

Modelling the Dynamics of our Common Future

Sustainability Simulation in the TERRA2000 Project

Presented by

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Prepared by

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- ➔ **The TERRA-2000 project**
- ➔ The Insight for TERRA (IfT) model
- ➔ Some Simulation Results
- ➔ Conclusions

The TERRA-2000 Project

<http://www.terra-2000.org>

IST-2000-26332

- ➔ Goal: Make policy recommendation concerning the transition to the GNKS
- ➔ Type of project
 - multidisciplinary
 - international
- ➔ Structure of TERRA 2000
 - » Modelling-pillar
 - » Scenario-pillar
 - » Dissemination-pillar

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Why Create Dynamic Models?

1. To understand the dynamics of complex system
2. To check coherence of
 - a. assumptions of causality
 - b. definitions of variables
3. To assess the future (threats & opportunities)
4. To evaluate policy alternatives
5. To communicate with others

Insight for TERRA: What?

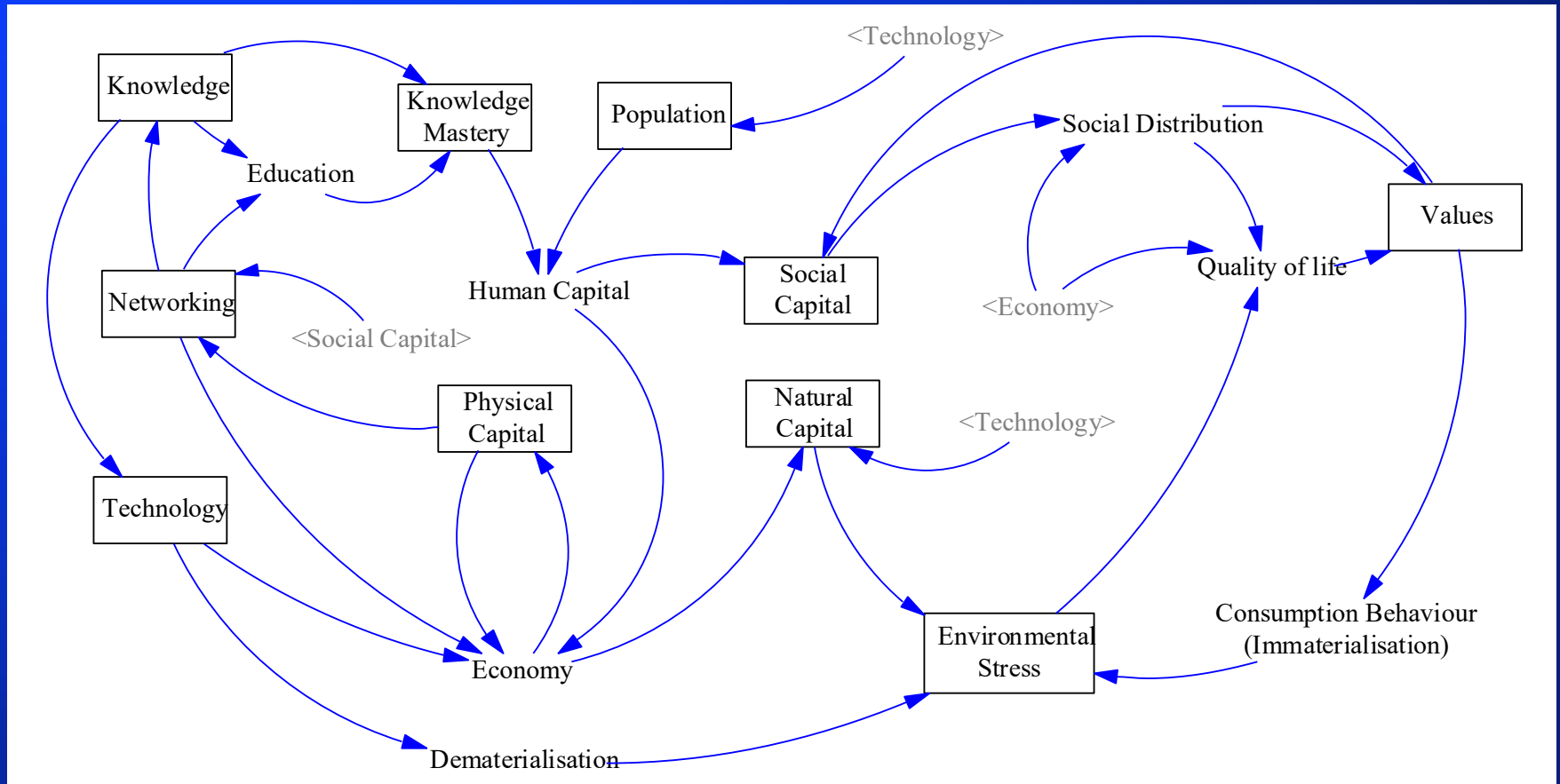
- ➔ A complement to the World3 model
- ➔ A global “simple” model - fitting in a multi-level modelling framework
- ➔ Modelling of the transition to GNKS (Global Networked Knowledge Society)
 - explicit representation of Networking
 - explicit representation of Knowledge (& Knowledge Growth)
- ➔ Sustainability indicators on all dimensions
 - economic
 - social
 - ecologic

A complement to World3: Why?

- ➔ Insight for TERRA includes Representation of
 - Social Dimension
 - Governance
 - Networking

- ➔ Further Development has to include
 - Regionalisation
 - Cultural Dimension

Dominant Relations



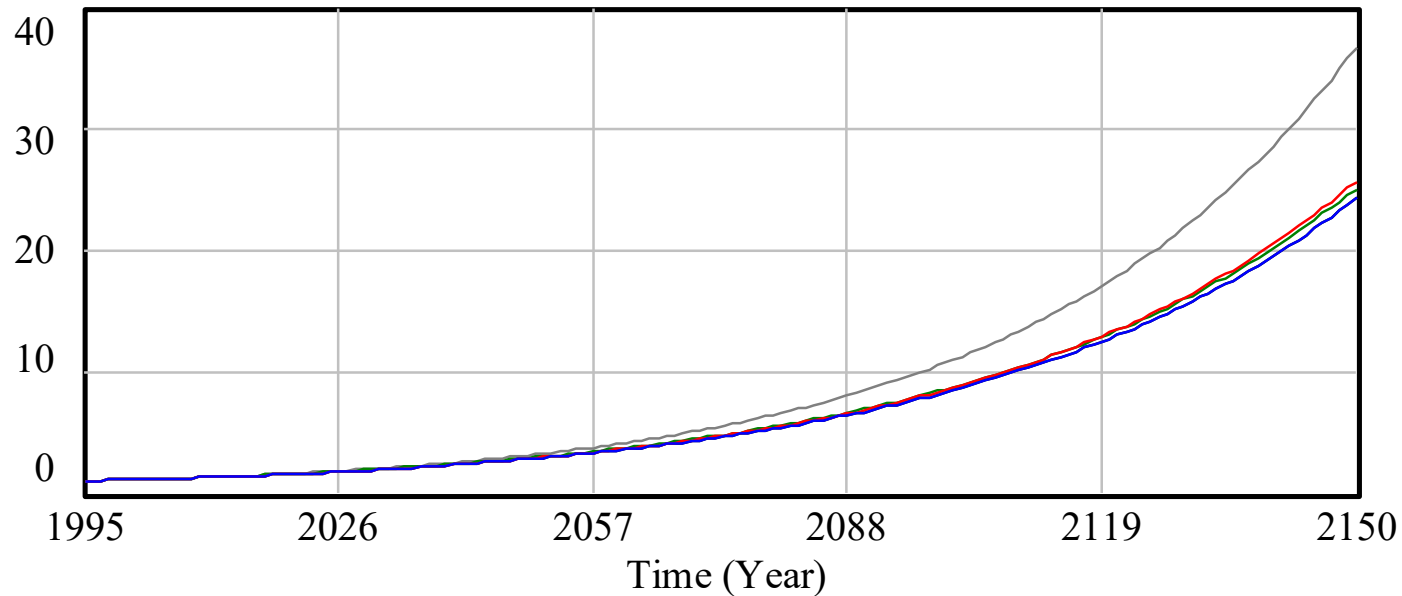
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Scenario 1: More R&D

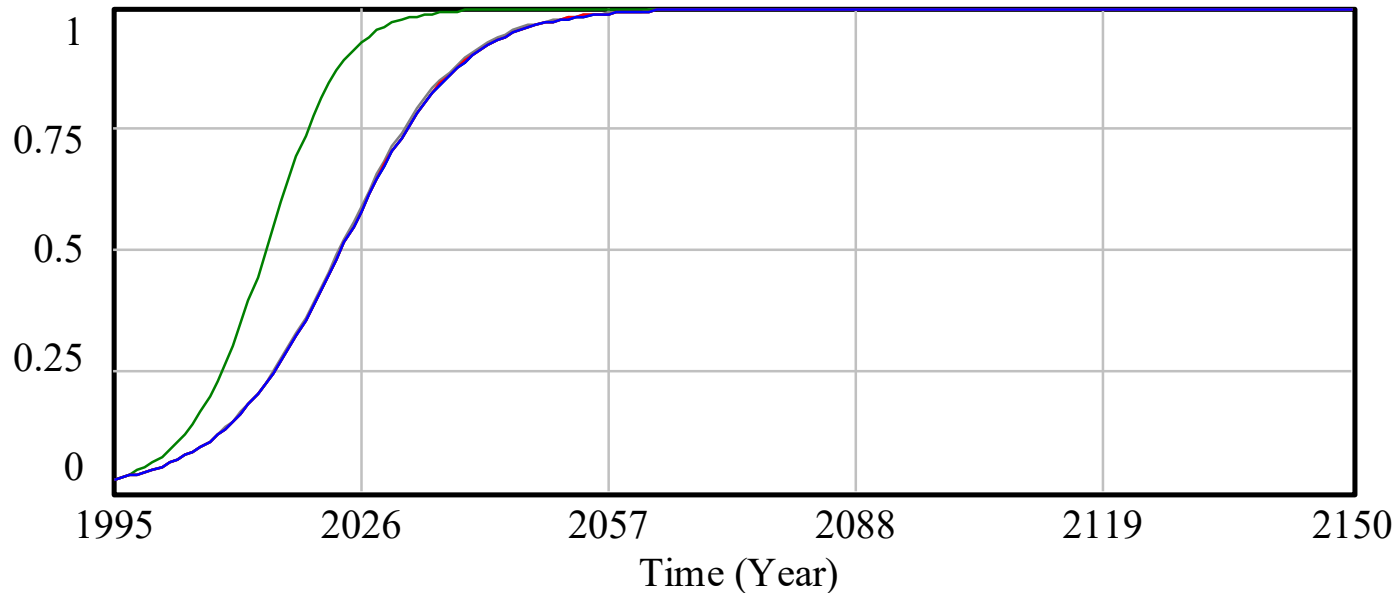
Graph for Knowledge



Knowledge : Factor 10 in 50 years ————— 1
Knowledge : More education ————— 1
Knowledge : Faster rollout of networking ————— 1
Knowledge : More R&D ————— 1
Knowledge : Base case ————— 1

Scenario 2: More Networking

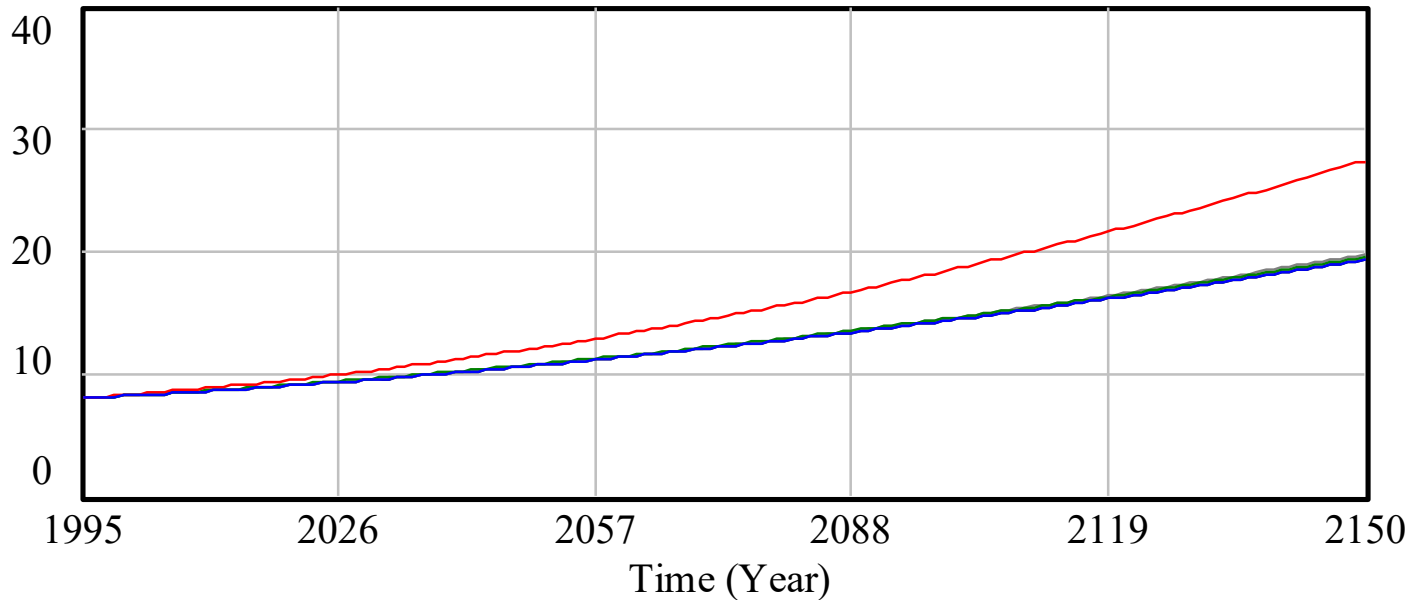
Graph for Networking



- Networking : Factor 10 in 50 years ————— 1
- Networking : More education ————— 1
- Networking : Faster rollout of networking ————— 1
- Networking : More R&D ————— 1
- Networking : Base case ————— 1

Scenario 3: More Education

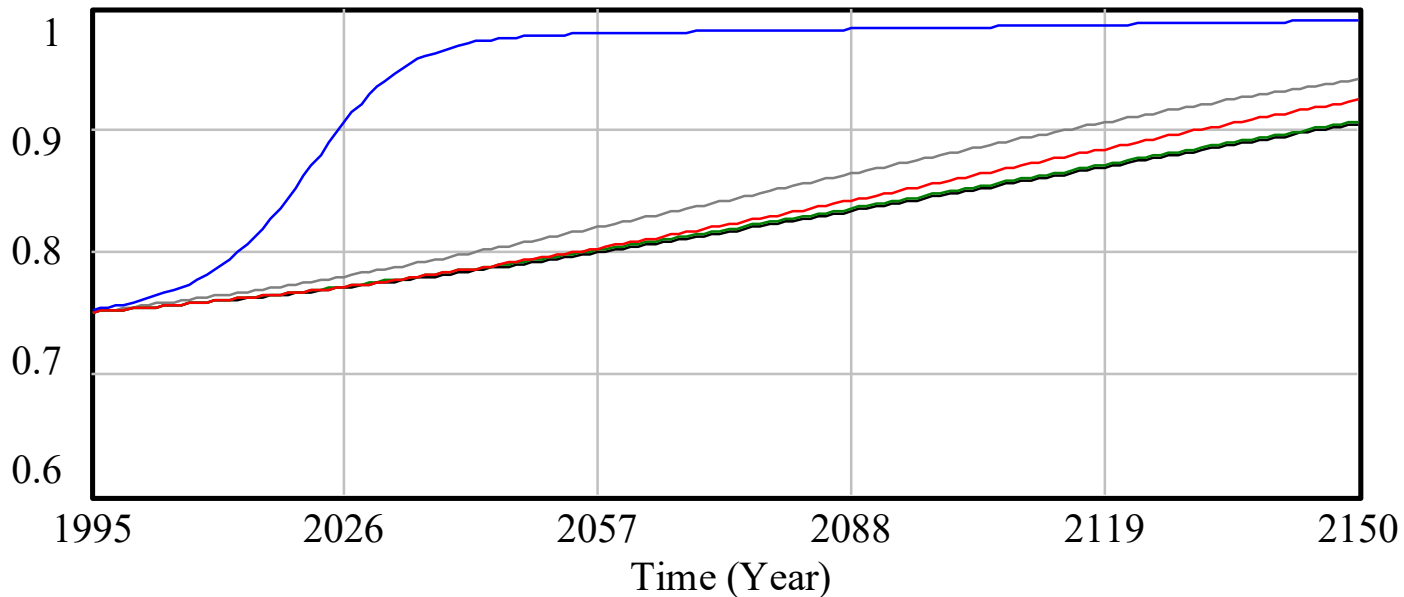
Graph for Average Education Level



Average Education Level : Factor 10 in 50 years ————— Year
Average Education Level : More education ————— Year
Average Education Level : Faster rollout of networking ————— Year
Average Education Level : More R&D ————— Year
Average Education Level : Base case ————— Year

Scenario 4: Factor 10

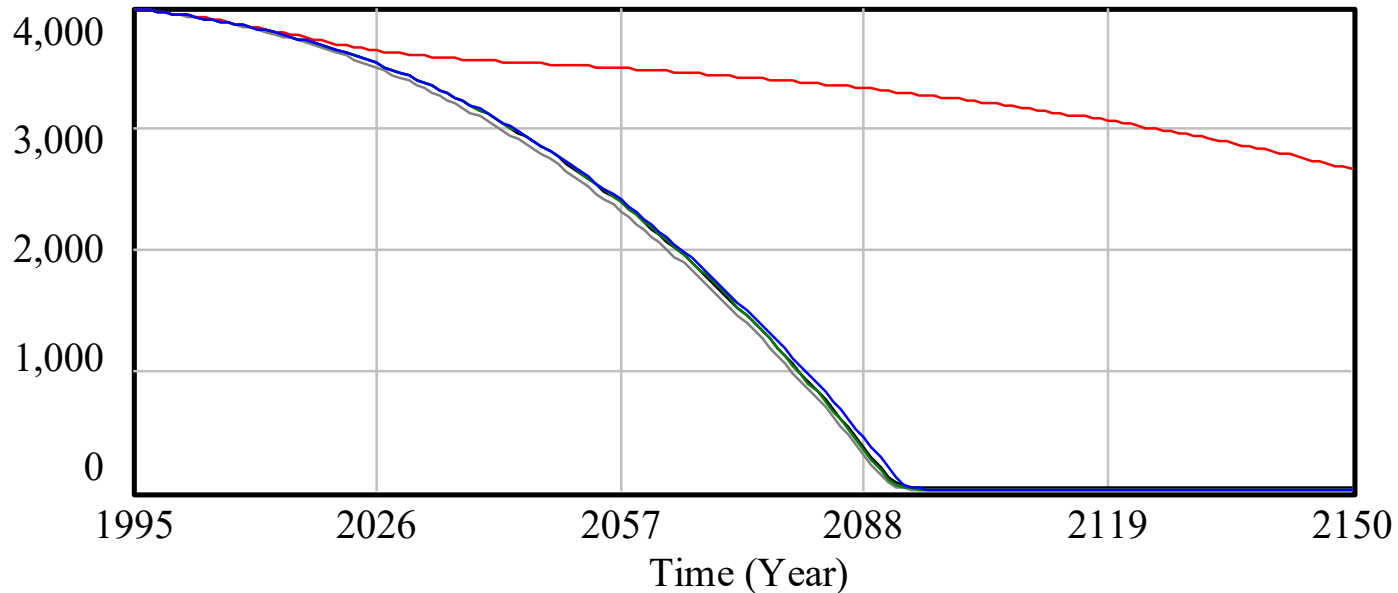
Graph for Dematerialisation & Immaterialisation



- "Dematerialisation & Immaterialisation" : Factor 10 in 50 years — 1
- "Dematerialisation & Immaterialisation" : More education — 1
- "Dematerialisation & Immaterialisation" : Faster rollout of networking — 1
- "Dematerialisation & Immaterialisation" : More R&D — 1
- "Dematerialisation & Immaterialisation" : Base case — 1

Natural Capital Running out

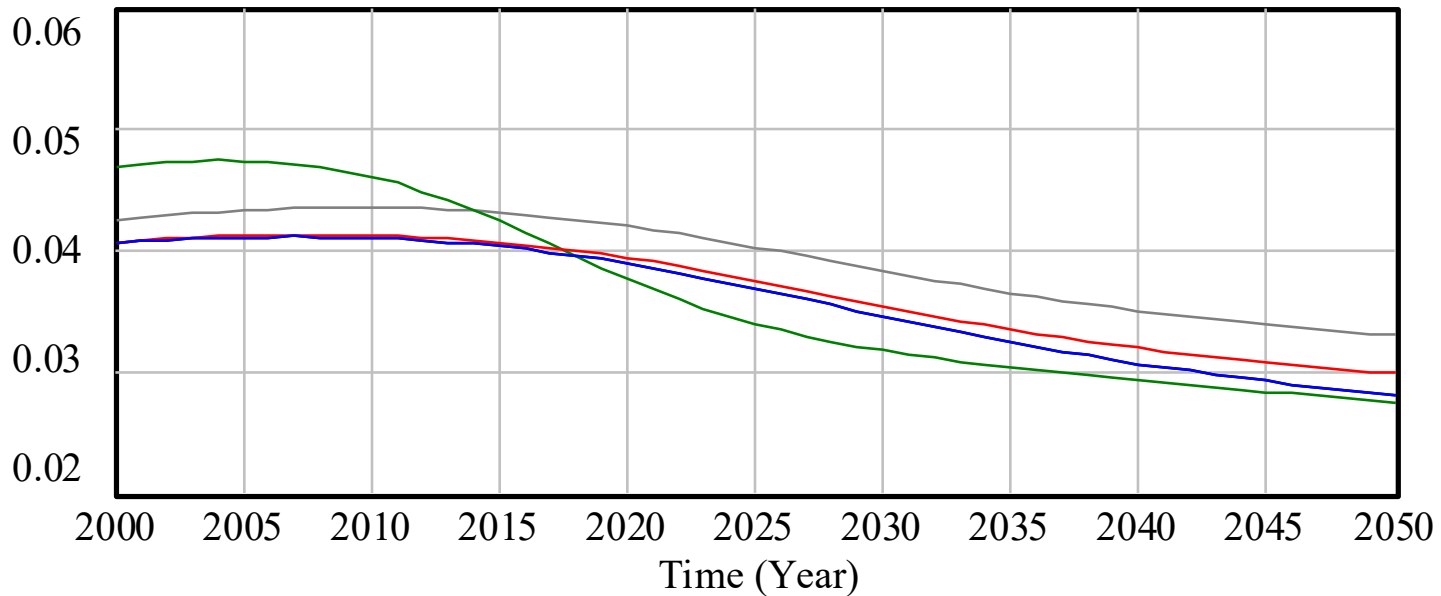
Graph for Accessible Natural Capital



Accessible Natural Capital : Base case ———— Billion Dollar
Accessible Natural Capital : Factor 10 in 50 years ———— Billion Dollar
Accessible Natural Capital : More education ———— Billion Dollar
Accessible Natural Capital : Faster rollout of networking ———— Billion Dollar
Accessible Natural Capital : More R&D ———— Billion Dollar

Economic Growth Rate

Graph for Economic Growth Rate



Economic Growth Rate : Factor 10 in 50 years —————

Economic Growth Rate : More education —————

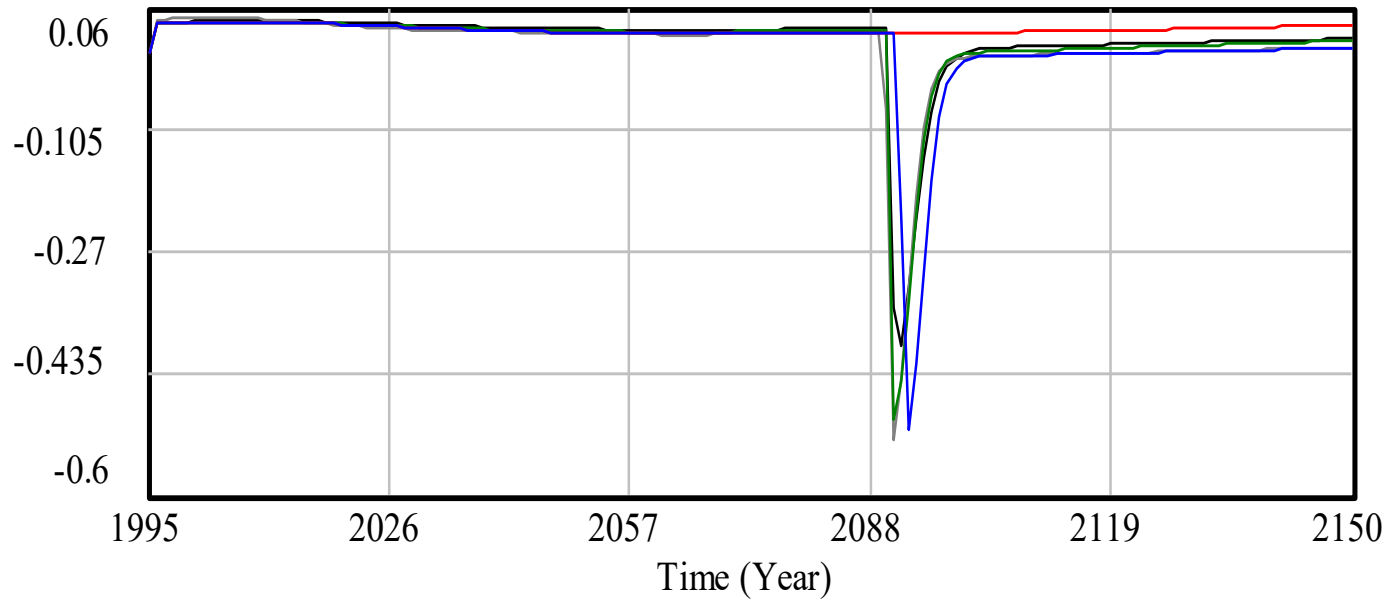
Economic Growth Rate : Faster rollout of networking —————

Economic Growth Rate : More R&D —————

Economic Growth Rate : Base case —————

Economic Growth Rate (2)

Graph for Economic Growth Rate



Economic Growth Rate : Base case —————

Economic Growth Rate : Factor 10 in 50 years —————

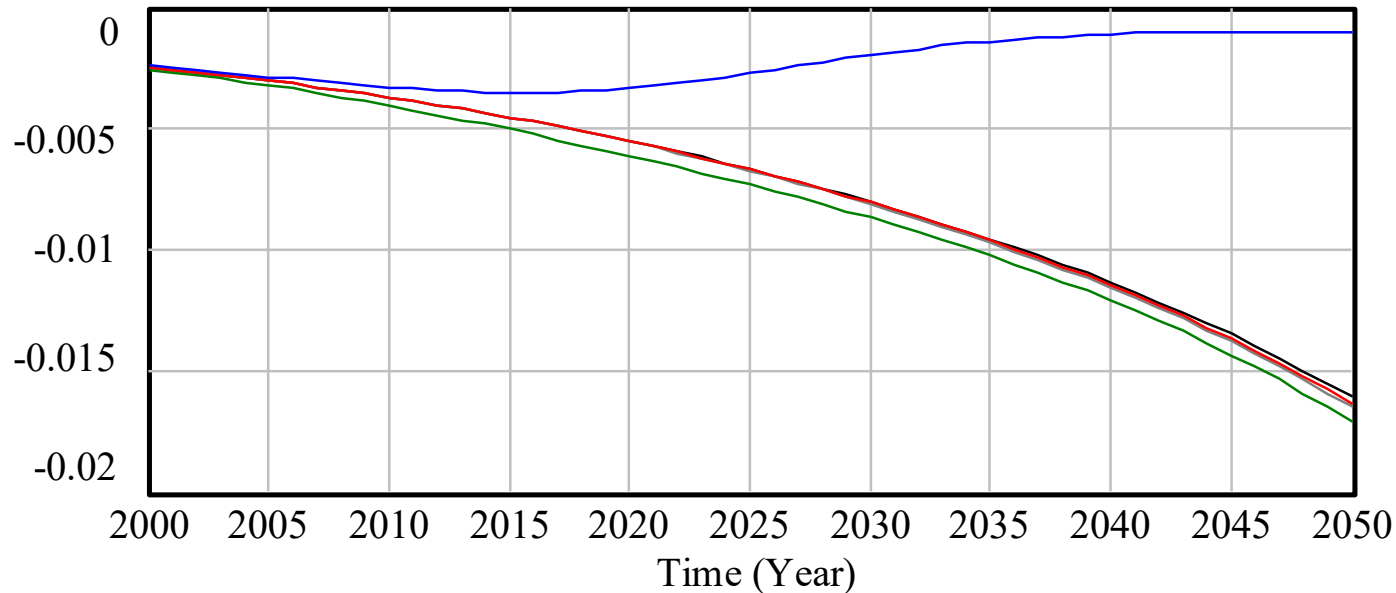
Economic Growth Rate : More education —————

Economic Growth Rate : Faster rollout of networking —————

Economic Growth Rate : More R&D —————

Factor 10: Needed,...

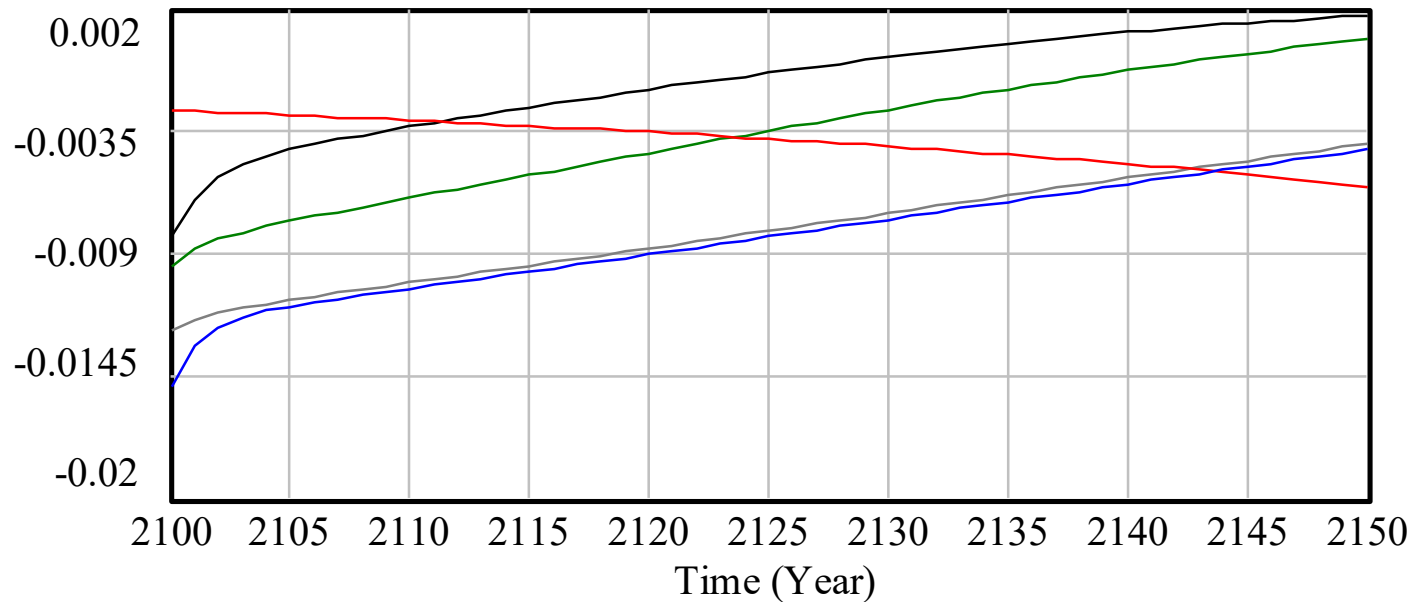
Graph for Net Natural Capital Growth Rate



Net Natural Capital Growth Rate : Factor 10 in 50 years — 1
Net Natural Capital Growth Rate : More education — 1
Net Natural Capital Growth Rate : Faster rollout of networking — 1
Net Natural Capital Growth Rate : More R&D — 1
Net Natural Capital Growth Rate : Base case — 1

... but not sufficient

Graph for Net Natural Capital Growth Rate



Net Natural Capital Growth Rate : Base case ————— 1
Net Natural Capital Growth Rate : Factor 10 in 50 years ————— 1
Net Natural Capital Growth Rate : More education ————— 1
Net Natural Capital Growth Rate : Faster rollout of networking ————— 1
Net Natural Capital Growth Rate : More R&D ————— 1

Further Development

- ➔ Splitting the economy into a number of sectors
 - agricultural sub-model finished (COSMOPAD)
 - others under way
- ➔ Regionalisation - Gaming
 - COIs
 - Agents
 - Structural changes

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Conclusions

- ➔ The model “works”
- ➔ There is a path for expanding the model through sub-models

- ➔ but, the Insight Model does not attempt to replace detailed models (like IFs)
- ➔ Rigid structure
- ➔ Are we asking the right questions?

New Questions

- ➔ Exact data does not always matter that much...
- ➔ Problems are well identified... yet nothing seems to happen:
 - “environmental” schizophrenia
- “yes I care about sustainability,...
but I am caught in a system”

New Questions about structural changes

➔ Abstract - Scientific

- New Science of Networking
 - » Topological characteristics
 - » Contextual Random Boolean Networks
 - » Integrating time dynamics into the science of networks
- Self Organised Criticality
- Predictable Innovation (<http://www.creax.com>)

➔ Practical policies

- IPR
- Participation - Subsidiarity
- Closing the Economic Loop

Modelling the Dynamics of our Common Future

The End...



in memoriam Dr. Ing. Robert Pestel

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