Session 2: Applying Strategic Foresight to STI Roadmaps for SIDS









INTERNATIONAL RESEARCH CENTER OF BIG DATA FOR SUSTAINABLE DEVELOPMENT GOALS 可持续发展大数据国际研究中心









September 1-8, 2025 Beijing, China



Agenda

	Welcome and session overview	Mr. Sai Navoti, Chief, SIDS Unit, Division for Sustainable Development Goals, UNDESA
	Strategic Foresight: An Overview	Ms. Azeema Adam, Senior Inter-regional Advisor, Strategic Foresight and Systems Thinking, Division for Public Institutions and Digital Government (DPIDG), UN DESA
•	Using Geospatial Data to Inform Foresight and Technology Assessment for STI Roadmaps	Mr. Wei Liu, IATT Coordinator, Sustainable Development Officer/UN Inter-agency Task Team on Science, Technology and Innovation for the SDGs, Division for Sustainable Development Goals, UNDESA
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V.	Technology Assessment as a Trust-Building Process for AI and Geospatial Technologies	Mr. Xavier Estico, Chief Executive Officer National Institute For Science, Technology & Innovation, Seychelles
	Group Activity: Horizon Scanning and Scenario Development	Facilitated by Ms. Azeema Adam
•	Why foresight matters for STI policy and planning	Prof. John Ouma-Mugabe , Professor of Science and Innovation Policy, Graduate School of Technology Management, University of



Group Activity Plenary and Question & Answers

Pretoria



Wrap up and closing remarks

Ms. Azeema Adam, Senior Inter-regional Advisor, Strategic Foresight and Systems Thinking, UN DESA

Mr. Sai Navoti, Chief, SIDS Unit, UNDESA





My name is ...

I have a mindset

What is Strategic Foresight?

From reactive to proactive

A structured approach to exploring **future possibilities**, navigating **uncertainty**, and shaping **resilient** strategies.

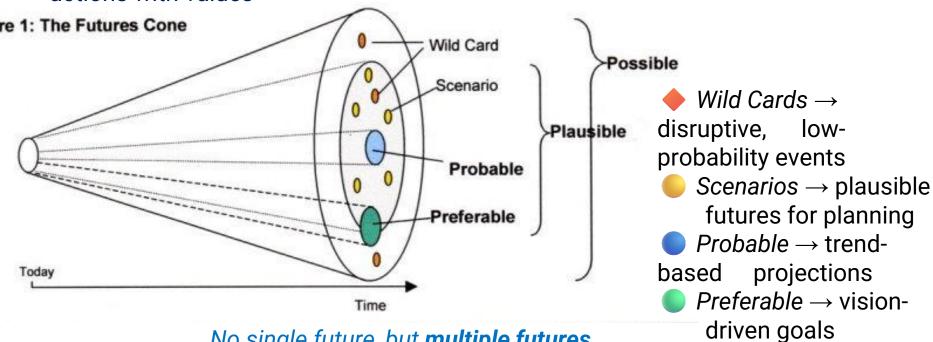
No single future, but **multiple futures**



In SIDS, foresight enables resilient choices across climate, economy, and society.

Multiple Futures?

The Futures Cone helps us explore uncertainty, clarify assumptions, and align actions with values



No single future, but **multiple futures**

Possible (everything that could happen)

Plausible (what might happen based on current knowledge)

Probable (what's likely to happen)

Preferable (what we want to happen)



SIDS in a TUNA World





Turbulent Climate shocks disrupting tourism & fisheries

In a TUNA world, robust planning requires foresight—not just reaction



Uncertain External markets and debt vulnerabilities



Novel New technologies reshape island opportunities



Ambiguous Conflicting signals on migration, aid, and sustainability



Why SIDS need Strategic Foresight

The future cannot be predicted, but foresight provides tools to:



Awareness of climate & economic trends

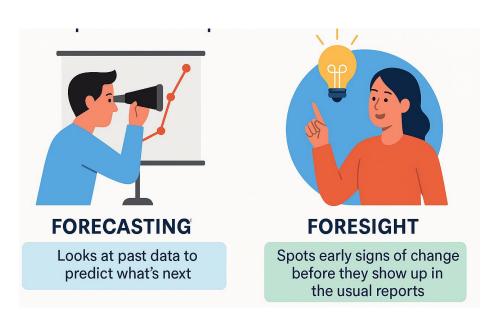
Scenarios for resilient island futures

Early warnings on shocks & opportunities

Future-ready Informed national leadership plans & in global decisions negotiations



Foresight vs Forecasting



Economic and Social Affairs

"Our brains are wired to the past, but the past is not a guide to the future"

Forecasts follow the past; foresight prepares for the unprecedented

Geospatial data adds the crucial "where" to decisions.

where it might happen, for SIDS, that means pinpointing:

- Which coastlines are at risk of erosion
- Which reefs are bleaching fastest
- Which island cities face flooding



From Evidence to Action: Strategic Foresight for SIDS

Strategic foresight combines evidence with imagination.



Use data — Big Earth Data and geospatial tools show where risks emerge.



Apply foresight — scenarios and backcasting prepare for disruptions



Shape futures — adaptive policies build resilience for SIDS



Forces SIDS Must Navigate

These forces challenge assumptions and shape the space of plausible futures we must navigate



Slow-onset change
Shocks
Tipping points

Uncertainties

Unknowns
Emerging dynamics
Unpredictable
interactions



Early signs of change
Often overlooked
May evolve into
disruptions

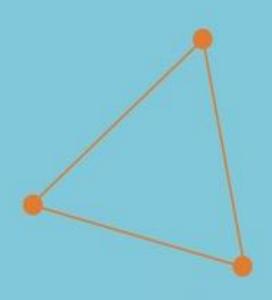
Strategic Foresight Tools

Explore the tools through three areas of application

Make sense of change

These are the tools that help us make sense of what is happening: they help us to observe the world and to look out for signals of change—things that might be small today but could become big in the future, or viceversa.

- > Horizon Scanning
- Three Horizons
- Futures
- > Triangle Futures Wheel



Source: UN Futures Lab (2023), UN Strategic Foresight Guide, pg12

Imagine possible futures

These are the tools for identifying new possibilities for the future, building scenarios, and identifying what a desired future might look like.

- Scenario Development
- Desired Future
- Matrix Policy Gaming
- Causal Layered Analysis

Take action

These are the tools that have to do with bringing the future back to the present. What transformations need to happen to bring about our desired future? What do we need to start doing now to move towards that future?

- Back Casting
- Change Agenda
- Wind Tunnel Testing

How SIDS Can Apply Foresight

SCAN

IMAGINE

PLAN



Horizon scanning

Track climate, tech, and market signals



Scenario planning

Explore alternative tourism, energy, and migration futures



Backcasting

Plan steps back from a resilient 2040 vision

Shaping Resilient Futures

- Foresight ensures the ocean remains a source of resilience, not vulnerability.
- With foresight and Big Earth Data, SIDS can safeguard sovereignty, sustainability, and survival.



The future should not catch us off guard

it should find us ready

Thank you





Using Geospatial Data to Inform Foresight and Technology Assessment for STI Roadmaps A Practical Guide for SIDS and Beyond

9:30-9:40

Mr. Wei Liu

IATT Coordinator, Sustainable Development Officer/UN Inter-agency Task Team on Science, Technology and Innovation for the SDGs, Division for Sustainable **Development Goals, UNDESA**



































The Core Challenge: Navigating Uncertainty



SIDS face unique vulnerabilities requiring long-term, evidence-based planning.

- Foresight: = navigating uncertainty (anticipating, not predicting)...
- **The Data Gap**: STI Policy is data intensive. Traditional data tells us **what** and **why**, but often misses where.
- The Opportunity: Geospatial data adds spatial context (coastal erosion, water stress)..

What + Why + Wher = Wholistic Understanding

United Nations

The Powerful Combo: Foresight + Geospatial Data



A dual lens for smarter STI roadmaps

- STI Foresight (What could be?) → explores 10–20 year futures.
- Technology Assessment (What is feasible?) → evaluates present-day options.
- Geospatial data = connector tissue ensuring both visions and diagnostics are grounded in place.

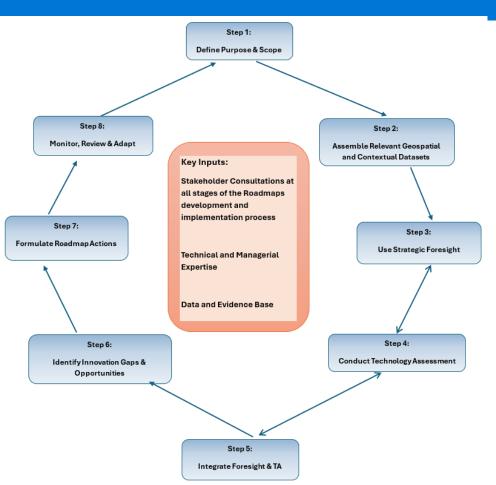




The 8-Step Process: From Vision to Action



Sustainable Development Goals



A practical, iterative cycle.

Define purpose → assemble data → foresight → TA → integrate → identify gaps → roadmap actions → monitor & adapt.

Flexibility in sequencing, scaling, or combining steps

Not linear, but cyclical, guided by continuous consultation.



Example 1 – Food Security (SDG 2)



From data to foresight-driven action.

- Data: Cropping intensity shows low productivity.
- Now: Precision agri-tech (IoT sensors, drones).
- Future: Anticipate drought stress → R&D for droughtresistant crops.



Example 2: Matching Solutions to Readiness (A SIDS Perspective)



Sustainable Development Goals

High-TRL Opportunity (Scale Now): Low-TRL Gap (Invest for Later):

- Problem: Saltwater Intrusion contaminating freshwater lenses (SDG 6).
- **Foresight**: Will worsen with sealevel rise and over-extraction.
- Solution: Deploy affordable sensor networks and Al-powered monitoring systems to manage extraction and map intrusion in real-time.

- Problem: Coral Reef Degradation (bleaching) from ocean warming (SDGs 13 & 14).
- Foresight: Critical for biodiversity, tourism, and coastal protection; threats are increasing.
- Solution: Fund R&D for nextgeneration coral restoration, such as selective breeding for heat-resistant "super coral" species.



Department of Economic and Social Affairs

Geospatial Insights for STI Investment



Goals

Data reveals where to target innovation and investment.

Examples from Table 2:

- Coastal erosion (SDG 13/14): Satellite shoreline data → mangroves
 + adaptive infra.
- **Groundwater depletion (SDG 6):** Remote sensing aquifers → solar-powered recharge tech.
- Urban heat islands (SDG 11): Thermal imagery → urban greening, cool roofs.

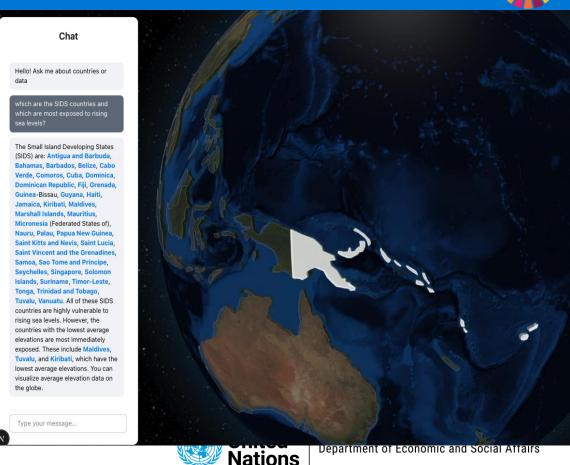


Enabling Implementation



Capacity, tools, partnerships.

- **Build capacity**: Train GIS/data analysts (UNOSAT model).
- Leverage open data and tools
 CBAS, NASA, UNOSAT; QGIS
- Innovative platforms:
 Conversational AI for non-experts.
- **Partnerships**: UN DESA, regional peers, and peer governments.



First Steps for Small Island Developing States (SIDS)

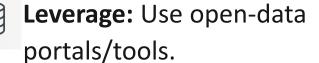


Sustainable Development Goals

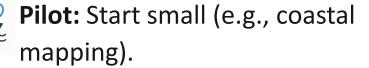
Practical entry points.



Assess: Map current skills/data.



Partner: Collaborate, don't build alone.









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Key Takeaways



Goals

Anchor STI in evidence + anticipation.

- Don't just diagnose → anticipate.
- Balance today's feasibility with tomorrow's needs.
- Start small → think big, scale with partnerships.

Integrated approach

Resilience and sustainability for SIDS and beyond



Thank you!

Questions? Follow up Webinar ...

Contact: Wei Liu, liuw@un.org

https://sdgs.un.org/events/capacity-building-workshop-small-island-developing-states-leveraging-big-earth-data-evaluate#background





Technology Assessment as a Trust-Building Process for Al and Geospatial Technologies

9:40-9:50

Mr. Xavier Estico
10-UN Member Group Member STI for SDGs

Chief Executive Officer

National Institute For Science, Technology & Innovation, Seychelles







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Capacity Building Workshop for Small Island

Developing States: Leveraging Big Earth Data to Evaluate the SDGs Progress
1-8 September 2025, Beijing, China

Technology Assessment as a Trust-Building Process for AI and Geospatial Technologies

Presented by:

Xavier Estico

10-UN Member Group Member STI for SDGs

September 2025

Technology Assessment Definition

Technology Assessment (TA) is the comprehensive evaluation of a new technology's impacts, while trust building involves the strategic actions taken to establish and maintain confidence with stakeholders. The two concepts are deeply interconnected, as a rigorous, ethical assessment process directly informs the transparency, accountability, and reliability needed to build trust

TA as a Trust-building Process in New Technologies

TA is a multi-faceted process for evaluating a technology's value and potential effects beyond its immediate function. A robust TA considers a broad spectrum of impacts, including:

- Economic: Cost-effectiveness and impact on employment.
- Social: Effects on user satisfaction, digital inclusion, and the potential to reinforce or create societal bias.
- Ethical: Adherence to principles such as fairness, accountability, and the responsible handling of user data.
- Environmental: Effects on resource consumption and end-of-life disposal.
- Technical: Performance, reliability, and security measures.

Strategies to build trust in AI and Geospatial Technologies

1. Explain the value proposition:

- The first step to building trust is to communicate clearly and convincingly how your new technology can solve a problem, meet a need, or create an opportunity for your target audience;
- Articulate the benefits and advantages of your new technology, as well as how it differs from existing or competing solutions;
- Need to address any potential risks, challenges, or trade-offs that your new technology might entail, and how you plan to mitigate them; and
- By explaining the value proposition of your new technology, you can show that you understand your audience's pain points, goals, and preferences, and that you have a solution that can help them.

Strategies to build trust in AI and Geospatial Technologies (cont.....)

- 2. Demonstrate the reliability and quality:
 - The second step to building trust is to provide evidence and proof that your new technology works as intended, and that it meets or exceeds the standards and expectations of your audience;
 - Showcasing the features and functionalities of your new technology, as well as the results and outcomes that it can deliver;
 - Sharing of testimonials, reviews, or case studies from satisfied customers, users, or partners who have used your new technology and achieved positive results; and
 - By demonstrating the reliability and quality of your new technology, you can show that you have a track record of success, and that you can deliver on your promises.

Strategies to build trust in AI and Geospatial Technologies (cont.....)

3. Engage in dialogue and feedback:

- The third step to building trust is to invite and encourage dialogue and feedback from your audience, and to respond to their questions, comments, or concerns;
- Creating opportunities and channels for interaction, such as surveys, polls, forums, social media, or live events;
- provide support and guidance for your audience, such as tutorials, FAQs, or customer service; and
- By engaging in dialogue and feedback, you can show that you value your audience's opinions, insights, and experiences, and that you are open to learning from them and improving your new technology.

Strategies to build trust in AI and Geospatial Technologies (cont.....)

4. Align with the values and norms:

- The fourth step to building trust is to align your new technology with the values and norms of your audience, and to respect their culture, beliefs, and preferences;
- Conducting research and analysis on your audience's demographics, psychographics, and behaviours, and by adapting your new technology accordingly;
- Involve your audience in the design, development, or testing of your new technology, and by co-creating solutions that suit their needs and wants; and
- By aligning with the values and norms of your audience, you can show that you care about their well-being, dignity, and rights, and that you are not imposing or exploiting your new technology.

Strategies to build trust in AI for Geospatial Technologies (cont.....)

5. Embrace transparency and accountability:

- The fifth step to building trust is to embrace transparency and accountability for your new technology, and to disclose and explain how it works, what it does, and why it does it;
- providing clear and accessible information and documentation on your new technology, such as its purpose, function, logic, data, and impact;
- Adhering to the relevant laws, regulations, and ethical principles that govern your new technology, and by complying with the best practices and standards of your industry or sector; and
- By embracing transparency and accountability, you can show that you have nothing to hide, and that you are responsible and trustworthy for your new technology.

Strategies to build trust in AI and Geospatial Technologies (cont.) sense of community and collaboration:

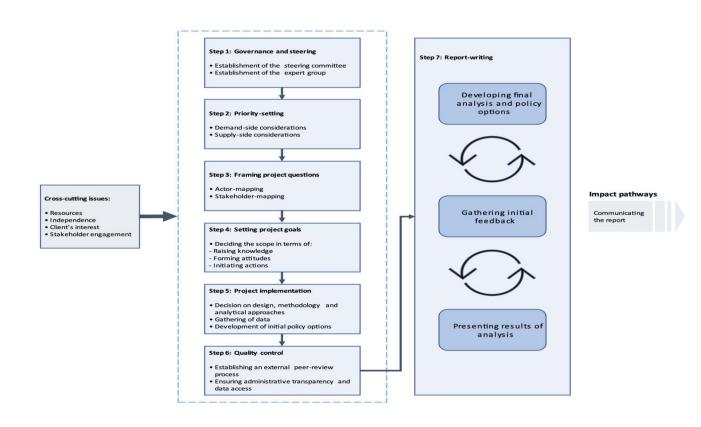
- The sixth step to building trust is to foster a sense of community and collaboration around your new technology, and to connect and network with your audience and other stakeholders;
- Creating and joining platforms, groups, or events that bring together people who share a common interest, goal, or vision related to your new technology;
- Partnering or cooperating with other organizations, institutions, or experts who can support, endorse, or enhance your new technology; and
- By fostering a sense of community and collaboration, you can show that you are not alone, and that you are part of a larger ecosystem that values and benefits from your new technology.

Strategies to build trust in AI and Geospatial Technologies (cont.....)

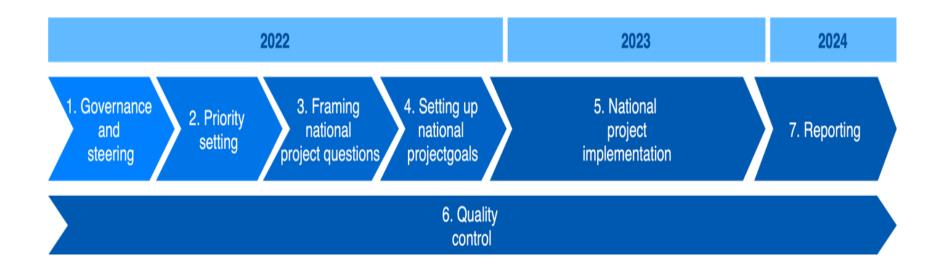
7. Other considerations:

• This is a space to share examples, stories, or insights that don't fit into any of the previous sections.

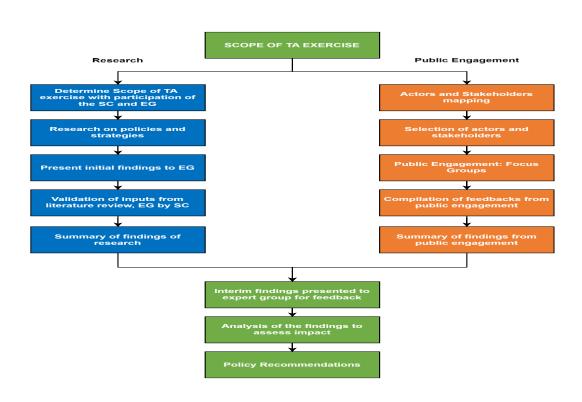
UNCTAD Proposed Technology Assessment (TA) Methodology



Timeline of the TA proposed at the first stakeholders' workshop (Seychelles' TA Process)



Substantive activities undertaken during the TA (Seychelles' context)



Conclusions

TA is an effective process that can help in building trust when adopting new technologies, including AI as;

- I. It provides perspective on the the value proposition;
- II. It helps to demonstrate the reliability and quality about the technology;
- III. It engages in dialogue and feedback;
- IV. It aligns with cultural values and norms;
- V. It embraces transparency and accountability;
- VI. It helps in fostering a sense of community and collaboration; and
- VII. It provides a space to share examples, stories, or insights

Recommendations

In order to build trust in the adoption of new technologies, including AI and Geospatial technologies, among SIDS, it is important that TA becomes a central part of the decision-making and STI policy formulation process.





What Horizon Scanning Is & How It's Applied

Identify emerging changes that could have a big impact on a country or a specific sector to make sense of a disruption or new changes in society

What are these?

- Drivers → "forces shaping change"
- Trends → "directions of change"
- Signals → "early signs of new risks or opportunities"
- Wildcards → "low-probability, high-impact shocks"

Ways to Apply Horizon Scanning

- Multiple approaches → lean or indepth.
- Sources of insight → expert panels, surveys, social listening, desk research, community voices.
- Framing tools → use PESTLE (Political, Economic, Social, Technological, Legal, Environmental).

Horizon scanning is the practice of spotting **early signals of change** to prepare for **emerging risks** and **opportunities**

Source: <u>UN Strategic Foresight Guide 2023</u>

How Horizon Scanning Works

Key steps:

- Gather diverse perspectives.
- Identify early signals, drivers, uncertainties.
- Clarify and elaborate → who's affected, what are the implications?
- Prioritize high-impact, high-certainty (to prepare) and high-impact, high-uncertainty (to explore).

Iterative practice \rightarrow regular, not one-off.

Where does data fit in?

- Signals can be qualitative or quantitative.
- Data & forecasts support drivers and trends once identified.
- Monitor leading indicators for early warning.
- Scoring probability/impact can help prioritization

Source: <u>UN Strategic Foresight Guide 2023</u>

Discussion at Tables

Objective: Identify drivers, trends, signals, and wild cards for key SIDS challenges.

Instructions:

- Each group will take one topic from the list.
- For your topic, identify:
 - Drivers → underlying forces shaping this issue
 - Trends → observable directions of change
 - Signals → early signs of emerging risks or opportunities
 - Wild Cards → low-probability, high-impact events that could disrupt everything

Please appoint a **chair**who will lead the
discussion and a group
rapporteur who report in
plenary.

Topics:

- Groundwater depletion threatens freshwater access and food security
- Coral reef degradation impacts biodiversity, tourism, and coastal protection
- Urban heat islands affects health, energy demand, and urban planning
- **4. Coastal erosion** undermines infrastructure and displaces communities
- 5. Declining land productivity reduces arable land and food production

Where possible, think about how **geospatial or Big Earth Data** could inform your analysis

Horizon Scanning – an example: Marine Plastic Pollution

Drivers

- Global plastic production and trade
- Weak waste management systems in SIDS
- Ocean currents transporting debris across regions

Signals

- Local pilot projects on plastic recycling and alternatives
- Community beach clean-ups with geotagged reporting apps
- Early research showing microplastics in SIDS fisheries and water supplies

Trends

- Rising plastic accumulation in coastal zones
- Increasing regional and global attention on plastic bans and circular economy
- Growth of plastic alternatives

Wild Cards

- A breakthrough global plastics treaty with strict enforcement
- Sudden collapse of fisheries due to microplastic contamination
- A technological breakthrough rapidly reduces marine plastics

How Geospatial / Big Earth Data Can Help

- Mapping hotspots → satellite imagery & ocean current models show accumulation zones
- Monitoring over time → remote sensing tracks seasonal/annual changes in plastic flows











































Scenario Development

An approach to broaden our understanding of how the future may evolve

- A strategy to identify risks and opportunities, especially those that emerge when different drivers of change interact.
- Scenarios help us plan for risks and issues by telling a tangible story of the future: how change unfolded and what actions were taken.
- Scenarios are structured around different time horizons:
 - Understand how the present evolved into this future.
 - Explore how drivers of change and their interlinkages combined to shape different futures.
- Scenarios present alternative futures. No single scenario is "preferred." Each has both positive and negative elements.
 United Department of Dep



Normally, scenario development is a multistep, time-intensive process involving mapping drivers, exploring uncertainties, and iterating across multiple time horizons.

Why Interlinkages Matter

- Drivers don't act alone

 — they interact with each other.
- These interactions can amplify risks or create new opportunities.
- Understanding interlinkages helps us see cascading effects rather than isolated issues.
- Scenarios become richer when we ask:
 How do different forces combine to shape
 the future?

Example:

- Rising sea levels (environmental) + weak coastal infrastructure (social/technical) → coastal displacement crisis.
- Digital innovation (technological) + strong youth networks (social) → new blue economy jobs.

```
Driver 1: Rising sea levels
     (Environmental)
  Driver 2: Weak coastal
      infrastructure
    (Social/Technical)
    Interlink → Coastal
   displacement crisis
          (Risk)
Driver 1: Digital innovation
     (Technological)
  Driver 2: Strong youth
        networks
         (Social)
   Interlink → New blue
      economy jobs
      (Opportunity)
```

Change progression method

We will be exploring two scenarios (baseline and radical) per major force of change (interlinkage), using the drivers of change that you identified in the horizon scanning exercise.

These are the same drivers you worked on earlier—now we'll explore how they could shape very different futures.



Baseline Scenario

No-change path, indicating that the weight of the past has stopped any change, referring to a response that reflects a status quo state



Marginal Change

Path with minor changes, which is a response to change that is largely reactionary



Adaptive Change

Path of agility, indicating a move beyond old patterns and behavior that is reformist and progressive



Radical

Change

Major structural transformation, indicating revolutionary responses

Step 1: Inputs for Scenarios

Instructions:

- •Start with your **horizon scanning outputs**.
- Select 2-3 critical drivers of change.
- Choose 1 wildcard that could disrupt the future.

Please appoint a chair who will lead the discussion and a group rapporteur who will take notes.

Definition:

← Critical drivers of change are the key forces — certain or uncertain — that will most influence how your topic evolves.

Example: Marine Plastic Pollution

Critical drivers: Global plastic production (certainty), weak waste management in SIDS (uncertain)

Wildcard: Sudden international plastics treaty

What we're not doing (today's shortcut):

- Mapping all interlinkages between drivers.
- Using quantitative models or Ai models

10 Minutes



Step 2: Waves of Change

First wave → Initial effects of your chosen drivers and wildcard.

Second wave → Consequences and stakeholder responses.

Third wave \rightarrow Cascading ripple effects across society, economy, and governance.

Example: Marine Plastic Pollution

Drivers: Global plastic production (certainty), weak waste management in SIDS

(uncertain).

Wildcard: Sudden plastics treaty.

First wave: Plastic accumulates on coasts; fisheries contaminated.

Second wave: Tourism declines, governments face new waste costs, local

entrepreneurs test alternatives.

Third wave: Regional alliances form, SIDS gain global leverage, new green jobs

emerge.

10 Minutes



Step 3: Develop 2 scenarios

- Use your selected drivers + wildcard + waves of change.
- Develop two contrasting futures for 2040 and beyond:
 - Baseline Scenario if today's trends continue with little major change.
 - **Radical Scenario** if a big disruption or transformation reshapes the future.
- For each scenario, describe in 3–5 bullets:
 - What the future looks like in 2040
 - Main **risks** and **opportunities**
 - A short, creative title

10 Minutes

If time allows, write your scenarios as a short narrative.

Each group will share their baseline and radical scenario in plenary (max 3 minutes).



Why foresight matters for STI policy and planning

11:20 - 11:30

Prof. John Ouma-Mugabe Professor of Science and Innovation Policy, Graduate School of Technology Management, University of Pretoria









































































Reporting back in plenary

























































