UP2U ECOSYSTEM TO ENGAGE SECONDARY SCHOOLS, TEACHERS AND STUDENTS

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Abstract

The initial challenge is to start connecting some selected secondary schools in some European pilot countries (Germany, Greece, Hungary, Italy, Lithuania, Poland and Portugal) using existing and established networks. Subsequent phases will then see the extension of Up2U to other countries. Our intention is to serve secondary education in those countries.

Individual secondary schools and learning communities will be able to use the Up2U ecosystem, its tools, infrastructures and services as an alternative education platform to store their personal courses and educational projects according to their own choices and local needs and policies. Up2U desired outcomes are seamless, interoperable intercommunication, broader education and an inspiring vision of a multicultural, connected society for all students. To summarize, Up2U will interconnect formal and informal education through engagement with teachers and students by means of sharing tools in virtual classes using project-based learning and interaction with schools in their own, and other, countries. It will provide strong support for teachers and will aim to deliver personalized education in a safe and trusted environment, where students will be able to complete inspiring assignments and receive community rewards thanks to a digital recognition system built into the platform.

The project team will be gathering early feedback form teachers and students, following the rapid prototyping and minimum valuable product development principles. The platform will also need to be future-proof and saleable, with room for growth and development to seamlessly accommodate new schools and future commercial partnerships. Nowadays, the distance between a creative idea and a commercial product becoming shorter and shorter; our commercial partners and project partnerships will explore these opportunities from day one. Up2U will also encourage "unschooling". But what does this mean? Unschooling is an informal space where teachers and learners meet. It is defined as the natural way to learn and is based on the fact that children are natural learners who thrive if provided with the appropriate tools in the right environments. So the platform, by being readily accessible in a context external to school, will enable students to keep on learning almost without realising it.

Keywords: Up2U, learning technology, ecosystem, tools, teach and learn, pilot countries.

1 INTRODUCTION

Up to University (Up2U) is a European Commission co-funded project started in January 2017. It addresses both the technology and the methodology gap between secondary schools and universities. It often causes difficulties for first year university students to adopt to the new learning environment and teaching style that is presented to them in higher education. This results in unnecessarily high drop-out rates and extra work for psychologists trying to address the problems at universities when they are presumably too late. Students in schools often perceive university as their final goal to get to, although it should only be one but very important stage of their professional development. The challenge for schools especially in secondary education is to create the right conditions for students to learn and develop their critical thinking needed in higher education. Developing student's soft skills is just as important as educating and training school teachers on novel methodologies with the right digital tools at their hands. In this paper, we focus on the technology aspects of supporting schools, teachers and student.

1.1   The Up2U concept

Focusing on technology, Up2U is aiming at designing and deploying an ecosystem (Fig. 1.) where formal education meets informal learning activities in the virtual space. As an innovation action we are not in the position to develop the infrastructure that schools are currently having; including their IT systems, equipment, internet access and other technology. However, it is proven by studies [1] that it is more likely that teenagers have their own smart phones, tablets and internet access in their bedrooms rather than in their class rooms. This constitutes a large portion of digitally equipped but not digitally educated student population entering higher education.
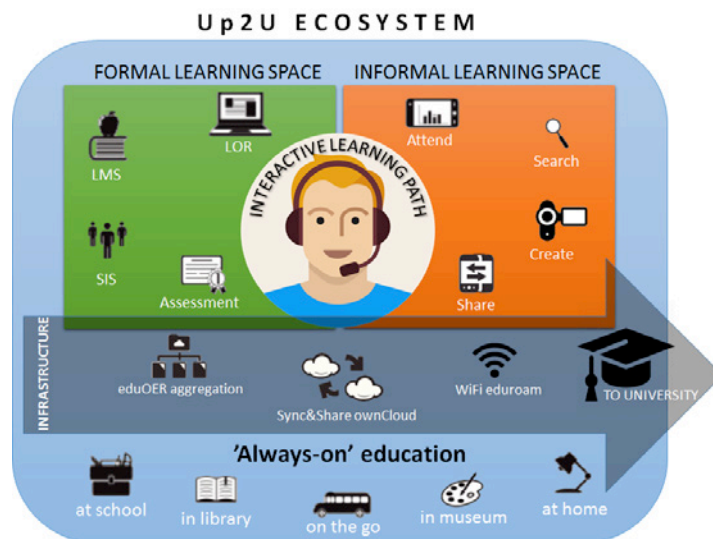

Figure 1. Up2U ecosystem

1.2   The infrastructure

Schools and schooling systems in Europe are vastly different. Depending on their funding streams, governance structures and national/regional policy environments some of them are very constrained in terms of budget but more flexible in picking up new methodologies while others are digitally well-equipped but often have to strictly follow national curriculum with less flexibility towards novel concepts.

The National Research and Education Networks (NRENs) – gathered under the GÉANT Association in Europe and also partnering in the Up2U project – are in the best position to support schools with infrastructure in many countries. Once the schools are connected to the R&E backbone network, providing them eduroam (i.e. seamless WiFi connectivity [2]) and making sure that they are handling their students and staff's digital identity properly (i.e. by deploying state-of-the-art IdPs and participate in federations) are the essential next steps. Where possible, GÉANT encourages its NREN members to provide these basic infrastructure components for schools, so Up2U can work with those who are willing and able to make an important sept forward towards an always-on education ecosystem with seamless pathway to university. We have identified a few pilot countries (Germany, Greece, Hungary, Italy, Lithuania, Poland and Portugal) where we want to engage with several secondary schools to participate in our pilots. The list is rapidly expanding as other countries also wish to benefit from our results.

2   METHODOLOGY

The methodology that we have chosen puts the user in the centre (i.e. user-driven) and aims the least effort prototyping. Taking the fact that in our defined learning context the end-users are teenage girls and boys attending secondary education and preparing for university, this methodology sets the biggest challenge to us. Kids can be very critical about all technology or solution that we offer. If they do not work or do not fit their initial expectations, they will not use them. We have to make sure that technology is not standing in their way so students can focus on the main activity; learning.

Our project is going to follow the methodology of the 'build-measure-learn' feedback loop as it was first set out by Erik Rees in 2008 in his Lean start-up analysis [2]. Since we target a user community where it is difficult to predict how students and teachers will react to a specific technology or solution, we have to make sure that we spent as fewer efforts as possible developing a prototype that has the minimum set of features needed to get feedback from the users. This is called the 'Minimum Viable Product (MVP)'. The MVP is a version of a new product or service which allows developers to collect the maximum amount of validated learning about it with the least effort. No matter how basic the first version of the solution is, we have to make sure that it support the chosen teaching methodology and students actually like it, before we make any decision on further development directions. We plan to run through this iteration round several times during the lifetime of out project. The build-measure-learn feedback loop is illustrated in Fig. 2.
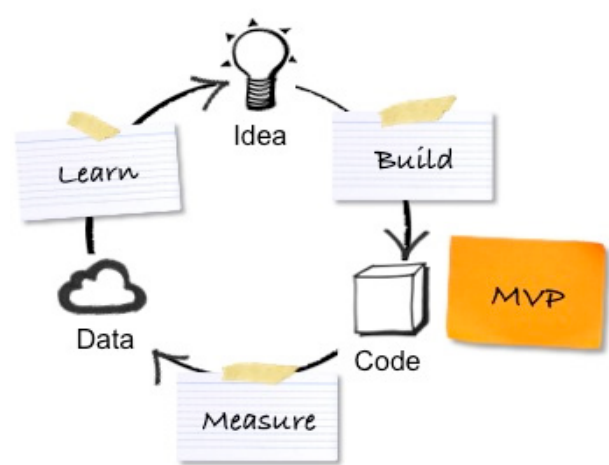

Figure 2. Feedback loop and MVP rapid prototyping

3 RESULTS

As the key element of the Up2U ecosystem, the project designs and develops a modular, scalable and portable software architecture that can be deployed at NRENs, other government agencies or commercial service providers supporting education in the country as well as on-sites where possible at the schools. As the very first step, the Up2U project is going to deploy a proof-of-concept central instance of the full software-stack and provide access to pilot schools as a cloud service. Later, we envisage the same or similar software-stacks being replicated at other project partners in the particular pilot countries and also some modules or the entire stack being taken on-site by those schools that are capable to handle it. Interoperability via standard-based open protocols and interfaces are fundamental to our design approach.

3.1 The architecture design

Our vision if to create an environment where teachers and students can experiment with novel teaching and learning methodologies and pedagogical practices with the minimum amount of extra efforts and with the least disruption to legacy. Therefore, we want to offer them a uniform and integrated Next Generation Learning Management Platform (NG-LMP) that has value-added features compared to any off-the-shelf LMS products on the market.

What makes a learning platform next generation is interoperability. We strongly believe in standard-based protocols, community-driven software development and highly modular and portable open architectures. There is no one-size-fits-all. Especially in the education sector where novel concepts and on-line tools are popping up literally every day we have to be agile and listen to the users.

Via the public Up to University web portal, selected pilot schools, their students and staff, will be able to access our main platform. Web Single-Sign-On and the state-of-the-art identity management and access federation solutions are essential parts of our design to protect privacy and personal data. Mostly dealing with minors under 18yo in the secondary school environment, it is required by the latest data protection regulations of the EU to handle personal information with care. We'll let the schools or trusted third-party identity providers to handle user credentials and we are implementing mechanisms

to get informed consent/assent from students with the necessary control by their parents and guardians as well as their school teachers before their gain access to our tools and services.

Our selected Learning Management System (LMS) constitutes the uniform platform for all applications and tools that we integrate and make available to our users. App-to-Universe is our dedicated "appstore" or "supermarket" that offers a validated and verified set of tools to support teachers and students in experimenting with new pedagogical concepts. The LTI (Learning Tools Interoperability) standard-based integration ensures the future modularity of both the platform and its tools.

Other than the LTI standard of IMS Global we also incorporate a bunch of open protocols (such as xAPI/TinCan, OpenCloudMesh, OAI-PMH/RSS and others) in a so called "Up2U Service Bus". The Up2U Service Bus ensures the interoperability between the functional elements within the architecture and also ensures the seamless integration of the various platform instances as well as third-party applications, infrastructures and content providers.

The platform offers value-added features such as learning analytics and digital rewards. These are based on a dedicated Learning Record Store (LRS) function that collects data from the LMS platform itself, from the integrated applications as well as third-party compliant application platforms and the underlying infrastructure components. The collection, correlation and enhanced analytics of those data provides the necessary insight to teachers to assess their new methodology, their students in class, or the efficiency of the pedagogical model compared to other similar use cases and scenarios at their peers.
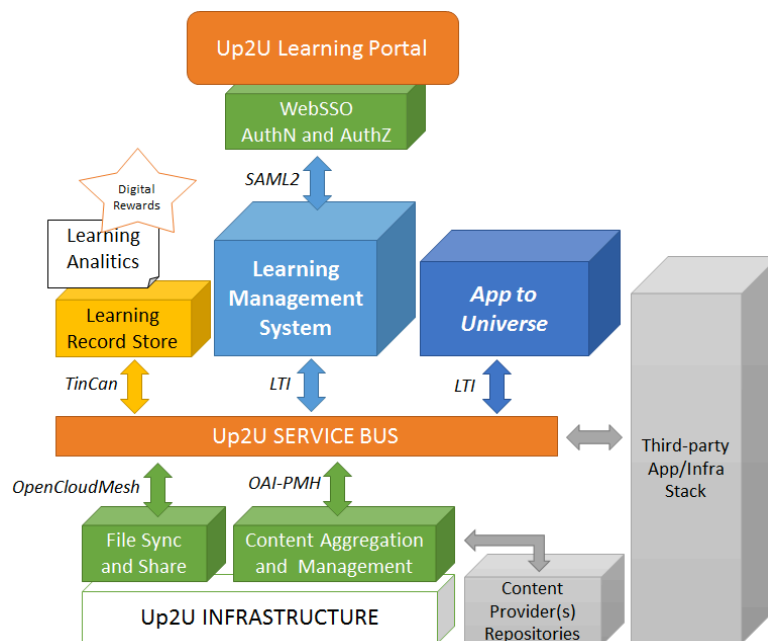

Figure 3. UP2U architecture design

The entire software-stack will be docker-based, made available in DockerHub, which supports it rapid deployment anywhere. We consider state-of-the-art trust and security as the basis of our data protection policy. We incorporate software that allows the sharing and syncing of files and folder across multiple instances, regardless of the underlying storage infrastructure either being in the public cloud or hosted by a private cloud provider or even stored on-premises to maximize control and enforce ownership on the data.

3.2   The content hub

At the foundation level, the learning platform must be fed by relevant content so we do not provide an empty shell. We found it important that both open and paid educational content should be searchable and findable without leaving the actual environment where the learning activity takes place. This provides the least disruption and the least efforts for both teachers and students experimenting with our platform.

GÉANT eduOER is a pilot service that has been developed by the GN4 project in order to aggregate metadata from various content repositories and make them available at a single exchange hub. The Up2U project decided to adopt the same referatory concept for our Next Generation Learning Platform. The metadata aggregation hub is based on the ARIADNE engine and uses several standard protocols such as RSS, OAI-PMH, IEEE LOM, REST API etc. to harvest metadata from the connected repositories and expose them to various consumers (web-sites, developers, metadata harvesters etc). Up2U defined its specific application profile (a set of metadata elements, policies and guidelines defined for a particular application [3]) that allows us to filter and validate the relevant Open Educational Resources (OERs) supporting our use cases. The intention is to connect several K12 education related repositories of the pilot countries as well as European and/or global thematic repositories to feed the necessary content into the platform. This will facilitate the instant co-design, co-creation and co-evolution of open content following the latest copyright regulation of the EU.
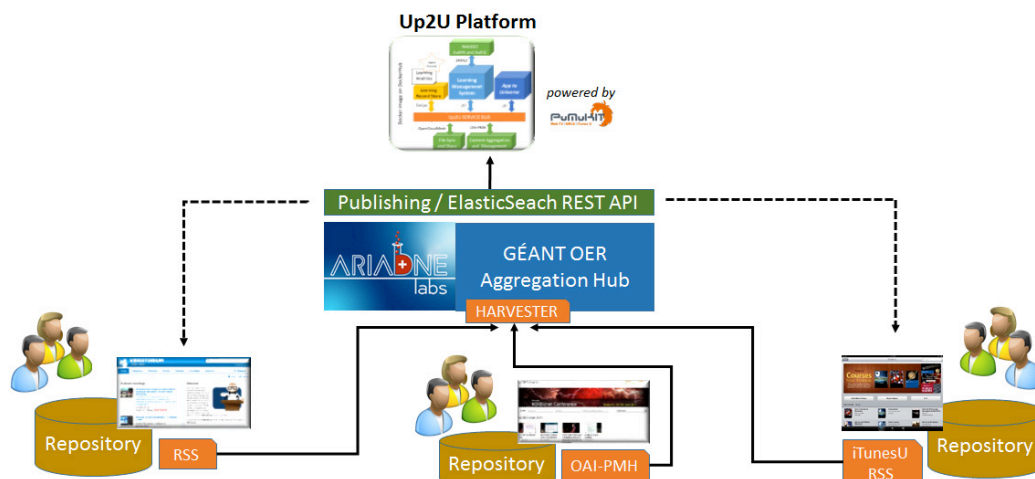

Figure 4. UP2U content aggregation design

The Up2U platform is also designed to act as a trusted delivery vehicle for commercial providers willing to reach the schools community with their targeted offerings; either applications or content or both. It is part of our sustainability model to investigate businesses opportunities and jointly develop viable business interactions – with the help of our commercial partners – that will allow our platform and services to continue once the EC funding ends.

4   CONCLUSIONS

In conclusion it can be said that Up2U understands the challenges of the particular problem space what concerns the technology and methodology gaps between secondary schools and universities. We believe that the key stakeholders must work together and build several bridges to ensure better productivity of the end-to-end education system. We collect traditional and open universities, R&E service providers (NRENs), e-infrastructure providers and commercial partners in out project to jointly address the challenges and pilot solutions for the benefit of teachers and students in secondary education.

ACKNOWLEDGEMENTS

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