



# ICT AS ENABLING TECHNOLOGY

Making ICT work: co-design for sustainable lifestyles

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## G-STIC 2017

### POSITIONING LIVING LABS WITHIN THE SDGS

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# 1. Aim of the event

In 2015, the **2030 Agenda for Sustainable Development Goals (SDGs)** was adopted by countries around the world, in recognition of the urgent action required to both curb global temperatures, and improve the quality of life for all of its inhabitants. With profound global implications, **17 goals** have been universally agreed upon in order to overcome massive challenges in sustainable development. It is the responsibility of each country to assume ownership, embed sustainability principles into practice and policy, and advance an agenda that encompasses all sustainability dimensions. Ranging from eradicating global poverty, overcoming the stark education divides that exist, building partnerships for action and supporting transitions to sustainable communities, cities and societies, **the SDGs target the crucial connections between economic growth, societal prosperity and environmental stewardship.** Underpinning all of these efforts is the promise to leave no one behind in the process, and the clear need to reconsider the current business-as-usual paradigm.

**The 1<sup>st</sup> Global Science Technology and Innovation Conference (G-STIC)** took place between **23rd-25th October 2017**, representing a global push to work across national and sectoral boundaries, and identify innovative and feasible solutions to help the world achieve the SDG's. Most importantly, this was delivered with the belief that broader forms of technical innovation must be strengthened and supported. One pivotal conclusion was underlined at G-STIC; **ICTs must be regarded as an indispensable tool to enable the achievement of the SDGs.**

Focused on integrated technological solutions that are good for the planet, for the people and for the economy, G-STIC 2017 provided a unique chance to join the global technological innovation community that is single-mindedly devoted to enabling transitions to less carbon and resource-intensive economic development models.

Similarly, G-STIC aimed to contribute to a **systemic change**. G-STIC was focused on building knowledge bases and global expert networks to support the technological transitions that are needed for the implementation of the Paris Agreement and the 2030 Agenda for sustainable development.

**G-STIC placed a deliberate focus on 12 themes.** To maximise the impact on the achievement of the SDGs, G-STIC 2017 activities were structured in **8 thematic clusters** (Agroecology, Circular Economy, Smart Water, Urban Mobility, Sustainable Buildings, Energy Efficiency, Waste Water and Sustainable Technology & Development) and **4 cross-cutting themes** (Climate-Smart Technology, ICT, Gender and Youth). Each of these 12 themes was managed by a dedicated team, and focused on selected market ready technological solutions.

## 2. Cross-cutting theme: ICT as enabling technology

This report will overview the main issues covered during the cross-cutting theme of **ICT as enabling technology**, aimed at exploring how ICT solutions can create opportunities for strengthening sustainable lifestyles.

ICT is crucial in developing integrated technological solutions as it links to innovation across a wide range of sectors. Hardware, software, connectivity (solutions) and data innovations are all part of the ICT theme and are technologies that could enable implementing the SDGs and the transition towards more sustainable lifestyles. It is therefore important to look at the adoption of technology by society as a whole and the opportunities and risks, as well as by end-users and contributions to individual sustainable lifestyles. In this sense, G-STIC not only intended to bring relevant stakeholders together to open new collaborative partnerships, but also intended to generate a set of national and international policy recommendations to accelerate these processes and the implementation of the SDGs.

Through a series of **four sessions**, this cross-cutting theme explored the relevance of ICT in delivering the SDGs. To this end, the following points were discussed:

- How ICT can enable implementation of all SDGs on the basis of specific **global reports**: *ITU's Fast Forward Progress: Leveraging Tech to achieve the Global Goals* and GeSI's [#SystemTransformation](#) and [#SMARTer2030](#).
- How to achieve ICT impact and **sustainable lifestyles that are inclusive and gender sensitive**; including **end-users, consumers and citizens** in the equation.
- How the **private sector** is developing integrated SDG solutions, with a specific focus on smart water solutions - companies presented good practices.
- How Living Labs as user-centred, open innovation ecosystems based on a user co-creation approach can bring Quadruple Helix actors (industry, academia, public sector and consumers/citizens) together to co-develop integrated SDG solutions - ENoLL showcased six worldwide examples of Living Labs.

### 3. Positioning Living Labs within the SDGs

Despite the potential of ICT in delivering sustainability, **user participation and scalability** remain a complex and challenging task, dependent upon multiple factors. Both infrastructure and connectivity are essential conditions for more sustainable societies. ICT technologies however require a **holistic approach to the SDGs**; one that takes people into account and integrates ICT into the very policies, infrastructures and solutions of the future. One which encourages experimentation and learning, crosscuts sectors and brings together partnerships in new ways. In

overcoming the uncertain nature of digital innovation from a citizen perspective, solutions have the opportunity to rapidly embrace the needs, concerns and capacities of the very people that they aim to reach. Through arrangements such as living labs, co-created innovation offers the greatest promise to simultaneously overcome both supply-side and demand-side barriers to ICT deployment.

Since 2006 the movement of “labs” has grown enormously across a great variety of forms and domains like Fablabs, edulabs, policy labs, xlabs, and of course more open Labs. **Living Labs** are defined as **user-centered, open innovation ecosystems based on a systematic user co-creation approach**. They integrate research and innovation processes in real-life communities and setting, placing the citizen at the center of innovation. Living Labs have in this way demonstrated their ability to better mould the opportunities offered by new ICT concepts and solutions to the specific needs and aspirations of local contexts, cultures, and creativity potentials.

In order to collaboratively develop solutions that can work towards the achievement of the SDGs, engaging all stakeholders, industry, government, research institutions, consumers/citizens/end users, collaborative partnerships and/or Labs-Collaboratories remains a central task. The international community, **European Network of Living Labs (ENoLL)**, brings together a wealth of knowledge in this respect, benchmarking and reaching out to Living Labs globally. By scaling-up practice from local to transregional and transnational communities, ENoLL and its members are creating bridges between different stakeholders and giving access to pilots Europe wide and globally.



ENoLL was involved in the ICT as enabling technology sessions and presented the network, its activities and members to the G-STIC participants at the ICT thematic island. Secretary of ENoLL, Pieter Ballon, spoke at the first ICT session on the 23rd October. The panelists which spoke at the ICT session that took place in the afternoon of the second day of the conference, were ENoLL President and Laurea Director Tuija Hirvikoski (Laurea Living Lab), Dr. Dimitri Schuurman (imec Living Lab), Dr. Belinda Chen (Taiwan Living Lab), ENoLL Vice President Artur Serra (i2Cat), Phil Donaldson (Adelaide Living Lab), Adam Olszewski (Poznań Supercomputing and Networking Center (PSNC)). Zsuzsanna Bodi, who is managing the association of Living Labs, opened the session to present the network and its 11-year long history.

## **4. Key highlights from the speakers**

### **4.1. Session 1 – ICT Opportunities for Sustainability across all sectors and SDGs**

On Monday morning the first of a set of four sessions was held. Opened by Tuija Hirvikoski and moderated by Marco van der Ree and Kristina Modée, session one set the stage for looking at ICT technology in its broadest sense - connectivity, hardware, software applications and data - and its impact on implementing the SDGs.

- **KeyNote 1: ITU, connecting the world**

Malcolm Johnson - ITU Deputy Secretary General.

**ITU** is the **United Nations specialised agency for information and communication technologies** – ICTs. They allocate global radio spectrum and satellite orbits, develop the technical standards that ensure networks and technologies seamlessly interconnect, and strive to improve access to ICTs to underserved communities worldwide.

Malcolm Johnson (ITU deputy secretary general) represented ITU at G-STIC, whose main aim is to connect all the world's people – wherever they live and whatever their means, carrying the vision that the fundamental right to communicate is protected and supported for everyone. In fact, **ITU's motto** is **“leaving no one offline”**.



According to ITU, two years after the adoption of the SDGs, there are still numerous challenges unsolved, which adds enormous pressure to cities and regions internationally. Growth of mobile-broadband subscriptions continues incrementally (20% per year), which means a systematic increase in data consumption. Internet penetration rates are also growing, for which getting more women online must be a top priority. In this regard, the **main output** from ITU is an international treaty on worldwide allocation for 5G: the Radio Regulations.

Thus, in order to implement crucial SDGs domains such as **infrastructure**, **climate action**, **resilience** and **economic growth**, different uses of satellites need to be promoted. For instance, new small satellites providing mobile service to rural areas would systematically increase the number of people connected to the internet. Earth observation related satellite functions also have the potential to impact on better environmental data collection, disaster management and economic development.

- **KeyNote 2: ICT delivering the SDGs - a business perspective**

**Luis Neves - GeSI Managing Director.**

In collaboration with members from major Information and Communication Technology (ICT) companies and organisations around the globe, the Global e-Sustainability Initiative (GeSI) is a leading source of resources and best practices for achieving integrated social and environmental sustainability through ICT.

Through the presentation of GeSI's [#SystemTransformation](#) and [#SMARTer2030](#) reports, Luis Neves (GeSI managing director) highlighted how ICTs can decrease global carbon emissions, stimulate economic growth and deliver benefits to society. They enable improved customer centricity and new business models building on increased digital density. Yet, to fully realise the potential of ICTs, stakeholder action is required with policy action as a key priority.

**Prioritised policy action areas:**

- National CO2 targets;
- Investments incentives in infrastructure deployment;
- Fair, balanced and consistent regulatory approach.

But **why digital?** GeSI outlined a set of properties to transform the world with speed and impact:

- **Diffusion Speed & Reach.**  
23x higher adoption rate for mobile networks vs. grid electricity in Sub-Saharan Africa. The 90% of world's data was created in the last two years.
- **People centric.** There will be 100 billion connected devices by 2030.



- **New Business Models.** 326 % growth rate for smartwatches, taking over market share from Swiss makers. 100% growth rate for MKopa, delivering solar-based off-grid lighting solutions.

Further, GeSI foresaw three categories of barriers hindering the transformative power of digital solutions for SDG achievement:

- **Rules of the game** – inadequate regulatory environment in all regions and limited awareness about digital solutions’ potential towards SDG achievement;
- **Supply** – lack of available capital for financing regions; lack of integrated standards across technologies in regions.
- **Demand** – lack of ICT skills, low affordability of ICT solutions.

- **Living Labs**

**Tuija Hirvikoski - ENoLL President.**

Tuija Hirvikoski, President of the European Network of Living Labs (ENoLL) Council, introduced Living Labs and their **systemic approach in engaging citizens and end users in ICT innovation processes.**

Tuija explored **Living Labs’ origins as test-beds.** Previously, companies, who already created new technological solutions, wanted to experiment and validate what they created in real-life conditions together with research institutes. **Today, however, from the point of**

**view of sustainable solutions, Living Labs are more concerned with co-creating solutions jointly with end-users.**



From a business perspective, Tuija contends that involving users shortens the phase from design/research to the actual mainstreaming of innovation. In this sense, Living Lab methods allow people to be involved in all phases of the innovation process thanks to. From idea generation to building prototypes, from design to commercialisation. When citizens true values and needs are heard and understood, we will all be in a better position to create solutions that respond to societal needs. Tuija concluded by making a claim on the urgency to **combine technological innovation and social innovation** to solve ethical and privacy implications and to facilitate the transition towards more sustainable lifestyles.

**Q&A. Marco van der Ree facilitated a round of questions and answers between the speakers and the audience concerning the topics previously discussed.**

**Q1. How do we make the mental shift from technology as an enabler?**

**A1.** Companies need to get together and share positive results, how to achieve them and the advantages of the change, so they are able to show how they have made the shift. This is essential for bringing competitiveness back.

**Q2. How long does it take for a project to go from the design to the upscaling phase?**

**A2.** The time frame varies between projects from months in the case of an e-learning solution for SMEs, to 6 years for a robotics project on assisted living. Here, the turning point was in the duration of experimentation phase.

**Q3. From a Policy Lab position, how do we export solutions from one Living Lab to another? (Scalability)**

**A3.** Normally it helps if public authorities have a basic understanding on how these type of innovation processes function. Scaling up from country to country (e.g. Spain to Finland) requires a 'brokering' entity such as EnoLL, in order to find the right partners and the right knowledge. Innovation pilots still need public funding (EU), but hopefully this public funding will attract private funding. After all, commercial partners are needed to create impact and business opportunities.

## 4.2. Session 2 – From Opportunity to Impact: Sustainable Lifestyles enabled by ICT

The second of the sessions, held on Monday afternoon, looked at ICT innovations from the user perspective. The focal point of discussion was on how ICT solutions can support implementing people's sustainable lifestyles, in their personal lives, in cities, at work, etc. The following issues were explored: behavioural change, monitoring, measuring, nudging, incentives, communication, lifestyles, communities and inclusion.

- **ICT Innovations facilitating the transition to sustainable lifestyles**

**Kristina Modée - CSCP Team Leader Sustainable Lifestyles.**

Kristina Modée kicked off session two by framing **ICT innovation as an enabler towards sustainable lifestyles**. Taking inspiration from the work of CSCP in understanding and facilitating transitions towards sustainable behaviour, Kristina opened by questioning the notion of the '**good life**', and what this might mean for sustainable people and communities of the future. Rather than material goods, overcrowded cities and polluted resources, **human wellbeing often connects to conditions such as health; safe space; clean environments and a vibrant social life**. Ultimately however, this vision of a good life, with all of these pieces in place, needs sustainable innovations.

Moving forward, Kristina underlined that **ICT can be an effective trigger to change consumption and lifestyle patterns at the individual level**, especially when paired with a consumer/citizen-centric approach to



innovation. Firstly, she discussed the role of individual behaviours in the context of lifestyles, as well as the needs of people. Values, norms and habits play an important role in changing lifestyles and consumption patterns, particularly when we require long-term changes to occur. Secondly, Kristina proposed co-created solutions as central to the debate, and stressed the connection between individual and societal pressures for behaviour change. Systemic conditions must be able to support, rather than restrict, sustainable patterns of movement, consumption, health, education and wellbeing. Kristina concluded by emphasising that in grasping the connection between these elements - the individual and collective patterns of behaviour, wellbeing and sustainability principles - we can further identify hotspots, bottlenecks and drivers that stand in the way of achieving the sustainable development goals.

- **From Opportunity to impact: sustainable lifestyles enabled by ICT**

Pieter Ballon - IMEC-SMIT, VUB Director.

Following Kristina's introductory presentation, Pieter Ballon zoomed in on **how to implement and demonstrate the impact of ICT for sustainable lifestyles**. As such, he presented the tools and methods that are currently being used by IMEC-SMIT, VUB to measure and evaluate ICT-enabled solutions.

Pieter began by framing **SDG 12 as an ambitious goal which**, on paper, requires citizens and users to adapt their current lifestyles and behaviours. In reality, **lifestyles are embedded in both individual and social conditions that might not be sustainable.**



Pieter initially focused on the user perspective, highlighting how ICT is currently being used to subtly enable social comparisons, provide information to users, and nudge or incentivise individuals into making more sustainable choices. He underlined that in order to effectively understand how ICT can be used in different conditions, and across different sectors to the benefit of SDG 12, it is necessary to also understand individual and collective factors that are at play.

By drawing upon **behavioural theory** and integrating ICT into data-driven environments that can capture and add context to user practices, Pieter discussed experiments that are being tested by IMEC in Belgium. Through case examples, he illustrated the importance of understanding behaviour in a holistic way. It is with this understanding that behavioural change

experiments can be designed to test and evaluate the impact of different approaches for replication. Pieter concluded by directing attention to ethics and privacy, unintended consequences and surrounding tensions between individual and collective patterns when considering ICT-enabled lifestyles.

**Q&A. Marco van der Ree facilitated a round of questions and answers between the speakers and audience concerning the topics previously discussed.**

**Q1. With regards to persuading people to make better choices. There are traditional ways like the ones mentioned earlier, but technology is currently having a lot of impact on changing perceptions and behavior.**

**A1.** There are ICT technologies and opportunities that make people change their sustainable lifestyles without them knowing it or just for the sake of convenience, for instance, NEST. However, we need to watch out for perverse effects. People's choices are based on convenience, but it is also necessary to actively monitor to avoid perverse effects (inefficiency, costs).

**Q2. Ethical and privacy implications on creating consumers profiles. Where would you say the line is?**

**A2.** We should be transparent about all these incentive processes; there should be a protocol where people can agree or disagree. The dividing line is to pass from nudging to nannying. Nudging is persuading; making it easy for the individual to do the right thing (ethical). And it also takes away the cost of the negative effects. Nannying is pushing to do things that the individual would never do, and forcing, then it is not ethical. But nudging for sustainable behavior and lifestyles is not enough; policy is needed to support the latter.

- **E-inclusion**

**Ilse Mariën - IMEC-SMIT, VUB Post-doc Researcher.**

Following the Q&A from the first set of speakers, Ilse Mariën (IMEC-SMIT, VUB) discussed crucial and critical aspects that she considers to be at the heart of inclusion in any transition towards digital societies. Drawing upon her PhD work, as well as additional experience researching e-inclusion in both Flanders, Belgium and South Africa, Ilse highlighted **consequences of rapid digitisation in both developed and developing contexts**, with an explicit focus on user and citizen-centric innovation.



Firstly, she argued that the withdrawal of users can occur due to the proliferation of a certain technology. Secondly, Ilse highlighted the matthew effect - which suggests that introduction of technologies can actually reinforce existing inequalities between rich and poor - as an example of how, if not considered critically, digital innovation can actually disempower large groups citizens in society.

Ilse further urged caution in the development of ‘**smart interventions**’ and growth of the data-driven society, citing recent examples of top-down experiments that have had ethical or privacy-related consequences. Ilse concluded by advocating for the inclusion of citizens in design processes, as well as the co-creation of policies with multiple stakeholders.

### **4.3. Session 4 – Collaboration for Results and Accelerated Implementation, Testing/Experiencing ICT Sustainability Innovation through Living Labs**

On Tuesday afternoon, the final session of the cross-cutting theme “ICT as an enabling technology” took place. Chaired by Marco van der Ree and jointly moderated by Tuija Hirvikoski and Zsuzsanna Bodi (ENoLL), the round comprised six living labs and focused on collaboratively developing SDG solutions, engaging multiple stakeholders. The European Network of Living Labs (ENoLL) brought together and showcased Living Lab experiences, best practices and lessons learned, contributing towards the discussion on Living Labs and their implications for the SDGs.

- **Key Note - ENoLL**

Tuija Hirvikoski - ENoLL President & Zsuzsanna Bodi - ENoLL Association Manager.

**Tuija Hirvikoski and Zsuzsanna Bodi (ENoLL)** set the scene with an introduction to the living lab approach, and the growth of ENoLL as a transnational network for Open Innovation. The **European Network of Living Labs (ENoLL)** is the sustainable outcome of a former European project that has evolved since its conception in 2006 into today's global network. ENoLL focuses on facilitating knowledge exchange, joint actions and project partnerships among its 170 members, influencing EU policies, promoting living labs and enabling their implementation worldwide.

The network places people at the centre of product and service development and innovation by providing transnational and Open Innovation platforms in three main areas such as **Social Innovation, Industrial Demonstration and Open Science (3Os Strategy)**. By adopting a **Quadruple Helix approach** ENoLL aims at fostering inclusion within urban and regional contexts by developing, managing and contributing to local ecosystems and inter-disciplinary teams.

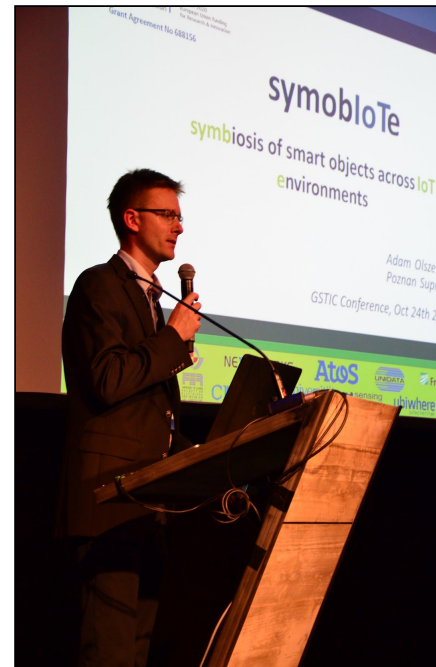
Zsuzsanna highlighted **ambitions** of the network; to support Living Labs, create studies that help policy makers and lobby for policies and initiatives that are in line with ENoLL's interest. Work of the network can also be seen through its engagement in diverse **projects** that cover many different fields – to which ENoLL provides citizen engagement through living labs. The projects work in spheres, such as **Smart Cities** (SynchroniCity, UNaLAB), **Climate and Air pollution** (iSCAPE and EU-MACS) and **Internet of things** (U4IoT).

Similarly, the network is actively involved in an iterative research process in the field of living labs. For instance, a study that was made jointly by ENoLL, Laurea University, and published by the European Commission “**Cities as Living Labs**” investigated the impact of investment in circular economy. According to the study there is a strong correlation between cities with strong urban strategies (and open innovation ecosystems) and cities that are receiving EU funding through H2020 or FP7 projects.

- **Living Lab examples**
- **Phil Donaldson** showcased **Adelaide Living Laboratories**, a cluster of low-carbon activities embedded politically in the city of Adelaide, Australia. During his presentation, Phil stressed the significance of ICT-enabled platforms to encourage dialogue and partnership building across stakeholders, and reflected on the prospect of Adelaide as a Living Laboratory for smart city initiatives.



- **Adam Olszewski presented Poznań Supercomputing and Networking Center (PSNC)**, a living lab situated in Poland that focuses on user-driven innovation in the ICT sector. During his speech, Adam highlighted the need to capture and understand different values from public bodies, citizens and private industry when striving for sustainability principles.



- **Artur Serra, Vice president of ENOLL**, broadened the discussion through the remark of living labs as new social technologies, embedded in local, metropolitan and digital environments across the globe. He presented examples and details from the CatLabs project, a development agenda in the Catalonia region, pinpointing the growth of living labs as regional policy instruments for urban sustainable development. Artur concluded by questioning living labs as a virtual





innovation system, not bound by space or place, but enabling the participation of every connected citizen.

- **Dimitri Schuurman, living lab lead (IMEC)**, introduced the ‘living lab as a service’ approach through multiple ICT-enabled SME living labs in the Flanders region, Belgium. By actively integrating the needs of citizens and users in innovation cycles, maintaining a panel of participants for projects and deploying living lab districts in a city context, Dimitri drew on multiple living lab initiatives to make explicit links between co-creation, entrepreneurship and sustainability. Moreover, he demonstrated that entrepreneurial living labs are already touching upon the sustainable development goals. Dimitri briefly outlined the future vision for living labs at IMEC, encompassing smart city applications, data-driven experiments, behaviour change validation and real-time experience sampling.



- **Dr Belinda Chan** (Taiwan Living Lab) shared her experiences from Taiwan Living Lab, an award-winning Living Lab that focuses on co-creating digital health, education and retail services in an Asian context. Belinda showcased service design workshops, hackathons and living lab trials as effective instruments in accelerating implementation of context-specific sustainability solutions in Taiwan.



- The final speaker of the session, **Samia Chelbi from DigiArt Living Lab Tunis-Nabeul**, shed light on the progress of Living Labs in education environments in Tunisia. Communicated via a pre-recorded message, Samia discussed the role of creative journalism and digital storytelling as tools to connect people to technology, at the same time stressing the importance of digital literacy in unconnected or newly connected environments.

**Q&A. Tuija and Zsuzsanna (ENoLL) facilitated two panel discussions to critically bring together the role of living labs in achieving the SDGs.**

**Q1. How can we elaborate LL as platforms to invite technological components, society, policy maker, to a shared orchestration table to reach goals. Is it possible?**

- Top-down and bottom-up approaches should be balanced;
- Creating bigger interest in the SMEs;
- LLs can provide the guidance and right contacts to matchmaking based on previous projects to make the multi-stakeholder engagement happen.
- Education is very important for all stakeholders to make them understand what a LL is. After that, putting a platform together comes easier.
- Learning by doing, learning by innovating is a lot more effective than receiving cognitive information. LLs are also educating and creating insights.
- Impact of the LL projects to reach more people really increases with ICT.
- LLs have a very extensive and wide reach to people. So that is important in terms of changing behavior into more sustainable lifestyles.

**Q2. How to use LL and ICT to tackle poverty and hunger?**

- Finding partnerships to upscale to more people quickly to reach the SDG in the years left to 2030.
- If an idea starts local, and there's global partners scaling up is very quickly because ideas are tested in different conditions so there's opportunities for learning.

- Quality education. A very high percentage of the population in developing countries are young. Creating scratch communities, teaching to young people another language: the innovation language, programming. Which at the end means learning to innovate.
- There is no ranking for SDG, they are all interconnected. So there no way to tackle an individual goal, but rather there needs to be a holistic approach.
- Learning Lab in ENoLL, for more LL applicants to learn, and be trained on how to meet a successful criteria to become a recognised ENoLL LL.



- **Session Conclusions**

Following the Living Lab presentations and Q&A sessions, Marco concluded ICT workstream session 4 by presenting several take-home messages.

**Firstly, *Living Labs promote multiple forms of collaboration that can contribute towards the SDGs.*** As an approach, Living Labs stress the importance of shared value and knowledge in tackling complex problems. As a transnational network, ENoLL actively facilitates the exchange of best practices across spatial and cultural contexts. Living Labs in this network can be found on all continents, highlighting the potential of innovation ecosystems in global contexts. ENoLL is also part of a movement towards citizen-driven innovation in all manners, and does not include the multitude of other collaborative networks or laboratories closely aligned to Living Labs. Having said that, in further contributing to the SDGs, the research and practitioner community faces greater urgency in adopting Living Labs to identify and upscale ICT solutions in different political and cultural settings.

**Secondly, *Living Labs support digital and social innovation and foster user participation.*** Living labs show promise in overcoming digital literacy, improving education in unconnected regions and reducing inequalities amongst both young and elderly population. DigiArt Living Lab Tunis-Nabeul exemplifies how Living Labs can break through digital divides, empower younger generations and advance transitions towards more sustainable societies. An ecosystem approach to innovation ensures that users get the chance to be involved and co-create a shared meaning with other relevant stakeholders. The growth of virtual and digital environments further unlocks

new environments where Living Labs can experiment, evaluate and expand to meet current and future challenges in cities, classrooms and consumption patterns. In essence, Living Labs adhere to the vision of G-STIC; to create a future whereby science, technology and innovation converge, and where no one is left behind.

***Thirdly, Living Labs increasingly connect co-created innovation to policy.*** They make innovation processes and outcomes visible to policy makers, often by including them directly in the development of any solution. In cities, Living Labs are gaining traction in smart city strategies, often as districts or areas to co-create and test new solutions to sustainability. Adelaide Living Labs demonstrates the ability of Living Labs to become part of the political fabric of a city, creating a participatory vision for low-carbon urban development in Adelaide.

## 5. Conclusions

In order to advance the discussion surrounding the role of ICTs in the SDGs, several recommendations were relayed at the close of G-STIC.

1. **Connect the Unconnected.** The 3.9 billion people still unconnected need to be included to fully benefit from connectivity. This process needs to be inclusive, and strive to connect those that are often left in the wake of transformation. Education should be paramount in any effort to connect.
2. **Collaborative innovation needs to be strengthened, supported and structured.** We must continue to create interdisciplinary innovation spaces for joint application, co-creation, and implementation. Living Labs calls this the quadruple helix: government, the private sector, citizens, and academia. Innovation needs to be inclusive and solutions need to be funded. The SDGs should be taken as the framework for action in collaborative projects and in developing new business models.
3. **ICT Solutions that deliver sustainability should be identified and fast-tracked for replication.** These solutions need to empower people, taking a “user-centric approach” to influence consumption behavior and provide the opportunity for more sustainable lifestyles.

Further, it is important that in responding to the SDGs, we must address the risks that may impact or be impacted by ICT solutions. Central risks identified during the G-STIC session include:

- Ensuring that ICT solutions respond to, rather than reinforce, existing processes of exclusion and disempowerment that are present in society
- Ensuring that policy, industry, research and civil society continue to converge around ICT innovation
- Rapid digitisation and increasing connectivity present new challenges related to transparency and ethical use of data. This risk crosscuts sectors, societies, markets and policies.

During G-STIC, the presence of ENoLL and affiliated partners underlined a commitment to drive towards the SDGs by fostering sustainable communities, lifestyles and partnerships. Research, industry and policy speakers further demonstrated the potential of Living Labs in implementing, understanding and upscaling new solutions to sustainability. Co-creating sustainability can foster participation, unlock new business models and sources of finance, and capitalise on the rapidly growing density of data generated in our societies.



