An overview of ocean observations and prediction, with a focus on African capabilities and recommendations for sustainability

Presented by Hayley Evers-King (EUMETSAT),
with thanks & apologies

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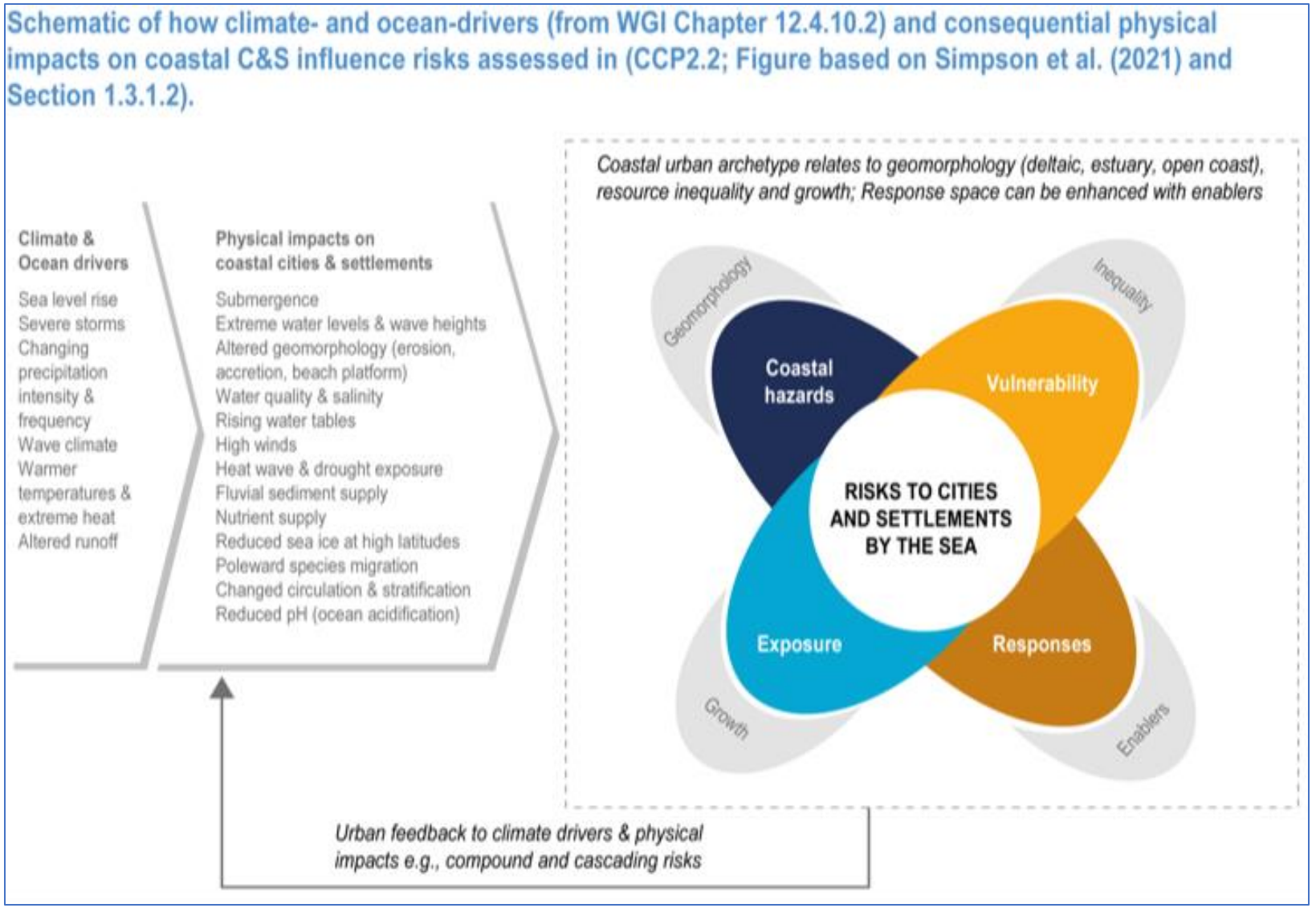
Not talking about specific African capabilities as you have lots of terrific presentations this afternoon….more useful to focus on the intelligence driven conceptual approach

SESSION 4 – OCEAN PRODUCTS AND SERVICES FLASH-TALKS SESSION

Co-Chairs: Louis Celliers (HEREON) and Hayley Evers-King (EUMETSAT)

10:40-10:50	OceanPrediction DCC – Africa Regional Team	Jennifer Veitch (SAEON)
10:50-11:00	GMES & Africa	Kwame Adu Agyekum (GMES and Africa)
11:00-11:10	Global Environment Monitoring Services for the Ocean and Coasts (GEMS Ocean and Coasts)	Joana Akrofi (UNEP)
11:10-11:20	Cordio East Africa	James Mbugua (CordioEA)
11:20-11:30	South African Oceans and Coastal Information Management System (OCIMS)	Marie Smith (CSIR)
11:30-11:40	EUMETSAT	Hayley Evers-King (Eumetsat)
11:40-11:50	Digital Twin of the Ocean and the Copernicus marine service at Mercator Ocean	Muriel Lux (Mercator Ocean International)
11:50-12:00	CLS Integrated Coastal Zone Management and Mangrove Monitoring	Mazomba Thando (CLS South Africa)
12:00-12:10	ESRI and Digital Earth Africa tools, data and learning resources for marine and coastal monitoring and reporting	Lorien Inness (ESRI Africa)
12:10-12:20		Kenneth Mubea (DEA)
12:20-12:30	Fugro digital solutions supporting coastal resilience efforts and decision-making	Delphine Lobelle (Fugro)

The context, from an IPCC perspective….



Coastal climate-related combined risks and drivers from an IPCC perspective (IPCC AR6)

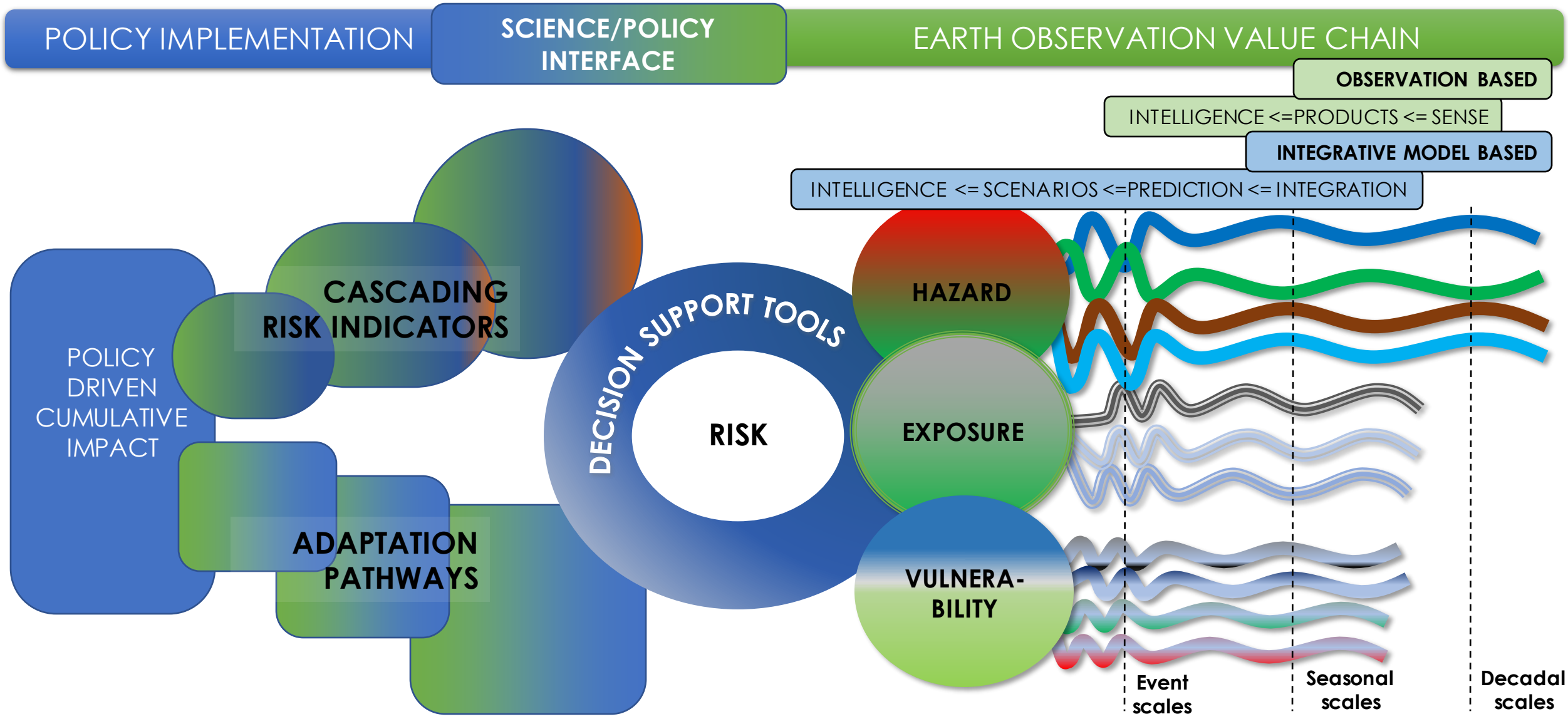
Earth Observation = satellite, *in situ* and model derived data and intelligence, including predictions and impact scenario modelling

It is very valuable from an EO perspective to follow the climate change and disaster response communities with this risk convention:

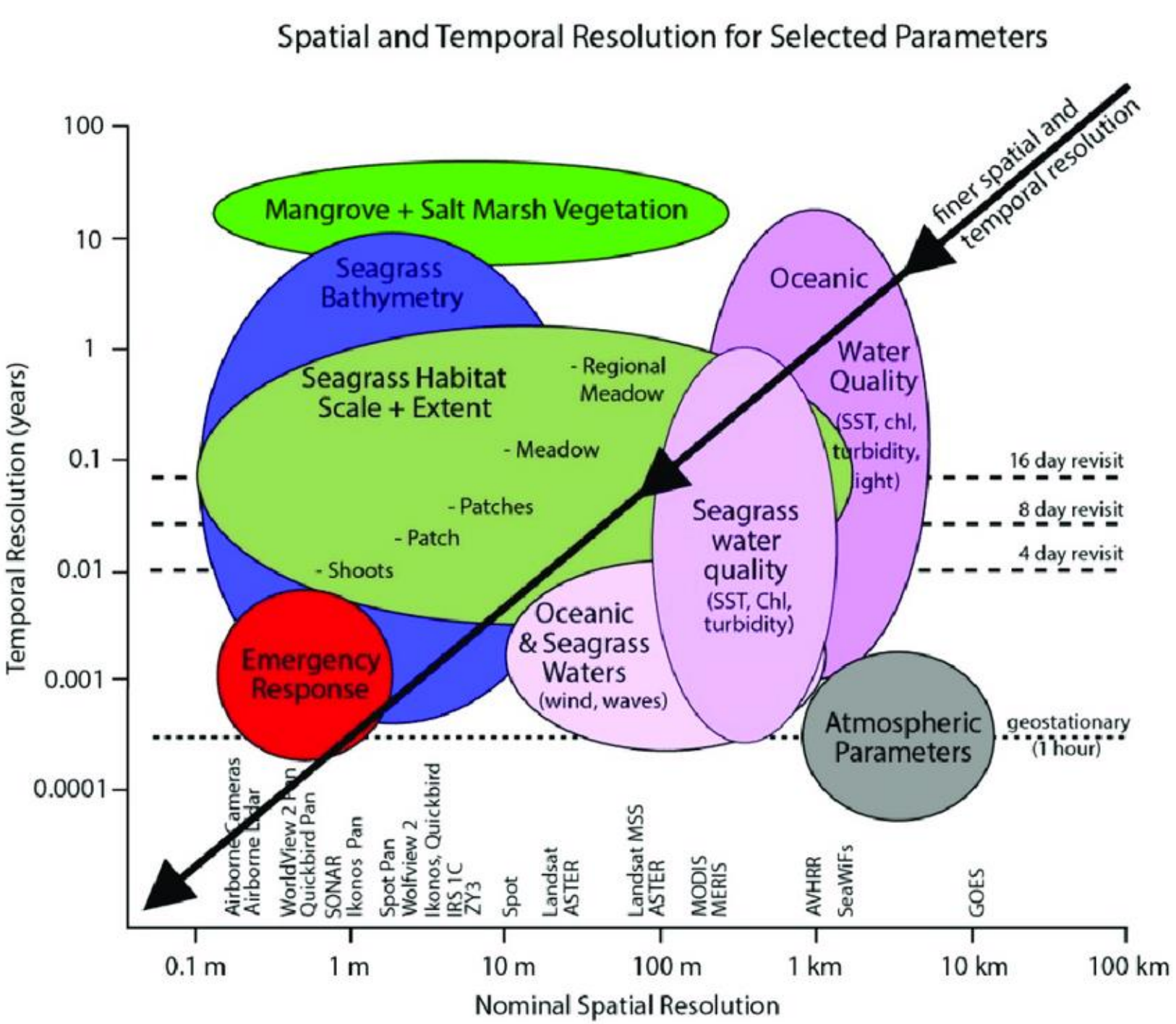
Risk = hazard x vulnerability x exposure

This also allows us to consider risk (or resilience) across the necessary spatial and dynamic scales

A view of the value chain, from earth observation through adaptation to policy…



The EO science community tends to focus primarily on hazards (because that is what we are good at!) but the other risk aspects & the need for actionable intelligence is critical to realizing value….

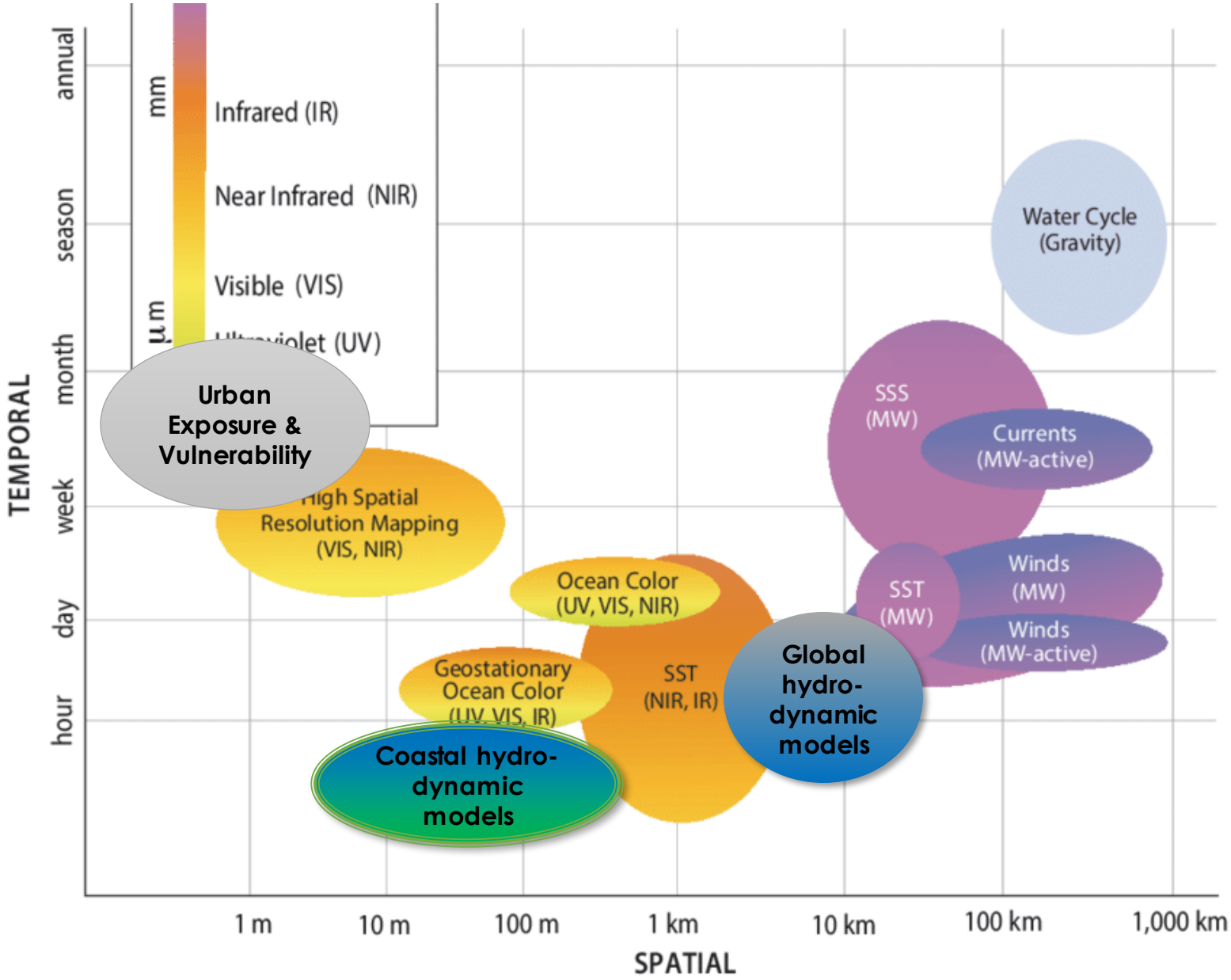


Scale consideration is critical to effective observation and prediction, as we need to understand both larger scale drivers, and risk impacts on both built and ecological infrastructure, primarily

- Shoreline changes incl. erosion and seabed mapping
- Coastal flooding and inundation
- Coastal ecosystem mapping
- Coastal waters quality

Phinn, S.R, Roelfsema, C.M. and Stumpf, R. (2010). Remote sensing: the promise and the reality. In: Dennison, W., (Ed.) Coastal Assessment Handbook, Chapter 15, University of Maryland.

It can be argued that our largest constraint is our inability to translate our very comprehensive current observational and modelling capability into appropriate intelligence services…



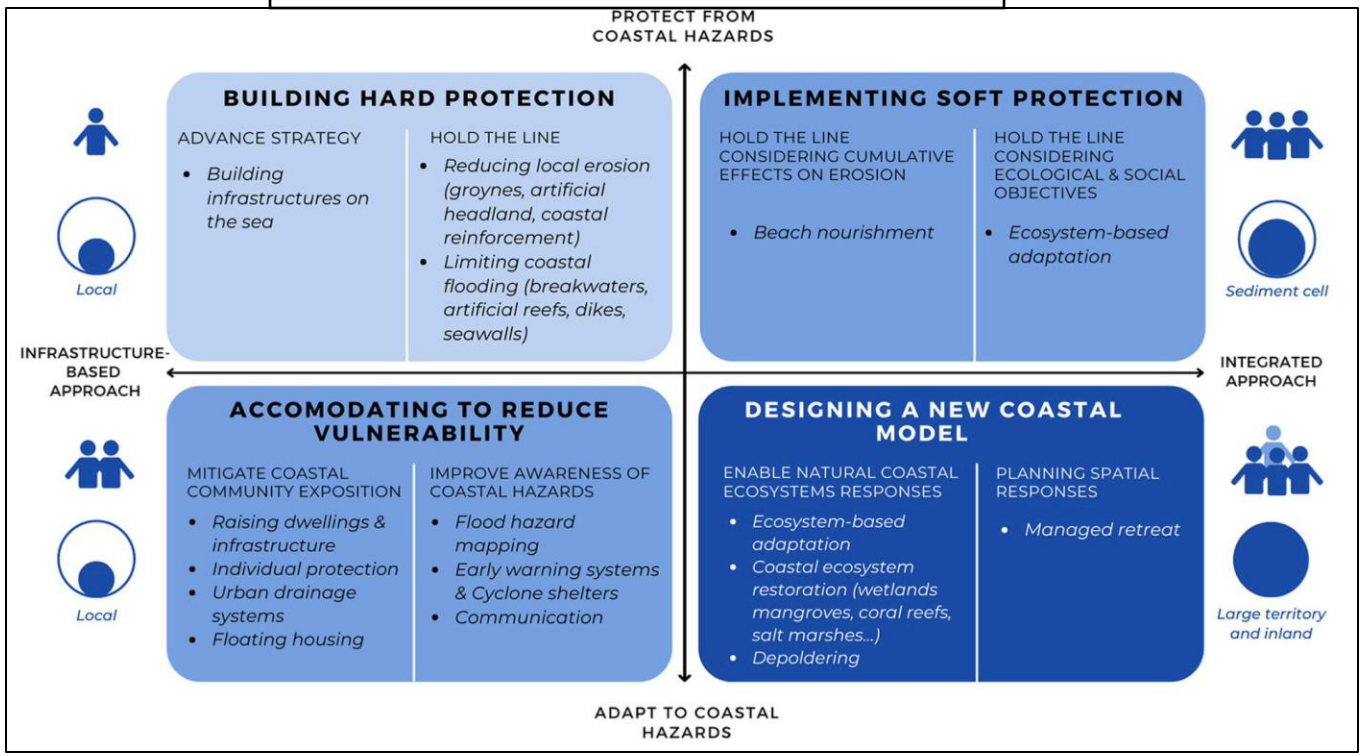
Typical earth observation observation & prediction scales, from drivers to risks….

Copernicus, NASA, NOAA, INPE, ISRO and other agencies provide significant freely available, multi-sensor & modelled data & products, but mostly in forms not suitable for decision makers

Coastal Flooding – An Example of the Observation and Prediction Needs for Earth Observation

Potential EO Value: Physical hazard drivers of extreme sea level (altimetry, tide gauges, models), storms & waves (scatterometers, SAR, altimetry, optical, models). Flood hazard products, both predictive (storm surge & scenario models) and near real time/historical surface flood extent (SAR, optical, models). Vulnerability sub-product ranges, e.g. land cover, impervious surfaces, topography (optical, SAR, lidar, models). Exposure products and inventories (optical, SAR, models)

Key Adaptation Activities

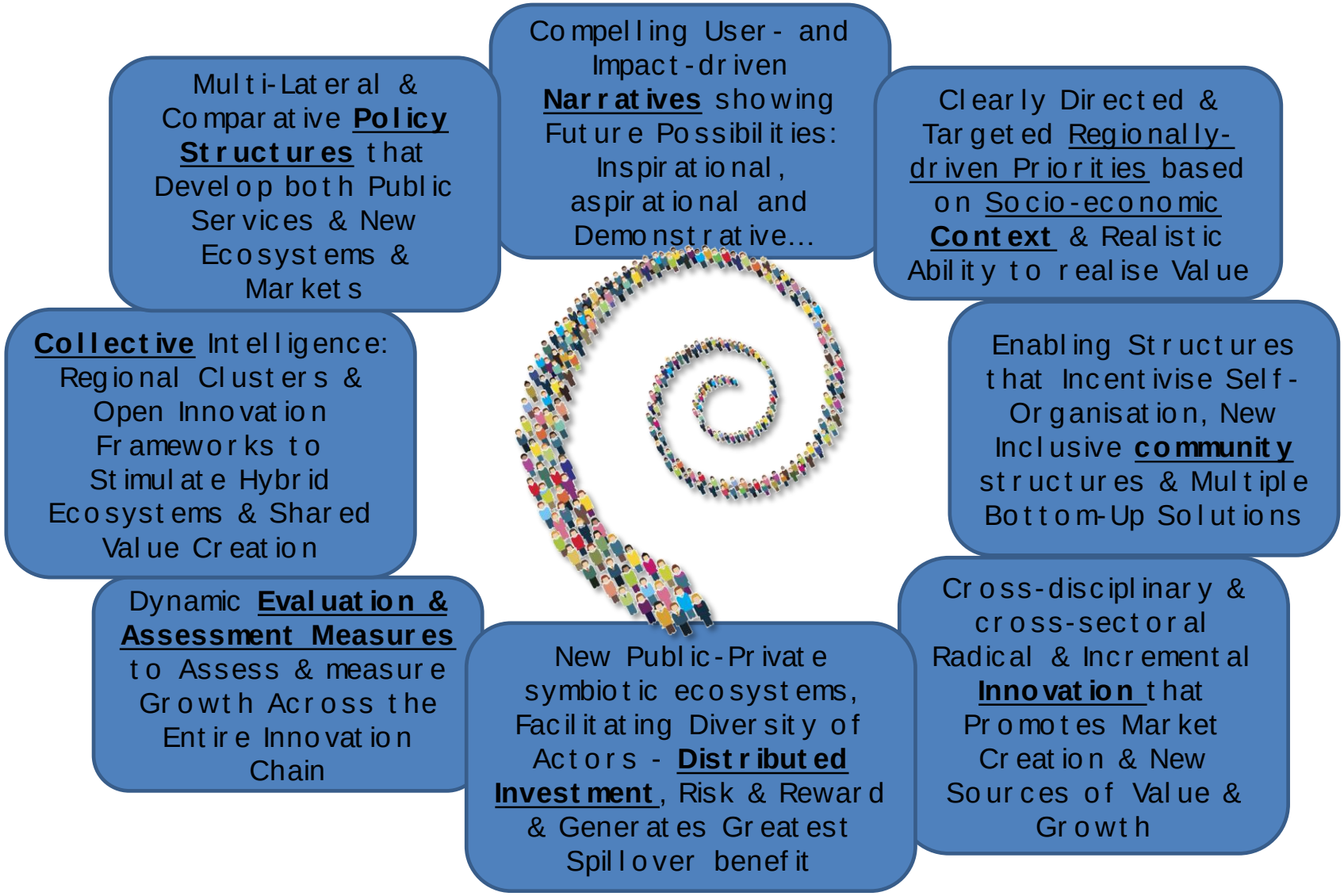


Required Earth Observation Components

- **Hydrological models** [Hazard], producing hydrological fluxes based on a wide range of climate, topography, surface and land use data.
- **Coastal inundation models** [Hazard], producing both deterministic and probabilistic flood maps..
- **Impact/damage models** [Vulnerability, Exposure], producing asset- or grid-based damage and loss metrics, typically based on water depth and ranges of depth -damage curves.
- **Resilience and Adaptation models** [Vulnerability, Exposure] producing maps of risk and resilience for critical infrastructure

Recommendations for sustainability

Sustainability = developing systems that are critically used, owned by user communities, contribute to economic growth, with business models extending beyond grant funding…



..merged thinking on using EO for downstream/ocean economic growth from Mazzucato, Kunkel, OECD, World Bank, EU Blue Growth Strategy…

A Resource/Intervention based approach to the value chain….

Traditionally EO Service development has focused more on the resource, e.g. the EO Data, and trying to shape products and delivery around (sometimes poorly understood) user needs.

It is more valuable to start with a very good understanding of the various user interventions, i.e. the actions users will take based on the insight provided by the (value enhanced) EO.

This approach maximises the ***co-design*** aspects of development, and allows iterative development along the X-AS-A-SERVICE value chain….

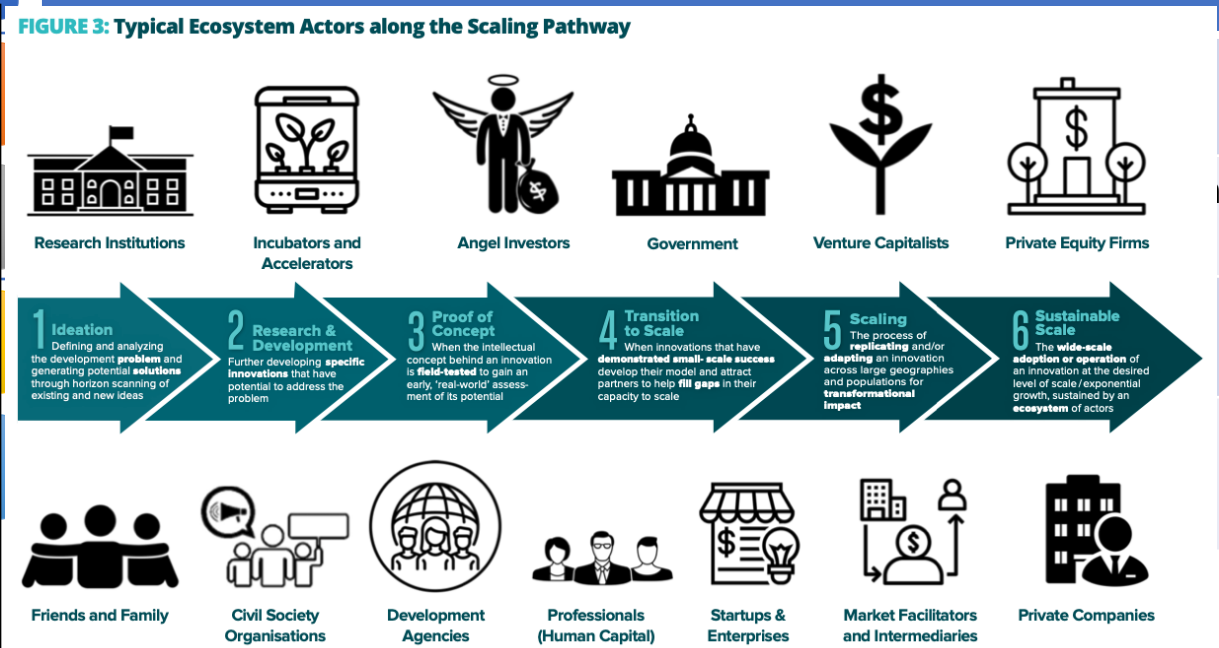
DATA

Provision of minimally processed data with little value add..

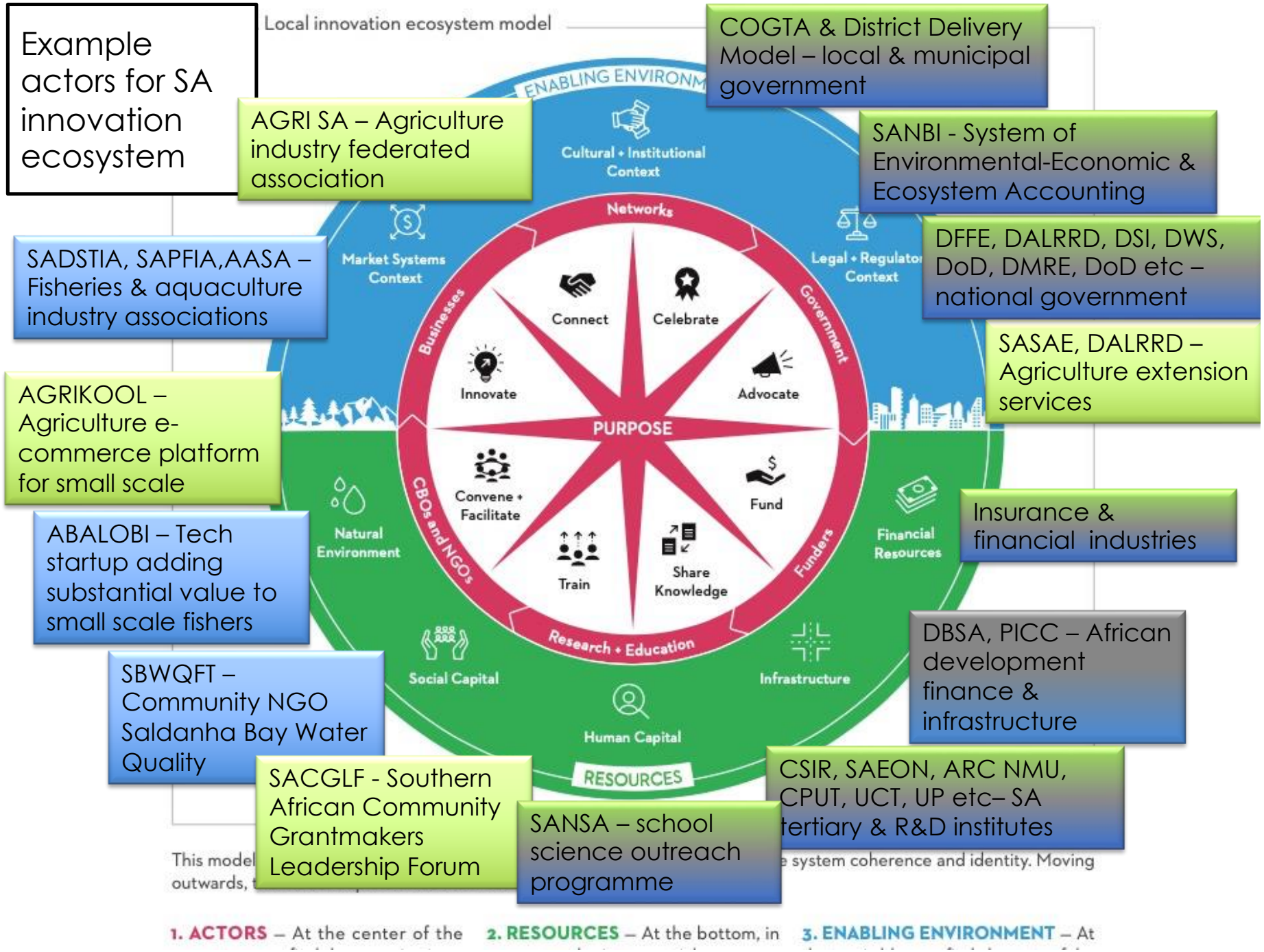
Main current offerin

Additional in domain exp communities

Innovation ecosystems are critical to real economic impact, bringing together the range of actors needed to maximise the value of EO – new communities are needed for sustainability, with public/private partnerships important … involvement with Blue Economy initiatives are critical



Example actors for SA innovation ecosystem



COGTA & District Delivery Model – local & municipal government

AGRI SA – Agriculture industry federated association

SANBI - System of Environmental-Economic & Ecosystem Accounting

DFFE, DALRRD, DSI, DWS, DoD, DMRE, DoD etc – national government

SADSTIA, SAPFIA,AASA – Fisheries & aquaculture industry associations

SASAE, DALRRD – Agriculture extension services

AGRIKOOL – Agriculture e-commerce platform for small scale

Insurance & financial industries

ABALOBI – Tech startup adding substantial value to small scale fishers

DBSA, PICC – African development finance & infrastructure

SBWQFT – Community NGO Saldanha Bay Water Quality

CSIR, SAEON, ARC NMU, CPUT, UCT, UP etc– SA tertiary & R&D institutes

SACGLF - Southern African Community Grantmakers Leadership Forum

SANSA – school science outreach programme

CO-DESIGN AND CO-DEVELOPMENT - AROUND A USER INNOVATION ECOSYSTEM - IS CRITICAL….

Engage potential users with any suitable mechanisms : workshops, one-one, top down, bottom up, etc. Make it light, attractive, potentially rewarding, very visual. Understand what motivates users in addition to their landscape, interventions, decisions. Strongly encourage any engaged, enthusiastic, forward looking (or mandated/politically driven) users to be embedded in development as ***champion users (these are the most critical aspect of effective co-design)***

Community and trust building is very important – any high value knowledge-based solution will definitely need much more domain knowledge & networks than just EO skills. Existing communities e.g. agri co-ops, NGOs etc that have already built a trust based user network are super valuable

Iterate often. Use whatever platforms are most appropriate, e.g. social media, blogs, meetings, to show users any development, especially any simulated/example products. Don't wait to launch some monster or perfect product/service that will take ages – keep the users engaged & build mutual ownership & trust

Use major environmental events to your advantage, e.g. major droughts, floods, blooms, etc. Users understand these very well as concerns decision making, interventions and impacts. Historical events are the best way to transactionally co-design/test your evolving products, and real time events offer great opportunities to test, optimize, better understand decision making & build mutual ownership

Thanks!

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