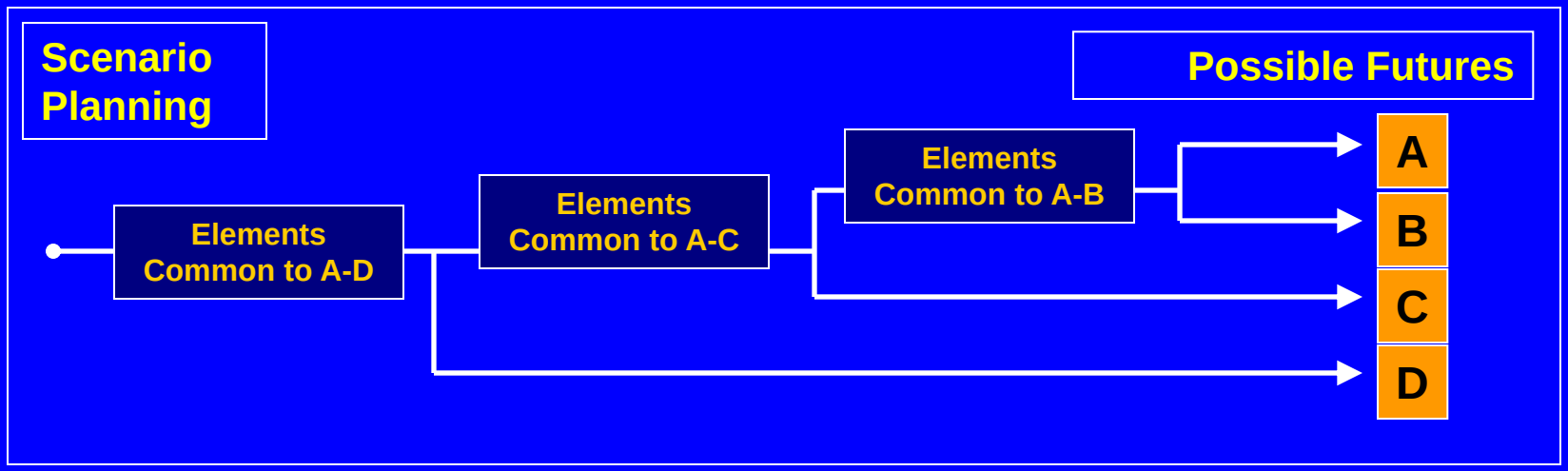
Scenario Planning for Climate Change Adaptation Decision Making: the State of the Art



WORKSHOP

31 March – 1 April, 2015

Gregg Garfin, University of Arizona

Acknowledgments

UA Institute of the Environment: Tina Gargus, Claudia Treviño, Angie Brown, Delight Craddock

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- UA Center for Climate Adaptation Science and Solutions (Kathy Jacobs)
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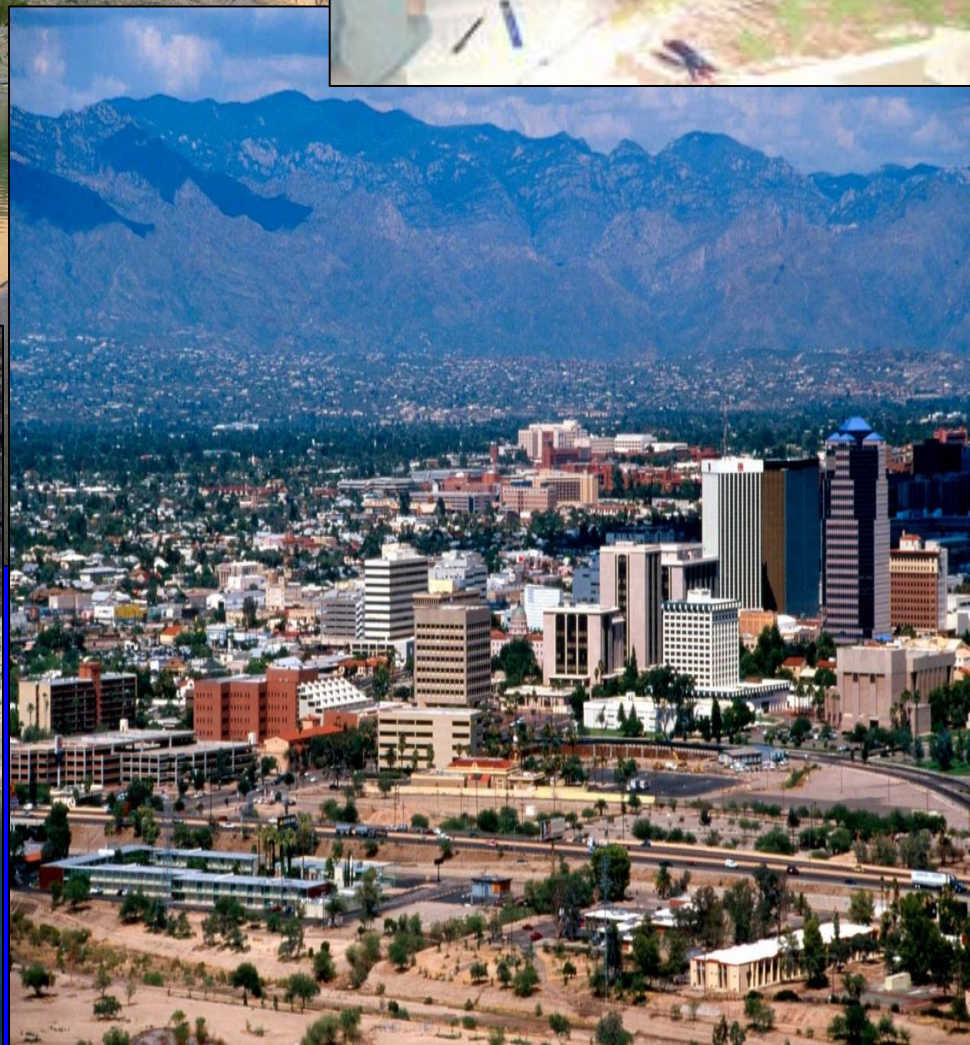
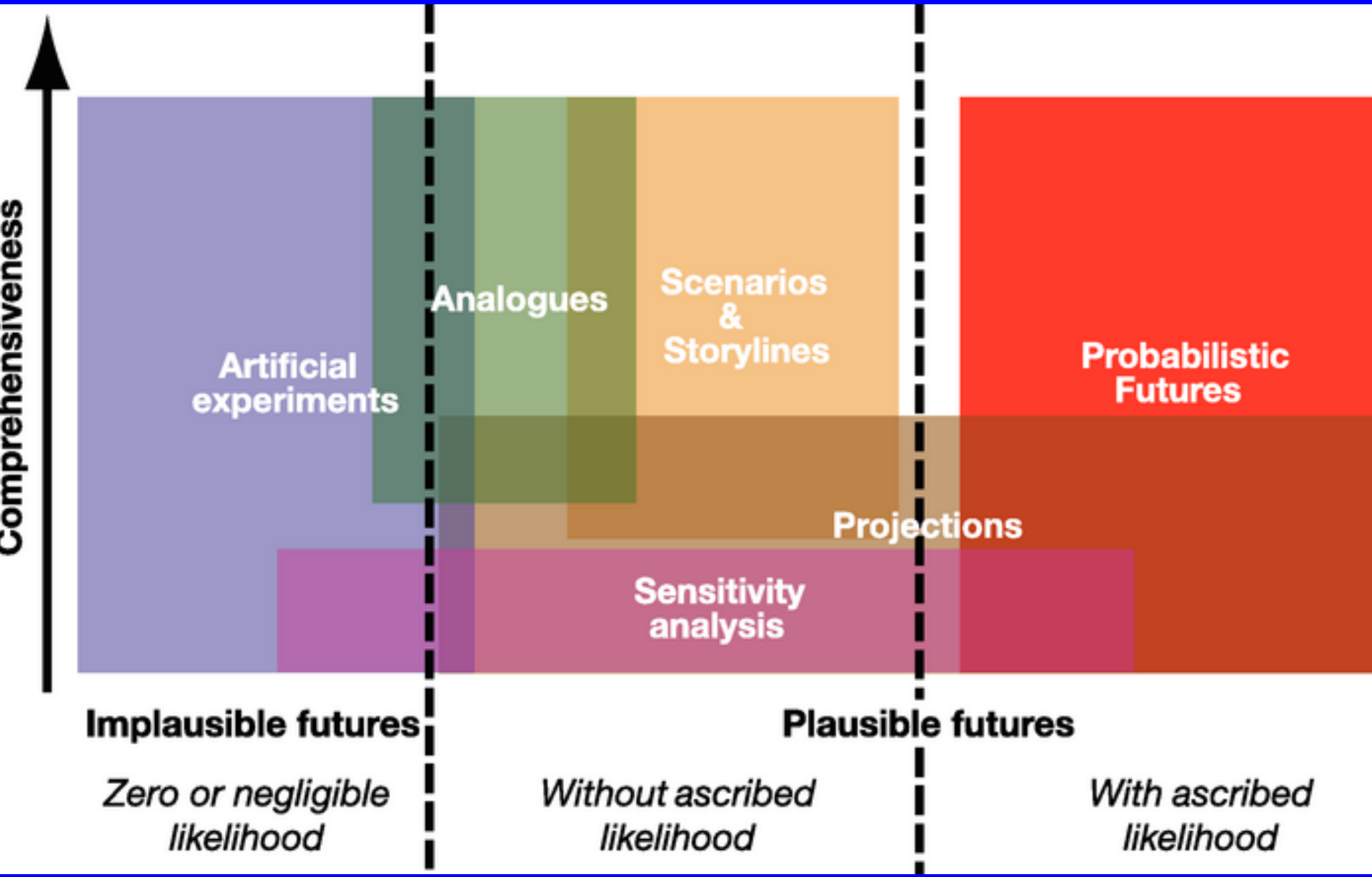
Organizing Committee: Mary Black, Carolyn Enquist, Gregg Garfin, Holly Hartmann, Kathy Jacobs, Richard Moss, Erika Rowland





Ways of Characterizing the Future

Motivation

What's going on!
What's going on?

Questions

- What is the state-of-the-art in scenario development?
- How can uncertainty within scenarios be communicated effectively to stakeholders and what types of scenarios are appropriate and beneficial to pursue in a given context?
- In using scenario planning methods: What works where, when, and why?
- How can the effectiveness and utility of scenario planning processes be enhanced?

Questions

- What is needed to move scenario planning forward in various contexts?
- How can what is learned be better integrated into organizations, programs, and agencies?
- How can we best provide a broader understanding of methods, their respective value, and their appropriateness to particular decisions or problems encountered by prospective users of scenario planning methods?

Goals

- **Understanding**
  - Methods, theory, applications
- **Assessment**
  - Characteristics, value, suitability
  - Research, institution, resource needs
- **Participation**
  - Leading to new and useful perspectives
- **Contribution/Outputs**
  - Typology
  - Publications

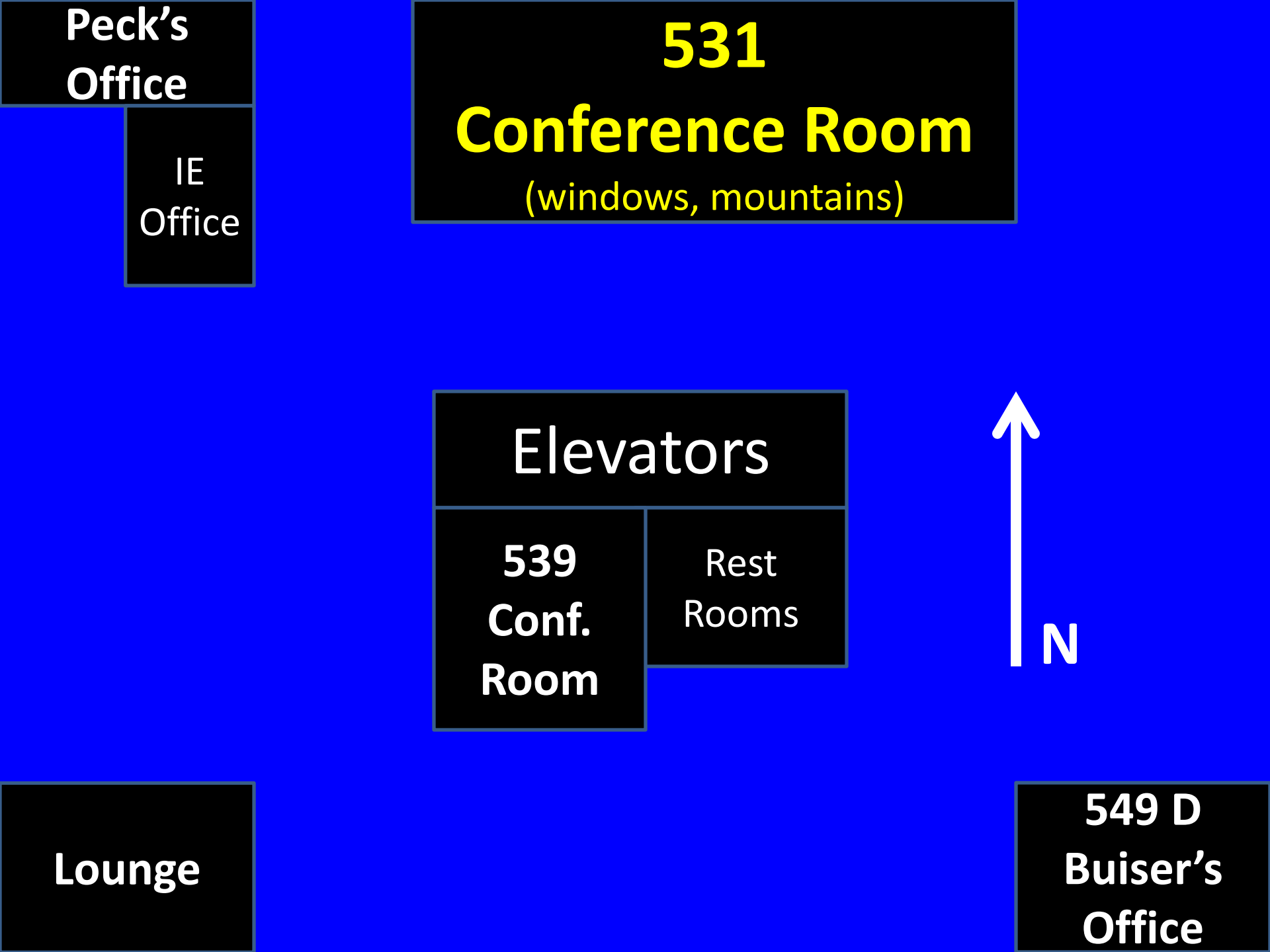
Purpose of Scenario Planning	Particip.	System Definition	Scenario Planning Method Used	Info Inputs to Scenario Develop.	Main steps	Engage & commu nic. Strateg.	What uncertain ties are addresse d, and how?	Outputs (e.g., scenario narratives, simulation s, tables, visualizatio ns)	Applic. of/outlet s for the scenario outputs
Describe the objective s of the process. Be as specific as possible, e.g., inform a specific decision, etc.	List the main groups of participa nts and their role(s).	Information about location, scale, component s of infrastructu re, activities, etc., that could be affected by climate and that are thus being planned.	Is there any existing categ. of different scenario planning methods	Types of scientific scenarios, obs., surveys, etc. used to define altern. future conditions → affect objectives or influence adapt. planning			Future climate condition s (used a high and low change scenario); regional pop. growth (…)		

DAY 1 – TUESDAY – 31 March 2015

TIME	ACTIVITY
9:00 – 10:00	**Workshop Overview and Introductions** (G. Garfin and H. Hartmann)
10:00 – 10:30	**Setting the Stage** (R. Moss)
10:30 – 10:45	Break
10:45 – 11:45	**Case Studies, Part I** (G. Garfin)
11:45 – 12:45	Lunch
12:45 – 14:15	**Case Studies, Part II** (G. Garfin)
14:15 – 14:45	Break
14:45 – 15:00	**Framing, Inputs and Outputs for Scenario Development** (K. Jacobs)
15:00 – 18:30	Break
18:30	**Dinner – Old Pueblo Grille, 60 N. Alvernon Way**

DAY 2 – WEDNESDAY – 1 April 2015

8:05 – 8:30	**Continental Breakfast**
8:30 – 9:00	Recap of first day + Schedule for today
9:00 – 10:45	**Process + Applications + Connections, Part I** (K. Jacobs, C. Enquist, H. Hartmann)
10:45 – 11:15	Break
11:15 – 12:15	**Process + Applications + Connections, Part II: Report Back** (H. Hartmann)
12:15 – 13:00	Lunch
13:00 – 14:15	**Typology, Guidance, and Promoting Innovation, Part I** (E. Rowland, R. Moss, G. Garfin)
14:15 – 14:30	Break
14:30 – 16:00	**Typology, Guidance, and Promoting Innovation, Part II: Report Back** (C. Enquist)
16:00 – 17:00	**Next Steps** (G. Garfin)


Peck's Office
IE Office
531
Conference Room
(windows, mountains)
Elevators
539 Conf. Room
Rest Rooms
N
Lounge
549 D Buiser's Office

Carpool to Old Pueblo Grille

Scenarios Are:

- A tool for long-term strategic planning
- Narratives of alternatives in which decisions may be played out
- Coherent, internally consistent, and plausible

Scenarios Are Not:

- Predictions or Forecasts
- A method for arriving at the “most likely” future

IPCC, 2008; Mahmoud et al. 2009; Holly C. Hartmann Consulting

Definitions

Bottom-up approaches: begin with analysis of the details of a system or decision that is of interest ,and then identify contextual trends or conditions that affect the system or decision.

Mixed-method approaches: methods for scenario development that use elements of both a scenario planning approach (strong participant input), and other planning methods or scientifically derived scenarios, which can be used at points in the process to identify broader socioeconomic, climate, or other conditions that could affect relevant aspects of the future.

Definitions

Top-down approaches: analyze general trends or properties of a system (e.g., global socioeconomic trends that give rise to emissions, then climate scenarios) to depict the broad context of future conditions which impact specific places, entities, or how decisions play out.

Uncertainty: the extent to which something is unknown.

- lack of information
- disagreement about how to interpret
- ambiguous definitions
- lack of understanding of underlying processes
- errors in observations
- lack of model skill
- qualitatively
- quantitatively

Definitions

Exploratory scenario – a scenario that is used to explore the implications of a possible future on predetermined goals and values (Holway et al. 2012).

Interactive and immersive visualization tools – consist of a range of visual and spatial media derived from modeling, data, scenarios, and descriptive narratives used to contextualize and communicate climate change information in two and three dimensions at the local or regional level (Sheppard et al. 2011).

Mental model testing – making explicit a group's mental model of how things work, based on their successes, so it can be discussed and compared to other scenarios.

Normative scenario – a scenario used to help identify a *desired future* (Holway et al. 2012).

Definitions

Participatory process – "a purposefully designed set of activities structured around framing a set of participatory activities (Moss et al. 2011)

- workshops
- social media
- decision theaters
- set of outcomes that could be a decision, a community plan, a report, films/audios, or other forms of knowledge sharing or exchange

Wind-tunneling – after building the event or end-state scenarios, the testing of alternative decisions for robustness. In this case, the scenarios are used for context.

Definitions

Decision scaling: “a new approach to using climate information within a decision making framework that links bottom-up, stochastic vulnerability analysis with top down use of GCM projections “ (Brown et al. 2011a).

- begins with a bottom-up analysis to identify a climate condition that impacts a decision
- sources of climate information, such as GCMs, to identify *how often such conditions occur* under different climate scenario

Definitions

Socioeconomic scenarios: narrative and/or quantitative descriptions of plausible patterns or pathways of

- demographic change (fertility, mortality, migration)
- economic development (patterns of trade, employment)
- technology (for energy, agriculture, water, etc.)
- institutions (governance arrangements)

These factors are important for understanding human contributions to climate change as well as the vulnerability or resilience of society. Historically, these scenarios have been developed to inform emissions scenarios.

Definitions

Emissions scenarios: descriptions of potential future emissions to the atmosphere of greenhouse gases and other radiatively important gases and particles that are used to explore the implications of alternative energy and technology futures and provide inputs to climate models (Moss et al. 2011).

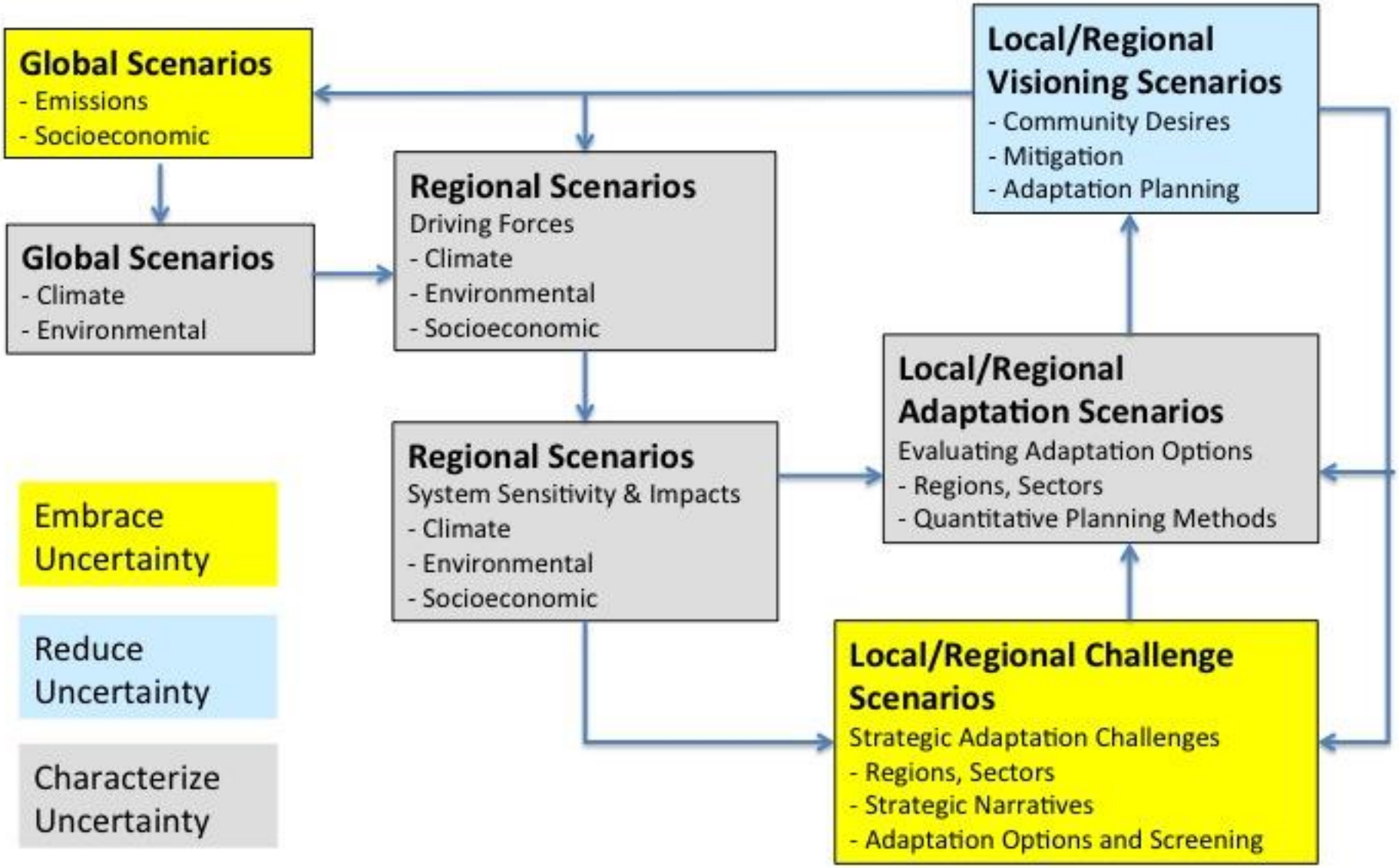
Climate scenarios: plausible representations of future climate conditions (temperature, precipitation, and other factors) produced using a variety of techniques including scaling of observed climate, spatial and temporal analogues, extrapolation and expert judgment, and mathematical climate and Earth system models.

Definitions

Environmental scenario – these "focus on changes in environmental conditions such as water availability and quality, sea level rise (incorporating geological and climate drivers), land cover and use, and air quality. *Climate change can drive changes in these factors, or scenarios can represent independently caused variations*. (Moss et al. 2011).

Climate model ensemble: a group of climate model simulations that use the same assumptions. Large ensembles are used to generate information about natural climate variability and to *characterize uncertainty from different sources, such as different initial conditions or model differences*.

Ecology of Scenarios

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