Taskforce 4

Foresight: Connecting the dots

From Science to Action

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Need for Action – Critical Transitions

TF1 – Future of Health

Repetitive outbreaks, neglected endemics, and prolonged pandemics, which lead to disruptive and overwhelmed healthcare

Global factors resulting from human-environment interplay, which lead to genetic and epigenetic alterations in human and pathogens

Skewedness of population demographics associated with increased age-related health issues

Increasing dependence on telehealth and other digital advancements for multiple health aspects

Healthcare moving towards advanced and personalized care

TF2 – Circular Economy

Endangering natural resources due to unsustainable and environmentally damaging use driven by population growth, urbanization and unwise consumption.

Increasing disruption of global supply chains due to system shocks (health, environmental, technological or financial)

Unstable weather and deterioration of environmental systems due to climate change

Approaching a tipping point where regeneration of biosystems is hindered.

TF3 – Digital Revolution

Connectivity disruptions and network stresses due to extreme events

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

Loss of trust due to rise in deep fakes and misinformation
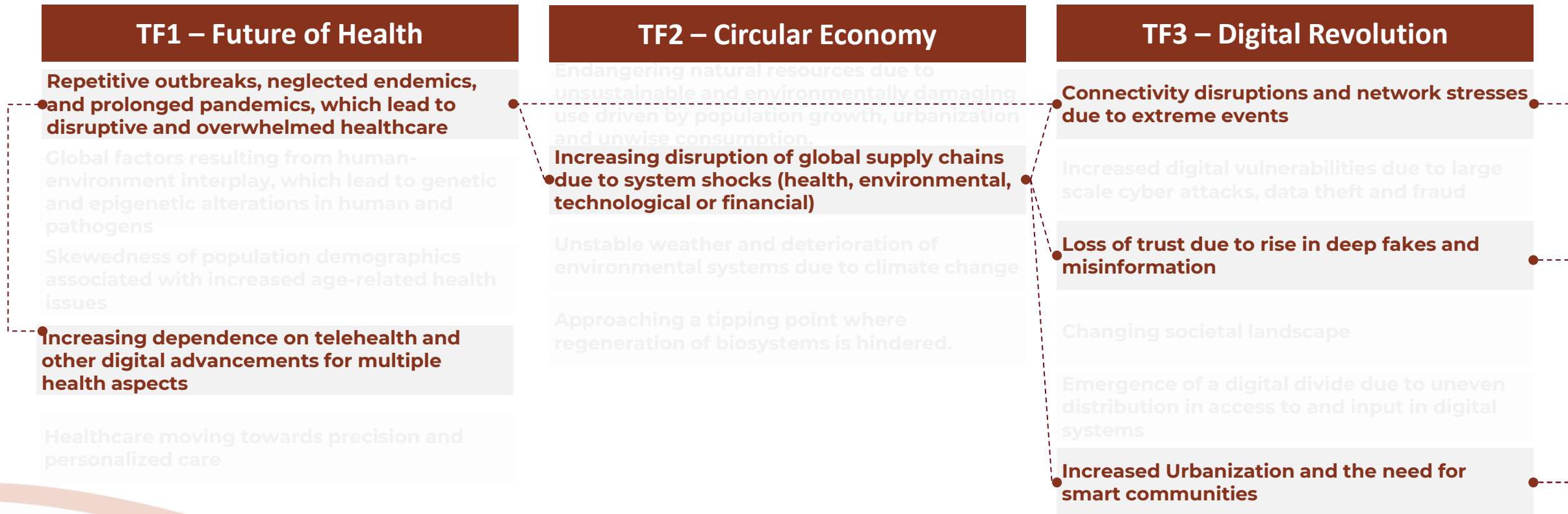
Changing societal landscape

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

Increased Urbanization and the need for smart communities

Need for Action – Critical Transitions Connecting the Dots

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Connecting the dots across the task forces – COVID-19 as an example event

TF1 – Future of Health	TF2 – Circular Economy	TF3 – Digital Revolution
Repetitive outbreaks, neglected endemics, and prolonged pandemics, which lead to disruptive and overwhelmed healthcare	Endangering natural resources due to unsustainable and environmentally damaging use driven by population growth, urbanization and unwise consumption.	**Connectivity disruptions and network stresses due to extreme events**
Global factors resulting from human-environment interplay, which lead to genetic and epigenetic alterations in human and pathogens	**Increasing disruption of global supply chains due to system shocks (health, environmental, technological or financial)**	Increased digital vulnerabilities due to large scale cyber attacks, data theft and fraud
Skewedness of population demographics associated with increased age-related health issues	Unstable weather and deterioration of environmental systems due to climate change	**Loss of trust due to rise in deep fakes and misinformation**
Increasing dependence on telehealth and other digital advancements for multiple health aspects	Approaching a tipping point where regeneration of biosystems is hindered.	Changing societal landscape
Healthcare moving towards precision and personalized care		Emergence of a digital divide due to uneven distribution in access to and input in digital systems
		Increased Urbanization and the need for smart communities

The COVID-19 pandemic has highlighted the interconnectedness of critical transitions across themes

Need for Action – Complexity of Critical Transitions

1 Convergence of multiple transitions with critical global disruptions.

2 Growing complexity, interconnectivity and interdependence of global social, economic, environmental and political systems

3 Emergence of foresight as a means of understanding complex systems through utilizing new data gathering and processing capabilities

Complexity due to high interconnectivity of critical transitions emphasizes the need for foresight capabilities

Need for Action – Challenges

1 **Limited skills, expertise and infrastructure** for foresight science

2 **Limitations of current foresight methods and analysis** in identifying and appreciating the synergies and interconnections between critical global transition

3 Lack of **understanding of future political, social and economic changes** in an increasingly interconnected world

4 **Difficulty in predicting and understanding technological change** due to increasing pace and complexity of technology development

Theme Specific Challenges

5 **Policy makers often unaware of foresight**

6 **Limited collaboration** between governmental, private and academic institutions as well as between countries

7 **Insufficient funding** to advance foresight research

8 **Limited data sharing** for foresight studies due to data ownership, security or unavailability

Common Challenges

Policy Recommendations

The G20 Academies of Sciences call for:

1 Developing **Foresight as a discipline in science**

2 Initiating a **global Foresight hub** to improve knowledge of foresight science

Theme Specific Recommendations

3 **Building trust and awareness** in science & foresight

4 Fostering greater **collaboration and coordination**

5 **Creating funding and support** for foresight science programs

6 Developing methods for **generating, collecting and sharing data globally**

Common Recommendations

POLICY RECOMMENDATION 1
Develop foresight as a discipline in science

Rationale

The growing complexity and interconnectedness of systems makes it increasingly difficult for policymakers, scientists and companies to understand the impact of their decisions. Foresight can be used to help identify the emerging social, economic, environmental and political changes, allowing individuals to better prepare against them. Given the role foresight can play, more individuals with expertise in the subject will be required and therefore foresight should be established as a discipline in science.

POLICY ACTIONS

1.1 Develop foresight as a discipline in science by developing methods for measuring the impact of foresight, particularly for complex systems.

1.2 Embed foresight concepts in science, engineering and social sciences curriculum for undergraduate & graduate programs and provide capacity building opportunities. This multidimensional approach should help with understanding future interconnected political, social and economic changes.

1.3 Advance foresight to become evidence-based, scientific & establish standards for conducting and utilizing foresight in assessing complex systems.

1.4 Advance use of large scale modelling, simulations, AI, machine learning and quantum computing in scenario and foresight analysis.

1.5 Develop foresight tools and methods that are able to better identify and appreciate the synergies and interconnections between critical global transitions.

1.6 Improve foresight curriculum to incorporate the latest technology developments.

1.7 Incorporate network science in foresight curriculum to address global social, economic, environmental and political systems.

Critical Transitions

I Convergence of multiple transitions

III Emergence of foresight

II Growing complexity, interconnectivity and interdependence

Challenges

I Limited skills, expertise and infrastructure

II Limitations of current foresight methods

III Lack of understanding of future changes

IV Difficulty in predicting and understanding tech. change

V Lack of awareness of foresight

VI Lack of collaboration and synergies

VII Insufficient funding in foresight

VIII Limitations with data sharing

POLICY RECOMMENDATION 2

Initiate a global foresight hub to improve knowledge of foresight science

Rationale

Given the limited global experience with foresight and the continually advancing nature of foresight, knowledge sharing will be. A global foresight clearinghouse can serve to improve knowledge sharing, collaboration and joint research.

POLICY ACTIONS

2.1 Create a foresight hub to be a global clearinghouse or knowledge-sharing hub and a global scientific advisory body for the collective exchange of foresight reports, data, best practices and information on foresight initiatives conducted around the world.

2.2 Strengthen scientific foresight research and international collaboration, with assistance from the hub, in existing global institutions and platforms working on critical transitions.

2.3 Conduct foresight studies, and develop common metrics and indicators needed to monitor and assess the impact of productive initiatives at local, regional and global levels.

2.4 Establish a system through the hub that enables early detection of future crisis allowing for preparedness and adaptation to response.

2.5 Support public and private sectors in collaboration with governmental entities on foresight studies.

2.6 Conduct trainings and an open repository of best practices in relation to foresight methods**.**

2.7 Advance capacity building and expertise on emerging disruptive technologies and their potential socio-economic impacts.

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POLICY RECOMMENDATION 3
Build trust and awareness in science & foresight

Rationale
Trust and awareness of foresight studies among policymakers and the general public is limited. To accelerate the adoption of foresight science efforts need to be taken to first build trust in science at all levels and then specific efforts to build trust and awareness of foresight science.

POLICY ACTIONS

3.1 Raise the awareness of the concept of foresight to broader society and policy makers through establishing strategies for communicating different futures to diverse audiences.

3.2 Support foresight broader participatory dialogue to help better understanding of trends and emerging issues and aligning visions for a desired future.

3.3 Establish multilateral cooperation for building trust and global buy-in amongst existing global institutions to create collaborative policies so that action can be synergized under a global umbrella that guarantees trust and transparency to deal with and navigate future transitions.

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POLICY RECOMMENDATION 4
Foster greater collaboration and coordination

Rationale
International collaboration and coordination will enhance the quality and acceptance of foresight studies. Given the growing global interconnectedness and complexity of multiple systems a diversity of input voices are needed.

POLICY ACTIONS

4.1 Encourage cooperation across boundaries while fostering acceptance and tolerance for cultural and societal differences which enhance social cohesion within individual communities.

4.2 Promote collaborative policy experimentation to stimulate transitions and generate innovations and anticipate changes in science and technology in society, economy and politics.

4.3 Encourage international dialogue on the need for foresight capabilities on understanding the complexity and high interconnectivity of global critical transitions.

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POLICY RECOMMENDATION 5
Create funding and support for foresight science programs

Rationale
There are limited foresight science programs globally and the science is not well funded. Given its importance in helping policymakers understand future challenges, funding and support for foresight science programs should be increased.

POLICY ACTIONS

5.1 Promote the importance of funding foresight research and applications at a global level.

5.2 Promote global programs that bring together multiple agencies and countries for foresight studies.

5.3 Provide learning opportunities through scholarships and exchange programs to learn best practices in foresight.

5.4 Enable greater diversity in foresight through supporting women and minorities in foresight science programs.

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POLICY RECOMMENDATION 6
Develop methods for generating, collecting and sharing data globally

Rationale
Foresight studies will only be strengthened through sharing data on a global level. Given the sensitives around data from a personal and national level, actions need to be taken to develop a fast and secure data sharing procedure.

POLICY ACTIONS

6.1 Encourage embracing open science principles to facilitate sharing of data, reports and best practices on foresight approaches, methods and tools.

6.2 Encourage adopting and implementing policies and regulations applicable to generating and sharing data generated by growing global monitoring systems and networks of the digital revolution.

6.3 Support the development of common international standards and regulation for personal and business data, to underpin new technology opportunities such as Internet of things (IoT) and sensor networks, distributed ledger technologies and remote sensing.

6.4 Encourage using the views and imagination of a wide range of participants, including government officials and representatives of industry, civil society, and academia as vital data on at what is possible or desired in foresight studies.

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Examples of Foresight Usage

1   **Apply Foresight Methods to Improve Regulations and Standards Applicable to the Digital Revolution**

2   **Build Resilience Linked to Economic Strength and Social Cohesion, with Foresight Guidance**

3   **Utilize Foresight as a Tool to Increase Robustness of Health Systems Globally**

4   **Use Foresight to Guide the Digital Revolution in Environmental Monitoring and Impact Mitigation**