



SCENARIO ANALYSIS

Prof. Dr. Rik Leemans
Environmental Systems Analysis

Scenarios are approaches to assess the future



An example: Shell Oil

In 1970, world oil prices were low and expected to remain so.

Shell scenario planners thought a rise in prices was likely, but were unsure of how this rise would occur - **traditional forecasting approaches were inappropriate.**

They identified a number of tensions and limits to production in oil-producing countries and concluded that at some volume of product, oil was more valuable kept in the ground than sold.

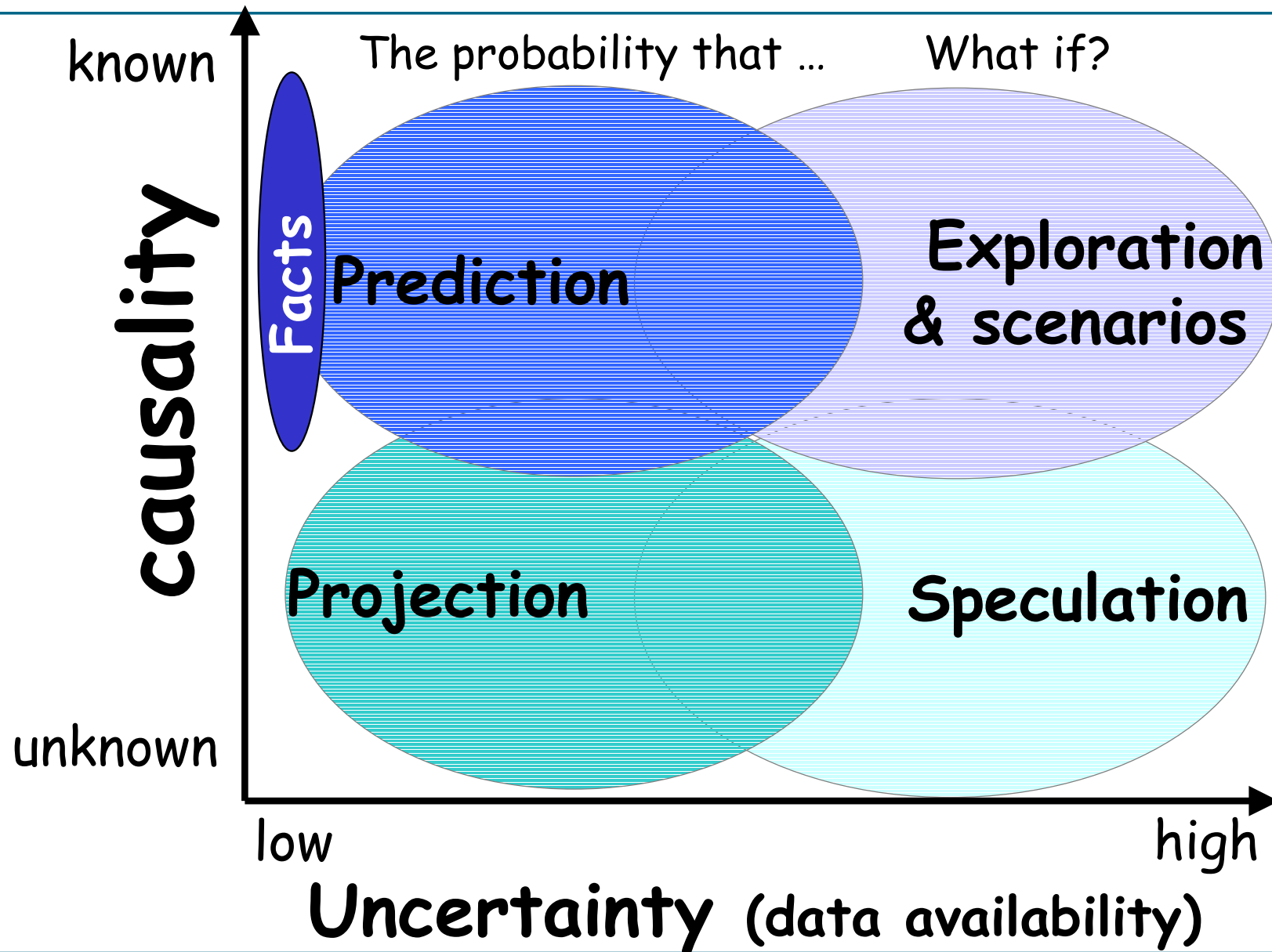
One of their scenarios envisioned a world in which a coalition of oil exporting countries was able to limit production. This scenario was considered radical, but it was plausible or not implausible.

The scenario planning exercise led Shell to adjust its business management practices to hedge against the potential for high oil prices by increasing the efficiency of its refining and shipping operations.

An example: Shell Oil & the events

- ✓ OPEC cartel was formed in 1972; oil prices rose rapidly - an unexpected shock to the global oil market.
- ✓ Shell's changes to its business practices, and its willingness to accept changes in oil prices as permanent, allowed it to adapt to a world of expensive oil much faster than its competitors.

Scenarios, predictions & projections?



All scenario definitions include:

- ✓ Scenarios are *hypothetical*, describing possible future pathways
- ✓ Scenarios describe *dynamic processes*, representing sequences of events over a period of time
- ✓ Scenarios consist of *states, driving forces, events, consequences and actions*, which are causally related
- ✓ Scenarios start from an *initial or desired* state, depicting a *final state or path* at a fixed time horizon.

Scenario methods

✓ Judgmental methods

- ❑ the values forecasted are from individual (expert) opinions

✓ Extrapolative methods

- ❑ based on data about the past values of the forecasted variable
- ❑ assumption: future will evolve in accordance with the pattern of historical behavior

✓ Causal and mathematical models

- ❑ for instance: linear single-equation regression model
- ❑ many other "causal" models: system-dynamics models, input-output models, mathematical programming models, etc.

Examples of scenario studies throughout the centuries

Malthus	'Essay on the Principle of population'	1798
George	'Progress and Poverty'	1879
Boserup	'The conditions of Agricultural Growth'	1965
The Club of Rome	'Limits to the Growth'	1972
OECD	'INTERFUTURES'	1979
Berendt <i>et al.</i>	'Global 2000 report to the President'	1980
Brundtland Commission	'Our Common Future'	1987
Meadows <i>et al.</i>	'Beyond the limits'	1992
WRR	'Ground for choices'	1992
FAO	'Agriculture towards 2010'	1995
UNEP	'Global Environmental Outlook'	1999
IPCC	'SRES'	2000
WSG	The Great transition	2001
Millennium Assessment	Ecosystem services & human well-being	2005

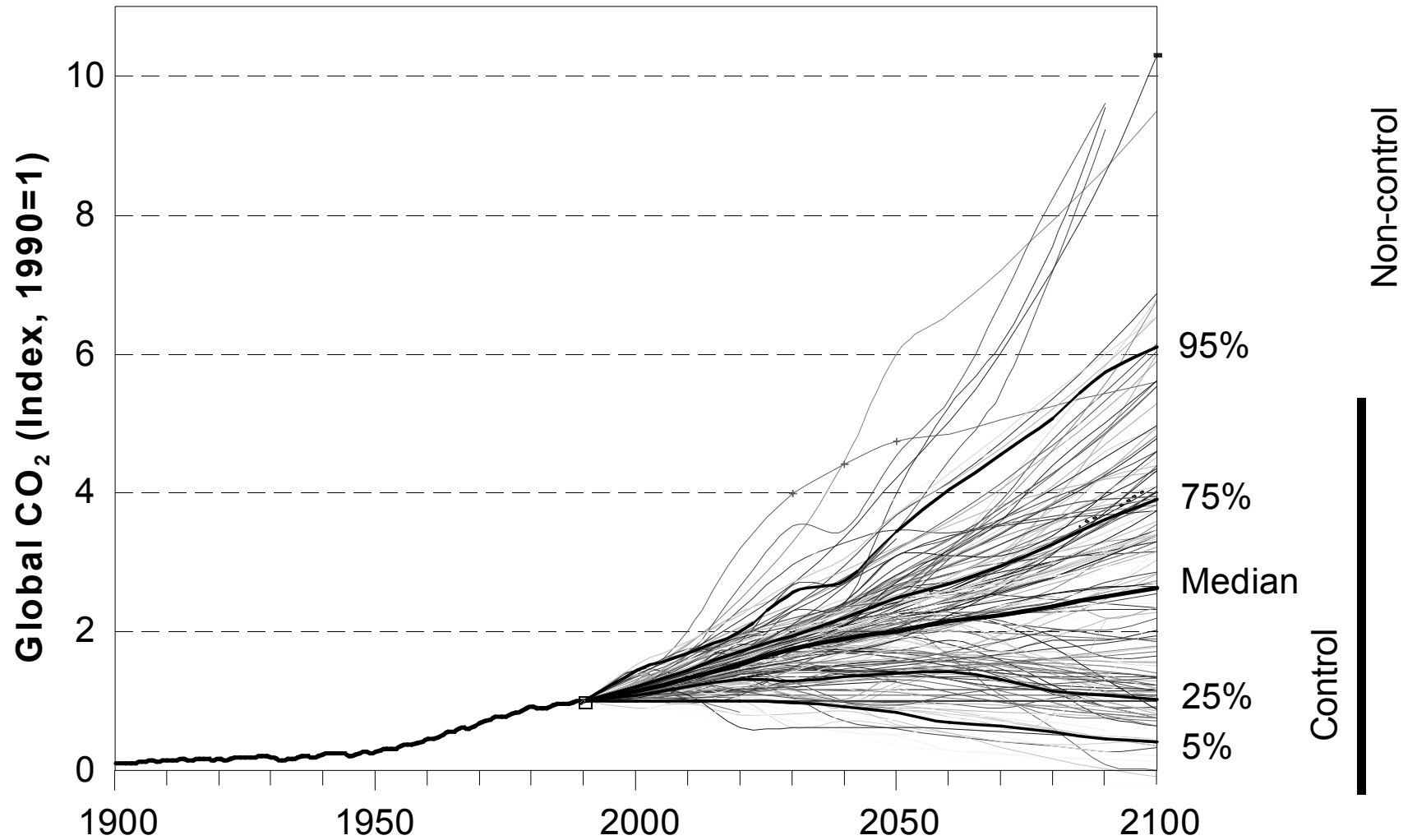
Types of scenarios

1. Qualitative or quantitative
 - ❑ Narrative and storylines
 - ❑ Specifying assumptions
 - ❑ Data needs and model development
2. Exploratory or Anticipatory
 - ❑ Speculation or precision
 - ❑ Extrapolation or simulation
 - ❑ End states - maybe as for the Millennium Development goals (i.e. normative)
 - ❑ Where and when are the branching points
3. Baseline or Policy
4. Expert-based or participatory

Traditional scenario development

- ✓ Use of expert judgment for the most likely future development of driving forces
- ✓ Limited consistency between driving forces
- ✓ Use of simple aggregated models to quantify the consequences of these drivers
- ✓ Neglecting important interactions and feedbacks

Available emission scenarios





Suddenly, Bob realizes that he's "part of the problem"

The South African Mont Fleur project: involving stakeholders

- ✓ Mont Fleur was intended to influence the future of South Africa through the development of several scenarios about how things might unfold over the coming decades
- ✓ The project took place right in the middle of a complex period of many kinds of negotiations about how to make the transition away from apartheid
- ✓ The Mont Fleur work was done by a team of leaders drawn from organizations that ranged across the political map: community activists, conservative politicians, ANC officials, trade unionists, academics, establishment economists, top corporate executives

Adam Kahane, Generon

The Mont Fleur scenarios

- ✓ ***Ostrich*** was a story of the white government believing that it could avoid a negotiated settlement with the black majority, burying its head in the sand, and thereby making matters worse in the end
- ✓ ***Lame Duck*** told the story of a prolonged transition where the new government is hobbled by compromises built into the constitution and, because "it purports to respond to all but satisfies none", it doesn't address the country's problems
- ✓ ***Icarus*** described a strong black majority government coming to power on a wave of popular support and embarking on a huge, unsustainable public spending spree that crashes the economy
- ✓ ***Flight of the Flamingos*** was a story about how the new government could avoid the pitfalls of the first three scenarios and gradually rebuild a successful economy

Summary of scenario development

- ✓ From narrow, disciplinary-based projections to multi-disciplinary integrated approaches
- ✓ From solely quantitative approaches with simulation models to comprehensive approaches with detailed qualitative narratives
- ✓ From "likely futures" to important lessons
- ✓ From expert-based to stakeholder involvement

The scientific discussion on the domain, value and likelihood of scenarios continues

One of the reasons the future is unpredictable is because we can influence it!
