DigitalSkills4Future.eu:

Improving skills of citizens and professionals on the twin transition

Claire Gauthier [1)], Mairi Higgs [2)], Fabian Scherf [3)], A. Fiona Schmid [2)], Joseline Silva Cousino [3)], Oleksandr Sushschenko [4)]

1) PhD student in political science, European University Viadrina, Frankfurt-Oder, Germany,
& Centre Marc Bloch, Berlin, Germany

2) Master student in Risks and Environment, Université Paris 1 Panthéon-Sorbonne, France

3) Master student in European Studies, European University Viadrina, Frankfurt-Oder, Germany

4) UNDP expert on Green Economy and Financing and research assistant, European University Viadrina

Executive Summary

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The COVID-19 pandemic underlined the need for structural changes towards a more digitized society. It both accelerated digital policies and also revealed weaknesses related to the digitisation process of the European Green Deal. Along with the diffusion of information and communication technologies in climate change adaptation and mitigation comes the necessity to support education on digital and sustainable transitions for a broad range of actors: Not only of citizens as consumers but also of public and private professional stakeholders as providers of innovative products and services.

Supported by the programme "Pensées Françaises Contemporaines" and the Centre Marc Bloch and within the framework of the competition "Utopie Europa" of the French Embassy in Berlin, we, six students from the universities Europa-Universität Viadrina (EUV) and Paris 1 Panthéon-Sorbonne (Paris 1) have devised a proposal to tackle the challenges and provide solutions correlated with the use of digital technologies for the green transition within the European Union (EU).

While discussing with experts from think tanks and non-governmental organisations (NGOs), industry representatives and scholars, we identified a demand for education on the application of digital technologies such as digital ledger technologies and data management as an obstacle to an effective transition in the energy sector and in disaster risk management. Hence, we developed the concept of an inclusive European education platform, including adapted MOOCs and training courses so that members of European societies may understand better and engage with these issues. The goal is to provide European citizens with tools and knowledge to take climate action on several levels - from local to global scales. Within categories like digital solutions for the energy sector, digital technology in environmental risk management, digital climate democracy and justice, digital sobriety or digital eco-innovation and investment, the platform offers resources in different forms, for different levels and time frames. We welcome partnerships and are open to embedding our platform within existing or ongoing similar initiatives. We inscribe our proposal in the context of the European Green Deal and the ongoing process of the twin transition, which corresponds to the complex interaction between the digital and many sustainably driven transitions of the EU.

I. Background of the initiative

In fall 2020, we, a group of six students from the Europa-Universität Viadrina (EUV) and Paris 1 Panthéon-Sorbonne (Paris 1) gathered via the programme "Pensées Françaises Contemporaines" to learn about and discuss the positive and negative environmental impacts of ongoing digitisation. Focusing on the applications of digital technologies for climate change mitigation and adaptation, we linked our exchange to current European policy actions relating to this *twin transition* (see part II.B. below). Besides following courses in both universities and organising two panel discussions, we took part in the competition "Utopie Europa" in March 2021, organised by the Embassy of France in Germany, the Institut français in Berlin and the French-German University. Having pitched the idea of our platform *DigitalSkills4Future.eu* to a distinguished jury, we would now like to bring our project to the attention of policy makers and academics. In order for citizens and professionals to better comprehend the complexity of the so called "twin transition" and engage with it, our proposal aims to provide online educational resources, a catalogue of participatory initiatives and a forum dedicated to the overlapping aspects of sustainability and digitisation.

Utopias are imaginary projections of an ideal social and political framework, that despite being superior to the current state of society are often impossible to reach or require resources beyond those that are currently available. We believe that our proposal is a tangible step towards a digital utopia in Europe: one in which its citizens leverage digital technologies purposely to avoid an undesirable climate future; one in which digital technologies solve more environmental problems than they cause; one in which digital technologies facilitate participation instead of aggravating existing inequalities.

The remainder of this paper should be understood as a first step towards a collaborative effort, a blueprint for our platform to be developed.

II. Research and policy context of the twin transition

In March 2020, the President of the European Commission, Ursula von der Leyen, published an op-ed in several newspapers for her first 100 days in office. She argued that leading both the ecological and digital transitions is the generational task and opportunity for the European Union (EU). This "twin transition" is thus foremost used in a political context.

Moreover, due to the COVID-19 pandemia, the importance of being online has greatly increased. Over 50% of the world's population is online compared to 8% 20 years ago. Current IT-solutions enable over 22 billion devices worldwide to connect, allowing a "real-time" society (Schwab and Malleret, 2020).

In the two following sections, we summarise important research trends and the EU policy context in which we embed our proposal.

A. State of research

We base our understanding of the "twin transition" on research on socio-technical transitions, which are long-term transformations of socio-technical systems fulfilling a societal function, such as providing information,

energy, transport or food (Geels, 2002). The “twin transition” relates to the complex interactions between digital and many sustainably-driven transitions.

Transition research has been primarily driven by sustainability concerns (Kanger, 2020; Köhler et al., 2019). It has also focused on the early phases of transformation of a core technology. As many sustainability transitions enter a phase of acceleration, marked by an increasing scope and speed of change, scholars look at the complex interactions and the pervasiveness of change between multiple systems, technologies or sectors (Rosenbloom, 2020; Andersen et al., 2020; Markard et al., 2020; Markard, 2018).

As generic technologies, ICT plays a central role in the transformation of several socio-technical systems and sustainability transitions. These technologies or actors from the digital sector can solve current challenges in the European energy transition and act as catalyst or accelerator of change in several sustainability transitions (Kolk and Ciuli, 2020; Loock, 2020; Erlinghagen and Markard, 2020). While these examples focused primarily on mitigation, research centered on the potentials of digitalisation for climate adaptation, including for developing countries, also exists (Balogun et al., 2020; Houghton, 2020).

A lot of research focuses on the positive effects of digitalisation on sustainability transitions. But this impact can also be ambivalent, for example in the mobility transition. Whereas automation is a technological innovation supported by incumbents and reinforces the dominant position of cars as mode of transportation, ICT can also provide organisational innovation, supported by newcomers, in which the role of the car is altered (Manders et al., 2016). This last example shows that technology is not neutral, as it can strengthen the status quo and the existing power distribution or provide alternative development pathways.

It is in this context that researchers and other stakeholders question the risks and opportunities of digital technologies for sustainable development (e.g. Renn et al., 2021; Rohde et al., 2021; Lange and Santarius, 2020).

Transition research is moving fast but key questions remain unanswered : to what extent will ICT contribute to stability or change in other socio-technical transitions? Will this change converge towards more sustainable patterns of production, distribution and consumption? How can societies make these interrelated socio-technical transitions converge?

To answer this last question, we should consider that systems with low environmental impact but high indirect effects on sustainable pathways, such as education, have been somewhat neglected by transition research (Kanger, 2020). If *“education as a social process and function has no definite meaning until we define the kind of society we have in mind”* (Dewey, 1916), it plays a crucial role in realising our collective vision by socialising individuals to fulfill their future role (Durkheim, 1956). This point becomes even more important when considering that most consumers may not be aware that sustainability transitions go beyond substituting one technology for another but depend on *“a more profound questioning of required changes in consumption patterns and lifestyles”* (Markard, 2018, 5). Therefore, through its intellectual, political, social and economic functions, education can play a crucial role in making transitions converge (Bennett and LeCompte, 1998 in Cookson and Sadovnik, 2002). For more literature on education in sustainability transitions, we refer to the book by Sterling and Huckle (2014) and the special section on learning in the Journal of environmental innovation and societal transitions in 2020 (e.g. van Mierlo et al., 2020).

B. Policy context

This proposal aligns with current policy priorities at EU level. The European Commission is focusing on how the current and next generations will tackle challenges ahead to make the EU a more sustainable, fair, and competitive place to live and work. The "twin transition" is at the heart of this agenda. The ongoing sanitary crisis and its economic, political and social implications did not deter the Commission from working on a European Green Deal and digital strategy. On the contrary, it sustained and reinforced these priorities considering the investment efforts needed to support the economy.

To proceed with the "twin transition", the EU currently elaborates a set of necessary actions: investments in environmentally friendly technologies; support to the industry to innovate; development of cleaner, cheaper, and healthier forms of private and public transport; decarbonisation of the energy sector; ensure that buildings are more energy efficient; work closely with international partners to improve global environmental standards. To guarantee that no one gets left behind, a Just Transition Mechanism and related Just Transition Fund are established, providing support to the most vulnerable regions in the EU. Because the upcoming changes are complex and require innovative solutions, the European Commission is going to implement IT-solutions on a large scale. It relates not only to activities in the real economy, but should also facilitate green finance mobilisation and a decrease in transaction costs.

We will now highlight relevant initiatives spanning climate mitigation, adaptation, digitalisation and recovery.

Climate mitigation

To achieve climate neutrality by 2050, the European Green Deal includes an array of climate-related and environmental measures in different domains, such as energy, agriculture, circular economy or biodiversity, promoting more sustainable patterns of consumption and production in Europe. These measures are cross-sectoral and transversal to a range of policies, e.g. industrial policy and financial policy.

For instance, considering the materiality of climate risks and accepting their systemic nature for the economy and financial relations, local and national governments are trying to make their financial systems more sustainable to non-financial risks. For this reason, the G20 countries established the Task Force on Climate-Related Financial Disclosures (TCFD) as part of the Financial Stability Board (FSB). As a result, in 2017, the TCFD prepared recommendations on how to make the global financial system climate resilient and sustainable to the outstanding risks (TCFD, 2017).

One cornerstone of the EU's mitigation strategy is the Clean Energy Package for all Europeans, adopted around 2018-2019. By June 2021, the EC should issue new proposals updating those dispositions to align with increased decarbonising ambitions for 2050. Among others, this package provides a regulatory framework paving the way for a decentralised, digital, decarbonised, and democratic energy system for 2030. For instance, through the development of smart cities and energy sharing between individuals or within communities, the benefits of the twin transition should become more palpable for European citizens.

Climate adaptation

In February 2021, the Commission also updated its Climate Adaptation Strategy, which holds an important digital component. It focuses on closing the knowledge gap by providing open data delivered by various European projects, such as Copernicus. In this context, the EC extended the Climate adapt platform launched in 2012 to include a climate change and health observatory in cooperation with the European Environmental Agency. By 2023, the EU will also launch a cloud-based platform, which will digitally model natural and socio-economic information to increase mitigation and adaptation efforts: Destination Earth (see Bauer et al., 2021 for a comment).

The EU also plans to increase local and individual resilience by supporting the update of digital solutions at local and regional level through the Covenant of Mayors and structural funds as well as focusing on retraining and upskilling the European workforce, especially in climate-vulnerable sectors, such as agriculture.

Both climate mitigation and adaptation require major efforts in educating and capacity building for different stakeholders, encouraging them to change their behaviour and make appropriate decisions, including in times of emergencies or disasters, which are likely to increase in the future (Field et al., 2012).

Digital strategy

Several elements of the digital strategy will affect other socio-technical systems, such as artificial intelligence or data governance. We want to highlight the commitments towards a digital education action plan and towards digital literacy and competence in the European skills agenda. Indeed, this agenda calls for an ambitious target of providing 70% of EU adults with basic digital skills by 2025 compared to 56% in 2019. Considering that the COVID-19 crisis revealed the potential and limits of digital education and is considered by many as a point of no-return, it is crucial to harness the momentum and to learn from this experience to support education beyond the borders of schools and universities.

Recovery efforts

To overcome the pandemic and economic crisis, one way forward relies on the “building back better” approach with specific emphasis on the following issues: well-being of the citizens and the planet, fair distribution of the gains, better understanding and measurement of the resilience (e.g. economic system), better tracking of the economic and social capital. As a result, national governments and central banks implemented huge recovery packages with the green economy and finance as a core (e.g. Recovery and Resilience Facility).

The recovery plan adopted by the EU during the global COVID-19 pandemic will allocate more financial support to stakeholders involved in the “twin transition”. Recovery and resilience plans proposed by the EU Member States will have to support a minimum share of expenditure for the green and digital transition, 37% and 20% respectively. Reskilling and upskilling are two of the key components described as possible reforms and investments. Therefore, we believe in education measures to deal with these challenges (cf. European Commission, 2020).

III. Summary and findings of the panel discussions

In order to prepare our project, we conducted two panel discussions focusing on how digital technologies can support both the mitigation of and adaptation to climate change in Europe. Two EUV professors moderated the exchange: for the first panel, Prof Dr Reimund Schwarze, Environmental Economist at the EUV and at the Helmholtz Centre for Environmental Research, and expert on management of environmental hazards; and for the second panel, Prof Dr Jochen Koch, holding the chair of Management and Organization and specialising in innovation and entrepreneurship. We invited panelists from academia, industry, associations and NGOs to discuss the opportunities and challenges in regard to digital technologies. In a first panel, Anne Köhler, director for gas, decarbonisation and digitalisation at the German association of energy market innovators, Anne Rabot, expert on sustainable IT and member of the French network Green.IT and Dr Oleksandr Sushchenko, UNDP expert on green economy and financing and research assistant at EUV discussed the complex question of how digital technologies can be best applied within the European energy transition. Opportunities such as increasing energy efficiency or applying smart distribution meters for enabling consumers to self-produce electricity were identified to help mitigate climate change.

The second panel focused on adaptation to climate change and how technologies could be leveraged to assess environmental risks and support crisis management. Two NGOs concentrating on digital solutions for risk management in crises such as droughts, floods or extreme temperatures, showed how they put them into practice: Juliette Grossmann from the think tank FING (*Fondation internet nouvelle génération*), introduced applications enabling citizens to use technology to improve resiliency against crises and environmental risks. Léonie Miège from CartONG elaborated how Geographical Information Systems, (web) maps, open data or data protection tools could help gather metadata on risks in order to support crisis management as well as to establish effective warning systems to prevent catastrophes. Prof Dr Reimund Schwarze also highlighted citizen participation and access to data as a crucial part of climate governance. Moreover, he underlined the importance of observation facilities for risk management and the combination of using digital ledger technologies (DLT) to smart contracts of crowd insurance.

For both climate adaptation and mitigation, observation, collection and analysis of data are essential, and ICT are indispensable tools. Nonetheless, using digital technologies can lead to issues, and could compromise certain elements of the ecological transition. Even though ICT has the potential to decrease energy demand and the use of material resources, the current balance tips towards more energy consumption and bottlenecks for critical and scarce resources (Lange et al., 2020; Itten et al., 2020; Ferreboeuf et al., 2019). Thus, the use of smart technologies should be limited, and over-digitalisation avoided. Concepts like digital sobriety or lean ICT are key in ensuring a coherent “twin transition”.

We draw the following findings from the panel discussions:

- Digital technologies and smart solutions are essential for optimising an increasingly complex energy system, empowering consumers, i.e. to produce their own energy, and reducing greenhouse gas emissions.

- Deregulation is needed to enable the development of digital technologies. Smarter regulation that incentivizes market stakeholders to further invest in innovative technologies is necessary.
- Digital sobriety is a way of avoiding over-digitalisation.
- Focus should always be on the problem a technology aims to solve, rather than on the technology itself.
- Global access to technology and data collection is to be ensured in order to provide common global solutions and equal opportunities across countries.
- Citizen participation is mandatory – not only in the debate on which technologies to use, but also by involving citizens into the actual application of technology by open-data sources.

IV. DigitalSkills4Future.eu - the platform

A. Purpose of the platform

We advocate for creating an inclusive online platform or embedding it in an existing one, in order to improve transparency and knowledge regarding technologies and sustainability, a smaller carbon footprint, as well as increased efficiency through digitalisation, which contributes to achieving a successful and sustainable Green Deal and helps the EU to remain competitive. Linked topics should be explained in a comprehensive and creative way, including their benefits, problems and future perspectives.

B. Content of the platform

Our platform will cover topics related to the intertwined digital and environmental transitions. The aim is to give people knowledge, tools and an appropriate network in order for them to take climate action on the local, regional, national or international scale. As the challenges of these transitions can vary from technical solutions to public participation and policy, content can be categorised according to the topic to which it refers. These categories would include among others : digital solutions for the energy sector, technology in environmental risk management, digital and environmental citizenship and social justice, digital sobriety or digital eco-innovation and investment. Within these categories, our platform offers resources in different forms, for different levels and timeframes.

Our proposed courses will have labels/tags permitting the learners to choose among the manifold courses that will be offered. Children will be divided into age classes (5-9 and 10-14), whereas adults can classify themselves as beginners, intermediates or experts.

Figure 1: Example of a proposed Massive Open Online Course (MOOC), its duration and difficulty level. Source : Authors' graph.

The platform should be accessible for everyone. Nevertheless, some functions (uploading documents, adding a project, posting in the forum) should only be available to registered users of the platform. To become a

member, a questionnaire has to be completed in order to minimize the risk of fake accounts and spam. With approval from the admins, the person can then use the following functions fully.
Attention should be brought to making sure that each topic is tackled from different points of view. Sustainability issues, technological solutions and transition policies are subjects that require a comprehensive approach instead of a simple problem - solution way of thinking. Opportunities and challenges or risks should be discussed in order to avoid learners to think that one miracle solution exists, but to get them to think critically about what is suggested.

MOOCs

A part of the platform will be dedicated to Massive Open Online Courses (MOOCs). Universities taking part in the project, as well as institutions, governmental organisations and even companies or think-tanks can provide input. Beyond just diffusing informative content, our project plans to encourage as much interactivity as possible. Therefore, the courses available on our platform will contain additional learning material such as peer reviewed work, quizzes, and collaborative projects whenever possible. Additionally, a forum will accompany each MOOC so that the participants can share knowledge, tools, and resources. These courses should be designed to be self-paced.

Document library and project library

The comprehensive document library enables members to upload related documents that are approved and verified before they are posted such as research papers, guides, etc. The project library aims at gathering projects with a link to one of the programmes featured on the platform.

Forum

The forum should be a place for members to share information and to engage with other stakeholders. Another interesting feature of the forum could be a space to learn more about jobs in the sector of the twin digital and environmental transition as well as a space for employers to connect with future employees.

C. Platform organisation :

The organisation of the platform partly reflects that of our project. As a multinational, multilingual group, we brought the best of our academic knowledge together. Partner universities that provide complementary courses will initiate DigitalSkills4Future.eu. The Université Paris 1 Panthéon-Sorbonne could cover technical knowledge of environmental risks and management, whereas the Europa-Universität Viadrina and the Centre Marc Bloch could provide expertise on European policy and digital innovation. Through cooperation, a comprehensive platform can be created and an enriching intellectual experience can take place at the European scale. In a second phase, beyond academic participation, we would strongly encourage organisations, companies, and think-tanks, such as those which took part in our panel discussions to provide input. We found these stakeholders very willing to share what they are doing.

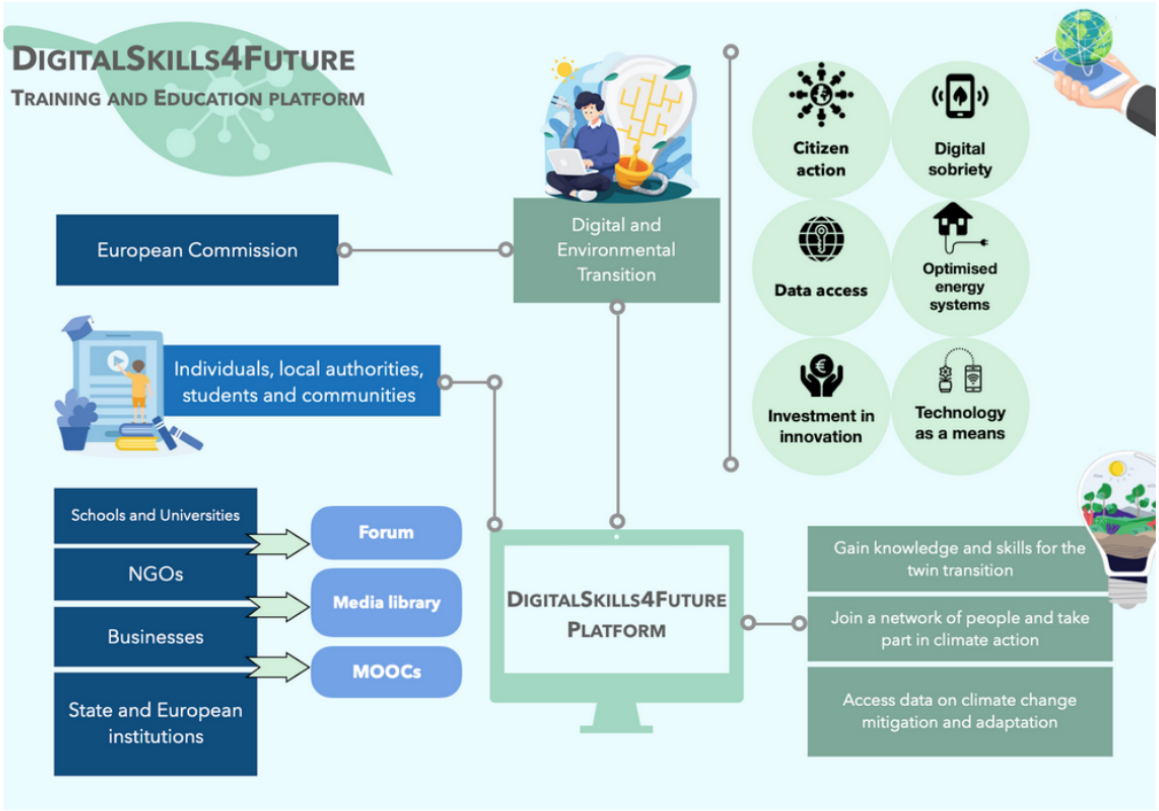
D. Implementation of the platform

The website developer in charge of creating this platform should comply with the European standards for labor and sustainable procurement of ICT, as well as to source its energy from renewables in line with United Nations' SDGs 5 (Gender Equality), 7 (Affordable and Clean Energy), 8 (Decent Work and Economic Growth) and 12 (Responsible Consumption and Production). With regard to the financing, we are hopeful that EU programmes such as LIFE or Horizon Europe could support the development and implementation of such a platform.

V. Conclusion :

In our eyes, the DigitalSkills4Future.eu platform contributes to building a digital utopia in Europe to be implemented by the EU and by our partners. As an open, free and interactive platform it would allow any citizen, student or professional to gain skills relative to the major topics of environmental and digital transition at their adapted level. We believe that in its form, our proposed platform tackles the challenge of information availability, capacity building and democratic policies. Through cooperation between individuals, businesses, NGOs and universities, we hope to strengthen European partnerships and to foster innovation in both the digital and environmental transitions. Our utopia is multi-scale: better knowledge for individuals, accessible tools for local communities and small companies, intra-European partnerships, and a competitive Europe in both types of transition.

Figure 2 : A simple guide to the DigitalSkills4Future platform



Source : Authors' graph.

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