

# Designing a Sandpit- and Co-Design-informed Innovation Process for Scaling TEL Research in Higher Education

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**Abstract.** Sustainably digitalizing higher education requires a human-centred approach. To address actual problems in teaching as well as learning and increase acceptance, the Technology Enhanced Learning (TEL) solution(s) must be co-designed with affected researchers, teachers, students and administrative staff. We present research-in-progress about a sandpit-informed innovation process with a f2f-marketplace of TEL research and problem-mapping as well team formation alongside a competitive call phase, which is followed by a cooperative phase of funded interdisciplinary pilot teams co-designing and implementing TEL innovations. Pilot teams are supported by a University Innovation Canvas to document and reflect on their TEL innovation from multiple viewpoints.

**Keywords:** higher education, sandpit, co-design, innovation, TEL

## 1 Introduction

Innovation in higher education often means scaling research outside of university in the open-market by founding start-ups [1], for example. However, research in the realm of Technology Enhanced Learning (TEL) also needs to be scaled internally to digitalize teaching and learning in our universities and meaningfully innovate higher education.

Despite the long research tradition in TEL (e.g. 2019-14<sup>th</sup> EC-TEL conference), the teaching and learning practice in higher education remains focussed on leveraging digitalization for scaling and enhancing frontal speech (e.g. recording courses for distance education). Many TEL insights are not transformed into sustainable practices as 3<sup>rd</sup>-party funding often only results in impact on selected application contexts.

When it comes to leveraging existing TEL-research for improving teaching and learning practices, sustainably and systematically, there is a gap: “How to understand, support and monitor sustainable evolution of university-internal TEL innovation?” In

this paper, we describe 1) a sandpit and co-design-informed innovation process for TEL innovation in higher-education and 2) the University Innovation Canvas as instrument for documentation, reflection and guidance within this process.

## 2 A Sandpit- and Co-Design-Informed Innovation Model

Our goal was to establish a university-internal innovation process at Graz University of Technology (TU Graz). Following Design-Based Research [2], a first version of the process, events and methodologies has been co-designed with experts from TEL, design-science and diverse university representatives ranging from rectorate to specific organizational units. The innovation process is planned to be implemented three times, whereby iterations are informed by stakeholder-interviews as well as analyses of the process documentation with the university innovation canvas, for example (see below).

We propose a human-centred approach to university-internal scaling of TEL that respects all relevant stakeholders by fostering collaboration and community building as core value. The innovation process consists of a competitive and a cooperative phase. While the competitive phase aims at finding pilot projects with respect to the goals of the university’s digitalization strategy and guiding an expert committee to an informed decision about the distribution of funding, the cooperative phase aims at a (mutually) supportive innovation process of the winning TEL pilots (see Figure 1). The results of the cooperative phase inspire the competitive phase of the next iteration.

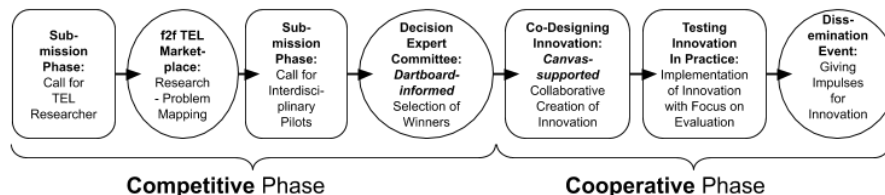


Figure 1. Cooperative and Competitive Phase of Innovation Process

### 2.1 Eliciting & Selecting Innovations in a Sandpit-Informed Competitive Phase

The competitive phase (see Figure 1) follows the idea of a ‘research sandpit’ [3], where an interdisciplinary group of academics and practitioners comes together for a short time to create new projects around a given theme. The process includes the chance to get to know each other and creatively form groups and ideas to narrow down most promising approaches. This research sandpit is implemented in a face-2-face event following the idea of an actual marketplace – anyone within TU Graz can present ideas or ongoing projects that have to do with learning and technology to lecturers and students (first call – for presentations at this marketplace). The second call is for interdisciplinary project teams who compete for (a limited amount of) funding. Requirements for these projects included that the TEL solutions must be

implemented in another faculty than the one of the researcher(s) for higher impact, for example.

For evaluation of submissions, we considered the university digitalization strategy [4], portfolio management [5] and product management [6, 7] and developed ten criteria that sum up to three main evaluation categories: “TEL concept”, “expected benefit” & “financial rationality”. Each criterium of a category was informed by a set of indicators assessed on a 5-point rating scale: e.g. in the “expected benefit” category, the ‘benefit’ of the pilot submission was based on the expected effects, addressed number of students and involved number of faculties. Results were illustrated in an easy-understandable and comparable graphic, the *University Innovation Dashboard* (see Figure 2) including segments for the categories with slices for respective criteria. Each slice represents a 5-point scale so that a filled dashboard means high performance. This structured evaluation informed an expert committee’s decision on the distribution of funding.

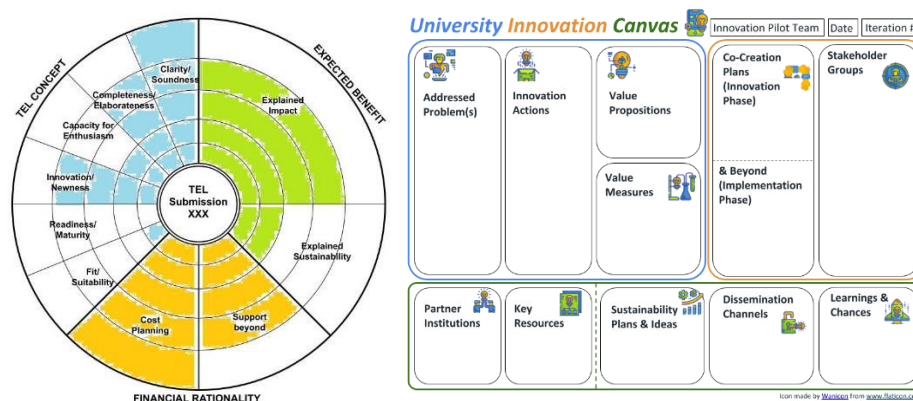


Figure 2. University Innovation Dashboard (left side) and Canvas (right side)

## 2.2 Co-Design-informed Innovation Phase with University Innovation Canvas

The winning pilots develop their TEL solution and implement it afterwards in a university course during the cooperative phase (see Figure 1). It incorporates the idea of collaboratively designing innovation together with the affected stakeholders to increase trust in the TEL solutions, address actual learning and teaching problems and promote broad adoption. The pilots are required to collaboratively create design three times with project stakeholders and with an expert team that provides outside support.

We have developed the *University Innovation Canvas (UIC)* in order to support documentation of pilots, as well as to trigger reflection on the project. The UIC is inspired by the business model [8] and the lean canvas [9]. It triggers reflection about factors that are important for a sustainable TEL innovation, such as thinking about which existing problems are solved, and by which characteristics of ‘the solution’; how (if) to leverage co-creation, and what is necessary beyond the technology development phase to make the innovation successful. From a communicative viewpoint, the UIC serves as an evolving boundary object for collaboration in the

interdisciplinary innovation-teams and cooperation with other pilots and outside experts. From a learning viewpoint, the UIC serves as trigger to enter into reflection, as guidance for the (collaborative) reflection process, and as means to document reflection outcomes [10].

We understand such an innovation activity to represent an activity system [11–13]. The UIC represents the ‘tool’ that helps innovators to collaboratively create their object-oriented activity, namely the transformation of research into sustainable TEL solutions in higher education. This socio-cultural understanding of innovation makes the UIC a prototype that is iterated like the emerging TEL solution. Like a ‘living document’, the UIC allows to evaluate the innovation process over time and provide targeted feedback and support from outside of the pilot team in form of specific reflection questions. To fit the innovation process within higher education, we designed the UIC as iterative artefact, excluded revenue streams and included a field for co-design to bridge the value proposition with targeted stakeholders; a field for value measures to assess the value proposition; a field for sustainability plans to maintain the value and a field for learnings as a kind of innovation diary (see Figure 2).

Alongside the cooperative phase, barcamps [14] are offered for cooperation and communication between and beyond the innovation teams. Without pre-defined but participants-driven process, the pilots can leverage these ad hoc-conferences in terms of their co-design needs and for cooperation with other teams. As a side effect, such barcamps are facilitatory for the emergence of a potential communities of practice [14].

### **3 First Results and Outlook**

At TU Graz, we are in the middle of implementing the first iteration of the innovation process. The competitive phase is conducted, and the winning TEL pilots are engaging in the cooperative phase. Without stating a funding maximum, submission requested about 20k€ for co-designing and implementing the TEL solutions. Out of 19 individual submissions for the f2f-marketplace (1. Call), we received 12 follow-up submissions from interdisciplinary teams (2. Call), covering all faculties. The expert committee decided to fund 6 out of 12 projects. These include virtual laboratories for studying 3D physical problems, digital tutors for training Python with in-time feedback & reflection support for understanding and monitoring learning goals alongside studies. On average requested funding is reasonable and 100k€ funding allows us to drive six one-year TEL pilots with high probability of impact on several faculties, also giving impulses for tool adoption and participation in the innovation process. The implementation of such a process is not cost-free, respecting costs for administration, expert support and hidden in-kind on top. However, it is much more expensive to first educate EdTech companies for research-informed TEL solutions [15] and then pay them for their services. Finally, initial feedback from the interdisciplinary pilots’ signals appreciation for the cooperative phase. The teams welcomed the chance to reach a shared understanding with the UIC,

leverage it as ‘guidance’ to keep the focus on important innovation factors and understand co-design as a fertile but demanding process in terms of the invested time. They further stressed that the “formal structure promotes an efficient innovation process and helps a reflected approach to sustainable innovation”.

We found first indication that our human-centred university-internal approach to scaling TEL research is well received by the users for their inclusion in the design as well as the innovators for guidance and support. Events and methods will be iterated for the upcoming implementation and assessment in future iterations. Research questions surround the processes and dynamics of intra-university open innovation as well as the effectiveness of the UIC to truly support and guide TEL innovation projects.

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