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The G20 countries should engage with blockchain technologies to build an inclusive, transparent, and accountable digital economy for all

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Abstract

Blockchain technologies hold the key to building an inclusive global digital economy that is auditably secure and transparently accountable to the world's citizens. At a time when governments must fight to restore the public's faith in cross-border economic cooperation, blockchains can play a critical role in strengthening economic resilience while ensuring the global economy works to the benefit of all. The G20 must take decisive steps to harness this technology in service of its policy goals across the core focus areas of economic resilience, financial inclusion, taxation, trade and investment, employment, climate, health, sustainable development, and women's empowerment. Failure to do so risks further fragmenting the global economy, undermining public trust in international economic institutions, and pushing the most cutting-edge blockchain developments into dark web deployments that are beyond the reach of government influence. By acting now to embrace blockchains' socially beneficial properties and minimize their potential downside risks, the G20 governments can lay the foundation for a just, prosperous, and truly shared global economy.

(Submitted as G20 Policy Paper)

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Challenge

In its communiqué outlining Priorities of the 2017 G20 Summit, the German presidency noted that "[t]he spread of digital technology in business and society requires discussion on an internationally agreed regulatory framework" and promised that "[t]he G20 will tackle this task."[1] Consistent with the G20's Blueprint for Innovative Growth, the strategy adopted must be one that "seize[s] the historic opportunities presented by technological breakthroughs for global economic growth"[2] while also "shap[ing] the basic conditions in such a way that all people are able to benefit from the positive effects of these developments."[3] Fulfilling this promise requires:

1) researching what ***new* internationally agreed frameworks** will be necessary to support the beneficial spread of digital technologies; and

2) evaluating how those same technologies can help **transform and improve the *existing* regulatory frameworks** currently governing key G20 policy priorities.

The G20 countries must prioritize investment in emerging technologies with the potential to further both objectives at once.

Blockchain is one such leading technology.[4] Blockchains are shared ("distributed" or "decentralized") digital ledgers which use cryptographic algorithms to verify the creation and transfer of digitally represented assets over a peer-to-peer network.[5] They operate via an innovative combination of distributed consensus protocols, cryptography, and in-built economic incentives based on game theory.

Blockchains are already being deployed to replace single points of financial system failure with decentralized market structures (DTCC 2016). They are helping expand financial inclusion to previously unbanked populations (Hyland 2016). They stand poised to improve the oversight of international markets by supplying policymakers with real-time data on financial flows and asset class risks (He et al. 2016). Meanwhile, blockchains are rapidly becoming the bedrock of the "New Industrial Revolution" (Industry 4.0) – introducing provenance tracking,[6] identity

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[1] Priorities of the 2017 G20 Summit, 1 December 2016, p. 9, at: http://www.g20.utoronto.ca/2017/2016-g20-praesidentschaftspapier-en.pdf

[2] G20 Blueprint on Innovative Growth (Hangzhou, 2016), p. 1, at:

https://www.bundesregierung.de/Content/DE/_Anlagen/G7_G20/2016-09-08-g20-blueprint-on-innovation-growth.pdf?__blob=publicationFile&v=4

[3] Statement by Dr. Angela Merkel, Chancellor of the Federal Republic of Germany, Priorities of the 2017 G20 Summit, p. 3, at: http://www.g20.utoronto.ca/2017/2016-g20-praesidentschaftspapier-en.pdf.

[4] For a primer on what blockchains are and how they work, see the Annex at the end of this paper and the references cited therein.

[5] For more detailed descriptions see, e.g.: https://en.wikipedia.org/wiki/Blockchain_%28database%29 ; Volpicelli (2016) and The Economist (2015).

[6] See Higgins 2016 and Parker 2016a.

management,[7] and digital scarcity[8] into global supply chain management while also enabling the near real-time trade and settlement of both tangible[9] and intangible[10] assets over secure, distributed networks.

But blockchains also introduce grave new risks to the global economy by displacing or bypassing some of the intermediaries upon whom governments have historically relied to implement important regulatory safeguards. It is not yet clear how safeguards like the Basel provisions promoting financial system stability or the Financial Action Task Force rules combatting tax evasion, money laundering, terrorist financing, and other dark web activities can be implemented in a blockchain-powered world. These and other questions deserve concerted research, as detailed below.

The G20 must take concrete steps to harness the tremendous opportunities and minimize the risks of blockchain technologies in this critical incubative period of their development. By doing so, the G20 can respond to two major contemporary geopolitical challenges. The first is the prevailing Zeitgeist of citizens' "increasing scepticism towards cross-border trade and open markets"[11] and the public's concomitant distrust in the institutions that structure our global economy. The second is the "risk of an increasing fragmentation of the international economic order"[12] brought about by rising anti-globalization sentiments. Blockchains present unique opportunities to address both. By design, they move away from a global economic order centered around powerful but not always trustworthy intermediaries – whether financial institutions, GAFA and BAWT type companies (Google, Amazon, Facebook, Apple and Baidu, Alibaba, Weibo, Tencent, respectively), or in some cases insufficiently accountable government bodies. Blockchain usage tends toward a more decentralized and democratic order which empowers individuals to participate in the global economy directly through systemically embedded transparency, accountability, and inclusiveness mechanisms.[13]

Much as the internet enabled the direct global exchange of information, blockchain empowers individuals around the globe to transact economically on a peer-to-peer basis, enabling them to quickly and cheaply exchange value across borders without the need for a trusted intermediary such as a bank, broker, or exchange. This has obvious application to core G20 concerns like financial inclusion, where the G20 has committed to furthering "[i]nclusive and sustainable financial systems that offer all households and companies appropriate access to financial

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[7] There are currently more than 30 companies, projects, and collaborative networks working on the use of blockchain for identity management. For a list, with links to websites, see: https://github.com/peacekeeper/blockchain-identity.

[8] See Parker (2016b).

[9] See Mizrahi, Alex, 'A Blockchain-Based Property Recording System', at: chromaway.com/papers/A-blockchain-based-property-registry.pdf .

[10] See Pinna and Ruttenberg (2016).

[11] Priorities of the 2017 G20 Summit, 1 December 2016, p. 7, at: http://www.g20.utoronto.ca/2017/2016-g20-praesidentschaftspapier-en.pdf

[12] Priorities of the 2017 G20 Summit, 1 December 2016, p. 4, at: http://www.g20.utoronto.ca/2017/2016-g20-praesidentschaftspapier-en.pdf

[13] They do this via an innovative combination of distributed consensus protocols, cryptography, and in-built economic incentives.

services"[14] – including the estimated 2 billion unbanked persons who are currently not served by the global financial system.

Often referred to as "the Internet of Value", blockchains also hold the key to integrating other emerging technologies identified by the G20's Blueprint for Innovative Growth as ushering in a "New Industrial Revolution" (NIR, also known as "Industry 4.0"). These include innovations such as "the Internet of Things (IoT), Big Data, cloud computing, Artificial Intelligence (AI), robotics, additive manufacturing, new materials, augmented reality, nanotechnology and biotechnology."[15] Since blockchain technologies promise to be the glue that binds the NIR together, the G20 countries must take the lead in forging effective technology-regulatory synergies for blockchain as a matter of priority.

Finally, thanks to their ability to record, verify, and broadcast transactions in a transparent and tamper-proof manner, blockchains can improve public oversight and strengthen economic resiliency of the global financial system by providing authorities with risk-monitoring data in real time. In the same manner, governmental and intergovernmental institutions can improve public confidence in the responsible stewardship of public resources by migrating many of their own data tracking processes to publicly viewable blockchains. The administration of certain international economic law regimes can likewise be made more efficient by deploying blockchain-powered data and asset management solutions. The G20 should facilitate active experimentation within each of these core concerns.

Proposal

The G20's 2017 Priorities communiqué recognizes that "the international community and the G20, as the most important forum for economic and financial policy cooperation, are called upon to work together in such a way that the benefits of globalisation and worldwide connectivity are both enhanced and more widely shared."[16] The overall approach the G20 countries should follow is specified in the G20 Blueprint on Innovative Growth (Hangzhou, 2016) and its accompanying New Industrial Revolution Action Plan. In the spirit of the principles, objectives, and actions set forth in those documents, the **G20 countries should take the lead in initiating several concrete steps** to support public and private sector blockchain innovations and establish internationally agreed regulatory frameworks to interface with them.

In particular:

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[14] Priorities of the 2017 G20 Summit, 1 December 2016, p. 6, at: http://www.g20.utoronto.ca/2017/2016-g20-praesidentschaftspapier-en.pdf

[15] G20 Blueprint on Innovative Growth (Hangzhou, 2016), p. 2, at:

https://www.bundesregierung.de/Content/DE/_Anlagen/G7_G20/2016-09-08-g20-blueprint-on-innovation-growth.pdf?__blob=publicationFile&v=4

[16] Priorities of the 2017 G20 Summit, 1 December 2016, p. 4, at: http://www.g20.utoronto.ca/2017/2016-g20-praesidentschaftspapier-en.pdf

1. To demonstrate its commitment to responsible global economic management, the G20 should **convene a research group to identify and scope which existing international regulatory regimes can be made more efficient,** transparent **and accountable** by migrating to blockchain-based systems. Prospects for consideration should include, *inter alia*:

   a. The <u>Basel agreements</u>, especially as regards public authorities' financial stability and systemic risk monitoring commitments and private financial institutions' reporting obligations thereunder;

   b. The <u>WTO agreements</u>, in respect of country-specific tariff commitments and rules of origin under the GATT and GATS, as well as intellectual property rights monitoring under the TRIPS Agreement, public procurement monitoring under the Government Procurement Agreement, etc.

   c. The <u>Paris Agreement on Climate Change</u>, in connection with reporting and monitoring of countries' Nationally Determined Commitments, the global stocktake, and internationally transferred mitigation outcomes (ITMOs), climate finance, and green finance.

   d. The <u>ICANN</u> domain name registry system, which could potentially be replaced by an automated, blockchain-based system (Ward 2015).

2. The G20 countries should support beneficial private sector blockchain development by **promoting the establishment of a global regulatory sandbox for the most promising blockchain use cases**.[17] This would allow different technical deployments of blockchains to be tested and refined within an environment that allows innovators to cooperate with national and international regulators to address difficult cross-border regulatory concerns from the outset and thereby "enhance the partnership between public and private sectors".[18] To succeed, such a regulatory sandbox must be cross-sectoral, start-up friendly, use-case tailored, and have global reach.[19] Active private sector development indicates that early candidates for a blockchain regulatory sandbox could include numerous projects of direct relevance to the G20's priorities, such as:

   a. <u>Financial services for currently unbanked and underbanked populations</u> (remittances, micro-finance/micro-savings, community investment initiatives, etc);

   b. <u>Global supply chain integration for SMEs and micro-SMEs</u> (e.g. trade finance, customs compliance, preferential procurement benefits for women-owned businesses);

   c. <u>Off-grid financing of clean energy</u> (e.g. solar in rural Africa and India); and

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[17] An in-depth overview of why such a sandbox is needed and how it might operate may be found in Maupin (2017).

[18] G20 Blueprint on Innovative Growth (Hangzhou, 2016), p. 4, at:

https://www.bundesregierung.de/Content/DE/_Anlagen/G7_G20/2016-09-08-g20-blueprint-on-innovation-growth.pdf?__blob=publicationFile&v=4

[19] These features are necessary in view of the fact that blockchains are global by nature and capable of beneficial deployment are across diverse sectors (e.g. healthcare, financial services, trade, communications, digital identity management, and more) – each with its own set of transnational regulatory concerns.

d. Digital identity and privacy management services (blockchain-powered cryptographic solutions to problems such as consumer privacy and mass data surveillance that also address countervailing risks of criminal abuse of blockchains' anonymity features for illicit purposes).[20]

3. To contribute to economic resilience, the G20 should **constitute and fund a Central Banks Blockchain Consortium** to study the monetary and fiscal policy implications of the rise of cryptocurrencies and other blockchain technologies. The momentum for such a consortium is already at hand. Many key central banks – including the German Bundesbank, Bank of China, Bank of England, US Federal Reserve, Australian Reserve Bank, South African Reserve Board, European Central Bank and Bank of Japan – have recently disclosed their intensive internal research engagement with blockchain.[21] These research efforts should be brought together to avoid further duplication and maximize the efficient use of scarce resources. The Central Banks Blockchain Research Consortium should be comprised of technical experts from across the spectrum of economics, law, cryptography, the computational sciences and related fields, with a mandate to objectively explore and evaluate the full panoply of blockchain-based global monetary system options. The consortium should meet regularly to study and publish independent research on topics such as:

a. The possible creation and design features of blockchain-based national fiat currencies and their desirability;
b. The co-existence and interaction of fiat and non-fiat cryptocurrencies and the implications of different countries adopting different approaches (e.g. Bitcoin, Ether, Zcash alongside blockchain-based Dollars, Euros, Renminbi);
c. The potential utility of public blockchain-based prediction markets experiments to improve the design and efficacy of national monetary policies and global reserve currency arrangements. (Blockchain-based prediction markets, e.g. Augur, can supply policymakers with large volumes of real-time data generated by decentralized market participants who are economically incentivized to make and publicize accurate financial predictions. In other words, they allow policymakers to tap the "wisdom of the financially incentivized crowd" as a tool for validating, improving, or debunking efficient markets-based and other monetary policy theories.)

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[20] An accessible overview of basic concepts is provided in Baars (2016).

[21] Recent news reports on these central bank research activities include:

https://www.cryptocoinsnews.com/japans-central-bank-european-central-bank-partner-for-blockchain-research/ (ECB-Japan);

http://www.coindesk.com/bundesbank-president-blockchain-multi-purpose-tool/ (German Bundesbank);
http://www.coindesk.com/sarb-chief-blockchain-financial-access/ (South African Reserve Bank);
http://www.coindesk.com/chinas-central-bank-testing-blockchain-backed-digital-currency/ (Chinese Central Bank);
http://www.coindesk.com/bank-of-england-dlt-reshape-banking/ (Bank of England);
http://www.coindesk.com/federal-reserve-central-bank-distributed-ledger-research-paper/ (US Federal Reserve); and
http://www.coindesk.com/australian-blockchain-government-bonds/ (Reserve Bank of Australia).

4. Finally, in furtherance of the foregoing three recommendations and in fulfillment of the Multi-stakeholder Communication Principle set out in its NIR Action Plan, the G20 should **partner with other transnational legal and regulatory bodies working on blockchain-related issues** of global concern, including, *inter alia*:

   a. The <u>International Standards Organization</u> (currently working on technical standards and interoperability for blockchain and distributed ledger technologies under ISO/TC 307, blockchain and electronic distributed ledger technologies);

   b. The <u>International Law Association</u> (studying international monetary law implications of blockchain within its MICOMILA committee);

   c. The <u>Financial Action Task Force</u> (monitoring the anti-money laundering and counter-terrorist finance risks posed by blockchain-based financial transfers);

   d. The <u>Commonwealth Virtual Currencies Working Group</u> (exploring the risks and opportunities of blockchain across diverse areas).

   e. The <u>OECD, UNCTAD, UNIDO</u>, and other national and international partners as set forth in G20 NIR Action Plan.

The **G20 is well-situated to take the lead in providing policy guidance on the use of blockchains in the global economy**. As the premier international forum focused on global finance and economics, it is representative of the world's major legal systems and economic traditions and comprises a broad spectrum of developed and advancing economies, including all of the world's most technically advanced countries, which together account for a large majority of world trade and investment flows. Moreover, providing leadership on blockchain law and policy questions is essential to fulfilling the G20's commitment to "encourage the creation of innovation ecosystems that catalyze creativity and support the combination of creative ideas with entrepreneurship, science and technology for innovative growth and job creation."[22] With blockchain and other distributed ledger technologies evolving so rapidly, failure to seize the initiative could conversely risk rendering irrelevant the G20's input into the future shape of the international economic order. The G20 must act now to exercise innovative leadership and engage in thoughtful experimentation. It must commit to developing appropriate multi-stakeholder initiatives that leverage blockchains' strengths and foster a more inclusive, open, and accountable global economy for all.

Implementation:

Two key existing G20 policy documents guide the manner in which the G20 countries should adopt and implement the foregoing policy recommendations. In particular:

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[22] G20 Blueprint on Innovative Growth (Hangzhou, 2016), p. 1, at:
https://www.bundesregierung.de/Content/DE/_Anlagen/G7_G20/2016-09-08-g20-blueprint-on-innovation-growth.pdf?__blob=publicationFile&v=4

- The **G20 Blueprint for Innovative Growth (2016)**, "highlight[s] the *importance of inclusiveness* to eradicate extreme poverty, reduce inequality and social exclusion and to bridge the digital divide."[23] It also "encourage[s] the *creation of innovation ecosystems* that catalyze creativity and support the combination of creative ideas with entrepreneurship, science and technology for innovative growth and job creation" and "aspire[s] to synergy in the discussion across work streams within the G20 and with international organizations and initiatives outside the G20."[24]

- The **G20 New Industrial Revolution Action Plan (2016)** recognizes that nascent technologies like blockchain imply "[n]ew industry and business models will be established and supersede conventional ones" and therefore enshrines the *Multi-Stakeholder Communication Principle* as its modus operandi. Pursuant to this approach, "[w]ithin each member, communication and collaboration among all stakeholders of NIR, such as government, enterprises, research institutions, trade unions, employees and business associations will help promote the smooth implementation of NIR while balancing respective interests." It encourages G20 members to "strengthen communication and collaboration to help address challenges common to all members."

These guiding principles provide a clear road map for the G20's policy engagement with blockchain technologies in connection with promoting inclusive, transparent, and accountable global economic governance.

Annex: Blockchains in brief

> *Note: what follows is a cursory introduction intended for non-technical readers. Readers in search of greater precision should consult the sources listed in the additional technical references section.

Blockchains are shared ("distributed" or "decentralized") digital ledgers which use cryptographic algorithms to verify the creation and transfer of digitally represented assets or information over a peer-to-peer network.[25] They operate via an innovative combination of distributed consensus protocols, cryptography, and in-built economic incentives based on game theory. The digital asset "native" to the first blockchain ever developed is the cryptocurrency known as Bitcoin – a non-state form of digital money that went into circulation in 2009 and has

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[23] G20 Blueprint on Innovative Growth (Hangzhou, 2016), p. 1, at:

https://www.bundesregierung.de/Content/DE/_Anlagen/G7_G20/2016-09-08-g20-blueprint-on-innovation-growth.pdf?__blob=publicationFile&v=4

[24] Ibid.

[25] For more detailed descriptions see, e.g.: https://en.wikipedia.org/wiki/Blockchain_%28database%29, Volpicelli (2016) and The Economist (2015).

since enjoyed considerable success.[26]   Beyond non-state cryptocurrencies, blockchains can be used to represent, track and trade many other types of assets as well, including:

- fiat (government issued) money (Wild 2017);
- stocks, bonds, options, derivatives, and other financial products (DTCC 2016);
- real and intellectual property rights (Shin 2016);
- contract rights (Morrison 2016);
- the movement of goods and services across a global supply chain (Higgins 2016 and Parker 2016a);
- the expenditure of public[27] or private[28] funds; and much more.

Blockchains can be set up in either public (permissionless – anyone can use them) or private (permissioned – restricted to use by approved parties) configurations, each of which entails distinct advantages and disadvantages. They can also be configured to accommodate greater or lesser degrees of user privacy. These and other design choices must be tailored to the specific goals pursued in each blockchain use case. Broadly speaking, however, blockchains can be specified to exhibit certain innovative properties which make them a highly useful tool in structuring our global economy, such as:[29]

1) *distributed consensus* – no central point of control or failure (no chokepoints or intermediaries);
2) *transaction transparency/auditability* – every ledger entry is verifiable and retraceable across its full history (accountability);
3) *party identity abstraction* – individual parties can transact with one another across the network without revealing their full identities (enhanced privacy).

It is thanks to these and other properties that blockchains are often referred to as the "internet of value". They allow individuals and organizations to exchange value (e.g. money, or assets, or assets for money) across borders in the same way the internet allows us to exchange information on a global, decentralized, peer-to-peer basis. And much like exchanging information on the internet, exchanging value on a blockchain is fast and cheap – often considerably faster and cheaper than the existing "legacy" systems of our global financial order. This makes blockchains an attractive vehicle for accomplishing a number of top G20 policy priorities, as discussed above.

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[26] For a technical explanation, *see* Satoshi Nakamoto (pseudonym) (2008). For non-technical readers, the Bitcoin Wiki page provides an accessible introduction, at: https://en.wikipedia.org/wiki/Bitcoin.

[27] See Das (2016).

[28] See Parker (2016c).

[29] These and other characteristic are explained in DTCC Connection (2016).

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