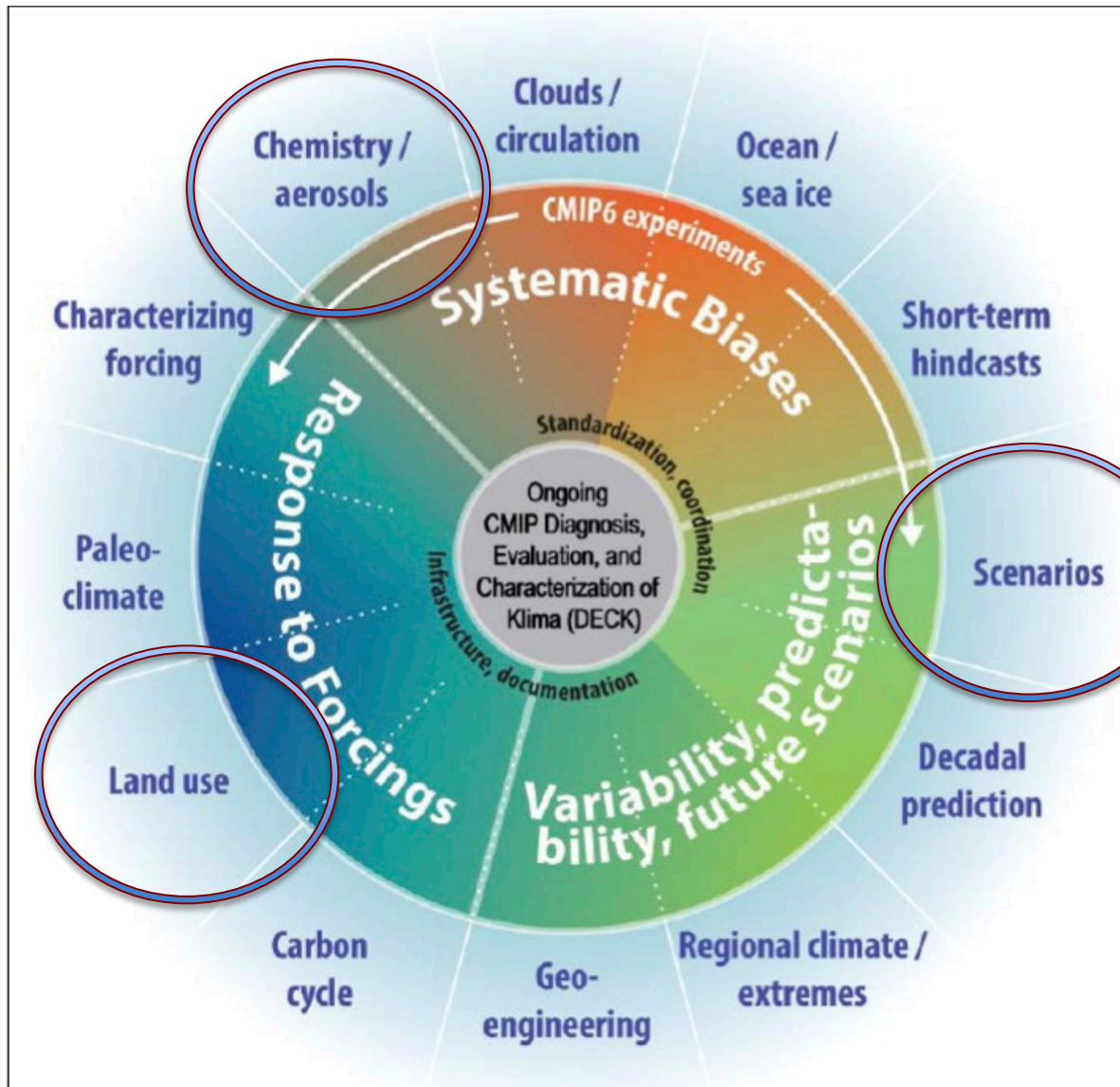


CMIP6 proposed structure

(EOS, vol. 95, No. 9, 4 March 2014)



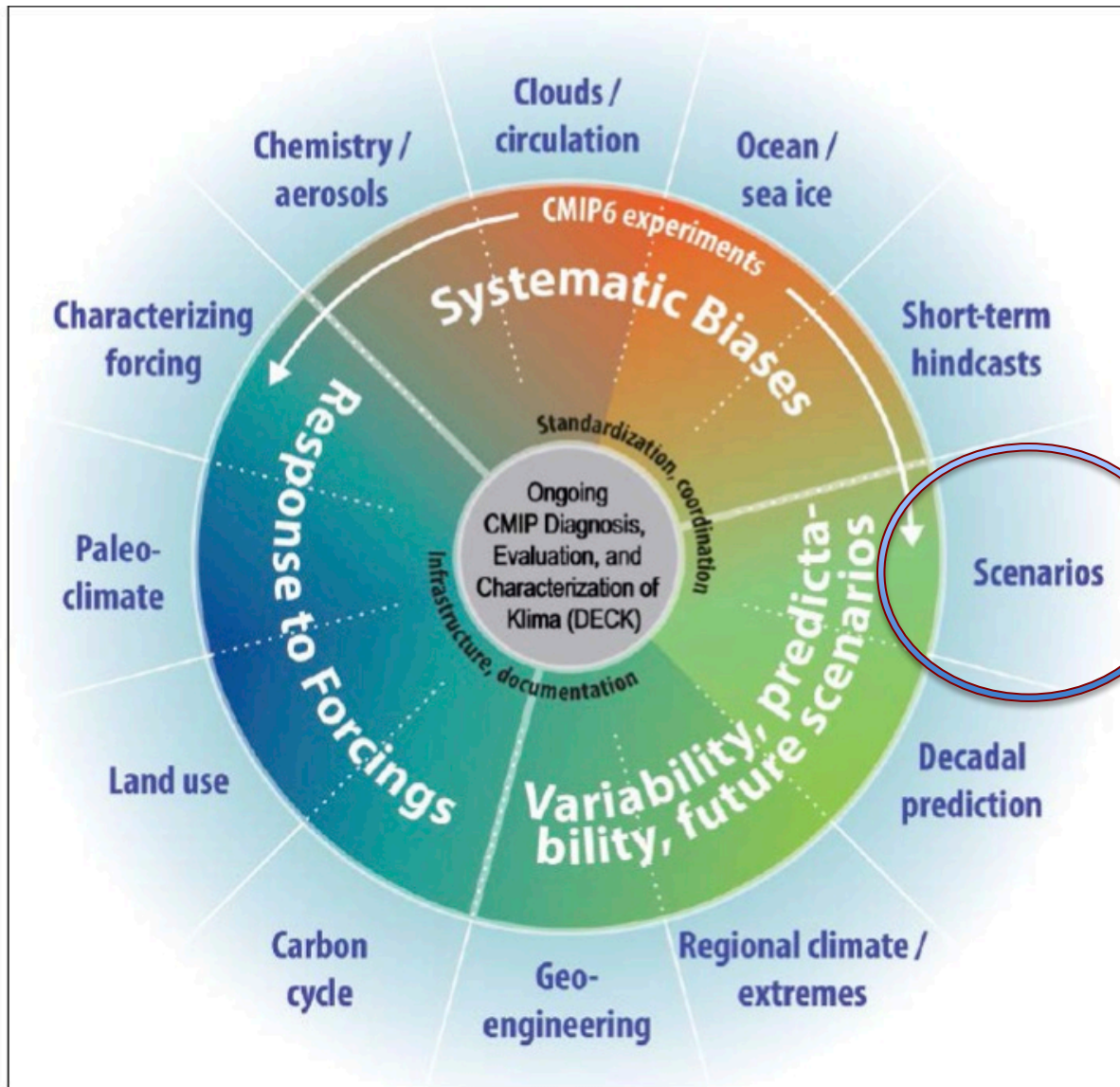
ScenarioMIP & Pattern Scaling Workshop Outcomes

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NCAR

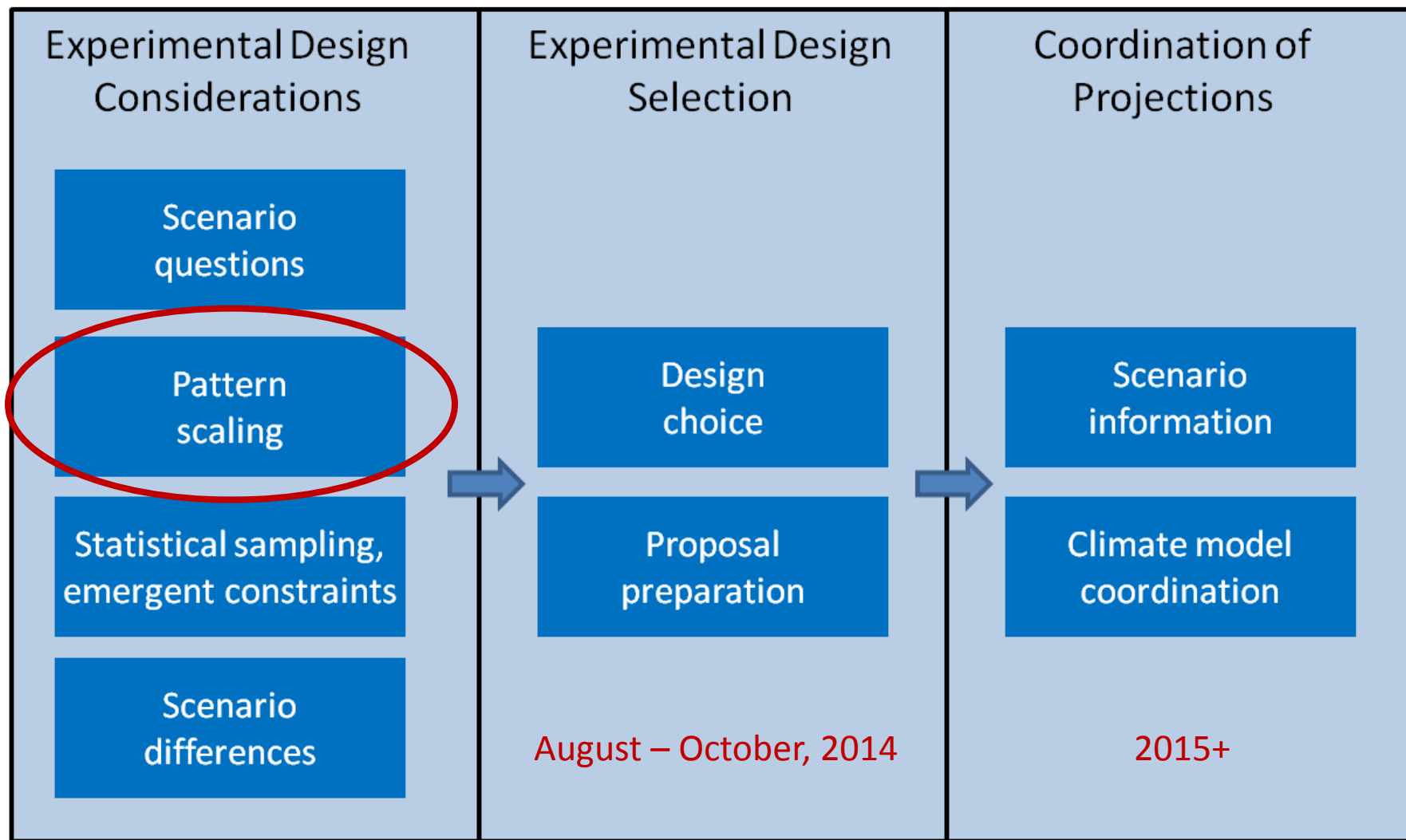
SDWG – CESM19
Breckenridge, June 2014

CMIP6 proposed structure

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ScenarioMIP



Co-chairs: B. O'Neill, D. vanVuuren, C. Tebaldi

Scientific Steering Committee: P. Friedlingstein, G. Hurtt, R. Knutti, JF Lamarque, J. Lowe, J. Meehl, R. Moss, B. Sanderson.

Scenario questions

- General purpose or targeted scenarios? E.g.,
 - What are the impacts and implications for adaptation and mitigation options under new global average forcing pathways not covered by the RCPs?
 - What is the sensitivity of climate to land-use change, and/or to aerosol or SLCF emissions?

Our general inclination is that the first type of scenarios constitute a priority for ScenarioMIP, other MIPs may take up more idealized scenarios to test the sensitivity of the climate system to variations in regional forcings.

Pattern Scaling

- Workshop in Boulder April 23-25, 2014: “**Pattern scaling, climate model emulators and their application to the new scenario process**”
- Main outcomes:
 - Preliminary *survey of user needs* in terms of variables, time and spatial scales of interest – a more comprehensive survey is under way;
 - There is a *hierarchy of needs*; for some, PS/Es may suffice, but it is clear that *they cannot satisfy the whole gamut of user needs* and therefore cannot be relied upon as substitutes for climate model runs.
 - A *systematic review of the methodologies*, and rigorous standardized *benchmarks* for their validation are needed and we plan to undertake some of it (esp. because of some low hanging fruit).
 - Work on limitations and hurdles (e.g., non-linearities/differences in time scale of response/varying performances depending on scenario characteristics) and on more complex approaches are available, but it is piece-meal.

Statistical sampling

- We briefly considered a sampling design based on filling the cells of a matrix pairing scenarios and models but concluded it is not workable
- We are now focusing on the question of *initial condition ensemble size*.
 - A proposal: *focus large ensembles on a single scenario* (or two at most, high and low) while intermediate could be run by only one IC member.
 - Possible synergies with other MIP focusing on Large Ensembles?

Scenario Differences

- Work on signal-to-noise is available or under way on the basis of CMIP5 experiments focusing on differences between scenarios in terms of *global characteristics* (RF, GAT).
- Other relevant questions have to do with *differences in regional forcings* (LUC, Aerosols) and proposals to LUMIP and AerChemMIP are in the works, e.g.,
 - exploring a bracketing pair of land use scenarios within existing RCPs in order to answer the first order question of “does it matter?” and, if the answer is yes,
 - explore more idealized experiments that could help develop pattern scaling methods of those signals and/or guide realistic scenario choices.

Task 1: Experimental design considerations

- **Task 1a: Scenario questions.** Scenarios can serve the purpose of providing climate projections to support a wide range of mitigation, adaptation, and impacts research as part of the SSP/RCP scenario framework, or can be focused on specific research or policy-relevant questions related to the framework. Which scenarios (for example, SSP-RCP combinations) would best serve each purpose?
- **Task 1b: Pattern scaling and emulators.** To what extent can pattern scaling or other forms of climate model output emulation be used to provide climate information for scenarios?
- **Task 1c: Statistical sampling and emergent constraints.** How many models and/or ensemble members do we need to explore?
- **Task 1d: Scenario differences.** How different should scenarios be from each other in terms of emissions, radiative forcing, or climate outcomes (at global, regional, or local levels) in order to merit separate climate model simulations?