

Consistency Between the Storylines and Quantification

Second Scenario Analysis Meeting
Hofgeismar by Kassel
5-7 February, 2007

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Going from Storylines to Models



“Economic growth
is *medium*”

“Expert judgement”

Economic growth
= 3 % per year

- Not transparent
- Not reproducible
- May not reflect the intention or meaning of the storyline-developers

Going from Storylines to Models



“Economic growth is *medium*”

“Matching”

Economic growth = 3 % per year

small	1% per yr
medium	3 % per yr
large	5% per yr

- Agree on numbers?
- Exactness not consistent with use of words “small”, “medium”, “large”.

Going from Storylines to Models



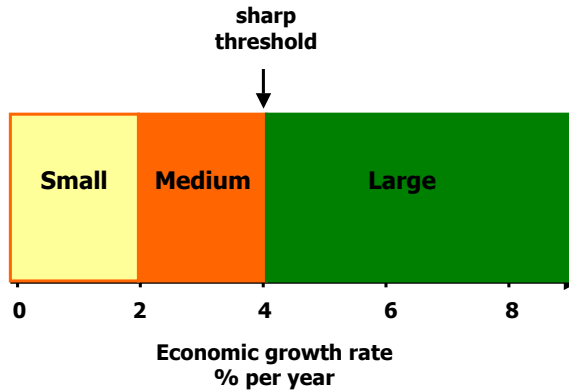
“Economic growth is *medium*”

Ranges/Thresholds

?

small	0 to 2 % per yr
medium	2 to 4 % per yr
large	> 4% per yr

Sharp Thresholds → Binary Logic



Going from Storylines to Models



“Economic growth is *medium*”

Ranges/Thresholds

?

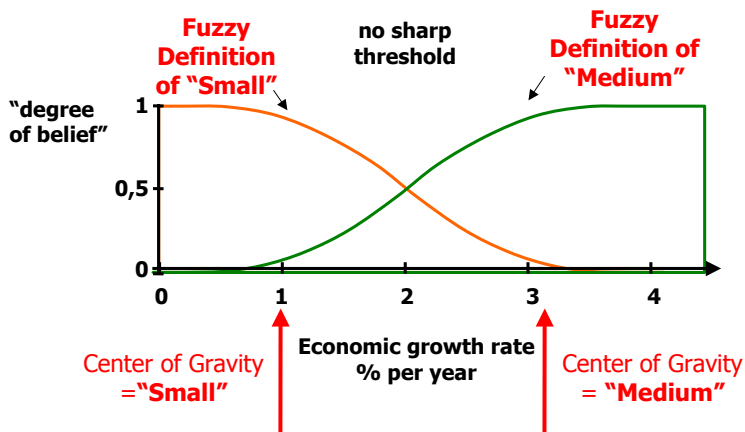
small 0 to 2 % per yr
medium 2 to 4 % per yr
large > 4% per yr

- Sharp thresholds, not realistic
- Agree on ranges?
- Does not provide a single number

Going from Storylines to Models



Fuzzy Logic Membership Functions – “Degree of Belief”



Questionnaire

Average annual rate of economic growth (% per year)

Small decrease	Small increase	Medium increase	High increase	Very high Increase
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

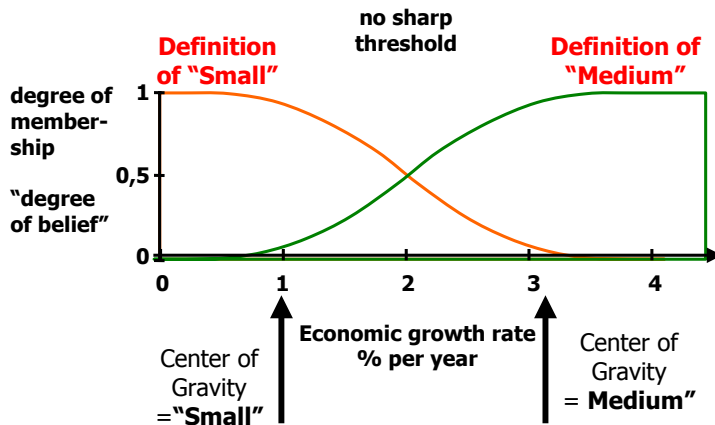
Questionnaire

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Small decrease	Small increase	Medium increase	High increase	Very high Increase
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<input type="checkbox"/> -2	<input type="checkbox"/> 0	<input type="checkbox"/> 2	<input type="checkbox"/> 4	<input type="checkbox"/> 6	<input type="checkbox"/> 8
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Fuzzy Logic – Membership Functions



Going from Storylines to Models



"Economic growth is *medium*"

"Fuzzy Sets"

Economic growth = 3 % per year

- Produces numerical data needed for models.
- Do not have to agree on boundaries of "small", "medium", etc. (fuzzy boundaries).
- Can represent many different views in definitions of "small", etc
- Translation from words to numbers is transparent.

Procedure – Going from Storylines to Models

Step 1

You (the stakeholders) should continue to specify in words how driving forces are changing in the storylines: "Economic growth is medium (small, large)".

Step 2

In a break-out group, define what **you** mean (in numbers) by "small", "medium", "large" economic growth, etc. → please fill out questionnaire.

Step 3

Based on questionnaire results → Scenario Team summarizes stakeholder opinions about meaning of "small economic growth", "medium economic growth", etc. into fuzzy set "membership functions".

Step 4

Using the fuzzy set "membership functions". → Support Team converts statements from storylines (e.g. "economic growth has medium increase") consistently into numbers for model input → Run models.

Result

The opinions of the stakeholders are represented more directly and transparently in the model calculations → **Storylines and models more consistent and rich.** ♦



GLOWA – Jordan River

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Federal Ministry
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and Research

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