

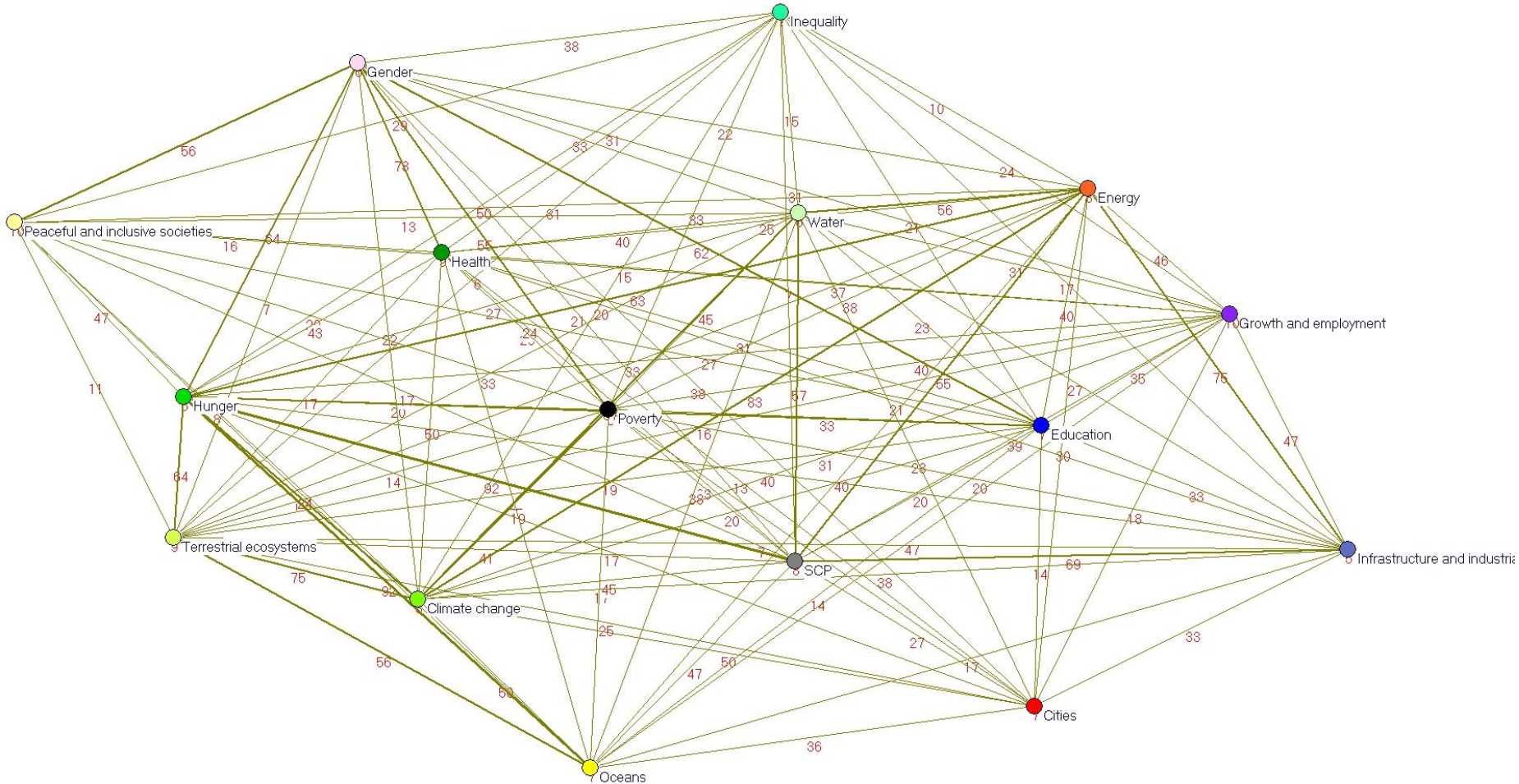
Sustainable Development Planning and Strategy Formulation: An Integrated Systems Approach



Jeffrey Crawford
Sustainable Development Officer
United Nations Department of Economic and Social Affairs (UN-DESA)
Division for Sustainable Development, Policy and Analysis Branch
E-mail: Crawford3@un.org

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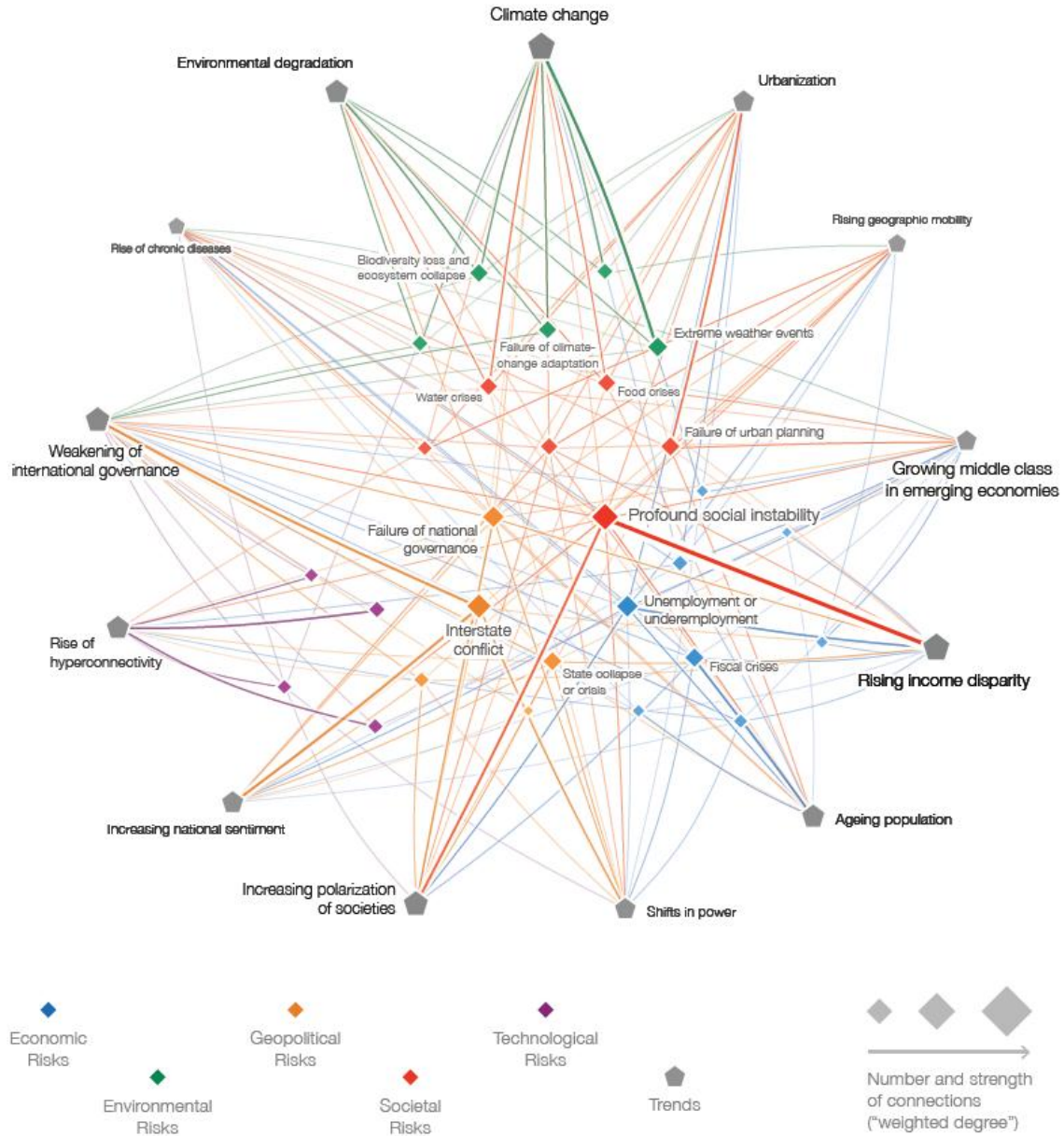
Interdependencies and Interconnectedness of SDGs



Notes: The numbers on the links indicate the percentage of targets linking the two goals (number of links between two goals divided by the sum of targets under the two goals). SDG17 on “means of implementation” (which links to all other goals) was excluded from the analysis. The Kamada-Kawai projection minimizes the “energy” of the network (imagine a network of physical springs) and hence places the most central nodes in the middle. Source: Chapter 2 of the United Nations Global Sustainable Development Report 2015 (forthcoming), adapted from *Review of Targets for the Sustainable Development Goals – The Science Perspective*, 2015 ICSU/ISSC .

Global Systems and Risks

Source: World Economic Forum, Global Risks 2015, 10th Edition



Defining an Integrated Systems Approach

Transport System

Sub-systems

Water

Rail

Road

Air

Water & Sanitation System

Sub-systems

Waste
Water

Distribution
Network

Filtration

Desalination

Energy System

Sub-systems

Hydro

Gas

Solar

Nuclear

Natural System

(biomes)

Freshwater

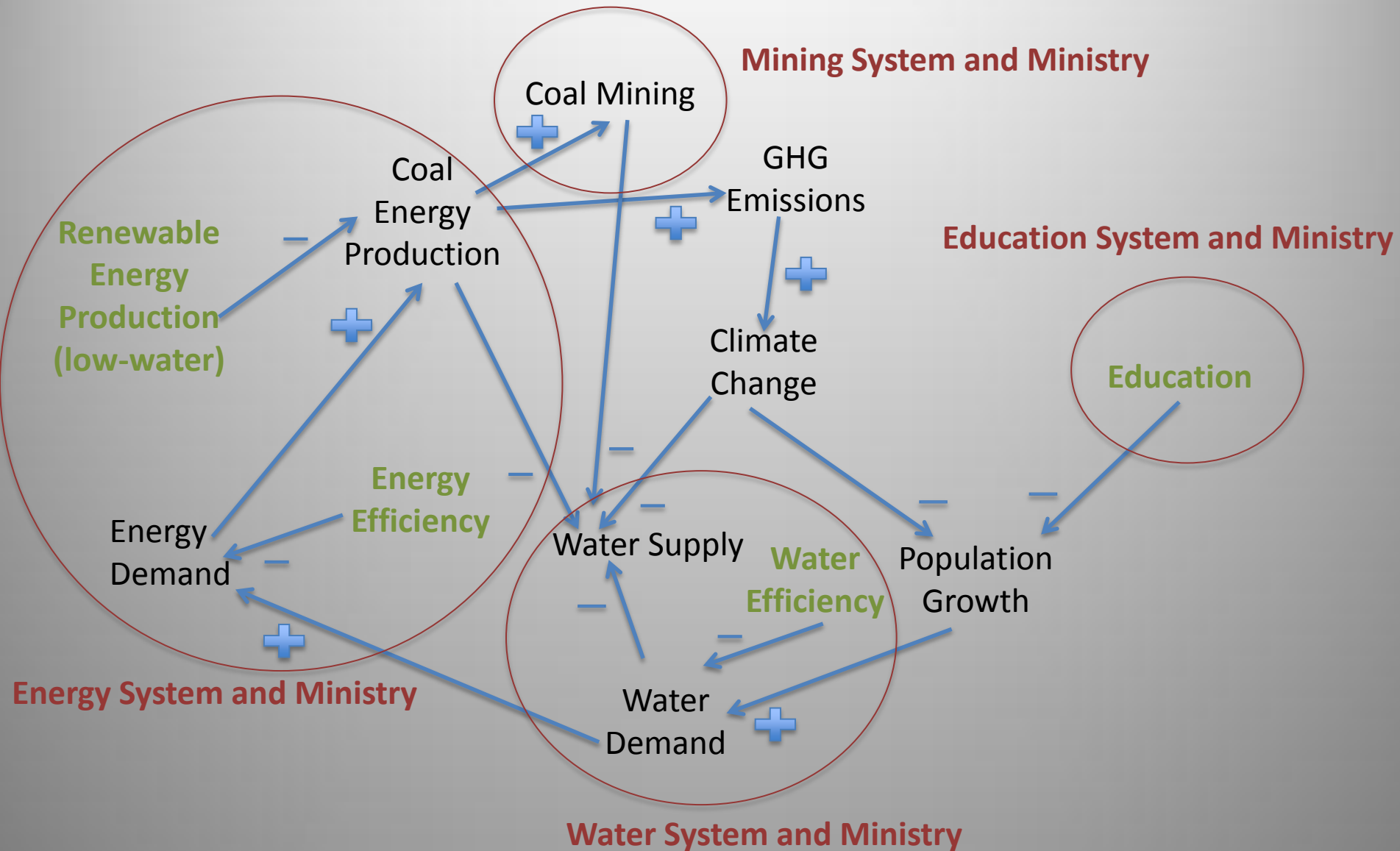
Marine

Forest

Grassland

System of Systems

Linkages, Dependencies and Feedback Loops



Selected Tools for Planning

CLEW

- Climate, Land-use, Energy, Water
- Uses national accounts data

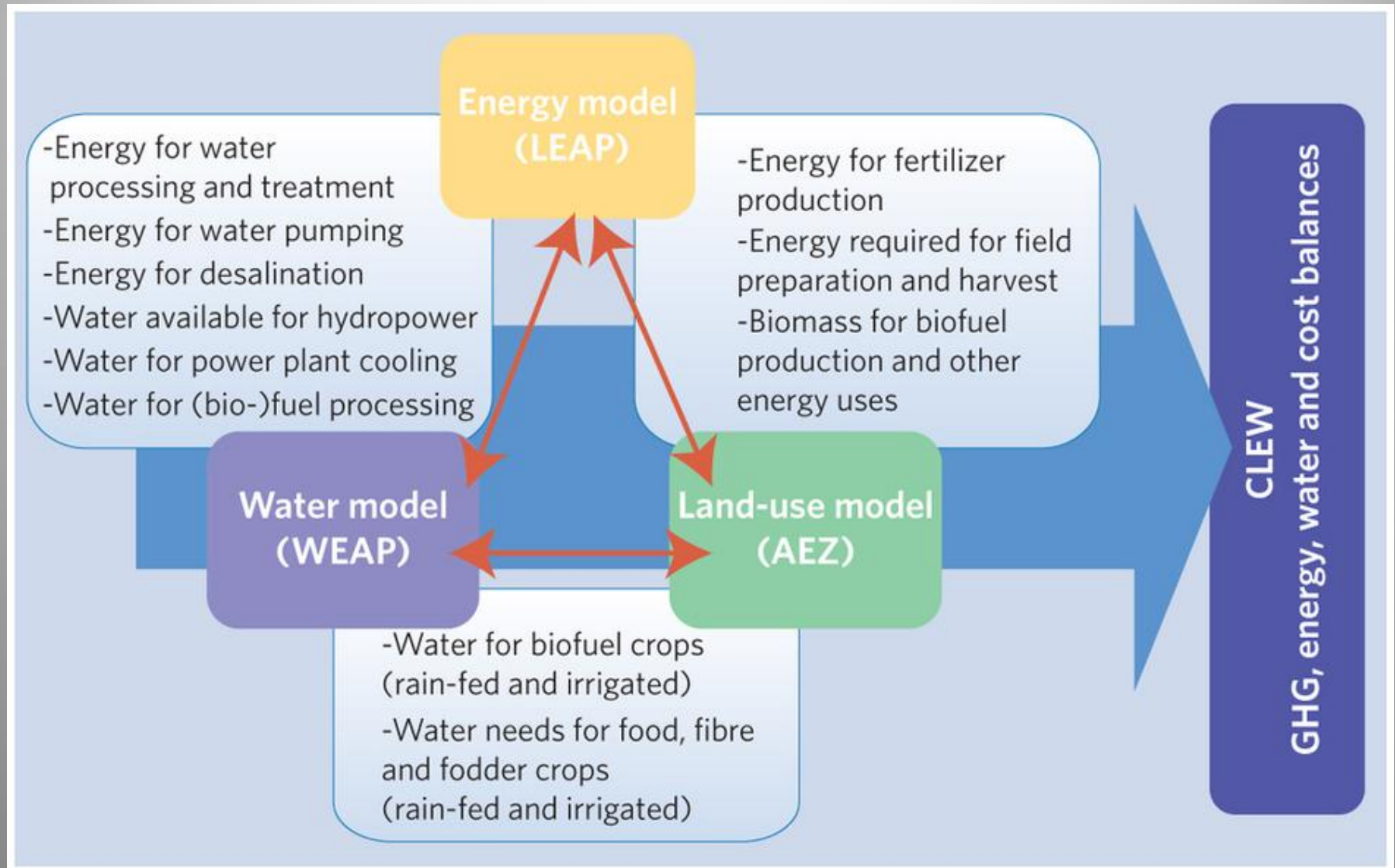
iSDG & T21

- Inter-sectoral
- System dynamics
- Tailored for SDGs (iSDG)

SoS MHRA

- All sector infrastructure prioritization
- Risk-based approach

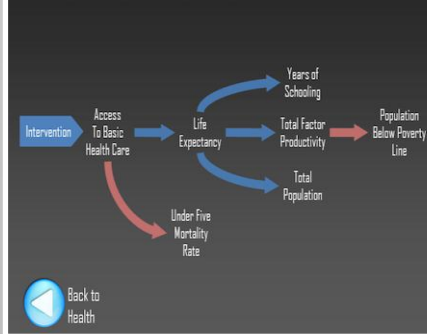
CLEW Model (Climate, Land-use, Energy and Water)



iSDG & T21 Models

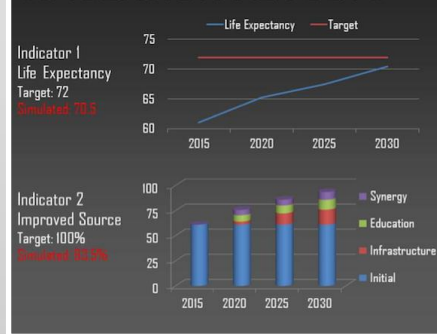
- System-dynamics based comprehensive development planning model
- Models cross-sectoral linkages and dependencies
- Utilized by government departments of planning (Kenya, Jamaica, Senegal, Mongolia)

INTERVENTION'S IMPACT



Intervention Impact Logic

SIMULATION RESULTS



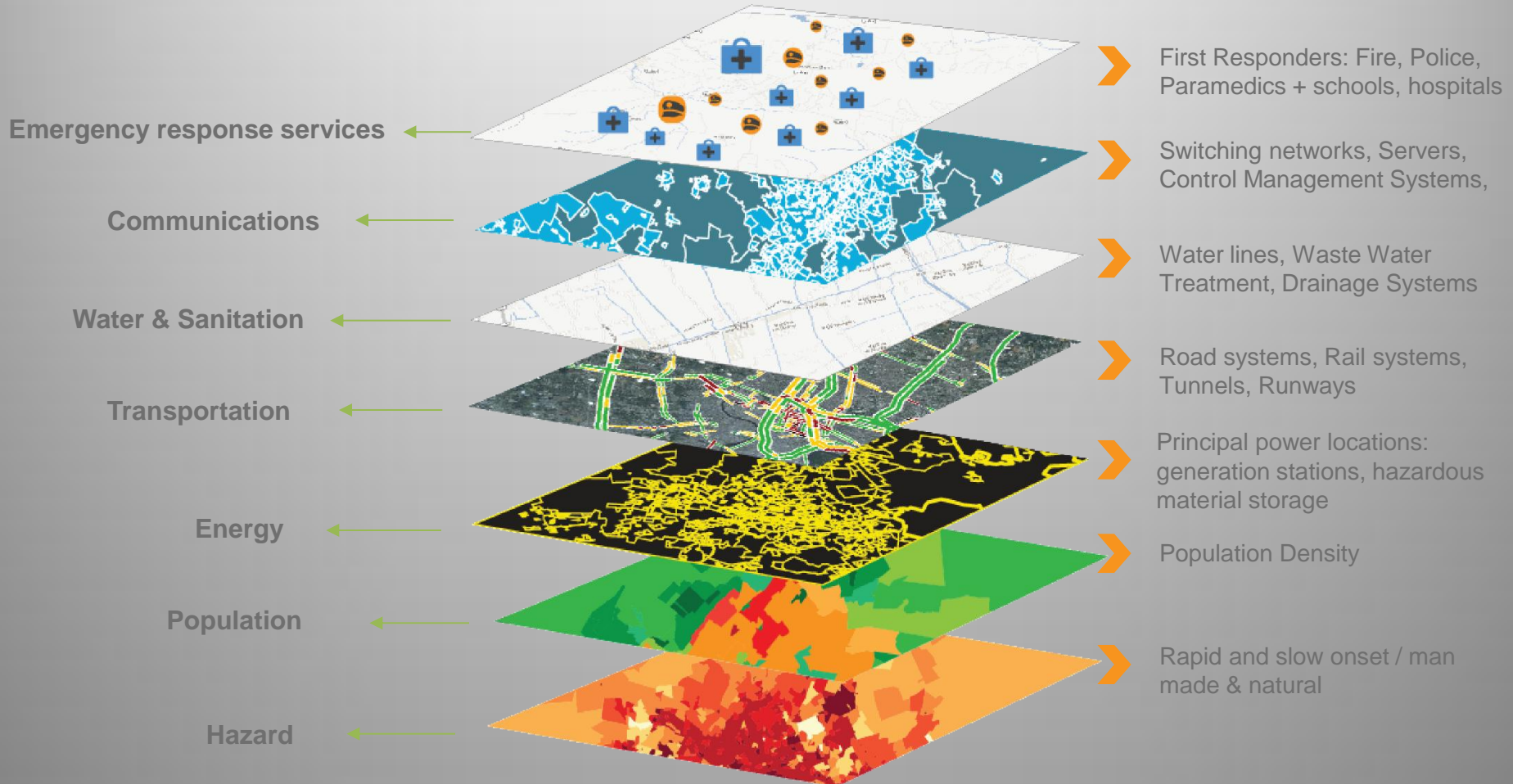
Indicator Dashboard

SELECT AREAS OF INTERVENTION

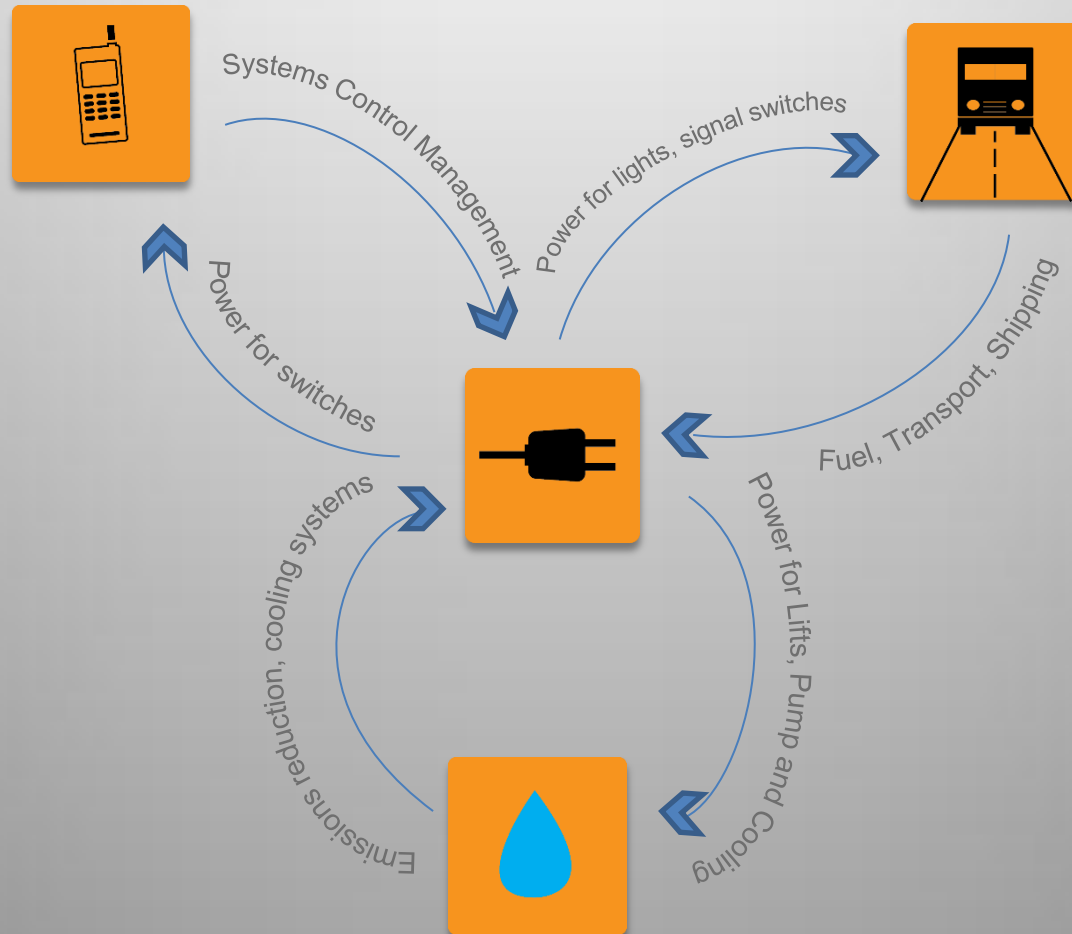


Select Area of Intervention

Systems of Systems (SoS) Approach: Critical Infrastructure Failure Prevention



SoS - Interdependencies and Interconnections of Critical Infrastructure Sectors



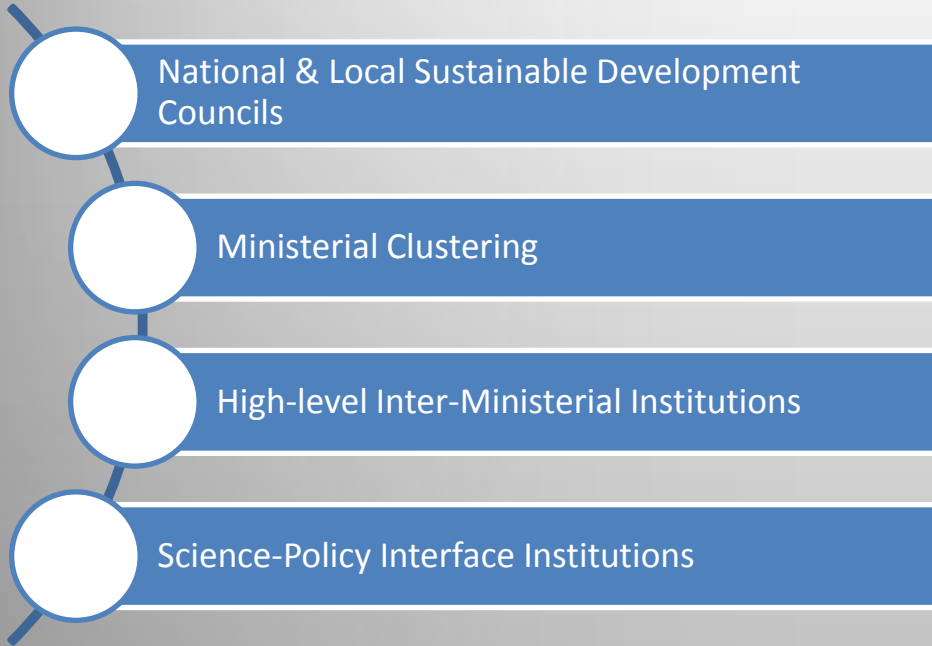
Interdependencies between infrastructures & resulting disruption on other infrastructures

Interdependencies between infrastructures, and cascading effect of disruption upon other infrastructures							
Infrastructure Disrupted → Infrastructure Impacted ↓	Electric Power	Natural Gas	Petroleum	Comm-unications	Water Distribution	Transportation	Public Health & Sanitation
Electric Power	N/A	Strong	Medium	Strong	Strong	Weak	Strong
Natural Gas	Strong	N/A	Weak	Strong	Weak	Weak	Weak
Petroleum	Strong	Weak	N/A	Weak	Weak	Strong	Strong
Communication	Strong	Strong	Strong	N/A	Strong	Medium	Strong
Water Distribution	Strong	Weak	Weak	Strong	N/A	Weak	Strong
Transportation	Medium	Medium	Strong	Medium	Weak	N/A	Strong
Public Health & Sanitation	Strong	Weak	Medium	Strong	Strong	Strong	N/A

Weak
Medium
Strong

Source: Source: Jeffrey Crawford, UNOPS, Climate-resilient Infrastructure, Presentation at Asia-Pacific Climate Change Adaptation Forum (19 March 2013, Incheon, Republic of Korea). Adapted from Climate Change, and Infrastructure, Urban Systems and Vulnerabilities: Technical Report to the U.S. Department of Energy. (2012)

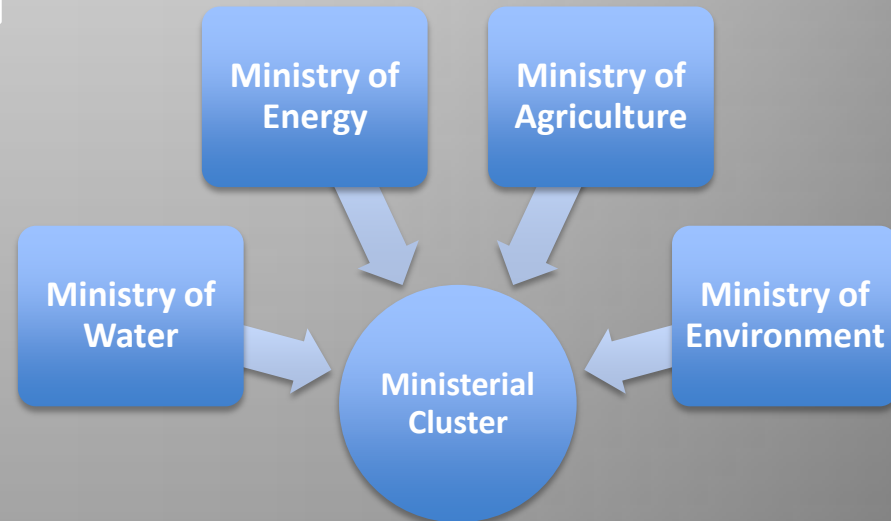
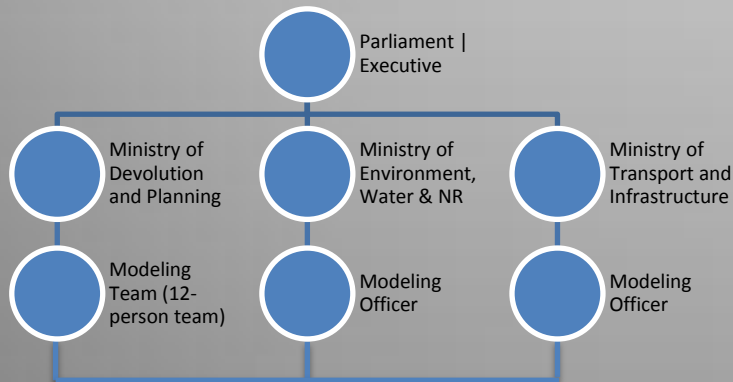
Integrated Governance Systems



National Infrastructure Coordinating Center



Source: <http://www.dhs.gov/national-infrastructure-coordinating-center>



Towards Integrated Information Systems

System of Environmental-Economic Accounting

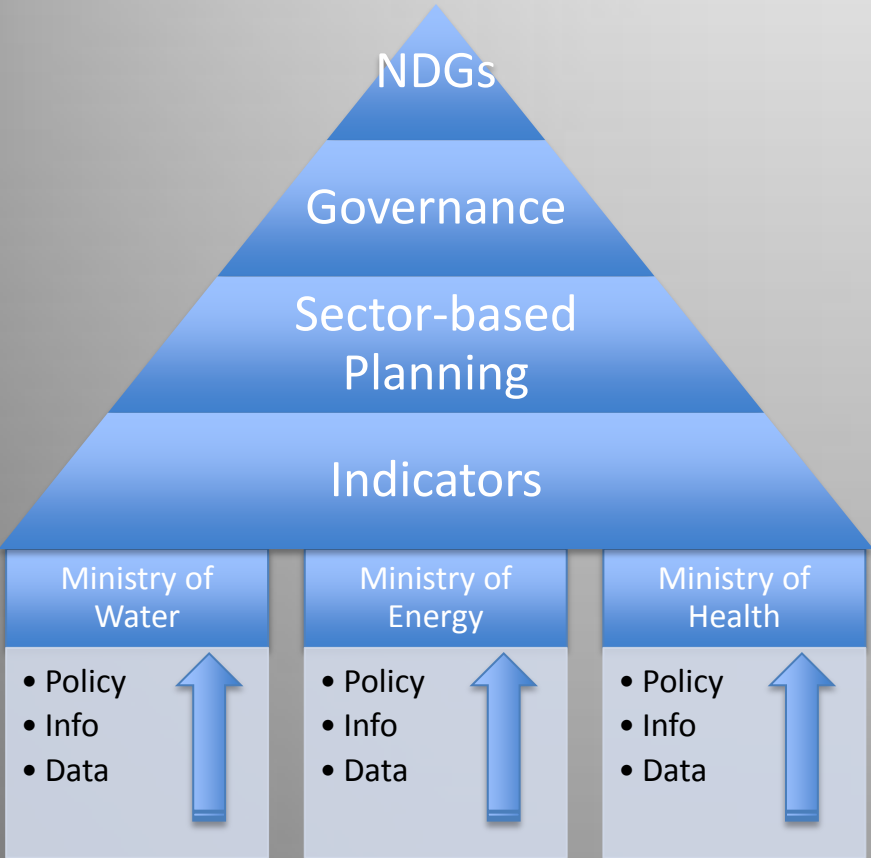
- National Accounts for water, energy, land, ecosystems, agriculture, fisheries and forests
- Measures stocks and flows
- Valuation of natural capital (e.g. ecosystem services)
- Many countries have SEEA programmes, such as Australia, Canada, China, Colombia, Netherlands, Norway, Philippines, South Africa, Sweden, and Uganda

Key Principles for the Data Revolution



From Silo-based to Integrated Systems Approach

Silo-based Approach



Integrated Systems Approach

