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Transformative innovation for a sustainable future

Note by the secretariat

I. Introduction

1. This note presents good practices and policy options on how countries can pursue transformative innovation for sustainable development. Transformative innovation, in this context, is understood to mean innovation that can drive significant systemic change towards the Sustainable Development Goals (SDGs), including by accelerating the green and digital transitions and helping to meet the triple planetary crisis of climate change, pollution and loss of biodiversity.

2. This note is based on the discussions on this topic at the fourteenth session of the ECE Team of Specialists on Innovation and Competitiveness Policies (ToS–ICP), held on 14 and 15 November 2022. It reflects and benefits from the experiences of national governments, academic institutions, civil society, the private sector and international organisations. The discussions at the ToS-ICP session, as well as this note, will feed into the seventieth session of ECE, whose high-level segment on 18 April 2023 will have "Digital and green transformations for sustainable development in the ECE region" as its theme.

3. The next section of this note will present the current context in which transformative innovation is increasingly necessary. The third section will detail the characteristics of transformative innovation. The fourth section will outline the challenges to transformative innovation and set out some policy options that can help solve these challenges. The fifth section will conclude with some reflections on the role ECE can play in promoting transformative innovation.

II. Transformative innovation in a changing world

4. Over the last decades, new technology has provided solutions to many socio-economic problems and improved the lives of millions. New technology is at the centre of redefining industry structures: It is creating business models and trade patterns that alter and extend the sources of competitive advantage. Technological development has thus led to growing competition between leading knowledge-intensive regions. Many countries are seeking to advance in global value chains by becoming innovation-based economies (including via the myriad possibilities presented by digitalization), and are investing heavily

to that end. In order to remain competitive in this environment, it is vital to understand and master the transformative dynamic of innovation itself.

5. At the same time, countries are failing to meet the SDGs. Pandemics, poverty, military conflicts, as well as the triple planetary crisis all increase the urgency of systemic transformation. Such transformations require not only that basic functions, such as food, energy, and transportation systems, become more sustainable, but also that these efforts are coordinated to reinforce one another. In that context, innovation can be an important piece of the solution.

6. The overarching sustainability frameworks that are prevalent in the ECE region today (e.g., the 2030 Agenda for Sustainable Development, the Paris Agreement, the European Green Deal) all take more of a systems perspective than previous policies. They increasingly promote innovation as an element that can reconcile increased competitiveness and economic growth with sustainability concerns. Furthermore, they regard societal challenges as opportunities for continued development and economic growth. The key is to stimulate innovation-driven competitiveness around broader societal concerns. With this orientation, and by harnessing the numerous existing innovation processes (individually and jointly), we can accelerate a sustainable transformation of our societies and innovate to build back better out of crises. This view of innovation as a vehicle for societal change constitutes the essence of transformative innovation.

III. Innovation as a vehicle for sustainable societal transformations

7. In essence, transformative innovation has three main characteristics: (i) systemic changes that pave the way for (ii) a new more sustainable directionality for the society (iii) supported and made possible through the active commitments of a multiplicity of stakeholders in society and industry. The case of the electric car as a transformative innovation for transport illustrates all three characteristics. As highlighted by the Chair of the ECE Working Party on Transport Trends and Economics at ToS-ICP, CO_2 emissions from motorized mobility are expected to grow 27 per cent by 2050 in a baseline scenario.[1] Broad adoption of electric cars therefore has the potential for a truly green transformation, as it would drastically reduce greenhouse gas emissions from transportation and create numerous cleaner jobs. Aspects of the three characteristics mentioned in this paragraph will be illustrated below using this example.

8. First, transformative innovation is about changing the operation of entire systems. Over time, our understanding of innovation has evolved from focusing primarily on research and technology to also involve knowledge creation, commercialization, and process management in multistakeholder networks. The objective of sustainable transformation adds another dimension: the capacity of society to absorb innovations becomes a prerequisite for change. In that sense, transformative innovation aims at creating adaptive systems capable of responding to current and future sustainability challenges. In the case of the electric car, reaching a true green transformation in transport will require alterations in the entire value chain of car production: The critical raw materials included in the batteries will have to be sustainably mined and transported to car factories, to cite but one example. Beyond the car value chain, other critical actors of the system, such as electricity providers and car owners, will also have to adapt their behaviour.

9. Related to the above point, transformative innovation implies breaking down the wider socio-technical regimes built around given technologies, to pave the way for something new. The key is to remove the various barriers that currently prevent innovation from flourishing. Such an endeavour will inevitably meet resistance from within the system and hinder innovation, either by consolidating already existing relationships (i.e. lock-in) or by

[1] See ECE/TRANS/WP.5/2022/2.

developing the system only within existing structures (i.e. path dependency).[23] In essence, such barriers extend beyond the technical dependencies and network effects of the system. They also involve blockages in surrounding actor structures (e.g., groups, networks and value chains) and established institutional or political arrangements (e.g, laws, rules, norms, values and expectations). Hence, while transformative innovation seeks to mitigate for these systemic barriers, it also extends our understanding to involve issues such as innovating our institutions themselves. In the case of the electric car, governments may encounter resistance from the fossil fuel sector and trading partners from whom they import such fuels, and may have to dismantle long-standing subsidies to various actors. Political will, an understanding of the need for a sustainable transformation, and flexibility by the entire society are necessary to remove such barriers.

10. Second, transformative innovation is normative, in that it explicitly promotes transformative processes in line with the Sustainable Development Goals (SDGs). This explicit directionality requires coordination of multiple objectives, with competitiveness, inclusiveness, environmental preservation, health, and provision of decent livelihoods all being equally important. Thus, a critical imperative of transformative innovation is to incentivize actors with diverging interests to innovate and develop in line with the SDGs. This requires a clear strategic vision that emphasizes the opportunities inherent in the SDGs, along with extensive policy work at all levels. In the case of the electric car, governments need to provide this directionality by adopting national strategies for climate change mitigation and green economy, and implement them via measures such as incentives for switching to electric vehicles and educating the public on the importance of the topic.

11. Finally, transformative innovation involves a high degree of complexity and uncertainty, not least because of the multiplicity of actors whose participation is needed. This is manifested at several levels. There are still major uncertainties regarding the non-linear, spurious, and multivariate relationships that ultimately define the conditions for governance and management of transformative innovation. This has implications also for the pursuit of transformative innovation. In the case of the electric car, it is not only the transport sector that is concerned, but also urban planning: Broad uptake of electric cars will not be achieved unless cities build sufficient charging stations. Therefore, governance of the issue has to involve coordination of both transport and urban development authorities.

12. Related to the above point, sustainable transformations do not rely on one single disruptive innovation. They require the combination and coordination of several parallel innovation processes. The challenge is to create synergies and spill over effects between sectors and systems that enforce the larger societal transformation: Hence the transversal and cross-sectoral dimension of transformative innovation. In the case of the electric car, innovations in battery development, smart charging solutions, advances in autonomous driving etc. all have to be considered in parallel. Similarly, processes for transformative innovation also involve a high degree of seamless interaction: between public and private entities cooperating across national borders and legislations; between administrative units increasingly working across established silos; between different professions coming together to solve joint problems; and between new actors participating in different parts of the innovation process. Interestingly, this particular aspect of governance has so far received little attention in the discussions around sustainable transformations.[4]

[2] Gregory Unruh. "Understanding carbon lock-in.". *Energy policy*, vol 28, no. 12 (October 2000), p. 817-830.

[3] David, Paul A. "Why are institutions the ‘carriers of history’?: Path dependence and the evolution of conventions, organizations and institutions." Structural change and economic dynamics 5, no. 2 (December 1994), p. 205-220.

[4] Alexander Hellquist and David Birksjö. "Styrning och implementering av innovationspolitik genom samverkan." (2021).

IV. Challenges to transformative innovation, and policy options to meet them

13. This section will outline four broader challenges that need to be addressed to achieve the desired transformative impact. Linked to these, a set of policy options will identify potential ways forward. Neither the challenges nor the policy suggestions are meant to be exhaustive. Instead, they provide a starting point for detailed discussions over the years to come.

A. Addressing the demand side

14. Any larger transformation requires that the demand-side be involved, as it relies on the acceptance and active participation of private entities and individuals in their roles as addressees, clients, users, and entrepreneurs. Therefore, an important prerequisite for transformative innovation is to address the outflow side of innovation processes, in order to a) promote dissemination and scale-up of new products and processes; b) create demand that stimulates and enriches additional innovation; and c) secure legitimacy and acceptance for the transition itself.[5][6][7][8] This imperative was also mentioned by speakers from the energy and transport sectors at the fourteenth session of ToS-ICP,[9] who noted the need for changes in consumer behaviour when deploying innovative technologies for decarbonization. Participants also highlighted that only uptake of useful innovations on a large scale, including within transition economies, can lead to a truly transformative impact.

15. Policy options that can address the demand side have been discussed by the ToS-ICP:

(a) Public procurement is an instrument that is used by several ECE member States to effectively drive innovation and scale-up, and provide directionality. By being a demanding customer, governments can promote sustainability criteria in public spending according to their national strategies and priorities, spur innovation, and provide a market for diffusion of successful products. Such top-down directionality will also allow awareness of sustainability issues to trickle down through every layer of authority. As highlighted by Norwegian authorities at ToS-ICP, Norway has for over a decade used innovation-enhancing procurement[10][11] (IEP) and pre-commercial procurement.[12] The Norwegian National Programme for Supplier Development (LUP) supports IEP in the country. It has thus far created EUR 35 million in public expenditure savings and 350 new jobs,[13] and provided directionality to innovation efforts in line with the National Strategy for a Green, Circular Economy. It has over 200 success cases of IEP, which include the FangstID system for

[5] Wouter Boon and Jakob Edler. "Demand, challenges, and innovation. Making sense of new trends in innovation policy." *Science and Public Policy* 45, no. 4 (August 2018), p. 435-447.

[6] Mariana Mazzucato. "Governing missions in the European Union." *Independent Expert Report* (2019).

[7] Felix Creutzig, Joyashree Roy, William F. Lamb, Inês ML Azevedo, Wändi Bruine de Bruin, Holger Dalkmann, Oreane Y. Edelenbosch et al. "Towards demand-side solutions for mitigating climate change." *Nature Climate Change*, vol. 8, no. 4 (2018): 260-263.

[8] Ann-Charlotte Mellquist, Maya Miltell, and Niklas Johansson. "De branschvisa färdplanerna för fossilfrihet–innovationspotential och systemanalys." (2022).

[9] See ECE/CECI/ICP/2022/2.

[10] Dag Stromnsnes. "Norwegian Strategic Approach to Public Procurement". 2022. https://unece.org/sites/default/files/2022-09/2_DFO_D_Stromsnes_Innovation%20procurement%20in%20Norway.pdf

[11] Johan Englund and Magne Hareide. “Norwegian Experiences on the Application of Procedures and Rules for Innovation Procurement”. 2022. https://unece.org/sites/default/files/2022-09/8_DFO_Englund_Hareide_Innovation%20procurement%20in%20Norway.pdf

[12] Elisabeth Smith. “Norwegian experiences on capacity building for innovation procurement”. 2022. https://unece.org/sites/default/files/2022-09/9_LUP_E_Smith_Capacity%20building%20on%20IEP.pdf

[13] Elisabeth Smith. “Norwegian experiences on capacity building for innovation procurement”. 2022. https://unece.org/sites/default/files/2022-09/9_LUP_E_Smith_Capacity%20building%20on%20IEP.pdf

automated collection of fishery catch data (good data being a prerequisite for sustainable management and harvesting of wild marine resources) and driverless snowplows for Oslo Gardermoen Airport. A 2021 ECE policy paper on IEP[14] lists other successful examples. Support to SMEs can also be achieved with IEP: As the costs of participating in public procurement can be prohibitive for small business and start-ups, Norway facilitates their inclusion via the StartOff programme.[15] StartOff has engendered several innovative solutions such as smart access to city bikes and floating smart waste containers for boat-dwellers. It should be noted that, while IEP has been used in several countries, its potential to truly promote direction, drive industry and help scale up of successful innovations is still largely untapped. Governments could thus benefit from further efforts in this area.

(b) Several other policy options, such as removal of subsidies that encourage demand for unsustainable products and appropriate pricing of externalities, also have strong potential to address the demand side. A 2016 ECE policy paper on accelerating the adoption of innovations critical for sustainable development[16] may provide inspiration for their implementation.

(c) Governments stand to benefit from creating mechanisms for systematic multistakeholder dialogue, including consumers, researchers and industry. (A successful example is provided again by Norway, where LUP's Partner Programme[17] brings public buyers and innovative suppliers together at dedicated conferences.) Such a dialogue would address the demand side by:

(i) Promoting the necessary behavioural change in consumers by informing them of the negative consequences of business-as-usual.

(ii) Allowing policymakers and innovators to better understand existing demand and direct innovation efforts accordingly.

B. Support new processes for learning

16. Sustainable societal transformations are by nature complex, and solutions are not readily apparent. Continuous experimentation, and embracing and learning from failed experiments, are therefore crucial for identifying the innovations and policies that can have a transformative effect, and helping to let go of those that cannot. Experimentation in this context refers not to arbitrarily trying new ideas, but to an organized search for practical solutions, guided by strategic directionality.

17. As mentioned above, innovating our very institutions themselves, as well as the regulatory frameworks they operate in, is necessary for transformative innovation. In this context, niche experiments are a critical component of the effort to break down or change prevailing socio-technical systems. Several governments in the ECE region, as well as the European Commission, are thus currently undertaking experimental approaches to regulation. For example, the New European Innovation Agenda of the European Commission incorporates concepts such as regulatory sandboxes, test beds and living labs, whereas Germany and the Netherlands have implemented mission-oriented policies. A 2015 ECE paper on public sector innovation[18] may be consulted for further inspiration, examples and policy recommendations on sandboxes, test beds and experimentation, as well as a discussion on the challenges of scaling up what works, stopping what does not, and overcoming risk aversion.

18. With its combined emphasis on experimentation and directionality, transformative innovation is a complex and uncertain endeavour, requiring procedures to verify that it is heading in the right direction. At the same time, it also defies established metrics and methods to project, assess, and evaluate the outcome of different policies. Ongoing evaluation and

[14] See ECE/CECI/2021/5.
[15] Sissel Kristin Hoel "StartOff: An Overview". 2022 https://unece.org/sites/default/files/2022-09/10_StartOff_Sissel%20Kristin%20Hoel_Overview.pdf
[16] See ECE/CECI/2016/3.
[17] Elisabeth Smith. "Norwegian experiences on capacity building for innovation procurement". 2022
[18] See ECE/CECI/2015/5.

learning are therefore a critical strategic dimension of transformative innovation. Scoping efforts, continuous assessment, and evaluation should be used as complementary tools for both control and a strategic development of policies and measures.[19] Furthermore, lessons learned from failures should be shared so others can benefit from them.

19. Several policy considerations can be highlighted in this context:

(a) A combination of various approaches to evaluation is needed for sufficiently nuanced learning. Evaluation can support either control or development. Evaluation for control focuses primarily on ex-post goal achievement, in order to establish responsibility in a hierarchical chain of command. In doing so, it also becomes a strategic instrument for transparency and trust.[20] Evaluation for development, on the other hand, seeks to improve future policies and measures by either 1) mapping and assessing an ongoing activity without questioning its goals (formative evaluation); or 2) questioning whether the goals, or even the problem itself, were relevant for the intervention (summative evaluation).[2122] Summative evaluations are currently gaining increasing attention, as they generate the strategic (rather than operative) learning necessary for sustainable transitions.[2324] The central point, however, is that evaluations for both control and development are needed. Ideally, the two types should be kept separate so that they do not contaminate each other.[25] Similarly, evaluation for development should be closely intertwined with policy, carried out on an ongoing basis, and led by those directly involved in the work, possibly with guidance from external consultants. This way, direct feedback can facilitate policy revision and strategic alignment.[26]

(b) There is also a need for new metrics and methods. Indeed, transformative impact cannot be measured by traditional metrics of innovation such as funds obtained from venture capital firms. Instead, it should be measured using indicators such as poverty reduction, decrease in greenhouse gas emissions etc. Capturing the complexity inherent to the governance of transformative innovation is another challenge.[27] In both cases, there is important work in progress in the ECE region, with digitalization increasingly used for better data and metrics. For example, the Arloesiadur collaboration between Nesta and the Welsh government mines data from company websites and social media platforms and uses machine learning and natural language processing techniques, in order to gauge how well Welsh innovation policy supports economic growth.

(c) Evaluation results must be readily available and broadly disseminated, so that the lessons learned can benefit all. Currently, policy learning from external evaluations regarding sustainable development is often limited to a few actors, and evaluators lack competence to evaluate systems.[28] There are also limitations in the ability of the public system to absorb evaluation results and keep using the learnings. Therefore, creating acceptance for evaluation and learning also go straight to the heart of transformative innovation in its

[19] Harald Rohracher, Lars Coenen, and Olga Kordas. "Mission incomplete: Layered practices of monitoring and evaluation in Swedish transformative innovation policy." *Science and Public Policy* (2023).

[20] Evert Vedung. Utvärdering i politik och förvaltning. *Studentlitteratur* (2009).

[21] Michael Quinn Patton, *Developmental evaluation: Applying complexity concepts to enhance innovation and use*. (Guilford Press, 2010).

[22] Ibid.

[23] Jason Potts and Tim Kastelle. "Public sector innovation research: What's next?." *Innovation*, vol 12, no. 2 (2010), p. 122-137.

[24] Effie Amanatidou, Paul Cunningham, Abdullah Gök, and Ioanna Garefi. "Using evaluation research as a means for policy analysis in a 'new'mission-oriented policy context." *Minerva*, vol. 52 (2014), p. 419-438.

[25] Ibid.

[26] James Meadowcroft. "What about the politics? Sustainable development, transition management, and long term energy transitions." *Policy sciences*, vol. 42 (2009), p. 323-340.

[27] Mikael Román, and Evert Vedung. "Politik för hållbar omställning: Utmaningar och möjligheter för utvärdering." (2021).

[28] Susana Borrás and Mart Laatsit. "Towards system oriented innovation policy evaluation? Evidence from EU28 member states." *Research Policy*, vol. 48, no. 1 (2019), p. 312-321.

ambition to create adaptive system. What is required is an overall system for evaluation that fosters critical thinking and continuous improvement as part of a policy cycle.[29]

(d) An adaptable workforce that can keep up with the dynamic nature of digitalization and transformative innovation is another necessity. Continuous learning is key in this context. Furthermore, transformative innovation requires letting go of institutions, innovations and companies that do not achieve the desired impact. This will by default make certain employees obsolete. Both public and private entities need to invest in learning, reskilling and upskilling programmes so that no one is left behind. Such programmes must have strategic directionality and align with broader sustainability goals. Many companies in the ECE region are exploring the use of digital technologies precisely to enable this kind of learning: Mastercard, for example, employs AI to model the impact of emerging technologies on jobs and analyzes large data sets from many sources (e.g., performance management, job descriptions, career development conversations) to create bottom-up worker profiles and identify training needs.[30] Online platforms that allow employees to assess their own skillsets and create customized training plans are in place in companies such as PricewaterhouseCoopers.[31] *(N.B. Mention of specific companies does not imply endorsement of their actions or policies.).*

20. On a broader level, capacity building on the nature of transformative innovation (including aspects such as directionality, sustainability, adaptability, continuous experimentation etc.) is also needed for decisionmakers in public and private entities and international organizations. Such awareness will allow innovation efforts to be channelled in the most effective and impactful manner. ECE is exploring the role it can play in this context.

C. Promoting seamless interaction

21. As noted above, transformative innovation calls for systemic change, including via continuous experimentation and learning and multistakeholder engagement mechanisms. Success therefore depends on promoting seamless interaction between a multiplicity of actors and across the borders that define sectors, silos, regions and nations. There is a need for flexibility to create new institutional and organizational links, experiment, and remove bureaucratic barriers and other structures that have not proven effective. This is not always easy, as it requires a de-bureaucratization of the innovation ecosystem that is not necessarily compatible with the funding and policy priorities of governments. The creation of the requisite institutions may lead to questions about their ownership and governance. Furthermore, new ways and methods of regulation may become needed as digitalization brings about entirely new industries. Anticipating such needs is difficult given the pace and unpredictability of the digital transformation.

22. Regardless of such challenges, several governments in the ECE region have successfully implemented measures that enable the required seamless flexibility. Their experiences give rise to policy options that merit attention. In this context, examples from three different innovation agencies in the region are presented below for inspiration:

(a) Freedom in mandate execution: The Defense Advanced Research Projects Agency (DARPA) of the United States and the Swiss innovation agency Innosuisse both operate with relatively little political influence. Innosuisse has a four-year funding contract with the Swiss government and can exercise its bottom-up research mandate as it wishes. DARPA, meanwhile, operates as an island that is independent of other military R&D, and bridges directly to senior Department of Defence staff. In Georgia, meanwhile, the government remained backstage and let international experts make decisions when Georgia's Innovation and Technology Agency was established.

(b) Stability of public funding: This helps DARPA and Innosuisse avoid the stop-and-go disruptions to research and development processes. In the case of Georgia, steady

[29] Oldsman, Eric. "Making evaluations count: Toward more informed policy." (2014): 229-246.
[30] Deloitte, "2021 Global Human Capital Needs", 2021.
[31] Eightfold.ai, "4 Successful Examples of Reskilling and Upskilling Programs", 1 June 2021.

financial support from donors and partners such as the European Union, the United States and the World Bank were instrumental in the creation of a strong innovation ecosystem.

(c) Building communities: DARPA and Innosuisse create multistakeholder networks that include their own staff but also researchers, technicians, companies and end users. Innosuisse animates “Innovation Boosters” for communities that work on specific themes such as food ecosystems or blockchain.

(d) A streamlined and fast granting process: The time-to-grant in Innosuisse is only six weeks, and unsuccessful projects can resubmit very quickly. This allows to learn from failures. DARPA, meanwhile, exhibits a flat organisational structure and a streamlined project approval process: It initially dispenses investment to several promising technologies at small scale, and then decides to scale up or abandon based on the outcomes of these investments. This allows project managers to make decisions with speed and freedom.

(e) Internationalization: Due to limited market size, start-ups in small, resource-poor countries need to expand abroad to grow. Innosuisse supports this with direct funding as well as by publicising such companies at Swiss pavilions around the world.

(f) Investment in education, and particularly in technical and applied research: This is crucial for small economies and those wishing to diversify away from commodity dependence. In fact, this can be thought of as one of the key factors behind Switzerland’s prosperity. Georgia, which is similarly small and resource-poor, has likewise achieved success by nurturing its innovation ecosystem in the past 8 years and focusing on technical fields such as artificial intelligence, fintech, civil engineering and e-commerce. This also demonstrates the transformative effect that capitalising on digitalisation can have on transition economies.

D. Harnessing the power of digitalization

23. Our world is becoming more and more digitalized every day. The global scale of this transformation fundamentally alters not only societal conditions, but also the dynamics of innovation itself.

24. First, the innovation system itself is evolving, because digitalization drastically empowers distributed user, household and urban innovation: A digital economy has a lot more information processing, administration, contracting and coordination power outside of firms and in the hands of households.

25. Second, the lower transaction costs inherent in digital economies enable much faster entry into market for innovative firms, as well as faster scale-up and acceleration of individual projects.

26. The economic changes caused by the ever-increasing uptake of artificial intelligence, automatization, blockchain, digital money, IDs, assets, contracts, marketplaces, and social institutions have the potential to spur the kind of innovations that can lead to systemic transformation. E-governance is another aspect of digitalization that has already had a large impact on the functioning of our societies, with many governments reaping the benefits of investing in it. Nevertheless, the risks inherent in digitalization (e.g., cybersecurity, growing inequality due to the digital divide prevalent in the ECE region etc.) must be taken into account, in order to mitigate possible negative impacts.

27. Some policy options that merit further attention are as follows:

(a) Exploring the potential of the platform economy: The term “platform economy” refers to the economic and social activity provided most prominently by digital goods and services platforms. With examples such as ride-sharing applications, peer-to-peer hospitality rental services and online marketplaces becoming more and more common, platforms are changing the behaviours of actors along the value chain at a large scale. Thanks to digitalization, the platform economy streamlines traditional communications channels, enhances transparency and accountability between parties, and provides both access to broader markets and ease of doing business for service providers and customers. In contrast to traditional firms, platforms allow quick scale-up, as they formalize and open markets for

activities that were previously part of an informal economy or limited to smaller contexts. Moreover, the COVID-19 pandemic has furnished signs that platforms may be more resistant to crises than traditional business models. They also have great potential to promote circular and sustainable consumption, for example by becoming pathways for re-commerce. In order to safely and effectively harness the potential of platform economies for sustainable development, governments are encouraged to explore how they can best provide directionality and regulation for these infrastructures.

(b) Offering public support to innovation commons: According to Professor Jason Potts of RMIT University, the keynote speaker at the fourteenth session of ToS-ICP, innovation commons, where communities take collective ownership and management of innovation resources (such as knowledge, digital data, software codes, news, media etc.) are becoming a much greater institutional infrastructure in the innovation system thanks to digitalization. Digital technology provides new means for creating entrepreneurship, by facilitating interaction, enabling knowledge sharing and distribution, and securing transparency, traceability and trust. This presents numerous opportunities that merit a closer look. The digital economy and the rise of the innovation commons can jointly become a global infrastructure for solving socio-environmental problems and achieving the SDGs. Governments should thus reflect on how they can best support, provide directionality to, and benefit from these infrastructures. In terms of successful cases, within the UN system, the UNDP Accelerator Labs can be thought of as one example of an innovation commons. The European Commission highlighted two other examples at the ToS-ICP: First, the EU Mission "100 Climate-Neutral and Smart Cities by 2030" which, with its Mission Platform that will provide access to various online resources and tools, an online peer learning and collaboration space, as well as zero-carbon technology and innovation factsheets, will support cities on their journey to climate neutrality by 2030. Second, the European Corporate Days hosted by the European Innovation Council constitute a business acceleration service that brings together large corporations with innovative start-ups for exchange of ideas.

V. Conclusions

28. As demonstrated above, transformative innovation is equally necessary and complex. Achieving it will require fundamental changes in the way we operate, and perhaps above all in the way we coordinate and support innovation activities. Further discussion is needed on the challenges and policies mentioned above, as well as on other aspects such as financing, reducing the digital gap in the ECE region, the specific context of transition economies etc. This note is intended to provide a starting point.

29. Several groups, initiatives, and programmes in the ECE region are promoting transformative innovation and provide studies, policy dialogues and best practices. These include the UNDP Accelerator Labs (whose membership only includes developing countries), the European Network of Innovation Agencies (which focuses mostly on high-growth enterprises), the Transformative Innovation Policy Consortium (whose geographic focus is on developing countries outside of the ECE membership) and the ITU International Center of Digital Innovation (which focuses mostly on connectivity issues), among others.

30. In 2022, ECE launched the UN-ECE Transformative Innovation Network (ETIN). Funded by the German Federal Ministry for Economic Affairs and Climate Action, ETIN aims to reinforce the innovation ecosystem in the ECE region to promote innovation and digital technologies for sustainable development and for the circular economy transition. ETIN provides capacity building and a platform for policy dialogue and exchange of best practices. Compared to the actors mentioned above, ETIN can fill a niche by bringing both the developed and the transition economies of the ECE region to the table to learn from each other, identify issues needing further discussion, and jointly develop best practices in response. It can also draw on ECE's convening power to pave the way for multistakeholder engagement, including with the private sector and the research community. In line with the theme of the seventieth session of ECE, ETIN will continue promoting digital and green transformations for sustainable development.