Transforming U.Lab: Re-designing a participatory methodology using a strategic sustainable perspective

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Abstract

Currently society is facing a set of interconnected challenges, known collectively as the Sustainability Challenge, which are systematically increasing socio-ecological unsustainability on a scale never experienced before.

In order to address the Sustainability Challenge, Social Labs provide an approach that is systemic, participatory and emergent, enabling solutions that are responsive to the dynamic nature of those interconnected challenges.

Our research explores how a specific lab - U.Lab - can be re-designed in order to move society strategically toward a sustainable future. We use the Framework for Strategic Sustainable Development, designed to help practitioners to facilitate society’s transition towards sustainable development, as well as concepts of strategic sustainable development, which support a shift from unsustainable systems, structures and practices towards sustainable ones in a strategic way.

Our research follows Design Research Methodology (DRM). DRM aims for the formulation, validation and development of theories and models in the field of design.

U.Lab’s experiential response to the Sustainability Challenge inspires participants to question paradigms of thought and societal norms. However, U.Lab is still an emerging social technology and lacks boundary conditions and a scientific basis for understanding our current reality and creating the solutions that will lead society systematically towards a sustainable future.

Keywords: U.Lab, Framework for Strategic Sustainable Development (FSSD), Strategic Sustainable Development (SSD), Labs
Statement of contribution

*Gabriel* is the ultimate networker. His positive energy, confidence and belief in our team abilities, our skills and our topic has pulled us through some difficult moments, as well as meant that we’ve made some fantastic connections. Furthermore, his networking brain makes connections between ideas as well, and it is not often that he comes to a check-in without a ‘beautiful new idea’, an ‘ah-ha’ from the night before, or a quote that he read that he thinks makes our point perfectly.

His speed, though sometimes trying to his slower-paced teammates, is a blessing in times of content-crunch, and his ability to read, extract the useful information, and populate a document skeleton at a lightning pace is uncanny. He is our reconnaissance man and, to the delight of all, he gets sent out on research and development missions, coming back to the roost with stories, content, ideas and cat gifs. In calmer moments, he also provides a grounded energy, committed and fierce care, and delicious veggie-burgers.

*Florentina*, the emotive, makes sure that nothing ever goes unsaid, and that we deal with any arguments, hurt feelings, or unwise words in the moment that they happen. She is direct and has a unique ability to get straight to the heart of the matter, leaving no room for bullshit or ambiguity. While this can be a difficult approach for some, it has held us in good stead for the duration of our time together, and allowed us to build a strong foundation of common understanding and appreciation. We are able to laugh, cry, mumble and get cross with one another, and still choose to hang out with one another at the end of the day (and year) in large part due to the honesty she demands from us all.

Florentina also has provided much of the structure of our thesis process. She is able to break down tasks, and assign flow to days in order to best optimise our time, and she keeps us all to task when we inevitably veer from our schedule. As the natural critical questioner, Florentina also acts as a go-between for the reconnaissance of Gabriel and the perfection of Rose. As first editor, she has the framework of the research in mind, but is still distant enough from it that she doesn’t get lost in the details and can respond to changing patterns in a strategic and complementary way.

*Rose* is the finisher. She holds all the strings, though she’s not always sure what’s at the other end of them. As the final editor, she works to weave the voices of her teammates into the narrative, while unabashedly slashing at their verbosity. The ultimate PE, Rose is a perfectionist who feels as though she’s been working to uncover the secret of their thesis for the last four months. She always has the big picture in mind, and is there to set their course towards it when the team drifts off-tack.

As the least excitable, Rose instead lends her calm energy, her steadfast work ethic and her (fairly) even temper to maintain the equilibrium of the team.
All: In undertaking this work together, researching and actualising a Master’s thesis, we were intent that we learn not only from the content we read and generated, but the process itself. The U process lent itself to the task for obvious reasons and helped us, we believe, in really embodying the subject and experiencing the ‘learning journey’ in another way. After all, U.Lab is all about breaking established paradigms and disrupting old patterns of behaviour and thought.

Collectively, we have 54 years of conventional education under our belts and knew, therefore, that we needed to take the time to completely immerse ourselves into the subject, warts and all. We needed to stop downloading – operating from the old patterns and habits that our previous training had indoctrinated in us. We turned to the U process, and realised that in order to stop downloading, we needed to engage in observation: Observe, observe, observe, are the instructions for the first movement, or ‘inner gesture’, to be able to change our patterns of thinking and being.

We spent weeks going through the U.Lab, reading the theory behind it, talking through the process and understanding the nuances, in order to be able to engage with the course as a whole (understanding that it is comprised of concepts, methodology, and theory). Ultimately, in the scoping of the topic, in order to undertake a manageable project, we decided to engage with U.Lab on a theoretical level – establishing a thorough understanding of the systems within which it operates, the vision of success and the strategy of the course.

The second movement is to ‘retreat and reflect’. Admittedly, this more so happened to us, as opposed to occurring due to any considered intention. Both Rose and Florentina were in the core team for the Art of Hosting training that happened in March, and Gabriel was also heavily involved in the fundraising of the initiative, which took us all out of a headspace that could easily focus on the thesis project. And, as is often the case in life, when it rains, it pours, and we collectively (sometimes cumulatively) dealt with financial crises, personal struggles and the pull of other Work. We spent a week in Barcelona – a literal and metaphorical retreat – in order to shake off these distractions, to let our inner knowledge emerge, and in the hopes of returning with a new perspective and sense of vigour - presenced. Presencing is “about holding the space and turning yourself into an instrument for something that is coming into being and that needs you to come into reality more fully” (MITx 2015, course video). Sure, it might sound a little hokey, but it worked.

The discussions around our thesis, our intentions, the process and methodology since then have been fast-paced and very productive. Our focus and the ways that we have been going about answering our research questions have changed multiple times, and rapidly – responding to that which wanted to (and could) emerge. Indeed, we acted very much in an instant – prototyping various ways of achieving our goal, and iterating the research questions and methodology as needed. This inner gesture of acting in the instant felt hectic and foreign, but we made it through, and can attest to the fact that the process of rapid-cycle prototyping does indeed help to “iterate, refine and evolve” an idea (MITx 2015, course video).

Finally, though perhaps seemingly superfluous to the task at hand, we feel it is important to give mention to the struggle that the thesis, we ourselves, our greater community and the Universe offered to us during the journey of the last five months. As a team, we set an intention to walk this path, and to support each other on the journey too, knowing that the process of reinventing patterns and behaviours “only works when leaders and innovators and creative
people who activate this source of knowing actually do some inner leadership work” (MITx 2015, course video). And there has been a lot of inner leadership work!

So – here’s to the laughs, the tears, and all the inner work (thanks, Otto). Here’s to the next struggle, and here’s hoping that the road rises to meet us on the journey ahead.

Karlskrona, Sweden, June 2016.

Florentina Bajraktari  Rosamund Mosse  Gabriel Neira Voto
Acknowledgements

“It is good to have an end to journey toward; but it is the journey that matters, in the end”.
Ursula K. Le Guin

The road has come to an end and we know it wouldn’t have been possible if it hadn’t been shared, supported, and inspired by the community we have - serendipitously, happily - fallen into. Here we are, holding each other at the end of this journey, with so many others to thank.

First of all, we would like to thank our primary advisor, Andre Benaim, for his caring mentorship and feedback over the past five months, and for his humility, which enabled us to feel total ownership over the direction of our work. Thank you Andre. We would like to thank our secondary advisor, Lisa Wälitalo, for her support - to us and to Andre - and the silent faith she had in us all along. Thank you Lisa.

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As to why we’ve come to be here at all - studying Strategic Sustainable Development, living in beautiful Karlskrona, building up our toolbox - it’s down to the dream and the perseverance of two men: Göran Broman and Karl-Henrik Robërt, the co-founder of The Natural Step. Thank you Göran. Thank you Kalle.

Our research has also benefited from two external advisors: Julie Arts - consultant, designer and host in multi-stakeholder transition processes and leadership programs, PI practitioner and U.Lab Core Team member; and Andreas Larsson - Innovation Practice Advisor and Case Manager at the MSF Sweden Innovation Unit, and an Innovation Leader at Blekinge Institute of Technology. They have both offered feedback and advice that has been of immense value. They urged us to keep the bigger dream and scope of our thesis alive, to keep innovating, to keep thinking like designers. Thank you Julie. Thank you Andreas.

Gabriel and Florentina were able to finish MSLS, and the thesis, thanks to the generosity of so many who supported and encouraged them through crowdfunding campaigns. That we are able to - financially and otherwise - sustain ourselves, is the first step in bringing about the change we want to see in the world. Thank you all for believing in us.

Karlskrona has been one of our closest allies this year, holding us and moulding us through windy, warm, sparkling and brisk days, a constant reminder of both the relentless nature of nature, and the reason we are all here. The BTH cafeteria has been our home and our witness for these last few months, our black-padded structure and our sun-drenched source of inspiration. Thank you to the places and spaces that have so impacted us. Thank you to the cafeteria staff - we know we’ve been a nuisance.

Thank you Barcelona. We fell at your mercy, fraught and exhausted, in need of perspective and vitamin D. Thank you Matheus for hosting us with as much warmth as the city provided.
We’d like to thank our friends and family who, even from afar (scattered in Belgium, Brasil, and Canada among other places), have been loving and supporting our dreams of becoming the changemakers and leaders we so desperately need to work towards a sustainable world. Thank you family. Thank you friends.

Last but not least, we would like to thank our community. MSLS 2016, it has been a pleasure and an honour. Thank you for the insights, the vulnerability, the care. Thank you for the connection, the courage and the joy of opening up and stepping in. Thank you for those gems hidden in moments of frustration, and fear and grief. Thanks for feeding us - literally and metaphorically, for hosting us, for calming us, and for mapping with us. Thanks for being (often) much further ahead of us on this thesis journey, that we may learn from your knowledge and mistakes. Thank you, really, for it all.
Executive Summary

Introduction

Currently, society is facing the most complex challenges in human history, challenges which are systematically increasing socio-ecological unsustainability on a scale never experienced before (Robèrt and Broman 2015). These interconnected issues are increasingly complex and systemic and can be defined as the Sustainability Challenge (Scharmer and Kaeufer 2013, Rockström et al. 2009).

In response to complex challenges, our thinking often largely parallels the fragmentation and reduction of industrial processes, but these paradigms of thought are outdated and unhelpful when addressing challenges that are complex and systemic in nature (Mintzberg 1994). In order to address complex challenges, adaptive solutions are required as they are flexible and dynamic. Instead of focused silos of inquiry, action and specialisation (Burge 1993), adaptive solutions require dispersed and internalised learning approaches throughout organisations and systems (Heifetz and Linsky 2002).

Zaid Hassan (2014) advocates for ‘Social Labs’ when dealing with complex social challenges. He argues that by taking an experimental and prototyping approach we create a portfolio of solutions thereby increasing the probability of resolving complex challenges. Social labs have great potential to address the sustainability challenge as they can be seen as a “U.Lab is “a framework describing a change process...a method for effecting change personally, organizationally, in communities and globally. And...a description of phenomena in the world” (WISR 2016). They are systemic, participatory and emergent, enabling solutions that are responsive to the dynamic nature of the challenges we face (Hassan 2014).

Social, participatory processes are essential to achieving sustainable development, and in order to address the sustainability challenge (Rockloff and Moore, 2006). Incorporating the perspectives of diverse stakeholders is important, not only because they can make the interventions more effective, but also from a moral standpoint, as people affected by any given intervention should have a say in developing it (Jonasson 2004; Bell and Morse 2003).

Snowden and Boone (2007) reinforce the necessity of experimental approaches when faced with complex systems and problems, such as the sustainability challenge. Complex problems are inherently unpredictable and can only be understood in retrospect. This means that there are no ‘right’ answers or one-size-fits-all approaches, instead experimental processes should be employed in order to “allow patterns to emerge” (Snowden and Boone 2007).

Furthermore, a Systems Thinking approach is necessary in the face of increasingly complex challenges consisting of increasing information, intense interdependency, and relentless change (Capra 1996; Checkland 1981; Hassan 2014). This shift in mind-set from a mechanistic and technical perspective to a holistic one can help tackle the systemic and complex nature of the global sustainability challenge.

Having ascertained the benefit of a lab approach in addressing the sustainability challenge, we focus our research on one specific lab, U.Lab. U.Lab is a Massive Open Online Course (MOOC) which merges the teaching of Theory U with a transformative, experiential process to inspire individuals to take action towards creating a future that we all want (MITx 2015).
U.Lab fosters learning and transformation on both individual and collective (organisational, systemic) levels, as highlighted in its title: *Transforming Business, Society and Self*. It is highly experimental - encouraging iterative and innovative approaches to the course, it is social, as participation is open to all, and it is emergent, incorporating feedback from participants in real time. U.Lab is a hybrid of a social lab and an open-source educational platform.

The goal of U.Lab is to empower change makers to co-sense and co-shape the future, using the process of Theory U (MITx 2015). However, “U.Lab is not just about becoming aware of all the deep systemic problems in the world. What we try to do instead is make the connection between social change and personal transformation” (MITx 2015, course video). This connection is seen as a necessary precursor to the broad-scale change U.Lab seeks to inspire.

We see the potential for U.Lab to play a deeply valuable role in transitioning society towards a sustainable future. However, it has been observed that the current U.Lab has been designed with a limited level of shared language, awareness, and clarity as to what defines the healthy boundaries of a sustainable society. As a result, we see an opportunity to contribute to the design of a U.Lab that ensures its contribution to strategic sustainable development.

The Guiding Research Question for our research is: *How might we design a U.Lab that necessarily moves society towards a sustainable future?* This is divided into two sub-questions:

1. *What concepts are lacking in the current U.Lab that would ensure that it strategically moves society towards sustainable development?*
2. *What concepts could be included to design a U.Lab that encourages the transformation of business, society and self towards a sustainable future?*

**Conceptual Framework**

In order to assess and design a U.Lab that necessarily moves society towards sustainability, we use the Framework for Strategic Sustainable Development (FSSD) and strategic sustainable development (SSD) concepts. The FSSD is a framework designed to help practitioners to facilitate society’s transition towards sustainable development. Strategic sustainable development can be defined as the shift from our current, globally unsustainable systems, structures and practices towards sustainable ones in a strategic way, and therefore is appropriate for our research goals.

For the purposes of this research, we focus on the systems, success and strategic levels of the FSSD only. These levels include the concepts of Systems Thinking, the Sustainability Challenge, a clear, singular and unifying definition of sustainability, Sustainability Principles, a vision of success and backcasting.

U.Lab is “a framework describing a change process...a method for effecting change personally, organizationally, in communities and globally. And...a description of phenomena in the world” (Hayashi 2010, 2). As Scharmer and Kaeufer state in *Leading from the Emerging Future: From Ego-system to Eco-system*, “twenty-first-century problems cannot be addressed with the twentieth-century vocabulary of welfare-state problem solving. The challenge that most societies face is how to respond to externalities in a way that strengthens individual and communal entrepreneurship, self-reliance, and cross-sector creativity rather than subsidizing their absence” (Scharmer and Kaeufer 2013, 55). U.Lab is a framework and course based on theory U, a theory of change developed by Otto Scharmer. The U process includes seven steps
that encourage learning by doing. It seeks to link the head (knowledge) and hands (action) with the wisdom of the heart, focusing on the importance of the individual’s state in effecting change.

Methods

We used Design Research Methodology (DRM) in conducting the research for our thesis. DRM is both an approach and a set of supporting methods and guidelines that can be used as a framework for doing Design Research with an objective of the formulation, validation and development of theories and models in the field of design (Blessing and Chakrabarti 2009).

Following Blessing and Chakrabarti’s (2009) description of DRM, our research was divided into three phases: Research Clarification (RC), Descriptive Study I (DSI) and Prescriptive Study (PS). A final phase, Descriptive Study II (DSII), is sometimes included in DRM but fell outside the scope of this thesis. While the phases are listed chronologically, the nature of DRM necessitates a consistent movement between levels.

The RC phase included a literature review and a 5LF description of U.Lab’s systems, success and strategic guidelines. This helped in crafting a realistic and worthwhile research goal and research questions. Using concepts of strategic sustainable development, we established success criteria for a new design, or impact model.

The DSI phase included a further literature review and the development of a reference model using the FSSD. In order to check the validity of the assumptions bred from our reference model, we created a self-administered questionnaire. Quantitative and qualitative data collected from the questionnaires was coded and analysed in order to refine the success criteria for the impact model.

We underwent an initial Prescriptive Study which included task clarification - a review of the analysis and data from prior stages of research, and conceptualisation - interventions (support) to enhance U.Lab, based on the established success criteria. This led to a 0.8 prototype of our impact model, U.Lab: Transforming Society, Business and Self towards Sustainability!

Research Clarification

Based on the literature review, we underwent a 5LF identify the goals of the research, formulate research questions, and clarify U.Lab’s current reality. At this point in our research, we felt confident in making the assumption that U.Lab could be supplemented by SSD concepts in order to provoke transformations that necessarily moved society towards a sustainable future.

The SSD concepts included at the systems, success and strategic levels of the FSSD which made up our success criteria were: Systems Thinking, the Sustainability Challenge, a clear, singular and unifying definition of sustainability, boundary conditions for sustainable development, a vision of success and backcasting.

Descriptive Study I

Having identified the five thematic concepts of the success criteria, we used the lens of the FSSD, and then the questionnaire, to establish their prevalence and efficacy of communication during the course. The results and discussion of each theme are presented below:
Systems Thinking: U.Lab currently uses an Iceberg Model in order to explain the systemic nature of current challenges. The results of our empirical data portrayed an effective explanation of this Systems Thinking within U.Lab, as over 90% of the participants felt very much or fairly enabled to adopt a systems thinking perspective. As the current design of U.Lab communicates systems thinking clearly, we saw no need to intervene with SSD concepts in order to explain it further.

The Sustainability Challenge: U.Lab recognises different aspects of the Sustainability Challenge as externalities of the current economic system. The results from the data show that elements of the Sustainability Challenge are communicated by U.Lab, however, a clear and integrated understanding of the urgency of the Sustainability Challenge is lacking. We see a need for supplementary information about the urgency of the Sustainability Challenge in our impact model.

A clear, singular and unifying definition of sustainability: The inherent sustainability of Society 4.0 is implied, but U.Lab doesn’t provide a unified and scientific definition of sustainability, thereby making it “difficult to know whether any given scenario is truly sustainable” (Robèrt and Broman 2015,3). Results from the questionnaire demonstrated confusion about U.Lab’s definition of sustainability.

Boundary conditions for sustainable development: The eight acupuncture points, or leverage points we need to address in order to reach Society 4.0 (U.Lab’s vision of success) are not necessary, sufficient, general, concrete enough and non-overlapping in the same way that the Sustainability Principles are. Boundary conditions mentioned by questionnaire respondents included the U process and acting from one’s heart. As such prototypes developed by participants have the potential to be inherently unsustainable as U.Lab provides no clear boundary conditions for sustainable development.

A vision of success and backcasting: Society 4.0 represents a contradiction to ‘the future that wants to emerge’. As it is phrased in the affirmative, and as the only vision of success desirable, it feels prescriptive. Many respondents didn't connect with Society 4.0 as a guiding ideology. Though learning from ‘the future that wants to emerge’ (MITx 2015) fits nicely with the concept of backcasting, the lack of concrete steps to “guide problem-solving and innovation” (Robèrt and Broman 2015, 3) remains problematic.

Prescriptive Study

We propose four interventions of support along the trajectory of U.Lab in order to redesign it as U.Lab: Transforming Society, Business and Self towards Sustainability.

To address the urgency of the sustainability challenge, we introduce the funnel metaphor in the downloading phase of U.Lab. The outline of the funnel is to be placed over the Iceberg Model after its initial description to illustrate the urgency of acting, and the limits that we are increasingly surpassing because of our current paradigms of thought.

In order to provide the basis for a clear, singular and unified definition of sustainability, we introduce the tree metaphor, also in the downloading phase of U.Lab. The tree metaphor, along with an explanation of the foundational natural science, would provide the unified and
scientifically based definition of sustainability that will also serve as a precursor to the boundary conditions explained in the prototyping phase.

We adopt the Sustainability Principles as the boundary conditions for sustainable development in our impact model. They will be introduced early in the U process and then again in more detail, providing necessary and sufficient, concrete and general enough, non-overlapping conditions for sustainable prototypes. The Sustainability Principles can be explained consecutively with Society 4.0, further clarifying a long-term vision of success.

We reintroduce Society 4.0 - bounded by the eight sustainability principles - as the long-term vision of success of our impact model. We recommend the introduction of a mechanism for visioning, that gives participants more agency over the future that they see as emerging, appropriate to the scale and sector of the individual prototype.

Finally, we recommend the introduction of the concept of backcasting from a vision of success framed by a principled definition of sustainability, constituting a more intuitive, generic, and practical approach to sustainable development.

While some questionnaire respondents voiced concerns that boundary conditions or a single definition of sustainability might hinder one of the main teachings of U.Lab which is to let things emerge, our analysis demonstrates that our redesign could make it more effective in inspiring the systemic change necessary for sustainable development. The supplementary information recommended in order to ground the content of U.Lab is based on natural science, thereby ‘stabilising’ the content (Geels 2011).

Furthermore, our impact model recommends a collaboration with FSSD practitioners who have experience working with corporations, academic institutions, not-for-profit organisations and municipalities, and the skills to create accessible content in order to reach broader audiences.

Our impact model is only a first iteration – a ‘0.8 prototype’, a tangible representation of our faith in “the power of iterative learning, the power of ‘fail fast to learn sooner’ (MITx 2015, course video). However, it is important to note that the initial abstraction of our impact model has not been validated. It will need further consideration as well as corroboration from expert interviews, a prototyping workshop or some other empirical experiment in order to test the model and incorporate relevant feedback into the design research cycle.

Conclusion

Our research explores how U.Lab, as an alternative mechanism for dealing with complex and systemic challenges, can be designed in order to move society strategically toward a sustainable future, and the potential contribution of SSD concepts.

U.Lab’s innovative and experiential response to the wicked problems we face inspires participants to assess and make changes to the paradigms of thought that dictate societal norms. However, U.Lab is still an incipient and emerging social technology and, as we have argued, lacks boundary conditions and a scientific basis for understanding our current reality and creating the solutions that will lead society systematically towards a sustainable, regenerative, and thriving future for all.
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I used to think that top environmental problems were biodiversity loss, ecosystem collapse and climate change. I thought that thirty years of good science could address these problems. I was wrong. The top environmental problems are selfishness, greed and apathy, and to deal with these we need a cultural and spiritual transformation. And we scientists don’t know how to do that. Gus Speth n.d.
1 Introduction

Society is currently facing one of the most complex challenges in human history. The sustainability challenge can be defined by the rising complexity and interconnection of systemic socio-ecological issues (Robèrt and Broman 2015). U.Lab is a global platform, combined with an eco-system of locally grounded learning communities that seeks to foster innovative and personally transformative solutions for a new economic paradigm. The goal of U.Lab is to empower changemakers to co-sense and co-shape the future. Therefore, it has the potential to play a deeply valuable role in transitioning society towards a sustainable future. However, it has been observed that the current U.Lab has been designed with a limited level of shared language, awareness, and clarity as to what defines the healthy boundaries of a sustainable society. As a result, we see an opportunity to contribute to the design of U.Lab to ensure that it contributes to strategic sustainable development.

1.1 The Sustainability Challenge

A wide spectrum of interconnected aspects defines what we understand as the sustainability challenge. They include, but are not restricted to, exponential population growth, increasing demand for natural resources, increasing economic inequality, as well as ecological problems such as ocean acidification, ozone depletion, chemical pollution, biodiversity loss, increasing land use, nitrogen and phosphorus inputs into the biosphere, and climate change. These problems together clearly demonstrate the impact we are having on the planet, which we all rely on for survival as a species (Scharmer and Kaeufer 2013; Rockström et al. 2010).

These challenges are systematically increasing socio-ecological unsustainability on a scale never experienced before, and can be described as “wicked problems” (Xiang 2013, 1; Scharmer and Kaeufer 2013). ‘Wicked problems’ have no clear definition; the stakeholders have radically different perspectives concerning the problem; solutions are not based on a binary such as true or false; and constraints and resources for solutions are dynamic and change over time (Rittel and Webber 1973). The Sustainability Challenge is an example of a ‘wicked problem’.

It can be said that wicked problems are, in essence, “expressions of diverse and conflicting values and interests” (Norton 2011a, part 1, para. 2). Furthermore, the process of working with them is fundamentally social, and should not be scientised in the conventional sense (Conklin and Weil 2007). Therefore, instead of a linear and reductive strategy that focuses on permanent solutions, wicked problems require a holistic, flexible and process-oriented approach (Xiang 2013).

One way to understand the sustainability challenge is by visualising a funnel. Here, the funnel represents the challenges that society faces becoming more drastic as the pressure on natural and societal resources increases, limiting those resources. As the wall of the funnel becomes more narrow, the room to manoeuvre towards sustainability becomes more limited. The wall of the funnel represents the Earth's carrying capacity for life (Robèrt and Broman 2015).
Our technological capacity is often heralded as our saving grace and used as a scapegoat to justify our continued unsustainable practices and behaviours (Scharmer and Kaeufer 2013). This attitude, however, fails to recognise the sustainability challenge as an interconnected and systemic set of challenges that are putting increasing and exponential pressure on the social, ecological and economic capacities needed to sustain life. As this increased pressure is felt worldwide, it will result in more social, ecological and financial crises and less room and time for us to alter our course in the direction of a sustainable future. Over time and without drastically adjusting our behaviour to limit our impact on the earth, we will end up crashing into the wall of the funnel, surpassing the limits of the planet (Robèrt and Broman 2015). Indeed, Rockström et al. (2010) contend that there are nine planetary boundaries, or thresholds, relating to ecological processes which, if surpassed, could lead to irreparable damage and system change. The planetary boundaries are another way of conceptualising the ecological thresholds also conveyed by the wall of the funnel.

1.2 Complexity and Systemic Challenges

According to Kofman and Senge “the major challenges we face in our organisations and beyond are increasingly systemic” (1993, 4). Systemic challenges present in ways that are complex, dynamically changing and intransparent (Frensch and Funke 1995). Additionally, as the solutions we develop continue to impact and influence one another, so increases the complexity of the system.

A complex (social) challenge can be defined by three characteristics: (1) the emergent nature of the situation, which (2) generates a steady flow of information to filter and negotiate, in (3) a setting that means the actors need to constantly be adapting their behaviour (Hassan 2014).

When trying to address complex and systemic challenges, our thinking often largely parallels the fragmentation and reduction of industrial processes, but these paradigms of thought are outdated and unhelpful when addressing challenges that are complex and systemic in nature, such as the sustainability challenge (Mintzberg 1994). Madrazo and Senge remind us that “[w]hen we evoke our memory of the whole, we remember our innate understanding of interconnectedness” (2011, 9).
This fragmentation of thought, action and society, as described by physicist David Bohm (1980), is useful for technical problems can be solved with specialisation and expertise, but when it comes to adaptive challenges, where there is no clear relationship between the cause and the solution, adaptive solutions are required. Adaptive solutions are flexible and dynamic, there is no best practice and a whole myriad of solutions are possible in a given time. Instead of focused silos of inquiry and action, specialisation and expertise (Burge 1993), they require a dispersed and internalised learning approach throughout organisations and systems (Heifetz and Linsky 2002).

The sustainability of change depends on having the people with the problem internalize the change. Complex challenges that require adaptive solutions will not be solved with technical solutions. Without learning new ways – changing attitudes, values and behaviors – people cannot make the adaptive leap necessary to thrive in new environments. (Heifetz and Linsky 2002, 29)

Whereas in the past, we could understand and address problems one by one, the interconnectivity of the modern era only increases complexity, and rapidly (Hassan 2014). The characteristics of whole-systems and complexity make the sustainability challenge dynamic and unpredictable.

New ways of dealing with the challenges of sustainable development are urgently needed, as the way we are currently planning for and responding to them fails to address their inherent emergence, complexity and systemic nature (Mintzberg 1994). This transformation in the way we think about and approach challenges represents what Kofman and Senge call a “Galilean Shift” (1993, 6), referencing the role of Galileo in shifting our perception of ourselves as the centre of the universe around which everything else moved to being able to see our true place in the system of things. In taking a systemic approach, “we move from the primacy of pieces to the primacy of the whole, from absolute truths to coherent interpretations, from self to community, from problem-solving to creating” (Kofman and Senge 1993, 6).

1.3 Responding to Complex and Systemic challenges: A Lab Approach

For some technical endeavours, such as manufacturing a car, analytical and reductionist solutions can be effective strategies (Ackoff 1994). However, as described above, a more dynamic approach is needed to address systemic and adaptive issues, as the actions selected to tackle them need to be able to adapt to the dynamic context of the challenge. Kahane (2004) states that there are no one-size-fits-all answers when dealing with complex adaptive challenges, just a choice between many possible solutions.

Zaid Hassan (2014) suggests that new ways of dealing with complex social challenges are needed. By taking an experimental and prototyping approach we, in essence, create a portfolio of solutions and increase the probability of resolving complex challenges. This is a tactic he employs in an approach he calls ‘Social Labs’.

“A social lab is a strategic approach toward addressing complex social challenges. As a strategy, it isn’t too hard to grasp. It can be stated simply. Bring together a diverse, committed team and take an experimental, prototyping-based approach to
addressing challenges systemically, that is, at a root-cause level. Keep going. That’s it.” (Hassan 2014, 125)

The use and processes of labs in the social sector are emerging, but the concept of a ‘lab’ is far from new. Scientific laboratories are well established and understood in our common parlance. Both traditional labs and this newer class of labs - social innovation labs, change labs, design labs, and others - value experimentation and iteration (though it is dictated by the scientific method in traditional labs). These newer labs, however, actively seek out diversity within the ‘research team’, as well as participation from the end-user and/or beneficiaries (MaRS 2012).

The concept of a Lab within the social sector then - as opposed to those commonly associated with scientific research - is “a highly designed and expert[ly] facilitated process clearly intended to support multi-stakeholder groups in addressing a complex social problem” (WISR 2016, 7). While types of labs and their intentions vary, there are three core elements to those labs which all aim to address complex social challenges:

1. **They are social.** The participation of diverse stakeholders beyond consultation, as opposed to teams of experts or technocrats, represents the social nature of social labs.
2. **They are experimental.** Social labs are not one-off experiences. They’re ongoing and sustained efforts. The team doing the work takes an iterative approach to the challenge.
3. **They are systemic.** This means trying to come up with solutions that go beyond dealing with a part of the whole or symptoms (Hassan 2014, 3).

### 1.3.1 Systems Thinking

Systems Thinking is a discipline for seeing wholes, seeing interrelationships and patterns of change rather than separate parts and static reality respectively (Senge 1980). The properties of a system disappear if it's broken into smaller parts which means that the system can only be really understood if we take into consideration the system as a whole embedded within its context/environment and the relationship between its components. Peter Senge concludes that:

“Today Systems Thinking is needed more than ever because we are becoming overwhelmed by complexity. Perhaps for the first time in history, humankind has the capacity to create far more information than anyone can absorb, to foster far greater interdependency than anyone can manage, and to accelerate change far faster than anyone's ability to keep pace.” (1980, 68)

Furthermore, a Systems Thinking approach emphasises the interconnections, relations, and context of an issue (Capra 1997). Relationships are the primary source of information, “objects themselves are networks of relationships, embedded in larger networks…The boundaries…of the discernible patterns – the so-called ‘objects’ - are secondary” (Capra 1997, 80).

Systems Thinking is highly relevant because the world exhibits qualities of wholeness and the whole is complex. The challenges we currently face are increasingly complex with more and more information, intense interdependency, and relentless change (Capra 1997; Checkland 1981; Hassan 2014). This shift in mind-set from a mechanistic and technical perspective to a
holistic and systemic one can help tackle the systemic and complex nature of the global sustainability challenge.

Systems Thinking has its roots in the theories of change that came out of the Tavistock Institute in the mid-twentieth century. Eric Trist coined what he called ‘mega-messes’, what we would call systemic, or wicked problems (WISR 2016). Trist noted that while it was evident that the ‘mega-messes’ of the time had been created by and persisted because of many factors, the traditional approach was to attempt to solve for them from one particular perspective, i.e. we acted like systems in creating a mess, but attempts to clean up the mess were individual. Trist’s response to this conundrum was to develop ways to get “the whole system into the room” (WISR 2016, 84). This type of thinking arguably led the way for the type of trans-disciplinary, multi-stakeholder, participatory and experimental processes that paved the way for labs.

1.3.2 Participatory Processes

Systems thinking also advocates for the participation of the people with the knowledge of a certain system in order to provide answers to problems within that system, instead of relying only on views of external experts (Checkland 1981). Having the perspectives of diverse stakeholders is important, not only because they can make the interventions more effective, but also in a moral sense, as people affected by any given intervention should have a say in it (Jonasson 2004; Bell and Morse 2003).

The importance of participation in sustainable development is outlined in Principle 10 of the 1992 Rio Declaration on Environment and Development:

“One of the fundamental prerequisites for the achievement of sustainable development is broad public participation in decision-making. Furthermore, in the more specific context of environment and development, the need for new forms of participation has emerged. This includes the need of individuals, groups and organizations to participate in environmental impact assessment procedures and to know about and participate in decisions” (UNCED 1992, para. 23.2).

For sustainable development, and in order to address the sustainability challenge, participation must be seen as a core principle (Rockloff and Moore 2006).

1.3.3 Experimental Processes

Snowden and Boone (2007) reinforce the necessity of experimental approaches when faced with complex systems and problems, such as the sustainability challenge. Complicated or simple challenges stem from order and have ‘right’ answers which can be ascertained by the study of the problem by experts (Snowden and Boone 2007). Complex problems, on the other hand, are inherently unpredictable and the system can only be understood in retrospect. This means that there are no ‘right’ answers or one-size-fits-all approaches, instead, experimental processes should be employed in order to “allow patterns to emerge” (Snowden and Boone 2007, 73). Snowden and Boone affirm that when dealing with complex challenges, the act of imposing a course of action is less efficient than simply allowing the path forward to reveal itself. When making decisions in complex environments, experimental processes are key. Complex challenges require that we employ a process of first probing, then sensing and finally responding (Snowden and Boone 2007).
1.4 U.Lab

In this research we are going to explore a specific lab - U.Lab, which fits the above criteria in the following ways: U.Lab was designed to create an environment to foster learning and transformation on both individual and collective (organizational, systemic) levels, as highlighted in its title: Transforming Business, Society and Self; U.Lab is highly experimental with emerging hubs all over the world that take iterative and innovative approaches to the course; and finally, U.Lab is social, as participation is open to all (provided you have access to a computer and internet connection). For example, the Scottish government is currently using U.Lab as a container for multi-stakeholder spaces to address national issues (Presencing Institute 2016).

U.Lab also shares the fundamental characteristics of a lab, as defined by MaRs: it is collective as opposed to hierarchical, dynamic not static, multi-disciplinary as opposed to utilising a singular/’expert’ approach, it is open to failure instead of being risk-averse, it embodies a systems-thinking approach as opposed to an operations-oriented approach, it is user-centric, not market-driven, it inspires outcomes of social change instead of production, it is iterative not linear, and its desired outcome is the conditional successes as described by users/beneficiaries as opposed to a prescribed success imposed by facilitators (MaRS 2012). U.Lab however, does not comply with a traditional definition of social labs in the following ways: it doesn’t involve a physical space, and it doesn’t bring people together in a team to work on a specific problem (Hassan 2016b).

According to the Waterloo Institute for Social Innovation and Resilience (WISR), social innovation can be defined “as about fundamental system change....A social innovation is any initiative (product, process, program, project or platform) that challenges and, over time, contributes to changing the defining routines, resource and authority flows or beliefs of the broader system in which it is introduced” (2016, 6). U.Lab could thus very well be classed as a Global Platform for a Social Innovation Lab.

What we see in U.Lab, its intention and approach, is a hybrid of a social/change labs which aim to address complex and systemic challenges and an open-source educational platform. U.Lab is a Massive Open Online Course (MOOC) which merges the teaching of Theory U with a transformative, experiential process to inspire individuals to take action towards creating a future that we all want (MITx 2015). The design and popularity of U.Lab not only highlights the shift in higher education models, but also the potential for yet another breed of labs - one that can include diverse experiences and involve hundreds of thousands of people, no matter their background.

1.4.1 U.Lab as a Response to Complexity

U.Lab is “a framework describing a change process...a method for effecting change personally, organizationally, in communities and globally. And...a description of phenomena in the world” (Hayashi 2010, 2)

Theory U, and subsequently U.Lab, came into being as responses to the permanent increase of complexity in our current environment (Scharmer and Kaeuffer 2010). As previously discussed, technical problems can be solved with specialisation and expertise, but when it comes to complex – or adaptive - challenges, where there is no clear relationship between the cause and
the solution, adaptive solutions are required, which are based on experimentation and adjustment (Heifetz and Linsky 2002).


Dynamic complexity involves a delay between the cause and effect in space and/or time (Senge, Kleiner, and Roberts 1999). Climate change is a clear example of this phenomenon as the effects of a given action (say carbon emissions) often don’t show up until decades later, and affect even parts of the world where the initial action didn’t occur (Scharmer and Kaeufer 2010).

To address dynamic complexity, a whole-systems perspective is imperative. However, “dynamic complexity is often accompanied and made more difficult to address by social complexity, which is the result of diverse values, interests, and worldviews among stakeholders” (Scharmer and Kaeufer 2010, 21). Furthermore, emergent complexity, which comes after a moment of disruptive change, is more and more commonplace. Emergent complexity is challenging as: “the solution to the problem is unknown, [t]he problem statement itself is still unfolding, [w]ho the key stakeholders are is not clear” (Scharmer and Kaeufer 2010, 21).

Scharmer and Kaeufer argue that the more complex a challenge or situation, the more ineffective it is to rely on our past experience (2010). They began to understand that downloading is no longer an appropriate response to modern complex challenges as they asked themselves: “what if the future is different from the past? What if one’s past experiences aren’t relevant to the emerging challenges? Is it possible, instead, to learn from the emerging future?” (Scharmer and Kaeufer 2010, 22).

1.4.2 Research Purpose and Questions

As discussed, the sustainability challenge is complex, adaptive, emergent and dynamic and therefore requires a similar response. Humanity has more impact than ever on natural flows and social structures and our efforts to effect change so far have been largely ineffective. The goal of U.Lab is to empower changemakers to co-sense and co-shape a future that we all want, using the process of Theory U (MITx 2015). However, in the words of Otto Scharmer – U.Lab’s founder - “U.Lab is not just about becoming aware of all the deep systemic problems in the world. What we try to do instead is make the connection between social change and personal transformation” (MITx 2105, Trailer video).

Therefore, we see U.Lab as an adaptive, emergent and dynamic tool with the potential to address the Sustainability Challenge. However, by not having a common or scientifically-backed definition of sustainability, the transformation fostered by U.Lab currently doesn't necessarily move society towards sustainability. The researchers believe that the addition of strategic sustainable development concepts could enhance U.Lab to help it necessarily move society towards sustainability.

Strategic sustainable development (SSD) incorporates concepts that are designed to address
complex and systemic challenges such as the Sustainability Challenge. In order to effect change at the scale and rate necessary to avoid hitting the wall of the funnel, the character, magnitude and urgency of the sustainability challenge needs to be established. Additionally, a common language and goal, as well as a concrete methodology, is essential in order to tackle the complex and systemic challenges we are facing. In essence, strategic sustainable development encompasses the shift from current, globally unsustainable systems and practices towards a sustainable society in a strategic way (Robèrt and Broman 2015). As such, it provides an adequate and beneficial conceptual framework for us to work with in the re-design of U.Lab so that it necessarily moves society towards sustainability. SSD will be explained further in the following chapter.

Our Guiding Research Question is as follows: How might we design a U.Lab that necessarily moves society toward a sustainable future?

However, in order to begin to answer our Guiding Research Question, we posed the following sub-questions:

Sub Question 1 What concepts are lacking in the current U.Lab that would ensure that it strategically moves society towards sustainable development?

Sub Question 2 What concepts could be included to design a U.Lab that encourages the transformation of business, society and self towards a sustainable future?

Scope and limitations: Initially, we thought we could assess how both the FSSD and U.Lab might complement each other but, after a few mapping sessions, we realised that we needed to scope further due to time constraints. Quickly, our goal became (simply) to design a U.Lab that strategically moves society towards sustainability, however, even this seemed more and ambitious as time went on, and we made the choice to focus on the theoretical and conceptual underpinnings of U.Lab, as opposed to the specific actions and tools included in the eight-week course. To us, addressing the theory and the culture of an organisation presents a bigger leverage point for change than tools and methods, as intervening in the overarching ideology will necessarily spark a domino effect that impacts all other aspects of the organisation.

Having accepted that our initial vision of success would not be possible within the time constraints of our thesis, we chose a more humble path; building our knowledge base, thoroughly assessing the current reality of U.Lab and the need for more structured theory around sustainability. We haven’t given up on the original goal. For us, the thesis is therefore only a first step of many, as we plan to continue developing the project, working on our prototype – testing, iterating, testing again.

However, this leads us to concede the limitations of this particular piece of work. While we see it as providing good foundational knowledge, and inspiring a 0.8 prototype, this is not, and should not be considered as, a comprehensive design project. We lacked the time to validate our 0.8 prototype through expert feedback or exploratory workshops, and we acknowledge that design research projects often take years – not months – to cycle through the phases as many times as necessary for a successful end result.
2 Conceptual Framework

At the outset of any research, it is crucial to consider any relevant theories that underpin the knowledge production of the phenomenon to be investigated (Eisenhart 1991). By addressing topics adapted from Grant and Osanloo (2014), the researchers were able to establish a theoretical and conceptual framework to guide them throughout the research. Specifically, we sought to establish the types of knowledge available to us, the theories that would best serve our research, as well as other theories relevant to the topic. This chapter outlines the concepts and theory that we have used to construct, analyse and present our thesis.

2.1 Strategic Sustainable Development

In *A Compass for Sustainable Development* (1997, 3-4), Robèrt et al. outline eight criteria for a theoretical model of sustainability, which laid the foundations for what they later term Strategic Sustainable Development. The eight criteria are:

1. *The model must be based on a scientifically acceptable conception of the world.*
2. *The model must contain a scientifically supportable definition of sustainability.*
3. *The overall perspective must be applicable at different scales, and must see the economy as a subsystem of the ecosystem at each scale.*
4. *The micro-economical perspective should not require individuals to act against self interest.*
5. *The model must be pedagogical and simple to disseminate so that it can support a public consensus necessary to be put into practice democratically.*
6. *The model must not engender unnecessary resistance or be adversarial.*
7. *The model must be able to get started without first requiring large scale societal changes. It should be implementable within today’s economic reality.*
8. *It would be an advantage if the model could also be used as a starting point for developing “new economics” — as a way to recognize a new and larger pattern of scarcity to which old and basic economizing principles must be applied.*

A strategic approach to sustainable development, as outlined by Holmberg and Robèrt (2000), includes a ‘simplicity without reduction’ methodology. This approach to sustainable development outlines first-order principles – those which define a system at its most elementary level – for a sustainable society, understanding that the transition from our current unsustainable state to a sustainable society is a complex, adaptive challenge, and therefore solutions must be likewise, and that we cannot resort to reductive or fragmented understanding (Holmberg and Robèrt 2000; Senge and Kofman 1993; Hassan 2014).

First-order principles of a given system are akin to the trunk and branches of a tree. The leaves then, can be understood to be the activities, symptoms, or consequences of neglecting the first-order principles. In any field, the higher the level of detail to a concept, the higher the level of specialisation needed to attain a thorough understanding. Therefore, by reducing the sustainability challenge to the trunk and branches, or first-order principles, changemakers from different fields can come together to create solutions based on a foundational understanding without ‘getting lost in the leaves’ of others’ detailed expertise (Holmberg and Robèrt 2000).
The first-order principles that explain the systems of society within the biosphere are the first and second laws of thermodynamics, photosynthesis as a biogeochemical process and trust as an essential bond to societal systems. The first law of thermodynamics states that all the matter that will ever exist on earth is currently here, as earth can be seen as a closed system to matter. The second law states that disorder (entropy) increases in all closed systems. While the Earth is a closed system to matter, it is an open system to energy as it receives energy from the sun. Sunlight is responsible for almost all increases in net material quality on the planet. The flow of energy from the sun creates structure and order from the disorder through photosynthesis and the effects of solar heating. Plants receive energy from sunlight through chloroplasts and in turn, provide energy for other forms of life, such as animals (Robèrt and Broman 2015). With regard to society as a system, trust is a necessary condition for economic, political and social sustainability. This means that fundamental human needs of an individual need to be met (Missimer 2015).

Additionally, in building a conceptualisation of sustainable development that is based on first-order principles, it is easier to identify causal elements in the sustainability challenge, as opposed to being unable to differentiate those causal, or more upstream elements, from the more downstream symptoms of the issue (Holmberg and Robèrt 2000).

Furthermore, first-order principles provide a stronger foundation for creating a shared vision of what a sustainable society should look like in comparison to details, symptoms or consequences, which tend to confuse and fracture interest groups (Holmberg and Robèrt 2000). Robèrt and Broman (2015, 1) affirm that “a unifying and operational definition of sustainability” is appropriate and necessary. This unified definition of sustainability is, however, strengthened by an understanding of the Sustainability Challenge.

By providing a principled definition of sustainability, framed by a set of boundary conditions, or things not to do, there is a wide range of potential sustainable societies (that complies with the basic sustainability principles) and therefore there are more than one route to sustainability (Robèrt and Broman 2015). This actually grants users of this approach to sustainable development more flexibility and freedom when it comes to making choices about one route to take over another. “The common principled framing would allow for identification of common challenges, possible synergies and coordinated collaboration over sectors...for reaching sustainability” (Robèrt and Broman 2015, 4) and “independent of scale and context” (Robèrt and Broman 2015, 3). According to Robèrt and Broman (2015), the Sustainability Principles of the FSSD (detailed below) are the only such principles to observe these criteria.

Finally, first-order principles establish the frame necessary to approach sustainable development in a systemic way. The trunk and branches analysis of a challenge provides an overarching frame within which experts can apply their specific knowledge. This systems-thinking approach is vital when addressing complex adaptive challenges such as the Sustainability Challenge (Holmberg and Robèrt 2000), as shown in Chapter 1.

### 2.1.1 The Framework for Strategic Sustainable Development (FSSD)

The Framework for Strategic Sustainable Development (FSSD) is a framework designed to help practitioners facilitate society’s transition towards sustainable development. It offers a definition of sustainability based on a scientific understanding of the socio-ecological system
and helps whoever uses it make sense of complex challenges we need to tackle today through a ‘simplicity without reduction’ approach (Holmberg and Robèrt 2000; Ny et al. 2008).

The FSSD is based on a Five Level Framework (5LF), a management and planning tool, and can be said to realise the eight criteria for a theoretical model of sustainability. It is organised by systems, success, strategic, actions and tools levels (Holmberg and Robèrt 2000; Ny et al. 2008). The levels can be described as follows:

System: The systems level addresses the global socio-ecological system (society within the biosphere) and gives an overview of the sustainability challenge as explained in section 1.1. It also includes the basic principles and behaviours for the functioning of the system that are relevant to the overall goal (success) (Robèrt and Broman 2015). In order to be efficient, we need to have an understanding of the system that we are trying to move toward sustainability. At this level, we try to understand the socio-ecological system and its interaction with the biosphere and the lithosphere (Robèrt and Broman 2015).

As previously discussed, society is starting to experience consequences of the mechanistic and reductionist mind-set that came out of the Industrial Revolution, such as climate change, poverty, loss of biodiversity and increasing inequalities. These problems can be viewed as elements of the sustainability challenge or, to use a previous analogy, similar to leaves on a tree. The leaves are not static but change over time, and have a direct relation to the trunk and branches. In order to tackle these issues in a more effective way, one has to understand the structure (or trunk), the leaves and the roots of the problem, to be able to fully comprehend the system the tree constitutes as a whole (Robèrt and Broman 2015).

Success: At this level, the vision of success is defined, which is framed by eight Sustainability Principles (SPs) that help define the structures and roots of the challenge. Each one of them is necessary and sufficient for a sustainable society, as well as general enough to be used in different contexts and by different actors. They are also concrete enough to allow for actions to be developed and non-overlapping and non-mutually exclusive. Furthermore, the principles are the result of scientific consensus, and therefore are based on common and widely understood language (Robèrt and Broman 2015).

According to Robèrt and Broman (2015), through the involvement of diverse experts and extensive research, they have ascertained the necessity of sustaining “assimilation capacity, purification capacity, food production capacity, climate regulation capacity and diversity”, as well as “trust between people and between people and societal institutions, diversity of personalities, ages, genders, skills, etc., common meaning, capacity for learning, and capacity for self-organization” (Robèrt and Broman 2015, 7).

That the Sustainability Principles are communicated as exclusion criteria for the redesign of our social and ecological processes is important, as they “constitute the boundary conditions within which society can continue to function and evolve, outside of which it cannot” (Robèrt and Broman 2015, 7), but allow for many versions of a sustainable society to become the vision of success. As they conclude, “[i]t is difficult to know whether any given scenario is truly sustainable or not if it is not framed by and assessed against a principled definition of sustainability. While specific initiatives and actions can have beneficial impacts, without proper framing, the likelihood of unintended negative consequences is significant” (Robèrt and Broman 2015, 3).
The Sustainability Principles were then conceived from these essential elements for sustainable development, by identifying what were the upstream mechanisms, i.e. the first stage in the causal chain, that would disaffirm these elements. Once those upstream mechanisms were identified, they were developed into principles for sustainability by the addition of a negating word – ‘not’. The eight Sustainability Principles can be summarised as follows (Robèrt and Broman 2015, 7):

1. **In a sustainable society, nature is not subject to systematically increasing concentrations of substances from the earth’s crust (such as CO2 and heavy metals)**

   Human society extracts substances from the lithosphere which are then introduced into the biosphere more quickly than nature can restore them to the lithosphere again, resulting in increased concentrations of those substances in the biosphere. Sustainability Principle 1 calls for the balance of these substances to be such that there is no systematic increase of them in the whole biosphere or in parts of it (Robèrt and Broman 2015).

2. **In a sustainable society, nature is not subject to systematically increasing concentrations of substances produced by society (such as endocrine disruptors, chlorine and bromine)**

   Many chemical compounds are being produced by society that are artificial and persistent in nature, meaning that they can't be processed and/or reintegrated into the biosphere. According to Sustainability Principle 2, human-produced compounds in the biosphere cannot be produced at a rate faster than the capacity of the biosphere to degrade and integrate those compounds into natural cycles (Robèrt and Broman 2015).

3. **In a sustainable society, nature is not subject to systematically increasing degradation by physical means (such as deforestation and draining of groundwater tables)**

   The physical impacts caused by society to the Earth are manifest in the destruction of wetlands, overfishing and desertification processes, among others. Sustainability Principle 3 dictates that natural systems must not be systematically degraded by overharvesting, mismanagement, displacement and/or other forms of physical exploration (Robèrt and Broman 2015).

4. **In a sustainable society, people are not subject to social conditions that systematically hinder their health (mental, physical and emotional)**

   People should not be exposed to conditions in the social system that “undermine their possibilities to avoid injury and illness; physically, mentally or emotionally”, such as dangerous work conditions or insufficient wages.

5. **In a sustainable society, people are not subject to social conditions that systematically hinder their influence (participating in shaping social systems they are a part of)**

   People shouldn’t be hindered from participating in shaping the social systems they are part of by any structural obstacle. Structural obstacles refer to political, economic and cultural social constructions, which might include the suppression of free speech or the disregard of certain opinions, in this case.

6. **In a sustainable society, people are not subject to social conditions that systematically hinder their competence (developing competence/learning individually or collectively)**
There should be no structural obstacles to the development of individual or collective competence, from acquiring skills or education. Violations of Sustainability Principle 6 include: lacking educational infrastructure and insufficient possibilities for personal development.

7. *In a sustainable society, people are not subject to social conditions that systematically hinder their impartiality (discrimination, fairness, equity) and,*

People shouldn't be subject to partial treatment, such as racial, gendered or religious discrimination.

8. *In a sustainable society, people are not subject to social conditions that systematically hinder meaning-making (creating individual or common meaning).*

The creation of individual and the co-creation of common meaning should not be hindered by any structural obstacles. Examples include the suppression of cultural expression and barriers to the co-creation of purposeful conditions.

**Strategic Guidelines:** At the third step of the framework, a backcasting approach is used in order to close the gap between the vision of success and the current reality by finding creative solutions. Here, the first-order principles (or sustainability principles) dictate the “boundary conditions for re-design” (Missimer 2015), as “backcasting does not only, or necessarily, occur from a simplified image of a desirable future” (Missimer 2015, 7), as previously discussed.

Backcasting “begins by defining the vision, and then asks: what shall we do today and subsequently to get there?” (Robèrt and Broman 2015, 3). Backcasting provides stepping stones for reaching success, while a principled definition of sustainability makes it logical, as backcasting alone has little frame within which to operate. Therefore, employing one without the other would not necessarily lead to actions that move society towards sustainability, while employing both concepts simultaneously provides the basis for many different paths to lead to a sustainable future. In order to achieve a principle-framed vision, solutions are prioritised by generic strategic guidelines provided by the FSSD as well as strategic guidelines which can be tailored depending on the specific situation (Robèrt and Broman 2015).

Backcasting is also an important conceptual novelty of the FSSD in that it avoids some of the classic pitfalls of forecasting. Forecasting uses our prior knowledge, current reality, and established mental models to predict what might happen in the future, as well as to define what is possible. But, as we have established that the Sustainability Challenge is complex and emergent, we know that predicting future events is nearly impossible, and the future that wants to emerge might not be what we can currently conceive.

**Actions:** At this level, actions that meet the conditions of the principle-framed vision, stay within the boundaries of the sustainability principles, and pass through the strategic prioritisation questions are implemented into an action plan to move society towards sustainability (Robèrt and Broman 2015).

**Tools:** The tools level of the FSSD provides an existing implementation tool called the ABCD planning process. However, tools can also include other methods, tools and support in order to plan, monitor, make decisions or implement the actions defined by the strategic guidelines and principle-framed vision of success as described above (Robèrt and Broman 2015).
Our intention for this research is to use the scientifically-backed, peer-reviewed concepts of strategic sustainable development to instil boundaries within which U.Lab can foster systemic change. To this end, our research concentrates on the system, success and strategic levels only.

2.2 U.Lab

The researchers recognised the need for a thorough conceptual understanding of U.Lab, as it is our object of study. In order to achieve this, we performed a partial 5LF analysis of U.Lab. The 5LF provides an overview of the context and current reality of a given organisation, process, or situation and was, therefore, an appropriate tool to use in the early stages of research. We assessed U.Lab’s ideology, strategy and vision, as well as its relationship to the current challenges we face, by detailing the Systems, Success, and Strategic levels of the 5LF. This broad overview represents an auto-reflective perspective.

2.2.1 Systems and Success Levels

U.Lab’s perception of its own system is based in economic thinking, as demonstrated by the language used to describe it, however, the scheme Scharmer uses strays far from traditional economic theory. The word economy has its roots in the Greek word oikos, or whole-house (Scharmer and Kaeufer 2013). Scharmer and Kaeufer write that “[t]ransforming our current ego-system economy into an emerging eco-system economy means reconnecting economic thinking with its real root, which is the well-being of the whole house rather than money-making or the well-being of just a few of its inhabitants. But while the whole house was for the Greeks something very local, today it also concerns the well-being of our global communities and planetary eco-systems” (2013).

Currently, we generally operate from the position of Society 3.0 or stakeholder capitalism. Within this economic paradigm, Theory U outlines three divides: the ecological divide, the social divide and the self divide. In this context, ‘divide’ is another word used to describe disconnection. The ecological divide, or disconnect, is between nature and society and includes issues such as climate change, deforestation, biodiversity loss, etc. The social divide details the disconnection between humans within society - vast inequalities in wealth, health and quality of life. The self divide is about the disconnect within oneself from a current self to a future self that wants to emerge. Furthermore, “the evolution of our economy mirrors an evolution in the quality of human awareness - from ‘ego-system’ to ‘eco-system’ awareness” (MITx 2015, course video). Society 4.0 – eco-system awareness - details the vision of success of U.Lab.

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<th>Primary societal challenge</th>
<th>Response: coordination mechanism</th>
<th>Primary sector/players</th>
<th>Primary source of power</th>
<th>Dominant ideology</th>
<th>Primary state of consciousness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society 3.0: Stakeholder-Driven, Social-Market Economy</td>
<td>Negative domestic externalities</td>
<td>Negotiating: stakeholder dialogue</td>
<td>Civil society/ NGOs; capital/business; state/ government</td>
<td>Normative (values)</td>
<td>Social democratic or progressive thought</td>
</tr>
<tr>
<td>Society 4.0: Eco-System Driven, Co-Creative Economy</td>
<td>Global disruptive externalities, resilience</td>
<td>Presencing: awareness-based collective action (ABC)</td>
<td>Cross-sector co-creation: civil society/NGOs; capital/business; state/government</td>
<td>Awareness: actions that arise from seeing the emerging whole</td>
<td>Eco-system centric thought</td>
</tr>
</tbody>
</table>

*Figure 2.1. Describing the Societal Levels, Scharmer and Kaeufer, 2013*
There are three limitations to stakeholder capitalism, the current economic paradigm of thought: “[i]t is biased in favor of special-interest groups, it reacts mostly to negative externalities, and it has only a limited capacity for intentionally creating positive externalities” (Scharmer and Kaeufer 2013, 55).

Stakeholder capitalism (Society 3.0) is marked by differentiated sectors: the public (governmental) sector, the private (entrepreneurial) sector and the civic (non-profit) sector. Because of being organised in this way, Society 3.0 tends to systematically disadvantage groups that cannot organise themselves so easily. These might include, for example, groups of many people such as consumers or citizens, and groups that haven’t yet come into being, such as future generations (Scharmer and Kaeufer 2013).

Furthermore, stakeholder capitalism tends to operate from a reactive position, responding to challenges such as climate change, resource scarcity, and social inequalities only once they begin to have a major impact on the economy (Scharmer and Kaeufer 2013). In response to these global challenges, regulatory mechanisms such as environmental protection, federal reserve banks, and social security measures are put in place but only serve to perpetuate the current system. In contrast, Society 4.0 – or an eco-system economy – would act from a pre-emptive position in order to allow for positive externalities to emerge.

As Scharmer and Kaeufer state in Leading from the Emerging Future: From Ego-system to Eco-system, “twenty-first-century problems cannot be addressed with the twentieth-century vocabulary of welfare-state problem solving. The challenge that most societies face is how to respond to externalities in a way that strengthens individual and communal entrepreneurship, self-reliance, and cross-sector creativity rather than subsidizing their absence” (2013, 55).

The Iceberg Model in U.Lab is a response to what Scharmer sees as silo-esque “approaches that address the problem at the symptom level, not at the root level, and that largely miss the interdependency across these problems” (MITx 2105, course video). The Iceberg Model shows the symptoms, or the visible challenges above the water level, which Scharmer has broken into the three divides (see figure 2.2).

To fully explain the paradigm of stakeholder capitalism, U.Lab outlines eight acupuncture points below the three divides. The divides trickle down to provoke disconnects within smaller sub-systems:

- between the financial and the real economy…
- between the infinite growth imperative and the finite resources of Planet Earth…
- between the Haves and the Have Nots…
- between institutional leadership and people...
- between gross domestic product (GDP) and well-being…
- between governance and the voiceless in our systems…
- between actual ownership forms and best societal use of property…
- between technology and real societal needs (Scharmer and Kaeufer 2013).

A characteristic of the eight acupuncture points is that they are complex and interconnected. To navigate this complexity, we can use “[t]he iceberg model, a diagnostic tool that suggests that beneath the visible level of events and crises that define our world today, there are underlying structures, paradigms of thought, and sources responsible for creating them” (MITx 2015, course material).
Below are eight visible symptoms of problems underlying the structure of the economic system. The figure shows each issue as it appears on the surface. The divides describe the symptom generally, the bubbles explain the disconnects contributing to the divide, and the text below the arrows indicates the limits the system is surpassing (Scharmer and Kaeufer 2013).

![Figure 2.2. The Iceberg Model, MITx 2015, course material](image)

The visible tip of the iceberg is the result of how we organise ourselves in society. In order to change those structures, sources and paradigms, we need to understand what they are, where they come from and why they come into being. Only then can we can deal with the root causes of the disconnection. The eight acupuncture points denote pressure or leverage points in the system. As with traditional Chinese medicine, if every point is addressed as a whole, “these acupuncture points hold the possibility for evolving our institutions in ways that bridge the three divides” (Scharmer and Kaeufer 2013). Each symptom, followed by the paradigm shift necessary in order to transition to Society 4.0, is described in more detail below.

**Infinite growth/Nature:** “All economic activity arises from and returns to nature” (Scharmer 2013). Though we may have forgotten this truth in Society 3.0, the negative externalities that have arisen as a result of our abuse and misuse of the natural world and our common resources are now becoming harder and harder to manage. Indeed, we are running a deficit of the natural resources we have at our disposal. As Scharmer and Kaeufer put it, “we leave an ecological footprint of 1.5 planets; that is, we are currently using 50 percent more resources than our planet can regenerate to meet our current consumption needs” (2013, 5) because of our current industrial and economic paradigms (Scharmer and Kaufer 2013).

**Success for Society 4.0:** The ecological disconnect will be bridged when we shift from seeing nature as a commodity to seeing it as a common resource, which would necessitate preservation of increasingly scarce resources (Scharmer and Kaeufer 2013). Society 4.0 would again return to the premise that “all economic activity arises from and returns to nature” (Scharmer and Kaufer 2013, 80), meaning that nature shouldn’t be treated like a commodity. Society 4.0 would be structured to achieve maximum efficiency, inspired by nature and biomimicry. This would include processes that utilise zero waste, solar energy, diversity and symbiosis, for example, which are regenerative and efficient because they mimic natural flows and cycles.
Furthermore, using closed-loop designs and cultivating the commons once again (community-supported agriculture, for example) are a part of the vision for a successful society.

**Income/Labour:** 
Negative externalities of stakeholder capitalism also included social ramifications. Eventually, even the measures put in place to protect citizens and workers failed as economic growth happened void of jobs, and we realised that exponential growth couldn’t be sustained and therefore was not a reliable solution to joblessness. In fact, even those measures that had created income security were generally at the expense of other populations and future generations (Scharmer and Kaeufer 2013).

**Success for Society 4.0:** To bridge the income and wealth disconnect, we need to level the economic playing field by adhering to human rights (Scharmer and Kaeufer 2013). Society 4.0 includes ‘economic human rights’ such as a universal basic income and the promotion of social entrepreneurship.

Society 4.0 also stresses relinking work with purpose as an important condition for a thriving society. The workplace should be a space that encourages employees to sense into and co-create a future that wants to emerge. It should also be a physical space that provides access to “enabling spaces where innovation happens in a nurturing environment, where challenges are the raw material for all learning and sensing mechanisms allow people to see themselves as part of the bigger picture” (Scharmer and Kaeufer 2013, 87). Additionally, capacity-building mechanisms should be built into organisational cultures as well as opportunities to be a part of a global community of mentors and partners (Scharmer and Kaeufer 2013).

**Financial:** 
Society 3.0 – or stakeholder-driven, social-market capitalism ushered in an era of unparalleled economic and industrial growth which, in turn, led to an unparalleled growth of financial capital – which then became more and more decoupled from the real economy. What’s more, financial capital, though largely abstracted from tangible goods and assets, became more valuable than physical or human capital – only furthering the gap between the financial and the real economy (Scharmer and Kaeufer 2013).

**Success for Society 4.0:** To bridge the financial disconnect Scharmer and Kaeufer (2013) suggest that there should be limits to speculation. The financial economy should also constitute an approximation of, or maintain a position relative to, the real economy. At the level of Society 4.0, money “would maximize the capacity of all economic actors to shape the systemic use of money in a more intentional, collective, and creative way” (Scharmer and Kaeufer 2013, 97).

Capital within Society 4.0 is monitored and measured with transparency and awareness about the social and economic impacts it has. It links the individual intention of all actors with a shared intention in a community (Scharmer and Kaeufer 2013). An eco-system economy sees the re-coupling of the financial economy and the real economy by way of the diversion of money from the financial economy into “natural, human, social and cultural-creative” forms of capital (Scharmer and Kaeufer 2013, 100).

**Technology:** 
The biggest change for technology in Society 3.0 was the switch from individual specialised machines that aimed to improve the work and efficiency of the worker operating them to production systems that were entirely automated, eliminating the need for a human operator. Furthermore, the more specialised and complex technology became, the wider the gap between those specialists controlling the algorithms that make-up and maintain the system, and the end-users or consumers of the product or design. And, as mass production became the norm, mass consumption as a trend necessarily followed (Scharmer and Kaeufer 2013).
Success for Society 4.0: Technology at the success level of Society 4.0 should shift from being system-centric to ‘human- or life- centric’ (Scharmer and Kaeufer 2013). When the knowledge around new technologies and the use of them is distributed and shared as part of collective intelligence, individuals would reclaim their access to enabling technologies and users would move from being recipients of products and services to becoming their co-creators, co-authors and co-users (Scharmer and Kaeufer 2013).

In order to reach eco-system technologies, Scharmer and Kaeufer (2013) suggests that a shift in mentality is just as important as the development of new technology. However, it is still imperative that research and development departments invest in technological development that addresses the most urgent ecological and societal needs. In this way, technology has the potential to incite the third industrial revolution (Scharmer and Kaeufer 2013).

Leadership: Leadership in Society 3.0 can be understood as a “participatory, relational, and networked structure in which multiple stakeholder and interest groups negotiate and engage in dialogue with one another” (Scharmer and Kaeufer 2013, 111). While this idea of a network may be preferential over previous structures, which included hierarchical, centralised and competitive forms of leadership, indeed none of these structures are capable of meeting the types and magnitude of the challenges we currently face (Scharmer and Kaeufer 2013).

Success for Society 4.0: Scharmer and Kaeufer (2013) point out that those making decisions are more and more disconnected from those affected by their decisions. In order to bridge the leadership disconnect, we need “participatory, relational, and networked structure” (Scharmer and Kaeufer 2013, 111). Leadership in Society 4.0 is collaborative, distributed and focuses on collective capacity. In order to respect and protect the commons and create the conditions for a future that wants to emerge, a leader in Society 4.0 listens to others with an open heart, an open mind and an open will. Leadership at this level requires enabling “a new collective leadership mechanism that allows a diverse constellation of players to connect, co-sense, and co-create.” (Scharmer and Kaeufer 2013, 111). It is this capacity for facilitating collective understanding and creation that defines the 4.0 leader.

Consumption: As previously discussed, the unprecedented growth of industrial society was necessarily met with unprecedented growth of consumerism. This was aided by the global advertising industry that positioned the consumer as “a target of economic activity rather than a partner whose evolving needs are being identified and served” (Scharmer and Kaeufer 2013, 117).

Success for Society 4.0: To bridge the consumerism disconnect, we need to connect with deep sources of knowledge, well-being and happiness, as well as connecting this deep knowledge with the economy (Scharmer and Kaeufer 2013). Society 4.0 fosters agents that make intentional and informed choices to co-create the economy. Instead of being passive targets at the end of the chain of production, consumers would instead drive production as a co-creative partner. Instead of mass production resulting in mass consumption in a never-ending cycle, consumption in Society 4.0 would seek to meet and respond to ‘real’ human needs. Furthermore, reducing consumption could be seen as “increasing the capacity of the system to redirect resources to people’s real needs, while strengthening their capacity to access their inner sources of well-being and happiness.” (Scharmer and Kaeufer 2013, 119).

To enable this shift, the 4.0 economy as a global system needs to facilitate connections between diverse stakeholders, allow for multi-stakeholder involvement, be transparent and be reflective. Ultimately, Society 4.0 does not separate “(1) consumers from production, (2) consumers from
each other...and, (3) consumers from themselves” (Scharmer and Kaeufer 2013, 119). The future of consumption is “empowered, conscious [and] collaborative” (Scharmer and Kaeufer 2013, 120).

**Governance:** The differentiated sectors of stakeholder capitalism (public, private and civic) mean that in a social-market economy, “the market is embedded in and navigated through negotiation, networks, and dialogue” (Scharmer and Kaeufer 2013, 122) of both centralised governments, decentralised markets, and civic interest groups. We have moved from a system where individuals are not expected to have control over, or hold responsibility for, their actions, to one where the civic sector is charged with creating the awareness and space for individuals to be able to see how their actions impact the whole. However, this is still a position that is reactive to negative externalities, as opposed to a system that internalises externalities and makes decisions from a whole-system perspective (Scharmer and Kaeufer 2013).

**Success for Society 4.0:** In order to bridge the governance disconnect, society needs to reassess our relationship to cooperation and competition, instead focusing on collaborative innovation for the system as a whole (Scharmer and Kaeufer 2013). Society 4.0 sees a shift from governance that is largely influenced by stakeholder capitalism to awareness-based collective action (ABC). Awareness-based collective action facilitates the “capacity of the system to see itself, to sense what wants to emerge, and to explore the future by doing (prototyping)” (Scharmer and Kaeufer 2013, 127). Instead of a social-market economy, ABC would give rise to an intentional market economy that rejects the tendency to operate like a business and positions citizens at the core of its vision and purpose. Governance in Society 4.0 facilitates the space for collaborative collective action as described above in a way that internalises the well-being of the whole into the individual consciousness of the actors in the system (Scharmer and Kaeufer 2013).

**Ownership:** As with the other acupuncture points, the unprecedented growth and increased consumption seen in the 20th century, paralleled a rise in poverty, inequality and resource scarcity. However, the 18th century ideology that material wealth and property were a right, and that not having either was due to laziness still prevailed. The response was to impose regulations that protected an individualistic approach to common resources. As the tragedy of the commons became more apparent with the widening gap between the rich and the poor, ‘the commons’ grew to include social and cultural commons (Scharmer and Kaeufer 2013). According to Scharmer and Kaeufer “[t]he crisis of our time is a crisis of our commons. The three divides reflect a massive attack on our commons through a host of unintended negative externalities that the current design of property rights facilitate” (2013, 131).

**Success for Society 4.0:** To bridge the ownership disconnect, Scharmer and Kaeufer (2013) call for commons-based property rights (Scharmer and Kaeufer 2013). As described at the system level, the crises we are facing are crises of the commons, which is facilitated by the way we interpret and uphold individual property rights. The vision of success at the 4.0 level includes a third industrial revolution sparked by commons-based property rights.

The idea of commons-based property rights - of sharing economies, of employee-owned corporations, or collaborative consumption - should be institutionalised, and the institutions held responsible to all stakeholder groups, including those without a voice, such as future generations (Scharmer and Kaeufer 2013).

In order to let Society 4.0 emerge, Scharmer and Kaeufer (2013) states that all three of the deep divides (Ecological, Social and Self) need to be approached in an integrated way (Scharmer...
and Kaeufer 2013). Scharmer believes that “the most significant disruptive change of our generation is yet to come. It has to do with the transformation of capitalism and self. The transformation of capitalism has to do with our ability to reshape how we connect to each other, to the system, and to ourselves” (MITx 2015, Trailer video).

2.2.2 Strategic Level

U.Lab, at the strategic level, is an online platform for a Massive Open Online Course that aims to empower its participants to co-create and prototype solutions for a given issue by using Theory U and the U process. Anant Agarwal, the founder of edX, said of U.Lab: “You’re not building a course; it sounds like you’re building a movement” (Scharmer 2015a, para 25). At once, it is an open online course and a movement for change.

U.Lab 1.0 was launched in January 2015 as a six-week course called U.Lab: Transforming Business, Society, and Self (MITx 2015). Delivered free of charge by MITx, U.Lab aimed to “prototype a new 21st-century university model, one that offers a hybrid online/real-world learning environment, with the goal of sparking a global web of interconnected hubs, inspiring initiatives, and grounding learning locally in places where societal challenges are manifest” (MITx 2015). 28,000 people from 190 countries participated in U.Lab 1.0, producing more than 300 prototypes (MITx 2015). U.Lab 2.0 was launched in September 2015 as an eight-week programme, with more than 50,000 participants (MITx 2015).

The fact that it is free and online democratises access to the content. Once the participant has registered on the edX online platform, they will be asked to create a profile and interact with other participants according to their location or interests. Practically speaking, this broad-scale change is possible because the course is online. As the course finishes, participants create a prototype to share online on which other participants are able to comment (Scharmer 2015b).

U.Lab is an emergent platform, as it is constantly adapting to the feedback provided by participants via social networks like Facebook or Twitter where U.Lab has a strong presence. Additionally, the Presencing Institute issues a lot of surveys in order to sense the field. For example, participant feedback from U.Lab 1.0, suggesting that the course content was difficult to digest in the six weeks, allowed for the hosting team to spread it over 8 weeks for U.Lab 2.0 (Scharmer 2015c). Furthermore, U.Lab is currently undergoing a metamorphosis, the results of which are U.Labs for specific realms such as education or finance (Scharmer 2015c).

The U Process: The U process is comprised of seven steps and is based on learning by doing. It seeks to link the head (knowledge) and hands (action) with the wisdom of the heart. This reimagined theory of change focuses on the potential and importance of the individual’s state in effecting broad-scale change and renewal. The seven steps (downloading, seeing, sensing, presencing, crystallizing, prototyping, performing) of the U-Process are related to three core movements: To observe, to retreat and reflect, and to act (in an instant) (Scharmer and Senge 2009). The shift from one step to the next is marked by certain gestures: Suspending (from downloading to seeing), redirecting (from seeing to sensing), letting go (from sensing to presencing), letting come (from presencing to crystallizing), enacting (from crystallizing to prototyping), and embodying (from prototyping to performing) (Scharmer and Senge 2009).
Moving down the left side of the U, the steps encourage the opening of the mind, heart and will by connecting with deeper sources of perception, decision-making and action. To open the mind, participants must suspend the Voice of Judgment, which perpetuates prejudice and bias. To open the heart, participants must suspend the Voice of Cynicism, allowing them to develop empathy, and to open the will, participants must suspend the Voice of Fear, cultivating intention instead of unconscious fear (Scharmer and Senge 2009; Scharmer and Kaeufer 2010).

The retreat and reflect movement at the bottom of the U involves the pivotal moment of the process – ‘presencing’ – a combination of the words ‘presence’ and ‘sensing’. This moment includes a change in the internal processes of participants, which in turn, fuels a change in that individual’s social field (Scharmer and Kaeufer 2010). In the presencing phase, the best potential of an individual unfolds, facilitated by the foundation laid in previous steps.

Moving up the right side of the U, the steps facilitate a creative, constructive process. By inviting the future that wants to come, prototyping and embodying that change in themselves, participants achieve a state of performing the emerging future (Scharmer and Senge 2009). Then, it is important to act in an instant: “Develop a prototype. A prototype explores the future by doing something small, speedy, and spontaneous; it quickly generates feedback from all the key stakeholders and allows you to evolve and iterate your idea” (Scharmer and Kaeufer 2013, 21).

**U.Lab as a niche:** We suggest that U.Lab is a niche - a protected space where users support emerging innovations and actors work on innovative and disruptive prototypes with the wish to replace existing (political, economic, social) systems and structures. Niches are particularly effective in inspiring societal transitions due to the prototypes they incubate which can lead to big waves of systemic change. Niches, then, are another tool to address wicked problems like the sustainability challenge (Geels 2011).
3 Research Design

According to Kates et al., sustainability science should focus on the following: “(1) understanding the fundamental interactions between nature and society; (2) guiding these interactions along sustainable trajectories; and (3) promoting social learning necessary to navigate the transition to sustainability” (Miller 2011, i).

Miller argues that the sustainability science community has largely failed to address the second and third points. He advocates, therefore, to reposition “sustainability science as a ‘science of design’— that is, a science of what ought to be in order to achieve certain goals, rather than a science of what is” (Miller 2011, 88). While an understanding of the interactions between nature and society is important, sustainability science now needs to turn its attention to the “design of solutions” (Miller 2011, 89). As Robinson states of the challenges related to sustainability: “to face these challenges we have to understand their nature; to meet them, we have to recognise that cultivating our natural powers of imagination, creativity, and innovation is not an option but an urgent necessity” (2011, 19).

Therefore, we draw upon design research methodology when addressing our research questions. Design research can be understood as fundamentally creative. While traditional research usually aims to determine ‘what is’ by way of inductive reasoning, or ‘what must be’ by way of deductive reasoning, design research instead uses a third kind of logic: abductive reasoning, or the process of envisioning ‘what might be’ (Faste and Faste 2012).

Van Aken, Ernst and Romme (2009) argue that while research into organisations has largely been influenced by the natural and social sciences and sought to understand organisations as natural systems, design science research offers an approach that analyses organisations as artefacts, “shaped through design-based interventions by their founders and other change agents” (Van Aken, Ernst and Romme 2009, 6). While predominant research methodologies on organizations are based on the production of representational, constructivist and narrative knowledge (or ‘pure’ knowledge), and contribute to our understanding of organisations as natural systems, design research focuses on “a problematic state in social or material reality”, or a field problem. In attempting to solve field problems, design research then “is interested in systems that do not yet exist or in improved performance of given systems”, thereby addressing the needs of an organisation as artefact (Van Aken, Ernst and Romme 2009, 6).

Moreover, a design research approach allows and encourages flexibility - specific phases can be omitted if they are not pertinent, and the iterative nature of the methodology means that researchers tend to move back and forth between the stages. Additionally, it offers freedom to the researcher to choose the most relevant methods from diverse approaches and disciplines (Blessing and Chakrabarti 2009).

According to Blessing and Chakrabarti (2009), Design Research not only seeks to understand but also to improve design. Therefore, by utilising design research to address how U.Lab can help move society towards strategic sustainable development, we aimed to enhance the current design of U.Lab and also address what Miller calls “the limitations of sustainability science research to move the field beyond the analysis of problems in coupled systems”. With this study, we aimed instead to advance the “solutions-oriented approach that seeks to understand, conceptualize and foster experiments for…sustainability” (Miller et al. 2013, 2).


### 3.1 Design Research Methodology

Design Research Methodology (DRM) is an approach and a set of supporting methods that can be used as a framework for doing Design Research. The objectives of DRM are the formulation, validation and development of theories and models in the field of design and design thinking (Blessing and Chakrabarti 2009). Design Research Methodology allows for a merging of research methods depending on the specific research questions, hypotheses and disciplines (Blessing and Chakrabarti 2009).

One distinctive feature of DRM is its aim to not only understand, but also improve the design of a particular product, service or system. However, DRM should still follow a certain flow. Blessing and Chakrabarti’s (2009) suggested methodology for Design Research is composed of four distinctive stages: Research Clarification (RC), Descriptive Study I (DSI), Prescriptive Study (PS) and Descriptive Study II (DSII).

![Figure 3.1. DRM Framework, Blessing and Chakrabarti 2009](image)

In the RC phase, the goal is to find evidence that supports the assumptions of the researchers in order to craft a realistic and worthwhile research goal. An understanding of the current reality and vision of success are outlined from this evidence (Blessing and Chakrabarti 2009).

In the DS I phase, researchers already have a clear goal and focus, but look to describe the current situation in more detail, leading to a refined understanding of the design success (Blessing and Chakrabarti 2009).

In the PS phase, researchers draw on this detailed understanding to elaborate the description of the vision of success. They then seek the most effective tools, concepts or methodologies to develop the improved design of the product, service, or system, and implement them in order to create an Impact Model (Blessing and Chakrabarti 2009).

Finally, in the secondary descriptive phase - DS II - researchers aim to understand the efficacy of the implemented support (Blessing and Chakrabarti 2009). This phase fell out of the scope of our thesis due to time constraints.

In the following chapters, the specific methods used for each phase of our research will be described, followed by the results and discussion of that phase.
4 Phase I - Research Clarification

4.1 Methods

In this phase “researchers try to find some evidence…that support their assumptions in order to formulate a realistic and worthwhile research goal” (Blessing and Chakrabarti 2009, 15). This phase gave the scope to our research, through the clarification of our questions and goals. We conducted a preliminary literature review and mapped the current reality of U.Lab using a Five Level Framework (5LF) as well as began to ask ‘how might we…’ contribute to moving society towards sustainability. This process allowed us to define our research questions.

At this point in our research, we felt confident in making the assumption that U.Lab could be supplemented by SSD concepts in order to provoke transformations that necessarily moved society towards a sustainable future. Acknowledging that these assumptions would need validating, we decided to implement an FSSD analysis and a questionnaire into the DSI phase. The deliverables at this phase were: A 5LF analysis of U.Lab, our three research questions and preliminary success criteria for our Impact Model.

4.1.1 5LF Current Reality Analysis of U.Lab

According to Blessing and Chakrabarti, an initial model serves to identify the goals of the research, formulate research questions and criteria, and clarify the current reality. The 5LF is a planning tool particularly suited for complexity that allows practitioners “to be deliberate and thoughtful in [the] journey toward sustainability” (The Natural Step Canada 2016).

4.2 Results and Validity

The results of the Research Clarification phase have made up the previous chapters in introducing our research, outlining the conceptual framework, developing our research questions, and choosing our research methodology. As such – and though a little anti-intuitive – the results of our research clarification are presented antecedently.

As U.Lab is such a new concept, we were met with a lack of secondary and peer-reviewed literature, necessitating the incorporation of empirical data (as outlined in Chapter 6) in order to fully comprehend the factors relevant to the improvement of the situation (Blessing and Chakrabarti 2009). Furthermore, the nature of U.Lab being an online platform meant that we had to rely on the web content provided for our review and analysis of U.Lab itself.

4.3 Success Criteria

The success criteria for our Impact Model (described in the Prescriptive Study phase) were derived from the SSD concepts that appear at the System, Success and Strategic levels of the FSSD. They include Systems Thinking, the Sustainability Challenge, a clear, unifying definition of sustainability, boundary principles, a process for achieving a vision of success and backcasting.
5 Phase II – Descriptive Study

In this chapter, we endeavour to answer the first of our research sub-questions: What concepts are lacking in the current U.Lab that would ensure that it strategically moves society towards sustainable development?

5.1 Methods

In this phase, “researchers, now having a clear goal and focus, review the literature for more influencing factors to elaborate the initial description of the existing situation. The intention is to make the description detailed enough to determine which factors should be addressed to improve […] as effectively and efficiently as possible” (Blessing and Chakrabarti 2009, 16).

At this stage, we performed a further literature review, developed a Reference Model and collected empirical data. This type of comprehensive DSI is necessary when the literature available on the topic is non-existent, insufficient or potentially incorrect (Blessing and Chakrabarti 2009). As U.Lab is such a new concept, we were met with a lack of secondary and peer-reviewed literature, necessitating the incorporation of empirical data in the form of self-completion questionnaires, in order to fully grasp the current reality and the factors relevant for improvement of the situation (Blessing and Chakrabarti 2009).

Finally, we revised our success criteria in order to create the Impact Model (described in the next phase). The deliverables at this phase were: The Reference Model (FSSD analysis), a fully developed questionnaire, coded qualitative and quantitative data, and a second iteration of the success criteria augmented by supporting data from the questionnaire and further literature review to strengthen the context and content.

5.1.1 Reference Model

Models are likenesses or representations of a current reality. They “provide conceptual organisation” and highlight “significant relationships between… concepts or attributes” (Blessing and Chakrabarti 2009, 20). The Reference Model built at this stage is representative of the current situation or reality and serves as the reference for what interventions are to be developed.

Because our Guiding Research Question asks how we might design a U.Lab that necessarily moves society towards sustainability, we used the FSSD, with its inherent SSD concepts, to build the Reference Model. By focusing on the first three levels, we have the opportunity for a greater impact, as the analysis and subsequent interventions at these levels are bigger leverage points than analysis and interventions that might happen at the Actions or Tools levels.

We considered U.Lab, its ideology, strategy and vision, as well as its relationship to the current challenges we face from the perspective of a sustainable society, as defined by the FSSD. This guided us in determining the gaps, or weak spots, of U.Lab regarding sustainable development.

In creating the reference model, we created tags out of the success criteria in order to look for similar concepts within the content and language of U.Lab. As a team, we then analysed the language and filed phrases and meanings under the appropriate SSD concept.
5.1.2 Empirical Data: Self-Administered Questionnaire

In order to validate the assumptions generated by our reference model, a self-administered electronic questionnaire was created. As discussed in the Research Clarification chapter, we narrowed the scope of our research to five thematic concepts, which were drawn from relevant SSD concepts at the Systems, Success and Strategic levels of the FSSD. The questionnaire was designed in order to test the validity of our assumptions about these five thematic concepts.

We circulated the questionnaire electronically among our own, as well as external U.Lab networks, and kept it open for nine days, generating 51 results from a diverse group of U.Lab practitioners. Fink (1995) recommends qualitative survey analysis for the exploration of meaning and experiences, and electronic questionnaires are optimal due to their low cost, and the rate and speed typical of responses (Preece 1999; Oppermann 1995; Saris 1991).

The questionnaire was designed with both open- and close-ended questions. Open-ended questions are generally more difficult to code and analyse, because of the categories and codes that have to be organised. However, they allow the respondent to express themselves with greater accuracy and in greater detail and also without being forced to put their responses into a category (Fink 1995). This expression was important in our research because of the complexity of the concepts and the diversity of individual understanding of sustainability.

Because the administration of the questionnaire was unsupervised, it was designed to be self-explanatory, and an open channel for clarification and further information was made available, as suggested by Fink (1995). An advantage of unsupervised self-administered questionnaires is that the user experience is consistent among participants. Furthermore, there is the potential for a wider, and therefore more representative, sampling (Fink 1995). However, the fact that the questionnaire was self-administered meant that we had no control over who participated, and therefore questions needed to be clear and any context needed to be implicit (Fink 1995).

The authors designed the questionnaire with the aid of a user-friendly software, SurveyMonkey™, after ‘conscious consideration’ of what might motivate participants to fill it out (Dillman 1999). Furthermore, we created a short video with information about the research. The circulation process was designed to include multiple mail-outs and reminders (Dillman 2000), and the authors also extensively mapped out a number of channels and hubs.

Ultimately, self-administered electronic questionnaires were chosen for empirical data collection because they allowed for a large sample size and geographical diversity. Because of the exponential growth of U.Lab from 1.0 to 2.0, it was important for us to have a sample that reflected the international and emergent nature of the course. As U.Lab advocates for multidisciplinary and vertically diverse participation, as noted by Hassan (2016) as a necessary requirement of all Social Labs, it was important for our research methods to also reflect this reality and to reach out to all - not just the ‘experts’ at MIT. We were able to take advantage of the transformative ‘moment’ in the trajectory of U.Lab, and we believe that participants, therefore, felt more motivated to be involved and that their answers had an impact on the future. A list of the questions asked in the questionnaire can be found in appendix B.
5.1.3 Empirical Data Analysis

We used empirical data to help us understand a given situation or system, but not to predict it. The data collected was used to validate the findings of the Research Clarification phase as well as the Reference Model.

Quantitative Data: In order to analyse the closed questions, we used an ordinal scale, which includes qualitative properties that can be ranked, but cannot be analysed in relation to one another as the intervals between them are not known or equal (Blessing and Chakrabarti 2009). The results, therefore, are presented as percentages and numbers of participants. This provided us with a starting set of data and an initial understanding of U.Lab participants’ thinking. We then compared the relevant qualitative data to the quantitative data to ensure that respondents had correctly understood the questions. The raw quantitative data can be seen in appendix C.

Qualitative Data: In order to analyse the qualitative data collected in the open-ended questions of the questionnaire, we used a method of analysis called coding. Codes, as defined by Blessing and Chakrabarti, are “categories, usually derived from research questions, hypotheses, key concepts or important themes” (2009, 117). For our purposes, we mostly used a form of pre-defined coding, popular in more theory-driven studies, where the codes are developed along with the questionnaire, and before participants have responded (Blessing and Chakrabarti 2009). We did, however, develop a few post-defined codes based around themes that emerged as we analysed the data.

In developing our coding process for the open-ended questions, we created tag words that indicated abbreviated mutually exclusive concepts, correlating to each open-ended question. The codes and tags we developed can be seen in appendix D.

Once the data had been encoded and organised, we were able to interpret the results. Because our aim with the questionnaire was to validate our prior assumptions, we employed strategic coding that mainly looked for pre-defined concepts, patterns and themes while not necessarily highlighting concepts or themes different from our pre-defined codes. This also made for basic interpretation of results (Blessing and Chakrabarti 2009). Some post-defined tags were created for questions where the data suggested a greater dispersal of responses or misunderstanding.

5.2 Validity

Reference Model: In the building of the Reference Model, we used the first three levels of the FSSD. As the authors are all studying for a Masters in Strategic Leadership towards Sustainability, we acknowledge that it serves our interests to advocate for the use of the FSSD. However, we tried to counteract this inherent bias with the dissemination of the questionnaire to stakeholders who are not also practitioners of the FSSD to incorporate other perspectives.

Questionnaire: The goal of the questionnaire was to ascertain the knowledge of sustainability concepts conveyed by U.Lab within our target group – U.Lab participants. A further goal was to validate the assumptions we developed when building the reference model, and support our literature review. These multiple data sources and research methods helped to ensure consistency and also highlighted parallel, or complementary, points for analysis (Blessing and Chakrabarti 2009; Patton 1999).
We employed non-probability sampling, an approach that does “not guarantee that all eligible units have an equal chance of being included in a sample” (Fink 1995, 32). As the data was to be used in evaluation and design, as opposed to advocacy, non-probability sampling was appropriate and convenient relative to our time constraints (Fink 1995).

Validity is “the degree to which the measurements actually reflect the true variation in the outcome of interest” (Blessing and Chakrabarti 2009, 124). While we acknowledge that the number of responses cannot be considered as representational of the entire U.Lab community, we consider the geographical diversity and anonymity of respondents, as well as the method of circulation important factors in determining the validity, or the “best available approximation to the truth” of our previous assumptions (Blessing and Chakrabarti 2009, 125).

**Empirical Data Analysis:** In order to ensure inter-encoder reliability, we employed a process called double-coding, which “involves coding of at least a part of the data by two different people or the same person twice but with a time delay in between” (Blessing and Chakrabarti 2009, 120). Two researchers from our team thus coded each question, to ensure a higher degree of inter-encoder reliability. Disagreements on coding responses were then resolved in group dialogic process (Blessing and Chakrabarti 2009).

Acknowledging that our interpretation method also opened us to a potential for bias, we made ourselves aware of what Miles and Huberman (1994) call archetypal forms of bias, including:

- the holistic fallacy: interpreting events as more patterned and congruent than they really are;
- elite bias; over-weighting data from articulate, well-informed, usually high-status informants;
- going native: losing one’s perspective and being co-opted into the perceptions and explanations of local informants (Blessing and Chakrabarti 2009, 123).

### 5.3 Results - Reference Model

In building the Reference Model, we analysed U.Lab through the lens of the FSSD, in order to ascertain the overlaps in the theory of U.Lab where sustainability is concerned. We then did a comparative analysis of the reference model with the 5LF analysis of the current reality of U.Lab as presented in Chapter 2 to ascertain the potential gaps regarding sustainability. These gaps are presented below, divided by the established success criteria.

#### 5.3.1 Systems Thinking

U.Lab uses an Iceberg Model in order to explain the systemic nature of the current reality. Immediately below the water line, Scharmer outlines the structural (or systemic) disconnects that give rise to the visible difficulties we are experiencing above the water line in the world today. Below those structures, Scharmer identifies current paradigms of thought, stating that what most influences these structures is “our quality of economic thought. Thinking creates the world. The result of any social and economic system is a function of the quality of awareness and the quality of thinking of the participants, of the members, in that system”. Below the level of paradigms of thought, lies the source of our creativity, what allows us to “connect, access, and activate our deeper sources of knowing, of creativity, and of self” (MITx 2015, course material).
The Iceberg Model exemplifies fairly well the interconnected and systemic nature of the challenges that society is facing, therefore providing an inherent understanding of systems thinking to participants. What wasn’t clear was how well this concept was communicated, and how much of a Systems Thinking perspective participants took away from the course.

Here, in the downloading phase, we “begin to see the system as a constellation of variables” (MITx 2015, course video) that includes us. We can understand the ways in which we contribute to the Sustainability Challenge, “but also, to the solutions that we could create tomorrow” (MITx 2015, course video). This shift in mind-set is essential to change at any level, and central to the purpose of U.Lab.

Additionally, Scharmer notes that in order to let come the future that wants to emerge from a given system we need to “[c]reate collective sensing mechanisms that make the system see itself” (MITx 2015, course video), which implies a systems perspective in the intention of a self-reflective system. These sensing mechanisms, however, remain undefined and unexplained.

5.3.2 The Sustainability Challenge

U.Lab recognises different aspects of the Sustainability Challenge as externalities of the current economic system. By addressing our current paradigms of economic thought which, Scharmer argues, parallel our paradigms of thought more generally, we will begin to learn from the emerging future that we all want (MITx 2015).

Although the language differs, many aspects of the Sustainability Challenge are introduced in U.Lab. Furthermore, the urgency of the situation is implicit throughout the course content and language, though perhaps not concisely stated, as with the funnel paradigm. As Otto Scharmer
states in a video from the first week of U.Lab, the challenges posed by the three divides are environmental destruction, resource scarcity, falling water tables, climate change, soil erosion, etc. We are running an economic system that makes use of one and a half times the amount of resources that the Earth can replenish. Scharmer affirms, “So that's the big problem here and it's not going to go away. It's going to get worse and we need something to do about that” (MITx 2015, course video).

Of the social challenges we are facing - the inequality, polarisation and violence - Scharmer says: “we live on a very thin and fragile layer of order that could break up any moment, and, in fact, is breaking up at an increasing rate both in the Global South and in the Global North” (MITx 2015, course video).

In order to justify the spiritual, or ‘Self’ divide that he sees, Scharmer offers current mental health trends and suicide rates, observing that “In 2010, worldwide, more people killed themself (sic.) in suicide than were being killed through war, murder, and natural disasters combined” (MITx 2015, course video).

Therefore, the urgency of the challenges we are facing is communicated in U.Lab. However, Scharmer often uses unclear and unspecific language. For example, he speaks of the current model of economic thinking, stating that “today, very visibly, that model is starting to hit the wall…because it cannot deal effectively with global externalities” (MITx 2015, course video). While this type of statement addresses the urgency of the 3.0 economy, which is linked to other issues that we understand as constituting the Sustainability Challenge in an effective way, we wonder if it fails to convey a clear understanding of the urgency of the Sustainability Challenge, as can be found in the funnel paradigm. As argued by Robèrt and Broman, the funnel metaphor helps to understand “the full scope of the sustainability challenge” (2015, 3).

5.3.3 A clear, singular and unifying definition of sustainability

Robèrt and Broman (2015) recognise that a single definition of sustainability can be contentious in that it might feel prescriptive and exclusionary of, in Scharmer’s words, the future that wants to emerge (Scharmer and Kaeufer 2013). However, they contend that by providing a principled definition of sustainability, framed as a set of boundary conditions, or things not to do, these concerns are addressed, as “there are many possible sustainable societies (all complying with basic sustainability principles) and there are many routes to sustainability” (Robèrt and Broman 2015, 11). This actually grants users of this approach to sustainable development more flexibility and freedom when it comes to making choices about one route to take over another.

U.Lab talks about sustainability, and the inherent sustainability of Society 4.0, but doesn’t provide this unified and scientific definition of sustainability, thereby making it “difficult to know whether any given scenario is truly sustainable or not [as] it is not framed by and assessed against a principled definition of sustainability” (Robèrt and Broman 2015, 3).

Further conditions for success for U.Lab can be understood as: connecting to intention, and being willing to operate as an instrument, aligning with and actualising that intention, practicing the U process, practicing listening with an open mind and heart, following your heart, being in constant dialogue with the universe, cultivating a supportive holding space for your journey, balancing your thinking or talking with action, and practicing being fully present and sensing into the current reality without jumping to react (MITx 2015).
5.3.4 Boundary Conditions for sustainable development

The eight acupuncture points are not necessary, sufficient, general, concrete, and non-overlapping in the same way that the Sustainability Principles are, though they are presented as leverage points we need to address in order to reach Society 4.0, and therefore do provide some kind of boundary conditions. Where the FSSD provides “necessary, but not more” (Robèrt and Broman 2015, 3) principles – i.e. that they are essential for sustainable development, but do not impose detailed or overly restrictive guidelines, U.Lab presents a fairly prescriptive vision of success for a ‘sustainable society’ - Society 4.0.

The Sustainability Principles as detailed in the FSSD are still sufficient, however, in that they offer a trajectory towards sustainable development without any big gaps. Scharmer’s Society 4.0, on the other hand, is missing myriad key criteria that are indeed necessary in order to establish a sustainable society. For example, the ecological Sustainability Principles are not addressed within U.Lab. The Ecological Divide indeed speaks of the de-commodification of Nature, a shift to biomimicry processes such as zero-waste systems, the use of renewable energy, the rise in sustainable agricultural movements, respect and protection of our common natural resources and reduced consumption, but provides no boundary conditions that would guide our behaviour in making those things happen.

Another benefit of the Sustainability Principles is that they are general. They are conceived from scientifically agreed-upon conditions for sustainability and presented in a way that is accessible to allow for “cross-disciplinary and cross-sector collaboration” (Robèrt and Broman 2015, 3). Furthermore, they are applicable at any scale. The description of Society 4.0 is not based on scientifically-backed theory and the language used is not accessible to diverse audiences. Additionally, U.Lab uses different, not necessarily synonymous terms to refer to the same concepts within the course, e.g. financial and capital, and income and labour.

Perhaps the most marked difference we saw between the Sustainability Principles and the acupuncture points of Society 4.0 demonstrates the lack of concrete steps to “guide problem-solving and innovation” (Robèrt and Broman 2015, 3). Within each acupuncture point, Scharmer details the historical context – how society has progressed from what he calls ‘Society 0.0’, based on communal assets and good, through ‘Society 1.0’, or state-centric mercantilism, ‘Society 2.0’, evidenced by free markets, to ‘Society 3.0’, which is our current reality of stakeholder capitalism. This context makes clear the trajectory we have taken and the pitfalls of the past but, apart from learning from past mistakes, Scharmer’s vision of ‘Society 4.0’ offers no clear step-by-step approaches to take in order to redesign our current paradigms. In this way, U Lab’s vision of success is very much determined by forecasting from our past experiences, current reality and established mental models. While Society 4.0 offers some tangible examples of systems, processes or movements, the guidelines that U.Lab provides in order to supposedly move us towards this vision are vague.

Finally, the Sustainability Principles provide a set of non-overlapping boundaries, where the acupuncture points of Society 4.0 tend to be far more interwoven. This is evidenced by the discussion of the same movements under multiple acupuncture points and the interrelated nature of the eight acupuncture points as they fall under the three divides. For example, in order to reach the vision of success for the ownership acupuncture point – the redesign of (individual) property rights as commons-based property rights, we would also be dependent on achieving the vision of success of leadership – working for the respect and protection of the commons – as well as the vision of success of the nature acupuncture point – the shifting of our understanding of nature from a commodity to a common resource. While this approach can be
considered holistic and can aid participants to view the Sustainability Challenge as systemic and complex, non-overlapping boundary conditions make it much easier to abide by to them.

This set of “first-order sustainability principles, as exclusion criteria for redesign” (Robèrt and Broman 2015, 7), is in contrast to Society 4.0, which is presented in the affirmative as both the vision of success and the future that is wanting to emerge. Each Sustainability Principle is discussed below in reference to U.Lab’s vision of success (for a detailed description of how each Sustainability Principle interacts with each acupuncture point, see appendix A):

**In a sustainable society, nature is not subject to systematically increasing…**

1. **concentrations of substances from the earth’s crust**

While it is clear that the theory behind U.Lab advocates for the respect and protection of nature, the focus of our technological advancements and innovation efforts to be directed towards society’s most pressing issues, a reduction in our consumption practices and the design of new economic paradigm that facilitate all this, Scharmer and U.Lab provide no clear examples or guidelines for what this means. What U.Lab instead relies on, is the respect and protection of the commons, or society’s most pressing issues are universally understood to mean the same thing – are normative. This is a potentially dangerous assumption. For example, SP 1 does not contend that any extraction of heavy metals from the Earth’s crust is non-compliant with sustainable development, only that our actions must not contribute to the systematic increase in concentrations of those heavy metals. The vision of Society 4.0 under the ‘Nature’ acupuncture point – as with all acupuncture points – is at once prescriptive and completely without strategic guidelines for its realisation.

2. **concentrations of substances produced by society, and**

Robèrt and Broman advocate for “conscious molecular design, limited production and safeguarding so that concentrations of societally produced molecules and nuclides do not increase systematically in the atmosphere, the oceans, the soil” (2015, 7). In reference to this principle, we found that U.Lab advocates for biomimicry and the use of solar energy, citing the benefits of closed-loop design, for the continued knowledge transfer and encouragement of innovation, and the revolutionary roles of leadership and commons-based property rights. When it comes to the prototyping phase of U.Lab, the advice offered to participants is simply to connect ‘horizontally’ and to listen to the feedback the Universe is offering (MITx 2015).

Highlighting universal feedback and a connection to deeper knowledge as leverage points is useful, powerful, and a benefit of U.Lab, but as it is not a strategic planning tool, the focus on how we might move towards the vision of success is largely lost. Perhaps then, we see a disconnect in the intention of the course, and what it actually provides. For example, Society 4.0 and the historical context, etc. provide a good foundational understanding of the transformational nature of economic paradigms, but perhaps the shift in the individual leadership capacity is all that U.Lab should seek to do.

3. **degradation by physical means.**

Again, here the themes of commons-based property rights, of leadership that serves to foster respect for, and protect, nature, and the reduction of global consumption patterns will support adherence to Sustainability Principle 3. The specificity of language that the FSSD language provides, however, is not matched by the language of U.Lab.
In a sustainable society, people are not subject to social conditions that systematically hinder...

4. ...their health,

A universal basic income and free healthcare would play into people’s “ability to avoid injury and illness” (Robèrt and Broman 2015, 7) by providing them with means to take care of themselves. Less obvious support is presented in the forms of more conscious consumer movements, and economic and governance paradigms that work for, and are accountable to, the good of the whole. The innate respect for the natural world that is built into Society 4.0 would also translate onto individuals in society.

5. ...their influence,

U.Lab does speak to the idea that everyone in Society 4.0 should be able to exert influence when it speaks of our great ability and potential to redesign the current economic, political and social paradigms (Scharmer 2002). This is perhaps where we see the most overlap between the acupuncture points of U.Lab’s vision of success and the Sustainability Principles as defined by the FSSD. Indeed, U.Lab is based on the belief of the power of the individual to transform the social systems they are a part of. In essence, U.Lab believes that actually in order to change the social systems we are a part of, personal transformation is a necessary pre-condition.

While U.Lab wasn’t built with the transition to a sustainable society in mind, this overlap demonstrates well why the authors see the potential of the course to help move society towards sustainability with the help of a few additional SSD concepts. These concepts would clarify integral ideas such as the Sustainability Challenge, and boundary conditions for strategic advancement towards a vision of success that includes a principled definition of sustainability. We know the potential for U.Lab to provide a much-needed focus on the personal, experiential journey, on the transformation of the ‘inner quality of the leader’ in order that it reflect the change we wish to see emerge. Indeed, this powerful, facilitated experience is already making waves among the community of practitioners, and we see the potential to take it to the next level in order that the prototyping, understanding and propagation that comes out of the course necessarily moves society towards sustainability.

6. ...their competence,

Sustainability Principle 6, where people “are not systematically hindered from learning and developing competence individually and together” (Robèrt and Broman 2015, 7) is also strongly reflected in the structure of U.Lab. In the language of U.Lab, in Society 4.0, labour is the act of ‘co-sensing and co-creating the future’ (Scharmer 2002), the role of the economy is to “relink the creation of money with entrepreneurial intention in our communities” (Scharmer and Kaeufer 2013, 97), and leadership, governance and technology all serve to encourage, distribute and facilitate the capacity of all to grow, learn and create a collective vision of success.

7. ...their impartiality, and

The ideas of fairness and equity are built into all acupuncture points at the level of Society 4.0. These roots of strong social fabric are recognised in both U.Lab and the FSSD. Interestingly, Scharmer contends that a misuse and misunderstanding of our common resources and our ideas about individual property are at the heart of all three divides – or crises – ecological, social and
spiritual/cultural. This misconstruction of our collective mental models has led to an economic paradigm that reflects this disconnect, and only perpetuates the disconnects of the eight acupuncture points, as discussed in Chapter 2. Across all three divides and all the way down to each acupuncture point, Scharmer describes the implicit need for a more balanced distribution of power, access, and production.

8. ...meaning-making.

The idea that people are not subject to the “suppression of cultural expression or obstacles to co-creation of purposeful conditions” (Robèrt and Broman 2015, 7) is also a central tenet to U.Lab, though perhaps not as evident as the elements of competence or impartiality. Perhaps most notable is the inclusion of “fairness, inclusiveness, transparency, and effectiveness” (Scharmer and Kaeufer 2013, 98) into what should constitute the economy in Society 4.0, demonstrating the absolute reversal of the way we interpret the economic realm and what we include in the spiritual, meaning-making realm. By providing means so that people can meet their basic needs, citizens are freed up to engage in work that is fuelled by passion, and spurs shifts in the role of leadership and ownership to encourage collective meaning-making.

5.3.5 A vision of success and Backcasting

As a method for effecting change, U.Lab communicates Society 4.0 as a unified vision of success, teaches people the U framework, and sparks initiatives that learn from the emerging future. The purpose of U.Lab, then, is to ask, “[h]ow can we build the capacity to sense and actualize a future that we feel is possible, that we know is possible, but that isn’t quite there yet?” (MITx 2015, course material). U.Lab seeks to take participants on a journey, to allow them to connect with other change-makers around the globe, to meet and be inspired by leaders who “already pioneer new ways of working, living, and creating” (MITx 2015, course video).

“We see that the emerging 21st-century model of higher education is an inversion of the 20th-century model in that it places the learner in the driver’s seat of personal, relational, and institutional renewal. The challenge of this approach is to spark inspiration in “the driver” (the learner). That spark is the missing aspect of higher education as it exists today. We can activate it by helping learners to tap into their deeper sources of knowing: Who am I? What am I here for? What future do I want to co-create moving forward?” (Scharmer 2015a, para 23).

Within U.Lab, the concept of learning from the future that wants to emerge (MITx 2015) reflects the concept of backcasting, the implication being that one is constantly conceptualising and refining a vision of success. However, U.Lab also posits Society 4.0 as a long-term, or ultimate, envisioned future which, in contrast to “the future that wants to emerge” (Scharmer and Kaeufer, 3) is prescriptive as it is phrased in the affirmative and as the ultimate vision of success for all.
5.4 Results - Empirical Data

5.4.1 Systems Thinking

Data from the questionnaire showed that over 90% of participants feel very much or fairly well enabled to adopt a systems thinking perspective. Additionally, no participants reported that U.Lab discouraged them from adopting a systems thinking perspective. Only one (1) participant was unsure whether U.Lab enabled a systems thinking perspective and 4.65% or two (2) participants said they were only somewhat enabled to adopt a systems thinking perspective because of U.Lab.

5.4.2 The Sustainability Challenge

The quantitative data from the questionnaire showed a perception amongst the participants that U.Lab provides a very good explanation of the ecological, social and spiritual/cultural struggles we, as a society, are facing. This was reinforced by the qualitative data as a majority of participants were able to recall and use the language of U.Lab to describe and discuss these struggles. A great number of respondents used specific terms in their answers. For example, one respondent mentioned concepts such as the “1.5 footprint; Higher suicide rate” and the “1 percent of population owns the wealth the rest of the world” (Questionnaire respondent 17, April 28, 2016). Another was also able to dispatch U.Lab language in naming some ecological and social aspects of the sustainability challenge when they wrote: “We currently consume more far more resources on the planet than can be renewed through natural processes. Socially, we have great divides between the ‘haves’ and ‘have nots’” (Questionnaire respondent 21, April 28, 2016).

Respondent 29 mentioned all three divides when elaborating on what U.Lab communicated as the struggles we are currently facing: “ecological - overusing the earth’s (sic.) resources: climate change; social - growing divide between rich and poor: growing social unrest; spiritual - gap between who we are and want to be: extremely high rates of suicide” (April 29, 2016).

However, the data did demonstrate that the ecological struggles were not so well communicated as the social or spiritual/cultural ones. For example, one participant wrote: “I didn't notice as much exemplified about ecological struggles as I did social and cultural” (Questionnaire respondent 10, April 28, 2016). From another respondent: “don't remember any Ecological struggle but the struggle of communication with others (social) and with ourself (sic) (spiritual)” (Questionnaire respondent 20, April 28, 2016). When analysing the qualitative data, we saw that some participants got lost in the details of specific struggles, and others failed to recall any.

In summary, only 2.33% or one (1) participant said that the U.Lab doesn't explain the ecological struggle at all and 4.65%, or two (2), participants were unsure. 23.26%, or ten (10), participants reported that U.Lab provided a somewhat clear explanation of ecological struggles. 25.58% or eleven (11) participants classified U.Lab's explanation of the ecological

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1 By mutual agreement, the terms of the self-administered questionnaire were that responses would be anonymous. As such, respondents are simply identified by a number.
struggles as fairly good. The majority of the participants, 44.19% or nineteen (19) respondents, felt that the ecological struggles are very well explained in U.Lab.

Secondly, 16.28%, or seven (7) participants, reported that U.Lab provided a somewhat clear explanation of the social struggles we currently face. 32.56%, or fourteen (14), participants classified U.Lab's explanation of social struggles as fairly good. Again, the majority of participants - 51.16% or twenty-two (22) respondents, felt that U.Lab’s explanation of the social struggles is very good. No participants were unsure or reported that U.Lab did not provide an explanation of social struggles.

Finally, no participants said that U.Lab did not explain the spiritual/cultural struggles we are facing at all. 20.93%, or nine (9) participants reported that U.Lab provided a somewhat clear explanation of social struggles. 23.26%, or ten (10), participants classified U.Lab's explanation of social struggles as fairly good. And again, the majority of the participants - 53.49% or twenty-three (23), people affirmed that the explanation about the spiritual/cultural struggles is very good in U.Lab. Only one (1) participant (2.33%) reported that they were unsure.

5.4.3 A clear, singular and unifying definition of sustainability

The majority of respondents (32.96%, or fourteen) indicated that a clear definition of sustainability was provided by U.Lab. A further 13.95% (six (6) people) reported that the definition of sustainability provided by U.Lab is very good. Eleven (11) participants, or 25.58%, said that U.Lab provides a somewhat well-defined concept of sustainability. 12.77% of the participants, or six (6), were unsure whether U.Lab provided a clear definition of sustainability, and 11.63%, or five (5) people, reported that sustainability is not at all well defined.

Even though the majority of participants felt that U.Lab provided a definition of sustainability (from somewhat well defined and clear to very well defined and clear), the open-ended questions demonstrate a diversity of understanding of what concepts were actually included in the definition of sustainability provided by U.Lab. For example, respondent 1 stated that “U-lab (sic) provides a certain kind of definition of social sustainability, but not environmental” (April 28, 2016).

The transition from ego-system to eco-system and the three divides were other themes that participants introduced. Respondent #31 stated that the definition of sustainability provided by U.Lab included the shift “from ego-system to eco-system” (April 30, 2016), which was reinforced by answers from participants 3, #6, 18, 44, 47, and 48. The three divides were referenced by ten (10) participants as contributing to U.Lab’s definition of sustainability.

The qualitative data on the subject of U.Lab’s definition of sustainability might reinforce the approximately 28% of respondents who weren't sure or stated that it was not at all well defined. Five respondents commented that they couldn't remember any sustainability concepts from U.Lab. Respondent 2 wrote: “I don't remember off the top of my head” (April 28, 2016), while respondent #14 commented, “I cannot remember that there were any explicit parts on sustainability” (April 28, 2016). Finally, respondent 6 admitted that sustainability was “Not easy to grasp for me” (April 28, 2016).
5.4.4 Boundary Conditions for sustainable development

The data shows that the majority of participants feel that U.Lab provides (somewhat clear to very clear) guidelines in order to move society towards sustainability. 32.56%, or fourteen (14) people, replied to this question stating that U.Lab provides fairly well defined and clear guidelines. Six (6) participants, or 13.95%, reported that the guidelines provided were very well defined and clear. 11.63%, or five (5) participants, reported that the guidelines for moving society towards sustainability provided by U.Lab were not at all clear. 25.58%, or eleven (11) participants, classified U.Lab’s provision of guidelines as somewhat well defined and clear. Seven (7) participants, or 16.28%, were unsure.

The qualitative data provided us with an understanding of what respondents understand as boundary conditions, or guidelines. One respondent wrote that “U.Lab provides the attitude and awareness guideline needed to move towards sustainability. When we live from open heart, open mind and open will, mankind will take decisions and actions based on responsibility and care. Which will create completely different outcomes!” (Questionnaire respondent 35, May 1, 2016).

Respondent 28 affirms this individual intention of the guidelines provided, while noting that guidelines for action don’t exist: “Through all the course, U Lab is stressing the need for deep listening, listening to all the stakeholders, I think this is the main guideline to sustainability. And earth is a "stakeholder", society, ... U.Lab makes also clear that you need to feel a deep inner coherence, for me this leads to clear choices that affect sustainability. When I think of it, I see more "guidelines" to alter an inner state of being than guidelines for our actions” (April 29, 2016).

Finally, qualitative data from questions about boundary conditions surfaced a disagreement with the fact that U.Lab should attempt to provide clear guidelines. One respondent wrote: “I don’t think it is the purpose of U-Lab to give 'clear guidelines' on what to do or not. Its (sic.) aim is bigger and wider than that. It offers support in the 3 dimensions you named before, and offers enough of support (online and offline) so that people start to do their own thing, their own action, start playing with prototypes” (Questionnaire respondent 5, April 28, 2016).

5.4.5 A vision of success and Backcasting

Respondents were asked if the vision of Society 4.0 influenced how they approached the prototyping phase, with 43.90%, or eighteen (18) participants, confirming that it impacted them to some extent. 24.39% of the participants, or ten (10) people, noted that it impacted their behaviour to a great extent when prototyping. 9.76% or four (4) participants reported that the vision of society 4.0 impacted their prototyping to a little extent, whilst 4.88% or two (2) participants stated that their prototype wasn’t impacted. Seven (7) participants (17.07%) were unsure to what extent the vision of Society 4.0 impacted their prototype.

On being asked to provide an example of when the vision of Society 4.0 impacted their prototype, various participants cited that one guideline offered by U.Lab was to follow their hearts: “Following my heart to start a project which potentially could create value to a lot of people's lives” (Questionnaire respondent 35, May 1, 2016), and “addressing the people's heart” (Questionnaire respondent 26, April 29, 2016), were two such responses.
5.5 Discussion of Results

As with the results above, we have developed our discussion around the five thematic concepts identified in the Research Clarification phase. We discuss the results from the Reference Model and the empirical data together.

5.5.1 Systems Thinking

Ultimately, we see U.Lab as a platform for connecting people with their deepest sources of creativity, in order to begin to act from this source to generate a change in the paradigms of thought, structures and systems that fuel the symptoms of disorder we see in the world today. According to U.Lab, “it's not enough today to react against the symptoms that we see. And it's not enough to redesign some of these structural issues…But what we need to do in addition is…address the deeper evolution of paradigms of economic thought…And that we begin to use a social technology for change that allows us, in complex stakeholder groups together, to go through this journey and to access our deeper sources of creativity” (MITx 2015, course video).

Our reference model suggested that the Iceberg Model was a good representation of systems thinking, we were unsure whether a truly systemic perspective was communicated to participants of the course if they had no prior understanding of the theory. The results of our empirical data confirmed that participants do feel as if the systemic nature of the challenges we face is conveyed clearly, evidenced by the whopping 60% of the participants who affirm that it is very well defined and the 33% of participants who believe it is fairly well defined.

As described in the reference model, the three divides connect the ecological, social and personal challenges, while the iceberg model connects the symptoms of visible challenges, such as the Sustainability Challenge, with the underlying “structures, paradigms of thought, and sources that are responsible for creating them” (MITx 2015, course video).

Respondents confirm that the challenges that U.Lab seeks to address are explained in terms of systems thinking. For example, respondent 8 wrote: “disconnection of thinking resulting in failure of decision regarding ecological and social problems, systems thinking” (April 28, 2016), in response to being asked about the challenges presented by U.Lab.

We believe that the systems thinking approach is well understood by participants because of concepts such as the iceberg model, the three divides and the eight acupuncture points, which communicate a holistic – or systemic - approach.

In the light of these findings, we concluded that the current design of U.Lab does communicate clearly a systems thinking perspective. Therefore, we saw no need to complement the design of U.Lab with systems thinking concepts from SSD. From a system thinking perspective, U.Lab is a good tool for addressing the Sustainability Challenge.

5.5.2 The Sustainability Challenge

As demonstrated by our quantitative analysis, the perception amongst participants of U.Lab is that it provided a good explanation of the ecological, social and spiritual/cultural struggles that our society is facing today. Furthermore, the ecological, social and spiritual/self issues were
generally very well explained by the majority of the respondents when asked to provide an example of the ecological, social and spiritual/cultural struggles that U.Lab highlights.

Several respondents pointed to the ecological struggle by referencing an example from the course - that we, as a society, are currently generating an ecological footprint of 1.5 planets. Highlighting the social struggles, or disconnect between self and other, one respondent gave the example (also from the course) that the top 1% of the wealthiest people are richer than the entire bottom 90%. Finally, regarding spiritual/cultural struggles, a respondent highlighted an example Scharmer gives about the rapidly growing instances of burnout and depression, which exemplify the growing gap between our actions and who we really are.

Therefore, we determined that the ecological, social and spiritual struggle we are facing are understood by participants of U.Lab. Furthermore, a great number of respondents used the specific content, context and language provided by the course in their answers. For example, respondent 21 concisely summarised the ecological and social aspects of the Sustainability Challenge listed above, in replying: “We currently consume more far more resources on the planet than can be renewed through natural processes. Socially, we have great divides between the ‘haves’ and ‘have nots’” (April 28, 2016).

Another participant mentioned all three divides: “ecological - overusing the earth resources: climate change; social - growing divide between rich and poor: growing social unrest; spiritual - gap between who we are and want to be: extremely high rates of suicide” (Questionnaire respondent 29, April 29, 2016). These clear and comparatively detailed responses to the question, can you provide an example of an ecological, social, and/or spiritual/cultural struggle that U.Lab highlights demonstrate that the examples and language that U.Lab uses to convey the Sustainability Challenge are effective.

However, some respondents get lost in the details of specific sustainability challenges. For instance, respondent 5 says “... there are many examples that are shared in the course; and as I am a 'big picture' person, there is not one that I remember to be mentioned…” (April 28, 2016).

Furthermore, a number of respondents found it more difficult to connect with the ecological struggles. For example, participant number 10 said, “I didn't notice as much exemplified about ecological struggles as I did social and cultural” (April 28, 2016). Another participant wrote, “don't remember any Ecological struggle but the struggle of communication with others (social) and with ourself (sic.) (spiritual)” (Questionnaire respondent 23, April 28, 2016).

While participants tend to agree on having a good grasp of the Sustainability Challenge, the urgency of our current situation and the need to take action in order to avoid increasing environmental, social and spiritual devastation is perhaps not so clearly communicated. Even though we prefaced asking for an example of an ecological, social or spiritual struggle that U.Lab highlights with an explanation of the Sustainability Challenge that included the pressure to solve the issues quickly due to increasing inequalities and scarcity of resources, no respondents spoke of urgency, pressure or a timeframe of any sort. Only one respondent hinted at pace when they wrote that there was “too little focus on the necessity of the individual aspect of letting go of the system...This shift on an individual level could speed up the collective...” (Questionnaire respondent 29, April 29, 2016).

Our analysis of the quantitative and qualitative data mirrors the findings of our reference model which suggested that, while the Sustainability Challenge is communicated well, the urgency
of our current situation is not. We see a need, therefore, to include supplementary concepts from SSD about the urgency of the Sustainability Challenge in our impact model.

5.5.3 A clear, singular and unifying definition of sustainability

While our reference model gave us no clear, singular or unifying definition of sustainability, the inherent sustainability of Society 4.0 is implied throughout the course. We asked respondents: Do you believe U.Lab provides a clear definition of sustainability? This question deserves a more in-depth analysis as the results have the shape of a bell curve. On the one hand, one-third of respondents (31.91%) said that the concept of sustainability was fairly well defined. On the other hand, approximately 23% weren't sure or stated that it was not at all well defined. 19% felt that sustainability was very well defined and 25% felt that it was somewhat well defined.

The "bell" dispersion on the graph and the significant number of respondents who answered ‘unsure’ could imply that indeed U.Lab does not provide a clear, singular definition of sustainability. We might assume that those respondents who felt that U.Lab did provide a clear definition, came to U.Lab with some prior knowledge of sustainability issues and therefore could interpret the language and examples as being more comprehensive or clear than they actually were. Or, we might assume that those same respondents have a relatively shallow understanding of sustainability issues and that the knowledge communicated then seemed clear in comparison to a prior lack of understanding.

We complemented our closed question about sustainability with an open-ended question in order to test respondents understanding – both of the question, as well as of the concepts we were inquiring about. We asked: What concepts are included U.Lab's definition of sustainability? The diversity of answers of the open-ended question relating to the definition of sustainability presented by U.Lab illustrates our conclusion that a clear, singular definition is not communicated by U.Lab.

There were a significant number of participants who couldn't remember any of the concepts included in the U.Lab definition of sustainability. For example, participant 14 wrote, “I cannot remember that there were any explicit parts on sustainability” (April 28, 2016).

The complexity and detail of the Iceberg Model and eight acupuncture points, which U.Lab uses to explain the current ecological, social and spiritual struggles we are facing (or what we would refer to as the Sustainability Challenge) might be a factor hindering participants’ understanding. For instance, participant 6 said that U.Lab’s definition of sustainability was “Not easy to grasp for me” (April 28, 2016). We also noticed some confusion of the concepts by some participants. For example, one participant wrote of “the three and 8 divides” (Questionnaire respondent 44, May 4, 2016).

It is possible that, due to the complexity of the concepts, participants may have been overwhelmed and took a reductionist approach to the course, memorising language, but not understanding concepts fully. We noted that a number of participants only mentioned “ego to eco” (Questionnaire respondents 5, 17, 18, April 28, 2016), or “ego-system to eco-system” (Questionnaire respondent 28, April 29, 2016) in their responses. However, we also must acknowledge that U.Lab 2.0 (the last U.Lab) ended over 6 months ago, which could also be the reason for confusion or misunderstanding.
Interestingly, the awareness and consciousness of the individual as a requirement for sustainability was mentioned in some responses, which is generally outside the realm of the FSSD definition of sustainability, though a main tenet of U.Lab as a course. Participant 27, for example, stated that “the quality of individual and group action is proportional to the level of awareness, the more actions are conscious and incorporate the views of all stakeholders are more sustainable” (April 29, 2016).

Hearteningly, at the system level, U.Lab and SSD concepts seem not only complementary but comparable. We feel that the SSD concepts that we introduce into the Impact Model in the next chapter only help to add clarity to the issues and challenges that U.Lab introduces. In this way, we see the immense potential for SSD concepts to strengthen U.Lab in its redesign for sustainability.

5.5.4 Boundary Conditions for sustainable development

U.Lab is a highly transformational course, and participants (we can assume) are often motivated by altruism. This is potentially a hefty criticism of U.Lab as it would follow that participants feel as if they are ‘doing the right thing’, as it comes from a space of inspired motivation, but without clear boundary conditions, participants could create prototypes, actions and scenarios that are inherently unsustainable – even contributing to ecological, social or spiritual devastation.

The findings from our reference model and empirical research clearly demonstrate the value in accessing sources of inspiration and creativity, but our research and knowledge of the FSSD would suggest that this connection to a deeper source is not enough to guide sustainable development. The guiding provided by U.Lab cannot guarantee that any prototype or action necessarily moves society towards sustainability.

Our quantitative data showed that social and spiritual sustainability are considered to a great extent in the prototyping phase for the majority of the participants. Ecological sustainability was considered to a great extent by fewer participants. In the prototyping phase, there isn’t a focus on conceptual learning, which is perhaps why it isn’t top of mind for participants. Instead, prototyping is more of an emergent process, and the advice is to “seek with your hands, don't think about it, feel it” (MITx 2015, course video).

One pattern that we saw in the qualitative data was that people interpreted the quality of relationships with others and with oneself as being the guidelines offered by U.Lab, as emphasized by a respondent when they wrote: “I remember only guidelines directed to the transition of oneself, finding your own Self” (Questionnaire respondent 8, April 28, 2016), or another who emphasized that the current design of U.Lab promotes guidelines intended “to alter an inner state of being than guidelines for our actions” (Questionnaire respondent 31, April 30, 2016). Tools such as ‘deep listening’ and ‘coaching circles’ are offered by respondents as examples of processes to hone the necessary guidelines.

For example, participant 35 states that “Ulab (sic) provides the attitude and awareness guideline needed to move towards sustainability. When we live from open heart, open mind and open will, mankind will take (sic) decisions and actions based on responsibility and care. Which will create completely different outcomes!” (May 1, 2016). It does not necessarily follow, however, that the outcomes created, if not generated inside clear sustainable boundaries, will necessarily move society towards a sustainable future.
Another perception from several respondents was that the U process/the course in itself provided the necessary guidelines. For example: “I would say that the whole theory/method could be viewed as a guideline. From "observe, observe, observe" taking you down the U. The "retreat and reflect" in the bottom of the U and "act in an instance" on the way up again. And in that framework there are guidelines concerning (sic) each of the steps, for example the importance to have a contemplative practice etc. Or when you move up the right side of the U, that you keep the connection with the source, form a core team, make 0.8 iterations to get feedback etc.” (Questionnaire respondent 51, May 6, 2016). Another participant commented: “Through all the course, U.Lab is stressing the need for deep listening, listening to all the stakeholders, I think this is the main guideline to sustainability... U.Lab makes also clear that you need to feel a deep inner coherence, for me this leads to clear choices that affect sustainability” (Questionnaire respondent 31, April 30, 2016).

The qualitative data also clearly conveyed that participants don’t see clear guidelines as necessary in U.Lab as the course is all about prototyping and iterating. For example, participant 5 stated, “I don't think it is the purpose of U-Lab to give 'clear guidelines' on what to do or not. Its aim is bigger and wider than that. It offers support in the 3 dimensions you named before, and offers enough of support (online and offline) so that people start to do their own thing, their own action, start playing with prototypes” (April 28, 2016).

Another participant wrote: “I don't remember well from the U Lab. However, the focus on boundary conditions feels very inadequate and maybe even counter-productive. In my experience, what is needed is an affective (sic) experience of being connected in this amazing living system. To feel love and awe and connection and from there to act to create a more beautiful world” (Questionnaire respondent 9, April 28, 2016). And another respondent stated that “the concept of prototyping and trying and sensing...would be against the concept to provide clear guidelines” (Questionnaire respondent 6, April 28, 2016).

Ultimately, though we see the value in the power of U.Lab as a tool to inspire reflection and motivate action that is connected to the source of people’s purpose and creativity, we see the potential for prototypes, actions and processes being developed that are inherently unsustainable as U.Lab provides no clear boundary conditions for success. Furthermore, the responses from our questionnaire participants – even though they would appear to disagree with our premise – only serve to further illustrate the need for a set of sustainable boundary conditions. The varied responses demonstrate a lack of common perception of what sustainability means, as well as a religious adherence to vague and abstract concepts that could be interpreted in numerous different ways. In order to really co-sense and co-create a future that we all want, we need a common language and a common understanding of where we want to go – at least where we don’t want to go. As a result of our analysis, we feel that it is essential to include the Sustainability Principles as boundary conditions for success in our impact model: U.Lab: Transforming Business, Society and Self towards Sustainability.

5.5.5 A vision of success and Backcasting

An advantage of a principle-based definition of sustainability (i.e. bounded by the eight Sustainability Principles) is that an affirmative vision of success can be difficult for diverse groups to agree upon, as evidenced by our findings. By simply having principles to abide by, it provides the room for many different visions of success to emerge that are all in agreement
with the principle-based definition of sustainability as provided by Robèrt and Broman (2015). Success, then, “can be achieved in many ways within the frame of the principles” (Robèrt and Broman 2015, 4). A definition too prescriptive or too open, as evidenced by our quantitative and qualitative data, not only breeds confusion but does little to support effective collaboration and progress of society towards sustainability.

Society 4.0 is prescriptive in that it is a pre-determined vision of success provided by U.Lab as a destination, which severely limits the agency of participants to build their own vision of success. For example, one participant wrote that “Since U lab (sic) is based on theory U it is both a methodology and provides analysis of what is wrong today and which goals we should all thrive for - what is good (hence is normative). This is a bit dangerous in my opinion. Methodology of co-creation and personal development is best implemented without normative implications…the mix of methodology and normative goals has a risk of being (sic) manipulative” (Questionnaire respondent 29, April 29, 2016).

Society 4.0 is conceived of largely by forecasting, i.e. it is based on lessons learned from the past as well as current trends. As previously discussed, forecasting is often not the best strategy to tackle long-term sustainable development, as it limits the number of possible actions and, as the field is dynamic and constantly changing, it can limit successful solutions.

Furthermore, forecasting is in direct opposition to the “learning from the emerging future” that Scharmer also advocates for in U.Lab. However, we also see a potential pitfall in simply letting come the future that is wanting to emerge in that U.Lab provides no boundary conditions for that future and it is therefore not necessarily sustainable.

When asked if they took the vision of success provided by U.Lab into consideration when prototyping, a significant number (almost 20%) of participants were unsure. This would indicate that the relation between eco-system and/or Society 4.0 is not necessarily being taken into consideration in the prototyping phase.

The data does demonstrate that U.Lab motivates actions and prototypes and that these prototypes are generated from a space of inspiration and individual and group consciousness, which could be understood as was to cultivate a vision of success. Participant 35 “… felt the vision and the whole ulab (sic) system as an enormous force and support. Without it I had not started my prototyping adventure and the project would never have had so much effect, as it has today” (May 1, 2016).

Even though Society 4.0 is heralded as a vision of success in U.Lab, some participants didn't feel comfortable enough with the concept to use it as a guiding ideology. Participant 51 stated, “it is not a vision of the 4.0 society that impacted my prototyping, but more the idea of awareness and consciousness as main development factors - that contains the key to a more sustainable society no matter how exactly that society would be” (May 6, 2016). Another participant wrote that “While planning an open u.lab camp I followed the concept to create a space where different talents can rise and the emerging future has a chance to enter” (Questionnaire respondent 39, May 3, 2016), which are both concepts found within U.Lab, even though there was no mention of Society 4.0 as a vision of ultimate success. Yet another participant concluded that “I had no idea of what the result would be, only believed it could have a sustainable effect...” (Questionnaire respondent 35, May 1, 2016).

Our analysis of the qualitative data showed that respondents were much more inclined to build their own vision of success from the concepts throughout the course that spoke to them, instead
of simply adopting Scharmer’s vision of Society 4.0. For example, participant 51 stated that consciousness should be a driving force for sustainability, “...the best way of getting more sustainable solutions is to work with consciousness. So this idea impacted my prototyping, as a main idea” (May 6, 2016). While Society 4.0 provides a vision of success that works on a macro scale, it is not applicable on a micro scale – the level of individual prototypes. In this sense, Society 4.0 does not serve as a sufficient and appropriate guiding vision.

The question: *Can you provide one or more examples of when the vision of society 4.0 impacted your prototyping process?* was skipped by half of the questionnaire respondents. We can, therefore, assume that participants didn’t quite know how to respond to this question and were challenged by it. We feel that this is because U.Lab lacks a vehicle for participants to build a vision of success, and an understanding of the difference between backcasting and forecasting. Instead, participants come up with prototypes by being present in the moment, tapping into their best selves and letting the future come. This approach does not imply the act of visioning and then working to realise something, but a prototype that almost happens to them. This idea of a future that happens to us in in contrast to Scharmer’s conviction that we should co-create the future that we all want, but indeed demonstrates a juxtaposition of the various concepts presented in U.Lab.

We believe that U.Lab could be improved by introducing a mechanism for visioning, that gives participants more agency over the future that they see as emerging, appropriate to the scale and sector of the individual prototype. However, this process of visioning should happen within the boundaries of the Sustainability Principles (discussed above), and should be presented alongside the methodology of backcasting in order to frame the purpose and procedure in a way that illustrates which parts of the process are rigid and which parts are flexible – as well as why.

### 5.6 Updated Success Criteria

Based on our findings from the reference model and the empirical data, we determined that the impact model (*U.Lab: Transforming Society, Business and Self towards Sustainability*) should include the following SSD concepts: the *urgency* of the Sustainability Challenge, a clear, singular and unifying definition of sustainability, boundary conditions, a process for creating a vision of success, and backcasting.
6 Phase III - Prescriptive Study

6.1 Methods

In this phase, “researchers use their increased understanding of the existing situation to correct and elaborate on...the desired situation” (Blessing and Chakrabarti 2009, 16) thereby finalising a vision of success. We underwent an initial Prescriptive Study which included task clarification, and conceptualisation (Blessing and Chakrabarti 2009). Initial Prescriptive Studies are often used when “time and resource constraints do not allow a comprehensive PS but thoughts about possible or improved support based on the results of the previous stage are required to round off the research” (Blessing and Chakrabarti 2009, 143-4).

Task clarification included a review of the analysis and data from prior stages of research. The conceptualisation for *U.Lab: Transforming Society, Business and Self towards Sustainability* included interventions (support) to enhance U.Lab, based on our understanding of the factors which currently hinder U.Lab in moving business, society and self towards sustainability, which were made clear in the Descriptive Study I Phase. This conceptualisation resulted in a prototype or Impact Model. An Impact Model is representative of the desired situation and highlights the impact of the interventions made when assessed against the Reference Model.

The five interventions include a description of the intended support, its elements and rationale and where and how it is realised (Blessing and Chakrabarti 2009). The deliverable at the Prescriptive Study Phase of our research is our Impact Model.

6.1.1 Ideation

In order to ascertain appropriate ideation techniques, we organised an Ideation session lead by Professor Andreas Larsson of the Innovation Centre at BTH. Subsequently, we were able to design a two-day workshop, based on methods designed by IDEO (IDEO 2012), which enabled us to transform the analysed data into a design prototype for our impact model. These methods included: brainstorming, bundling and building a journey map.

*Brainstorming:* Brainstorming is exactly as it sounds - a storm of ideas around a specific theme - in this case, our five pre-determined SSD concepts. In brainstorming, the key is to generate as many ideas as possible—by deferring judgement, building on others’ ideas, and embracing even wild and crazy ideas (IDEO 2012).

*Bundling:* After the initial brainstorming, we then bundled similar ideas together in order to take “strong individual concepts to solutions of substance” (IDEO 2012). In bundling, we were able to select those ideas that best match our success criteria. The bundled ideas served as a roadmap for how to introduce the SSD concepts into our final impact model (IDEO 2012).

*Journey Mapping:* Having determined how to include the SSD concepts into our Impact Model, we then turned our focus to where said interventions made the most sense along the U process. In order to determine this, we used a process of journey mapping which allowed us to “identify and strategize for key moments in the...experience” we were designing. By assessing how each SSD concept would integrate into the U process, we were compelled to do another
iteration of brainstorming, and bundling, now taking into consideration the concepts also introduced by U.Lab at the various intervention points.

Some of the interventions we generated indicated a need for accessible and inclusive design, as the target group for U.Lab is composed of highly diverse participants. The advice from Professor Larsson echoed the ‘simplicity without reduction’ (Broman, Holmberg and Robèrt 2000) approach in order to make the transition towards sustainability manageable even for those not interested or knowledgeable, without minimising the challenge.

6.2 Validity

Here, the researchers must acknowledge that the validity of design research methods is not universally recognised. In fact, design research is largely about pushing the boundaries of conventional research in order to discover that which has yet to be created. As such, and though we followed methods in designing our impact model, our process was more about recognising the inherent bias that our life experiences, context and research gave us in order that we could bolster our creative confidence and embrace the learning that comes from failure (IDEO 2016).

6.3 Results - Impact Model

The following results endeavour to answer our second research sub-question: What concepts could be included to design a U.Lab that encourages the transformation of business, society and self towards a sustainable future? Our Impact Model, with the five recommended interventions in order to necessarily move society towards sustainability, is presented below.

6.3.1 The urgency of the Sustainability Challenge

While Scharmer notes that “[t]he importance of learning from the emerging future is not new. But in practice, given the urgency of today’s challenges, it has never been more important as it is today” (MITx 2015 course material) in the introduction to U.Lab, the real urgency of the situation was not apparent in the questionnaire responses we collected. As the Iceberg Model provides an operational and well-communicated visualisation of the Sustainability Challenge, we felt it necessary to only tweak it in order that it effectively convey the pressure of the situation. Therefore, we propose the introduction of the funnel in the downloading phase. The outline of the funnel is to be placed over the Iceberg Model after its initial description to illustrate the urgency of acting, and the limits that we are increasingly surpassing because of our current paradigms of thought.

The wall of the funnel still represents the decreasing capacity of the earth to sustain life and the systematic nature of the many crises making up the Sustainability Challenge. As portrayed above, the Iceberg Model, the eight acupuncture points and the disconnects currently extend beyond the walls of the funnel, demonstrating the inherent unsustainability of our situation, and the limits that we are surpassing are only going to grow. However, as depicted in the new figure: The Iceberg Funnel, by altering our actions to keep from hitting the walls of the funnel, we can move society towards a sustainable future, where the earth’s carrying capacity remains in balance with what we need to sustain life. The vision of a sustainable society would include Scharmer’s vision of Society 4.0, bounded by the eight Sustainability Principles, as described
below. As we learn to live within the means of ecological and social boundaries, we might even begin to look towards a regenerative society - Society 5.0 or 6.0, perhaps.

6.3.2 A clear, singular and unifying definition of sustainability

Our research pointed to the need for a clear definition of sustainability for our Impact Model. A common language and definition of sustainability will help to allow a strategic coordination across different sectors and the design of more effective solutions (Robèrt and Broman 2015; Kates, Clark and Corell 2001).

We propose to introduce the tree metaphor, together with the Iceberg Model in the downloading phase of U.Lab. We believe that the tree metaphor, with its inherent scientific basis, will bridge the gap we perceived in our research, as our data suggests that the Iceberg Model only provides participants with unconnected details, or symptoms, of the sustainability challenge. Adding in the tree metaphor here, with an explanation of the foundational natural science, would provide a unified and scientifically based definition of sustainability.

This scientifically-based definition sustainability will also serve as a precursor to the boundary conditions explained in the prototyping phase of U.Lab as detailed below. Finally, the tree metaphor also reflects a systems thinking approach reinforcing the idea that the components of the sustainability challenge interact and affect one another in multiple feedback loops (Robèrt and Broman 2015).

Acknowledging suggestions for the impact model made by Andreas Larsson, we agreed that the supplementary information should be as accessible and engaging as possible in order to make the concept of sustainability easy for the participants to grasp and actualise.

6.3.3 Boundary conditions for sustainable development

We recommend that U.Lab: Transforming Business, Society and Self towards Sustainability adopt the Sustainability Principles, as explained by Robèrt and Broman (2015), as the boundary conditions for sustainable development. They will be connected to the tree metaphor explained in the downloading phase and therefore be introduced early in the U process. At the time of crystallizing, they will be discussed again in more detail, providing necessary and sufficient, concrete and general enough, non-overlapping conditions for sustainable prototypes. The Sustainability Principles can be paired and explained consecutively with Society 4.0, further clarifying U.Lab’s long-term vision of success, and they can be introduced as guidelines for sustainability for the prototypes participants are asked to create. During the prototyping phase, participants are invited to go back to the “systems thinking part of our journey, which really is about the global phenomenon of collectively creating results that no one wants” (MITx 2015, course video), in order to ideate, innovate and prototype new results. Here it is incredibly important that these ‘new’ results move society in the direction of sustainability, instead of contributing to our current unsustainability. Therefore, having tangible and accessible guidelines - or principles - is paramount. The eight Sustainability Principles will provide a more comprehensive understanding of the vision of success of Society 4.0 as well as of the individual visions of success of each prototype.

The Sustainability Principles can be quite nuanced and complicated, but we feel that FSSD practitioners would do a particularly good job of communicating them. Many FSSD
practitioners are experienced at conveying SSD concepts to diverse stakeholders. As such, we recommend a collaboration between the U.Lab core team and FSSD practitioners in order to work the Sustainability Principles into the U process in U.Lab.

### 6.3.4 A vision of success and Backcasting

As described above, we propose to reintroduce Society 4.0 as bounded by the eight sustainability principles as the long-term vision of success of U.Lab. We will also suggest a process whereby participants are invited to construct their own vision of success for each prototype at the prototyping phase that is more specific to the desires of the participant and the sector of the prototype. This micro-scale vision of success will also be created with the eight sustainability principles as boundary conditions in order that each prototype necessarily moves society towards sustainability.

After the eight sustainability principles are explained in the prototyping phase, participants will be asked to define their core principles and values as well as their envisioned future, which will be developed with the SPs as boundary conditions. In the Presencing Institute Toolkit for Prototyping, U.Lab begins this exploration into core principles, values and the envisioned future. The toolkit asks, “[w]hat is wanting to born in my life and work right now?” and “[w]hat future do I want to create?” (Presencing Institute 2015, prototyping). We will compliment this section with the question: What is/are the Big, Hairy and Audacious Goal/s (BHAGs) for your prototype?

A BHAG is a 10-25 year compelling goal that inspires greatness. BHAG’s often are daunting, but push us beyond the obvious or status quo, and the commitment to a seemingly impossible goal creates an environment of innovation, energy and inspiration (Collins and Porras 1994).

Additionally, Robèrt and Broman (2015) argue that backcasting from a vision of success framed by a principled definition of sustainability, would constitute a more intuitive, generic, and practical approach to sustainable development, and it strengthens both concepts by presenting them together. We would, therefore, recommend a partnership with FSSD practitioners to produce specific content focused on backcasting.

### 6.4 Discussion

Based on our experience designing the Impact Model, below we discuss our guiding research question: *How might we design a U.Lab that necessarily moves society toward a sustainable future?*

While some participants questioned the purpose of a sustainability-focussed U.Lab and demonstrated a concern that boundary conditions or a single definition of sustainability might hinder one of the main teachings of U.Lab which is to let things emerge, our analysis still demonstrates that designing *U.Lab: Transforming Business, Society and Self towards Sustainability* could address some gaps in the current iteration of U.Lab making it more effective in inspiring the systemic change necessary in the pursuit of sustainable development. In this way, our Impact Model of *U.Lab: Transforming Business, Society and Self towards sustainability* reinforces the importance of the role of niches. As argued by Geels (2011), improving the efficacy and popularity of niches involves the following: support from external...
actors can be boosted by clearly articulated expectations and visions, which provide guidance for innovation activities; expanding the resource base of niche-innovations, by expanding their social networks guaranteeing the enrolment of more actors, and; a multi-dimensional and iterative process of learning and articulation (Geels 2011). Our interventions, or supplementary information, serve to improve the efficacy of U.Lab as a niche structure in moving society towards sustainability, lending momentum to the current design as it (Geels 2011).

In relation to the criteria listed above, our Impact Model helps clarify the vision and expectations by using language that is precise and more broadly accepted (Geels 2011). The introduction of SSD concepts will supplement U.Lab with a clear and shared definition of sustainability, relay the urgency of the sustainability challenge, introduce of boundary conditions and a principled vision of success, and communicate the benefits of backcasting. Geels argues that one can improve the legitimacy and resources to niche-innovations by enlarging their networks, thereby increasing the potential of the participation of powerful actors (2011). One of U.Lab’s current strengths is its reach and networks, as demonstrated by the great diversity of stakeholders, powerful and not, from individual actors in the majority world to the Scottish government, for instance.

However, we believe that our Impact Model, with its scientifically-backed concepts and language, could make *U.Lab: Transforming Business, Society and Self towards sustainability* accessible to further communities of participants. For instance, our re-design recommends collaboration with FSSD practitioners, which has the potential to expand U.Lab’s stakeholders and participants, as FSSD practitioners could forge a link between corporations, academic institutions, not-for-profit organisations and municipalities.

Finally, our Impact Model indeed acknowledges various learning processes, as well as the benefits of diversifying content, methodologies and language. We have recommended the supplementary information in order to ground the content of U.Lab in natural science, thereby ‘stabilising’ the course (Geels 2011).

As stated above, one of the ways to develop a niche is to expand the resource base for participation and innovation, as well as to develop a common language and explicit expectations and visions. As such, we also sought to increase the legitimacy of *U.Lab: Transforming Business, Society and Self towards sustainability* through the introduction of SSD concepts which are based on widely accepted natural and social scientific principles. While U.Lab wasn’t developed specifically with sustainability in mind, we believe we have demonstrated the need and potential for designing a U.Lab for Sustainability. Recalling the criteria for a theoretical model of sustainability proposed in *A Compass for Sustainable Development* (Robèrt et al. 1997), we feel that by adding in the discussed SSD concepts to the U.Lab process, we manage to address all eight criteria. The criteria (Robèrt et al. 1997, 2-3), and the rationale for how our Impact Model achieves them are outlined below:

1. The model must be based on a scientifically acceptable conception of the world.

While U.Lab uses language that doesn’t always or necessarily stem from natural science, it does convey a systems thinking approach. Furthermore, as we have suggested above, by including the natural laws, or first-order principles, in order to comprehensively explain the Sustainability Principles and provide a singular and unifying definition of sustainability, *U.Lab: Transforming Business, Society and Self towards Sustainability* will add validity to its
context and foundation. These first-order principles, based on the laws of natural science, ipso facto come from a scientifically acceptable conception of the world.

2. **The model must contain a scientifically supportable definition of sustainability.**

As proposed above, the inclusion of laws and principles of natural science will preface the establishment of boundary conditions and a definition of sustainability. Therefore, the intended support for communicating a clear, singular and unifying definition of sustainability will be scientifically supportable.

3. **The overall perspective must be applicable at different scales, and must see the economy as a subsystem of the ecosystem at each scale. Individuals must see how their actions aggregate from micro scales up to the macro scale, and thus understand their role in the overall move toward sustainability.**

As demonstrated by the title, *U.Lab: Transforming Business, Society and Self*, U.Lab is intended to work at different scales. Much of the transformation that U.Lab aims to effect, is on an individual level which, so goes the argument, is a necessary starting point in order to ripple out to all scales and constellations of more than one person. As one respondent wrote, U.Lab believes that “the quality of individual and group action is proportional to the level of awareness... of all stakeholders....” (Questionnaire respondent 27, April 29, 2016), while another respondent affirmed that U.Lab promotes a “Transition starting from within yourself” (Questionnaire respondent 35, May 1, 2016).

4. **The micro-economical perspective should not require individuals to act against self interest. We may need some altruistic behaviour in the political task of setting up the rules of the game, but in the actual playing of the game we should not expect individuals to behave altruistically.**

While Scharmer advocates for a shift from our current paradigm of thought, it is from an ‘ego-system’ perspective to an ‘eco-system’ one. He argues that, by thinking of the good of the whole, we can manage to think both altruistically and in self interest at the same time (Scharmer and Kaeufer 2013). For example, respondent 35 wrote of “Following my heart to start a project which potentially could create value to a lot of people's lives. I...felt the vision and the whole ulab (sic) system as an enormous force and support” (May 1, 2016) emphasising the work they were called to do as beneficial to both themselves and others.

5. **The model must be pedagogical and simple to disseminate so that it can support a public consensus necessary to be put into practice democratically.**

As evidenced by the numbers of U.Lab participants, as well as the nature of MOOCs, U.Lab is, in fact, built to be pedagogical and easy to disseminate. Because U.Lab is free and open-source, the education is democratised. Furthermore, participants can take whichever elements of the course that worked for them and incorporate them into their work and daily lives. In this sense, the dissemination of the theory and tools encapsulated in U.Lab is also democratic.

6. **The model must not engender unnecessary resistance or be adversarial.**

While the nature of our research was not to investigate if U.Lab is contentious or adversarial, our data did illustrate a few gaps which, if addressed by the intended SSD support, could
provide U.Lab with more validity in the form of scientific credibility, thereby reducing the for potential resistance or dismissal.

7. **The model must be able to get started without first requiring large scale societal changes.**
   It should be implementable within today’s economic reality. Business corporations, political parties and the public should be able to use the model directly.

As evidenced by our analysis and data, one of U.Lab’s greatest strengths is that it empowers people to immediately make changes in their lives - from changing the way they think to switching careers to prototyping a new product, experience or service. U.Lab is intended for everyone, from individuals to organisations and institutions. As one respondent to our questionnaire wrote: “The main challenge U Lab seeks to address is how to change oneself first to be able to change the world we live in” (Questionnaire respondent 42, May 3, 2016). Another stated that: “Ulab (sic) has been a great inspiration to me, and has largely affected my choices in life. I have taken leave from work to focus on what I think is important, and put time this year on interests related to sustainability, social innovation and entrepreneurship and leadership” (Questionnaire respondent 19, April 28, 2016). Many more participants spoke of using U.Lab either within their organisations or as a consultancy tool for external work.

8. **It would be an advantage if the model could also be used as a starting point for developing “new economics” — as a way to recognize a new and larger pattern of scarcity to which old and basic economizing principles must be applied.**

Our 5LF analysis of U.Lab clearly demonstrates the ways in which U.Lab questions current paradigms of economics and thought, as well as the ways in which Scharmer sees the current challenges we face as externalities of capitalism and capitalist thinking. While U.Lab clearly advocates for a transcendence of economic thought in Society 4.0, instead of maintaining old/basic economic principles, Economy 4.0 is based on the understanding that nature is not a commodity, that our current trends of consumption and philosophies of ownership need to be reconceived, that Leadership 4.0 is rooted in the protection of the commons and that the financial economy needs to once again revert to an abstraction of the real economy - based on the natural, human, social, and cultural-creative capital (Scharmer and Kaeufer 2013).

However, it was important for us to acknowledge some of the push back, and also allowed us greater insights into the perceptions of our stakeholder group so that we could take it into account when designing our impact model. For example, one respondent wrote: “I think there are some bias in 'the belief' around your question... I don't think it is right that everyone need to be 'on the same page”’ (Questionnaire respondent 5, April 28, 2016), while another said: “I am not comfortable with the word sustainability (sic). I think ULab (sic) talk more about regeneration” (Questionnaire respondent 15, April 28, 2016). We believe that the interventions we have suggested, with their accessible and widely accepted language and concepts, provides a clear rationale for said interventions.

The intended support, or interventions, outlined in the results section of this chapter constitutes the Impact Model, defined by our success criteria. The success criteria are detailed and addressed in the preliminary prototype that we offer in order to better demonstrate our findings with a tangible set of outcomes, but this initial abstraction has not been validated and would need further consideration and corroboration from expert interviews, a prototyping workshop or some other empirical experiment in order to test the model and incorporate relevant feedback into the design research cycle.
While our prototype is only a first iteration – a ‘0.8 prototype’, which perhaps causes anxiety to some (the researchers’ included), we believe whole-heartedly in what Scharmer calls “the power of iterative learning, the power of ‘fail fast to learn sooner,’ or the power of 0.8”. The principle of 0.8, an ideology of Cisco Systems, is that regardless of the intended duration of a project – from three months to three years, a 0.8 prototype encourages testing sooner, it “means you have something that you can put in front of stakeholders. And then generate feedback from all of these stakeholders that help you to evolve and to shape your idea better and faster with the benefit of that feedback. In practice, the principle of 0.8 really means lowering the threshold between thinking and action” (MITx 2015). And so, we have humbly presented you with our 0.8 prototype of *U.Lab: Transforming Business, Society and Self towards Sustainability*.

However, it is important to state that this is not the end of our journey. After the conclusion of the thesis, we intend to test our impact model and the new concepts in the field, with workshops including various stakeholders in Karlskrona. For each workshop, we will design a questionnaire and interviews to validate the effectiveness of the impact model. This source of empirical data will allow us to continue gathering feedback and improve our prototype. This cycle of prototyping and iterating will ultimately help shape more innovative and effective solutions for U.Lab so that it necessarily moves society towards sustainability.

### 6.5 Recommendations for Future Research

A final phase sometimes included in DRM is a second Descriptive Study Phase, in which “researchers investigate the impact of the support and its ability to realise the desired situation” (Blessing and Chakrabarti 2009, 17). This is done through empirical studies of the tool/support/service in action, which then feeds back into the DS I stage, to develop the idea and further iterations and prototypes (Blessing and Chakrabarti 2009).

The development of the interventions was a creative process, based on an understanding of the current limitations of U.Lab regarding sustainability and the concepts of strategic sustainable development. The intended support developed in the PS stage was a theoretical creation. It was an extrapolation of reality as defined by the literature review and empirical data and interpreted by us, and we recognise that it will need to be evaluated in the field to legitimate any assumptions made within the research (Blessing and Chakrabarti 2009). Given the time restraints, this phase, unfortunately, fell outside the scope of our thesis, and we recognise that the assertions we can make about our Impact Model are therefore limited.

Furthermore, the context in which the intended support will be used is dynamic, complex and emergent, and therefore a DS II which included several prototypes and evaluative workshops would allow for more effective solutions to be incorporated into subsequent iterations (Blessing and Chakrabarti 2009). The validation of our interventions and support should constitute the future research of either the authors themselves or subsequent researchers.

As previously stated, we limited our research at the first three levels of the FSSD. An obvious and interesting next step could be to assess the Actions and Tools levels of U.Lab, which would constitute more research into the pedagogical process and methodology of the course itself.

Finally, an area for future research could explore how U.Lab, theory U or specific tools of the course could benefit practitioners in implementing the FSSD or in communicating the sustainability challenge.
7 Conclusion

In light of the global sustainability challenges we are facing today, the urgency of those challenges and the rise in complexity of the systems they impact, there is an equally urgent need to develop new ways of tackling them. We need solutions that encourage broad-scale participation and amplify the voices of those most impacted by the symptoms of our global messes. We need solutions that address the underlying structures and systems that create the conditions for the continued unsustainability we are experiencing. And we need solutions that embrace innovation, experiment and a probe, sense, respond approach in order to ‘fail fast to succeed sooner’ because, let’s face it, we don’t have much time.

U.Lab seeks to empower change-makers to co-sense and co-shape the future by shifting from a pattern of learning based on previous experiences or reality to a process of learning from the future as it emerges by experiencing the U process (MITx 2015). Learning from the future as it is emerging, combined with sensing into a deeper source of knowing, understanding and acting, is the only way to break the cycle of downloading and address the systemic and complex challenges of our time (Scharmer and Kaeufer 2010).

While we are whole-hearted advocates for U.Lab and have experienced first-hand the deeply profound and transformational changes it can inspire, we also recognise areas in which the current constellation is lacking. Our research has demonstrated and validated the need for a design that includes SSD concepts in order to aid and inspire U.Lab practitioners and participants to move society towards sustainability. We have made suggestions for five interventions in the current design of U.Lab for our Impact Model, a prototype for U.Lab: Transforming Business, Society and Self towards Sustainability.

Robèrt and Broman acknowledge the limitations of the FSSD, and its role in sustainable development, but contend that “we expect that much more knowledge and competence will be developed on how the FSSD and other forms of support can be mutually supplemental” (2015), thereby reflecting our thinking that the FSSD can lend structure and clarity to Impact Model. They go on to conclude that: “the purpose of the FSSD has never been to replace or exclude other forms of support for sustainable development, but the opposite; to provide a structure that allows for clarification of their respective strengths and that aids a coordinated use of them” (Robèrt and Broman 2015, 12).

As Speth aptly recognised, “[t]he top environmental problems are selfishness, greed and apathy, and to deal with these we need a cultural and spiritual transformation. And we scientists don’t know how to do that” (Speth, n.d.). U.Lab’s innovative and experiential response to the wicked problems we face inspires participants to assess and make changes to the paradigms of thought that dictate societal norms. However, U.Lab is still an incipient and emerging social technology and, as we have argued, lacks boundary conditions and a scientific basis for understanding our current reality and creating strategic sustainable solutions. The addition of SSD concepts could bridge this gap, and therefore contribute to the movement of society towards sustainability.
Reference List

Cited References


Additional References


Appendix A: Boundary Conditions

As mentioned in Chapter 2, the FSSD provides eight sustainability principles (SPs) that can help in defining a vision of success. They act as boundary conditions for sustainable development and help in defining the vision of success for a sustainable society. Under each Sustainability Principle outlined below, we have detailed the eight acupuncture points and the relevant overlap from the vision of Society 4.0 pertaining to each acupuncture point and the Sustainability Principle.

1. In a sustainable society, nature is not subject to systematically increasing concentrations of substances from the earth’s crust (such as fossil fuels and heavy metals).

*Nature:* Society 4.0 is cognizant of the fact that nature shouldn’t be understood to be a commodity. Extractive processes in society 4.0 are based on biomimicry, for example, Scharmer recommends the design of zero-waste systems, citing that in the natural world, every output becomes an input for another process, thereby maintain the balance of nature’s flows and cycles.

U.Lab advocates redesigning the current industrial paradigm of ‘take, make, waste’ to a system based on closed-loop designs, which could (we can assume) mean a decrease in the concentrations of substances from the earth’s crust in the biosphere (Scharmer and Kaeufer 2013).

*Technology:* Innovation and new technologies shouldn’t be elite knowledge. If technologies can provide solutions to help the environmental sustainability challenges we are currently facing, they should be accessible in order to encourage solutions-focused knowledge production, innovation and creativity (Scharmer and Kaeufer 2013).

*Leadership:* Respect for and protection of the commons is an inherent leadership trait in Society 4.0. We can assume then, that systematic increases in concentrations of substances from the earth’s crust into the biosphere will lessen (Scharmer and Kaeufer 2013).

*Consumption:* While our current economic system of stakeholder capitalism defines a consumer’s need, Society 4.0 advocates for a system where human needs dictate patterns of consumption and where those needs stimulate the chain of production. This reconfiguration of our patterns of consumption, it is believed, will also reduce our demand for goods that require, in their production, processing or transportation, substances that we extract from earth’s crust (Scharmer and Kaeufer 2013).

*Ownership:* Commons-based property rights advocate for a shift in our relationship to nature - from ownership to stewardship. Commons-based property rights – based on co-creative production and collaborative consumption – would hold all individuals accountable to the whole, as well as to future generations. This reframing of how we understand property and the commons would shift our thinking around natural resources as endless commodities for us to make use of, instead coming to see them as part of our shared responsibility (Scharmer and Kaeufer 2013).

2. In a sustainable society, nature is not subject to systematically increasing concentrations of substances produced by society (such as antibiotics and endocrine disruptors)
Nature: Again, in Society 4.0 nature isn’t seen as a commodity. Systems and processes in Society 4.0 are based on biomimicry - zero-waste systems, for example, where every output become an input for another process, thereby reducing our impact on the biosphere.

Solar Energy, as recommended for society 4.0, would limit the systematic increase in pollutants such as carbon dioxide. Furthermore, U.Lab advocates redesigning the current industrial paradigm of ‘take, make, waste’ to a system based on closed-loop designs, which would again (we can assume) mean a decrease in the concentrations of substances produced by society in the biosphere (Scharmer and Kaeufer 2013).

Technology: In society 4.0, U.Lab calls for the research, development and use of technology to solve the most pressing needs of our time, as opposed to being funnelled into the areas most profitable. We could extrapolate this to include ecological challenges such as SP2 (Scharmer and Kaeufer 2013).

Leadership: The role of leadership in society 4.0 also includes the respect and protection of the commons, which would include not systematically increasing concentrations of substances produced by society in the common resources found in our biosphere (Scharmer and Kaeufer 2013).

Consumption: The shift in the ways, and reasons that we consume, would mean that consumers “extend their awareness of the ego-system (the well-being of oneself) to the eco-system (the well-being of all). Furthermore, society 4.0 sees globally reduced consumption, thereby reducing the concentrations of pollutants that we release into the biosphere as by-products of production (Scharmer and Kaeufer 2013).

Ownership: Finally, commons-based property rights – based on co-creative production and collaborative consumption – would hold all individuals accountable to the whole, as well as to future generations. This reframing of how we understand property and the commons would shift our thinking around natural resources as endless commodities for us to make use of (the current paradigm of economic thought), instead coming to see them as part of our shared responsibility (Scharmer and Kaeufer 2013).

3. **In a sustainable society, nature is not subject to systematically increasing degradation by physical means (such as deforestation and draining of groundwater tables).**

Nature: The idea that “[a]ll economic activity arises from nature – and returns to it” (Scharmer and Kaeufer 2013, 78) only emphasises that we need to replenish what we take, and not degrade the Earth beyond a point of restoration. As previously stated, we need to shift our relationship to nature from one where we see it as a resource to one where we cultivate the commons. Scharmer suggests community-supported agriculture programmes and organic farming as markers of Society 4.0 that would also contribute to not systematically increasing the degradation of the earth by physical means (Scharmer and Kaeufer 2013).

Technology: In society 4.0, Scharmer calls for the research, development and use of technology to solve the most pressing needs of our time, as opposed to being funnelled into the areas most profitable (Scharmer and Kaeufer 2013). We could extrapolate this to include ecological challenges such as SP3.
Leadership: The respect of the commons is an inherent trait of the leader as conceived in Society 4.0 (Scharmer and Kaeufer 2013). We can assume then, that systematic degradation of the earth by physical means will lessen.

Consumption: While our current economic system of stakeholder capitalism defines a consumer’s need, Society 4.0 advocates for a system where human needs dictate patterns of consumption and where those needs stimulate the chain of production (Scharmer and Kaeufer 2013). By placing the human need at the beginning of the value chain will reduce our levels of consumption and, as a consequence, reduce the degradation of the earth by physical means.

Ownership: Commons-based property rights advocate for a shift in our relationship to nature - from ownership to stewardship. Commons-based property rights – based on co-creative production and collaborative consumption – would hold all individuals accountable to the whole, as well as to future generations (Scharmer and Kaeufer 2013). This reframing of how we understand property and the commons would shift our thinking around natural resources as endless commodities for us to make use of, instead coming to see them as part of our shared responsibility.

4. In a sustainable society, people are not subject to social conditions that systematically hinder their health (mental, physical and emotional).

Nature: The innate respect for nature that is inherent in society 4.0 also extends to include ourselves and our bodies as a part of the natural world. Movements such as community-supported agriculture, local food initiatives and local living economies, the Slow Food movement and sustainable sourcing practices are examples of this shift (Scharmer and Kaeufer 2013).

Labour: By recognising the myth of growth, we can change from a system that surpasses ecological, social and labour limits, to a system that provides people with adequate income to be able to take care of themselves, and adequate state-provided care when they can’t.

Society 4.0 sees a universal basic income for everyone in the world as a human economic right, that should be coupled with accessible (or free) healthcare and education in order to ‘level the playing field’ (Scharmer and Kaeufer 2013).

Finance: The function of money and all financial mechanisms in Society 4.0 is to work for the well-being of society. They are enabling conditions only, not an end in and of themselves. We need to experiment with alternative economies, for example complementary (local) currencies which have been shown to increase employment and stabilise local economies (Scharmer and Kaeufer 2013).

Technology: In society 4.0, Scharmer calls for the research, development and use of technology to solve the most pressing needs of our time, as opposed to being funnelled into the areas most profitable. Specifically, he cites communicable disease as an example, highlighting that most of our funding goes into non-communicable disease research in developed countries for which the pharmaceutical payoffs are the greatest (Scharmer and Kaeufer 2013).

Leadership: 4.0 leadership is about working for the well-being all everybody in a system (an organisation, community, society) and not just the good of some (Scharmer and Kaeufer 2013).
Consumption: The consumer is a partner in the co-creation of economic activity (production) which serves to meet human needs as opposed to a target of advertising and marketing campaigns that seek to keep the wheels of capitalist production turning.

4.0 sees a shift in consumer awareness that means that we think about the well-being of all involved from the chain of production to the end-user, as opposed to just the well-being of the individual, which would alter labour conditions, political regimes and the general well-being of everybody on earth, as evidenced by movements such as fair trade, organic, and boycotts of products that were backed by unjust or inhuman regimes (Scharmer and Kaeufer 2013).

Examples of 4.0 consumer movements are: “farmers’ markets, slow or local organic food, community-supported agriculture (CSA), organic-fabric clothing, eco-tourism, urban agriculture, car sharing, zero-emission cars, and renewable energy” (Scharmer and Kaeufer 2013, 119) which advocate for collective health and well-being, as well as serving a human need or purpose.

According to Scharmer and Kaeufer (2013), “the strategy for enhancing our well-being without destroying the planet builds on reducing the flood of useless widgets and mindless commercials and increasing the capacity of the system to redirect resources to people’s real needs, while strengthening their capacity to access their inner sources of well-being and happiness” (Scharmer and Kaeufer 2013, 119).

Governance: 4.0 governance holds the economy accountable to reduce the negative externalities for all (Scharmer and Kaeufer 2013).

Ownership: Commons-based property rights – based on co-creative production and collaborative consumption – would hold all individuals accountable to the whole, as well as to future generations. This reframing of how we understand property and the commons would shift our thinking around how and why we use resources that are essential to human health and survival (Scharmer and Kaeufer 2013).

5. In a sustainable society, people are not subject to social conditions that systematically hinder their influence (participating in shaping social systems they are a part of).

Labour: Society 4.0 sees a universal basic income for everyone in the world as a human economic right, which takes away the pressure to work for systems in which they feel they have no influence. According to Scharmer “we need to create new types of enabling infrastructures that help people to co-sense, co-develop, and co-create their entrepreneurial capacities by serving the real needs in their communities” (Scharmer and Kaeufer 2013, 87), thereby granting all people a voice in the mechanisms and decision-making that affects them.

Finance: Capital has different forms - it can be physical, human, industrial, financial, social, or spiritual. In our current economic system, financial capital operates on a global scale, while physical, human and social capital tends to be localised. Financial capital can change owners and places in seconds, while physical and social capital cannot.

In order to reshape the economic systems we are a part of, we need to reconceptualise capital as connected to community and our creativity and purpose. In society 4.0, we would reclaim our ownership over capital and its definition, and collectively create this capital with awareness and transparency (Scharmer and Kaeufer 2013).
Technology: Society 4.0 envisions a movement to reclaim access to enabling technologies by creating intentional communities and the dissemination of knowledge on those technologies for a more sustainable society. Technologies developed for the greater good should be accessible to and developed in collaboration with the people they are intended to support (Scharmer and Kaeufer 2013).

Leadership: 4.0 leadership is not based on individual decision-making capacity but is instead a distributed leadership that enhances the capacity of the collective. It is about “listening with an open mind, an open heart, and an open will to what is being said and what isn’t being said” (Scharmer and Kaeufer 2013, 113). This new type of leadership needs to be supported by enabling infrastructure that engages everybody in co-sensing, co-inspiring and co-creating the future together. 4.0 leadership focuses on the “well-being of our global communities and planetary eco-systems.” (Scharmer and Kaeufer 2013, 2) and therefore people are not subject to social conditions that systematically hinder their influence.

Consumption: In Society 4.0, the consumer makes informed and intentional choices to co-create the economic process. The consumer is the starting point of the chain of production and is, therefore, the one defining need. Many actors are involved in the conversation to build a transparent and cyclical, reflective system (Scharmer and Kaeufer 2013). In this way, “[u]sers move from being recipients of products and services to becoming their co-creators, co-authors and also co-users” (Scharmer and Kaeufer 2013, 109).

Governance: ABC—awareness-based collective action— facilitates “the capacity of the system to see itself, to sense what wants to emerge, and to explore the future by doing (prototyping)” (Scharmer and Kaeufer 2013, 127).

Governance, in this understanding, is directly linked to the economic system. Because governance in Society 4.0 seeks to co-create spaces where key players in both realms can come together to make decisions based on ABC and collective good, people are not subject to social conditions that systematically hinder their influence (Scharmer and Kaeufer 2013).

Ownership: Commons-based property rights – based on co-creative production and collaborative consumption – would hold all individuals accountable to the whole, as well as to future generations. This reframing of how we understand property and the commons would shift our thinking around how we make decisions about the commons. This shift is a step toward the decentralised power that is at the heart of a global transformation, according to U Lab. It would allow individuals to have more power and weight in the decision-making processes around systems and structures that they are impacted by. Scharmer sees the sense of influence as integral to society 4.0 as “[a]ll legitimacy emerges from a felt sense of fair balance between rights and responsibilities among people in a community” (Scharmer and Kaeufer 2013, 128).

6. In a sustainable society, people are not subject to social conditions that systematically hinder their competence (developing competence and learning individually or collectively).

Nature: Many movements that represent the shift to Society 4.0 are based on building individual and collective competencies. Examples are the Slow Food movement, community-supported agriculture, local living economies and sustainable sourcing practices (Scharmer and Kaeufer 2013).
Labour: Society 4.0 sees the advent of “enabling infrastructures that invite more people into the generative space of co-sensing and co-creating the future that they care about” (Scharmer and Kaeufer 2013, 97) in order to solve the challenges of our time, recognising that we will need an integrated and collective approach. These enabling infrastructures include physical spaces, knowing the challenge, a sense of their place in the order of things, and “capacity-building mechanisms...capital... technology...community” (Scharmer and Kaeufer 2013, 87).

By providing a universal basic income and accessible healthcare and education, society 4.0 frees up citizens to pursue entrepreneurial and competence building activities at will. By providing a universal basic income, capital is funnelled into local economies and fuels micro-entrepreneurial initiatives (Scharmer and Kaeufer 2013).

Finance: The force of creativity “is the ultimate source of all capital and value creation” (Scharmer and Kaeufer 2013, 96). Capital has different forms - it can be physical, human, industrial, financial, social and spiritual. U.Lab advocates for the redesign of the economy in Society 4.0 so that it serves our creativity and entrepreneurial drive, instead of the other way around.

According to Scharmer and Kaeufer, “[t]he main purpose of money 4.0 and capital 4.0 is to relink the creation of money with entrepreneurial intention in our communities” (2013, 97). The gift economy is a good example of this intention, as it is incredibly productive, and allows people to develop their own competence at will.

Technology: Technology has the potential to allow citizens and consumers to inform themselves about the choices they make - by displaying the ecological footprint of a product, to promoting awareness of social or political issues, to facilitating connection and self-organisation (Scharmer and Kaeufer 2013).

Leadership: U.Lab contends that “[l]eadership is a distributed or collective capacity in a system” (Scharmer and Kaeufer 2013, 112), not about individuals at the top of the ladder, and therefore how we approach and educate for leadership is about building the capacity/competence of the entire system. In order to solve complex challenges, there is the realisation that we all need to be involved.

Governance: ABC—awareness-based collective action— facilitates “the capacity of the system to see itself, to sense what wants to emerge, and to explore the future by doing (prototyping)” (Scharmer and Kaeufer 2013, 127), thereby encouraging space to develop the competencies of all.

7. In a sustainable society, people are not subject to social conditions that systematically hinder their impartiality (discrimination, fairness, equity).

Nature: In establishing a society where nature isn’t seen as a commodity, but as common assets that are the responsibility of and for the benefit of all, including future generations, there is also an inherent understanding of impartiality (Scharmer and Kaeufer 2013).

Labour: Here, we can see a link to impartiality in Society 4.0 as the idea of a universal basic income is seen as an economic human right. By providing a universal basic income and accessible healthcare and education, Society 4.0 encourages fairness and equity (Scharmer and Kaeufer 2013).
Finance: According to Scharmer, “[m]oney 4.0, which does not yet exist, would maximize the capacity of all economic actors to shape the systemic use of money in a more intentional, collective, and creative way” (Scharmer and Kaeufer 2013, 97). In Society 4.0, the real-economy is about serving the well-being of all as the ultimate goal.

Technology: The knowledge production and dissemination of new technologies has the potential to ‘level the playing field’, of all actors’ involvement in the systems and structures they belong to (Scharmer and Kaeufer 2013).

Leadership: 4.0 leadership is about working for the well-being all everybody in a system (an organisation, community, society) and not just the good of some (Scharmer and Kaeufer 2013). Therefore, people are not subject to social conditions that systematically increase impartiality.

Consumption: In Society 4.0, the primary goal of the economy is to respond to the needs of the people it serves. This is in contrast to the current imbalances in power distribution that puts consumers and citizens in disadvantageous positions.

Scharmer and Kaeufer assert that economies should not be run with a business mind-set for the following reasons: “(1) An economy cannot walk away from its community of citizens; and (2) it has to internalize all of its externalities. The traditional market idea argues that the goal of the corporation should be to maximize the financial bottom line while dumping all negative externalities onto others” (Scharmer and Kaeufer 2013, 126). The 4.0 consumer shifts from an ego-system perspective (the well-being of oneself) to an eco-system awareness (the well-being of all), therefore creating an intentional and impartial market economy (Scharmer and Kaeufer 2013).

Governance: Governance in Society 4.0 is awareness-based collective action that arises from seeing the big picture. ABC is created collectively by individuals that have integrated an understanding of the well-being of the whole into their consciousness (Scharmer and Kaeufer 2013). Therefore, we can assume that people are not subject to social conditions that systematically hinder their impartiality.

Ownership: In theory U, commons-based property rights’ mean that “trusts and trustees are accountable to all stakeholder groups in the eco-system, including future generations, to act as stewards of the whole” (Scharmer and Kaeufer 2013, 134). This accountability to long-term sustainability translates into a society where people are not subject to social conditions that systematically hinder their impartiality.

8. In a sustainable society, people are not subject to social conditions that systematically hinder meaning-making (creating individual or common meaning).

Nature: Society 4.0 would disrupt our current ‘commodity fiction’ where, because we see nature as a commodity, we have lost sight of the role it plays in our collective meaning - what was once ‘deep human understanding’. Movements such as community-supported agriculture and local food and living economies can help to reinstate this meaning (Scharmer and Kaeufer 2013).

Labour: In Society 4.0, citizens don’t have to work for money, which kills creativity, but instead are encouraged to connect to “the inner source of inspired creative energy” (Scharmer and Kaeufer 2013, 86). By reconnecting what we do for work, with our Work (or passion) we provide people with the conditions to create their own meaning.
Scharmer reminds us that as a global community, we are “ecologically, economically, socially, and spiritually highly interdependent and connected. And if we agree that we are, are we willing to lend a hand to one another?” (Scharmer and Kaeufer 2013, 87).

**Finance:** Finance 4.0 would be based on “fairness, inclusiveness, transparency, and effectiveness for the real economy” (Scharmer and Kaeufer 2013, 98). Again, movements such as the gift economy and complementary currencies give people the freedom to co-create meaning, even within an economic paradigm.

**Technology:** Heidegger observed that the root of technology - techne - is the Greek word for ‘art’. Scharmer and Kaeufer argue that art is a culmination of the creative process and that therefore “the source of technology leads us to the source of creativity” (2013, 108). He sees the great potential of technology in connecting us to our deepest source of creativity which is, in his opinion, the source of our collective ability to co-create meaning.

**Leadership:** According to Scharmer and Kaeufer (2013), all great leadership starts with listening. By listening, we allow for the co-sensing and co-creation of a future that we all want because we are in touch with the reality of the field. Collective sensing and prototyping allow for collective meaning, as opposed to the institutionalised silo approach of leadership as it currently stands.

**Consumption:** 4.0 sees a shift in consumer awareness that means that we think about the well-being of all involved - from the producer to the end-user - as opposed to just the well-being of the individual. This fosters meaning in the systems in which we invest.

Examples of 4.0 consumer movements are: “farmers’ markets, slow or local organic food, community-supported agriculture, organic-fabric clothing, eco-tourism, urban agriculture, car sharing, zero-emission cars, and renewable energy” (Scharmer and Kaeufer 2013, 119) which can be understood to facilitate meaning creation as they are value-laden movements.

Furthermore, “the strategy for enhancing our well-being without destroying the planet builds on reducing the flood of useless widgets and mindless commercials and increasing the capacity of the system to redirect resources to people’s real needs, while strengthening their capacity to access their inner sources of well-being and happiness” (Scharmer and Kaeufer 2013, 119).

**Governance:** Intentional Awareness-Based Collective Action allows for not only the co-creation of meaning but the self-reflection of the entire system, which breeds empathy, a necessary element to system change (Scharmer and Kaeufer 2013).

**Ownership:** Shifts in the way we perceive ownership, such as sharing economies, community-owned urban agriculture, and employee-owned corporations are all changing our criteria for collective meaning-making. Furthermore, by transforming our current economic paradigm of thought which views the earth, society and money as commodities, to Economy and Society 4.0, we create a future where the three divides don’t exist (Scharmer and Kaeufer 2013).
Appendix B: Questionnaire

1. Did you participate in U.Lab 1.0, 2.0 or both? Y/N
2. Did you participate in a hub in either U Lab 1.0 or 2.0? Y/N
3. Did you host a hub in either U.Lab 1.0 or 2.0? Y/N
4. How would you describe your own dedication to the course?
   a) Very low - I engaged rarely/didn't engage at all.
   b) Low - I engaged in some activities
   c) Regular - I engaged in approximately half of the activities
   d) High - I engaged in the majority of the activities proposed
   e) Very high - I engaged in almost every activity, video, reading

5. What are the main challenges that U.Lab seeks to address, in your understanding?

6. To address the current state of unsustainability, and to move society towards sustainability, we believe that a clear and shared understanding of sustainability and the challenges that sustainability involves is important to get everyone on the same page. Do you believe U.Lab provides a clear definition of sustainability? (closed)
   a) Somewhat well defined and clear
   b) Fairly well defined and clear
   c) Very well defined and clear
   d) Unsure

7. What concepts are included in U.Lab’s definition of sustainability? (open)

8. Exponential population growth, increasing demand for natural resources, increasing economic inequality, as well as ecological problems such as pollution, biodiversity loss and climate change are some of the major issues we are currently facing today. The nature of these challenges means that they are interconnected, evolving and complex. We are under more and more pressure due to increasing inequalities and scarcity of resources to solve these issues quickly.

8.1. To what extent does U.Lab explain the social struggles we are facing? (closed)
   a) Not at all
   b) Somewhat well
   c) Fairly well
   d) Very well
   e) Unsure

8.1.1. Can you provide an example that U.Lab highlights?

8.2. To what extent does U.Lab explain the ecological struggles we are facing? (closed)
   a) Not at all
   b) Somewhat well
8.2.1 Can you provide an example that U.Lab highlights?

8.3 To what extent does U.Lab explain the spiritual/cultural struggles we are facing?
   a) Not at all
   b) Somewhat well
   c) Fairly well
   d) Very well
   e) Unsure

8.3.1 Can you provide an example that U.Lab highlights?

9. *A systems thinking approach looks at wholes, seeing interrelationships and patterns of change rather than separate parts and a static reality of a given situation. A whole systems perspective understands that the whole is more than just the sum of its parts and therefore adds another level of complexity (Capra 1996).* In your opinion, to what extent does U.Lab enable participants to adopt a systems thinking perspective? (closed)
   a) Not at all
   b) Somewhat
   c) Fairly well
   d) Very much
   e) Unsure

10. *Guidelines for moving society towards sustainability are boundary conditions - things not to do - when considering any action, purchase, philosophy, etc.*** To what extent does U.Lab provide clear guidelines in order to move society towards sustainability? (closed)
   a) Not at all well defined or clear
   b) Somewhat well defined and clear
   c) Fairly well defined and clear
   d) Very well defined and clear
   e) Unsure

If so, please provide one or more examples of these guidelines.

11. One of the desired outcomes of U.Lab are prototypes that are generated throughout the process. When prototyping, to what extent do you consider:

   1. Environmental sustainability
      a) To no extent
      b) To a little extent
      c) To some extent
      d) To a great extent
      e) Unsure
2. Social sustainability

   a) To no extent
   b) To a little extent
   c) To some extent
   d) To a great extent
   e) Unsure

3. Spiritual/cultural sustainability

   a) To no extent
   b) To a little extent
   c) To some extent
   d) To a great extent
   e) Unsure

12. U.Lab outlines its vision of success as a transition from ‘ego-system’ to ‘eco-system’ thinking within the eight acupuncture points of society 4.0. How much did the vision of society 4.0 dictate your behaviour when prototyping?

   a) To no extent
   b) To a little extent
   c) To some extent
   d) To a great extent
   e) Unsure

12.1 Can you provide one or more examples of when the vision of society 4.0 impacted your prototyping process (open).

13. Are you currently using U.Lab/Theory U in your career or personal life? If so, please describe how? (optional)

Please indicate if you would like to participate in a phone or skype interview to further develop the conversation by including your name and contact details below:

Thank you for completing our questionnaire! If you have any questions or comments, please contact us here: florentinabaj@gmail.com
Appendix C: Quantitative Data Results

Q1: Did you participate in U.Lab 1.0, 2.0 or both?

Q2: Did you participate in a hub in either U.Lab 1.0 or 2.0?

Q3: Did you host a hub in either U.Lab 1.0 or 2.0?
Q4: How would you describe your own dedication to the course?

Q6: To address the current state of unsustainability, and to move society towards sustainability, we believe that a clear and shared understanding of sustainability is important in order to get everyone on the same page. Do you believe U.Lab provides a clear definition of sustainability?
Q8: Exponential population growth, increasing demand for natural resources, increasing economic inequality, as well as ecological problem such as pollution, biodiversity loss and climate change are some of the major issues we are currently facing today. The nature of these challenges means that they are interconnected, evolving and complex. We are under more pressure due to increasing inequalities and scarcity of resources to solve these issues quickly. To what extent does U.Lab explain the ecological/social/spiritual struggle:
Q9: A systems thinking approach looks at wholes, seeing interrelationships and patterns of change rather than separate parts and a static reality of a given situation (Senge 1990). A whole systems perspective understands that the whole is more than just the sum of its parts and therefore adds another level of complexity (Capra 1996). In your opinion, to what extent does U.Lab enable participants to adopt a systems thinking perspective?

Q10: Guidelines for moving society towards sustainability are boundary conditions - things not to do - when considering any action, purchase, philosophy, etc. To what extent does U.Lab provide clear guidelines in order to move society towards sustainability?
Q11: One of the desired outcomes of U.Lab are prototypes that are generated throughout the process. When prototyping, to what extent do you consider environmental/social/spiritual sustainability:

Answered: 42  Skipped: 9

- Environmental sustainability?
- Social sustainability?
- Spiritual/cultural...

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

- To no extent
- To a little extent
- To some extent
- To a great extent
- Unsure
Q12: U.Lab outlines its vision of success as a transition from 'ego-system' to 'ecosystem' thinking within the eight acupuncture points of society 4.0. How much did the vision of society 4.0 dictate your behaviour when prototyping?

Q14: Are you currently using U.Lab/Theory U in your career or personal life?
Appendix D: Coding and Tags

Question #5: What are the main challenges that U.Lab seeks to address, in your understanding?

- Pre-defined tags: Sustainable development; transition of society towards sustainability.
- Post-defined tags: Emerging future; 3 divides; connection (inner self and collectively); real gaps; sustainable solutions/values.

Question #7: What concepts are included in U.Lab definition of sustainability?

- Pre-defined tags: The Sustainability Challenge; ecological and social unsustainability of current situation; increasing pressure, urgency (funnel metaphor).
- Post-defined tags: Social/ ecological/spiritual divides; 8 acupuncture points; ego-system to eco-System; awareness; consciousness; can’t remember

Question #8: Can you provide an example of an ecological, social, or spiritual/cultural struggle that U.Lab highlights?

- Pre-defined tags: exponential population growth; increasing demand for natural resources; increasing economic inequality; ocean acidification; ozone depletion; chemical pollution; biodiversity loss; increasing land use and decreasing viable, productive land; increasing nitrogen, phosphorus and other concentrations in the biosphere; climate change; continued structural obstacles to health, influence, competence, impartiality, meaning-making.
- Post-defined tags: Open heart, open mind, open will; ego-system to eco-system; can’t remember

Question #10: Guidelines for moving society towards sustainability

- Pre-defined tags: A clear set of boundary conditions (same across many responses) for any results of U.Lab that necessarily helps move society towards sustainability.
- Post-defined tags: No guidelines; deep listening; sensing; open heart, open mind, open will; can’t remember

Question #13: Can you provide one or more examples of when the vision of Society 4.0 impacted your prototyping process

- Post-defined tags: Society 4.0 as vision of success; connection with the heart; organizing in the community; consciousness; awareness; emerging future

Question #14: Are you currently using U.Lab/Theory U in your career or personal life?

- Post-defined tags: Direct use - using it at work; influenced by it in personal life; using in trainings; facilitation; work in communities.