning [6].

4.7 Deployment and Required Resources

Deployment of badges is easier for small and agile organizations, which have been designed to respond to the world around them, than for large organizations. In a small organization, it is easier to deploy learning badges across the width of the whole organization. On the other hand, lack of resources might prove to be a problem in case of small organizations.

Badge deployment requires resources, and it is advisable to keep that in mind when acquiring badges. At the beginning stage of the deployment, the biggest task is the appropriate presentation of metadata related to the badges. Often this requires that the training programs' competence descriptions are opened up in more detail.

Verification of competences created at a later stage and especially issuing of the badges typically require some new practices. During badge deployment, it is advisable to pay attention to who issues the badges, how they will be issued, can one apply for a badge and whether the approval of the applications and their scrutiny will bring a lot of additional work. Verification of competences creates its own challenge, for example in situations where it is possible to earn a badge on the basis of an application. The technological solutions used may allow us to add questions to the badge application to verify possible competences. The issuance of a badge is made even easier if the technical solutions take into account that it is possible to also append objects to the form to verify competences: for example, different files or links to web pages as evidence.

When selecting the system for badge creation, it should be noted that the practices of issuing badges are made considerably easier if the badges can be integrated to make them a part of existing training systems. For this, open interfaces are required by the service used for the creation and management of badges. With the help of these interfaces, badges can be issued for example from the existing Learning Management System.

In connection with the pilots of an organization working with associations, valuable experience was gained about how learning badges can be deployed in case of an organization working in cooperation with dozens of member organizations. The most important observation was that at the beginning phase the creation of some kind of learning badge ideology must be strongly emphasized. This has demanded a great deal of discussion, consultations and training with the associations and their commitment was required as well. Workshops in which the member associations constructed their own badge systems with the help of an expert turned out to be a particularly good way of operation.

4.8 Updatability of Badges

The contents of training programs change with time. Often, the contents of training also change with the target audience. This applies, above all, to companies' customer and product training. The badges

must evolve with that change. The challenges related to the updatability of the badges and metadata are regarded as important, especially from the viewpoint of required resources.

When using external material linked to the metadata, it should be noted that the material obviously cannot be changed to correspond to new contents to be taught because the references linking external materials and attached to the badges already issued would also change. In such cases, new external materials to which the new badges can refer have to be created. A badge that is issued is a kind of independent element. Internal metadata contained in the badge is stored along with the badge in the badge earner's storage solution (for example, Mozilla Backpack or Open Badge Passport). When the internal metadata of a badge to be issued is being updated, the metadata of the badge issued earlier shouldn't change, of course.

If the training for which badges are issued is very dynamic and changes a lot, for example with the target audience, the alternative is to create several almost similar badges. The badges can then have small differences in metadata in accordance with the teaching contents. Another alternative is to create several external descriptions about the teaching contents and link the most suitable of them to the badge when it is issued. The third alternative is to write the teaching contents onto the metadata in such a general level that the badge will be appropriate for several training programs that slightly differ from each other. In that case, the idea that with the help of learning badges it is possible to describe learnt contents more accurately becomes somewhat blurred.

4.9 Badges' Usefulness for Their Recipients

The great challenge related to the badges is that the earner of the badge also receives the badge. For accepting a badge, it must be useful to its receiver. This must be kept in mind when designing badges. The contents and the criteria of the badges must be appropriately described so that they can be utilized in a variety of ways. If badges are issued by application, it is natural that the issued badges also often are received. On the other hand, if badges are issued to all the participants, the badge must have some added value to as many badge earners as possible.

From the customers' viewpoint, added value is obtained if the badge has some significance for example in recruitment situations. At best, learning badges could provide additional information about the applicant's competence to the employer and thus supplement the information shown in certificates. The badges could indicate their earner's special competence acquired outside formal education, for example by learning at work or at workshops. In addition to recruitment situations, the badge earners can make use of their badges for example in their work organizations and in connection with development discussions to indicate the special competences acquired by them.

Usually, all the students who have completed the course will have the same badge with a similar description of the competence. The usefulness and usability of the badge, from the viewpoint of its earner, can be improved by making the learning description in the metadata more personal. Metadata can be made to include information about the student's personal competences within the course. This requires technological solutions from the service that is for the issuance of the badges. Supplementation of the competence description could be implemented so that at the issuing stage the issuer would append, to the badge, external documents indicating the level of the competence.

When considering the usefulness of the badges it is advisable to pay attention also to who the recipients of the badges are. A virtual badge does not seem that natural to aged learners, for example. For elderly population, it is often somewhat more difficult to point out the significance of the badges. They do not use as much social media applications, and for example job application situations or study credits often are not relevant matters for them.

4.10 Difficulties in Receiving and Distributing Badges

Badge earners are not necessarily technically oriented and virtual environments are not necessarily familiar for them. If the aim was that the badge earners would be willing to receive their badges, these functions should be processes that are technically as easy as possible. Technically, receiving a badge can be made easier by making the logging into the system easy and by minimizing the work stages required in the process of receiving. In most systems such as Open Badge Passport, receiving a badge can be automated so far that having once received the badge, the student will automatically get the badges from the same issuer to his/her own passport without any additional measures.

From the marketing perspective, it is of utmost importance that the badge earners display their badges in their own networks. Also distribution of badges should in practice be manageable with a press of a

button and naturally to as many services as possible. This also is, above all, a requirement related to the application used for the storage of badges.

In addition to technical problems, the language employed might in some cases prove to be a problem mainly to the earner of the badge, especially in environments where the English language is not normally used. The language versions of the service used in the reception of the badges are the solution for this. This should, in fact, be one of the considerations when selecting a service.

4.11 Inflation and Comparability of Badges

It is often thought that if a very great number of badges are issued, they will suffer from an inflation of certain kind. Here, the earner of the badge has a decisive role to play. The appropriate way is to filter into view the badges which the person who has earned them wants to display, to make them align with the target audience and context each time. In a job application situation, the job seeker shows only the badges that are relevant for the job and not all the badges earned by him/her.

Comparability of the badges is a bigger problem. Even though a very accurate competence description can be attached to a badge, there might be uncertainty about whether the badge can be earned merely by participating in a training program or whether the competence provided by the training has been tested in some manner. The question then is whether the badges are signs of competence or participation. This could create a problem even within the organization. Thus, within a large organization, it is important already before deploying the badges, to jointly clarify the rules of the game about the rationale for issuing badges.

It might be a good idea in the future to consider providing metadata that indicates whether the competence shown by the badge has been verified in ways other than by participation. However, this kind of solution would be appropriate mainly in situations where the badge is issued in connection with some kind of training. The solution does not seem very natural for situations where the earning of the badge is based on experience, for example.

5 CONCLUSION

Digital learning badges offer many new possibilities in comparison with traditional certificates. To realize the benefits requires, however, that learning badges become a widely recognized concept. For this, there is still some distance to travel, although already many good solutions have been implemented. Above all, we need functional tools for the creation, issuance and reception of badges and some experiences about their deployment that have turned out well. Successful deployment cases, in which many badges are issued and, above all, received and distributed, increase the recognizability of the badge system.

With Open Badge Factory, there were pilots in which the use of badges was tried in many different environments, both in educational institutions and companies providing customer training. However, it wasn't possible to get actual experience about the effects of the Open Badge concept during the pilots. Nevertheless, the pilots gave a good idea about the potential of the Open Badge concept and about the factors possibly creating challenges for the deployment of the badges.

The Open Badge Factory service for the creation, management and issuance of badges and the Open Badge Passport service for the reception and display of badges, both of which were developed during the project, proved quite functional. The services were easy to use and, most importantly, their properties were very diverse. Open Badge Passport emphasizes technical ease in the reception and distribution of badges. The services are still under development, and in the future we can expect solutions in the form of organization-specific passports, for example.

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