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# State of the community driven scenario process: New framework for futurescenario development for the AR5

*SBSTA 36 Research Dialogue*

19 May 2012 | Tom Kram, PBL

DRAFT

# Motivation



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- Noordwijkerhout Parallel Process sought a way to craft NEW storylines & scenarios that could link research products across all three of the research communities.

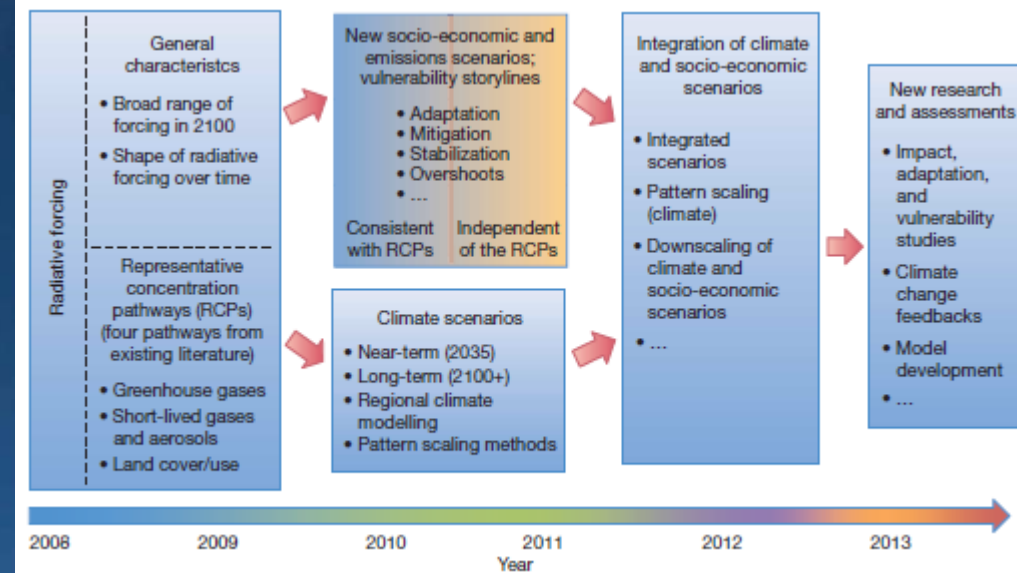
TOWARDS NEW SCENARIOS FOR ANALYSIS OF EMISSIONS, CLIMATE CHANGE, IMPACTS, AND RESPONSE STRATEGIES

## TOWARDS NEW SCENARIOS FOR ANALYSIS OF EMISSIONS, CLIMATE CHANGE, IMPACTS, AND RESPONSE STRATEGIES

IPCC EXPERT MEETING REPORT  
19–21 September, 2007  
Noordwijkerhout, The Netherlands

Intergovernmental Panel on Climate Change  
WMO

UNEP

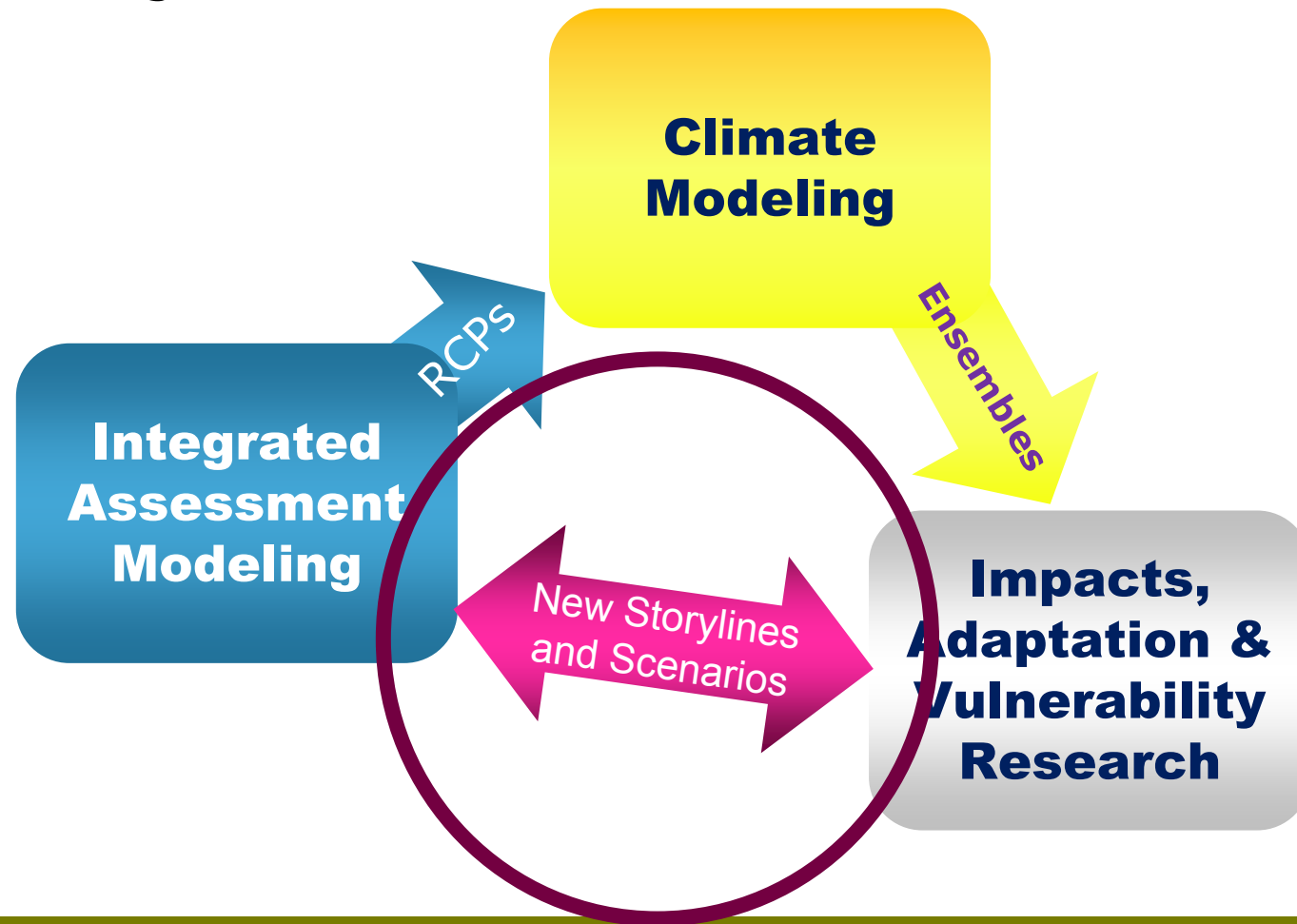


# Exchange between communities



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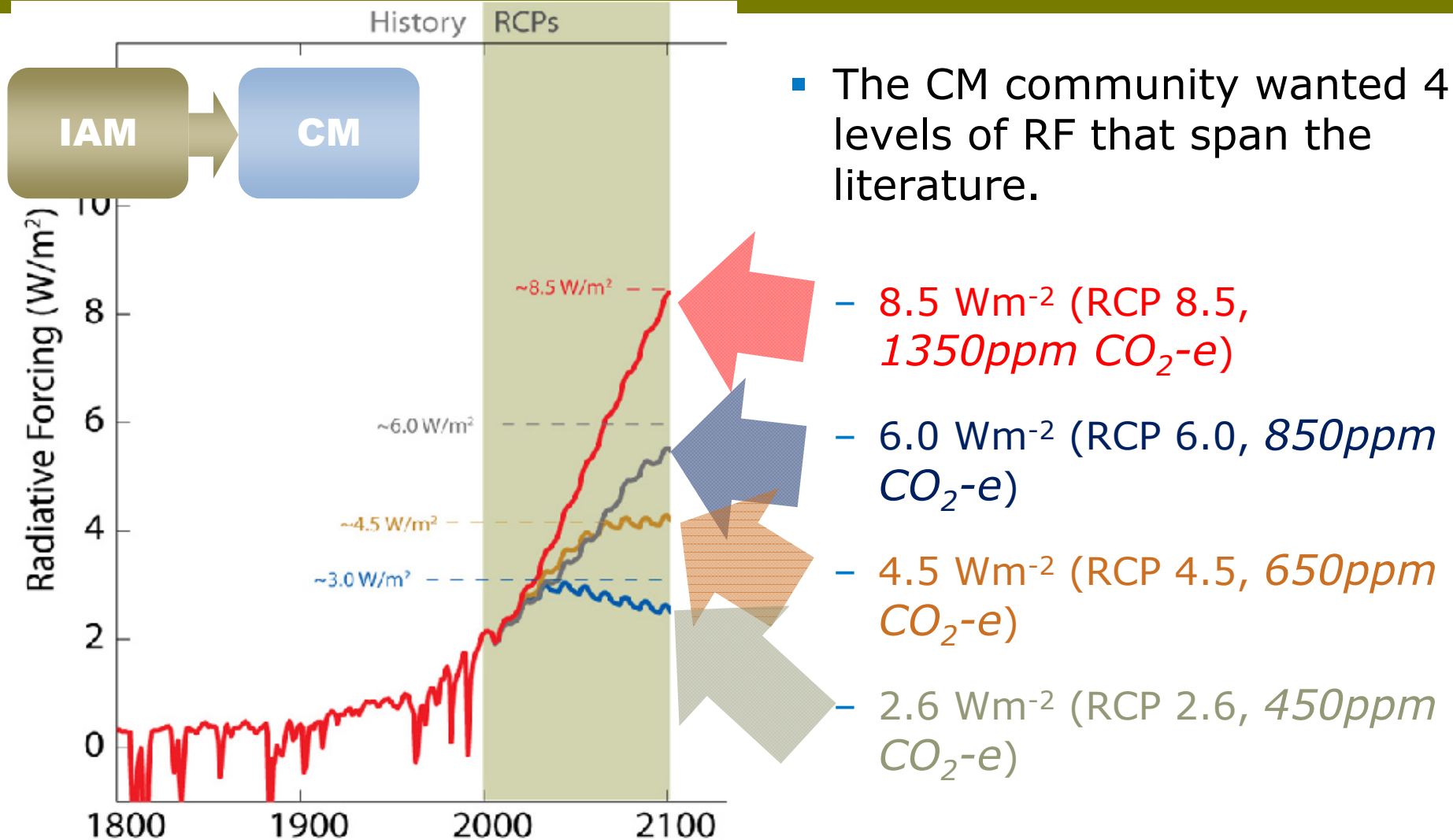
- Better climate assessment; and better assessment in general.
- Adding a new dimension to link IAM, IAV and CM.



# RCPs: from IAM to CM



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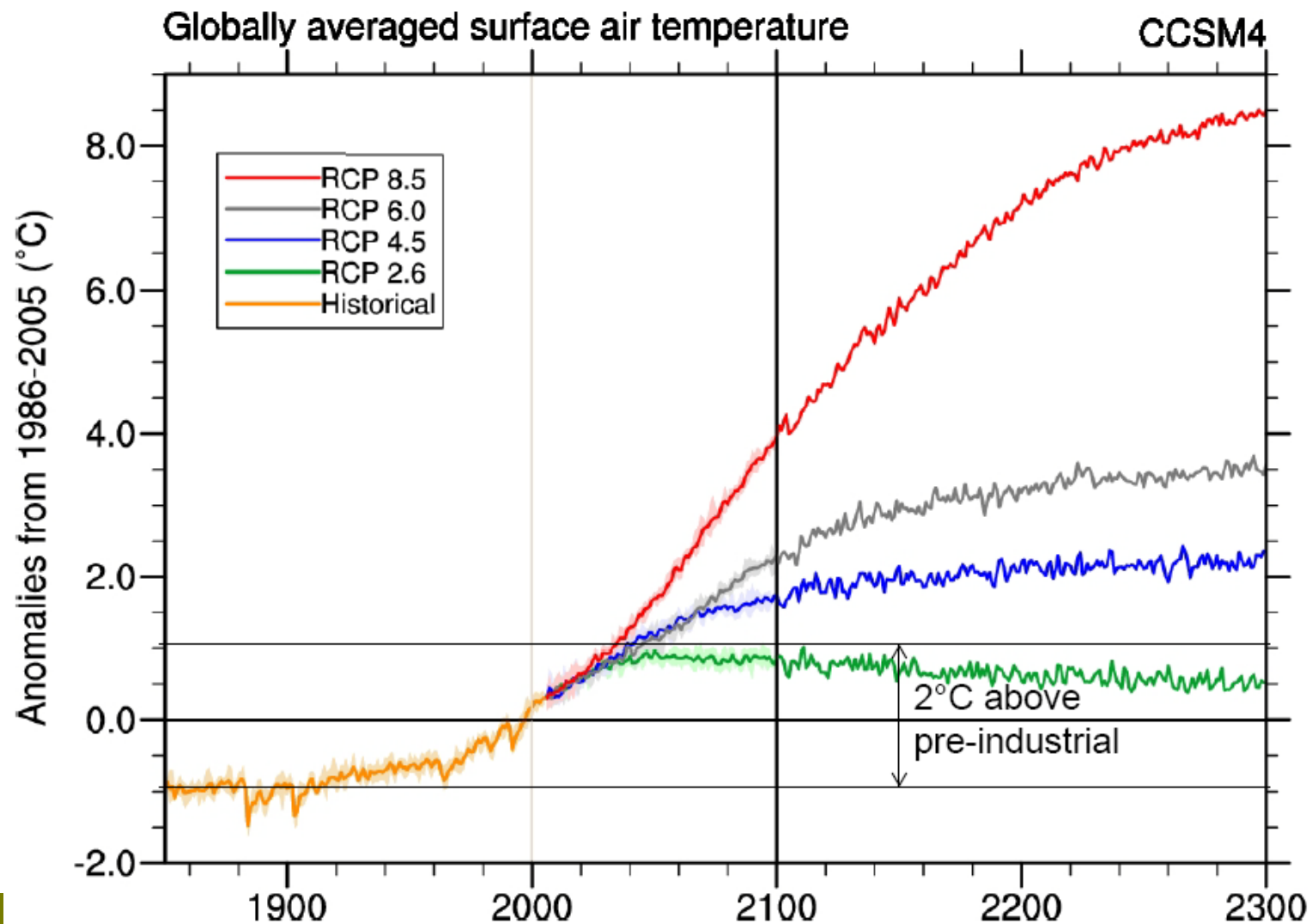


# First results from CM



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Results from CMIP5 experiments from CCSM4 at NCAR



(Meehl et al., 2011, J. Climate)

# Timeline of SSP development



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Nov. 2010: IPCC Workshop on Socioeconomic Scenarios, Berlin

Jul. 2011: Meeting on Shared Socioeconomic Pathways, Changwon City

*Aug. 2011: Draft Framework Paper posted (review by Oct; currently under revision)*

Oct. 2011: IAMC preliminary intercomparison of SSP storylines and model runs, Laxenburg

Nov. 2011: Workshop on Socioeconomic Pathways, Boulder, CO

*Dec. 2011: Formation of Joint IAV/IAM committee on SSP development and application (co-chairs Richard Moss Tom Kram)*

Jan. 2012: SSP quantification meeting, Utrecht

**May 2012: Meeting on New Socioeconomic Pathways for Climate Change Research, the Hague**



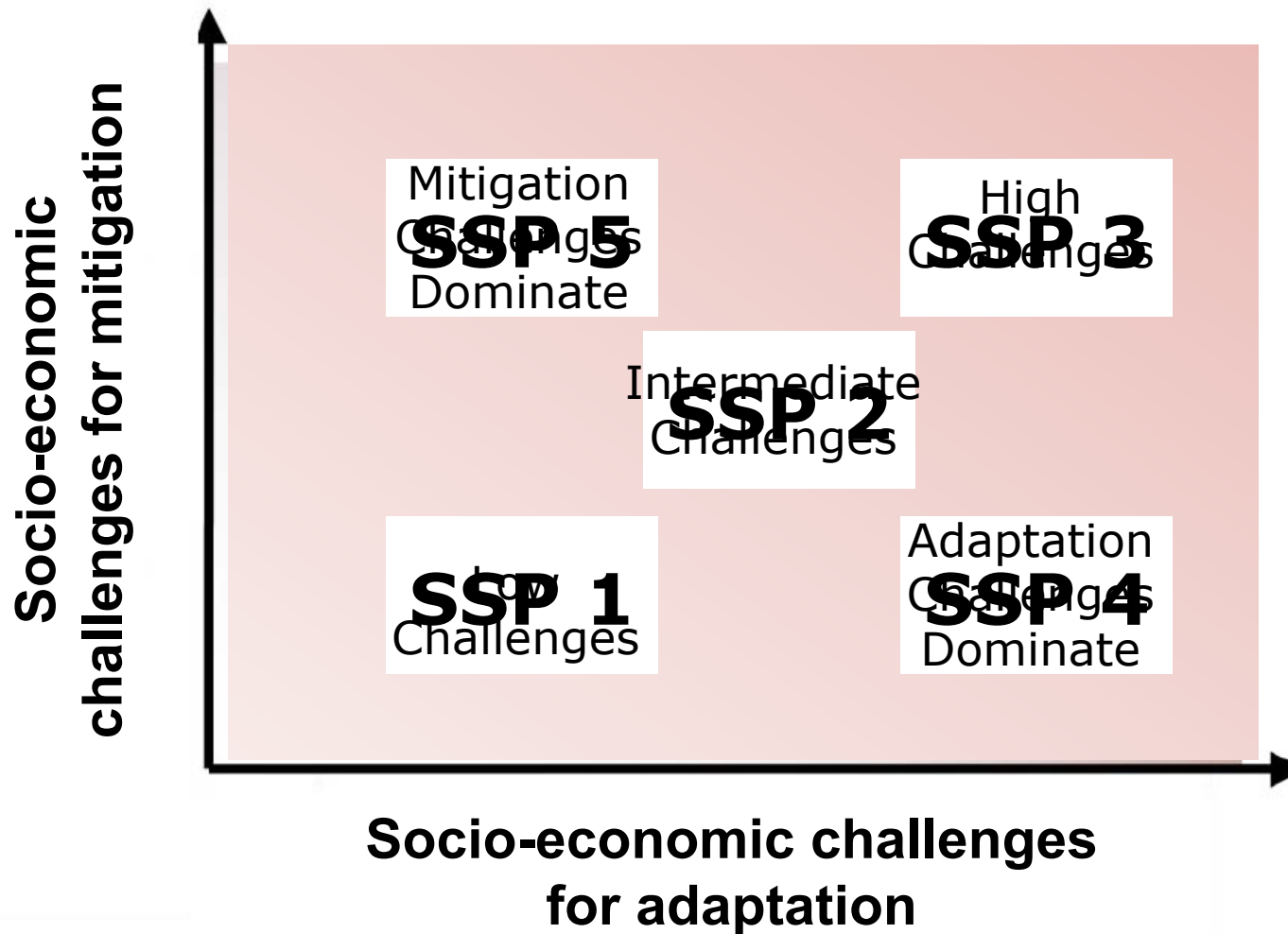
- **Defines the direction for new scenario development to explore scenario uncertainty** in terms of:
  - **SOCIOECONOMIC CHALLENGES TO MITIGATION; AND**
  - **SOCIOECONOMIC CHALLENGES TO ADAPTATION**
- **Designs a Linkage** from new (SSP-based) scenarios to the Climate Model community's RCP-based ensembles for new research.
- **Creates an intellectual framework in which to categorize scenarios** along the two lines of uncertainty; to test whether or not SSPs really do produce scenarios of the desired character, and to test the ongoing work.

[http://www.isp.ucar.edu/sites/default/files/Scenario\\_FrameworkPaper\\_15aug11\\_0.pdf](http://www.isp.ucar.edu/sites/default/files/Scenario_FrameworkPaper_15aug11_0.pdf)

# SSP Logic

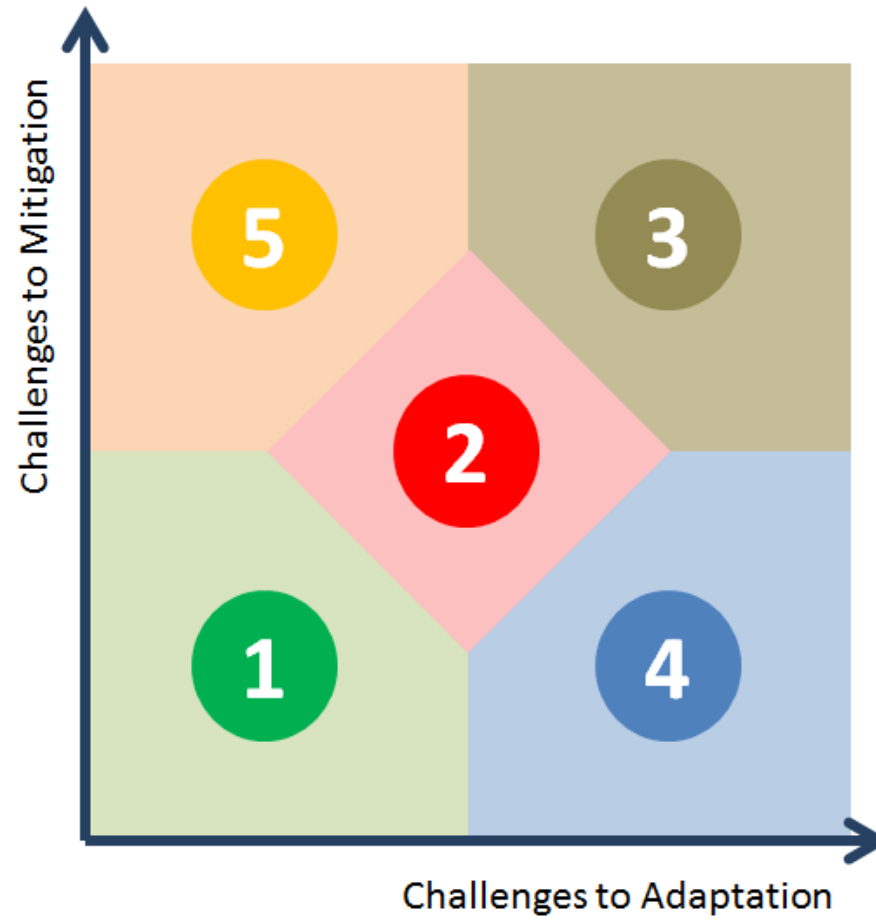


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Source: Brian O'Neill, Presentation, "Introduction to the Shared Socio-economic Pathways (SSPs)", this workshop



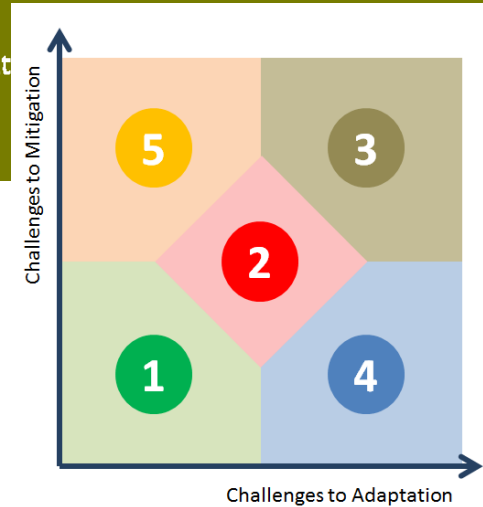


# SSPs have three elements



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**Storyline:** a verbal description of the state of the world. All non-quantitative aspects of the scenario are included here



## IAM Quantitative Variables

define IAM reference “no-climate-policy” scenario inputs. E.g. reference population by region by year, GDP, Technology, etc.

Note: SSPs specify only pathways for quantitative input assumptions used by IAMs. They do NOT include IAM outputs.

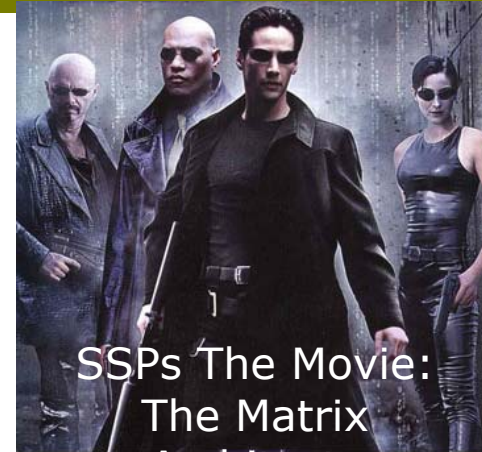
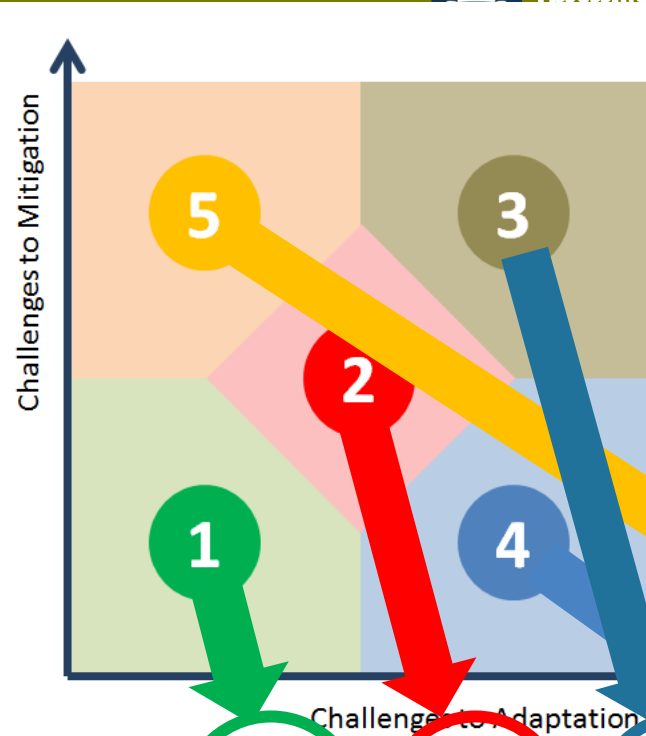
## Non-IAM Quantitative Variables

define reference “no-climate-policy” scenario, but are not IAM drivers. E.g. governance index or ecosystem productivity and sensitivity.

# Into the Matrix: SSPs and RCPs



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		SSP 1	SSP 2	SSP 3	SSP 4	SSP 5
	Reference	X	X	X	X	X
SPAS Forcing/CC	8.5 Wm <sup>-2</sup>			X		
	6.0 Wm <sup>-2</sup>		X	X	X	X
	4.5 Wm <sup>-2</sup>	X	X	X	X	X
	2.6 Wm <sup>-2</sup>	X	X		X	



## SSP status and plans as of 16 May 2012

- General
  - Ad-Hoc JIIC to continue coordination
  - Extended membership (notably IAV and DC/Emerging)
- Narratives
  - Drafts in Boulder Report, under review
  - Plus: filling gaps, extensions: short term, scales, uses/users, governance, “shocks”?
- SSP key variables quantification
  - Initial set (Pop, GDP, Urbanization) open for review
  - Tests with IAM models started, hand-off to ISI-MIP and AG-MIP
  - Shorter term points/corridors?
- IAM SSP assumptions
  - Under development & testing; internal review -> open review



## SSP status and plans as of 16 May 2012/cont'd

- Nested scale applications and tools
  - Group launched in the Hague, incl. downscaling
- Improve communication
  - Within research communities
  - To “outside” world
- IAV quantification and metrics
  - Expanded list of topics/activities in the Hague
- SPA: Shared (climate) Policy Assumptions
  - Small SPA set for mitigation (EMF, others)
  - Explore adaptation policies for SPAs
- Matching RCPs and SSPs
  - Examples and priorities for uses/users
  - Facilitating data distribution (with DDC – TGICA)



## Prospects for IPCC AR5

- New GCM/ESM ensemble runs using RCPs
- Full set of IAM model runs combining SSPs and RCPs
- IAV model intercomparisons using SSPs: ISI-MIP, AG-MIP, (possibly WWAP, others?).
- 'Binning' in WGII and WGIII AR5 Reports
  
- And a long list for post-AR5. . . . .



# Thank you

# Shared Socioeconomic Pathways (SSPs)



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- Are a set of reference, no climate policy pathways consisting of **1. Storylines**, **2. IAM inputs**, and **3. non-IAM quantitative variables**, potentially usable as reference points for new IAM and IAV research.
- A set of points of reference for creating RCP replications—and therefore of linking a variety of socioeconomic scenarios with the ensemble calculations created by the climate modelers for CMIP5 from 4 original RCPs.
- Provide a framework for organizing new **and existing** scenarios in terms of their socioeconomic **challenges to adaptation and mitigation** and for testing our work.

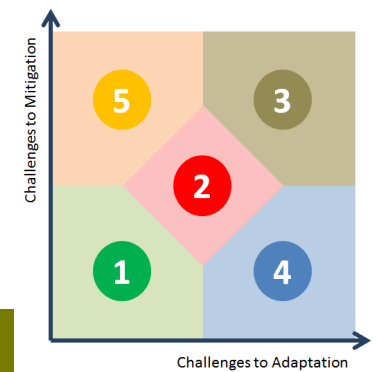
**Storyline:** The storyline is a verbal description of the scenario. All non-quantitative aspects of the scenario are included in the storyline.

**IAM Quantitative Variables** that define IAM reference "no-climate-policy" scenario. E.g. reference scenario population by region by year. Energy prices.

**Non-IAM Quantitative Variables** that define reference "no-climate-policy" scenario, but which are not IAM drivers. E.g. governance index or ecosystem productivity and sensitivity.

SPAs

		SSP 1	SSP 2	SSP 3	SSP 4	SSP 5
Reference		X	X	X	X	X
RCP Replication	8.5 Wm <sup>-2</sup>			X		
	6.0 Wm <sup>-2</sup>		X	X	X	X
	4.5 Wm <sup>-2</sup>	X	X	X	X	X
	2.6 Wm <sup>-2</sup>	X	X		X	





# From SSPs to a Scenario



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## Elements of an SSP

**Storyline:** The storyline is a verbal description of the state of the world. All non-quantitative aspects of the scenario are included in the storyline.

**IAM Quantitative Variables** that define IAM reference “no-climate-policy” scenario inputs. E.g. reference scenario population by region by year. GDP, Technology Availability.

**Non-IAM Quantitative Variables** that define reference “no-climate-policy” scenario, but which are not IAM drivers. E.g. governance index or ecosystem productivity and sensitivity.

IAM Brand X

## Outputs of IAMs

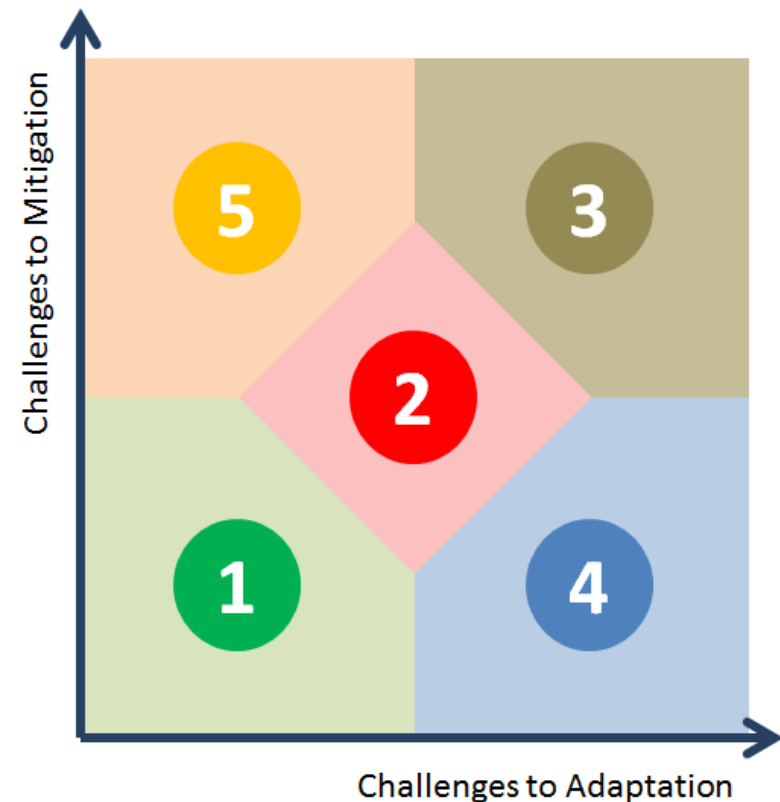


# The Sorting Function of the SSP Framework



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- In the AR5 there will be lots of scenarios, and most of them will not be new SSPs.
- The SSP Framework can be useful to us in thinking about how to identify comparable scenarios.
- ▶ **This could be called the “Sorting Function” of the SSPs**
- ▶ ANYTHING that has high challenges to mitigation and adaptation belongs in Domain 3.
- ▶ **How to define the boundaries between SSPs?**

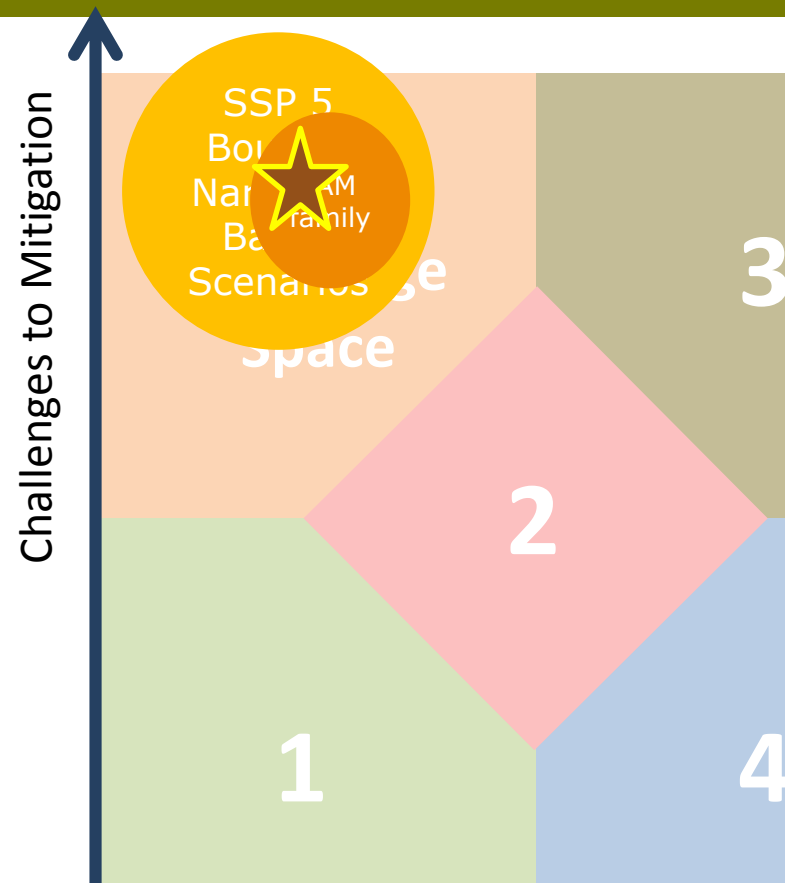


# Exactly which SSP5 did you mean? Or, was that SP5?



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- Any scenario that exhibits high challenges to mitigation, but low challenges to adaptation, regardless of who or how it was crafted, is an element of the SSP 5 Challenge Space, but is an SP, not SSP.
- Any scenario that was build using the Boulder SSP5 **narrative storyline** would be a member of a narrower set of scenarios in the SSP 5 challenge space.
- Any scenario that used the Boulder SSP narrative storyline, AND a common set of **quantitative IAM inputs**, e.g. population, econ. and tech., plus would be a member of an even narrower subset of the SSP 5 challenge space.



- We might choose one **Representative Scenario Based on SSP5.** ★