



Beyond static inventory datasets

Chris Mutel

LCA DF 84, 21.09.2023





Adrian Segens, FRSA · 2nd
Sustainability Advisor, Analytics & Insight

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I'm both proud and happy to share this news.

In his keynote speech at LCM 2021 **PRé Sustainability**'s **Eric Mieras** shared his vision for the future of lifecycle assessment:

"The days of static reports are gone. Now, we must move in the direction of a more automated and digitized approach to make knowledge more widely available and easy to interact with."

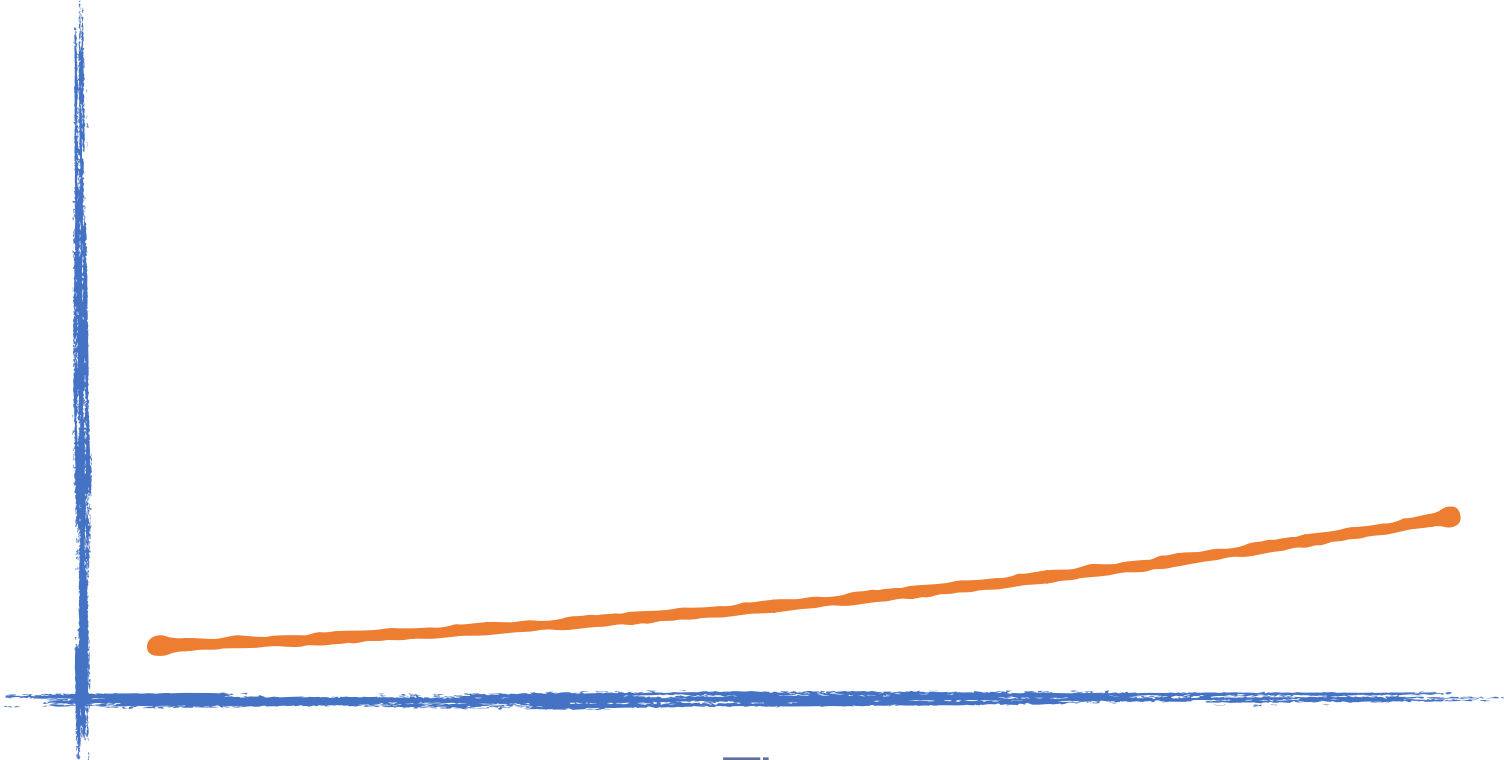
Since then, my colleagues and I at **Tata Consultancy Services** have been working in partnership with **PRé Sustainability** to make that vision a reality.

The result - TCS Product Life Cycle Profiler - comes from 2 years of collaboration, development and real-world application with TCS customers.

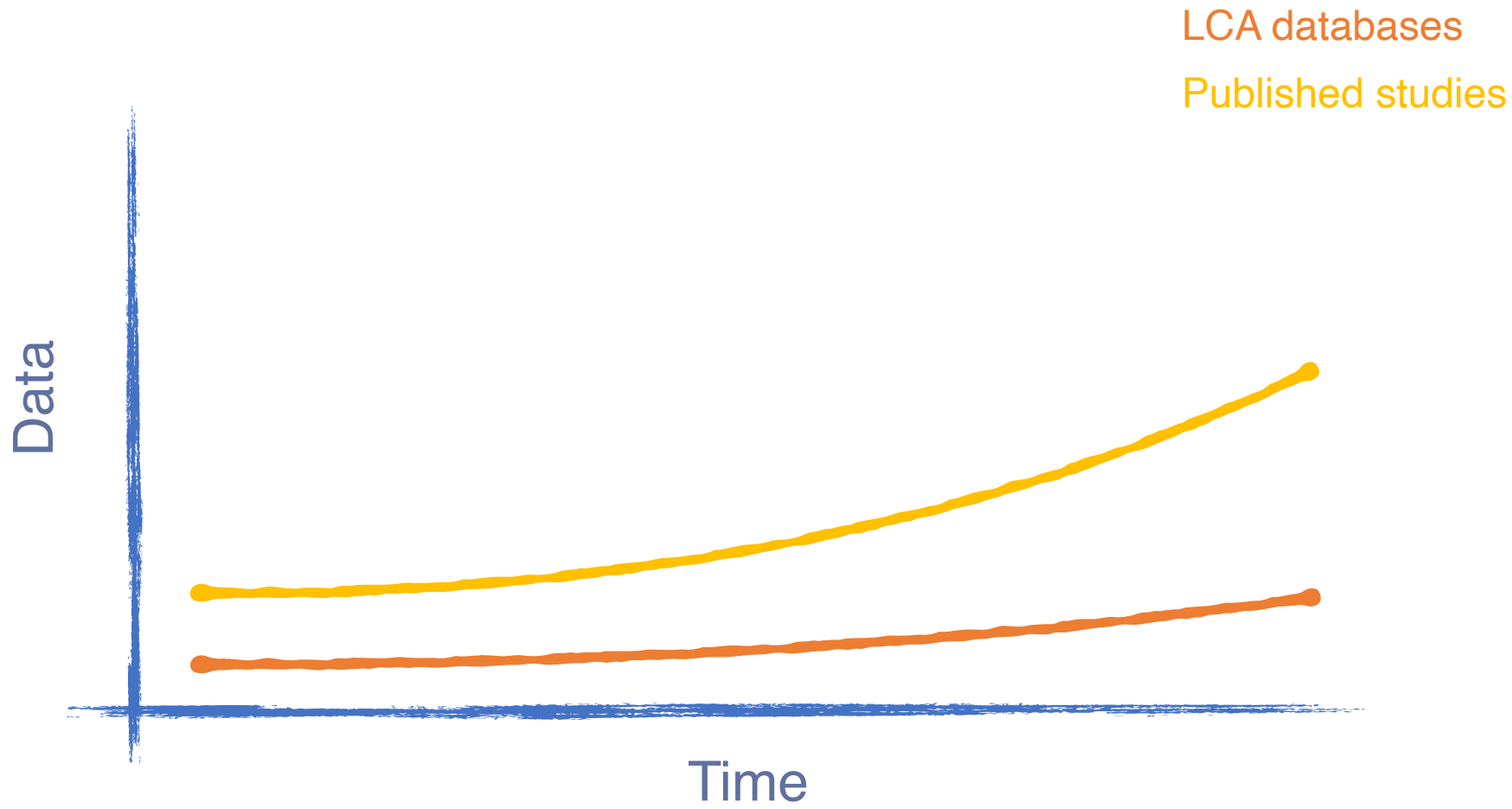
https://www.linkedin.com/posts/adriansegens_tcs-launches-innovative-digital-solution-activity-7109871730289950720-GJ2Z

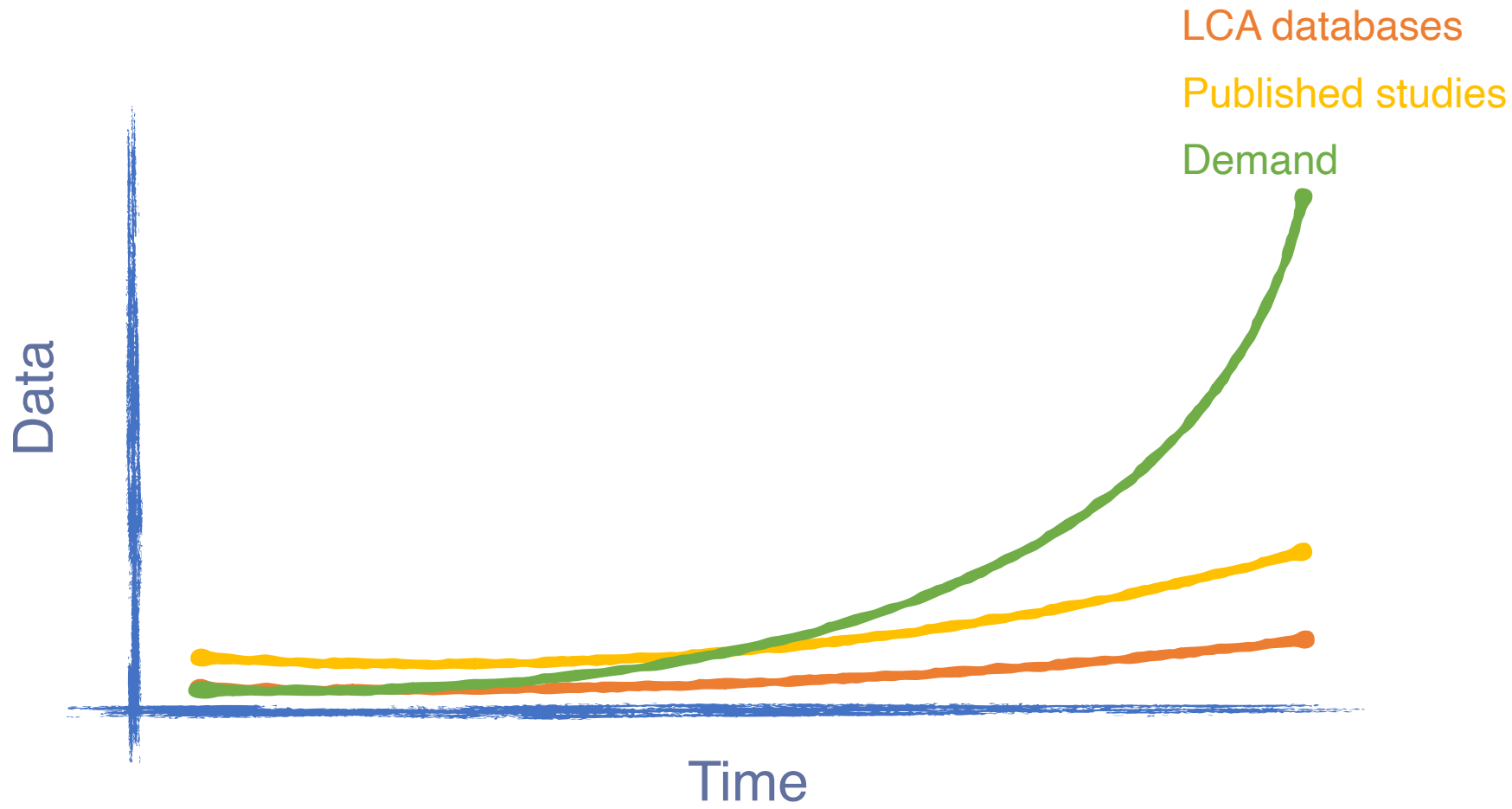
LCA databases

Data



Time



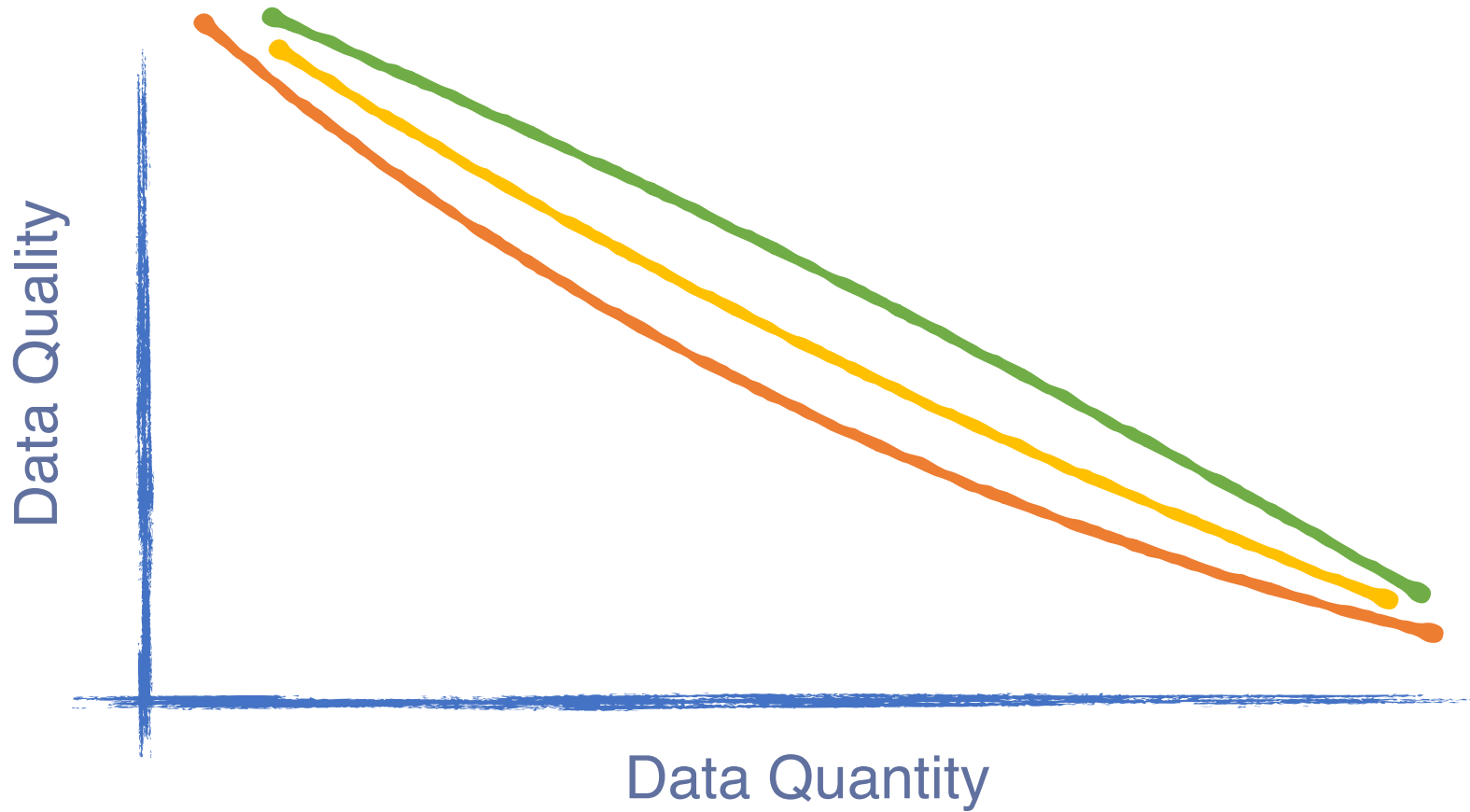


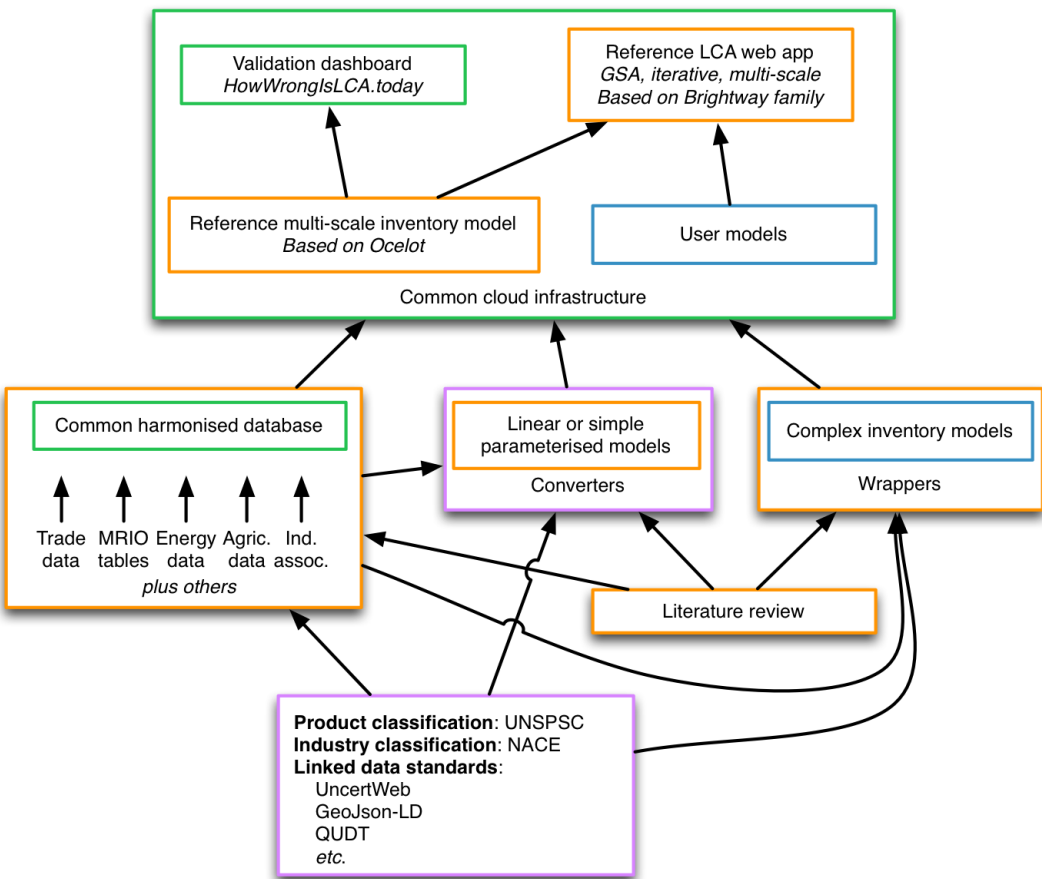
We need to see differently

- Make hard choices
- Be honest about ourselves
- Focus on the mission

- Can't find the right data
- The data found doesn't match our operations
- The data found is out of date







Make LCA Great Again (2017)

<https://chris.mutel.org/next-steps.html>

We don't know how wrong we are
Lunch isn't free, but someone has already paid for it

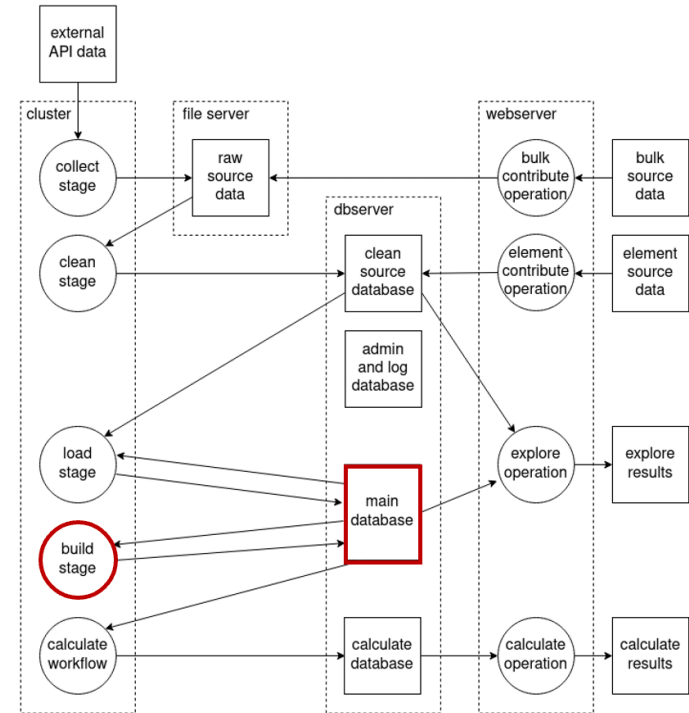
Uncertainty exists, and can even be useful

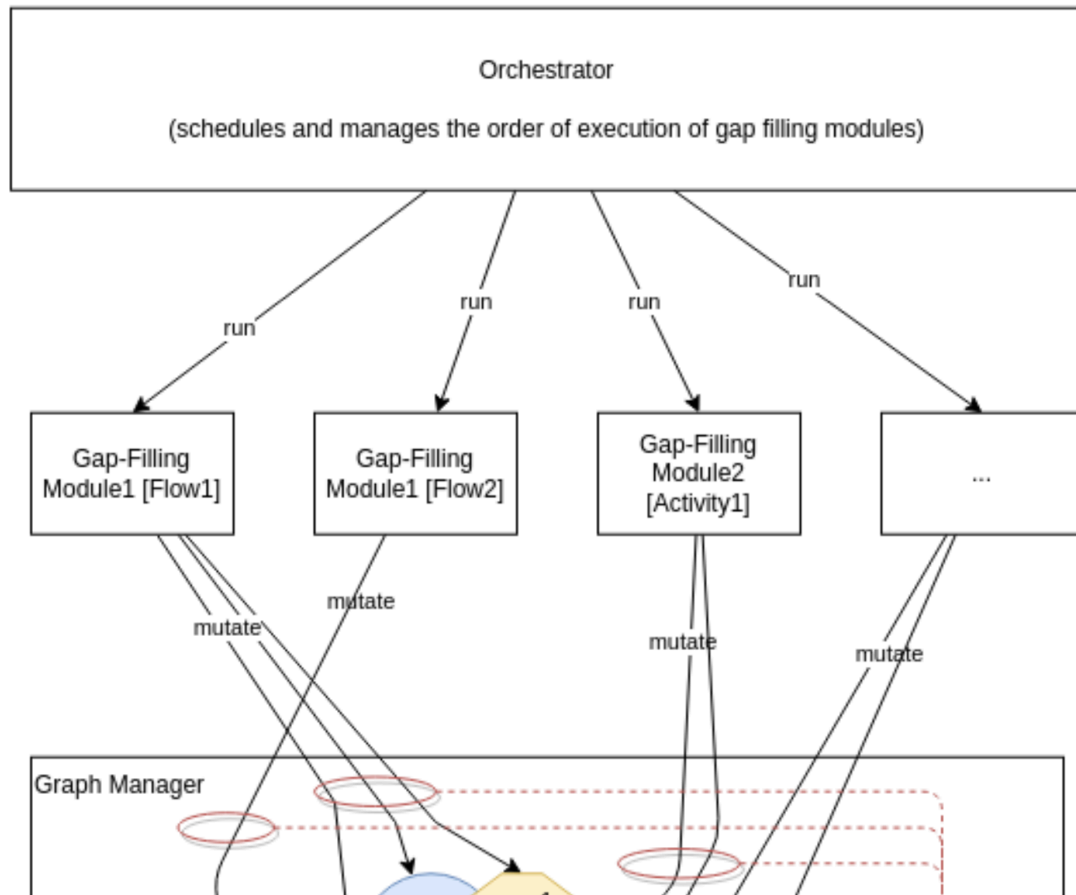
The importance of open data and open source software

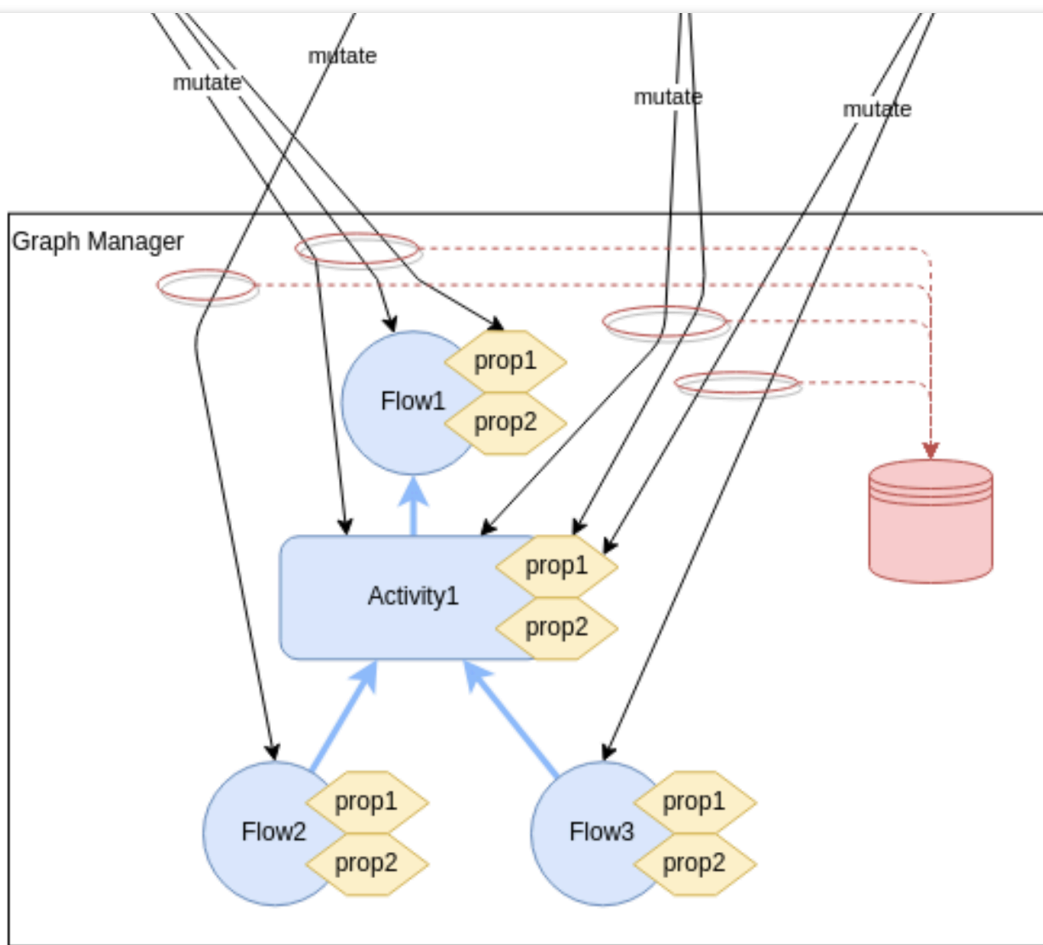
Inspiration from the amazing Open Energy modeling community
BONSAI, or something like it

Build stage

- Transforms data
- Clean data to IO system
- Only interacts with main database







Gap-Filling-Modules

Ingredient Splitter

Glossary Matching

Subdivision (dry, wet)

Ingredient Amount Estimation

Import / Export / Production Statistics

Transport (Location, Distance & Mean)

Base Inventory Data

> Impact Assessment <





<https://github.com/Depart-de-Sentier/brightcon-2023-talks>

Search | Hestia

https://www.hestia.earth/search?page=1&query=Potato&sortOrder=desc

HESTIA Data Format Data Platform Calculation Tools Sign In

UNIVERSITY OF OXFORD Legos Foundation WWF

Potato Filters

Cycles (106) Sources (10) Aggregated Cycles (0)

Showing 1 - 20 of 106 Cycles (0.03 seconds)

Potato, tuber - China - 2013 - Potato

Region: China
 Source: Xu & Lan (2016)
 Description: Potato

inputs emissions products

Summary Inputs & Products Emissions Downloads

Sweet potato, tuber - Luancheng, China - 2010 - Sweet potatoes (Sweet Potato - ...

Source: Yang et al (2014)
 Description: Sweet potatoes (Sweet Potato - Cotton - Sweet Potato - Summer Maize - Cotton Rotation)

inputs emissions products

Summary Inputs & Products Emissions Downloads

https://www.hestia.earth/cycle/fepi3jeje6 **tuber - Luancheng, China - 2010 - Sweet potatoes (Sweet Potato - ...**



Sign In



Search for crops, animal products, regions...

« Collapse

- 1. Cycle Summary
- 2. Cycle Navigator
- 3. Site: Measurements
- 4. Cycle: Data Completeness
- 5. Cycle: Inputs & Products
- 6. Cycle: Practices
- 7. Cycle: Emissions
- 8. Impact Assessment: Emissions
- 9. Impact Assessment: Resource Uses
- 10. Impact Assessment: Impact Indicators
- 11. Impact Assessment: Endpoints
- 12. Impact Assessment: Driver Chart
- 13. Bibliography
- 14. Download

CYCLE | Potato, tuber - China - 2013 - Potato

Original Recalculated

1. Cycle Summary

Hestia ID: fepl3jejegj6
Name: Potato, tuber - China - 2013 - Potato
Description: Potato
Reference period: 2013
Country: China
Source: Xu & Lan (2016)
Site: Cropland - China

Compare with Aggregated Data

> Impact Assessments: 1



Search for crops, animal products, regions...



Filters

« Collapse

- 1. Cycle Summary
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- 6. Cycle: Practices
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- 10. Impact Assessment: Impact Indicators
- 11. Impact Assessment: Endpoints
- 12. Impact Assessment: Driver Chart
- 13. Bibliography
- 14. Downloads
- 15. JSON-LD Viewer

† Data uploaded by the user * Data added by Hestia ** Data updated by Hestia

5. Cycle: Inputs & Products ?



Table view

Chart view

Recalculations logs

er,...	Inorganic Phosphorus fertilize...	Inorganic Potassium fertilizer...	Machinery infrastructure, depr...	Pesticid
	kg P ₂ O ₅	kg K ₂ O	kg/functional unit/Cycle	kg activ
1. Sweet potato, tuber - Luancheng, China - 2010 - Sweet potatoes (Sweet Potato ...	75.2 †	150 †	0.812 †	0 †

† Data uploaded by the user * Data added by Hestia ** Data updated by Hestia *** Data aggregated by Hestia

6. Cycle: Practices ?



Table view

Recalculations logs

Full tillage

Irrigated

Residue removed

5. Cycle: Inputs & Products ?



Table view

Chart view

Recalculations logs

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13. Bibliography

14. Downloads

15. JSON-LD Viewer

6. Cycle: Practices ?



Table view

Recalculations logs

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5. Cycle: Inputs & Products ?



☰ Table view

☰ Chart view

☰ Recalculations logs

	er,...	Inorganic Phosphorus fertilize...	Inorganic Potassium fertilizer...	Machinery infrastructure, depr...	Pesticid
				<i>kg/functional unit/Cycle</i>	<i>kg activ</i>
1. Sweet potato, tuber - Luancheng, China - 2010 - Sweet potatoes (Sweet Potato - ...				0.812 *	0 †

Sweet potato, tuber - Luancheng, China - 2010 - Sweet potatoes (Sweet Potato - ...
value: 0.812 * Docs

methodModel: Agribalyse (2016) *
statsDefinition: modelled *
term: Machinery infrastructure, depreciated amount per Cycle * Docs

† Data uploaded by the user * Data added by Hestia ** Data updated by Hestia *** Data aggregated by Hestia

5. Cycle: Inputs & Products ?



Table view

Chart view

Recalculations logs

Inputs

Products

[Open Full Logs](#)

Filter by name	Units (per hectare)	Original	Recalculated	Difference	(1)
<ul style="list-style-type: none"> Inorganic Potassium fertilizer, unspecified (kg K₂O) 	kg K ₂ O	-	-	-	-
Field: impactAssessment		-	-	-	Hestia Aggregated Data ✖ (Docs) 🔗
<ul style="list-style-type: none"> Machinery infrastructure, depreciated amount per Cycle 	kg/functional unit/Cycle	-	0.812	-	Agribalyse (2016) ✓ (Docs) 🔗
Field: impactAssessment		-	-	-	Hestia Aggregated Data ✖ (Docs) 🔗
<ul style="list-style-type: none"> Pesticide unspecified (AI) 	kg active ingredient	0	not recalculated	-	-
Field: impactAssessment		-	-	-	Hestia Aggregated Data ✖ (Docs) 🔗
Saplings		-	-	-	Poore & Nemecek (2018) ✖ (Docs) 🔗
<ul style="list-style-type: none"> Seed 	kg	-	148	-	FAOSTAT (2018) ✓ (Docs) 🔗
Field: impactAssessment		-	-	-	Hestia Aggregated Data ✓ (Docs) 🔗
<ul style="list-style-type: none"> Water, source unspecified 	m ³	1,500	not recalculated	-	-

Search or go to...

hestia-earth > Hestia Engine Models

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Hestia Engine Models

Project ID: 25790261

Star 1

1,408 Commits 6 Branches 166 Tags 1.1 GiB Project Storage

Hestia's set of models for running calculations or retrieving data using external datasets and internal lookups.

feat(emepEea2019): update combustion models to account for `operation`
Juliet Telfer authored 13 hours ago

f2f94111

deveLop hestia-engine-models History Find file Clone

- README
- MIT License
- CHANGELOG
- CONTRIBUTING

Name	Last commit	Last update
.gitlab/issue_templates	docs(contributing): improve guidelines	5 days ago
envs	chore: fix env for testing	4 days ago
hestia_earth	feat(emepEea2019): update combustion ...	13 hours ago
layer	chore(layer): remove markdown files	3 months ago
scripts	chore(scripts): use axios instead of s3 to ...	4 days ago

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deveLop hestia-engine-models / hestia_earth / models History Find file Clone

Name	Last commit	Last update
..		
agribalyse2016	fix(utils): fix liquid fuel include `petrol`	5 days ago
akagiEtAI2011AndIpcc2006	docs(*): specify Node types allowed per model	6 months ago
aware	docs(*): add missing models and terms	2 months ago
blonkConsultants2016	fix(*): rename `orchard` to `plantation`	1 month ago
chaudharyBrooks2018	fix(*): rename `orchard` to `plantation`	1 month ago
cml2001Baseline	docs(*): update documentation from glossary changes	3 days ago
cml2001NonBaseline	docs(*): update documentation from glossary changes	3 days ago
cycle	feat(cycle input): ignore background data on Input fr...	1 week ago
dammgen2009	docs(*): specify Node types allowed per model	6 months ago
data	chore(recipent): remove data file	10 months ago



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hestia-earth > Hestia Engine Models > Commits

develop hestia-engine-models Author Search by message

Sep 20, 2023

 **feat(emepEea2019): update combustion models to account for `operation`**
Juliet Telfer authored 13 hours ago and  Guillaume committed 13 hours ago



 f2f94111  




Sep 18, 2023

 **fix(impact assessment): handle skip not relevant models**
Guillaume authored 2 days ago

 3c8bf48d  

Sep 17, 2023

 **feat(ipcc2019): add n2ToAir organic and inorganic models**
daineromeo authored 3 days ago and  Guillaume committed 3 days ago



 58117287  




 **feat(model links): add `n2ToAirExcreta` under `jarvisAndPain1994`**
Guillaume authored 3 days ago


 3349aecb  

 **docs(*): update documentation from glossary changes**
Guillaume authored 3 days ago

9138877b  

 **feat(jarvisAndPain1994): add `n2ToAirExcreta` model**
schoi839 authored 3 days ago and  Guillaume committed 3 days ago

 9b33a8a6  

 **ci: skip steps in forks**
Guillaume authored 3 days ago

 637aba00  



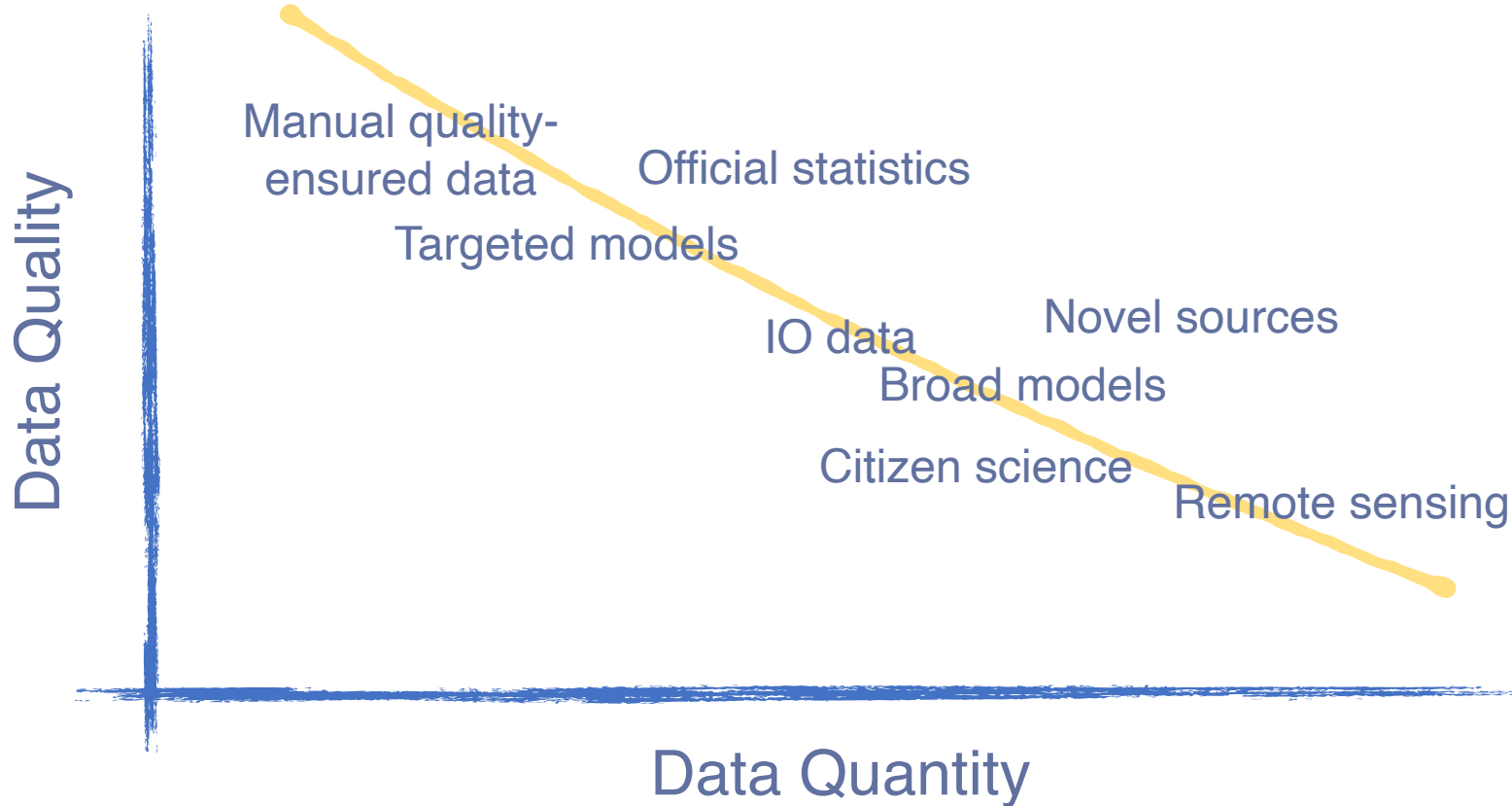
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The most interesting sources are missing!



Conclusions

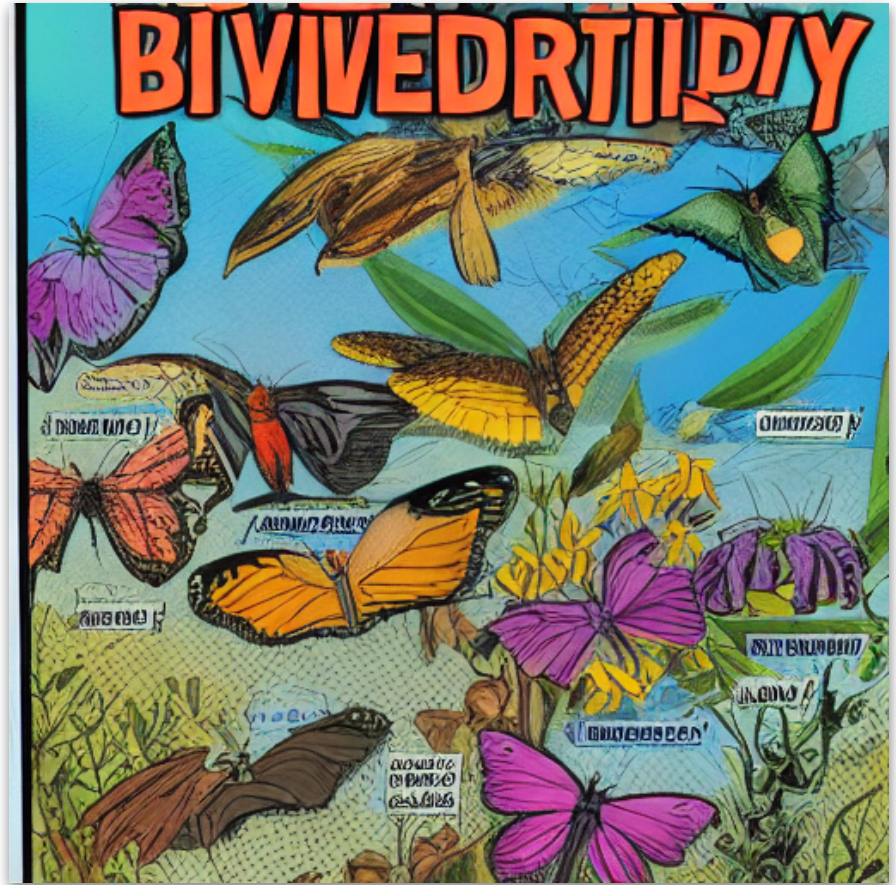
Let data scientists do their job

LCA practitioners should focus on their specific expertise

(Arguing about allocation)

Auditable and reviewed models FTW

We need everyone working together



Biodiversity?



Thanks!

Opinions are my own.

Slides: df84.mutel.org

Email me to discuss Brightway or how
ecoinvent can better support your work.

chris@cauldron.ch / mutel@ecoinvent.org

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seemed appropriate :)

