Taskforce 3

Digital Revolution:

Achieving Universal Connectivity and Smarter Communities

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Need for Action – Critical Transitions

1   **Connectivity disruptions and network stresses due to extreme events**

2   **Increased digital vulnerabilities due to large scale cyber attacks, data theft and fraud**

3   **Loss of trust due to rise in deep fakes and misinformation**

4   **Changing societal landscape**
(including increasing digital penetration, risk of underemployment/unemployment, updated social platforms etc.)

5   **Emergence of a digital divide due to uneven distribution in access to and input in digital systems**

6   **Increased Urbanization and the need for smart communities**

Need for Action – Challenges

1 Lack of **resilient digital infrastructure**

2 **Closed digital systems restricting interoperability** of digital infrastructure

3 **Lack of standardized policies, protocols, organizations and institutional frameworks** to advance digital technologies both within and across nations

Theme Specific Challenges

4 **Limited awareness and understanding** on digital technologies among policy-makers

5 **Lack of collaboration** between public and private institutions, as well as between countries

6 **Insufficient funding and investment** limits advancements in digital technologies

7 **Risks with data storage, ownership and cross-border sharing**

Common Challenges

Policy Recommendations

The G20 Academies of Sciences call for:

1 Bridging the emerging **digital divide** by developing low cost and accessible technologies

2 **Reducing vulnerabilities and enhance the resilience** of current and future digital technologies

3 **Preventing spread of disinformation** across digital platforms

4 Developing **interoperability standards for digital technologies** to support sustainable and scalable deployment of smart city technologies

5 Assessing the **social impact of the digital revolution** and develop policies to mitigate against the adverse effects

Theme Specific Recommendations

6 Establishing a **global platform to enhance collaboration** in the field of science and technology to accelerate breakthroughs in field of digital technologies

7 Developing **appropriate rules and regulations for local and cross-border data sharing** among government, academia & industry while protecting privacy & personal data of individuals

8 Developing **strategies to inform society and build awareness** on the benefits of digital technologies

9 Promoting **sustainable financing programs** that enable technical and economic collaboration at the international level for scientific research & development

Common Recommendations

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① Bridging the digital divide

POLICY RECOMMENDATION 1

Bridge the emerging digital divide by developing low cost and accessible technologies

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RATIONALE

COVID-19 pandemic has brought to fore the divide in our society between those who have capability and access to digital technology, especially the internet, and services enabled by it, and those who either have limited or no access to these. Internet accessibility is increasingly being considered a basic or fundamental right of every citizen. Narrowing the gap between the 'haves' and the 'have nots', between the under-connected regions and hyper-connected regions is, therefore, a critical challenge.

POLICY ACTIONS

1.1 Develop technologies that will contribute to reducing inequalities between the 'Haves' and 'Have Nots' in a digital context.

1.2 Support research on novel wireless communication schemes that integrate satellite, airborne, and terrestrial networks.

1.3 Encourage research on developing agile networking technologies that adapt their structure and resource allocations based on the population density of a region and the quality of service required by its users.

1.4 Establish Global Access to the Internet for All (GAIA) Research Groups using revised regulations and policies, new business models, and innovative wireless communication and networking technologies.

1.5 Promote inclusive learning solutions to ensure digital education opportunities for all, especially women, and prepare them for 'future of work'.

Critical Transitions

Ⅰ Connectivity disruptions and network stresses

Ⅲ Loss of trust

Ⅴ Emergence of a digital divide

Ⅱ Changing societal landscape

Ⅳ Increased digital vulnerabilities

Ⅵ Smart cities

Challenges

Ⅰ Lack of resilient infrastructure

Ⅱ Lack of interoperable infrastructure

Ⅲ Lack of standardization

Ⅳ Limited awareness

Ⅴ Lack of collaboration

Ⅵ Insufficient funding and investment

Ⅶ Risks with data

POLICY RECOMMENDATION 2

Reduce vulnerabilities and enhance the resilience of current and future digital technologies

RATIONALE

Existing telecom infrastructure is vulnerable to all kinds of disruptions including pandemics, disasters and political conflicts. It typically takes a long time to rebuild this infrastructure once destroyed. Catastrophic failure of aerial/space-based networks can lead to the sudden loss of connections of millions of global users. Despite the strong need for resilience, most nations restrain themselves from investing towards building more redundancy in networks, as that requires significant investments as well as political will, while the results of such investments may not be directly visible.

POLICY ACTIONS

2.1 Leverage scientific community in developing plans to upgrade current digital infrastructure, and deploying additional infrastructure (e.g. explore low orbit satellite internet), in order to sustain increasing network traffic demands, improve the connectivity services for remote digital services (e.g. e-learning, e-health, home office) along with contingency plans to ensure continued availability even during disruptions.

2.2 Support research and launch of many competing networks (including aerial or space constellations) in order to offer a certain level of redundancy, thereby ensuring fail-safe network connectivity.

2.3 Dedicate more resources to promote research and development of robust and resilient AI algorithms that are less susceptible to random failures and malicious attacks.

2.4 Support research and development of stronger cryptographic protocols and regulations to protect digital information.

Critical Transitions

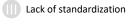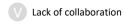**I** Connectivity disruptions and network stresses

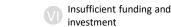**II** Changing societal landscape

III Loss of trust

IV Increased digital vulnerabilities

V Emergence of a digital divide

VI Smart cities

Challenges

I Lack of resilient infrastructure

II Lack of interoperable infrastructure

III Lack of standardization

IV Limited awareness

V Lack of collaboration

VI Insufficient funding and investment

VII Risks with data

POLICY RECOMMENDATION 3
Prevent spread of disinformation across digital platforms

RATIONALE

Digital technologies can be used to spread false information. Various forms of unchecked digital content can reach vast population across countries regardless of inter-states relations. This will eventually affect the public's trust worthiness of various forms of digital technology. Lack of adequate technologies to prevent disinformation, lack of sufficient public digital literacy, and insufficient national and global regulations to control spread of deep fake are key challenges owing to which the spread of false information is hard to control.
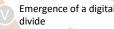
POLICY ACTIONS

3.1 Enhance the quality of digital education for all stakeholders, from the general public to the workforce and decision-makers.

3.2 Define and enforce a compulsory basic level of digital and cyber literacy in educational curricula.

3.3 Develop technologies and processes that allows for rapid detection and blocking of deep fake, fake news and disinformation.

3.4 Provide scientific guidance and address unsubstantiated claims on potential use and limitations of Artificial Intelligence across domains.

3.5 Invest in research and development of trustworthy and explainable AI in high stakes domains, such as finance and healthcare.

3.6 Promote scientific vigor and temperament in the society to tackle the amplification of "filter bubble", where personal conviction trumps information.

Critical Transitions

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V	Emergence of a digital divide
VI	Smart cities

Challenges

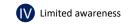|	
I	Lack of resilient infrastructure
II	Lack of interoperable infrastructure
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VII	Risks with data

④ Interoperability standards for smart cities

POLICY RECOMMENDATION 4

Develop interoperability standards for digital technologies to support sustainable and scalable deployment of smart city technologies

RATIONALE

Globally cities are adopting smart technologies for better management and operations of urban applications. There are multiple standards and protocols for smart city technologies, many which rely on proprietary technologies. A lack of interoperability will place financial and operational burdens on city administrators when deploying technologies and could result in closed systems that are difficult to upgrade. Interoperable standards will allow cities to focus on deploying smart city technologies when needed without the risk of being tied to a single vendor or legacy technology.
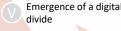
POLICY ACTIONS

4.1 Accelerate the development of smart cities and smart communities to improve recourse sharing and expedite emergency recovery plans by working closely with scientific community.

4.2 Encourage collaboration among the scientific community and industry stakeholders to explore the needs of the society and develop model smart cities with tangible and real-life benefits rather than focusing on marketing hype.

4.3 Promote sharing of know-how, best practices and experiences in development of sustainable smart communities among nations.

4.4 Increase awareness about advantages of smart community and encouraging government support for building digital infrastructure for smart communities in both rural and urban setups

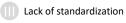**Critical Transitions**

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Challenges

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V	Lack of collaboration
VII	Risks with data
II	Lack of interoperable infrastructure
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VI	Insufficient funding and investment

⑤ Social impact of the digital revolution

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POLICY RECOMMENDATION 5

Assess the social impact of the digital revolution and develop policies to mitigate against the adverse effects

RATIONALE

The digital revolution is transforming the way customers, workers, employers and society as a whole interacts. While the digital revolution will bring many benefits there will be adverse effects which need to be fully understood and planned for. Additionally policies will need to be implemented that maximize the benefits of the new technology while minimizing the inevitable short-term disruptions.

POLICY ACTIONS

5.1 Conduct studies to understand the impact of the digital revolution on communities (young, middle-aged and older) and how the communities are adopting and adapting to the new technologies.

5.2 Perform studies and assessments to understand how the digital revolution will transform commerce and business.

5.3 Develop a platform to test and share best practice ideas on how to respond to the digital revolution (through policies & programs)
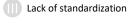
Critical Transitions

(I) Connectivity disruptions and network stresses

(III) Loss of trust

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Challenges

(I) Lack of resilient infrastructure

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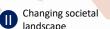
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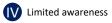
POLICY RECOMMENDATION 6

Establish a global platform to enhance collaboration in the field of science and technology to accelerate breakthroughs in field of digital technologies

RATIONALE

Digital technologies will form the bedrock of future industries and economic systems. It is vital to promote collaborations across nations on the development of such technologies.
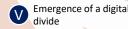
POLICY ACTIONS

6.1 Promote development of globally accepted & transparent standards for telecommunication technologies through international organizations.

6.2 Encourage cross-border sharing of data, codes, computations and knowledge.

6.3 Promote greater funding in research and development projects, allowing for bi-lateral and multi-lateral funding.

6.4 Create simplified and internationally accepted standards and policies for data collection, protection, sharing, and processing among different parties such as governments and the private sector with clear enforcement mechanisms, keeping in view the cultural aspects of different nations.

6.5 Invest in building of unified domain-specific data-centers and linking of national and global data sources into it.

6.6 Promote open data access in government & private sectors by establishing frameworks for data collection, protection, analysis, & access.

6.7 Develop standardized tools and frameworks for continual evaluation of digital technologies to maximize efficacy in their usage.
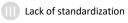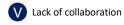
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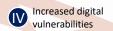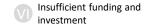SCIENCE

POLICY RECOMMENDATION 7

Develop appropriate rules and regulations for local and cross-border data sharing among government, academia & industry while protecting privacy & personal data of individuals
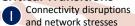
RATIONALE

The digital revolution is creating a step change in the amount of data being generated and collected. In order to accelerate the digital revolution, it is critical to define how this data is managed, secured and shared.

POLICY ACTIONS

7.1 Support initiatives for data sharing, building testbeds and allow for collaborations in real-world application settings.

7.2 Create a mechanism for cross-border data sharing.

7.3 Develop a set of data sharing laws and regulations that are provide a base for sharing data.

7.4 Establish protocols for securing data using latest cryptography and blockchain based solutions.
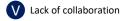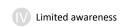
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POLICY RECOMMENDATION 8

Develop strategies to inform society and build awareness on the benefits of digital technologies

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RATIONALE

With the development of increasingly complex digital technologies, their potential for widespread disruption and spread of fake news there are growing concerns among society on the use of AI, facial recognition, drones and 5G. In addition to the technologies, there are concerns on increased unemployment due to widescale automation, with AI a particular fear. Adoption of new digital technologies will rely on acceptance by society and the benefits of new technologies need to be properly communicated.
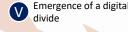

POLICY ACTIONS

8.1 Encourage development and adoption of AI regulations or development of a Global Artificial Intelligence Association (GAIA), through interdisciplinary research to ensure safety of humanity, standardized liability and governance laws while considering ethical, legal and potential for inappropriate use of AI systems.

8.2 Promote AI capacity building and skill development through widespread education in schools, colleges, universities and international collaboration in AI R&D while also raising awareness among public on utility of AI and its deployment in business, health, agriculture and environment.

8.3 Strengthen focus on education and training of students and faculty in a unified framework in schools, training camps and universities, focusing on STEM subjects to develop the next generation of researchers, promote digital literacy and innovation, enhance labor skills to reduce socio-economic disparities with emphasis on 'fair digitalization'.
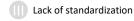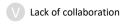

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POLICY RECOMMENDATION 9

Promote sustainable financing programs that enable technical and economic collaboration at the international level for scientific research & development
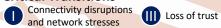
RATIONALE

Although there are significant investments in digital technologies, there are gaps in funding of certain technologies and a lack of international collaboration. In order to make the digital revolution inclusive, efforts can be taken to promote sustainable financing programs.
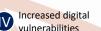
POLICY ACTIONS

9.1 Support funding for multidisciplinary research interlinking social sciences, humanities and computer science

9.2 Collaborate and assist technically and economically so that this revolution is sustainable over time

9.3 Provide focused funding in science and technology for the development of digital technologies including connectivity, AI, and smart communities.

9.4 Provide greater investment and resources towards developing less intensive computational methods, such as lite AI, which would not only reduce costs, but also reduce energy consumption.
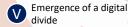
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