Inclusive EdTech ecosystem

for the 21st Century

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Contents

Executive summary

The aim of this document is to describe a way to **enable access to high-quality education to everyone globally** through re-organizing the EdTech ecosystem.

The approach is based on the notion that everyone has the right to quality education and solutions that improve learning can come from anyone, anywhere.

While designing the concept we took a learner-centric approach to figure out how all learners can reach the best learning outcomes by leveraging the technological possibilities we already have at hand.

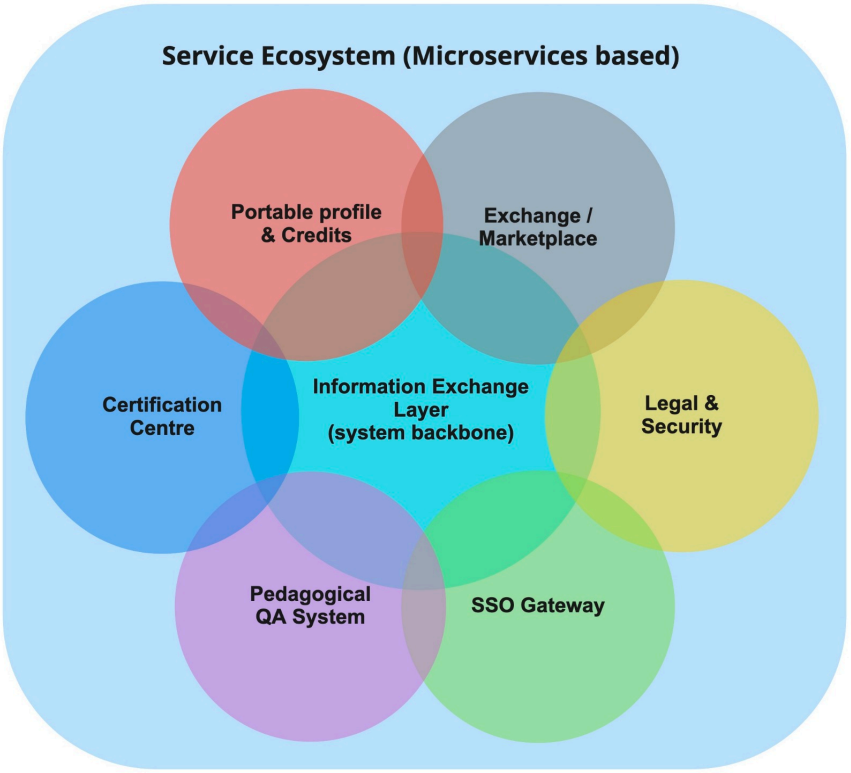
This approach of developing the EdTech ecosystem enables communities to propose solutions to problems they see in their local context. We invite them to come up with scalable solutions that not only solve the issues in their community but could be applied globally to solve similar problems. We also ask the communities to come up with a sustainable business model to ensure the longevity of their solution. By doing this, we expect to achieve a situation where all learners have access to the solutions in an inclusive way, so no one would be left out.

For the communities to be able to provide solutions to the issues, we need to introduce the microservices approach, an infrastructure that allows everyone to propose solutions to problems in education.

The fundamental building blocks of the ecosystem are shown in the illustration.

These tools are enabling communities to develop solutions using the startup model for innovating education.

The full document to introduce the concept is available here.



Inclusive EdTech ecosystem for the 21st Century

The aim of this document is to describe one possible way to enable access to high-quality education to everyone globally by designing a framework to improve the EdTech ecosystem in a learner-centric way..

It is based on the notion that **everyone has the right to quality education** and that **solutions and ideas to improve learning can come from anyone, anywhere**. Therefore, we need to ensure that everyone has an opportunity to learn, to try out their ideas, and to access the tools and support required to build ideas into sustainable solutions benefiting learners across the globe. When designing this concept we are taking a learner-centric approach and try to answer the question of **how all learners can reach the best learning outcomes leveraging the technological possibilities available today.** We will seek to connect the formal and informal learning domains in a complementary way to ensure the learning innovations and assets will be available to all and not just benefit the ones with resources to purchase the best solutions on the market. It is time to make innovation in learning benefit everyone.

Writing of this document has been inspired by the discussion between Mart Aro and Tiina Neuvonen, and Vision Learning 2020.

We are taking the market ecosystem approach whereby individual service providers are brought together within a service ecosystem and aligned with the learners' needs. The objective is to provide a seamless single-sign on user experience enabling access to quality learning assets for all. To achieve this goal, a "microservices approach" is applied where many service providers are connected with one another to fulfill a specific function within the service ecosystem. The ecosystem approach allows a single service provider to focus on a single task leading to quality outputs. As the ecosystem is kept open to competition, startups providing focused services have an incentive to continuously improve their services (essential for maintaining high-quality services). Over time, the effect of open competition will lead to significant improvements in the quality of the services, a reduction in service costs, and an improvement to the quality of learning assets. This model supports the need for a continuous evolution of the services in an organic and market-driven way.

Traditional EdTech procurement is not sustainable, as it distorts the competition benefits and does not incentivise service providers to improve. Moreover, as the ecosystem is growing increasingly complex (service providers need to have pedagogical, business, and high-end tech and legal expertise just to mention few requirements to succeed), single providers are not able to deliver comprehensive high-quality products. Without incentives to continuously develop the product and the inability to harness all expertise, the product soon becomes outdated. Without continuous investments from the buyer, the product soon falls below the market's standard quality and locks in buyers with a single provider.

There are unforeseen opportunities and disruptions happening in global education. We need radical transformative innovations at the system level to minimize the threats materializing through the accelerating global skills crises. It is critical to act now, as the Corona crisis is escalating the already serious situation in learning poverty. This document outlines the key challenges in the existing global education systems, and proposes a technology-powered ecosystem model to overcome the challenges and realize access to high-quality learning opportunities for all. The key **challenges** we need to address in the design of the new model are:

1. Education innovation is driven by the private sector and it has been growing and becoming ubiquitous, however it does not reach the most of classrooms, and benefits only a very small proportion of learners globally. Education systems have been slow to pick up and benefit from learning innovations, whilst private sector and corporate learning innovation is booming. This situation seems to reflect a lack of awareness in the demand side (education authorities and institutions) on the available and emerging solutions and a weakness in the offer side (EdTechs) to raise this awareness.

2. Education innovations do not scale. Whilst there are great innovations in the EdTech sector, their dissemination and adoption, specifically in the public sector, is slow. Education systems remain siloed and tied to national systems, traditions, and standards. Scaling the best practices, even at the national level, remains challenging.

3. Big players dominate the marketplace: Currently digitalisation has led to a situation in which big platforms dominate the market and make it even harder for smaller companies to enter with their solutions, or to have a say in the development of industry standards. This trend has the potential to strengthen as the Covid crisis represents a scenario in which the big player may take profit of startups not well prepared to react and repositions during and after the pandemic.

4. Safeguarding ethical standards is becoming harder as we lack strong international ethical standards that learners and educators can rely on. This leads to, for instance, the use of collected data to benefit big corporations.

5. Limited access to data and legal regulation slows down innovation as it is messy or not clear enough for innovators. Countries with lower standards of data protection and security leave the more regulated countries behind. Strengthening Intellectual Property and making more stable legal frameworks is required to foster innovation eco-systems in every sector, and EdTech is also the case.

6. Development of competitive ed-tech solutions is becoming very challenging for the smaller players and companies as it requires a very broad and complex set of expertise. For instance, few companies have expertise in pedagogy, multimedia content creation, IP standards, data and ethics, machine learning and analytics, just to mention some key areas of expertise critical for EdTech development.

7. The current systems and services are not learner-centric. The key issue is that the siloed and fragmented offerings are hard to access. Implementation of a universal education sector single sign-on solution would significantly improve the situation.

8. Everyone is required to reskill and become an exponential learner in today's quickly-changing world, but the current system does not support the planning and building of relevant learning journeys based on personal learning objectives. Self-directed learning across platforms and contents from many different sources typically requires a lot of work for the learner.

9. We are still in the education export mindset where solutions are based on the local education system, but, when exported, they might not actually solve issues in the new market. Education needs, systems, and cultures are local. Microservice-based software architecture would make solutions much easier to reuse across national borders.

10. Crediting standards in formal and informal learning are not compatible. Fragmentation and fraudulent practices cause challenges for educators and learners because of a lack of mechanisms to prove their skills in a trusted way. This creates challenges for learners to access formal education, or, in the case of refugees, to access learning and employment opportunities in their host countries.

11. Purchasing EdTech solutions and content is difficult and not sustainable. Buyers are often forced to commit to single vendor systems and solutions that are not compatible with other solutions and systems. Procurement models distort market competition and eliminate the incentives for continuous development.

12. A lack of quality standards in digital learning makes it challenging for learners and educators to evaluate and pick the best solutions for their learning objectives and goals. With the growing volume of solutions, this challenge is becoming more prominent.

13. Business models are built on single solutions, not for the learning ecosystem, which leads to siloes and excludes learners from poor socioeconomic groups. Users struggle to access the existing learning resources in order to find and organize coherent learning experiences for themselves in line with their personal learning goals. This situation behaves as a market imperfection that affects both EdTechs and customers.

14. Whilst data is quickly becoming the key asset in the marketplace, it benefits the large corporations who are able to provide the platforms for smaller solution providers, leaving the small solutions providers with a fraction of the benefits.

15. We are at high risk of deepening the inequalities as public education systems are unable to transform fast enough, and private schools and countries with the less data regulation simultaneously are making big innovation leaps.

16. Advanced technologies to support personalized learning exist, but adaptive learning remains to be mainstreamed.

To address the above-mentioned challenges, we propose the development of a new (digital) learning ecosystem based on the microservices approach built on learners' needs.

Beneficiaries, Challenges, and Value Propositions

Overall, the objective is to create a digital platform (global EdTech marketplace) to find the best solutions in the world of learning and make them accessible to all while accelerating the development of quality EdTech solutions in the global marketplace.

To provide a basis for the service ecosystem design, we identified the primary users (or beneficiaries) and their **key challenges to solve**. Initially we propose to focus on three user groups:

1. **Learners:** This covers all learners globally with a special focus on learners in high-need, low-resource settings.

   The key challenge is the difficulty to advance personal learning objectives by effortlessly creating relevant learning pathways consisting of high-quality digital learning content.

   Value proposition: A personal digital tutor connects the learner with quality learning resources, helping her to reach her personal learning goals (i.e getting a job, acquiring the skills to return to formal education track, etc.) Learning experience is tailored to match the learner's level and learning style for optimal outcomes.

2. **Facilitators:** The teachers, mentors, and coaches helping others to reach their learning objectives.

   The key challenge is to find the resources that would support teaching and allow students to reach specific learning objectives outlined in the curriculum. Selecting high-quality solutions and making smart investments without being tied to a single or small number of service providers.

   Value proposition: Access to the world's largest curated learning content and solutions library that is constantly updated and allows easy development and

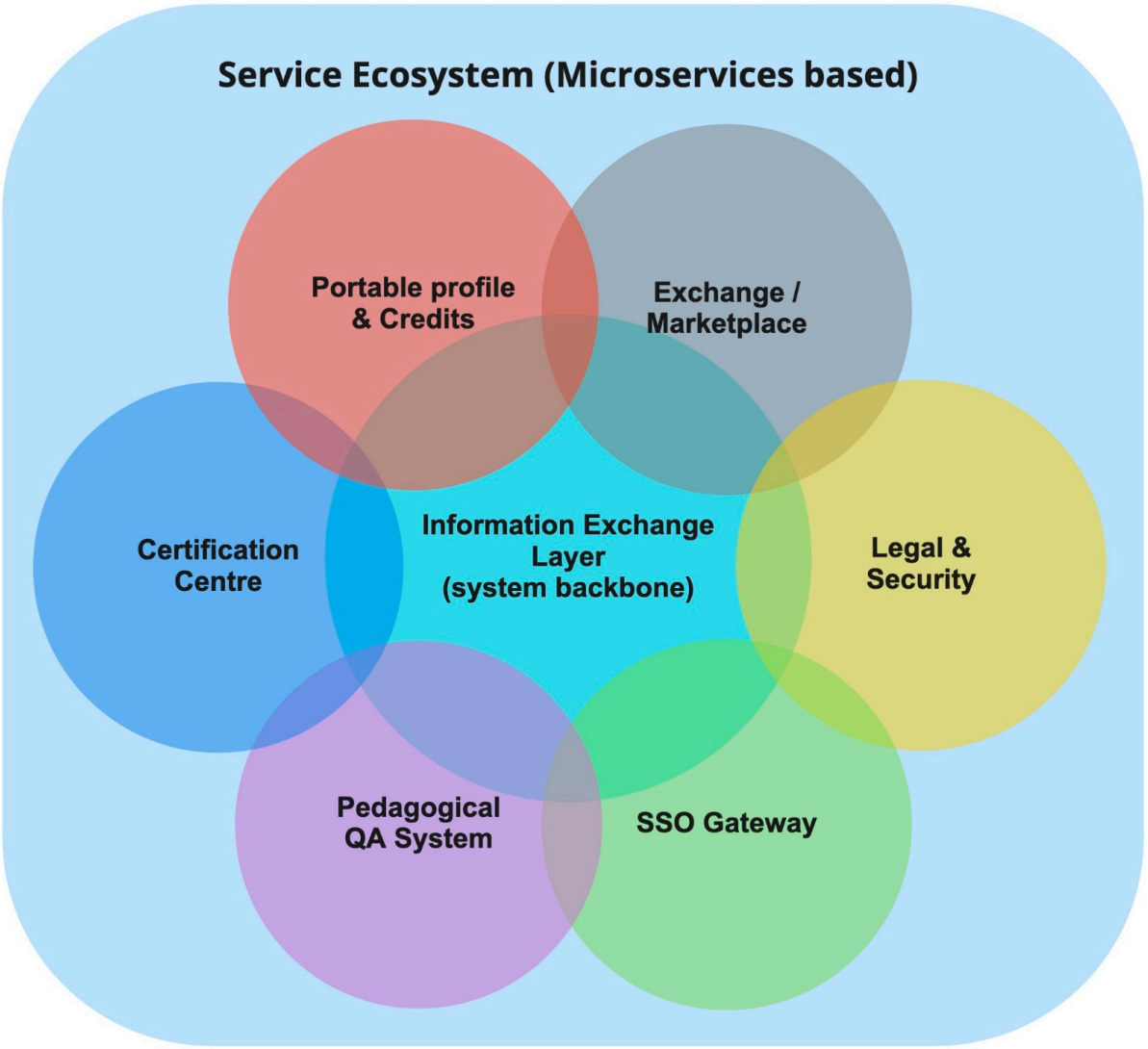
dissemination of digital curriculums and related learning resources. Progressive fee based on available resources.

3. **Service providers:** Companies, Universities, NGOs, and individuals with learning solutions, materials, and tools of varying levels of maturity.

   The key challenge is to have the diverse competences in-house to develop high-quality learning solutions, building the critical user-base and accessing the global markets for revenue creation.

   Value proposition: Provide access to tools, services and marketplace to accelerate development of high quality learning solutions catering to the global audience of learners.

Microservices Ecosystem Map



In the microservices ecosystem approach, service providers focusing on a specific task within an ecosystem are connected to each other through a shared data exchange backbone. The backbone enables separate services to form a seamless service cloud for the end user.

In this scheme, the main challenge for the selection of service providers is choosing the right granularity of the function that the ecosystem player should have. Then allowing several players into this role to enable positive competition. After that, the market will start doing its job of balancing and selection of the most suitable tool.

This will place an important challenge on the ecosystem orchestration team initially that needs to propose the suitable granularity level of solutions. If the services are too broad, they may have difficulties not only in providing a very high-quality product, but also scaling the product. In addition, a successful scaling of a larger then optimal service could give the service provider too much market power, enabling them to distort the market. Hence the second important task for the ecosystem orchestration team is to do it's best to balance the market players, making sure each has enough power to provide a great service while not becoming too powerful.

In this situation the user/consumer is the one that drives the market. We have also looked at how the replacement / switching of microservice providers works, and it is amazingly simple to the level that the one who needs the solution (consumer) just decides to use a new tool as of the moment their needs are not met or a better solution becomes available. For example moving from Skype to Zoom.

Governance

Proposal to start off with an independent NGO or other coordination body to facilitate the ecosystem coordination and set up, provide support in scaling and onboarding stakeholders in different markets, and potentially, merging the NGO into a suitable international organisation for long-term facilitation.

The Board of the NGO could consist of the orchestrating core team + a strong advisory board.

Ownership of the solutions, where possible, should be left to the private sector solution providers within the ecosystem. Also, the need exists to foresee that there would be several players in every niche to have healthy competition. Only the standards generation and data exchange backbone system would need to be governed by some kind of consortium as they should ideally be the only one globally to support interoperability.

In the business model design it is important to ensure inclusivity: the users should have access to an extensive collection of quality open educational resources (OERs) and services, free of charge (freemium membership). The membership fee for public and private schools and facilitators (professional users) could be progressive and linked to

available resources, such as the company revenue, or public funding allocation to educational resources. An introduction of “scholarships” to access paid educational content and services should be considered, for instance, on a needs or learner performance basis. Organizations and private sector companies could purchase tailored re-skilling and micro-skilling courses and “promote” micro-skilling modules as an investment in talent development or acquisition.

The key components of the ecosystem:

SSO gateway

Needs to have a widely-acceptable SSO gateway solution that could be used by all EdTech (connects the ecosystem services).

In short we need to investigate if we could set up a gateway where all SSOs can connect and also all startups can connect. To the level where each country can decide which SSO's are allowed to be used in their education system. **It is important to make sure that the EdTech startups would have to make only one integration.** **Read more.**

Exchange / Marketplace

Needs to set up a marketplace where on one hand learners could conveniently filter out solutions that could support them in learning according to their interests, needs, skills, etc. On the other hand, the solution providers need to be able to conveniently offer their solutions.

What could be built upon:

- ➔ Ability to build curriculum
- ➔ Data exchange backbone (Fi, EE, NL)
- ➔ Analytics sys
- ➔ Skills mapping
- ➔ AIntelligent learning buddy
- ➔ Formatting assistant to address user learning preferences and available tech (i.e gamification tools, text to audio, automated translation, etc.)

Legal & Security

Needs to review from an education innovation perspective to clarify the situation and enable data exchange.

- ➔ Privacy
- ➔ Data protection

Pedagogical quality assurance system

Needs to have a system for pedagogical quality assurance as well as evidence of proven learning outcomes besides the standard user rating. The aim of this tool is to enable companies to map their solutions against a pedagogical framework and help facilitators and learners select the high-quality solutions by different criteria.
This could also include any evidence that the tool is providing the learning outcomes that it promises. Possible partners: Digital Promise, Education Alliance Finland

Certification centre (Quality assurance system)

A portal where solution providers could log in and get an overview of what requirements/standards they need to meet. The certifications could include legal, ethical, technical, and other strict standards. The suggestion is to have different levels of requirements depending on the volume of users. Eg. If a solution has below ten thousand users, they would need to meet very basic requirements. Visually - the provider can log in and tick off boxes that they have filled. They also can ask a trusted third party to verify/certify that they actually fulfill those requirements. The Cert centre profile is accessible to everyone that needs to have access to it.

- ➔ Legal standards
- ➔ Technical standards
- ➔ Data exchange
- ➔ Ethical standards
- ➔ etc.

Portable profile & Credits (Micro learning - Blockchain based online diploma), Recognition of learning.

Needs to enable learners to keep track of all the learning that they have done by collecting the past and future skills, degrees and diplomas in one verifiable skills profile. A verification mechanism will be developed to address the fraud issues (with a potential to link to a personal digital ID).

- ➔ Portable profile (could include learning preferences for adaptive learning)
- ➔ Micro credentials
- ➔ Nano degrees
- ➔ Trusted third party accreditation

Opportunity: If we could get 5 of the largest tech corps to the table and agree upon a common standard for micro credentials, it is very likely that it will be accepted universally.

Microservices based technology architecture

The concept can only work effectively if cloud & microservices-based architecture is embraced. Monolithic approach will make it impossible to keep the market open and agile.

Read more about the microservices based architecture. Short summary, for introducing the idea to a wider audience: Lego Blocks for Learning or detailed description by Estonian national CTO: Nextgen GovTech Architecture.

Rapid innovation cycle in education

To enable an influx of high quality solutions for education, the Leonardo initiative could be applied in major cities globally. In addition it would create a possibility for researchers to share their theoretical education development views with innovators, that then can be used in developing learning solutions:
https://www.martaro.me/articles/leonardo-initiative

Strategic investment fund

To steer the development of the needed ecosystem, it would be meaningful to establish a strategic EdTech investment fund.

In this case the orchestrators group would need to select the startups that are already doing needed things with the right granularity level and invest in those startups to speed up their development. Investment could be done either alone or together with other investors (co-invest).

This approach would enable us to pinpoint the direction of the development. Read more.

Way forward

- We propose setting up a small **coordination body** and an advisory group to orchestrate contributions from a diverse set of experts in the development of the new inclusive digital learning ecosystem.
- Call for contributors to advance the concept design and technical development focusing on different challenges / technical components each forming a separate work stream. This can include connecting existing projects and products, or developing smaller working groups focusing on the design of specific components.

- Developing detailed roadmaps and budgets for each work stream. Mobilizing resources per requirements.

Key research questions

- Map ecosystem stakeholders and their needs.
- Needs from the emerging markets perspective.
- India & East Africa have been development aid receivers from Finland, so those regions should be prioritised.
- Are there different needs for the ecosystem development on global vs national / regional level?
- Regulation towards private sector involvement in education development needs to be mapped as well.

To take all of the 12 wings of the ecosystem development vision and go into details with each of them, developing a more concrete plan and expected outcomes for each of the 12 areas. Including best visions for ownership for each etc. And already mapping the potential partners for each component. This includes bringing experts on board for each of the areas.

Feasibility study on creating and accelerating platform economy for education sector, to respond to the deepening of a global learning crises due to the COVID 19. The focus is on facilitating the South-North cooperation, and universal access to quality learning through a service platform catering both, the EdTech startups and the learners (covering self-directed learners and education duty bearers, i.e governments and municipalities responsible for arranging access to edu even when the pandemics hit). An excellent opportunity to connect a development opportunity (education is still a strongest determinant of lifting someone out of poverty and remote and quality learning can only be made accessible by ensuring the edu tech innovation benefits all), and the development of economic, ethical and inclusive economies.

- **Primary objective:** Create a model and a roadmap for the acceleration of a platform economy to service the global education needs including the 1) platform ecosystem 2) services for the “clients” and 3) technology platform architecture (functional criteria for the service providers).

Research should focus on (secondary themes):

- Understanding and verifying the stakeholder needs to inform the development of a thriving platform economy in education sector. We will focus on 2-3 markets (Nordic, Indian, African – tbd.)
- The stakeholder needs identification should inform the service and business model development and roadmap development and later, support the ecosystem orchestrators operating in the pilot markets to carry out the screening of 1)

ecosystem service providers and 2) stakeholder coordination supporting successful entries to the ecosystem
- Key components besides the service and ecosystem model to look at are 1) Business model options and feasibility and financial sustainability longer term 2) Participant criteria (data, privacy and ethics) for the service providers participating and 3) what else? Mapping of the ongoing initiatives that would ideally connect their resources for a better impact?

Research deliverables:
- Needs prioritization (across the markets) is carried out leading to a "universal" model including recommendations for the platform development roadmap and coordinator (or orchestrator) guidelines to facilitate successful stakeholder entries.

Additional issues to be tackled

- To develop an inclusive EdTech Ecosystem 'hard' issues need to also be considered (connectivity, digital access and tools).
- Include an innovative regulatory approach that may be considered by local education authorities (a sort of Regulatory Sandbox).

Executive summary in a separate document.