InNOSys: Integrated sustainability assessment and optimization of energy systems – Project Overview

(Integrierte Nachhaltigkeits-Bewertung und –Optimierung von Energiesystemen)

Tobias Naegler

InNOSys-Workshop @
GOR Workshop “OR im Umweltschutz”
Karlsruhe, May 16th 2019

Agenda InNOSys-Workshop

- **8:45:** Welcoming Coffee and Reception
- **9:00h:** Introduction to the InNOSys project (Tobias Naegler, DLR)
- ~~**9:15:** Sustainability assessment and framework for selection of sustainability indicators (Jens Buchgeister, KIT ITAS)~~
- **9:45h:** Coupling of energy system model with LCA data: approach, challenges and first results (Tobias Junne, DLR)
- **10:15h:** PANTA RHEI – Modeling approach and applications (Ulrike Lehr, GWS)
- **10:45h:** Coffee Break
- **11:00h:** MADM Methods for Sustainability Assessment of Energy System Scenarios (Claudia Sutardhio, INATECH)
- **11:30h:** Multi-criteria assessment of transition paths in energy system analysis (Jutta Geldermann, University of Duisburg-Essen)
- **12:00h:** Environmental co-benefits and trade-offs of decarbonizing our global energy systems (Thomas Gibon, Luxembourg Institute of Science and Technology)
- **12:30h:** End of InNOSys-Workshop

Main objectives of the project

- **Development of an interdisciplinary, integrated method for the sustainability assessment of transformation scenarios** for the (German) energy system.
- Economic, ecologic and social aspects will be taken into account through a coupling of models, methods and competences of the project partners.
- **Analysis and comparative sustainability assessment of a spectrum of relevant transformation scenarios** for Germany
- **Optimization of capacity expansion in the power sector under consideration of ecological, economic and social sustainability aspects**
- **Identification and analysis of conflicting goals and trade-offs between different sustainability indicators** which will occur during the transformation process
- Formulation of **conclusions for energy policy and society** with respect to alternative courses of action

Time plan and work packages

1) Sustainability assessment basics, selection of scenarios
2) **Method development (model coupling, MCDA) & LCA for energy technologies**
3) **Determination of indicators for selected transformation pathways**
4) Investment and dispatch optimization power system under consideration of sustainability aspects
5) Integrative, multicriteria assessment and synthesis of results
6) Project management and dissemination

Year	2018				2019				2020			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4
AP1												
AP2												
AP3												
AP4												
AP5												
AP6												

Supported by:

Federal Ministry for Economic Affairs and Energy

on the basis of a decision by the German Bundestag

DLR

Project partners (in alphabetical order)

Deutsches Zentrum für Luft- und Raumfahrt
German Aerospace Center
Institute of Engineering Thermodynamics

- **DLR**: **German Aerospace Center**, Institute for Engineering Thermodynamics, Department of Energy Systems Analysis in Stuttgart

Sonja Simon

Tobias Junne

Tobias Naegler

- **Research focus within InNOSys:**
  - Coupling of energy system models (MESAP, REMix) with LCI data base
  - Re-modelling of energy scenarios
  - Energy system optimization under consideration of sustainability aspects
  - Project coordination

Project partners (in alphabetical order)

GWS SPECIALISTS IN EMPIRICAL ECONOMIC RESEARCH

- **GWS**: **Institute of Economic Structures Research** in Osnabrück

Ulrike Lehr

Lisa Becker

Philip Ulrich

- **Research focus within InNOSys:**
  - Macroeconomic modelling and assessment
  - Coupling of macro-economic model (PANTA RHEI) with energy system models

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Project partners (in alphabetical order)

INATECH
DEPARTMENT OF SUSTAINABLE SYSTEMS ENGINEERING

- **INATECH**: **Department of Sustainable Systems Engineering** at the University of Freiburg

Anke Weidlich

Claudia Sutardhio

- **Research focus within InNOSys:**
  - Energy system modelling (ÖkoFlex)
  - Coupling of ÖkoFlex with scenario development tool MESAP
  - MCDA

DLR

Project partners (in alphabetical order)

INEC
INSTITUTE FOR
INDUSTRIAL ECOLOGY
PFORZHEIM

- **INEC**: **Institute for Industrial Ecology** at the University of Applied Sciences Pforzheim


Tobias Viere


Ingela Tietze


Heidi Hottenroth


Lukas Lazar

- **Research focus within InNOSys:**
  - LCA of energy technologies
  - MCDA

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Project partners (in alphabetical order)

ITAS Institute for Technology Assessment and Systems Analysis

- **KIT-ITAS**: **Department for Technology Assessment and Systems Analysis** at the Karlsruhe Institute of Technology

Jens Buchgeister

- **Research focus within InNOSys:**
  - Sustainability framework and indicators
  - LCA of energy technologies

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Project partners (in alphabetical order)

zirius
Center for Interdisciplinary Risk and Innovation Studies

- **ZIRIUS: Center for Interdisciplinary Risk and Innovation Studies** at the University of Stuttgart

Ricarda Scheele

Oliver Scheel

- **Research focus within InNOSys:**
  - Assessment of stakeholder preferences and acceptancy
  - Focus groups & conjoint analysis

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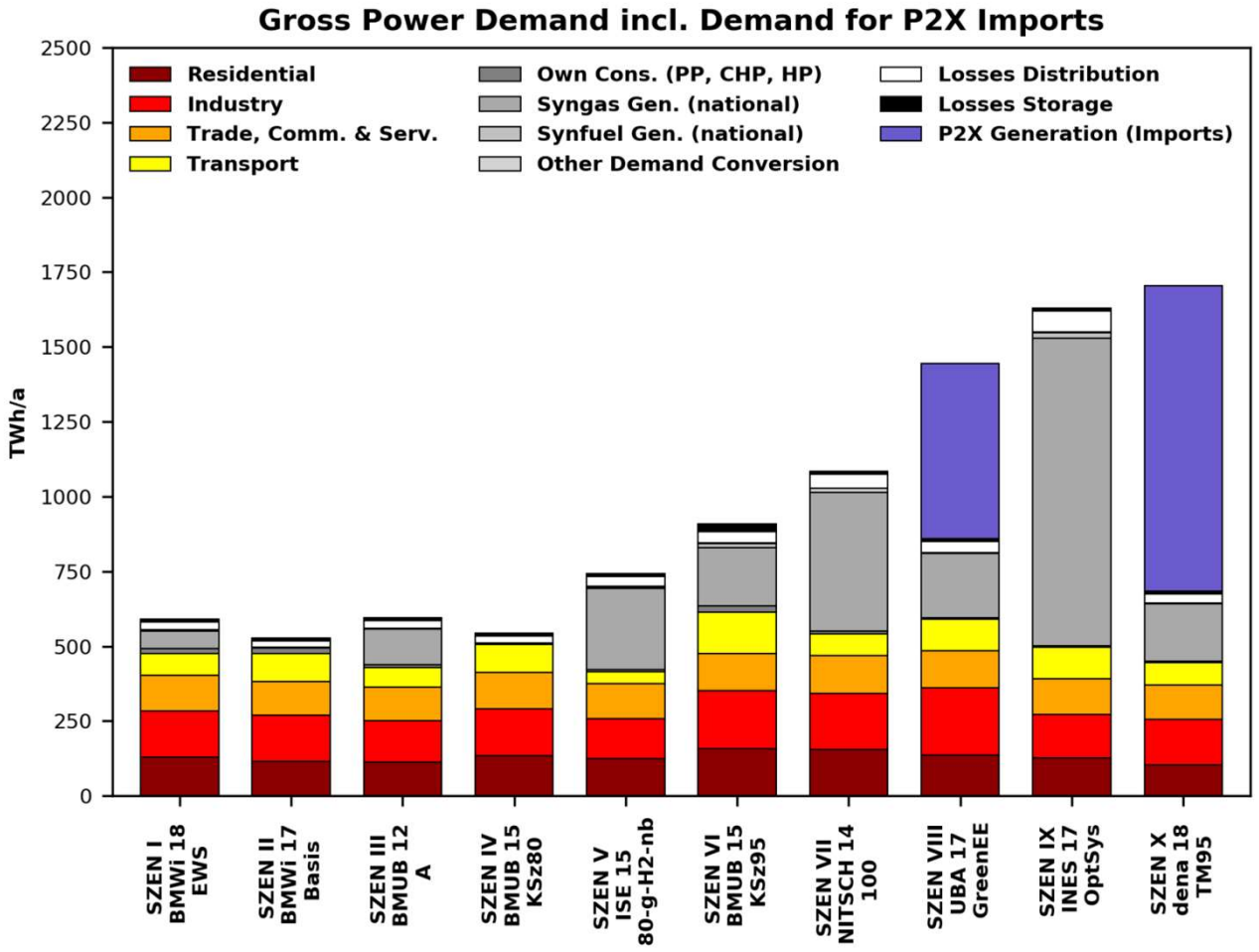
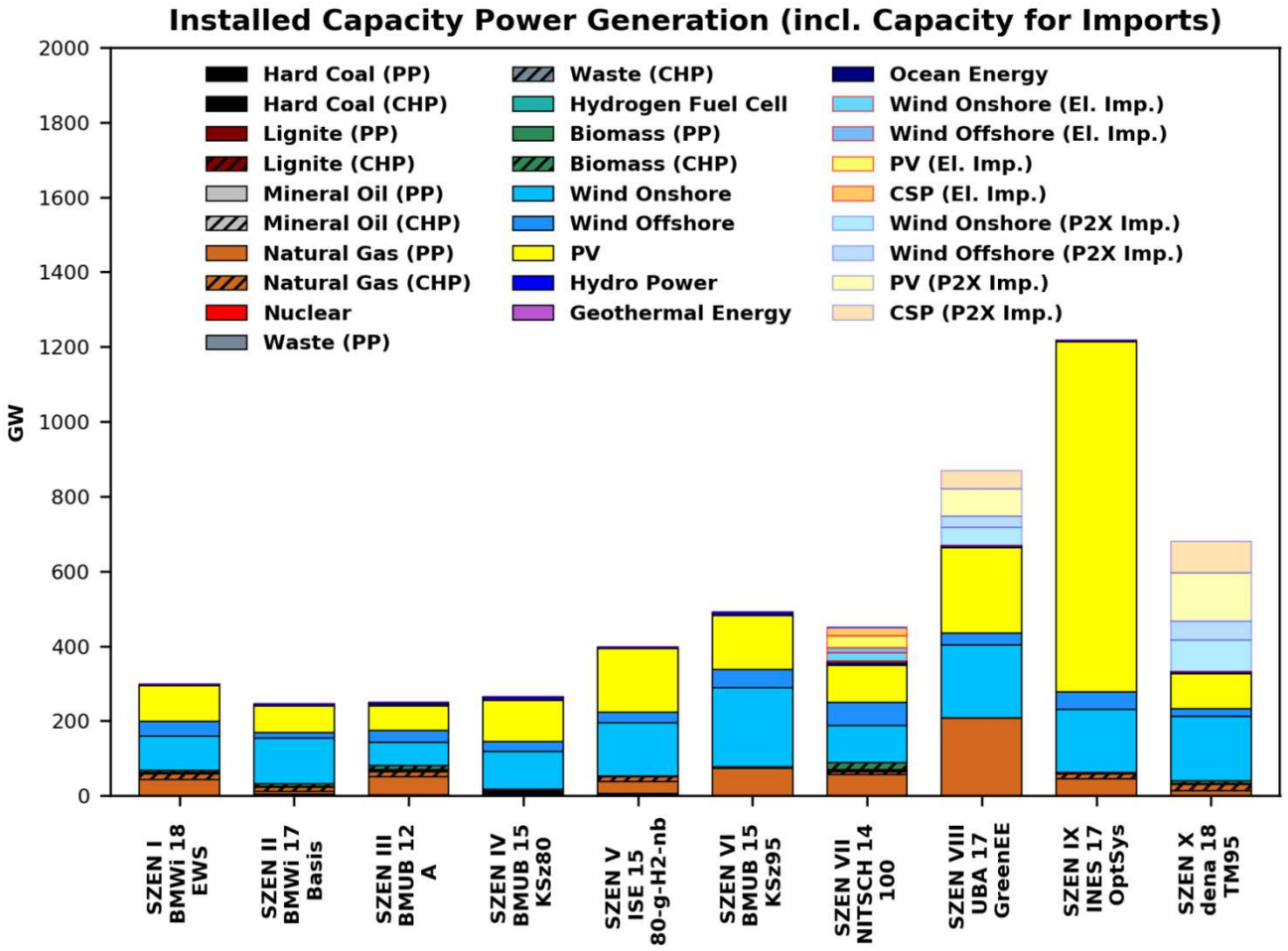
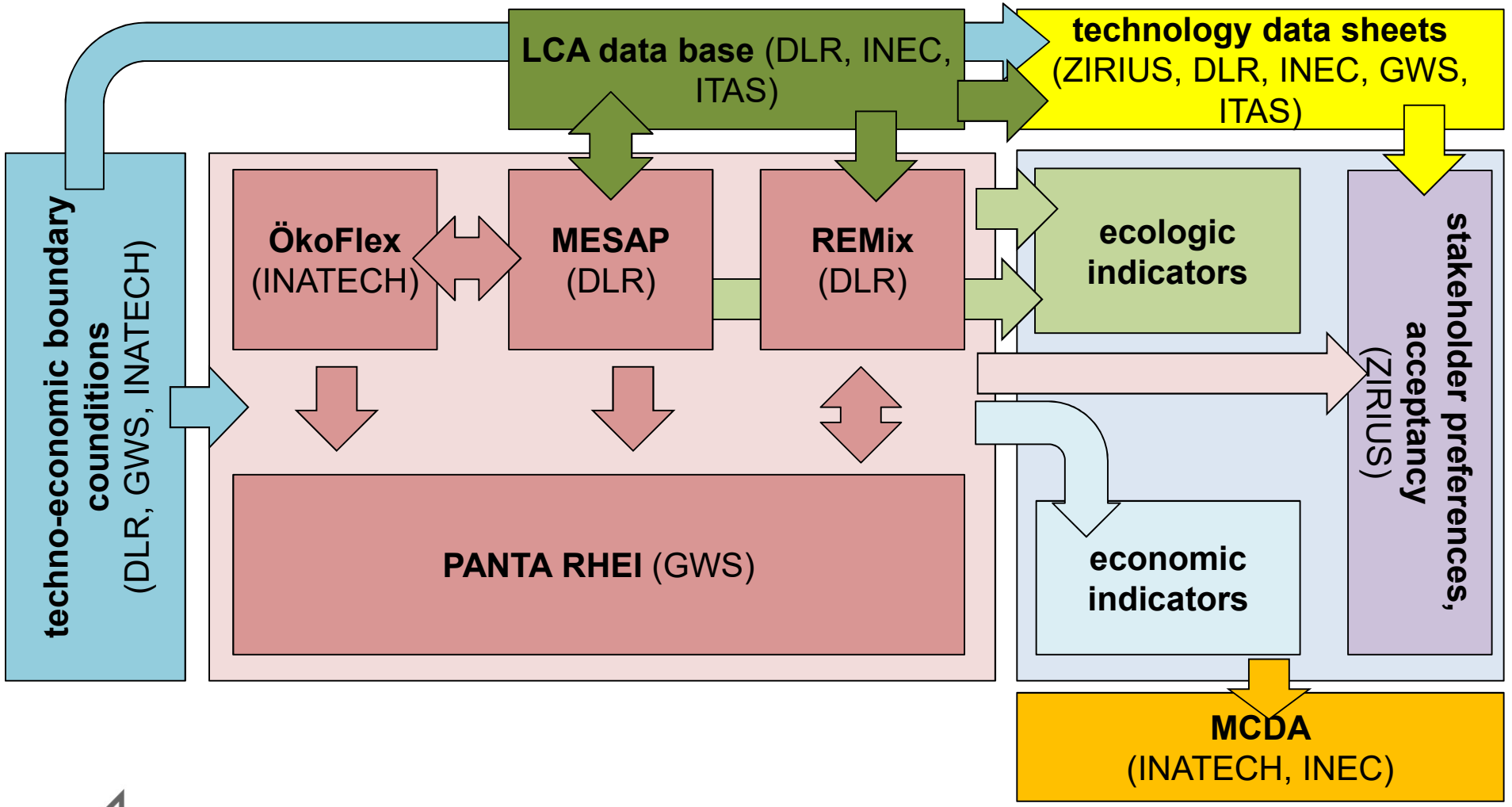
Remodeling of different transformation pathways as basis for systematic impact assessment



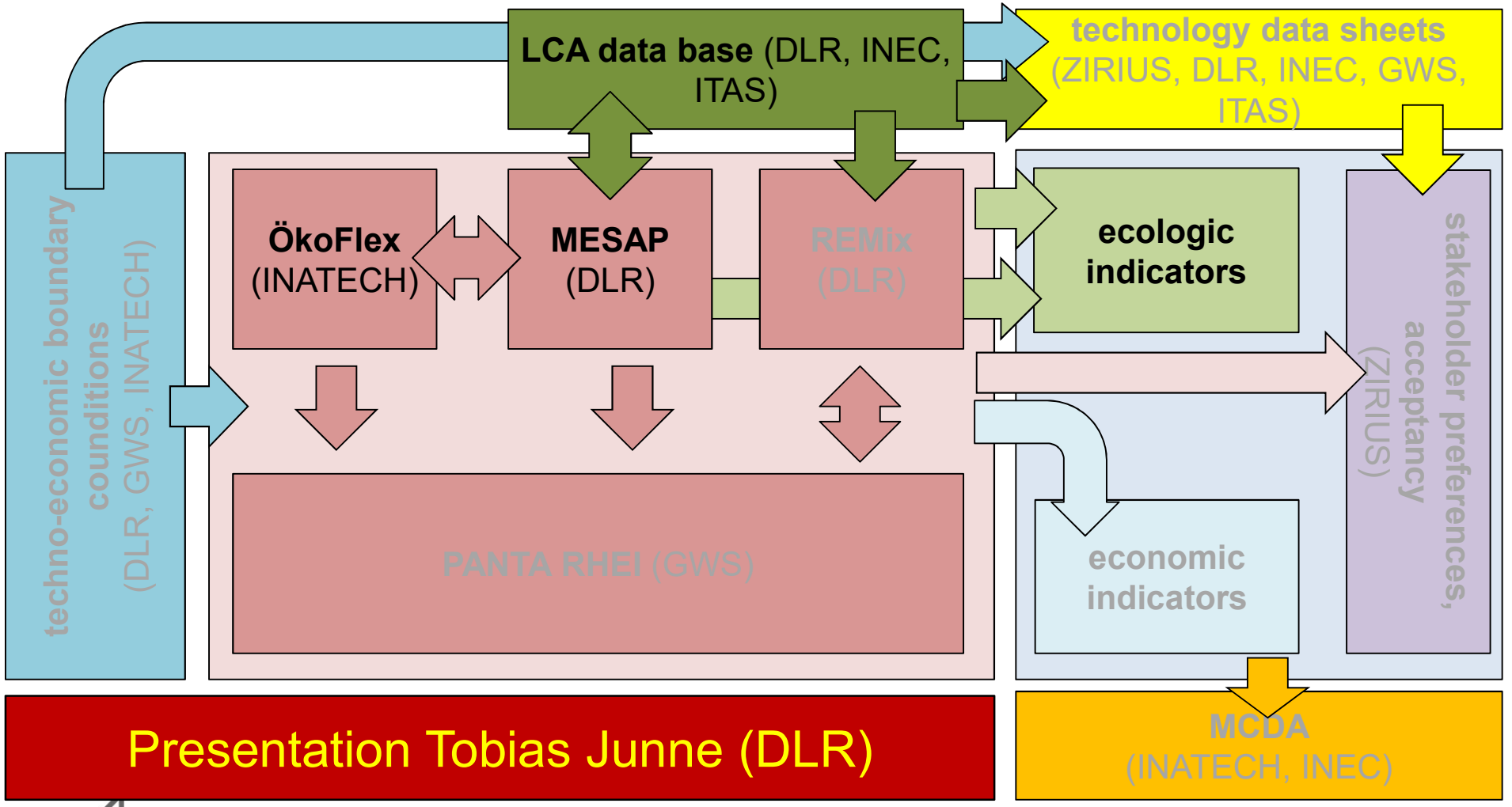
Remodeling of different transformation pathways as basis for systematic impact assessment



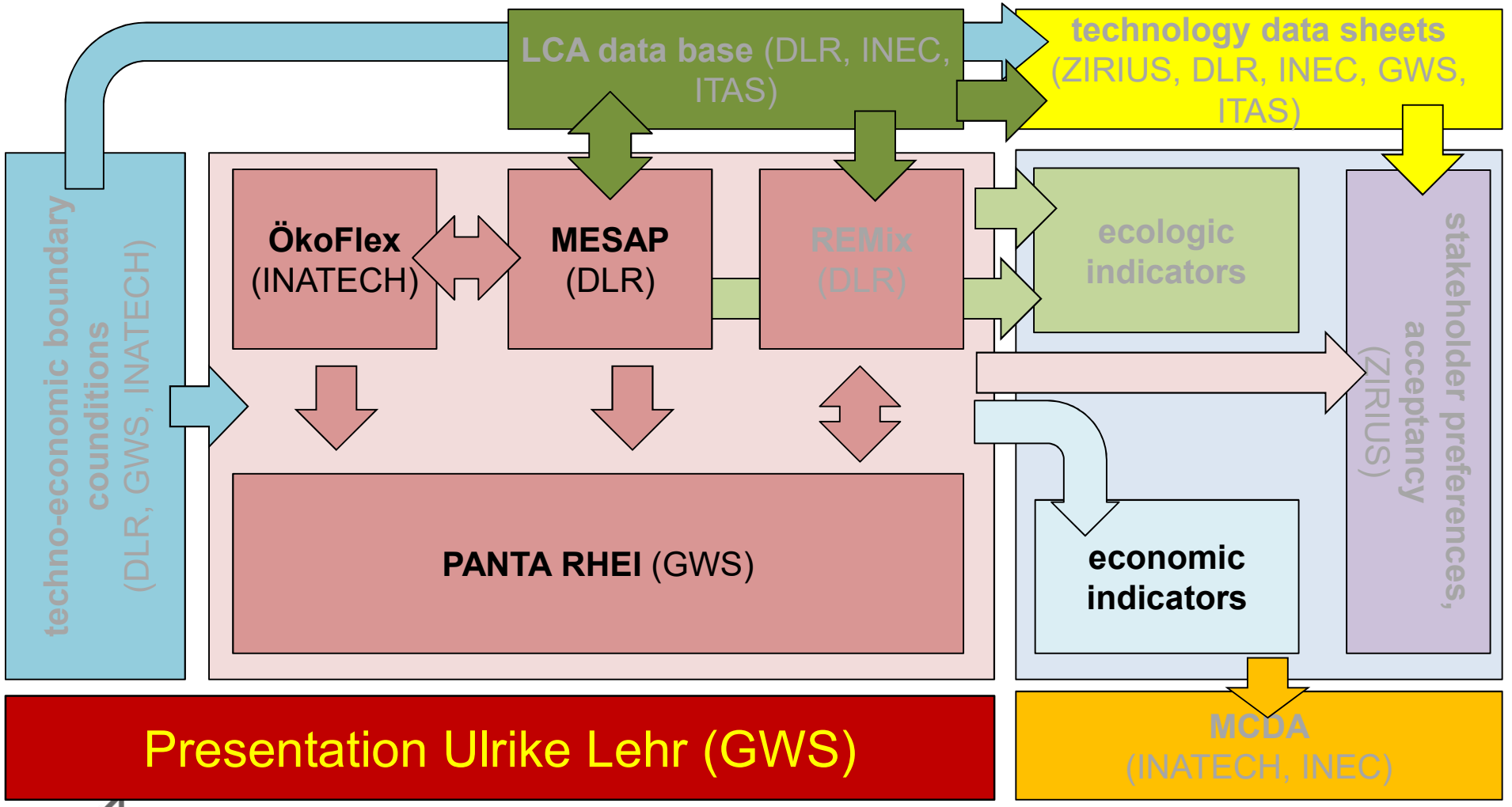
InNOSys: basic idea for model and competence coupling



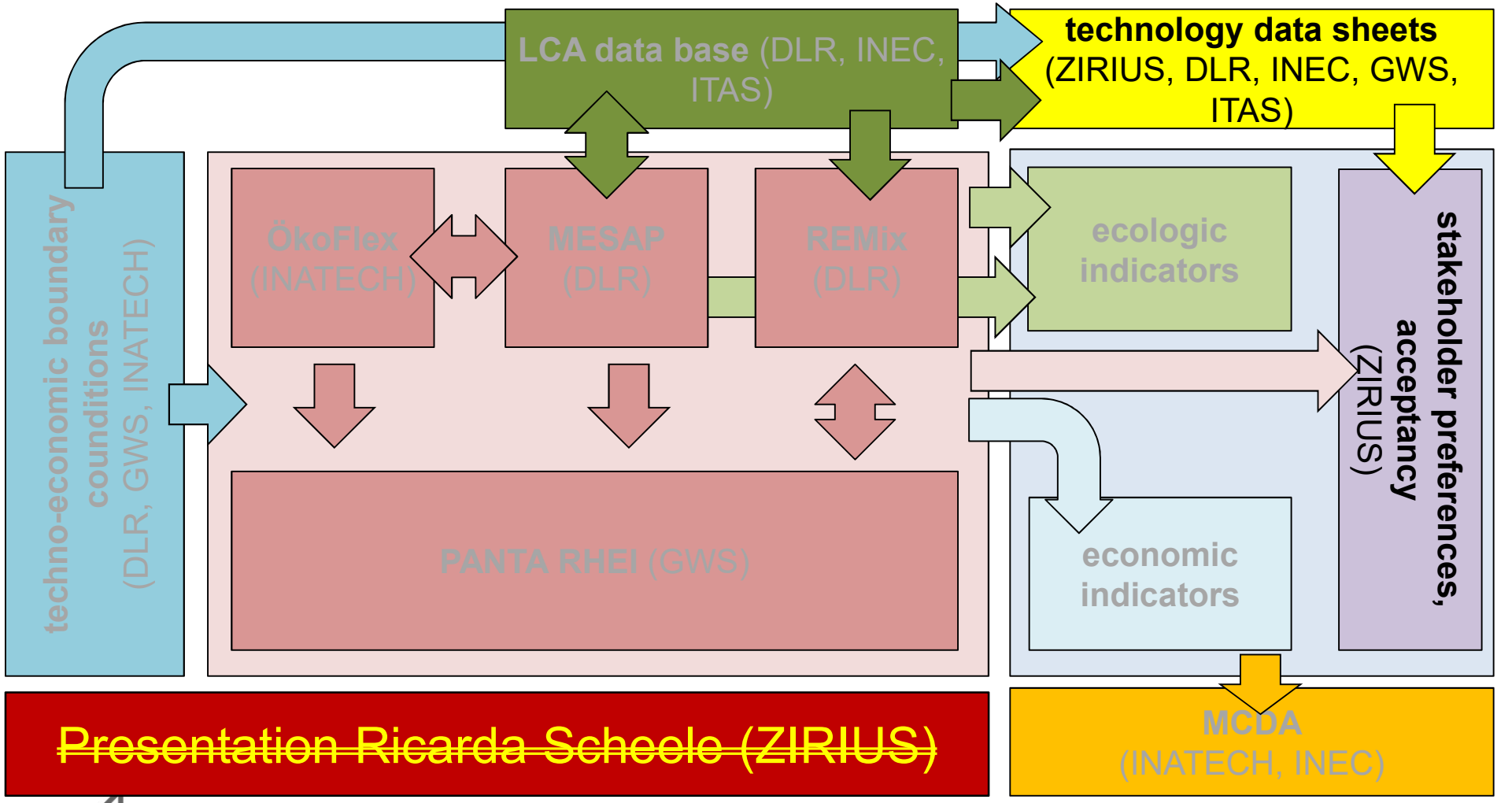
Coupling of LCA data base and scenario development tool → assessment of ecologic indicators



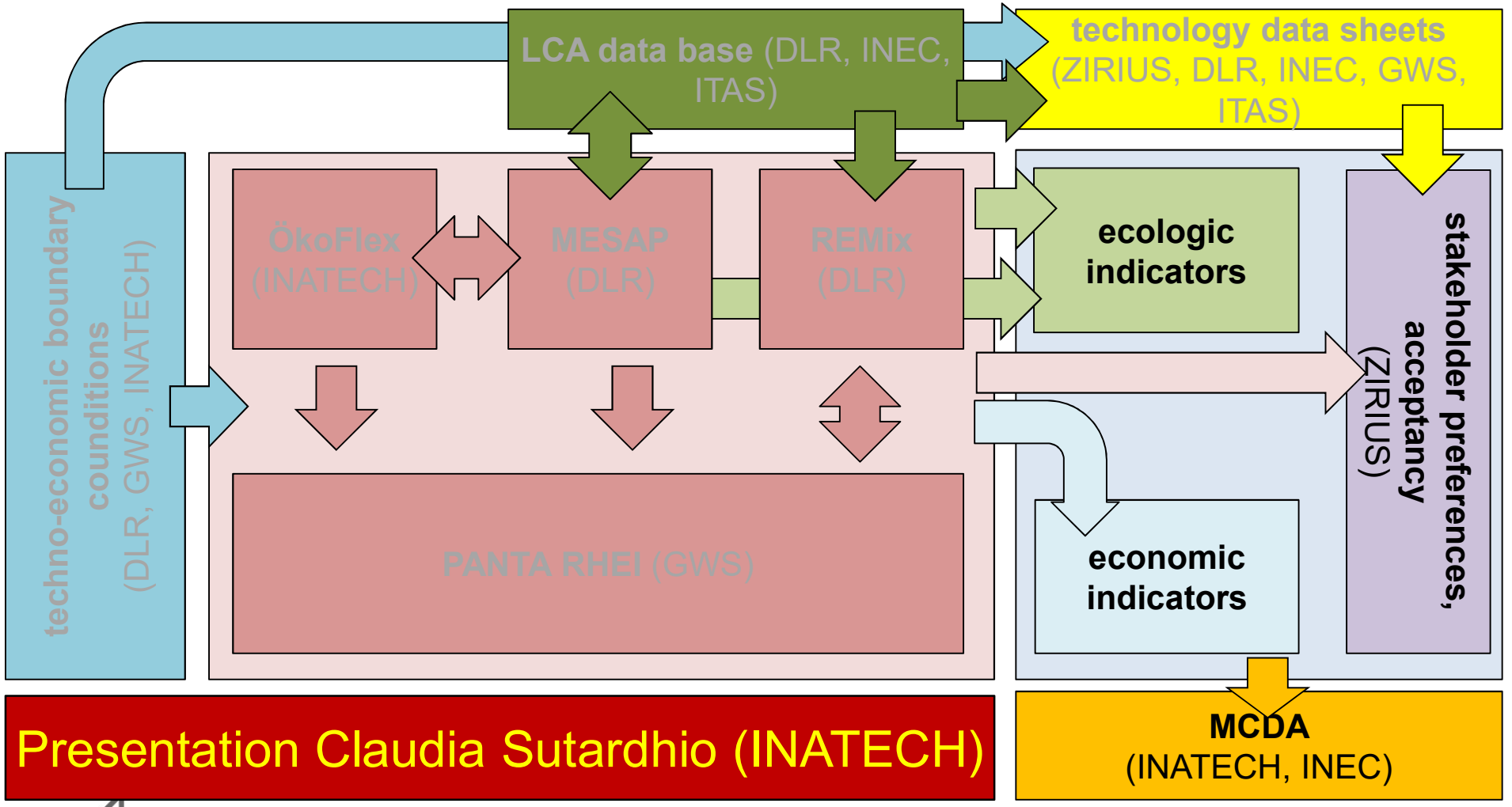
Coupling of macro economic model and scenario development tool → assessment of ecologic indicators



Assessment of stakeholder preferences and acceptancy



MCDA


LCA data base (DLR, INEC, ITAS)
technology data sheets (ZIRIUS, DLR, INEC, GWS, ITAS)
techno-economic boundary counditions (DLR, GWS, INATECH)
ÖkoFlex (INATECH)
MESAP (DLR)
REMix (DLR)
PANTA RHEI (GWS)
ecologic indicators
economic indicators
stakeholder preferences, acceptancy (ZIRIUS)
Presentation Claudia Sutardhio (INATECH)
MCDA (INATECH, INEC)

Thank you very much for your attention!

Contact:

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http://www.innosys-projekt.de

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