



Empowering Institutions: Leveraging Technology Solutions for Climate Action

Workshop 7: Strengthening Public Institutions for Climate Action

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Dr. David Green, Green Resilience Insights



David Green, PhD

GREEN RESILIENCE INSIGHTS



Principal Consultant

- Fireline-AI
- Western Fire Chiefs Association Applications Center
- Earth Fire Alliance, FireSat Mission
- National Institutes of Health, Climate and Health Outcomes Research Data Systems,
- Open Geospatial Consortium, Disaster Pilots, Wildfire, Flood, and Heat Risk
- Model-of-Models Compound Perils
- ProWESS (Proactive Wildfire & Environmental Sustainability Solutions) Center Fellow
- Howden Group, Data Analytics Team



Program Manager NASA (2014-2023)

- Disaster Risk Reduction & Community Multihazard Resilience: floods, earthquakes, tsunami, tropical cyclones, wildfire, volcano, algal blooms



Program Manager NOAA (2003-2014)

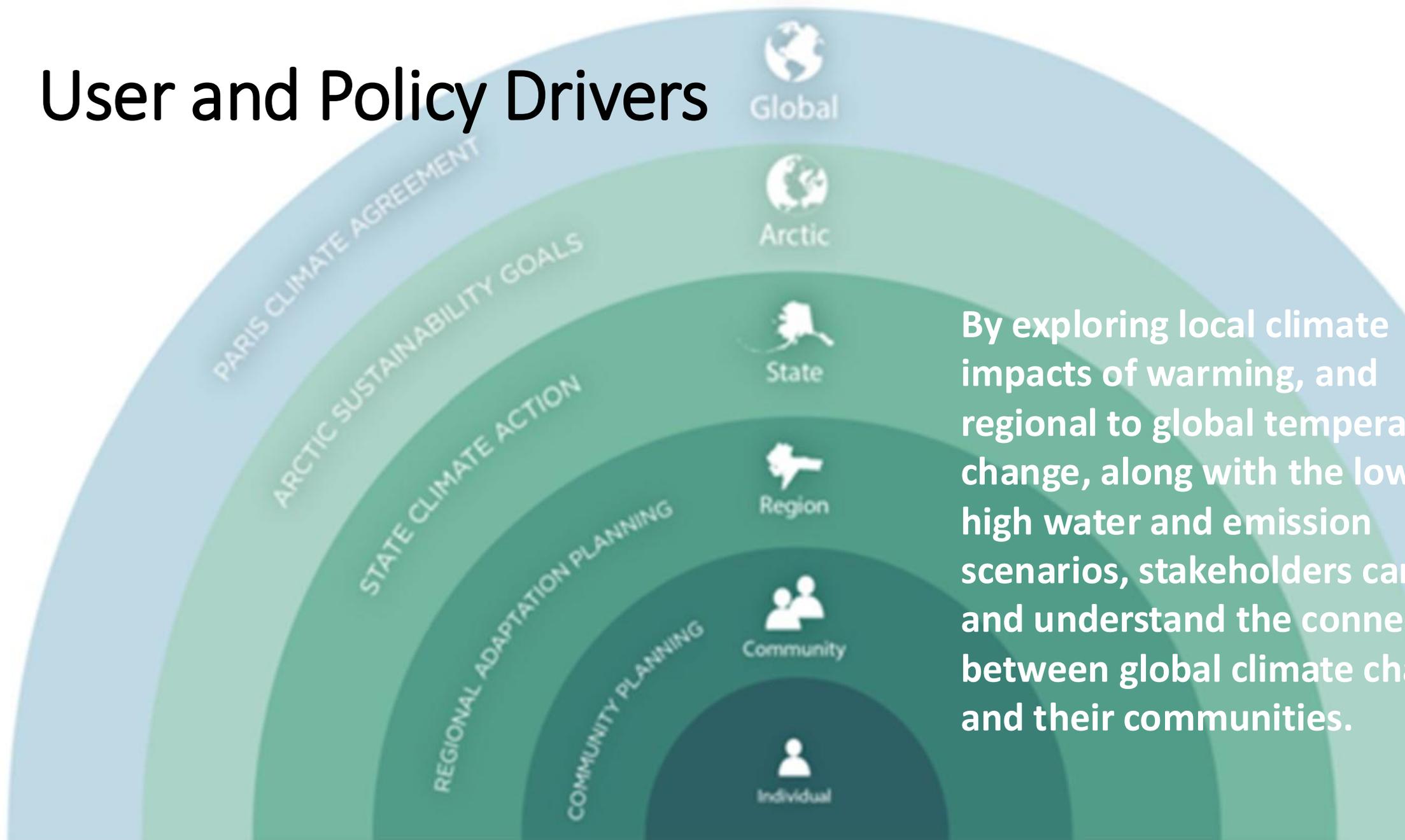
- Weather, Water, Ecosystem and Climate Forecasting, Early Warning and Prediction

Overview

- Harnessing Digital Solutions in Public Institutions for Climate Action Perspectives
- Guiding Questions
- Communications and Data
- Informing choices, supporting decisions, guiding actions
- Balancing the science and technology innovation with human context
- Conclusions



User and Policy Drivers



By exploring local climate impacts of warming, and regional to global temperature change, along with the low high water and emission scenarios, stakeholders can and understand the connection between global climate change and their communities.



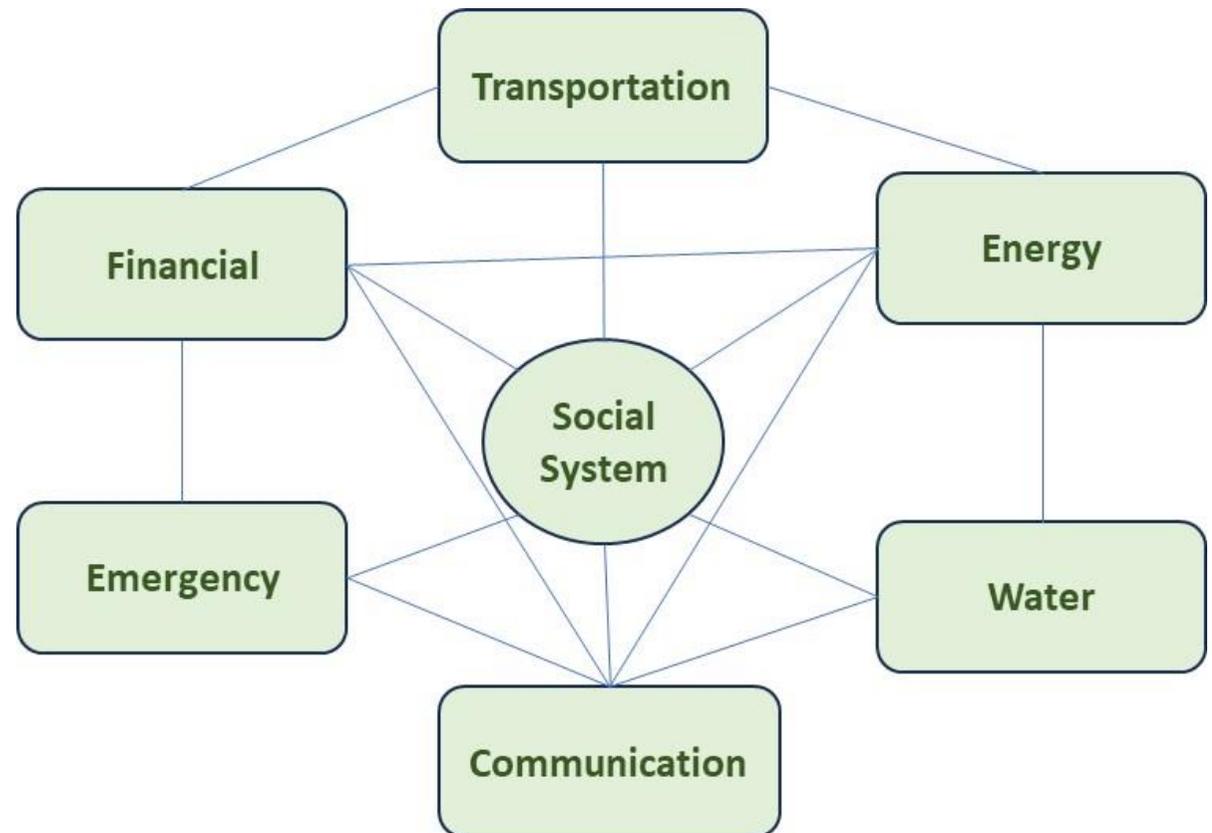
Policy insight, science-informed decisions and technology innovation must consider the impacts of earth's climate as a dynamic system

Utility of AI and related frontier technologies must be considered within context of communities and traditional knowledge, and socio-economic processes across scales



Digitization within a human context

- Changing the paradigm from siloes to collaboration
- Enabling transdisciplinary collaboration
- Focusing on outcomes
- Social process and governance



Changing the paradigm to a systems outcome approach

➤ *Managing severity to thrive in the face of change*



Higher Value

▪ **Adaptive Management**

- Cross-disciplinary multisector solutions tied to workflows at operational and societal decision scales

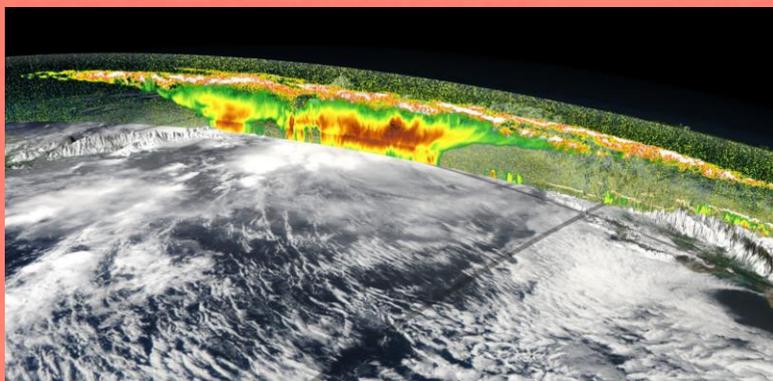
▪ **Earth Systems Science**

- Use-inspired “Risk and Benefit” Applications
- Integration and Interoperability
- Technology and Methodologies
- Data

- Multiperil: drought, water, health, weather, population, biodiversity, infrastructure, ...
- Sensor webs: remote constellations, internet-of-things, digital twins, AI/ML, 3D/4D
- Standards for data, IT & communications: Analysis Ready Data, Data Risk Intelligence...

GenAI for Earth Systems

Generative Artificial intelligence (GenAI) offers new opportunities to predict future scenarios of our Earth System in space and time.



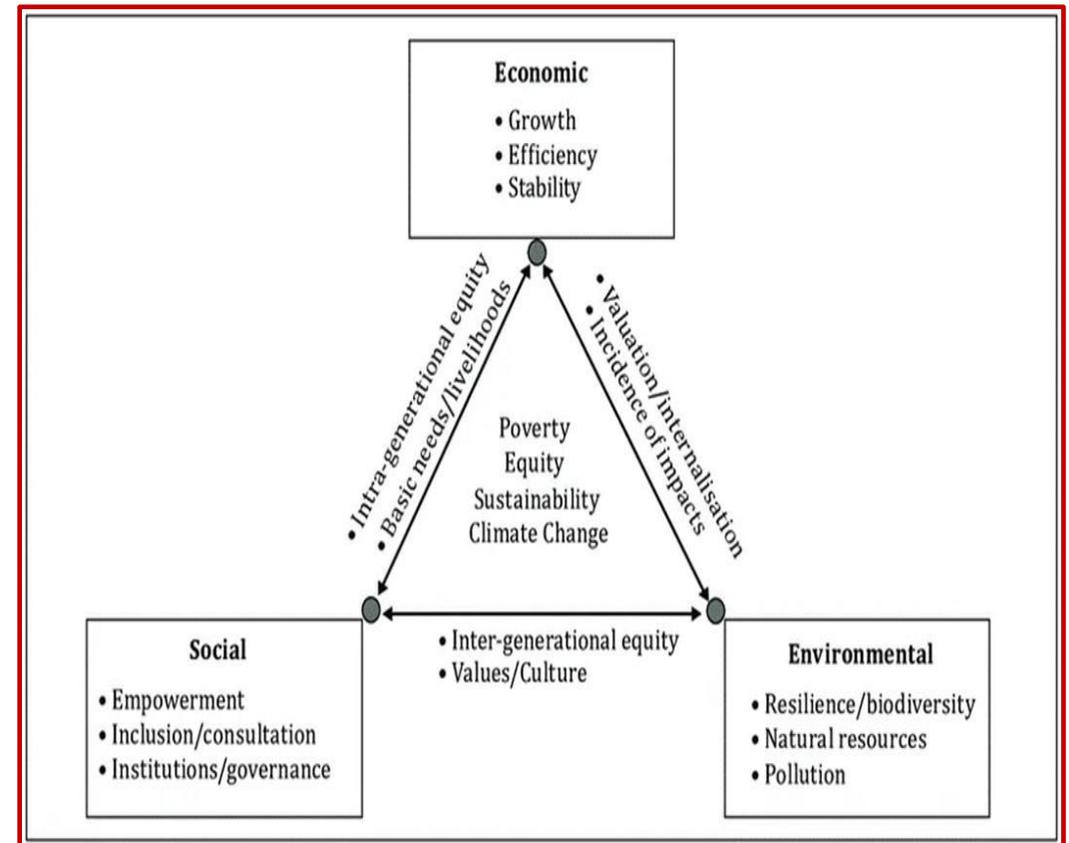
Multisector stakeholders are actively exploring ways to use AI/ML and digital approaches to advance insight to protect communities and infrastructure impacted by human and natural system interactions

What are key digital technologies and solutions currently being used or explored in the context of climate action

- Earth System Observatories (in contrast to Earth Observing Systems)
 - Satellite and remote sensing (including Unmanned Aerial and underwater Vehicles (drones); Stationery and mobile ground networks, internet-of-things and autonomous smart sensor webs
- Comprehensive data collection and fusion
 - Geospatial data and mobile communication systems (data cubes and data commons); Spatially-enabled data cataloging and information retrieval solutions for data integration and discovery
- Digital twins, Conversational AI and advanced 3D computing simulators
 - Virtual cloud-based and AI/ML supported modeling and decision tools

Changing the Risk Appetite

- Be risk-aware early and welcome change
- Embrace the full social process triangle
- Integrate exposure and vulnerability to anticipate and act on severity
- Prioritize governance, coping capacity and standardized open approaches
- Leverage frontier technology, communication and circular economics for enterprise solutions
- Balance the science and technology innovation lifecycle with practical use and timelines
- Respect cultural and human behavior



Developing Resilience

- Target investments, coordination and collaboration that “develops” resilience - emphasizing improvement, inclusion and **return on resilience ROR**

What strategies and best practices can governments adopt to bridge that digital divide, particularly in Least Developed Countries, Landlocked Developing Countries, and Small Island Developing States, to ensure inclusive access to climate-response digital solutions?

- Exploit technologies and align policy to empower communities to collaborate worldwide in near real time for urgent and collective long-term resilience action
- Create global and inclusive connectors (communities-of-practice, standards, sandboxes and demonstrations) cross-sectors, with students, early-career and professionals across disciplines (public, private, NGO, civil-society, ...)
- Social process and governance integration from the start for continuity beyond political cycles (decadal roadmaps and implementing frameworks)

How can digital platforms and data-sharing mechanisms be leveraged to enhance collaboration and coordination among different levels of government and stakeholders in implementing climate actions?

- Comprehensive data collection, commons and fusion
- Increased discovery and useability through standards, interoperability, cataloguing and retrieval
- Pilot projects and demonstrations of return-on-investment (ROI) and return-on-resilience (ROR)
- Scenario exercises for training, collaboration and translation
- Digital and mobile communications through strengthened networks and IoT
- Demonstrate business case for open data, public-private data licensing, applied to lifelines and practical workflows

How can digital technologies be effectively harnessed to enhance transparency and accountability in public institutions, particularly in ensuring equitable participation and representation of vulnerable communities?

- Open and participatory geospatial data, dashboards and discovery tools
- Open and near-real time communications
- Multilingual and culture-based programs
- Conversational AI, AI/ML and cloud access
- Augmented reality and 3D visualization
- Strengthened access to digital networks, training and capacity development
- Feasibility pilots, value demonstrations and scenario exercises
- Prizes and challenges



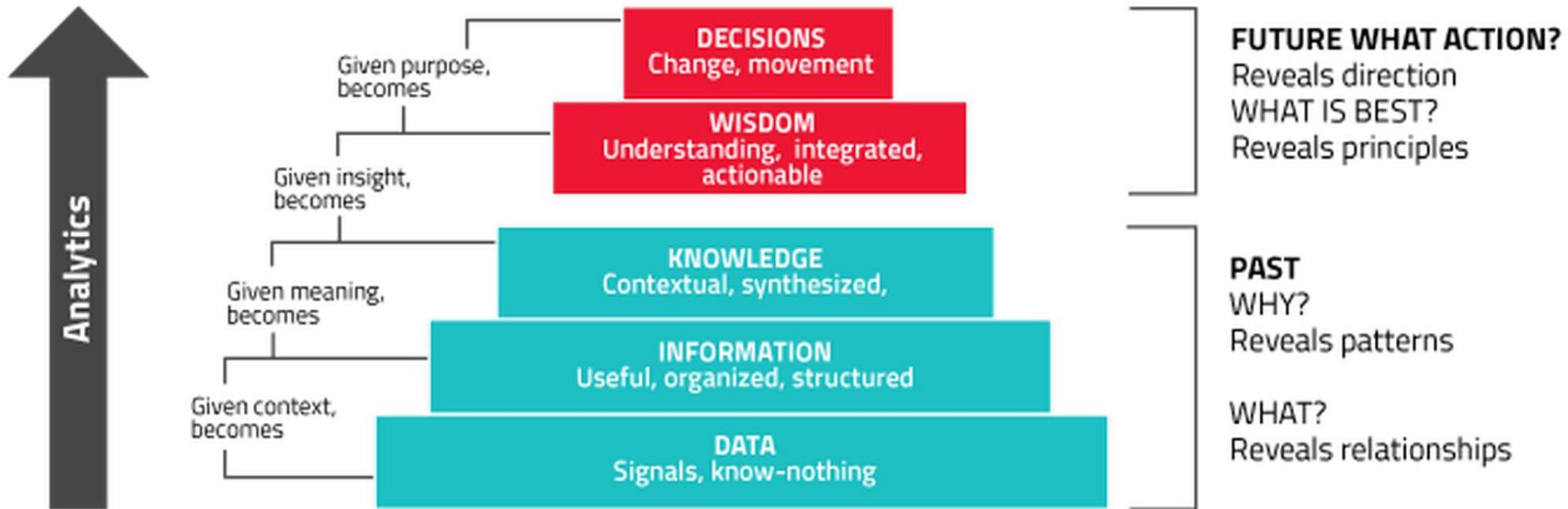


How can institutions become more agile and adaptive in leveraging digital innovations to address evolving climate challenges?

- Sandboxes where governance and cross-sector rules are tested and relaxed (commerce, energy, water, food, infrastructure, ... health)
- Greater linkage to economics and finance risk networks
- Projects and investments targeted on most vulnerable, exposed and severe within political and operational timeframes
- Invest in transition plans and partnerships from the start
- Create “sticks” and not just incentives – regulatory and conditional plans, funding and operational practice
- Mandate aligned role of community, schools, early career, non-traditional institutions and partners

Digital innovation and data analytics

Moving from Insights to evidence-based action



<https://electronics360.globalspec.com/article/4890/optimal-analysis-algorithms-are-iot-s-big-opportunity>

Return on Resilience

Our collective approach is not just a conversation about preserving nature and the need for technological innovations, but addresses the critical role of balancing social, financial, and policy governance with environmental research.



Findings

- Empowering institutions and technology
 - “What questions are being asked” and “Is the right data and information providing insight to action”
 - Target resources to exposure and vulnerability in community and social context, expanding open communication, trust building, and knowledge transfer
 - Move beyond understanding - Translate matured research to applications with outcome performance for anticipatory action, co-planning and co-development of impact-based climate solutions
 - Support alignment of transdisciplinary and transborder science, technology and social governance

Conclusions and recommendations

- Ensure public policies that enable free, immediate, and equitable access to publicly funded research results, analytics and transition to application.
- Minimize “innovation theatre” by investing in impact, open science, accessible technology that require measurable “return on resilience.”
- Enable near real-time and interoperable access to data and support collaborative sandboxes, strengthen connectivity and network-of-networks
- Utilize cloud, generative and conversational AI, geospatial analytics to mobilize insight from knowledge and use digital twins to provide simulations of alternatives and evidence to inform investment and governance choices based on anticipated impacts that steward severity risk and encourage thriving with change.



Thank You

david@greenresilienceinsights.com