

Digital Finance for Mobilizing Sustainable Finance

Applications of Digital Technologies
to Sustainable Finance

September 2018

The Sustainable Digital Finance Alliance

The Sustainable Digital Finance Alliance has been founded by UN Environment and Ant Financial Services to address the potential for fintech-powered business innovations to reshape the financial system in ways that better align it with the needs of sustainable development. The Alliance's Advisory Board is co-chaired by Erik Solheim (Executive Director, UN Environment) and Eric Jing (CEO, Ant Financial Services) and comprises of innovative financial and sustainable development institutions committed to using digital technology to advance sustainable finance, including Piyush Gupta (CEO, DBS Group); André Hoffman (President, MAVA Foundation); Nick Hughes (Co-founder, M-KOPA); Caio-Koch-Weser (Chair, European Climate Foundation); Rachel Kyte (CEO, Sustainable Energy for All); Philippe Le Houérou (CEO, IFC); Ma Jun (Director, Center for Finance & Development, Tsinghua), Phumzile Mlambo-Ngcuka (Executive Director, UN Women), Patrick Njoroge (Governor, Central Bank of Kenya); Henry Paulson (Chairman, Paulson Institute, former US Treasury Secretary); Alex Pentland (co-founder, MIT Media Labs); and Vijay Sharma (CEO, PayTM). The Alliance draws in allies from across the worlds of environment, development and finance, who, through their expertise, insights and networks can contribute to collaborative actions with timely and scaled potential. Building on the work of the UN Environment Inquiry published in 2016, *Fintech and Sustainable Development: Assessing the Implications*, the Alliance published its first paper *Scaling Citizen Action on Climate – ANT Financial's Efforts Towards a Digital Finance Solution* in May 2017.

More information is available at: info@sustainabledigitalfinance.org and www.sustainabledigitalfinance.org.

About this report

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This input paper has been prepared for the G20 Sustainable Finance Study Group (SFSG) by the Sustainable Digital Finance Alliance. The views expressed in this paper are those of the authors and contributors, and do not necessarily represent the views of the SFSG or their institutions.

Comments are welcome and should be sent to fiona.bayat@sustainabledigitalfinance.org.

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ACRONYMS AND ABBREVIATIONS

AFIN	ASEAN Financial Innovation Network
AI	Artificial intelligence
API	Application programming interface
ASEAN	Association of Southeast Asian Nations
DLT	Distributed ledger technology
ETF	Exchange-traded funds
EU	European Union
EUR	Euro
FDI	Foreign direct investment
FSB	Financial Stability Board
GDP	Gross domestic product
GFSG	G20 Green Finance Study Group
GPFI	Global Partnership for Financial Inclusion
ICT	Information and communications technology
IFC	International Finance Corporation
MLAI	Machine learning and artificial intelligence
MSMEs	Micro, small and medium-sized enterprises
OECD	Organisation for Economic Co-operation and Development
P2P	Peer-to-peer
PAED	Publicly available environmental data
PE	Private equity
RMB	Chinese renminbi
SDGs	Sustainable Development Goals
SFSG	G20 Sustainable Finance Study Group
SMEs	Small and medium-sized enterprises
UK	United Kingdom
US	United States
US\$	United States dollar
VC	Venture capital
WEF	World Economic Forum



SUMMARY

Financing sustainable development and ensuring a resilient financial system are key current global challenges. However, a number of barriers limit the mobilization of such finance at scale. For example, the lack of disclosure of environmental and social information creates information asymmetries and increases search costs for sustainable investments. Similarly, investors face difficulties in fully identifying, assessing and pricing risks associated with unsustainable investments as well as upside opportunities.

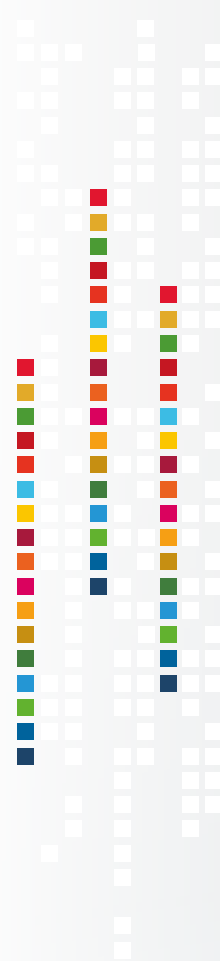
Digital finance, which includes big data, artificial intelligence (AI), mobile platforms, blockchain, and the internet of things (IoT), is demonstrating its ability to address these barriers and promote sustainable, inclusive economic growth. AI alone could lift global GDP by an estimated US\$15-20 trillion by 2030. At the same time, technology advancements have not benefitted all equally, and the unintended consequences from such advancements have contributed to some of the most pressing environmental and development challenges today. Indeed, while the financial system has been at the forefront of adopting new technologies, its application of digital finance to sustainable finance is limited, and the impact of digital finance on scaling sustainable investments is far from certain. This creates opportunities for international cooperation and policymakers to address potential market failures, cross-border issues and common risks, better enabling digital finance to increase financial flows towards sustainable and inclusive investments. The G20 has recognized the importance of these developments for the financial system and its relationship with sustainable development in the real economy. Through its Sustainable Finance Study Group (SFSG), it is exploring opportunities to better leverage digital technologies for financing sustainable development, as well as the challenges that limit the effective use of digital technologies for this purpose, and how they might be overcome, particularly across capital markets, private equity and venture capital (PE/VC).

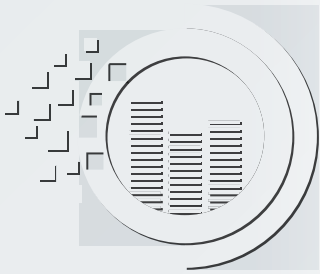
Digital finance makes large amounts of data available more quickly at lower costs, increasing transparency and access to information related to sustainable investments. It also promotes greater inclusion and innovation, increasing opportunities for citizen participation in the financial value chain and unlocking new sustainable business models. Digital finance automates and makes large amounts of data available at high speed and low costs, which increases opportunities for more sustainable lending and investments in sustainable assets through greater information and transparency. This reduces search costs for information related to environmental, social and

financial impacts and risks, improves measuring, validating and tracking the ‘greenness’ of investments, and facilitates regulatory compliance. Digital finance also unlocks greater inclusion and innovation. It incentivizes citizens to direct financial resources towards more sustainable consumption choices, and unlocks new sources of finance, both ‘bottom-up’ and by better matching investors with sustainable investment opportunities. The interaction between innovations in digital finance and the real economy creates new business models that make investment in sustainable sectors commercially viable. Ultimately, these benefits enable the financial sector to interact more closely with the real economy and better align financial flows with the sustainable development goals (SDGs).

In relation to the SDGs, linking specific sustainable digital finance practices and evidence of its impact, demonstrates that digital finance is contributing to achieving 13 out of 17 SDGs. Mobile technology, followed by MLAI and big data are most prevalent, particularly related to unlocking new sources of sustainable finance and innovations in the financial and real economy. Further research is needed to assess the potential of current and emerging digital technologies with respect to achievement of the SDGs and measure impact beyond practices related to financial inclusion.

However, a mapping of sustainable digital finance practice across G20 members and the private sector reveal that the ‘data power’ of digital finance is under-leveraged by the financial sector; that its ‘innovation power’ is small scale; and that it creates economic, social and environmental unintended consequences. Under-leveraged ‘data power’ raises the question about how digital finance technologies can be more widely mainstreamed by the financial sector to better integrate sustainability considerations into investment decision-making. Small-scale ‘innovation power’ raises the question about how the real economy can better use digital finance to drive innovations that make investments in sustainable business models, sectors and outcomes more viable at scale. Finally, while digital finance enables greater opportunities for boosting the positive impacts of sustainable finance, it blurs the line between sectors and stakeholder groups and creates a range of possible economic, social and environmental unintended consequences. If not appropriately managed, such consequences could jeopardize targeted impacts. The benefits as well as these implications are summarized in Figure 1 below.





INTRODUCTION

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RELEVANCE OF DIGITAL FINANCE IN THE CONTEXT OF SUSTAINABLE FINANCE AND THE G20

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Box 2: Facts and Figures from International Organizations and Research Institutes: The Scale and Impact of Digital Finance

- Digital transactions are up to 90 per cent cheaper to process than traditional transactions.
- Digital finance can add US\$4.2 trillion in new deposits and US\$2.1 trillion in new credit.
- Digital financial services can turn 1.6 billion of the 2 billion unbanked people into formal financial customers by 2025. That, in turn, would add US\$4.2 trillion to the balance sheets of providers, 95 million additional jobs and US\$3.7 trillion added to the GDP of emerging economies.
- From 2011 to 2015, the number of mobile money subscribers worldwide grew from 60 million to over 400 million.

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FIGURE 1: TITLE



02

HOW CAN DIGITAL FINANCE ENHANCE THE MOBILIZATION OF SUSTAINABLE FINANCE? APPLICATIONS OF DIGITAL TECHNOLOGIES TO SUSTAINABLE FINANCE

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T 1: EXAMPLES FROM MAPPING OF SUSTAINABLE DIGITAL FINANCE PRACTICES ACROSS G20 MEMBERS AND THE PRIVATE SECTOR

	Investment	Incentivizing sustainable choices	Unlocking new sources of finance	Interaction between innovations in the financial sector and real economy
Big data	<p>What are the emerging dynamics in the real economy which could be important for progress towards or away from a sustainable financial system?</p> <p>What are the key disruptive factors that could shape the prospects for a sustainable financial system to 2020 and beyond?</p> <p>What is the relationship between long-term investment horizons and sustainability outcomes?</p>	<p>How might these emerging dynamics effect options for interventions in pursuit of a sustainable financial system?</p> <p>How could technology and institutional innovations in the financial sector impact social and environmental outcomes?</p> <p>What steps are needed to fully integrate the sustainability dimension into the long-term investment agenda?</p> <p>How can the scope of financial risk management effectively incorporate environmental and social factors at the system level?</p> <p>What is the case for (and against) and practice of central banks and financial regulators directly and indirectly pursuing environmental and social objectives?</p> <p>What are the key features of an assessment framework to evaluate financial policy measures for green economy impacts?</p>	<p>How do existing financial rules and regulations need to evolve in order not to hold back necessary green financial innovation?</p> <p>What new financial frameworks are needed to encourage specifically green financial innovation, for example, in investing in ecosystem services?</p> <p>How could different parts of government work together establish a coherent policy that could deliver a sustainable financial system?</p> <p>How can the short- and long-term dynamics of the financial system be reconciled with a green and inclusive green economy?</p> <p>What are the policy and regulatory levers that can effectively reconcile the short- and long-term dynamics of the financial system with a green and inclusive economy?</p> <p>How could the mandates for rule setters be updated to take account of the systemic risks associated with the financial system's impact on green and inclusivity outcomes, and vice versa?</p> <p>What are the essential principles that should guide policy options for a sustainable financial system?</p>	<p>Canada plans to invest US\$950 million in supercluster innovation centres to develop AI solutions applied to supply management systems, which will have a ground-breaking impact on sustainable and inclusive economic growth. BioMachines (Indonesia) is helping with sustainable cocoa farming by using sensor technology to gather environmental data from experiments, and enable knowledge transfer to cocoa farmers. Such data driven practices can unlock access to finance for farmers. Simpa Networks (India) uses a rooftop leasing model made possible with mobile payments and control technology to unlock investments in solar home solutions for last mile markets.</p> <p>Telecom Italia (Italy) is building a new wireless network for IoT. Smart meters for homes and utilities are expected to be among the first devices to be connected in order to improve water and electricity consumption. Sustainable Smart Cities Project (Japan) helps to better balance demand and supply side across various sectors, making infrastructure investment more efficient by limiting large scale investment in the supply side. Mexico City is using a "Smart grid" system which includes traffic management and incident detection, operating 20,000 sensors and cameras around the city. It has helped reducing electricity theft. Disaster and environmental monitoring are also included to keep supplying data into making the city even smarter. Istanbul (Turkey) has deployed the "Smart Cities" to implement IoT technologies to improve transportation administration and the environment, which will transform infrastructure financing.</p>
MLAI	<p>What is the impact of short-termism, short-term trading activity and intra-sector trading on environmental and equity outcomes?</p>			
Mobile platforms	<p>How do international finance governance institutions and processes take environmental and social issues into account?</p> <p>How does analysis of systemic risk under macro-prudential regulation take environmental and social matters into account?</p>			
IoT	<p>The Shenzhen Green Finance Committee (China) is piloting the use of blockchain and IoT chips embedded in green assets to digitize the green certification and verification process.</p>			
Blockchain	<p>Nespresso (France) has launched a blockchain-based register to track climate-positive actions to share positive social and environmental impacts with shareholders. The Islamic Development Bank (Saudi Arabia) plans to use blockchain to develop sharia-compliant products, to meet demand from Muslim investors, with firms from Indonesia to Canada, and allowing instantaneous clearing and settlement of transactions and assets exchanges.</p>			

T 2: EXTENT TO WHICH DIGITAL TECHNOLOGIES ARE BEING USED TO ACHIEVE SUSTAINABLE OUTCOMES

	Systems & Data	Sustainable choices	New sources of finance	Innovation for the SDGs
Machine Learning/AI	High adoption	Early adoption	Prevalent	Early adoption
Big data	Prevalent	Early adoption	Prevalent	Early adoption
Mobile/ financial applications	Prevalent	Prevalent	High adoption	High adoption
Blockchain	Nascent	Nascent	Nascent	Nascent
IoT	Nascent	-	Nascent	Nascent

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SUSTAINABLE DIGITAL FINANCE AND THE SDGS

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IMPLICATIONS AND UNINTENDED CONSEQUENCES

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CHALLENGES TO LEVERAGING THE FULL POTENTIAL OF SUSTAINABLE DIGITAL FINANCE

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EMERGING OPPORTUNITIES

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Box 14: Opportunities for Action

The challenges and opportunities highlighted in Sections 5 and 6 point to specific actions that could be undertaken to better leverage the power of digital finance to enhance the mobilization of sustainable finance.

A Research Agenda:

- The combination of sustainable finance, which is relatively new, with digital finance, which is rapidly changing, creates gaps in understanding the nexus between the two areas. This highlights the need for further research to strengthen knowledge, raise awareness and inform action to take the potential of sustainable digital finance to scale. Below are suggested, non-exhaustive research questions:
- How can digital technologies help financial institutions better identify, analyse and integrate environmental and social risks into financial decision-making?
- How can financial centres leverage digital finance to improve sustainability?
- How can digital finance transform the future of sustainable infrastructure financing?
- How can digital technologies accelerate achievements of each SDG?

Multi-stakeholder Engagement Platforms:

Establishing a platform at the national or regional level that brings together the financial sector, policymakers, sustainable development experts and the fintech community can contribute to improve engagement on sustainable digital finance and create a centre of gravity. Such a platform could convene various actors to look at national (or regional) sustainable finance strategies from a digital finance lens; identify country (or regional) specific challenges and opportunities, and define what it would take by various stakeholder groups to address local challenges and fully leverage the power of digital finance for sustainable development.

As a centre of gravity, such a platform would also better facilitate engagement with regulators and policymakers around the aspects of digital finance as these relate to sustainability. Specific work streams within national platforms could catalyse dynamic forces for change. For example, a 'green bond tech' task force could enable green bond issuers to join forces with big data, AI and blockchain experts to identify opportunities for technology to reduce costs and scale green bonds. National platforms would also be able to raise awareness about the value of environmental data and increase demands by citizens for greater integration of sustainability considerations into investment decisions by pension funds, asset managers and banks. As a number of national platforms emerge, a network could be created to improve cross-border learning and sharing.

Country Action:

In addition to national sustainable digital finance platforms, specific action at the country level may include:

- Incorporating into existing regulatory sandboxes criteria that encourage the development of sustainable digital finance solutions. Sandboxes that provide an environment where fintechs and financial players can develop and test sustainable digital finance solutions will help catalyse investment in these areas with a pathway to scale. Regulatory sandboxes can also help address adoption challenges around data by developing standards, methodologies and protocols for translating behavioural data into environmental performance data.
- Creating competitions, hackathons, incubators and accelerators that focus specifically on crowding in solutions related to sustainable business models, or better integrating sustainability elements into the existing ecosystem.

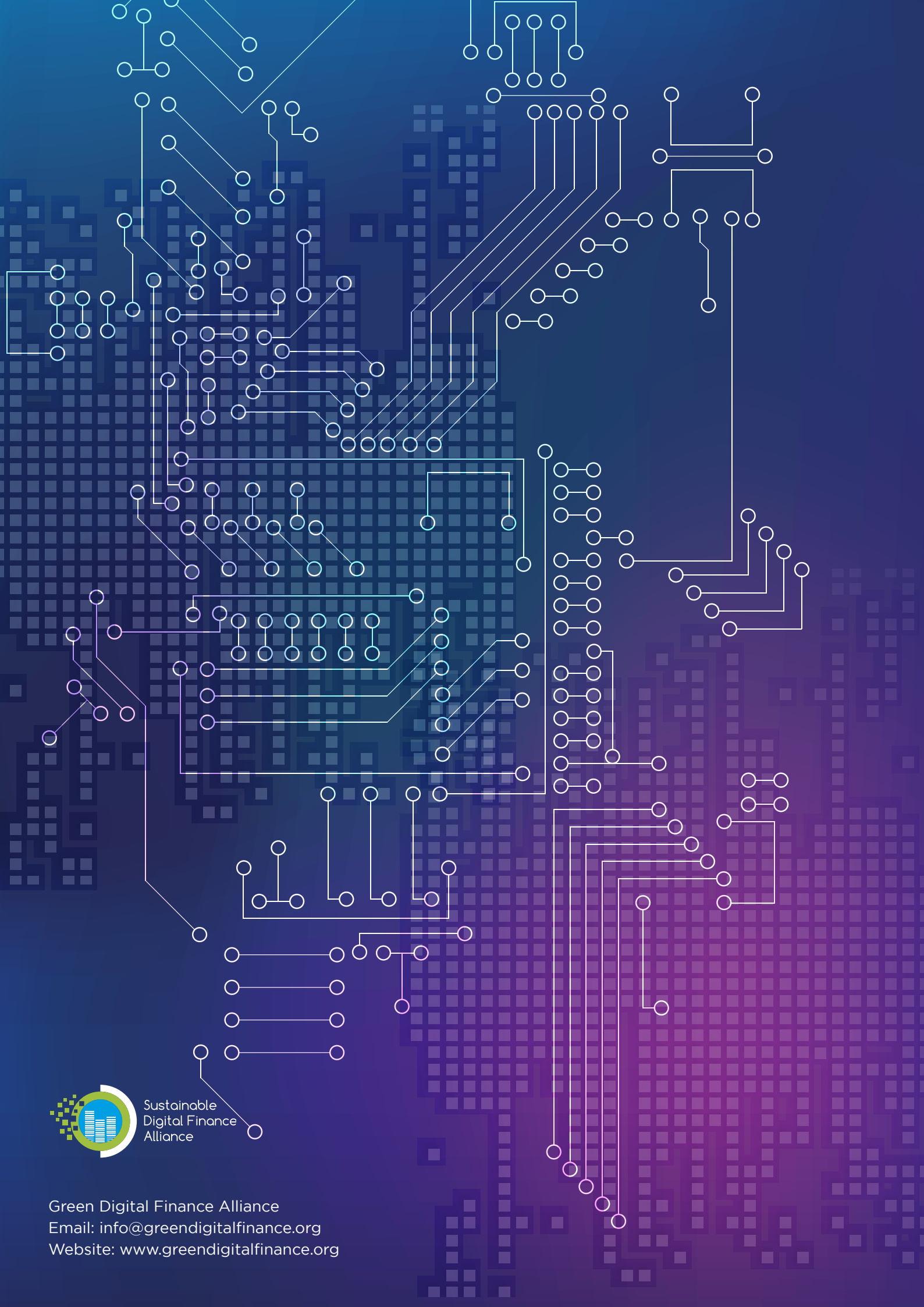
International Cooperation:

Continuing the momentum created by the G20 SFSG on the topic of sustainable digital finance would be helpful to move the agenda forward. Taskforces within international forums and specific international networks (e.g. networks of regulators) would be particularly helpful to address cross-border challenges, risks and opportunities in this area. Such a collaboration would create opportunities for sharing experiences and sustainable digital finance pilots across countries, which would help scale current small-scale initiatives.

ENDNOTES

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