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D4.4.3

HOTEL Innovation Support Validated Model

SEVENTH FRAMEWORK PROGRAMME

HoTEL Holistic Approach to Technology Enhanced Learning

Innovators – Opinions – Perspectives

WP4 | D 4.4.3

HOTEL Innovation Support Validated Model

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public report	final	5	30/09/2014	M24
audience & type	status	version	doc date	due date

TABLE OF CONTENTS

1. Introduction

The HOTEL Project is designing and testing an "Innovation Support Model" (ISM), that means a different thing than an "Innovation Model". We believe that Innovation, particularly in the field of Technology Enhanced Learning (TEL), may take very different forms than the classic paradigm that moves from research through prototypes to massive commercial exploitation.

While an innovation model conceptualises the different steps and processes that bring innovations to be generated, adopted, incorporated in use, scaled up and eventually exploited in commercial or institutional ways (see sections 2 and 3 of this document for the main references that have respectively been used by HOTEL for general and TEL-specific theories of innovation), **an Innovation Support Model (ISM) refers to the way a "professional body" of analysts and stakeholders representing users categories, advisors, fund raisers, institutional and private investors, etc. can help innovators to succeed, or to succeed more quickly than they could do without this support**. From this perspective, **an ISM is essentially a relational model, linking innovators to their context through a structured set of interactions that, in the case of HoTEL, take place within and around the Learning Exploratorium Labs**.

The main purpose of HoTEL is therefore not to define a new model of TEL innovation, but **to design, test, improve and propose an effective way to support innovators, which may correspond to different innovation models co-existing in the TEL field**. In order to do this the project selected a set of innovators and innovations to be accompanied, for a period of time, through a series of interactions with experts, stakeholders' representatives and other critical colleagues who, hopefully, will concretely contribute to strengthen the success prospective of these innovations and contextually reflect on the proposed support (content, process, outcomes and potential impact).

In the field of TEL, innovation may frequently start in a classroom or in a community of practice, or may be the result of massive use of a technology not born for educational purpose. This means that any "innovation support model" must fit into the variety of modes and contexts in which innovation may emerge, and have different, adaptable ways to support it.

The road to success for a TEL innovation depends, to a large extent, on the possibility to be understood and supported by some categories of stakeholders that are not always the same (e.g. industrial investors, school leaders, publishers, policy makers, teachers' networks, student associations, consultants, et cetera). Not all of them might ultimately influence every kind of TEL innovation with similar leverage, but it is important to consider the full spectrum of involved interests to select the

most crucial representatives of stakeholders to discuss/support the innovation development.

Furthermore, what appears a big success in a certain context may not work at all in another context (e.g. country, socio-economic environment, organization, or sector). It is therefore fundamental to identify not only "what works" but also "where" and "under which conditions", distinguishing between success factors that are relatively "unique", specific to the context, and others that can more easily be found or reproduced in other contexts.

In order to design the HOTEL Innovation Support Model (ISM) to be tested and validated through the support process of the Learning Exploratorium Labs along with the selected innovations, we have looked into innovation models first, focusing then on the concept and features of innovation in TEL. Out of the results of such an analysis, a "to be tested" version of the model has been produced and used by the Labs in their innovation support cycle. Within this document, Chapter 1 looks at innovation models in general, Chapter 2 considers innovation in TEL; Chapter 3 and 4 concentrate on the HOTEL Innovation Support Model, while the annexes provide the Lab protocols, developed in cooperation with the Labs and guiding the labs in testing of the identified innovations and in testing of the ISM as such.

2. Innovation models

In order to design a meaningful Innovation Support Model for TEL, the HOTEL project team has run an in-depth analysis f existing innovation models, from within and outside the learning domain.

The importance of an understanding of innovation as a process is that it shapes the way in which we try and manage it. This understanding has evolved in the past decades. Early models interpreted innovation as a linear sequence of activities, whereas more recent work tries to build more complexity and interaction into the innovation arena[1]. Table 1 below summarises the features of the different innovation models generated over the last decades.

Model	Generation	Characteristic
Technology push	First	Simple linear sequential process, emphasis on R&D and science
Market pull	Second	Simple linear sequential process, emphasis on marketing, the market is the source of new ideas for R&D
Coupling model	Third	Recognizing interaction between different elements and feedback loops between them, emphasis on integrating R&D and marketing
Interactive model	Fourth	Combinations of push and pull models, integration within firm, emphasis on external linkages
Network model	Fifth	Emphasis on knowledge accumulation and external linkages, systems integration and extensive networking
Open innovation	Sixth	Internal and external ideas as well as internal and external paths to market can be combined to advance the development of new technologies.

Table 1: Development of innovation models (source: Preez & Louw, A Framework for Managing the Innovation Process, page 2)

[1] http://www.emotools.com/media/upload/files/innovation_models.pdf

2.1 Open and Society-driven innovation

The HOTEL project aims was to develop a model supporting innovation in TEL, and in order to do so relied on a set of Exploratorium Labs supporting innovation adoption in three learning areas: Higher Education, Learning@work and Informal learning in professional networks.

As from the DoW, the HOTEL Exploratorium Labs take inspiration from the Living Lab concept though being different from them in the following:

- They do not address the local level, but take into consideration the complex multistakeholder ecosystem typical of the education and training sector
- They address a non-typical "market" sector" (education and training) where institutional actors co-live (and have a strong role) with market actors.

In this perspective, the **Open Innovation Model** is the one that most recalls the dynamics necessary for innovation to work in TEL, in that it implies the simultaneous work of actors of a different nature to try, through relational activities, to support the adoption of the innovation by enhancing externalisation of tacit knowledge, modelling and combination of tacit knowledge and internalisation of tacit knowledge. This participatory Open Innovation Model is also inline with the SECI model of knowledge creation in the TEL context as was described by Nonaka and Takeuchi (1995), Nonaka & Toyama (2003), Kamtsiou & Klobucar (2013), and Kamtsiou et al. (2007)

The general idea of Open Innovation is that a single organization cannot innovate alone, but must engage with different kinds of actors to get new ideas and resources and remain competitive. This is especially true in the case of TEL, since TEL innovations have a systemic nature (Kamtsiou & Nascimbeni 2013a, Bocconi et.al 2012).

As from figure 1 below "Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. [This paradigm] assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology"(Chesbrough 2006).

Thus, in open innovation institutions adopt both internal and external ways to use technologies and rely not only on their internal R&D capacity but also on external sources of knowledge (spin offs, universities, suppliers, etc.).

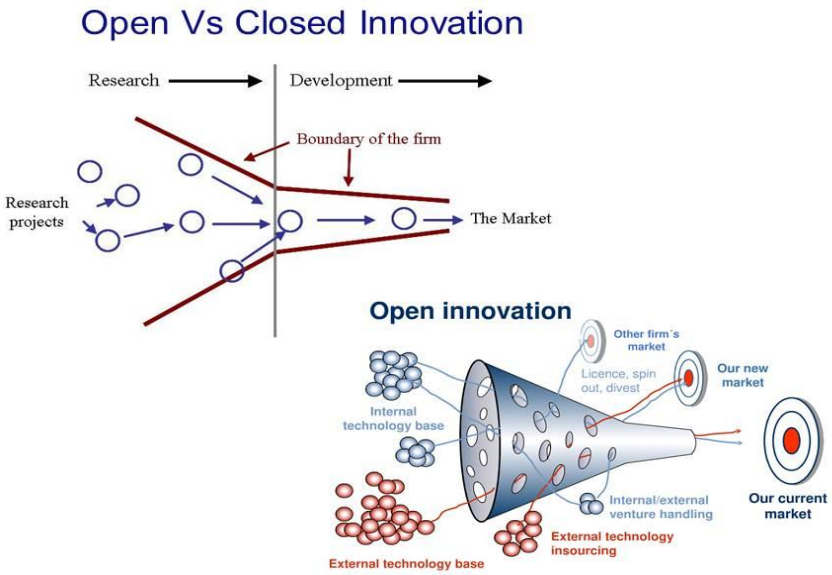

Figure 1: Open vs closed innovation. Source: Business models and innovation strategies Blog.

In contrast, closed innovation implies a situation where, as Chesbrough himself put it, "companies generate their own ideas and then develop them, market them, distribute them, service them, finance them and support them on their own". The graphical representation in figure 2 below provides some practical specifications of the two different approaches to innovation.

Closed Innovation	Open Innovation
Most of the smart people in our field work for us	Not all of the smart people work for us, so we must find and tap into the knowledge and expertise of bright individuals outside our company
To profit from R&D, we must discover, develop and ship ourselves	External R&D can create significant value; internal R&D is needed to claim some portion of that value
If we discover it, we will get it to market first	We don´t have to originate the research in order to profit from it
If we are the first to commercialize we will win	Building a better business model is better than getting to market first
If we create the most and the best ideas in the industry, we will win	If we make the best use of internal and external ideas we will win
We should control our intellectual property (IP) so that our competitors don´t profit from our ideas	We should profit from others´ use of our IP, and we should buy others´ IP whenever it advances our own business model

Figure 2 Open vs closed innovation - specifications (Chesbrough 2006)

The need to involve actors "outside the institution" and to promote collaboration with "external research" are very relevant to the world of learning and to the concept of innovation therein, as learning is featured by a complex stakeholders' ecosystem determining its evolution.

Talking about innovation in learning settings implies the need to consider not only innovation processes but also (and mainly) the significance of interconnection of the actors involved in the processes of innovation. In other words, the complex ecosystem of TEL stakeholders shall be considered when defining and supporting TEL innovation.

In this respect, a relevant interpretation of innovation for the area of learning is the one offered by the Society Driven Innovation Study developed in the frame of the INNO GRIPS Project – Global Review of Innovation Intelligence and Policy Studies[2]. The Study considers innovation as a systemic process where societal needs are met through the complex interaction of actors engaged in meeting socially defined needs. According to the Study, "**Society Driven Innovation (SDI)** is innovation where: (i) The objective is something other than just the narrow economic goals of competitiveness and economic growth. Rather it is to meet some sort of social or cultural need; (ii) This 'societal need' is defined by society (usually through the government acting as 'the voice of the people); (iii) Government policy is deliberately oriented to this objective – and this is the primary goal of the research or innovation programme (not just a hoped-for spin-off)".

SDI is largely government, top-down driven, and not bottom-up/grassroots although "other forms of action may also generate SDI, particularly research and development and public procurement, where innovation criteria are involved and there are efforts to stimulate 'lead markets' through the adjustment of market signals (e.g. for renewable energy supplies) and regulations (especially related to social or environmental criteria)". It is when the five main features of the SDI are described that relevance to the world of learning becomes particularly clear:
1) Social and cultural objectives are identified by social institutions on which a substantial consensus exists.
2) The objectives are of general and national or even international significance and importance; often they concern alleviation of social or environmental problems (e.g. disease, climate change).
3) The goods or services are often provided by, supported by, or involve lead markets facilitated by governments (though this need not be exclusively the case).
4) The innovations requiring a significant structure to ensure effective implementation and/or diffusion.
5) The innovations have potentially significant structural and large-scale impacts on society.

[2] J. Rigby, Y. Nugroho, K. Morrison, I. Miles, January 2008, Mini Study 03 – Society Driven Innovation
[2] http://samidob.blogspot.it/p/open-innovation.html

Societal actors may take a variety of roles in supporting the implementation of innovation: a) initiating an action to meet a need (= driving innovation); b) creating the network of actors required to meet the need; c) active participation in networks, c) passive participation (= endorsing innovation). This classification has been important to define possible roles of stakeholders within the HOTEL Innovation Support Model.

The following framework is proposed to map SDI:

Societal objective	*What are the societal objectives of the initiative? What concerns are being addressed? From the review of literatures, it is anticipated that the areas of concern will be around the issues of environment, healthcare, clean energy, access to technology for 'less able' groups, etc.*
Mode of definition	*How is the initiative defined? Who proposed the initiative and in what way? What processes are involved and what stages are traversed before the initiative is made public?*
Responsibility and mode of implementation	*Who is responsible for realising the initiative? Who is responsible for the implementation? What are the means of implementation? It is likely that the realisation of the initiatives will become the responsibilities of the authorities, possibly with some support from nongovernmental institutions.*
Role of innovation	*What role does innovation play with regard to the initiative?*
Horizon/timespan	*What is the time span of the initiative? Short term or long term? Is the deadline specified? Who defines the horizon and sets the deadlines?*
Scale	*What is the scale of the initiative? Is the scale clearly set out? Who defines the scale of the initiative?*
Society support	*Is the concept broadly supported by the society? How has this been achieved?*
Evaluation	*How is the initiative evaluated? How is the evaluation scheme developed (top-down or bottom up)? How far and in what way is the stakeholder involved in the evaluation processes? How is the evaluation documented?*

Going further in the definition of innovation as relevant to the context of the HOTEL project, in a recent JRC report **ICT enabled innovation for learning** "refers to the profoundly new ways of using and creating information and knowledge made possible by the use of ICT (as opposed to using ICT for sustaining or replicating traditional practices). It deals with both formal and informal learning, covering traditional education settings (schools and higher education) and adult education. Last, but not least, this ICT potential for innovation must be realised and accompanied by the necessary pedagogical and institutional change" (Kampylis, Bocconi and Punie, 2012). According to IPTS, "the paradigm underpinning ICT-enabled innovation for learning entails a holistic transformational shift towards connecting learning organisations and processes (i.e. connecting the realities of learners' lives and their experience of school). It applies the four principles of social innovation, where innovation is conceived as open, collaborative, free and characterised as "with" those involved (and not innovation "to" or "for").

A framework for the categorisation of innovations is proposed by IPTS (as a tool for the development of the Scale CCR Study[3], that could easily be adapted to the needs of HOTEL) to classify ICT-enabled innovations (graphically represented in the spider diagram of figure 3 below).

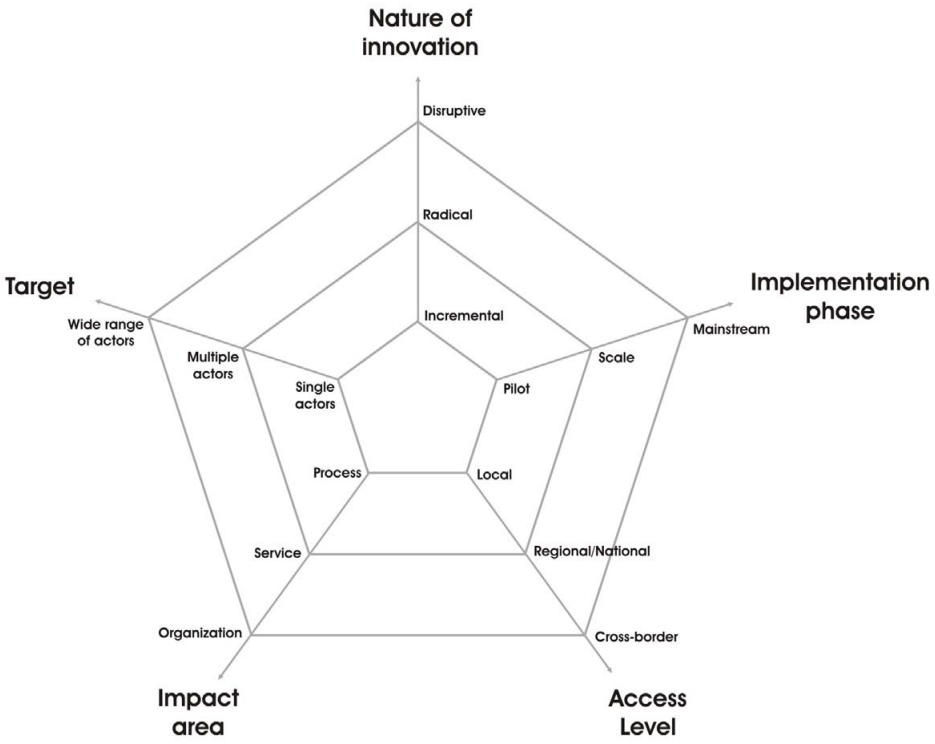

Figure 3 - Categorising ICT enabled innovation (IPTS-JRC 2012)

[3] http://is.jrc.ec.europa.eu/pages/EAP/SCALECCR.html

2.2 Categorization of innovations according to their nature

Figure 4 below shows a categorization of technological innovation according to the **nature of the innovation i.e, linear/incremental, disruptive and systemic.**

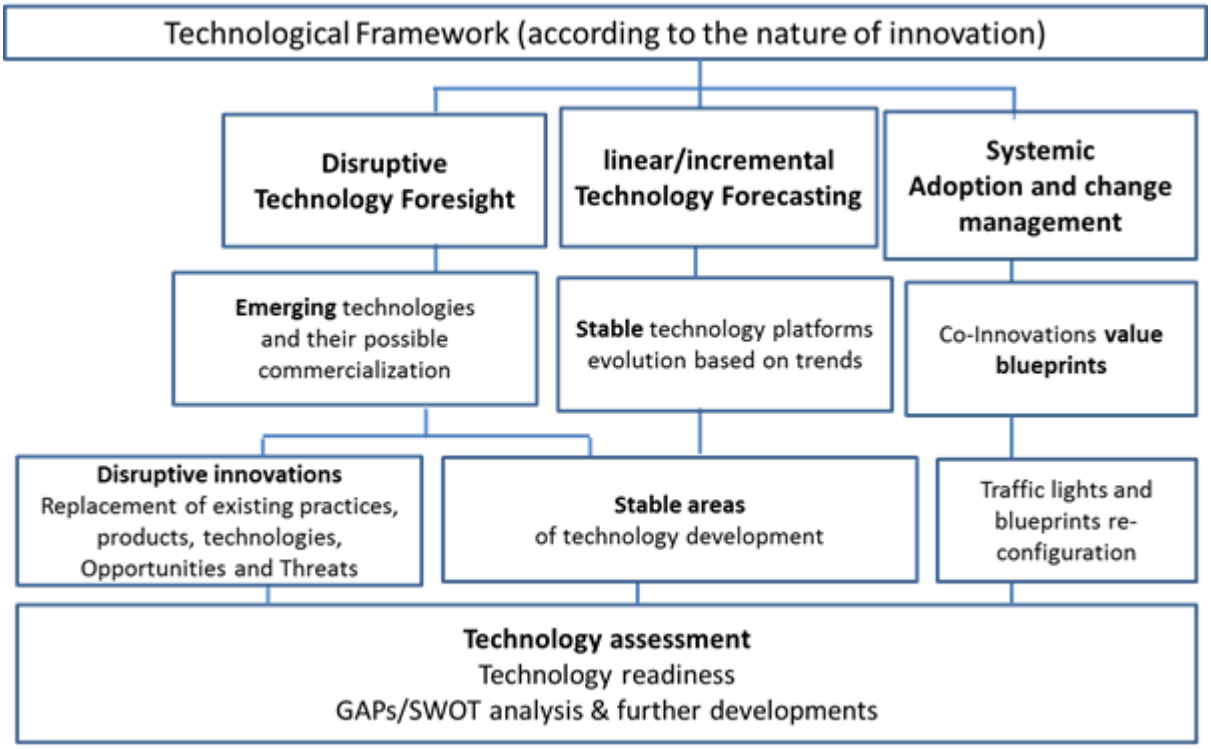

Figure 4: categorisation of TEL innovation (Kamtsiou 2013b)

The identification of emerging technologies in TEL innovations and the possible commercialization of such technologies (Technology foresight), as well as their possible evolution (Technology forecasting from existing trends), are both needed in order to identify risks, opportunities and threats related to such developments and the impacts of these technologies at some time in the future (Technology assessment). In addition, a plan for adoption of the foreseen innovations must be developed, which would include all the relevant actors involved in the innovations functional logic for implementation.

Depending on the nature of innovation incremental, disruptive or systemic, different approaches and methods are used in order to assess possible technology gaps. Each of these "technology intelligences" methods (including the market and economic intelligence related to adoption of these innovations) support TEL innovators in order to assess their innovations and achieve their successful implementation under a number of plausible technical, social as well as learning and business contexts.

Incremental innovations: Technology Forecasting methods

In case of incremental innovations (or sustained innovations), usually technology-forecasting methods are used in order to assess technology readiness and ability to add value in existing TEL solutions. Related activities are:

- identify critical requirements and "products" to be developed (added value).
- identify major technology areas and technology drivers.
- identify technology alternatives and their possible evolution based on strong trends, historical data, hype curves and technology life cycles or S-Curves.
- assess technology readiness.

S-curves are growth curves widely used for Technology Forecasting. The growth curves have an "S-shaped" form similar to life cycle over a period of years. "An S-curve represents a technical performance as a function of time or research effort and its shape is influenced by market demand, scientific knowledge and level of investment or innovation" (Phaal et al. 2004). In the beginning of the S-curves, still at incremental growth stage, we expect to be able to make good predictions on the technology evolution. In the top of the s-Curves the picture is very different. Similar to life-cycle analysis, as technology matures further improvements are not possible. At this point, substitute or new emerging technologies are replacing the mature technologies. This is a turbulent time until a new dominant design emerges. Since, by definition S-Curves of different technologies are not linked, technical discontinuity is a given (Phaal et al. 2004) and managing the transition to the new technologies is difficult depending on the nature of innovation (e.g. disruptive innovation, innovation at the interface of more than one technologies, incremental innovation etc.).

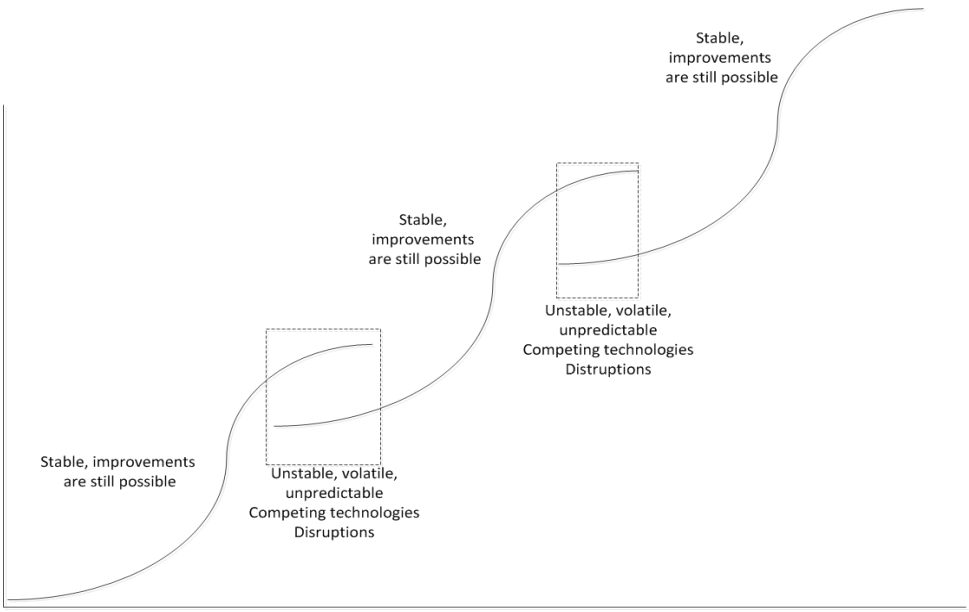

Figure 5: Evolution of S-curves (current and emerging) adopted by: Linstone (2004) *p.p. 189*

Disruptive innovations: Technology foresight methods

Disruptive innovation is a powerful means to both expand and develop new markets and to provide new functionalities, which could disrupt market linkages and/or replace market leaders (Yu & Hang 2010; Christensen 1997; Adner 2002). According to Christensen "disruptive innovation happens in a process. Disruptive technologies are technologies that provide different values from mainstream technologies and are initially inferior to mainstream technologies along to the dimensions of performance that are most important to mainstream customers." (Yu & Hang 2010) In its early stage, disruptive innovations can only server niche segments, which value non-standard performance attributes.

In case of disruptive innovations, we need to understand the possible innovation opportunities stemming from the emerging technologies and any threats or weaknesses that might influence their adoption. Identification of possible trends and signals that might lead to disruptive innovations are also very important. S-Curves could also be used to understand both, if traditional attributes show of an overshoot to current customers, and if lower costs emerging products or services are emphasise secondary attributes (Schmidt 2004). Usually, Open innovation models may be applied to manage disruptive innovations, because of lack of complimentary resources and skills to create and market these innovations. (Chesbrough and Crowther 2006; Paap and Katz 2004) Regional clusters of co-innovators can also help manage the adoption of disruptive innovations. For example:

- What will be their potential for commercialization, in terms of desired applications, products or services?
- Which products, technologies, practices or even markets will be disrupting/replacing?
- What will be the resistance from the current players in the market?
- What it means in terms of the adoption of the new technologies?
- Who else needs to come in an agreement in order for the innovations to be created and adopted?

The analysis of the S-curves in technology forecasting methods also provides a first indication of when a new technology will be most likely to appear as a replacement of a mature one. Sometimes, disruptive innovations are used in a sense of radical innovations, which provide superior performance or services compared to current offerings of the market leaders. A comparison of traditional technologies against the S-curves of emerging technologies could be made in order to understand if there is a real superior performance of the emergent technology in comparison with the traditional technology that would motivate the decision makers (suppliers, producers) in the industry to invest in it and replace the previous one.

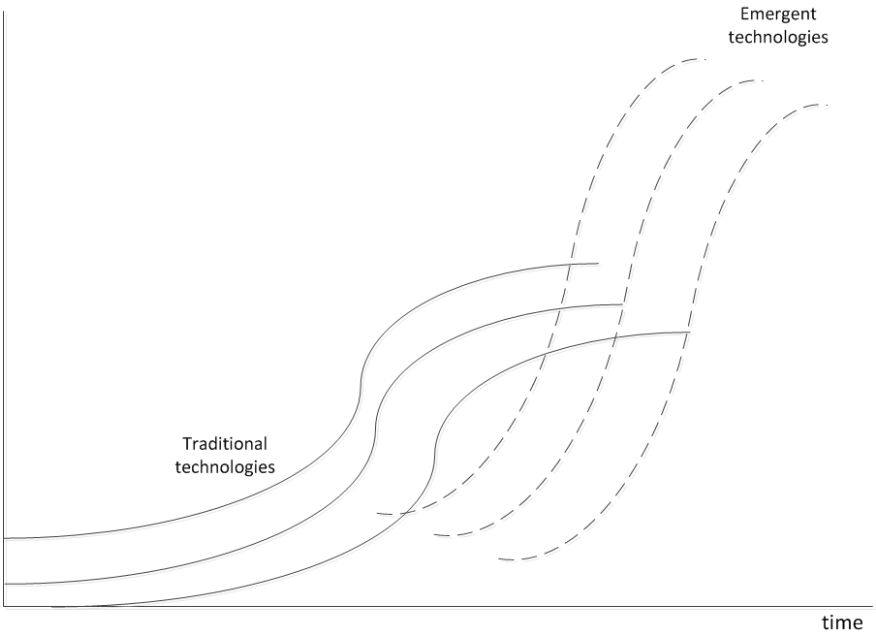

Figure 6: Traditional technologies S-curves, versus emergent technologies (adapted from source: R. Tierney et al. / Technological Forecasting & Social Change 80 (2013) 194–211, page 1998)

Furthermore, the foresight methods are usually used in order to identify and understand the uncertainties and changes in the TEL socio technical landscapes, develop plausible scenarios in order to analyse drivers for change and their signals, other competing technologies (including the possible integration of several technologies) and their disruptions. In case of innovations developed from the integration of several technologies, these technologies are usually grouped and considered as one new technology to assess as well.

Systemic innovation: taking an holistic view

An alternative method to scenarios (plausible futures) comes from systems thinking approach, where the causal relationships between concepts are analysed. An example is given below that relates to student's retention in Higher Education. This map was produced in a TEL-Map workshop titled, 'Thwarted or Embedded: Mapping Cause and Effect' held at the JISC-CETIS Conference in Nottingham in 2013. The main task was to map out causative factors and their inter-relationships, which can then be used to help plan appropriate actions.

This diagram reflects and was built up during the discussion.

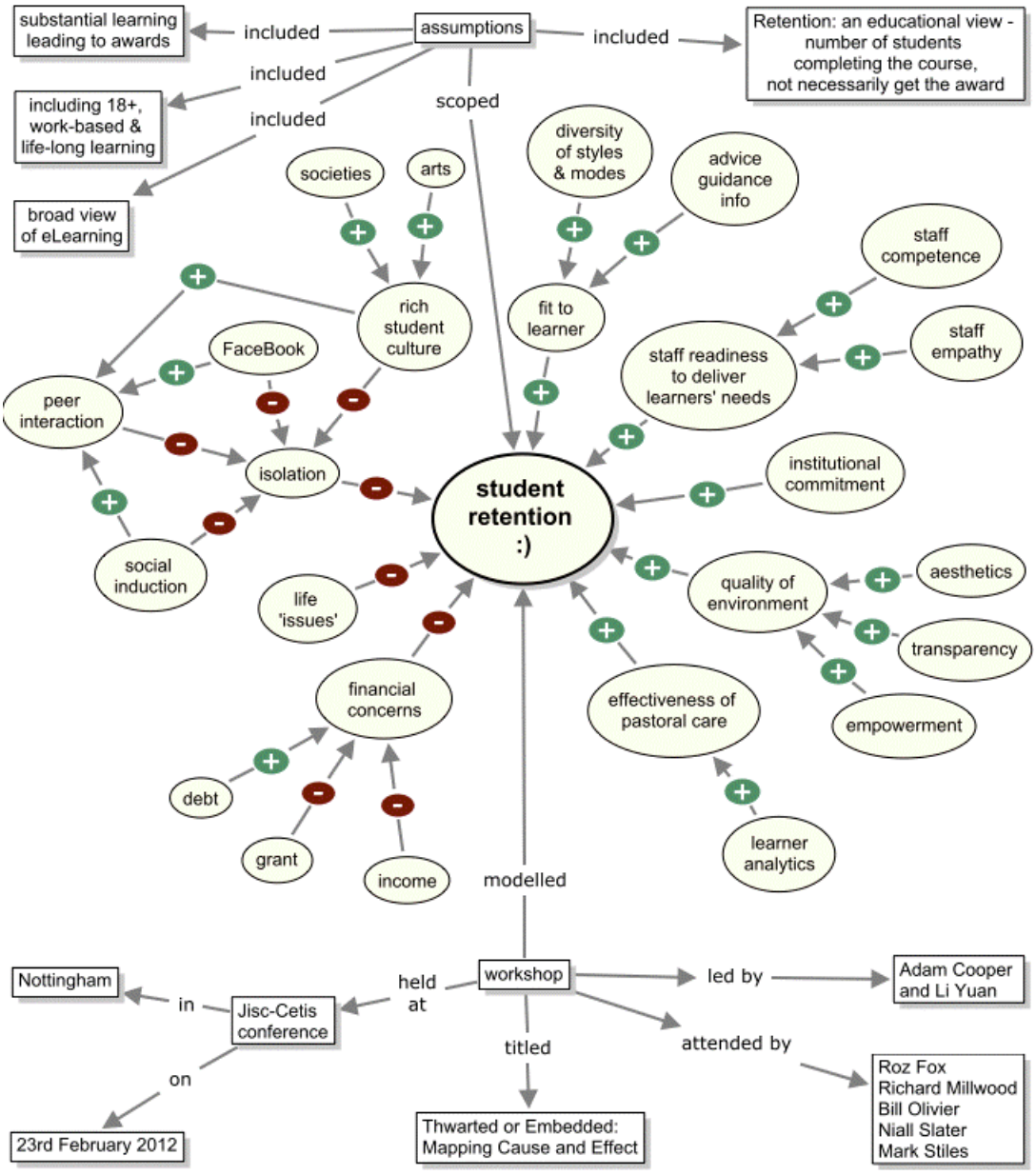

Figure 7. Interplay of Factors Enhancing or Reducing Student Retention source: TEL-Map project[4]

TEL innovations are difficult to be classified as disruptive with the possible exception of Higher Education and the emerging MOOCs model. In this case, the students who do not have the time or cannot afford traditional Higher Education are provided a strong alternative of highly targeted, low cost, time flexible

[4] The '+' and '-' signs should not be read as 'good' and 'bad', but taken to indicate the nature of the impact of the source factor on the destination. Thus for example, 'debt' increases (+) 'financial concerns', while 'financial concerns' can act to reduce (-) 'student retention'.

education via MOOCs programmes. This is also true for some students who have been over-served with high quality education currently offered by Higher Education Institutions. For example, instead of full degrees they could be offered online education of very specialised industry or specific competencies related courses. In case of schools, it is more likely to see radical and systemic, rather than disruptive innovations that would not replace schools as institutions, but will enhance significantly the learning experience. These innovations could introduce radical changes in the way schools are governed; curricula are created and change teaching practices and pedagogies. Therefore, it could be disruptive for Ministries of Education, Teachers, and Schools administrators, but since the offerings would be of radically higher quality compared to the current educational offerings, such innovations could not be characterised as disruptive. In corporate education, we could foresee a possible disruption of current TEL providers' markets. This is more likely to happen by technological innovations outside the TEL industry or on the boarders of TEL. Such innovations could include intelligent tutors, AI, Data analytics, gesture interfaces, etc.

2.3 Technology and market adoption readiness

Assessing Technology readiness

Whether we have to deal with incremental, disruptive, or systemic TEL innovations, a technology assessment in terms of technology readiness of the foreseen technologies to deliver the innovation opportunities (whether technological, business, practice or socially driven) needs to be performed. Most common methods include surveys in form of interviews with experts in both technologies (ICT) and business. Below is an example of a generic questionnaire to assess technology readiness used in the Nanotechnologies roadmaps (Tierry et al. 2012).

Stage 1: Has the Technology solution feasibility to implement the new capability been supported by conceptual studies with a likely R&D pathway.
Stage 2: Has an analytical study been performed that confirms the potential usefulness of the new solution?
Stage 3: Is there a viable path forward that would lead the experiment and or analytical result forward to a future application that solution risk can be evaluated?
Stage 4: Has the new solution been successfully modelled and tested and a viable path forward to experimentation or demonstration of the potential application identified?
Stage 5: Has the new solutions demonstrations been successfully and consistently performed with key elements being tested individually and or in an integrated fashion?
Stage 6: Has rigorous system –level demonstrations been performed successfully in a relevant environment with results consistent with the levels of performance, cost, etc. that the new solution must posses for the intended application?

Stage 7: Has verifiable system-level demonstration of the solution been performed successfully in a relevant environment with the results consistent with the levels of performance, costs, etc. that the new solution must posses for the intended application in the actual environment of use?
Stage 8: Has a production solution been fully described and successful manufactured with no additional commercial barriers to overcome and all interactions between each technology understood and qualified to the satisfaction of one or more customers?
Stage 9: Is the solution producible at the critical dimensions levels such as performance, cost, quality, reliability that were originally anticipated and all unforeseen barriers been removed with complete customer satisfaction? In case the responders were saying NO in a question to a stage, they were asked to stop and if possible to forecast what would be the period in years required for the technology to progress to this stage.

It should be noted that TEL innovations are more and more happening on the interfaces of more than one technology rather than as a result of the development of one single technology. Technology readiness usually measures individual technologies and not systems. Therefore, the operationability and the adoption of the whole system in its transactional and operational environments must be assessed as well. In case of systemic innovations, it is important to understand how the developed technology integrates in the bigger system and what disruptions it causes in the system value chain and its subsystems value-chains. For example, are the suppliers of the system influenced by the innovation (backward integration), or the customers (forward integration), or makers of other elements and subsystems (lateral integration).

Assessing Market adoption readiness

Finally, another useful market adoption model for analysing technological innovations based on requirements for major changes of behaviour from users adopters is developed by Moor (1991). This approach is a good tool for assessing the market innovation readiness in disruptive innovations. According to this model, the market adoption of a technological innovation resembles a bell curve that trucks customer adoption of new product or service (Lee et. al 2011).

Figure 8: Technology adoption lifecycle adapted from: http://readwrite.com/2007/08/06/rethinking_crossing_the_chasm#awesm=~oodCRNvJuAdBAa

Moore explained that although many technologies initially get pulled into the market by enthusiasts, later fail to scale and to get wider adoption. It is therefore critical for innovators to come up with strategies that will help them build a bridge across that gap. The characteristics of the innovation adopters in each category will assist the innovators in developing strategies to bridge the gap.

The complication in TEL is that innovation adopters (end users) could be also suppliers of innovation. For example, teachers adopt a new technological innovation in their learning practices and in turn innovate and produce new ways of learning organization and delivery. Moore's model appears to be primarily focused on the supply side, with the final end user or customer placed at the end of the chain, but not involved in the innovation process. In TEL, these may include content providers, brokers, curriculum developers, competencies models, teachers, tutors, examination boards, assessment developers, etc., who may also add value to the technological innovation or their decisions may hinder its adoption. Therefore, a careful analysis of the types of adopters as well as their role in supporting the innovation must be made. In addition, sometimes those who decide to buy are not the same as those who have to use TEL, so the adoption process has two steps in two relevant categories: decision makers on one side, teachers and learners as direct users on the other side.

3. Innovation in TEL: genesis, adoption, scaling up

3.1 Innovation genesis models

In the field of Technology Enhanced Learning three main genesis models are recognised by HoTEL:

1. **Technology and Industry-led**, in which the availability of a new technology, normally not specifically designed for learning, finds a number of educational or informal learning applications that may lead to large adoption out of massive industrial and commercial investment The case of tablets use within classrooms but even more importantly in informal learning corresponds to this model. It has been explored by HoTEL WP1 and by several studies on emerging technologies having an impact on learning (see D1.1.2 and D2.2.2).

2. **Research-led**, in which learning theories search and find application in experimental learning settings that are created and monitored to check learning effectiveness, usability and other key features of both generic and learning-specific new technologic applications. This is model that is normally supported by national and European research programmes and has been also explored by HoTEL WP2 (see D2.2.1 and D2.2.2).

3. **Practice-led**, spontaneous bottom up innovation emerging from individuals or communities of teachers and learners that find original ways of using technology to materialise new ideas about learning and teaching and are able to demonstrate their effectiveness in new contexts of use; this model was explored in HoTEL WP3 (see D3.3.1 and D3.3.2).

One could argue that a fourth model exists, that is **policy-led innovation**, materialised by the many national and supranational programmes launched since the 80s to diffuse ICT and its use in classrooms. In our views these policies gave support to one or the other of the existing three models, or a combination of those, without really establishing a different genesis model. Policies may become very relevant, on the contrary, in the subsequent steps of innovation life cycles, and notably adoption, scaling up and institutional exploitation.

Another observation that can be made is that each of the three genesis models of TEL innovation carries with it some strengths and some weaknesses, and that integration of approaches is desirable. That is why the approach followed in HoTEL combines/ integrates those genesis models of innovation in order to define the innovation support model.

3.2 Adoption and change management of TEL innovations

The field of TEL is considered to be a diverse and multi-level domain, involving many types of players, working in different cultures and operational contexts, under varying jurisdictions, with differing and sometimes opposite approaches to pedagogy and the task of education. Looking more deeply, the TEL domain is not only varied, but the adoption of TEL in general, and "products" in particular, is also complex, with many technical and organisational interdependencies. For instance, as it has been analysed in HOTEL WP1-WP2 multiple root technologies such as content delivery and assessment need to be integrated with other technologies that are found outside TEL, such as those related to Big Data, AI and internet of things. These kind of technological innovations which are produced on the interface of several technologies are in turn giving birth to new pedagogical innovations, and supporting the implementation of new learning and educational practices, such as seamless learning, microlearning, Rhizomatic learning, etc. Thus, most TEL innovations are not linear, single rooted or independent, but rather systemic, involving several converging and or competing technologies, complex interactions by many players, who have to collaborate in order to align their contributions and develop holistic solutions, rather than simply the introduction of new standalone products. Hence, these types of systemic innovations have "a nature of integrality" (Jari Kaivo-oja, 2011), and at the same time a nature of multi-diversity, since the applications envisioned usually require for different development pathways per involved technology. Different providers of systems, content and services are often mutually dependent and a degree of coherence between them is necessary to transfer TEL innovations to the mainstream. Further, many other types of stakeholders have to come to agreement about what is wanted and how it should be provided. When organizations are looking to introduce and manage TEL innovations, they need to take into account the whole eco-system in which they are operating. The focus is on desirable systemic change by which we mean changes in business (and learning organizations), learning processes and practices, as well as technological (software, and tools and infrastructure) and social (e.g. role of learning in developing European citizens, their employability, and personal fulfilment).

For systemic innovations to be successful the "functional logic of the whole ***product/service delivery and supply chains*** (suppliers, manufactures, distributors, value-added resellers, installers and consumers) may change because of the new innovations" (Jari Kaivo, 2011). In the case of TEL, educators, software developers, brokers, policy makers may also have to be aligned, co-innovate and make changes for the successful adoption of TEL innovations. Most common types of incremental innovations are (1) technological innovation, (2) business innovation and (3) social innovation. In systemic innovations, these three types are systemically interconnected, thus systemic changes in one of these three innovation types can introduce changes or innovations in the other two innovation types as well (Jari Kaivo, 2011).

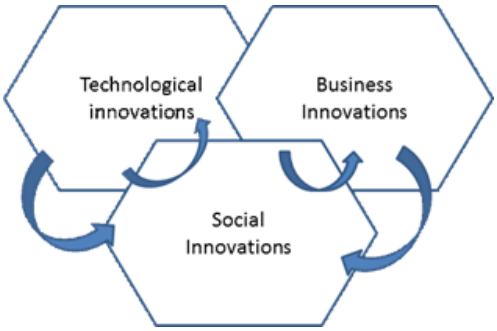

Figure 9: Synergy field of different forms of innovations, source: Jari Kaivo, *2011, page 7.*

First, we need to decide which element drives the systemic innovation (key innovation element) and then organize the other elements inside its strategic framework logic. For example, if (1) technological aspect of innovation is the key element of the innovation the other 2 elements of innovation are subsystems of larger systemic innovation. (Kaivo, 2011).

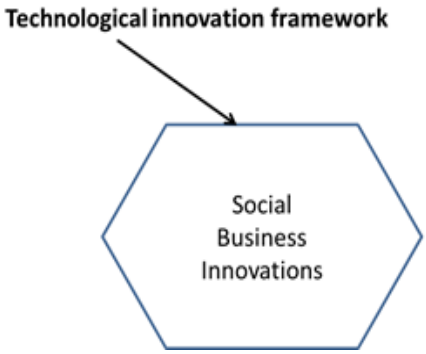

Figure 10: Technological framework for a systemic innovation

In our case, we have added one additional innovation type "learning practice innovations" specific to TEL innovations.

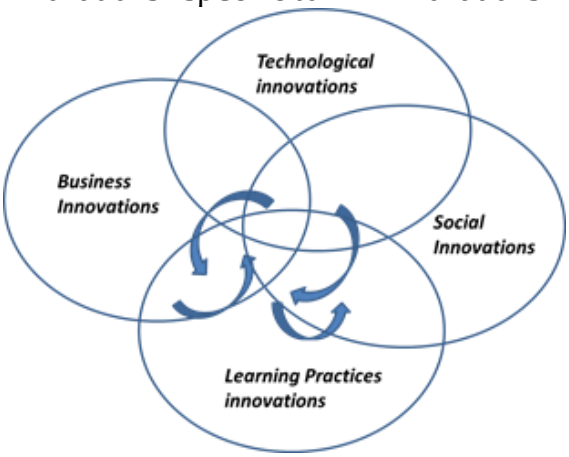

Figure 11: Synergy field of different forms of TEL innovations

In line with this reasoning, innovators within the HoTEL Labs have had access to different "***knowledge banks***" either developed by the project such as the report on technological landscape of TEL with special focus on the emerging technologies, the map of the learning theories associated to TEL learning practices, the definition of educational challenges as mean of defining a map of technologies and TEL learning practices, as well as other explicit and tacit types of knowledge available via dialogue with HoTEL innovator experts and lab reviewers. Different methodologies have been used for analysing the different innovation frameworks depending on the sectors and on the innovations (see D4.4.2 Integrated HOTEL Labs Report).

3.3 TEL innovation Adoption challenges

OECD (2008) identifies several models of innovation adoption in learning:

- In the *Research-development-dissemination-adoption model*, "there are clear stages to be followed based on the industrial conception of innovation as a technical process. This assumes linear rationality, planning and the division of labour. Some of the evidence-based approaches to educational policy and practice relate to this industrial conception of diffusion".
- In the *epidemiological model,* "innovation is understood to spread in a given population rather as an epidemic, following a cumulative S-shaped logistic curve as growing numbers of people are "touched". More recent, naturalist theories of culture see ideas as contagious, not practices. This relates to the discussion of personalisation and the warning of widening existing inequalities".
- Individual decisions and their aggregated social effects lie at the core of the "*social-interactionist model* in contrast with the epidemiological model which allows little room for wishes or decisions. This focuses on mechanisms for persuasion, more or less complicated, linked to two key parameters: a) given and received information; b) communications networks".
- "In the *institutionalisation innovation model,* an innovation has a finite duration and, in the best of cases, it leaves traces of its existence. When it is adopted by an institution, it becomes appropriated so that the innovation loses its newness and energy, is absorbed by the institution, and becomes part of a routine. The innovation is firmly institutionalised when it has found its way into legislation requiring new forms of practice".

Change management and adoption of systemic innovations

As analysed above, in the past, many originally very promising technologies have run into a "last mile" problem, essentially failing to convince either the actors involved in the supply-delivery value chains or the wide majority of users of their benefits. Technology adoption is about making technology available (*a delivery process*) and most importantly about people, their expectations, and what they imagine and then learn about what a technology can do (*a social process*). Often users' response to new technologies undergoes a stagnation or disillusionment stage (HypeCycle), before it picks up again. Failing to identify this development at an early stage - and to deal with the reasons behind it - can have a seriously negative impact. In reality, technology adoption conforms to more complex patterns and is subject to the influence of very diverse factors. The issue of uncertainties in user responses and acceptance of emerging technologies are often ignored, and in reality the assessment of future innovations simply concentrate on technological potential and supplier's deployment processes.

A practical example of technology and adoption or change management successfully adopted by TEL-Map project was based on Ron Adner's model published in his book, The Wide Lens (Adner, 2012). Essentially Adner's points to the dependencies an innovator will often have on co-innovators as well as with the value chain suppliers and intermediaries. Adner's model is based on the assumption that individual technological innovations in order to be successfully commercialise, other complementary technologies must be developed prior and an agreement with suppliers of such technologies and other intermediaries must be made. He suggests mapping out these players and their interdependencies in a ***'value blueprint'***. The key questions are a) who else needs to be able to co-innovate with you before your value proposition reach your users? and b) who else needs to be able to adopt your value propositions before they reach the end users?

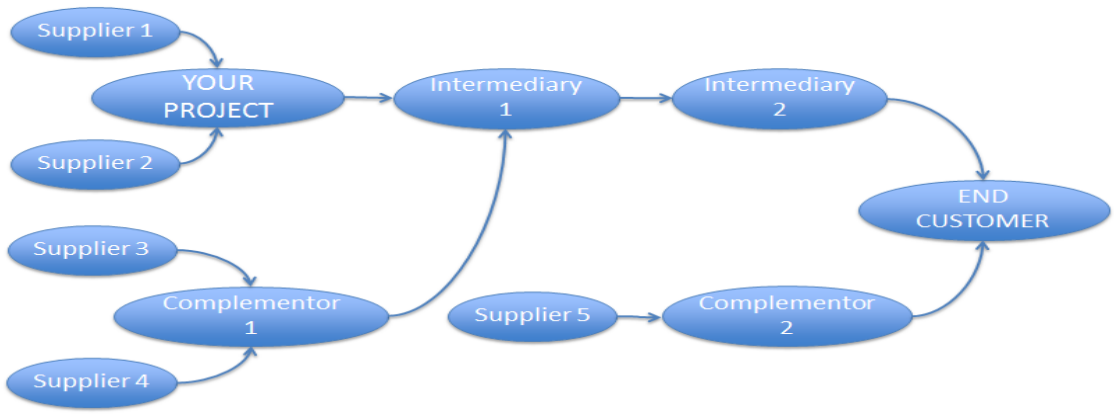

Figure 12: Value Blueprint. Adapted from Adner (2012) p.87

Adner provides an example from the publishers sector. The example is called the elusive E-reader, and uses the value print methodology in order to investigate why Amazon succeeded where Sony failed to develop the market for its e-readers. In 1990, Sony introduced its Data Discman Reader, but the venture failed due to very limited content available only on Sony-published CD. Limitations included: they were very expensive, too big, and tiring for the eyes. Then in 2000, online retailers sold 500.000 copies of Stephen King's novel Bag of Bones, a signal that motivated all major publishers to launch digital imprints. This led to increased sales for the publishing houses and in some cases revenues were doubled. Microsoft and Amazon started to compete for software to support the new e-books. Despite this success the current electronic reading devices were not selling. This was attributed to not user-friendly hardware, difficult to find and to read the e-books. Sony launched a new e-reader in 2006 the PRS-500 Portable reader. Users could buy the e-reader at 350 dollars, 20% cheaper than the previous model, and could choose from approximately 10.000 titles available at Connect.com the online bookstore that Sony launched alongside the Reader. It was a two-step process to read the content. First the users had to download the content in a proprietary format to their PC and then transfer it from the PC to the reader. Nevertheless, the reader failed again to successfully become adopted by the market. Main problem was its blueprints of adoption. The target customer was the book reader. Sony developed both the hardware and the standard for the e-reader. It partnered with excellent suppliers like E Ink and managed to develop a high quality product. At launch Sony saw all green lights across the project, supplier and intermediaries. They planned to bring on board many authors and publishers to Sony's own retail store. In reality, Publishers as adopters of the innovation saw only red lights (several economic, legal and quality concerns as well as copyrights and security issues).

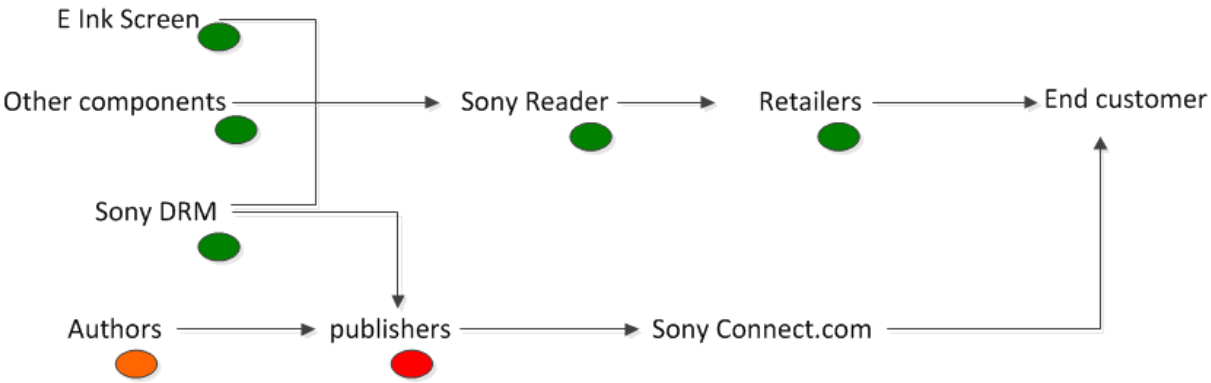

Figure 13. The Sony reader value print at launch, Adner (2012), p.94.

The figure above shows the various dependencies that had to be managed and the willingness of the co-innovators and intermediaries to come along. These are simplified and represented in the map as a green, yellow or red traffic lights against each player. It shows that Sony Reader Value Blueprint was an excellent technical product, but it was not a market success because the publishers, a key part of the whole innovation ecosystem, were not on board. Particular attention therefore needs to be paid to those players whose traffic lights are red, i.e. whose costs

outweigh the benefits. If these key players' issues are not addressed, then there is little chance of the innovation succeeding.

Amazon in 2007 launched the Kindle and this innovation made e-books into mainstream. As a device, it was inferior to Sony's reader, heavier and with an inferior screen. But Kinder was a closed platform, which was reducing the risks associated with sharing the content with friends and others, or making it impossible to transfer content from other devices; it was a one stop shop providing a simple and cheap way to purchase and enjoy an e-book. It was positioned as a service and not a device. The figure below shows the Kindle value blueprint.

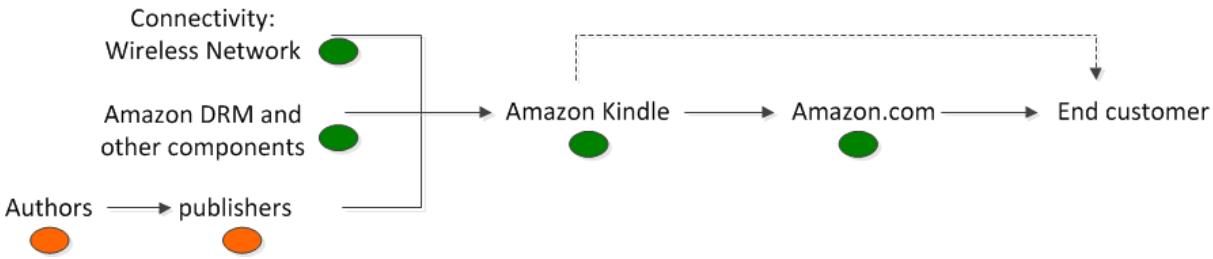

Figure 14: Amazon's Kindle value blueprint at Launch, Adner (2012), p.96.

The key difference was the way they aligned the ecosystem to bring their value proposition to the end customer. This was a simplified proposition for everyone involved. No lights are red. In order to transform the orange light for publishers, it was critical to reduce their perception of risks and total costs. Amazon aside from solving the problems with piracy and copyrights, it also paid the publishers 50 % of the list price of the print version but then sold the e-book for 9.99 dollars. Moreover, its retail giant gave them a lot more power to approach publishers and authors with a good proposition.

Learning practices challenges

TEL innovations are more complex since they need to be fitted or to (innovate/disrupt) current learning practices and pedagogies. Consider for example how innovations or "value propositions" from software designers and platform developers influence and impact the individual contexts of teachers (teaching practices at schools, training needed to adopt the new systems, professional development) or those contexts of schools administrators and IT managers, where they need to make informed decisions on access, affordability, quality, and adaptability to existing organizational processes, or a ministry of education, who may have a say in how the innovation fits with the school curricula, place and time of adoption.

In addition, the learning practices, which are supported or enabled by the TEL innovations need to be identified and described. TEL innovators, need not only to be informed of the current and emerging learning practices supported by TEL, but also they need to understand the current analytical frameworks and use them as checklists against the proposed innovations and the respective learning and pedagogical paradigms associated with these innovations. Such analysis of the related learning practices and the analytical pedagogical frameworks is intended to lead to improvements in the innovations' design or in the change-management of their adoption. In other cases, they may help identify the assumptions made of existing practices that can be combined with the innovation to ensure its viability.

Social changes

Learning theory has been a contested scientific field for most of its history, with conflicting contributions from many scientific disciplines, practice and policy positions. Add to this the continuing and disruptive influence of technology on information, knowledge and practice in all sectors of society and it is no wonder that innovators, drawn to the interactive potential that computers bring to learning, are challenged by the theoretical basis for their innovations.

Formal education is also a high stakes, culturally & institutionally conservative activity which serves more than one societal purpose, including: learner development and fulfilment, child care, preparation for citizenship, parenthood and retirement, preparation for work or selection for jobs.

Even at the higher, informal and professional sectors of education, complexity of education is matched by complexity of learning that may include:

- skills development;
- knowledge acquisition;
- improvement in strategic, analytic and creative capacities;
- attainment of competence;
- establishment of attitudes and values.

Each of these societal purposes and these learning areas demand different approaches and understandings for the learning theorist but also the TEL innovator and may develop at varying rates or found to be diverse in relation to context, location and culture. For example, in the case of TEL innovations, if they span more than one educational system (National education systems), or in more than one sectors, (e.g. Schools, Higher education, Professional development) or types (Formal, informal) their implementation may need to be adapted for each of these systems. Furthermore, as each educational system may evolve differently in response to wider political, economic and social pressures, the innovations may need to be continuously adapted to these changes as well.

3.4 Influences in the definition of the HOTEL ISM

As analysed above, different methods and steps need to be taken to analyse TEL innovations according to their nature (incremental, disruptive or systemic) and their types (technical -technology push, business - market pull, learning practices - bottom-up and social - social needs pull).

Successful innovations need also to take into consideration: a) the integrated design process and the organizational architecture of the institution that adopts the innovation (e.g. to a company, a learning institution such as a University, a school or a professional organization; b) the design and implementation of the "product, services, practice"; and c) the design and implementation of new technologies (Preez and Lou, 2008). A lot of very good ideas or even pilot products in TEL, whether they are coming from technology push, or practices (market pull) or research they often fail to be successfully adopted and mainstreamed. A successful management of the innovation process (from idea to market) and a good understanding of the different innovation models is needed in order to guide this process from the stage of an idea to adoption and mainstreaming.

TEL being such a complex domain, it is safe to argue that the majority of TEL innovations would require the sharing of ideas, contributions and collaboration of efforts from research, technology, practitioners, including software and learning solutions developers. That is why the main result of this preliminary analysis is that the HOTEL Innovation Support Model must, first of all, be able to involve stakeholders (and different stakeholders according to the innovations analysed in the Labs); it must be far from considering the innovation process as linear and it must be open to measure the "potential" and "success" of innovation in different ways.

4. The HoTEL Innovation Support Model

This section presents the HOTEL Innovation Support Model in its components and characteristics, and sketches the tools, methodologies and indicators used in the model. More detailed information on all the tools, protocols and methods of the ISM are provided in detail in D 4.4.1 Learning Exploratorium Labs Methodological framework.

4.1 Structuring assumptions

Five "structuring assumptions" are the basis of the HOTEL Innovation Support Model:

1. **Recognition of the diversity of innovation paths**, along with innovation channels, start points, contexts, expected outcomes, success criteria and, in general, every single step and factor of the support model and the setting.
2. **Recognition of an existent difficulty on measuring 'success' within a TEL innovation setting**. How is success defined? Do we use pedagogical, technological, socio-economic, business-economic, or other criteria to determine what can be considered as being a success?
3. **Embedded flexibility and adaptability** of the support model in order to match different stages of innovation development and different contexts and innovation paths. The support model must take the various key factors from every context, stakeholder, and user, to integrate them into the innovation, so that a unique experience is produced. This unique experience feeds every actor of the setting (i.e. Higher Education, Workplace learning, and Informal Learning in Networks), included the model and the innovation themselves, making a full iterative cycle.
4. The core concept in the support model is that of a "**multi-stakeholder ecosystem**" (with different stakeholder representatives according to the nature of the innovation proposed) that analyses and eventually tests the proposed innovation from a multi-perspective approach, identifying all the strengths and the weaknesses from each relevant stakeholder's perspective. This test might be either practical, on the ground, with real users and in a real context-setting or theoretical, with a deep-thinking test bench by experts and qualified users.
5. **Context-sensitivity of the analysis and support action proposed**, in order to distinguish transferable from non-transferable success factors, according to a well-defined set of criteria.

4.2 The theoretical framework of the HOTEL ISM

In order to understand the theoretical framework of the Innovation Support Model, we need to go back to the whole project structure and logic. It is in fact necessary – before designing strategies to support innovation – to be aware of the general context within which such innovation should be considered and analysed. In particular, we refer to the fields of emerging technologies on one side and learning theories and practices on the other side. The work carried out in WP1 and 2 and the integration of such work into D.2.2.3 provide the theoretical framework of the project, highlighting and mapping learning theories and practices in relation to emerging technologies and their use. The experts' workshop organised by HOTEL in London in Spring 2014 (following the recommendations of reviewers in Review n.1) and reported in D.2.2.3 provides interesting inputs also in terms of "sense-making" of innovation in TEL. What experts suggested is that innovations, in order to be meaningful, accepted and adopted, need to tackle/intend to solve significative challenges and to comply with the social/economic/organisational priorities of the specific educational context being addressed. In other words, to be considered "meaningful and deserving the attention of decision makers" at the public and private level, innovations need to:

- be relevant to some extent in the emerging technological landscape,
- show impact on existing learning practices/theories or demonstrate the potential to contribute to new learning practices,
- contribute to meet the contingent political, social, economic priorities in the context addressed and/or at the EU level.

A recent IPTS study (Panagiotis, K., Law, N. and Punie, Y. 2013) –based on case studies having already achieved a significant degree of scale and impact – identifies four principles that differentiate the strategic effectiveness of different innovation initiatives, which had been considered in the definition of the HOTEL ISM:

- Multiple pathways to innovate and scale this principle refers to the awareness that there is no single recipe for innovation and that there is no one size fits all solution to innovation: each case might have its own features and route to scalability and mainstreaming.
- Ecological diversity of innovations foster scalability – the more the "innovation sites" involved, the more the potential for scalability.
- Leadership for strategic alignment as a necessary condition for scalability – need for a strong coordination as ecological diversity and multiple pathways can be a richness but also a risk in terms of effectiveness.
- Foster multi-level, system-wide connectivity and strategic partnership – according to the results of the study, public-private partnerships emerging as a result of bottom-up intiatives: "help to mobilize resources, increase the problem solving and innovative capacity of the project and solicit both tangible and intangible support".

Moving to the wider field of learning with the support of technologies, the recently published *Beyond prototypes* report (TEL, 2014) focuses on enabling innovation in TEL, with a special attention on the UK context. The considerations and conclusions of the report are extremely relevant – we believe – to the wider EU area and very interesting for HOTEL. The main point of connection with the HOTEL experience is in the fact that both research actions give importance to the "bricolage" dimensions of innovation in TEL. "The work involved in successful TEL innovation can be characterised as 'bricolage'. This is a productive and creative innovation process that involves bringing together and adapting technologies and pedagogies, experimentation to generate further insights and a willingness to engage with local communities and practices (TEL, 2014, pag. 6)". The HOTEL experience fully confirms this view. Further, similarly to HOTEL, the report sets as a starting point the consideration that TEL is a complex system where communities, technologies, learning practices and pedagogy interact. Recommending the need for meaningful innovation in TEL (with long term objectives and making sure that the adopted innovations have as a scope a positive impact on educational change) the report outlines the key role played by the context where the innovation is to be introduced and highlights the importance of the implementation process to ensure the success of the innovation.

4.3 HOTEL ISM: Three phases and eight steps

The desk and field research run by HOTEL (WP1 and WP2) as well as the innovators engagement of innovators (WP3) and the practical piloting run through the Labs (WP4) have confirmed the initial view of HOTEL, that is – using a metaphor - that innovation in TEL is a constellation, and that the main need is to connect the stars to get innovations to work and to mainstream.

Because of this the Innovation Support Model proposed by HOTEL is not composed of prescriptive actions, but rather of a set of adaptable phases (3), which can be implemented through a set of practical steps (8). The philosophy of the ISM is quite in line with idea of the i-teams model produced by NESTA for the Bloomberg Philantropies (http://www.nesta.org.uk/project/i-teams) since it gives space to local partnerships (as in the case of the ELIG lab) and to customised support, as demonstrated by the fact that in the HOTEL project every lab has been operating autonomously in its own context, connecting with the other labs to exchange views and to learn from each other.

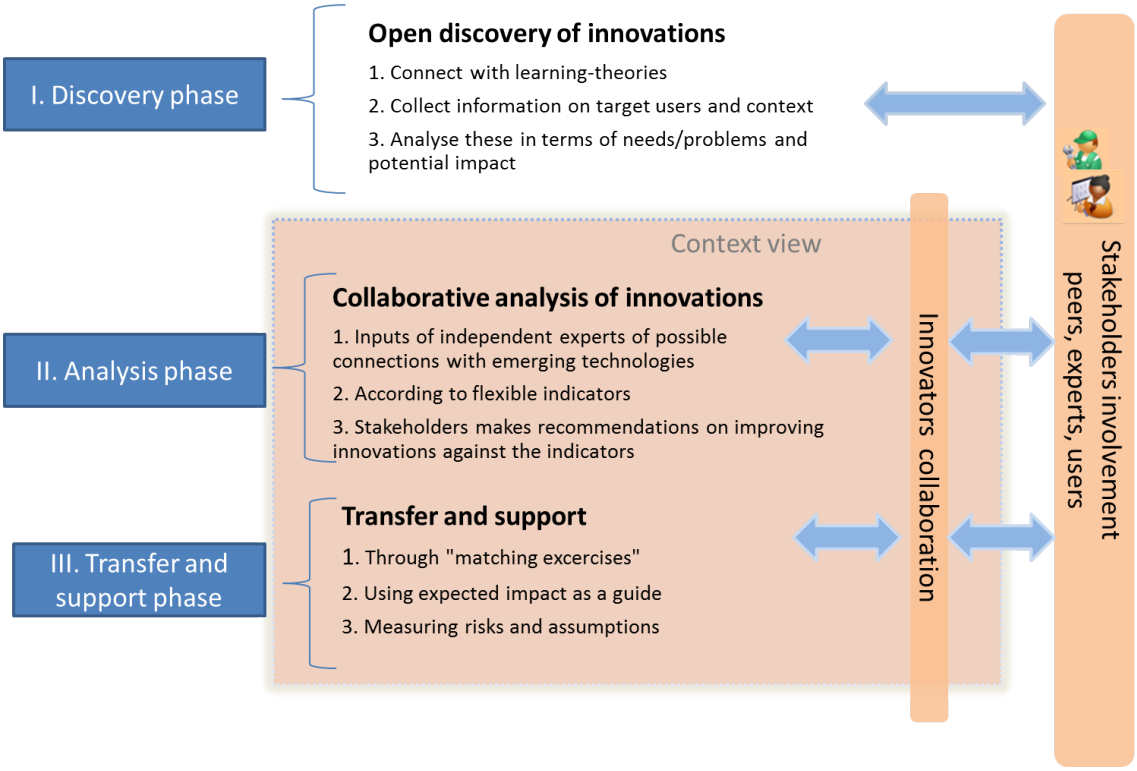

Figure 15. Main elements of the HOTEL Innovation Support Model

Therefore and according to the information presented in the Figure 17, the ISM on its general conceptualization is composed of the 3 following phases:

1. A **discovery phase**, where an innovation is discovered and described in a structure format so that different innovations can be compared with each other, and where added value is provided by connecting with learning theories and by supporting the innovation leader in context exploration and in stakeholders (including main "influencers") identification.

2. An **analysis phase**, where the innovation is be analysed from a full multistakeholder view, through a number of flexible protocols with macro categories of analysis such as a) sectors/ context of innovation, b) impact of innovation, c) stakeholders involved in innovation, d) process of development of innovation, e) serendipitous elements in innovation, f) unique nature of innovation, g) innovation elements in innovation, etc.

3. A **transfer and support phase**, aiming to support an innovation either to be transferred to another context or to be further developed and scaled within the same context. A number of matching excercises need to be done, e.g. mapping stakeholders from the originating context to the new context, isolating critical

success factors for the innovation and transferring them to the new context, etc.

These three phases are articulated through eight practical steps, which represent the HOTEL "innovation support process", graphically described below.

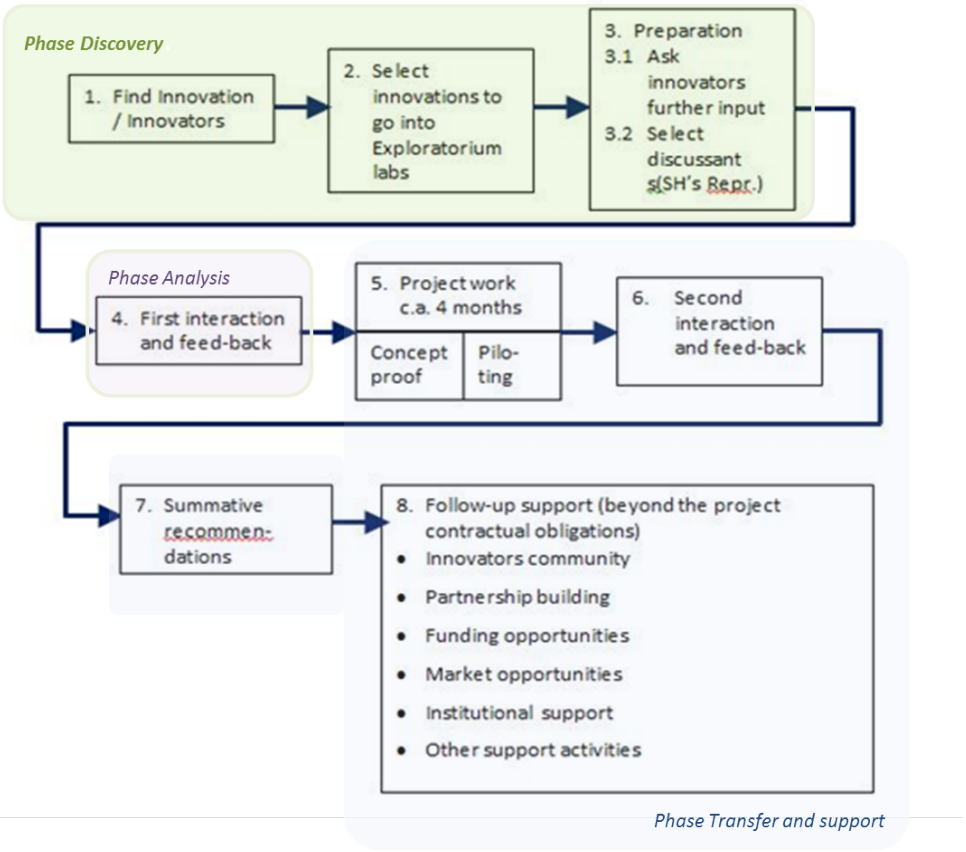

Figure 16. HOTEL Operational steps for the support to innovation adoption

As part of the Discovery phase and in particular as part of the selection Step 2, presented in the previous figure, the following set of dimensions has been used to rate innovations. These dimensions are inspired in the framework defined by IPTS (Kampylis et al, 2012):

1) **Kind of innovation** addressed (product, service, process).
2) **Nature of the innovation**, from the introduction of some new elements (incremental), to a relevant number of innovative elements (radical), to a profound and comprehensive change (disruptive).
3) **Lyfecycle stage of the innovation** (development, pilot, scale. mainstream). This describes the stages of development, ranging from limited, experimental application (pilot), to wider up-take (scale), to consolidated use (mainstreaming)
4) **Territorial level addressed** (Local, Regional/national, EU).

5) **Target groups**: from a specific group (single actors), to a diverse set of actors (multiple actors), up to a variety of stakeholders (wide range of actors).
6) **Potential impact** of the innovation
7) **Stakeholders to be activated** to support the innovation implementation.

In terms of Analysis and supporting the innovation (phases II and III) there are two key interaction activities with the innovators, which are described here below.

First Interaction: Self-Assessment
Each innovator is invited to participate in a self-assessment exercise, providing detailed information on the innovation's character, the value proposition / innovative aspects of the innovation, the strategic objectives of the innovators' development plan, an analysis (SWOT) of the objectives outlined, a development plan in terms of R&D, marketing & promotion and pricing. As part of this development, innovators are encouraged to include measurement indicators from a common pool suggested by the ISM (available in D4.4.1), so as to be able to compare and contrast effectiveness of implementation. These include: Number of beneficiaries, Profile of beneficiaries, Learning user performance per user and target group (before and after the innovation), User interaction per user and target group (before and after the innovator), Others such as user reputation, level of disruption, technological improvement.

Second Interaction: Reporting, Review, Support and Implementation
At the end of the innovation-testing period, innovators are asked to report on their progress, i.e. the changes implemented in qualitative terms as well as to report their performance against the success indicators established by the reviewers. Following this, the same teams of reviewers who reviewed the innovation initially will re-analyse the innovation using the same procedure as above (i.e. individual review followed by a conciliation meeting). The aim of this review will be to detect whether the innovations have made progress in terms of improving their adoption potential.

According to the results of that second interaction a group of recommendations could be generated to help the innovators in their goal of improving such potential.

4.4 Innovative aspects of the Innovation Support Model

The HOTEL ISM is innovative in a number of ways.

First, it represents a "bridge" between innovation drivers and innovation supporters. The ISM has in fact been designed in such a way to be able to combine bottom-up innovation (coming from single grassroots innovators or groups thereof

addressing societal needs, or market needs, or consumer needs) and top down innovation (coming from institutions and addressing societal needs), and can therefore be used by "innovation supporting agencies" or policy makers to spot innovative TEL practices and products and to accompany them towards replication and/or mainstreaming.

Second, it is fully open. Consistently with the Open innovation approaches presented in Chapter 1, the ISM recognises the need of interaction between internal and external actors and between practice and research (through for example the phase where learning theories and pedagogical approaches are brought into the picture). Thanks to this openness, the model can "learn from experience", as it did during the HOTEL piloting process, and can therefore be constantly improved.

Third, it highlights the key role played by stakeholders in the innovation process. Within the ISM stakeholders are not just expected to "comment" or "validate" the result, but are the real engine of the process: the stakeholders' ecosystem is key in the implementation of the HOTEL model, where top-down and bottom-up innovation co-live, given that the TEL landscape is populated not only by single, "grassroots" innovators but also by market and institutional forces and where more than often innovation is a societal need. The stakeholders identified include four broad categories of participants to be involved in the running of the Learning Exploratorium Labs: "TEL innovators" of any background who will propose "innovations" (ideas, research results, teaching practices) that they wished to test through the HoTEL Labs, aiming at getting support for exploitation, "Lab managers" who were are leading and taking active part in the Lab activities, "Innovation experts" who bring approaches and expertise from within and outside TEL, and finally "TEL and innovation stakeholders" who observed, commented and validated the innovation cycle that will be under testing in the Labs.

If we look at the genesis of innovation (chapter 3 above), we can already understand how key becomes the involvement of different stakeholders in enhancing an innovation, depending on how it was generated. In table 2 below, the three learning areas covered by HOTEL through its Exploratorium Labs are matched with the three genesis models of innovation in TEL.

	Higher Education	**Learning at work**	**Professional networks**
Technology and industry-led	□	■	■
Research-led	■	□	□
Practice-led	■	■	■

Table 2: Stakeholders' engagement strategy to support innovation

It is evident that each area implies the need to involve different stakeholders to guarantee the successful implementation of the innovation: being innovation in Higher Education (generally) research and practice-led (■), the support of stakeholders representing TEL industry (□) will be necessary to support the innovation adoption and scaling. In the case of corporate training (learning at work), as innovations usually come from industry, the support of stakeholders representing the research world as well as practitioners will be needed. Finally, as concerns professional networks, being at the crossroad between the industry world and the practitioners world, they usually generate innovations that are either technology and industry-led or practice-led and will need therefore to seek support by research stakeholders.

4.5 The HOTEL Model in action

The aim of the HOTEL Innovation Support Model is to support innovation into learning settings by: a) Providing decision makers with an analytical framework to classify TEL innovations, and properly understand their advantage/contribution and potential within their action context; b) Helping innovators to properly formulate their ideas in a way which aids a possible innovation uptake; and c) Highlighting lacunae in their diffusion/adoption strategies, assisting innovators in developing strategies to improve their diffusion/adoption.

The below representation clarifies the process of supporting innovations through the implementation of the different ISM phases: discovery (as identification, selection) -, analysis (as analysis); support and transfer (as support) into the Labs.

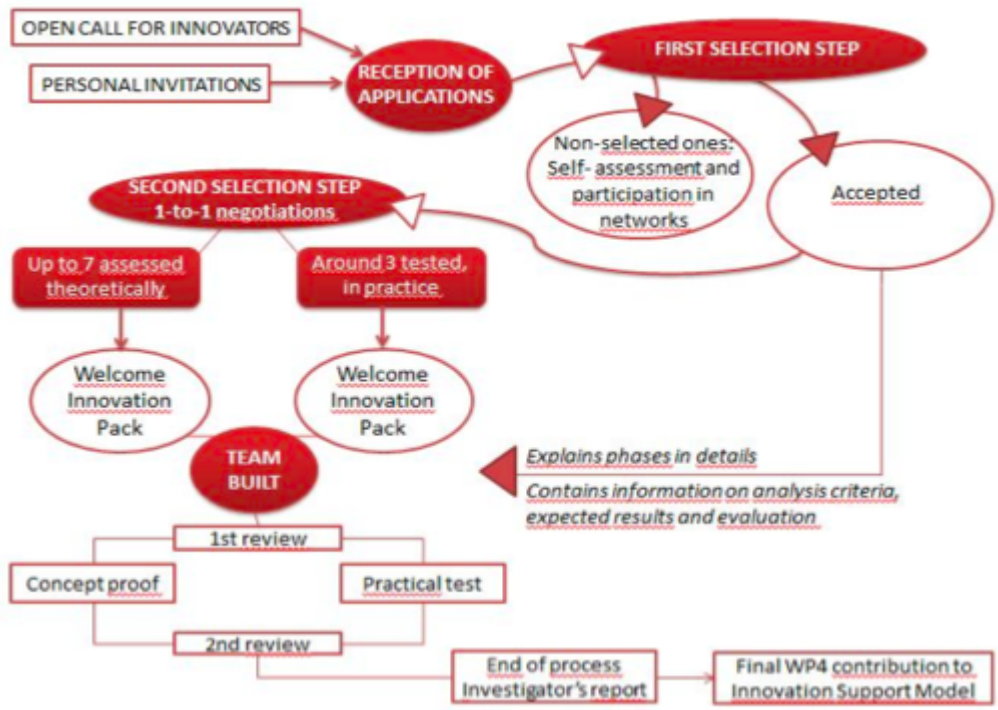

Figure 17. Innovations "processing stages."

The above process can be narratively described as follows:

1) An Open call for Innovators was launched in Spring 2013 to gather applications from innovators in TEL for the three labs (details in D.3.3.1). Personal invitations to apply were also sent on the initiative of the single Labs, either in parallel or if needed (i.e.: when the collected applications were not judged as appropriate).
2) To check the relevance of the applications to the aims of the project a transparent procedure was carried out, engaging experts from each Lab and using a grid to assess the practices innovativeness, applicability and state of development (see D4.4.1 for more details).
3) Once the selection process was over, applicants were informed of the results and received: a) in case of selection, information and instructions on how to move on (through the Welcome Pack and personal briefings[5]) and b) in case of exclusion, a self-assessment tool to support them in reconsidering their innovation and/or the way to present it more effectively (see D4.4.1 for these documents).
4) Each Lab worked with theoretical and practical testing. Throgh theoretical testing, innovations were assessed conceptually, through the practical testing, practices were actually tested by the Lab.

[5] More information about the Welcome pack and what it contained is provided in D.4.4.1

5) The innovators worked together with the HOTEL team via personal contacts (virtual and face to face): innovations were analysed and supported through a set of tools and actions (see below).
6) At the end of the process, innovators were asked to assess their experience with HOTEL both in terms of the processes they had to work with and in terms of the impact of such process on their innovation. The validation input provided by innovators was crucial for the final definition of the ISM.

The Labs worked on a set of protocols that were common to all of them but could be flexibly adapted, depending on the features of the Labs and of the innovators they were working with. The standard process implied the following actions:

- the in-depth description and analysis of the innovations as carried out by innovators themselves by filling in the Self assessment tool where they had to describe their innovation in detail, their expected impact and the expected support from HOTEL
- the review of filled-in self assessment tools by external experts (each Lab had its own experts) and the provision of feedback, suggestions and recommendations on i) how to better describe the innovation; ii) how to better ground the innovation on the technological and pedagogical context of reference; iii) how to speed up the path of innovation as wished by the innovator (for instance, from an idea to a prototype). (see Initial Review form and Initial Collective review form)
- the upgrade of the innovation by the innovators based on the recommendations of reviewers and the feedback received by relevant stakeholders (including potential users) in ad-hoc organised events (for concept proof validation or for practical testing).
- A new review round by external experts to provide the final assessment on the innovation upgrade process
- The validation of the Innovation Support process by innovators

4.6 Future improvements of the HOTEL Innovation Support Model

During the HOTEL lifecycle, the ISM was continuously enhanced along the feedback received from the Labs. Still, a number of improvements are envisaged for future versions of the model.

- **Practical examples** should be added, particular those that have a local relevance and using cases that are familiar to participants, since they appeared to be a valuable vehicle so to allow for the autonomous self-directed application of the ISM analytical tools.
- Consideration of **language as a barrier** should not be neglected and a translation of any type of information might be considered.
- **Keeping complexity moderate** by breaking down complex topics in well-defined and clearly understandable chunks will further support participation opportunities as well as autonomous self-directed application. A shared understanding of what "success" and "impact" mean do not exist. One of the major difficulties towards innovation development within an educational setting was to properly define "success" (particularly while using the HoTEL lab protocols). These criteria have proved to be dependent on the inserted context, the objectives, and the target-group addressed, among other direct and indirect variables. Similarly, the same challenge has arisen while assessing the potential impact of an innovation. The set of dimensions that can be considerable to analyse the innovative impact to the target-group, whether individually or in general, and/or to the working and learning environment, for instance, makes it difficult to strictly assess the real impact. This issue was also highlighted by the participants at both the implementation sessions and physical events, particularly at the local multiplication seminar.
- Although all areas are important to the successful development of the product or service, some interventions need to take place sooner than others. Hence, **it's important to analyse and define priorities**. In order to facilitate this process, a design mindset must be implemented inside the innovator's team towards overcoming external barriers. The design process start with the formulation of questions and problems based on a deep understanding of human need, both practical and aesthetic, thus the relevance of this mindset to the early stage of the innovation's development emerge.
- It could be useful to **better target the model to the different stage of the innovations**, or to develop more than one sub-models, tailored to innovations at different stages of development. While innovations in an intermediate stages of development did find the models extremely useful and fitting their needs, innovations still in conceptual phase (in terms of service provision not in terms of research and development) found the process to be less useful, as a service concept had not yet been developed, and in this case they were seeking a process by which to arrive at a service concept, rather than a process by which to improve an already existing service-concept. Similarly, innovations in a mature phase of development also found the process to be less useful. In this case the reason was because they had already dealt with problems which may be described as 'low hanging fruit'. They were instead looking for new areas to explore, evaluation of long-term strategies, etc. rather than incremental improvements on their current activities.

- **Stakeholders' involvements must be continuous and continuously supported**. The first interaction between the innovator and the stakeholders is very important and certainly influences all process, thus the interaction and communication is important in order to address the stakeholders' specific requirements and to understand what motivates them. Breakdown in communication between actors is a frequent cause of problems and can lead to a lack of support for the process, or unwillingness to face up to the opposition. Furthermore, during the negotiation of involvement, a commitment should be given to provide consistency. In order to respond to the changing external involvement, this involvement needs to be reactive.
- Further, the workshop organised by HOTEL in London in Spring 2014 (see D.2.2.2) highlighted the need for **innovations to be linked to up-to date learning challenges/priorities** in order to be considered potentially relevant by investors. For the current educational situation, the following challenges were detected:
  - Supporting teamwork at the workplace and in education
  - Coping with the unforeseen
  - Improving assessment
  - Open education
  - Social quality assurance.

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Annex 1. Tools and protocols used within the ISM

HOTEL has produced a number of tools to be used when implementing the ISM described in the present document, facilitating and documenting the work undertaken by innovation supporters (as the three HOTEL Labs) in a homogeneous way, providing support to innovators and easing the interaction of reviewers, individually and collectively, with innovators. All these tools are contained as Annexes in D4.4.1, and are hereby briefly described.

- **Template for selection of innovators** helps to characterise the received applications but is not yet linked to the types and categories of innovations.
- **Innovators Welcome Pack** to explain the main purpose and activities foreseen for innovators who will go through the Lab.
- **Declaration of intentions for Innovators**, a useful tool to formalise the commitment of innovators to the Lab activities and does not require major changes
- **First Assessment questionnaire**, an approximation to what reviewers (experts, stakeholders, supporters of different kinds) need to know to assess and support innovators, to be provided by innovators themselves.
- **Declaration of intention for Experts** is a useful tool to guarantee understanding of mutual commitment among parties.
- **Reviewer Questionnaire** is supposed to be used as a way to collect individual views by reviewers.
- **Initial collective review sheet** is also focused on scores in the first section, but and includes a more dialogic free text section on barriers and recommendations that can constitute a good basis for starting interaction between the group of reviewers and the innovators.