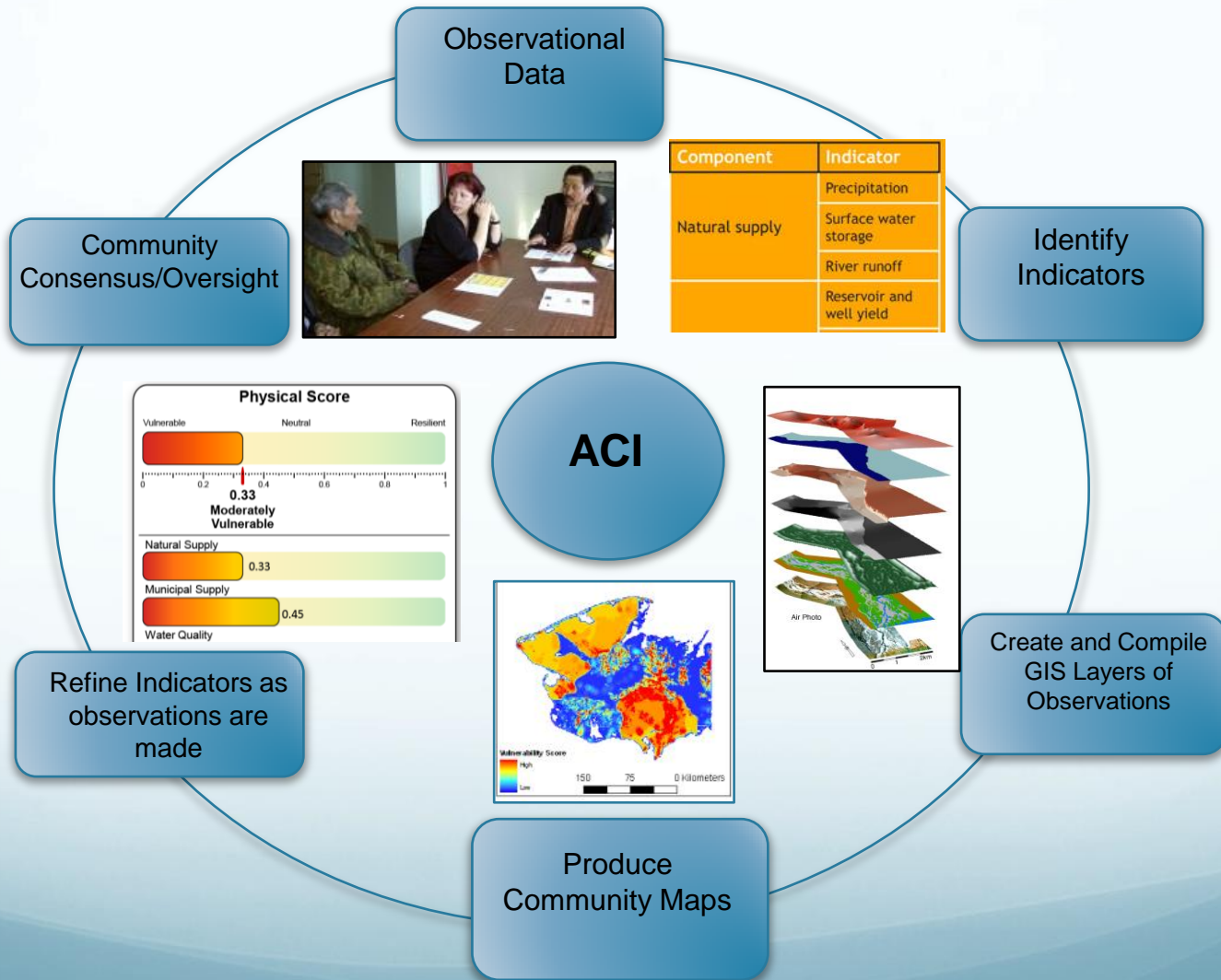
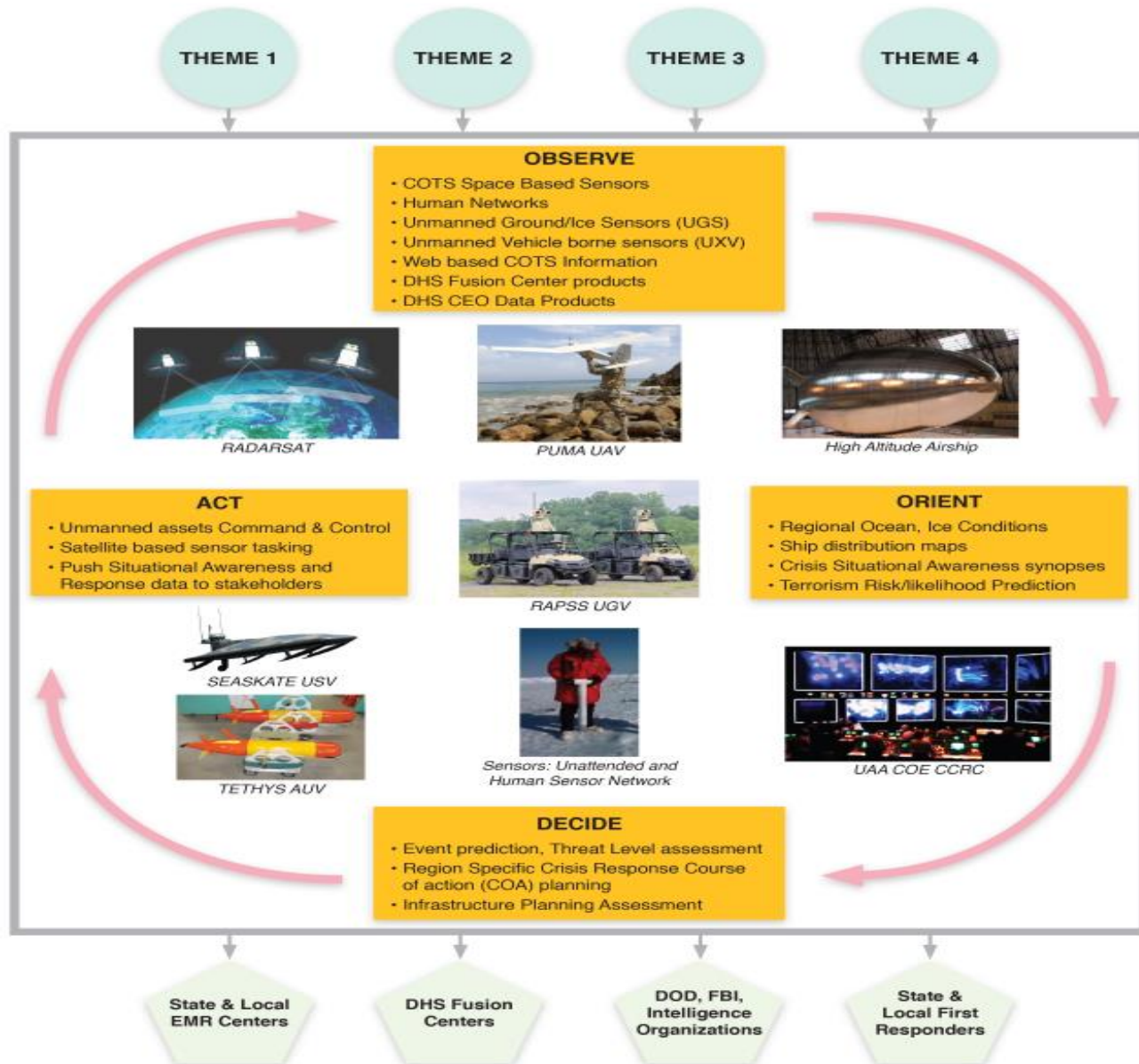


Observations, Indicators and Adaptive Capacity Indices



CBON-SA/Community Observing Network for Adaptation and Security (CONAS)



The role of Indigenous science and local knowledge in integrated observing systems: moving toward adaptive capacity indices and early warning systems

Lilian Alessa, Andrew Kliskey, James Gamble, Maryann Fidel, Grace Beaujean & James Gosz

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Indicators Tables for Arctic PACE (Predicting Arctic Critical Events)

- Project within the DHS Arctic Domain Awareness Center (ADAC);
- Will drive the ADAC ISoS Decision Support Tool.
- Expansion to include Digital Data Mining (DDM) to build rule sets for human responses to environmental change (MAS).
- Part of DOD Long Range Research and Development Planning Process (LRRDPP)

Type of Sensor	Indicator	Sub Indices
Remote Sensing	Sea ice	Extent, velocity, quality, pattern
	Marine debris	Bulk, diffuse, rigid, unknown
	Roads, building, and ports	
	Shipping patterns (AIS visible)	Baseline, irregular, proximity to habitat
	Phytoplankton and marine algae	Variation from baseline, pattern, density, types
	Oil / petrochemicals	Location at unfamiliar places, density
	Wetland drying / surface drying	Rates
	Greening / browning (NDVI)	Rates, types of vegetation, proximity to habitat, cause
	Phenology	Increased uncoupling
	Ocean temperature	Higher, lower, phenologically disjunct
Buoy / Meteorological Station	Coastlines	Erosion (rates & patterns), proximity to habitat, proximity to infrastructure, sedimentation
	Ocean temperature	Higher, lower, phenologically disjunct
	Salinity	Higher, lower, pattern
	Microbes	TBD
	Oil / petrochemicals	Location at unfamiliar places, density
	Precipitation / hydrology	Increase, decrease, rate (e.g., drought/flood), proximity to infrastructure
	Phenology	Increased uncoupling
Community-based Observing Networks	Species distributions / biodiversity	TBD
	Sea State; Sea Ice; Marine transit inc. patterns (AIS – dark)	Patterns and Occurrence
	Fauna - familiar	Frequency, body condition (e.g., lesions), behaviors
	Fauna – unfamiliar	Occurrence, distribution
	Flora – familiar	Frequency, productivity (e.g., berries, rhizomes, roots), condition
	Flora –unfamiliar	Occurrence, distribution
	Phenology	Increased uncoupling
	Human activity – desired	TBD
Coastlines	Erosion (rates & patterns), proximity to habitat, proximity to infrastructure, sedimentation	

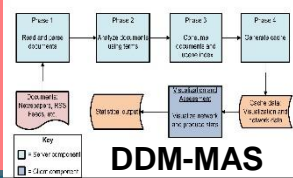


CBONS and Early Warning Systems



CBONS

Retrospective Analyses



Indicators and Rule Sets

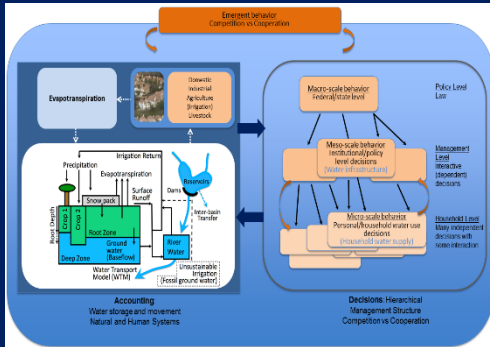
Hydrological
Land Use
Maritime

Ecological states
Climate

WBM-SWIM

Coupled:
Hydrologic Processes
Human Responses
Feedbacks

- Improvisation
- Resource Competition
- Trade-offs
- Conflict versus Cooperation



Micro-scale Human Behaviors
Macro-scale Human Behaviors

Infrastructure
Policies

Agents



National Infrastructure (USACE Dataset)



Aim #2

FUTURES

Informed by Retrospective DDM

Climate Scenarios:

- 1) Historical (1979-2010)
- 2) Downscaled CMIP5 (2011-2100)
- 3) Resource supply futures
- 4) Infrastructure for supply
- 5) Socioeconomic strategies

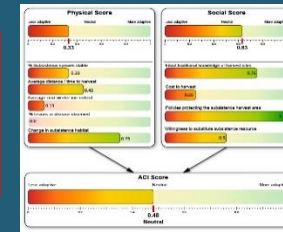
Changing Landscape Scenarios:

1. Dryer West/Wetter East; Low Infrastructure; H/L Social Cooperation
2. Dryer West/Wetter East; High Infrastructure; H/L Social Cooperation
3. Grey and Black Swan Events

Aim #1

Model Outputs Refine Indicators

Biophysical and Hydrological Indicators Weighted



Sociocultural and Economic Indicators Weighted

Aim #3

Conflict Cooperation Early Warning System (CCEWS) Prototype Augmented Adaptive Capacity Index

- 1) Web-based interactive indicators definition/exploration
- 2) Mapping of social ecological technological system hotspots
- 3) Direct engagement with strategic advisory group and other stakeholder/user groups.