

The Industrial Ecology Digital Lab

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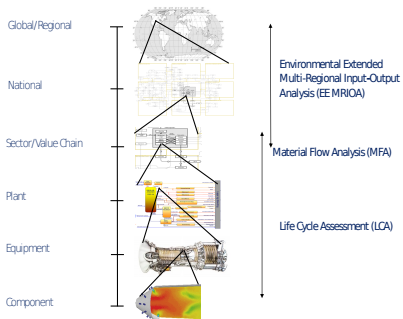
Industrial Ecology Programme, NTNU, Norway

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- ▶ The Industrial Ecology Digital Lab:
What is it? Why is it?
- ▶ Discussion
 1. Do you know any similar initiatives?
 2. First steps in setting up a Digital Lab
 3. Do we miss something at the Digital Lab?
 4. Current issues and way forward

The problem



Goal

Digital Lab

Activities

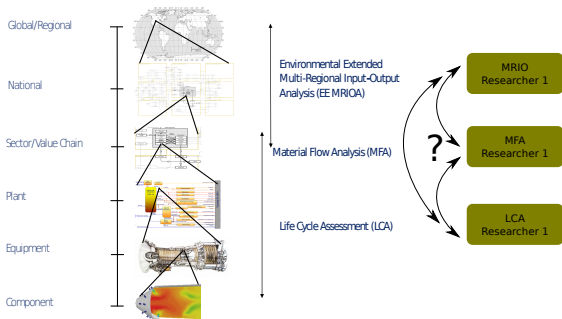
Solutions

Issues

Outlook

Discussion

The problem



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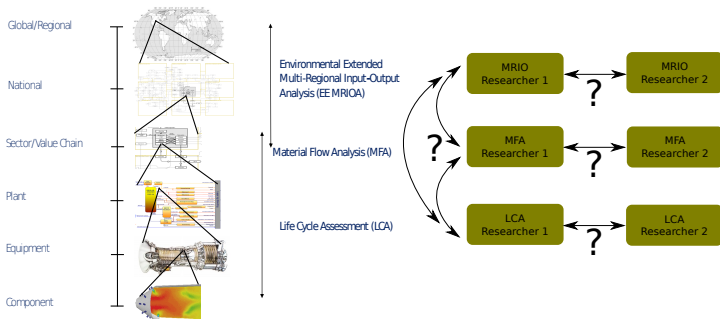
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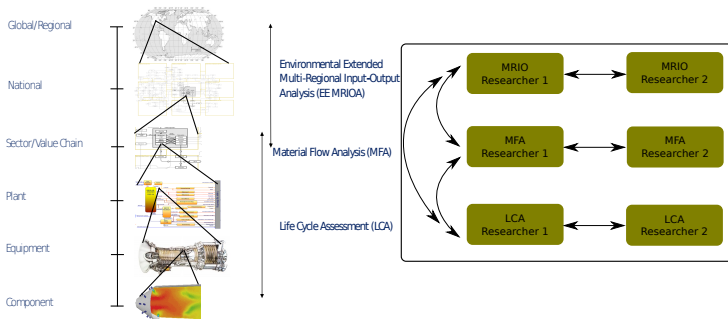
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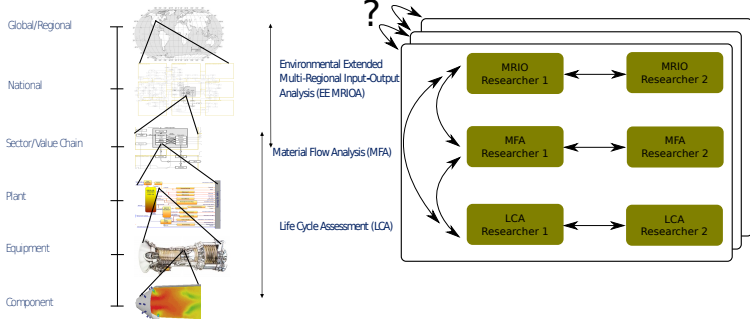
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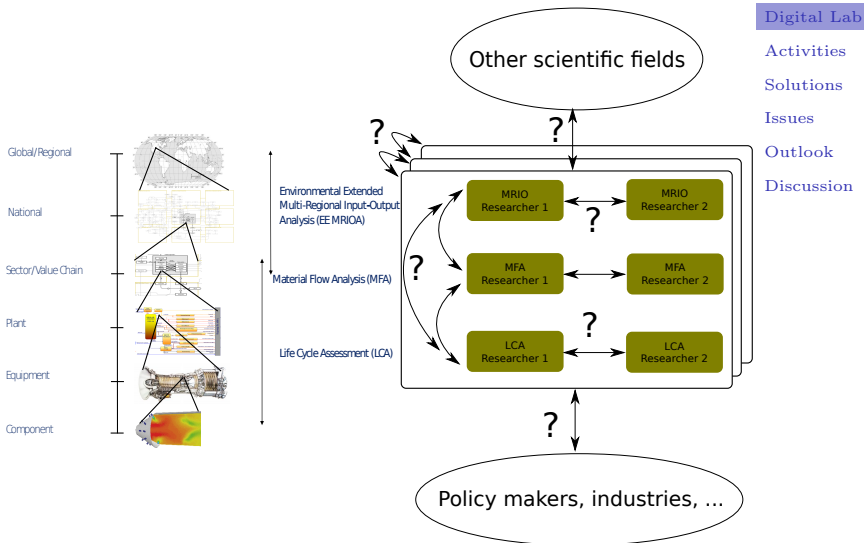
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The problem



1. **consolidate available infrastructure** and ease the integration of newly developed tools by **providing code and data exchange standards** across the group
2. **develop novel software based on common needs** across the IE programme, thereby building an IE software and data toolbox
3. explore synergies with other research groups by **connecting to similar initiatives** in the sustainability and environmental research community

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Research software

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Project specific
analysis methods

IE tools

pySUT

ARDA

pymrio

matlab - software folder

THEMIS

www.environmentalfootprints.com

Generic tools

Databases

Web scraping

Basic statistics

Data exchange

Generic visualization

Versioning, workflow management

Multitprocessing

Research software

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Project specific
analysis methods

Core IE
Digital
Lab

IE tools

pySUT

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Generic tools

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Versioning, workflow management

Multitasking

Knowledge exchange

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Issue Scattered information

Solution Central wiki system (based on DokuWiki)

Failed Indexing all documents (Open Semantic Search)

Uptake Good, minimal requirements

Code exchange

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Issue Scattered code, no version control

Solution Git and gitlab

Alternatives Github/Bitbucket (both have limited private repos)

Uptake Problematic, teach through projects

Communication

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Issue Email overload

Solution Slack, IRC, gitlab issues

Uptake Limited, use slack internally, email still the main communication form but enforce issue tracker for all code specific communication

Identifying needs across the group

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Issue Common needs across the group (30 researchers)

Solution Workflow mapping exercise of common task by each researcher

Result Overlap between workflows: visualization, data harvesting/input, aggregation

Coding standards

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Issue Different programming languages, lack of best practice guidelines

Solution Adopted numpy docstrings for matlab and GAMS documentation + automatic harvesting script

Uptake Started with minimal requirements (one line docstrings), slowly improving b/c benefits

Different systems

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Issue Different OS,
different programming languages, ...

Solution Promote cross platform solutions,
virtualization (docker) and central server

Uptake Good, requires some guidelines (e.g.
hard coded path structures)

Increasing expertise in the group

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Issue Different backgrounds/interests of researchers

Solution Project based education - directly addressing needs and showing benefits; agile development strategy

Uptake Good, but rather slow process

Some open solutions

country converter (coco) Converting country names between different classifications and match different forms of a certain country name with regular expressions (Stadler 2017).
github.com/konstantinstadler/country_converter

Datavis for specific datavisualization Providing world map, sankey and nested pie graphs
datavis.indecol.no

pymrio A python module for automating input output calculations and generating reports (Stadler 2015).
github.com/konstantinstadler/pymrio

web-trawler Bulk download files from a given url.
gitlab.com/dlab-indecol/web_trawler

fp-vis Environmental Footprints Webpage.
www.environmentalfootprints.com

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Reoccurring problems

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- ▶ Need of multiple accounts
- ▶ Intimidating command line

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- ▶ Basic infrastructure in place
- ▶ Switch to a interactive notebook workflow (Jupyter)
- ▶ Interlinking IndEcol methods

Discussion

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