Task Force 4
Digital Transformation

Policy brief

SUSTECH SOLUTIONS: ENABLING NEW TECHNOLOGIES TO DRIVE SUSTAINABLE DEVELOPMENT*

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ABSTRACT

New technologies can help drive sustainable development, what can be called “SusTech” solutions. But how can these be supported by governments adopted by firms (especially in managing value chains) and encouraged by users? This policy brief proposes a three-part solution: (1) The G20 should create a Sustainable Technology Board (modelled after the Financial Stability Board) as a mechanism for coordination, cooperation, and scaling of SusTech solutions; (2) Governments can consider adopting policy and regulatory measures to help firms integrate SusTech solutions into value chains, including drawing from eleven concrete, actionable options; and (3) Examples of how firms have already adopted SusTech solutions, to illustrate opportunity and inspire replication.

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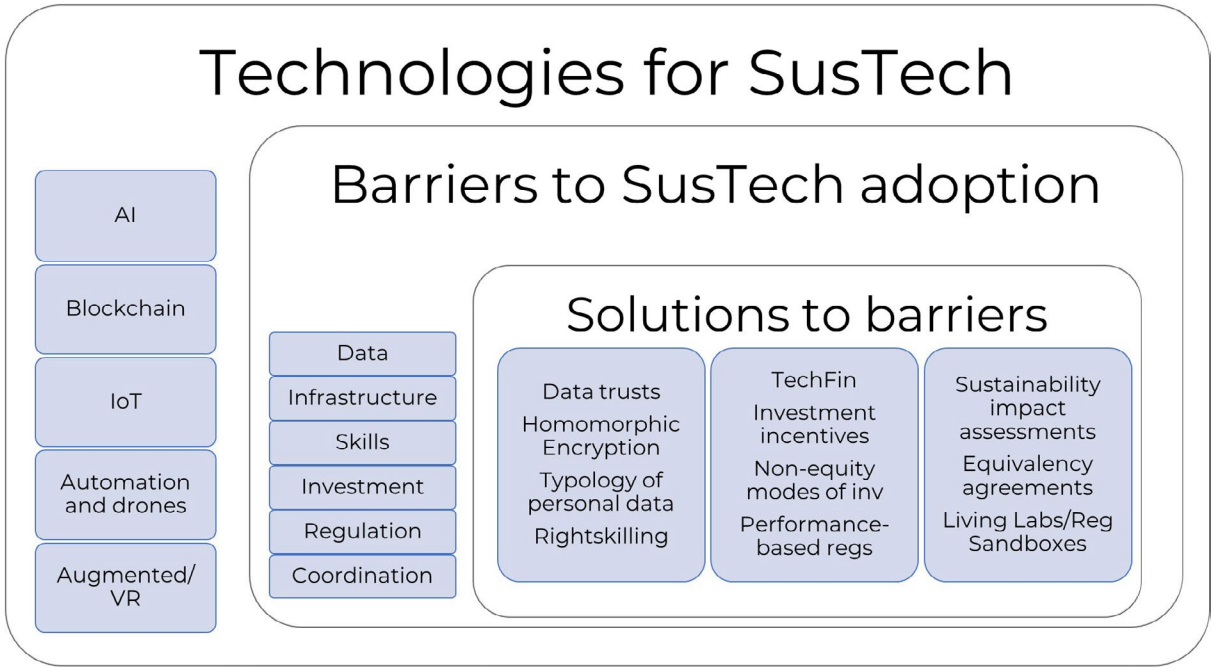
SUSTECH SOLUTIONS SNAPSHOT

SUSTAINABLE TECHNOLOGY BOARD



CHALLENGE

There is wide consensus that scaling technology can help achieve sustainable development (Herweijer et al. 2020, p. 7; Diaz Anadon et al. 2016, p. 1; Habanik et al. 2019, p. 48; and World Bank Group 2016, pp. 303-20).[1] One of the main mechanisms is through greener, safer, and more inclusive value chains enabled by technology that can increase efficiency, transparency, resilience, and responsibility (Sotelo and Fan 2020, p. 13).

This was already important before COVID-19, but the urgency has grown: value chains need to become more resilient to future pandemics; societies need to address inequality that has been exacerbated; and economies need to raise productivity to generate growth that can address record-high levels of debt.

Adopting new technologies in ways that lead to sustainable development can help achieve these goals, what can be called "SusTech solutions". SusTech is defined as the use of new technologies that help achieve Sustainable Development Goals (SDGs), either directly or indirectly. Directly would mean the technology is adopted to achieve a certain goal (e.g. lowering carbon use), while indirectly would mean the technology is adopted to achieve business efficiency but also provides additional benefits (e.g. lowering carbon use). The word "solutions" is added to denote that these new technologies help governments and firms achieve their objectives.

SusTech solutions are focused on technologies of the Fourth Industrial Revolution, given the new opportunities that these afford for sustainable development. Survey data has found that five specific technologies may have the most transformational impact: artificial intelligence (AI), blockchain, internet of things, automation, and virtual reality.[2]

To provide one example, AI and automation can be used to help grow the circular economy. Smart recycling robots should soon be able to efficiently dismantle, analyse, and categorize electronic waste – "de-manufacturing" and "re-manufacturing" electronic objects and components – and in so doing both tap into an estimated US$ 62 billion electronic waste industry and help safeguard the planet (Enel 2020). Additional examples of SusTech solutions are presented at the end of the brief.

Yet how can SusTech solutions be enabled and integrated into value chains in practice?

This requires tackling three interconnected challenges:

1. **Governance failure** as new technologies are leaping forward in terms of their economic and social importance, but policy and regulatory frameworks are not keeping up and may not be fit for purpose. The speed and direction of technological change, as well as expanding the knowledge gap between public and private sectors, challenge the use

of traditional regulatory approaches. Governance failures can take place both at the domestic level, but also at the international level, given the interconnectedness of economic and technological systems. Even worse, technology could actually undermine people and the planet if negative impacts (e.g. on privacy, competition, climate, etc.) are not addressed. New technologies are, in and of themselves, neutral and require accompanying frameworks to avoid distortions and help orient them in support of societal goals.[3]

2. **Market and coordination failure** is taking place at the global level because advances in technology that can drive sustainable development (SusTech) represent a form of public good that suffers from a collective-action problem as well as a complex system that suffers from coordination challenges; together, this is resulting in underinvestment and undersupply, and calls for mechanisms to address collective action and cooperation challenges.

3. **A growing desire to reconfigure value chains** through SusTech solutions to increase resilience and sustainability, but lack of widely known practical, actionable steps to do so. Both public and private actors wish to seize on reform appetite following COVID-19 to move from global value chains (GVCs), to *Sustainable* GVCs (SGVCs), and SusTech provides one of the keys to do so (Schmidt et al. 2019).

The policy brief will be structured in three parts to provide solutions to these three challenges.

PROPOSAL

CREATE A SUSTAINABLE TECHNOLOGY BOARD

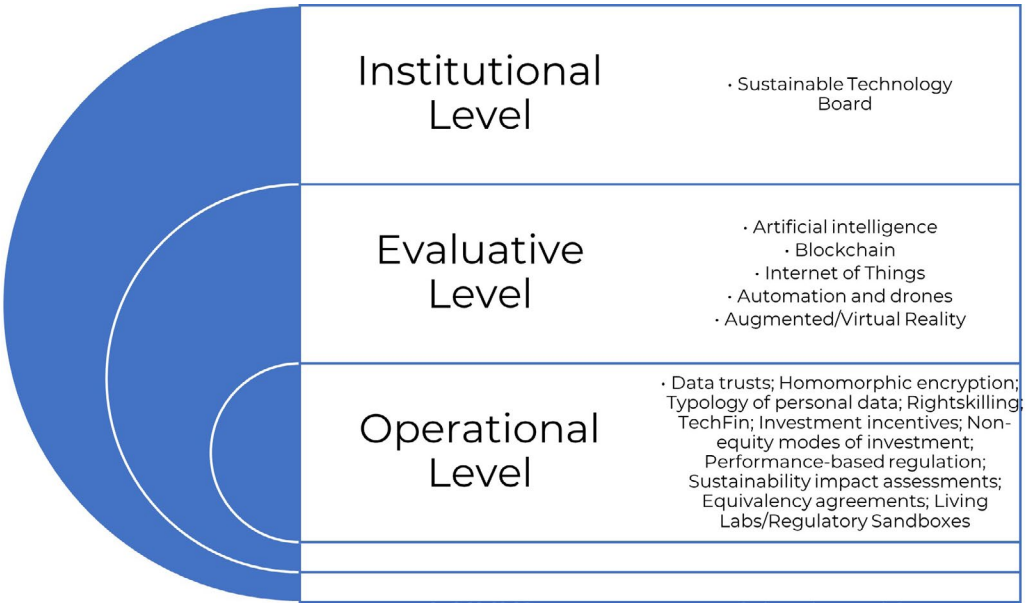
The G20 should create a Sustainable Technology Board (STB) as a mechanism for coordination, cooperation, and scaling of SusTech solutions.[4] An STB is called for given the transformative potential of new technologies, and to address the concern, confusion, and competition that is increasingly underlying their integration. There is an opportunity to pre-empt escalating techno-nationalism – and address societal concerns over techno-equity and integrity – through a mechanism that convenes key actors, provides analysis and options, and promotes cooperation over competition. As such, the platform could be mandated to help shape technology in a way that advances SDG-oriented value chains through active policies that guide technology in these directions. A first step in this direction is the decision by the G7 to convene a 'Future Tech Forum', together with the OECD, in September 2021, and on which the STB could build (G7 Communiqué 2021).[5] Concretely, the STB would be structured to deliver three core functions.

PROVIDE A PLATFORM FOR COOPERATION

A platform where policymakers, firms, and experts, and civil society come together to identify needs, share both concerns and opportunities, and transparently chart out ways to integrate SusTech solutions in both regulatory frameworks and corporate strategies. Such a platform would provide a space for cooperation between national technology bodies. It would also provide a space for those at the frontier of technology innovation – especially in the private sector – to flag risks and opportunities so they can be addressed or seized.[6] It would also create a mechanism for outreach, engagement, and inclusion of less-developed economies and smaller firms to help develop and adopt SusTech solutions. One specific outreach mechanism could be through a Pioneer Program, whereby technology authorities in different jurisdictions would sign up to trial SusTech policies and measures, backed by the technical support of STB partners to help with capacity development.[7]

GENERATE ANALYSIS AND OPTIONS

To inform platform-based cooperation, the STB would generate analysis and provide options. The analysis could include developments in new technologies, risks and opportunities that these generate, and good practices for how authorities and firms have addressed risks and seized opportunities. The emphasis would be on practical policy options and measures that could be adopted. Analysis could also track progress on goals, and whether policies and measures were effective in achieving their intended aims regarding technology adoption and sustainable development. Together, such analysis and options would support dissemination, replication, and scaling of SusTech solutions, both scaling up and scaling out. This process can be understood as taking place across three levels.



DEVELOP STANDARDS AND GUIDELINES

In addition, one of the main goals of the STB would be to develop standards and guidelines on new technologies to facilitate their sustainable adoption. Standards and guidelines would apply to both business and national authorities. They would thus facilitate cooperation between economies, allowing for interoperability, alignment, and well-function systems. They would also at once create larger markets through interoperability as well as provide regulatory clarity, predictability, and stability. Conversely, the lack of standards and guidelines creates systemic risk in terms of governance, corporate returns, and consumer protection.

Starting with "soft" or voluntary standards could overcome the challenge of competition between different economic systems or visions. A valid concern is how economies with very different approaches to technology governance can fruitfully cooperate through an STB. The answer is to first develop soft standards that are adopted on a voluntary basis. Perhaps after a critical mass of economies adopt a soft standard – because it proves useful in practice – it can be viewed as a "firm" standard, one that is widely accepted but still not a binding "hard" standard. In practice, "firm" standards may often be sufficient for planning and collaboration between economies and firms. Where relevant, the STB can build on or adopt ISO work on sustainability standards.[8]

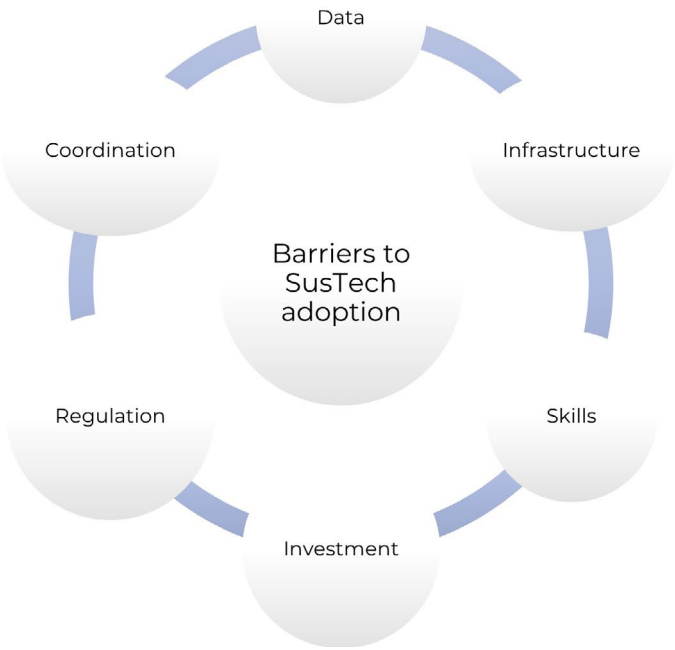
PRECEDENT AND PRACTICE

There is a strong G20 precedent for creating an STB. The STB could be very similar to – and modelled after – the Financial Stability Board (FSB),[9] which was established following the G20 summit in London in 2009. A more recent example includes the G20 Global Smart Cities Alliance on Technology Governance, which was established following the G20 Summit in Osaka in 2019.[10]

How do the FSB and Smart Cities Alliance function, and how could this be replicated? FSB policy options and standards are not required to be adopted by members, but rather encouraged through dialogue, discussion, and reports to the G20. In other words, national authorities retain policy autonomy. The Smart Cities Alliance is also voluntary, with the World Economic Forum acting as a secretariat. The STB could operate similarly, developing voluntary standards and principles and being housed, for instance, in the World Economic Forum's Center for the Fourth Industrial Revolution, whose mission is help to maximize the benefits of technology while avoiding potential risks.[11]

BARRIERS AND SOLUTIONS TO SUSTECH ADOPTION

There are six main types of barriers to wider adoption of SusTech. These include: (1) data, (2) infrastructure, (3) skills, (4) finance and investment, (5) regulation, and (6) coordination.



Data is the lifeblood of technology systems. Just as humans need blood to course through their bodies to function, technologies need data to flow both within and between systems to function. This, in turn, requires sufficient volume, trust, and interoperability. While data policy is increasingly tense and disputed – with differing visions between G20 economies – this paper proposes three data "landing zones" to break impasse through finding common ground.

If data is the lifeblood, infrastructure is the highway. One can take "secondary roads" but it will take longer, you may hit a pothole, and you may never find your destination on account of poor signage. Much the same way, fit-for-purpose infrastructure is needed if firms are to adopt SusTech solutions, as otherwise they will be limited to "secondary-road technologies". This includes, *inter alia*, infrastructure for transportation, communication, connectivity, processing, and storage.

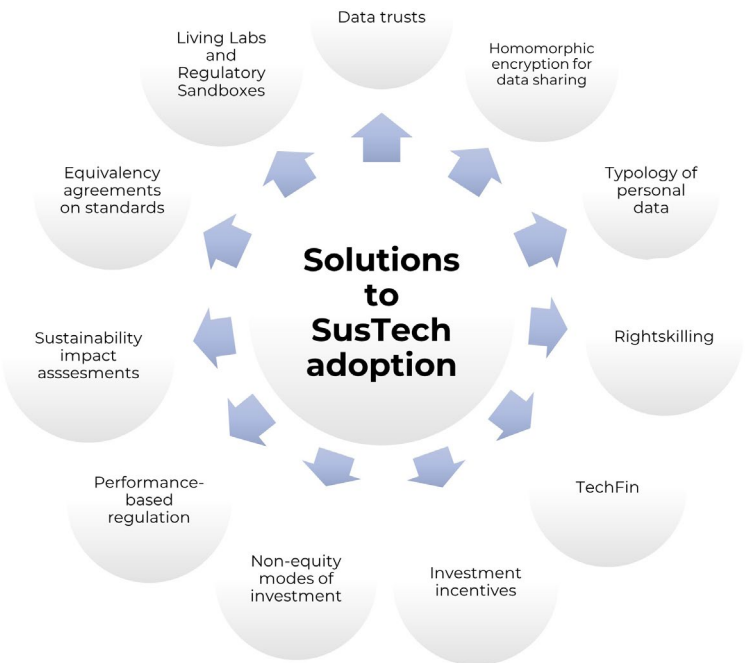
Skills, in turn, are the new passport, and *right*-skilling the new visa. Worryingly, large swathes of society risk being locked out of growing global markets by not having needed

digital skills. While policymakers talk about upskilling and reskilling, the goal may actually be *right*-skilling: matching skills to technologies (Ross, Schaninger, and Yue 2018).

Building infrastructure and growing skills require investment and finance in technologies, or *TechFin*. Investment needs are enormous, but the capital is there. However, investments are not taking place to scale as outdated regulatory frameworks are creating undue risks. This calls for updating regulatory frameworks to create "digital-friendly investment climates" (Stephenson 2020). It also calls for a public-private, innovative financing mechanism targeted at technology, what could be called "technology finance2 or TechFin. This may be especially needed for SusTech rollout in developing markets.

None of this can effectively take place absent coordination and regulation. These are, one might say, the "field" and "rules" that allow for collaboration to take place both directly on technology as well as on the other barriers, namely data, infrastructure, skills, and investment. Absent effective coordination and agreed regulation, one can find oneself in a situation where one team thinks the game is football and the other rugby and picks up the ball to run, or one team is on field A and the other waiting on field B to play the game. While this may sound humorous, at present the lack of clear and agreed regulation – coupled with the lack of mechanisms of coordination – mean countries and firms run the risk of doing just that.

Policymakers may thus wish to consider targeted policies and measures to address these barriers and enable SusTech solutions. The reason is that these technologies are new, and therefore policy and regulatory frameworks have not kept up. While some technologies may require specific policies and measures (i.e. vertical in nature), this brief will propose eleven policies and measures that apply across all technologies (i.e. horizontal in nature). In addition to helping lay the groundwork for the adoption of technologies, the added benefit of considering horizontal interventions is that new technologies work in bundles and so require to be enabled together (UNCTAD 2017, p. 176; Sotelo and Fan 2020, p. 4).



ESTABLISH "DATA TRUSTS" TO SHARE DATA SAFELY AND SECURELY[12]

Data trusts are legal structures that serve as a fiduciary (or third-party steward) for data provided by members of the trust and govern the data's use. Data trusts thus allow organisations to give some control over their data to a new institution so that data can be shared and aggregated (Open Data Institute 2019; WEF and McKinsey 2019). Large-scale aggregation may be essential to accrue full benefits from SusTech, given that data present increasing returns to scale for SusTech solutions. Two-thirds of firms across all industries report they would be willing to share data with the right conditions, and data trusts can help provide those conditions (Zarkadakis 2020).

USE HOMOMORPHIC ENCRYPTION TO SHARE DATA SAFELY AND SECURELY

Homomorphic encryption can also be used to share data, either as a complement or an alternative to data trusts. Homomorphic encryption makes it possible to analyse encrypted data without revealing the data's content. It thus allows for sharing data safely and securely, whether the data is sensitive or personal, or whether it is being shared with a jurisdiction that has a different standard of data protection and privacy. This opens up the increasing returns from data flow and aggregation even absent agreement on data policy (Zafrir 2020). It also opens up access to the 80% of datasets that are currently private, whether in the hands of governments or firms.[13]

ADOPT A TYPOLOGY FOR DATA TO FACILITATE MANAGEMENT AND SHARING

The challenge to data policy to enable SusTech solutions relates to personal data, not corporate data. Firms can manage corporate data for commercial ends if the data are allowed to flow between jurisdictions, but individuals often do not have the same oversight and control. As a result, governments have sought to protect personal data, but this has also erected barriers to its use. The solution lies in differentiating data by type and adopting differential regulation: firm data (f-data), official personal data (o-data), privy personal data (p-data), and collective personal data (c-data).[14]

- **f-data** is owned and controlled by firms, who can choose to share it or not (e.g. patterns in sales in different markets)
- **o-data** is created and authenticated by the state but controlled by people (e.g. a passport number)
- **c-data** is shared within a well-defined group governed by certain rules (e.g. aggregated data from banking cooperatives)
- **p-data** is created by people, either directly through **first-order p-data** (e.g. photos put online) or indirectly through **second-order p-data** (e.g. location data from smartphones)

f-data should be allowed to flow freely both within and across economies, following corporate agreements between parties (WEF 2020). o-data, c-data and p-data should be in the hands of people, who can decide whether to share it (and on what terms), or not. o-data

would likely not be shared; c-data would be shared to achieve certain objectives; and p-data might be shared depending on compensation (financial or non-financial, such as services).

ENSURE RIGHT-SKILLING PROGRAMS MATCH SKILLS SUPPLY TO SKILLS DEMAND

One of the greatest limiting factors to adopting SusTech solutions are skills. The basket of skills needed to understand, adopt, apply, and develop technologies is quickly changing, and risks leaving people or economies behind. The solution lies in public-private dialogue and training to match skills supplied to skilled demanded. First, firms need to be asked what skills are needed to enable SusTech; second, governments need to work with universities and other centres of excellence to help develop those skills[15] ; third, mechanisms need to be created for this process to continue, monitoring and adapting as technologies evolve.

DEVELOP INNOVATIVE TECHNOLOGY FINANCE (TECHFIN) INSTRUMENTS

Both the development and adoption of SusTech requires resources, and so policymakers may wish to support technology finance (TechFin) to help with uptake and rollout. Specific instruments could include blended finance, government-backed incubators and accelerators, patient or concessional capital, funds and prizes, and public procurement (Herweijer et al. 2020 p. 33).

ORIENT INVESTMENT INCENTIVES TO ENCOURAGE THE UPTAKE OF SUSTECH SOLUTIONS

Governments can use a number of investment incentives to encourage capital to flow into SusTech solutions. These include both financial and non-financial incentives. Financial incentives could include tax breaks, grants, or subsidies. Non-financial incentives could include faster approvals, lighter or expedited regulatory review, or operational support to encourage the uptake of SusTech solutions.

INCORPORATE NON-EQUITY MODES OR STRATEGIC PARTNERSHIPS IN DOMESTIC AND INTERNATIONAL POLICY FRAMEWORKS

Evidence suggests that Non-equity modes of investment (NEMs) or strategic partnerships have been growing in importance and are prevalent in the digital economy and high-tech investments.[16] Strategic partnerships are much more flexible than FDI, allowing firms to respond quickly to fast-paced technical changes and evolving market conditions. They are also increasingly deployed as a means to obtain rapid access to knowledge, technology, and intangible assets. Policymakers may wish to ensure that regulatory frameworks are updated to support cross-border NEMs that can drive SusTech solutions.

USE PERFORMANCE-BASED REGULATION TO BALANCE FLEXIBILITY WITH OVERSIGHT

The challenge with supporting SusTech is to get the balance right between flexibility and oversight. This allows for new technologies to bloom while also protecting societies from untoward outcomes. One innovative solution is to apply performance-based regulation (PBR). The idea is to focus on desired, measurable outcomes, rather than prescriptive processes, techniques, or procedures (United States Nuclear Regulatory Commission 2021). The goal is specified, but not the path to get there. PBR – which represents a close cousin to the increasingly popular risk-based regulation (WBG 2017) – can be flanked by periodic reviews to ensure it is working as desired.

USE SUSTAINABILITY IMPACT ASSESSMENTS

Another way to support SusTech is through the use of Sustainability Impact Assessments (SIAs) by both regulatory agencies and firms. SIAs – which again represent a close cousin to the increasingly popular Regulatory Impact Assessments (RIAs) (WBG, n.d.) – can be used to proactively identify potential benefits and drawbacks across technologies. SIA can therefore help to develop and adopt mitigation measures to any negative impact, including displaced workers, anticompetitive practices, etc.

ENSURE EQUIVALENCY AGREEMENTS ON STANDARDS AND CERTIFICATIONS

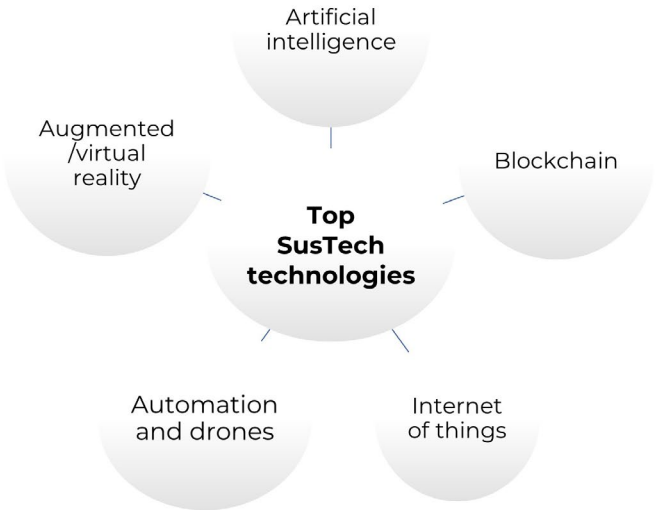
As a first step to facilitating cooperation on SusTech adoption – and absent the development of standards by an STB – G20 policymakers may wish to consider equivalency agreements on SusTech-related standards and certifications. This could significantly support SusTech efforts by creating larger markets for investment and operations. Standards and certifications increase predictability and quality, providing confidence to consumers and firms, yet history shows they are often developed in an uncoordinated and inconsistent manner between jurisdictions, forming a significant barrier to cross-border commercial activities.

BUILD LIVING LABS AND (INTERNATIONAL) REGULATORY SANDBOXES

A final way to allow regulatory flexibility and innovation for SusTech solutions to bloom – while also safeguarding societal interests – is the use of Living Labs and Regulatory Sandboxes. These create the space for more permissive testing of SusTech applications, while circumscribing potential risk. Regulatory sandboxes can thus generate learning on SusTech solutions through experimentation. Moreover, *international* regulatory sandboxes can be created so that experiments and collaboration can be conducted jointly across jurisdictions, creating more legitimacy for setting shared global standards and guidelines.

EXAMPLES OF SUSTECH IN ACTION

How have firms already integrated SusTech solutions into operations to increase profits, resilience, and sustainability? Real-life examples illustrate how SusTech solutions are already being successfully adopted, providing models for how to further roll-out SusTech solutions in practice. As a starting point, one can focus on five of the technologies that have been identified as having amongst the most long-term transformational impact through recent analysis and surveys.[17]



EXAMPLES OF HOW FIRMS HAVE ALREADY INTEGRATED FIVE SUSTECH SOLUTIONS ARE PRESENTED IN THE APPENDIX.

CONCLUSION

SusTech solutions have the potential to transform our world. New technologies of the Fourth Industrial Revolution can help achieve the Sustainable Development Goals. However, this will require key enablers.

First, a new Sustainable Technology Board (STB) can provide a platform for cooperation on accelerating uptake and growing impact from SusTech. Second, certain policies and measures can help address barriers to the adoption of SusTech solutions. Third, the realization that firms are already starting to adopt SusTech solutions, but this can be accelerated and scaled.

The G20 should act now. G20 economies stand most to gain from SusTech solutions in the short term as they have the absorptive capacity to integrate new technologies. Yet because of the public goods nature of implementing SusTech solutions, cooperation will 'increase the pie', and the G20 has the critical mass to create effective cooperation mechanisms. If this happens, it will lead to benefits for non-G20 economies, both through knowledge spillovers and opportunities for non-G20 economies to plug into value chains in new ways, including through new types of digital services exports, benefiting all economies.

APPENDIX

REAL-LIFE EXAMPLES OF SUSTECH

ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) could increase global Gross Domestic Product (GDP) by US$ 15.7 trillion by 2030, according to estimates (PwC 2017). Some firms are already starting to seize this potential, but there is a scope for huge scaleup.

For instance, AI can be used for financial inclusion, especially to provide financial services to those that do not have a formal credit history. Machine-learning algorithms, such as those of Aire, can use mobile phone activity, and other digital footprints, to evaluate creditworthiness and help provide financial services to new market segments. Similarly, **EastNets'** approach is to use AI to detect financial fraud. Another example is **ClearMetal**, which has adopted AI for predictive logistics and supply chain management that allows it to predict transit delays and optimize routes, saving shipping costs, increasing timing accuracy, and avoiding unnecessary backups and backlogs (Nguyen 2020; ClearMetal 2017). AI can also help for sustainable energy, for instance **Moxia** is using AI powered energy management software that allows smart energy storage through batteries and sharing through grids.

BLOCKCHAIN

Blockchain holds perhaps the most transformative potential in terms of technology's impact on sustainable development.

For instance, blockchain technology can help ensure inputs are sourced responsibly (e.g. diamonds through **Everledger**), sustainably (e.g. tuna through **Provenance**) and efficiently (e.g. creating mechanisms for peer-to-peer exchange of excess solar energy through **PowerLedger**). (Adams, Kewell and Parry 2018, p. 134; Ahl et al. 2020). Another example is in the Democratic People's Republic of Congo (DRC), where **Cobalt Blockchain** is tracing the provenance of cobalt to allow for identification of any malpractice along the supply chain. Rather than eschewing sourcing from the DRC because of the risk of supporting human rights violations, manufacturers now have the confidence to purchase from the DRC, increasing sustainable development (Herweijer et al. 2020, pp. 21-22).

INTERNET OF THINGS

The internet of things (IoT) is also foreseen to be a gamechanger for both growth and sustainability. In terms of growth, estimates suggest it could add US$ 14 trillion in economic

value to the global economy by 2030 (WEF 2018, p. 3); in terms of sustainability, IoT can dramatically improve efficiency and outcomes in, *inter alia*, agriculture, transportation, energy, and smart cities.

For instance, **BBVA** has installed 50,000 sensors in its Madrid headquarters to detect and collect data about the status of the facilities, environmental conditions, and the presence of people, allowing it to save 5,766,731 kWh on energy. This represents savings of 12 to 15 percent compared to before and is equivalent to the energy of about 1,900 households per annum (BBVA 2019).

AUTOMATION AND DRONES

Automation holds both risks and rewards for sustainable development, a clear case where Sustainability Impact Assessments can help evaluate impact. On the one hand, workers are likely to be displaced; on the other, automation in, *inter alia*, factories, transportation, health and agriculture, can both increase worker safety and allow them to move to more value-addition work, if retrained and right-skilled, while also saving cost, energy, and time through optimization. Estimates in the United States predict such efficiency improvement may result in reduced carbon dioxide and harmful particulates by up to 60 percent (Bösch et al. 2018).

For instance, drone delivery by firms such as **Amazon**, **DHL**, **Google**, and **UPS**, is expected to improve corporate carbon footprint, with one study in Thailand finding that the "online shopping system using drone delivery is one of the most environmentally friendly transportation options throughout a wide range of scenarios" (Koiwanit 2018).

AUGMENTED AND VIRTUAL REALITY

Augmented and virtual reality (AR/VR) holds the potential to transform everything from education and healthcare to mining and tourism. The risk is that currently only a small segment of the world's population is benefitting from AR/VR, prompting the need for targeted support of this particular SusTech solution (Bogdan-Martin 2021).

For instance, firms like **Proprio**, **ImmersiveTouch**, **TrueVision**, and **EchoPixel** have been using AR/VR to improve the quality and accuracy of surgery (Daley 2021). In addition, lockdowns brought about by the COVID-19 pandemic have catapulted interest in learning through AR/VR, such as that being provided by **Google**, **Microsoft**, and **AR VR Academy** (Immersive Learning News 2020)

NOTES

[1] Fourth Industrial Revolution technologies could have a high impact across 10 of the Sustainable Development Goals (SDGs), and 70% of the 169 targets underpinning the SDGs could be enabled by these technologies.

[2] Sotelo and Fan (2020) and WBG (2016) identify the same list, with the only different virtual reality vs. automation, and so the brief will address both.

[3] Acemoglu, Manera, and Restrepo (2020) show that the tax system has favoured automation over labour as labour is heavily taxed while capital is not, creating incentives for firms to over-invest in automation as a labour-saving technology, undermining societal goals.

[4] See complementary proposal 6 in T20 Policy Brief, Steps to Make "Data Free Flows with Trust" Operational in Practice.

[5] It is also worth noting that the US and EU at the same time established a Trade and Technology Council, with the aim of addressing bilaterally similar issues, demonstrating the growing importance of collaboration on these issues. See European Commission, "EU-US launch Trade and Technology Council to lead values-based global digital transformation", 15 June 2021, https://ec.europa.eu/commission/presscorner/detail/en/IP_21_2990

[6] For instance, the sustainable value chains have been developed for key commodities through cooperation and commitments between key actors (e.g. in Sustainable Palm Oil), and a similar approach would be taken for technologies rather than commodities.

[7] For instance, a Pioneer Program has been adopted by the G20 Global Smart Cities Alliance to trial smart city policies. See https://globalsmartcitiesalliance.org/?page_id=714

[8] See ISO, "Sustainability standards from ISO", https://iso26000.info/sustainability-standards-from-iso/

[9] The FSB is organized around three standing committees, namely a Standing Committee on Supervisory and Regulatory Cooperation, a Standing Committee on Assessment of Vulnerabilities, and a Standing Committee on Standards Implementation. These align with the proposed functions of an STB, which could be organized similarly. See Financial Stability Board, "About the FSB", https://www.fsb.org/about/#mandate

[10] See G20 Global Smart Cities Alliance, "About the Alliance", https://globalsmartcitiesalliance.org/?page_id=107. WEF serves as the secretariat of the Alliance.

[11] See Centre for the Fourth Industrial Revolution, https://www.weforum.org/centre-for-the-fourth-industrial-revolution

[12] See complementary proposal 3 in T20 Policy Brief, Steps to Make "Data Free Flows with Trust" Operational in Practice.

[13] World Wide Web Foundation, Open Data Barometer, September 2018 in Herweijer et al. (2020), footnote 91.

[14] Snower, Twomey and Farrell (2020) provide the typology for personal data.

[15] Apprenticeships may be particularly useful, whereby part of the training is done by and within companies, in co-operation with universities, and with support or other incentive from government for firms that invest in such training.

[16] This finding can be seen through a new dataset covering about 27,000 corporate relationships of 147 multinational enterprises (MNEs) in 13 sectors. See Andrenelli, Lejárraga, Miroudot and Montinari (2019).

[17] Sotelo and Fan, 2020 and WBG (2016) identify the same list, with the only different virtual reality vs. automation, and so the brief will address both.

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