Planbureau voor de Leefomgeving

IAM/IAV input to research community scenario design

Co-chairs: Brian O'Neill and Detlef van Vuuren

Objectives session

- Provide an opportunity for discussion of priorities for scenario experiments to be run in the CMIP6 process, as inputs to the AGCI session the next week to continue developing CMIP6.

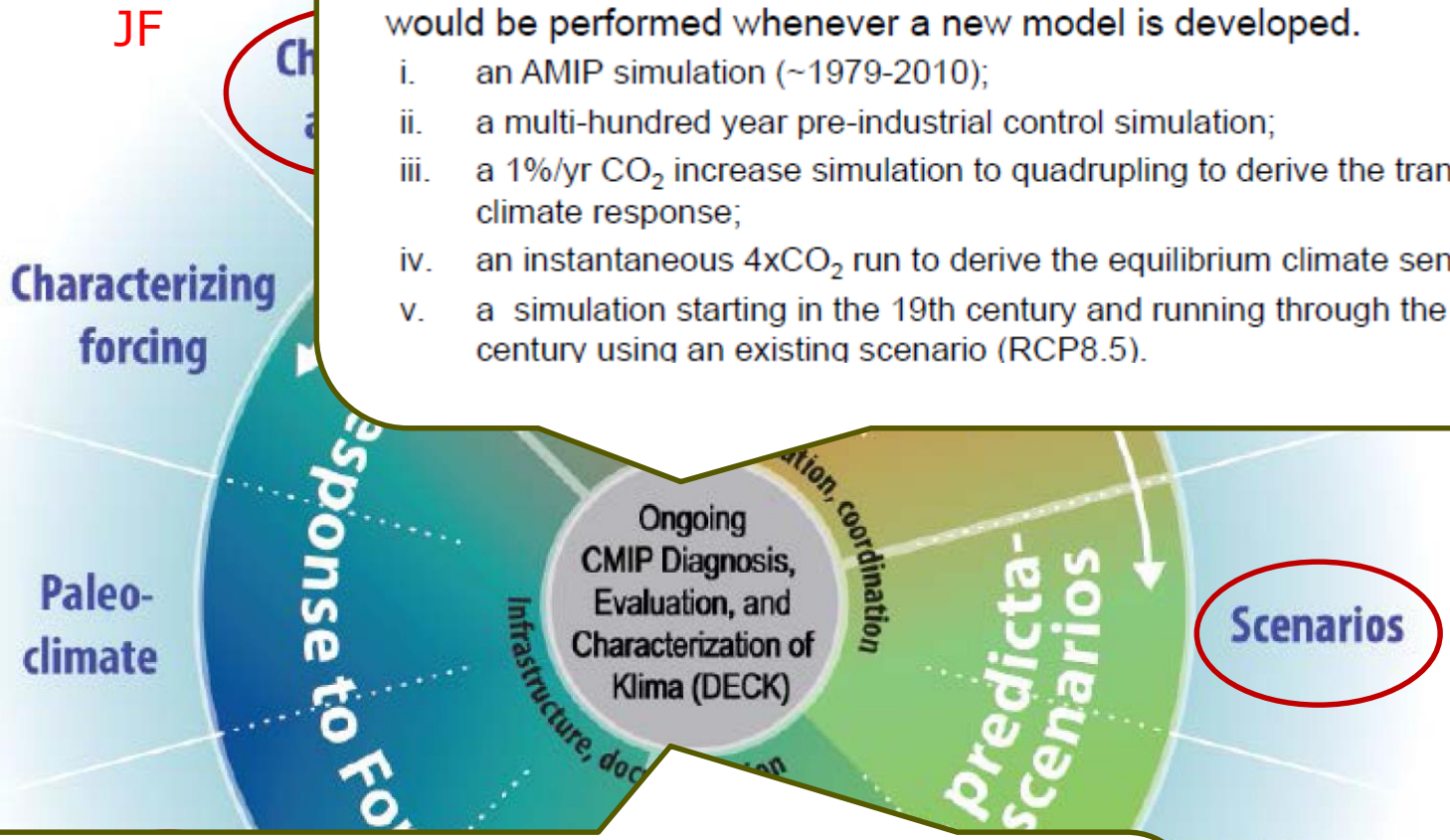
- Among the topics that could be addressed are:
  - Which scenarios should be run by ESM models
  - Would there be advantages to focusing on specific time frames, e.g. to mid-century
  - Would it be especially valueable to improve understanding of particular attributes of climate, e.g. extreme events
  - Is there interest in 'overshoot' or other scenario types?
  - Is there interest in ensembles for the same scenario?

CMIP6

JF

Ongoing CMIP Diagnostic, Evaluation and Characterization of Klima (DECK) experiments: a small set of standardized experiments that would be performed whenever a new model is developed.

i. an AMIP simulation (~1979-2010);
ii. a multi-hundred year pre-industrial control simulation;
iii. a 1%/yr CO_2 increase simulation to quadrupling to derive the transient climate response;
iv. an instantaneous 4xCO_2 run to derive the equilibrium climate sensitivity;
v. a simulation starting in the 19th century and running through the 21st century using an existing scenario (RCP8.5).



- **CMIP6-Endorsed MIPs** would propose additional experiments, and modeling groups could choose a subset of these to run according to their interest, computing and/or human resources and funding constraints.

Kate/George

- The MIPs would also likely have additional experiments that would not be part of CMIP6 but would be of interest and relevant to their respective communities.

World Climate Research Programme

cmip Coupled Model Intercomparison Project

Tasks ScenarioMIP

1. **Define and recommend an experimental design for future scenarios** to be run by climate models as part of CMIP6.
2. **Coordinate the provision of IAM scenario information to climate modeling groups**, including emissions, concentrations, and land use datasets, coordinating with LUMIP, AerChemMIP, C4MIP, the Integrated Assessment Modeling Consortium (IAMC) and other groups as necessary.
3. **Contribute to the coordination of the production of climate model simulations and facilitate provision of output sufficient to support scenario-based research** in the impact/adaptation and integrated assessment communities.

In the short term, propose research plan to CMIP6 panel (this could be the scenario design, but also a process that would lead to a design).

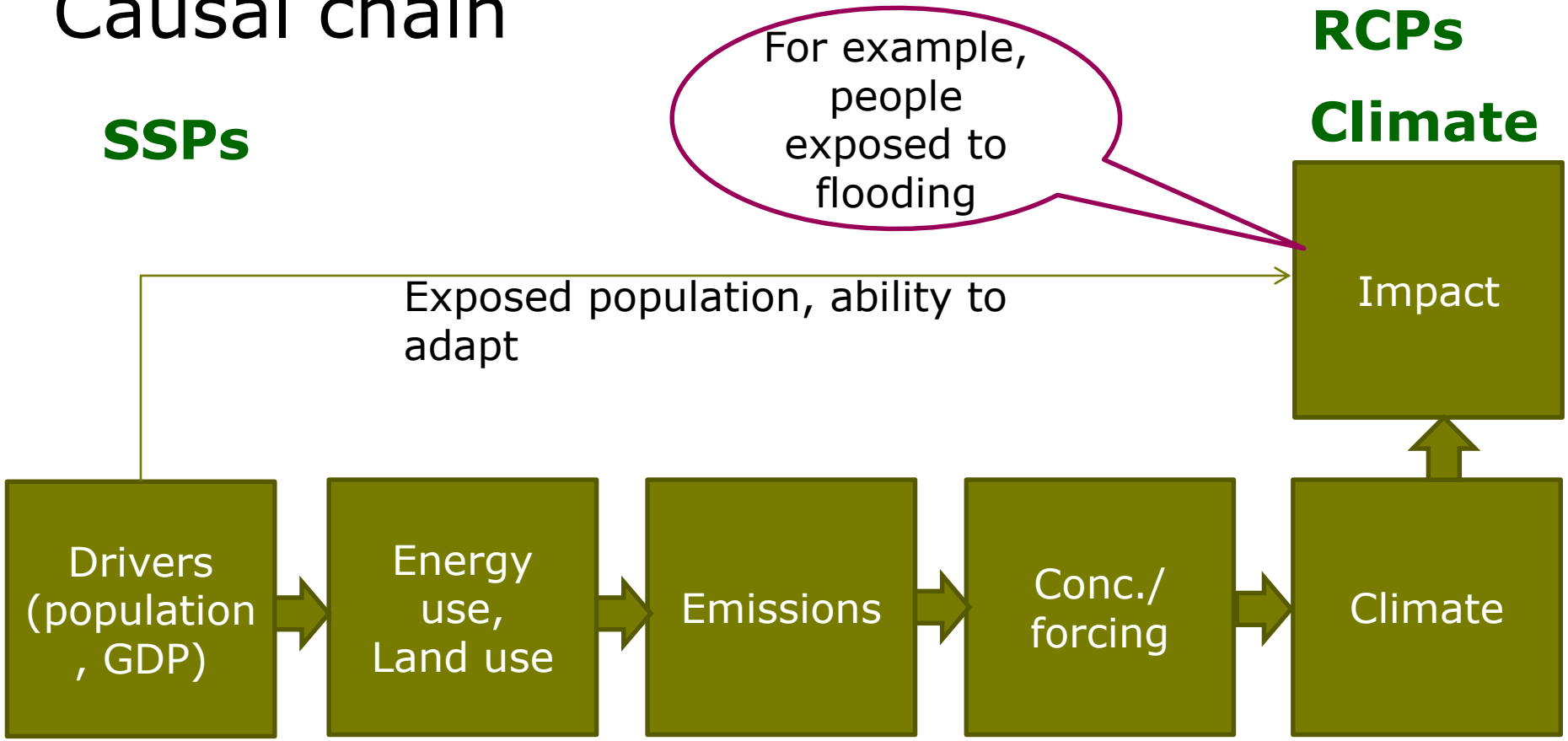
Contact: Brian O'Neill, Claudia Tebaldi, Detlef van Vuuren

More specific guidelines from CMIP6 panel (members)

- Around 4 scenarios (maybe less)
- Clearly motivate choice

- Research questions have been identified for CMIP6: 1) contribute to integrated analysis of impacts and responses, 2) look into short-lived climate forcing and air quality, 3) look into LULCC, 4) look at overshoot, 5)identify climate risk related variability.

Integrated analysis - starting point: Causal chain



The Scenario Matrix Architecture

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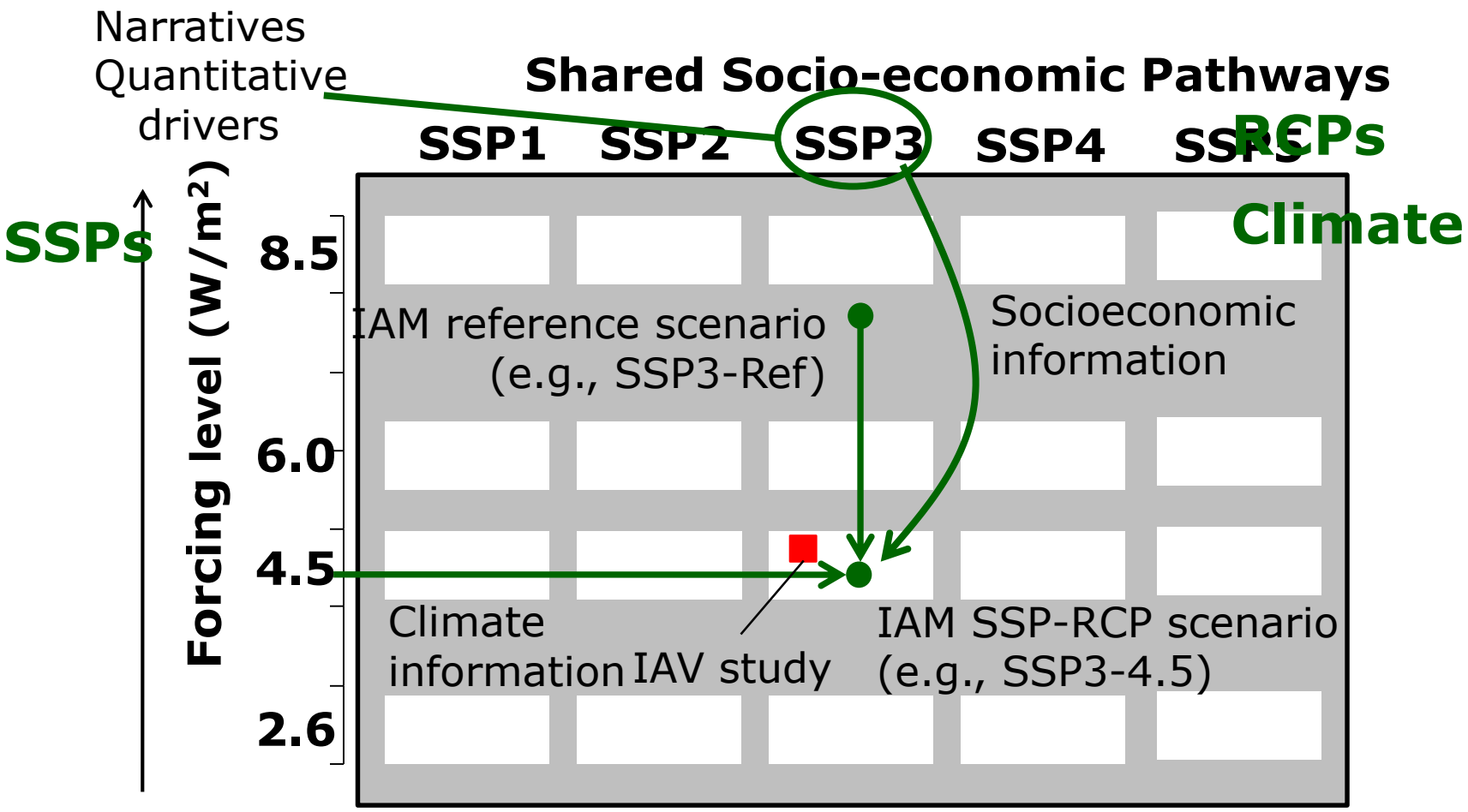

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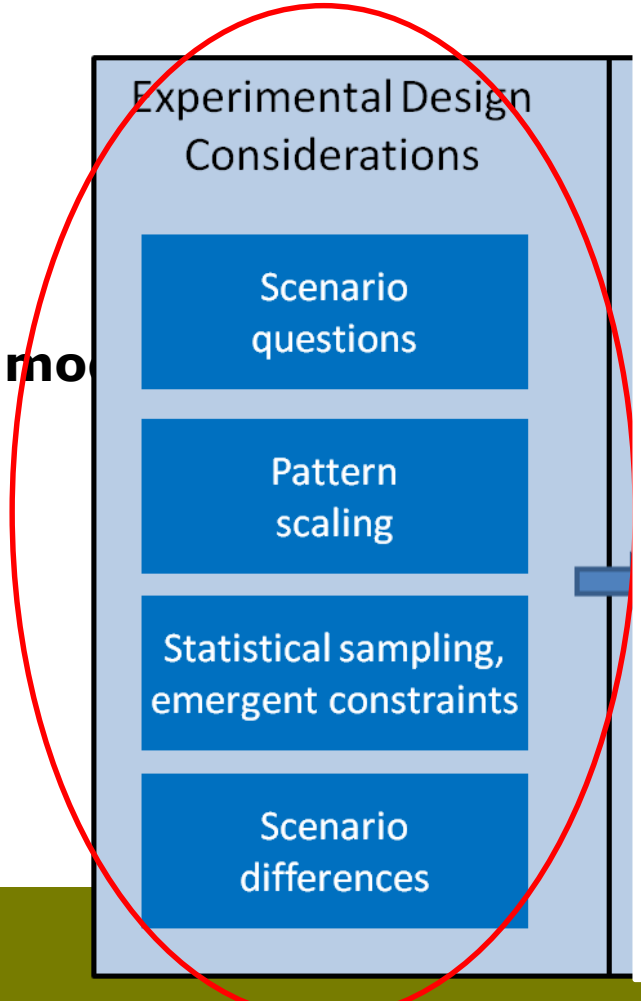
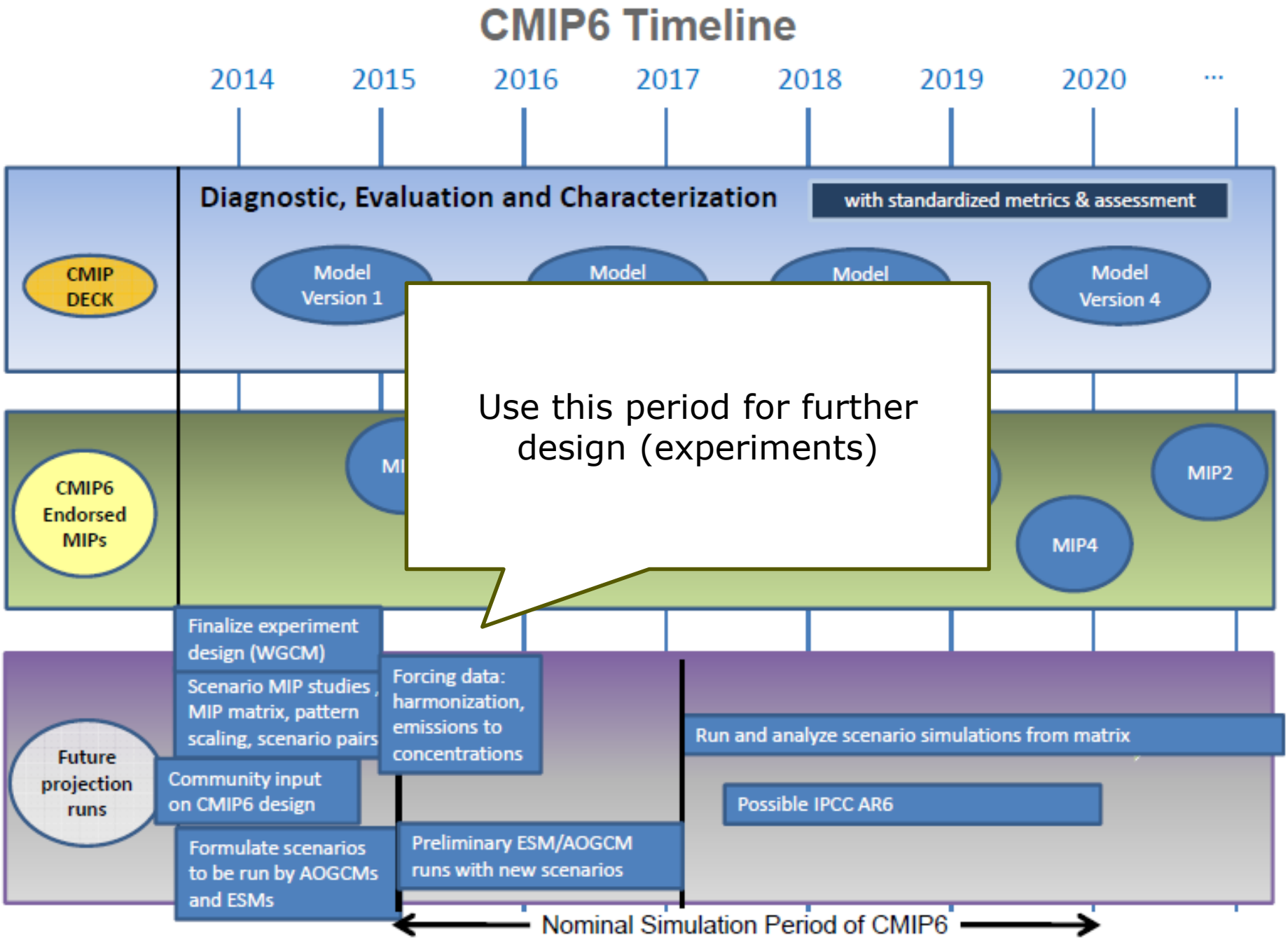


experimental design

Key questions that needed to be answered before design choices could be made:

- What are actually the questions that we are addressing? — Brian
- How important is the range of new scenarios? Could pattern scaling help? — Claudia
- Could statistical sampling help in designing scenarios? — Claudia
- How different would scenarios need to be before there are interesting for climate research? Radiative forcing, land use, air pollution? — Claudia


CMIP6 Timeline
2014
2015
2016
2017
2018
2019
2020
...
Diagnostic, Evaluation and Characterization
with standardized metrics & assessment
CMIP DECK
Model Version 1
Model
Model
Model Version 4
Use this period for further design (experiments)
CMIP6 Endorsed MIPs
MIP2
MIP4
Finalize experiment design (WGCM)
Scenario MIP studies, MIP matrix, pattern scaling, scenario pairs
Forcing data: harmonization, emissions to concentrations
Future projection runs
Community input on CMIP6 design
Run and analyze scenario simulations from matrix
Possible IPCC AR6
Formulate scenarios to be run by AOGCMs and ESMs
Preliminary ESM/AOGCM runs with new scenarios
Nominal Simulation Period of CMIP6

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