INFINITE AI, FINITE EARTH

DIALOOGSESSIE MET FAUSTO ALBERS EN TIWÁNEE VAN DER HORST

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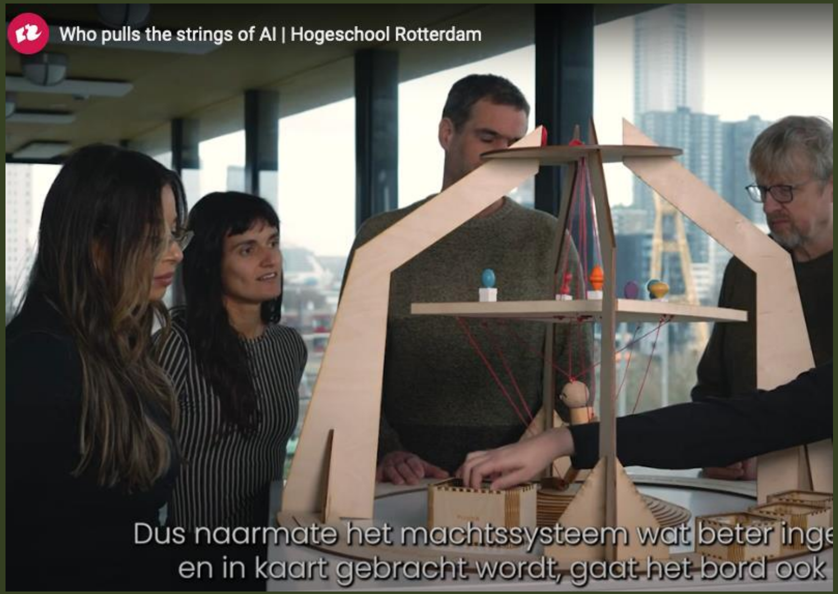
WIE ZIJN WIJ?

Fausto Albers

AI Engineer, founder AI builders community

Tiwánee van der Horst

Ontwerpend onderzoeker Cybersocial Design, AI & Society



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PROGRAMMA

14:00 Intro Infinite AI, Finite Earth

14:10 Toegepaste AI casus (Fausto)

14:15 Onderzoek casus (Tiwánee)

14:20 In gesprek: Duurzaam ontwerpen met bestaande AI / AI Duurzaam ontwerpen - Groepen verdelen

14:25 Dialoog in groepen van 4

14:40 Delen inzichten

14:50 Afronding + Einde

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ARTIFICIAL INTELLIGENCE NARRATIVES TODAY

TECHNOSOLUTIONISM : “WE NEED AI TO COMBAT CLIMATE CHANGE”
TECHNOFOBIA : “AI WILL MANIPULATE US OR TAKE ALL OUR JOBS”

HOW DO WE (WANT TO) ADDRESS THE ECOLOGICAL IMPACT OF AI?

DO WE ADDRESS THAT:

Training

Having a conversation with **Chat GPT** costs one **water bottle of 500 ml***

Applying

AI Applications like **driverless cars** and **delivery drones** pose **a threat to animals and natural environments****

Disposing

In 2050 the total amount **of e-waste on the planet** will be more than **one million sea containers*****

*Li, P., Yang, J., Islam, M., & Ren, S. (2023, oktober 29). *Making AI Less 'Thirsty': Uncovering and Addressing the Secret Water Footprint of AI Models*.
** https://earth.org/the-green-dilemma-can-ai-fulfil-its-potential-without-harming-the-environment/#:~:text=AI%20applications%20like%20driverless%20automobiles,and%20frequent%20delivery%20of%20goods.
***https://ewastemonitor.info/e-waste-will-double-by-2050/

EU AI ACT

her applicable Union law, those guidelines contribute to the design of a coherent, trustworthy and human-centric AI, in line with the Charte
human agency and oversight means that AI systems are developed and used as a tool that serves people, respects human dignity and per
d overseen by humans.

safety means that AI systems are developed and used in a way that allows robustness in the case of problems and resilience against atten
es, and minimise unintended harm. Privacy and data governance means that AI systems are developed and used in accordance with privac
ty and integrity. Transparency means that AI systems are developed and used in a way that allows appropriate traceability and explainabil
ly informing deployers of the capabilities and limitations of that AI system and affected persons about their rights. Diversity, non-discrimi
ctors and promotes equal access, gender equality and cultural diversity, while avoiding discriminatory impacts and unfair biases that are
ns are developed and used in a sustainable and environmentally friendly manner as well as in a way to benefit all human beings, while mo
ation of those principles should be translated, when possible, in the design and use of AI models. They should in any case serve as a basi
lustry, academia, civil society and standardisation organisations, are encouraged to take into account as appropriate the ethical principles

neficial uses of AI, that technology can also be misused and provide novel and powerful tools for manipulative, exploitative and social control practice
radict Union values of respect for human dignity, freedom, equality, democracy and the rule of law and fundamental rights enshrined in the Charter, i

ve techniques can be used to persuade persons to engage in unwanted behaviours, or to deceive them by nudging them into decisions in
the market, the putting into service or the use of certain AI systems ***with the objective to or the effect of materially distorting*** human behaviour, v
l***, psychological health or financial interests*** are likely to occur, ***are particularly dangerous and*** should ***therefore*** be forbidden. Such AI systems
those stimuli are beyond human perception or other manipulative or deceptive techniques that subvert or impair person's autonomy, deci
vare, they are still deceived or are not able to control or resist. This could be facilitated, for example, by machine-brain interfaces or virtua

UN SUSTAINABLE DEVELOPMENT GOALS (SDG)

ORDERED LIKE THIS?

SDG Wedding Cake Model. A way of viewing the economic, social, and ecological aspects of the Sustainability Development Goals. From Azote for Stockholm Resilience Centre, Stockholm University (CC BY 4.0)-https://www.stockholmresilience.org/research/researchnews/2016-06-14-how-food-connects-all-the-sdgs.html. The illustration is free to use under the Creative Commons license (CC BY 4.0)

PLANETARY BOUNDARIES

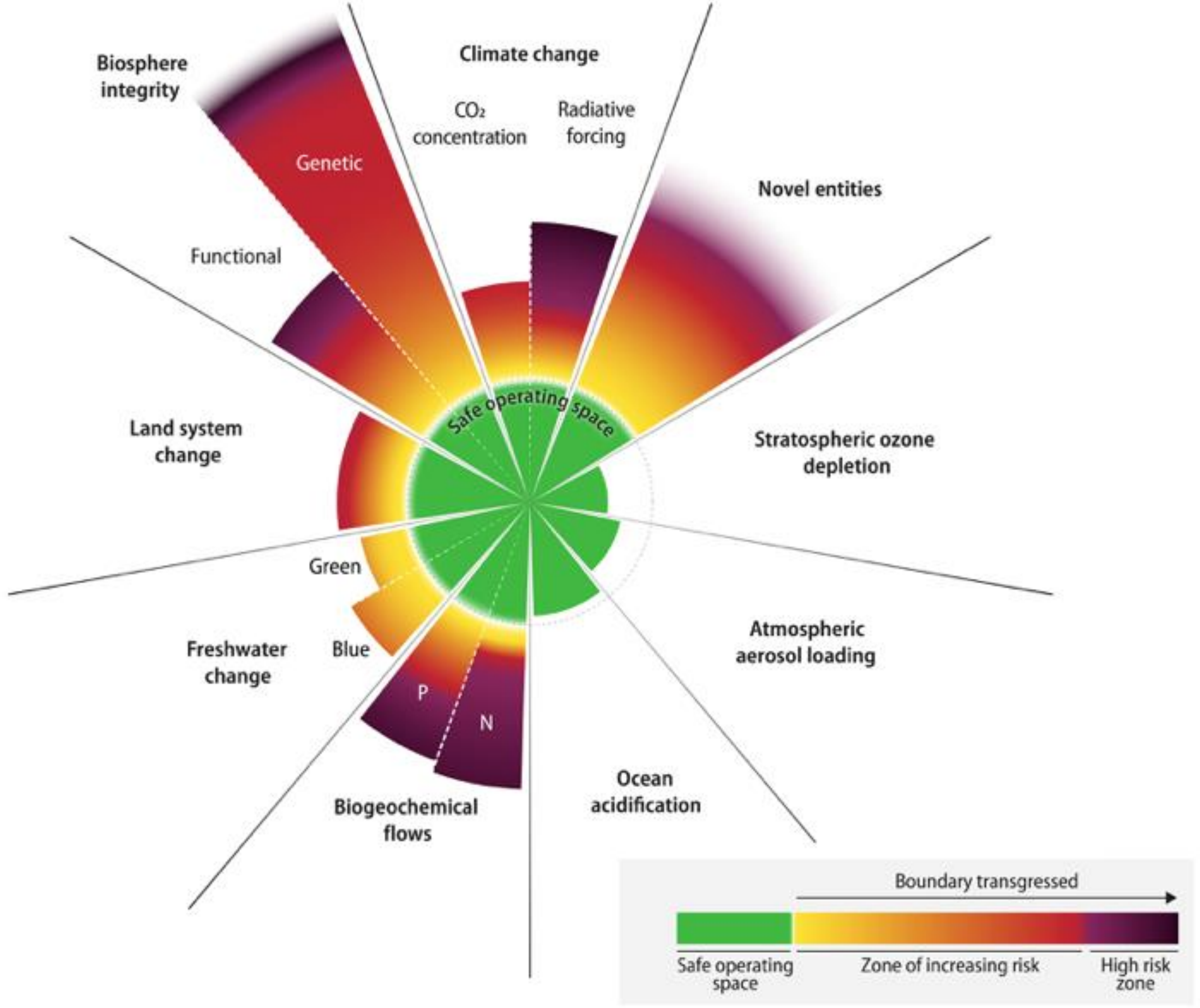

Fig. 1. Current status of control variables for all nine planetary boundaries.
Six of the nine boundaries are transgressed. In addition, ocean acidification is approaching its planetary boundary. The green zone is the safe operating space (below the boundary). Yellow to red represents the zone of increasing risk. Purple indicates the high-risk zone where interglacial Earth system conditions are transgressed with high confidence. Values for control variables are normalized so that the origin represents

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Earth beyond six of nine planetary boundaries.. 2023 *Sci. Adv.* **9** Katherine Richardson *et al.* (2023).DOI:10.1126/sciadv.adh2458

ACHTERGROND

De vraag naar energie groeide in 2024 opvallend hard

Klimaatverandering De toename werd voor een belangrijk deel veroorzaakt door het koelen van gebouwen om hitte te doorstaan. Door de toegenomen energievraag raken de klimaatdoelen verder uit zicht.

Laura Bergshoef
24 maart 2025 • Leestijd 2 minuten

Luisteren Leeslijst

Naast al die airco's speelden het energieverbruik vanuit de industrie, de elektrificatie van auto's, en de groei van datacenters en kunstmatige intelligentie een belangrijke rol in de toegenomen energievraag. Vooral opkomende economieën zoals China en India stuwden de vraag op. Zelfs de energievraag in de Europese Unie steeg weer, na een jarenlange daling sinds 2017 (met uitzondering van coronajaar 2021). Volgens het IEA komt dat onder meer door de daling van de energieprijzen.

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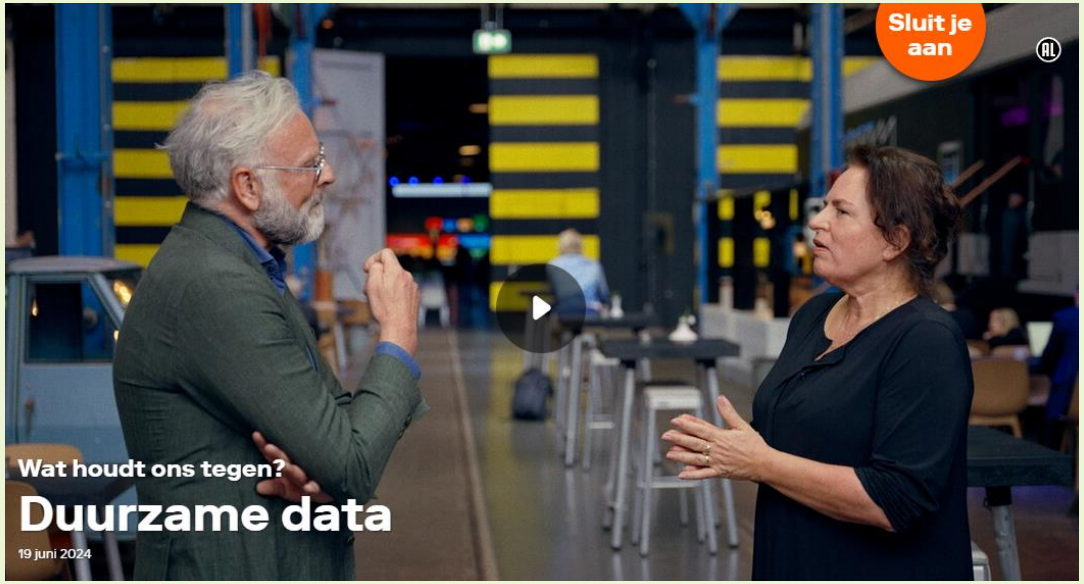
De vraag naar energie groeide in 2024 opvallend hard – NRC

WHAT CAN WE DO IN AI DESIGN?

Model Design | Training | Interface Design | Toepassen | Hardware afval | Data afval | Rapportage



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Model Design | Training | Interface Design | Toepassen | Hardware afval | Data afval | Rapportage

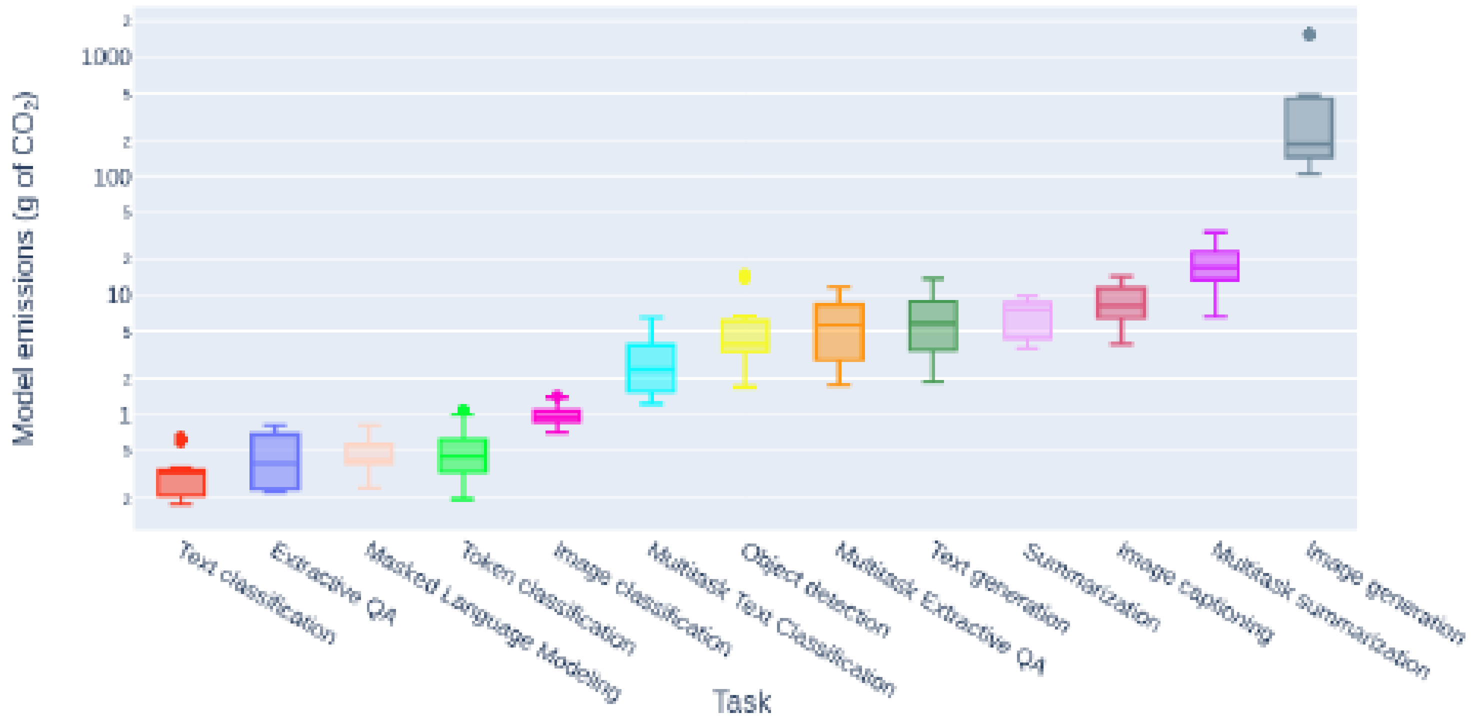
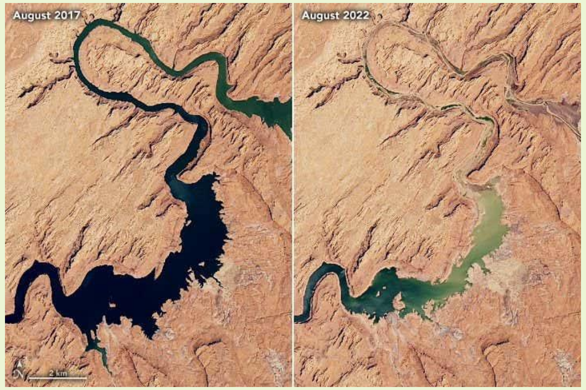


Figure 1: The tasks examined in our study and the average quantity of carbon emissions they produced (in g of CO_2eq) for 1,000 queries. N.B. The y axis is in logarithmic scale.

Power Hungry Processing: Watts Driving the Cost of AI Deployment? (Luccioni & Strubell, 2024)

https://www.datacenterdynamics.com/en /news/metas-mesa-arizona-data-center-comes-online/. Published 30 January 2025

The cloud is carbon, water and matter



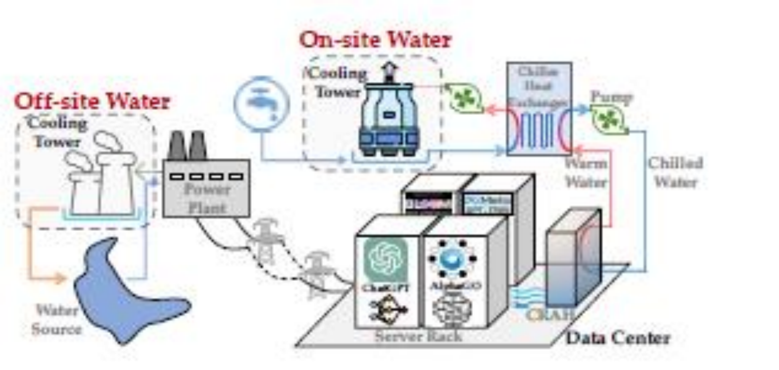


Photo: NASA Earth Observatory

Making AI Less “Thirsty”: Uncovering and Addressing the SecretWater Footprint of AI Models (Li. Et al, 2023)

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Model Design | Training | **Interface Design** | Toepassen | Hardware afval | Data afval | Rapportage

Kleurgebruik

Keuze opties

Toegankelijkheid (abonnementen)

Detail niveau

Fig. 1. The interface of Craiyon [screenshot].

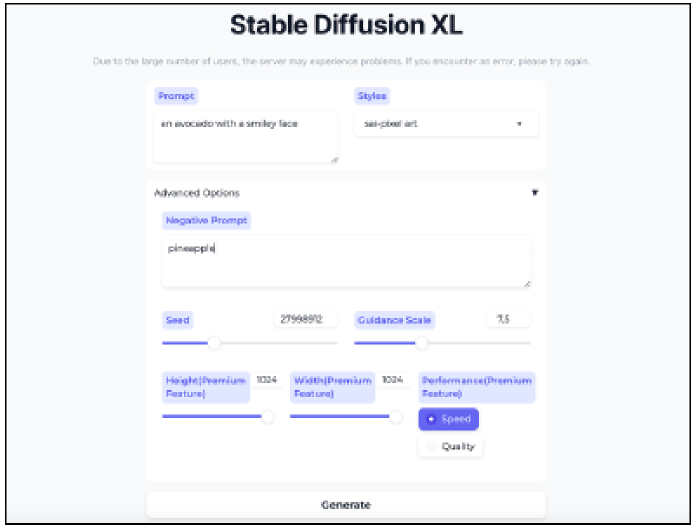

Fig. 3. The interface of Stable Diffusion [screenshot].

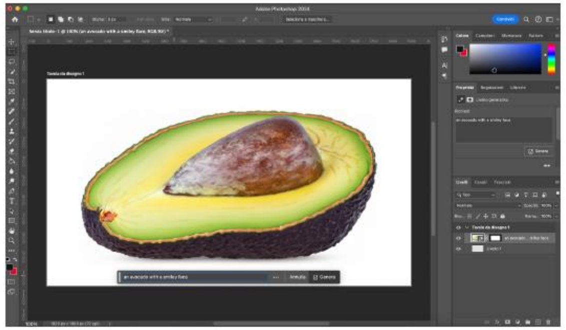

Fig. 4. Adobe Firefly integrated in Photoshop [screenshot].

Fig. 5. The interface of DALL-E 3 integrated in ChatGPT [screenshot].

Challenges and Responsibilities in the UX Design of Text-to-Image AI Models: A Discussion Through a Comparative Heuristics Evaluation (Vacanti et al., 2024)

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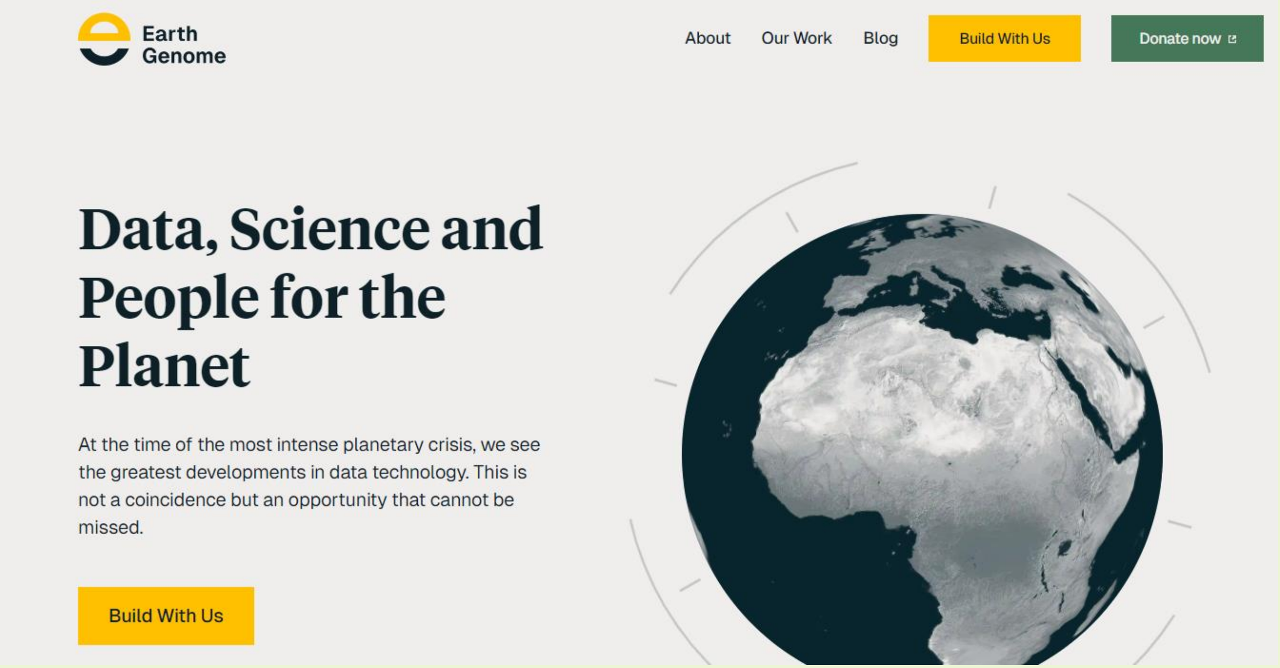
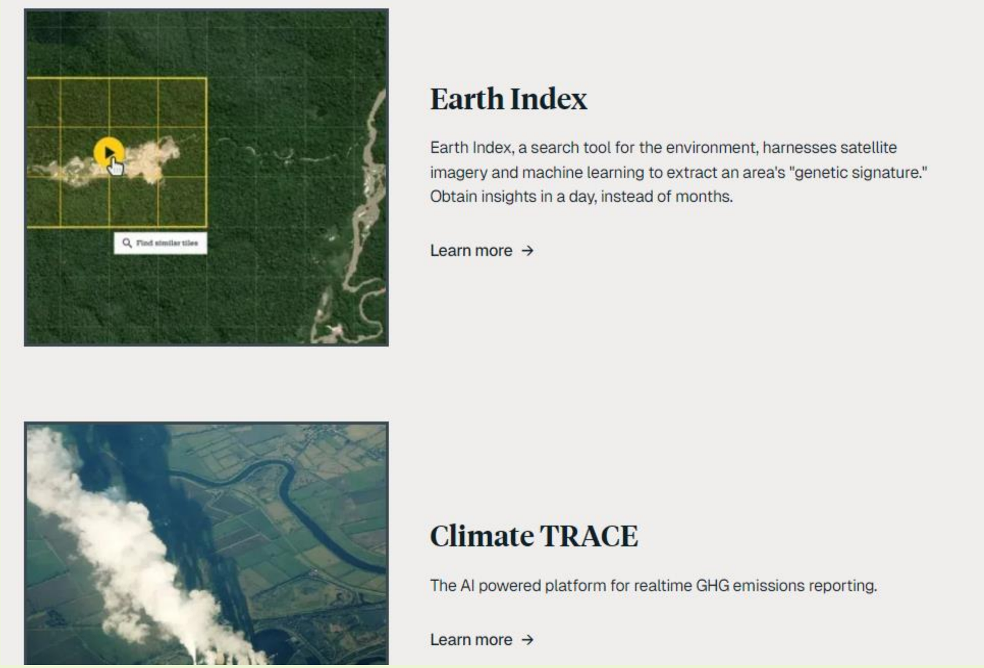
Model Design | Training | Interface Design | **Toepassen** | Hardware afval | Data afval | Rapportage





Voorbeeld:
https://www.earthgenome.org/

Model Design | Training | Interface Design | Toepassen | **Hardware afval** | Data afval | Rapportage

Hergebruik je bestaande computers, GPU's?

Maak je efficient gebruik van de hardware die je kiest?

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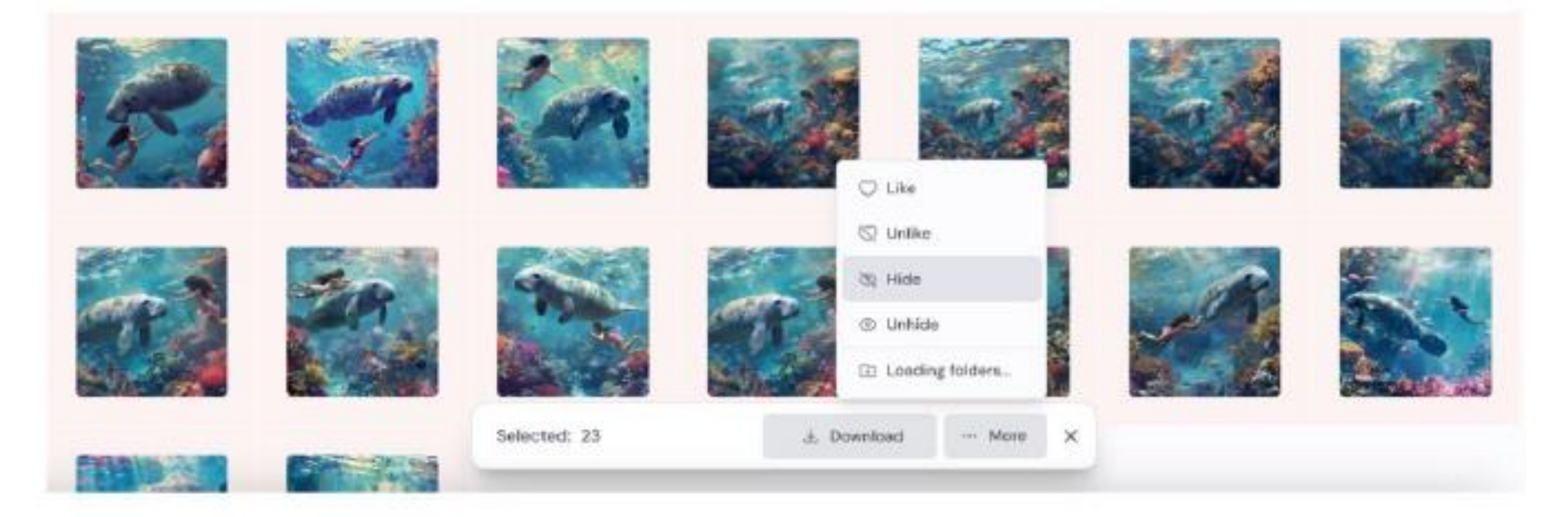
Wie kan meebeslissen over de data die opgeslagen wordt?

Wanneer besluit je Gen AI te gebruiken?

Welke data sla je op?



AI Waste: The invisible hyper-linear model of Generative AI. (De Chirico & Vacanti, 2024)

Hoe meet je wat jouw ecologische impact is?

Emissions for individual code repositories based on infrastructure and power consumption.

Exemplary equivalents to put emissions in context.

Voorbeeld:
https://codecarbon.io/

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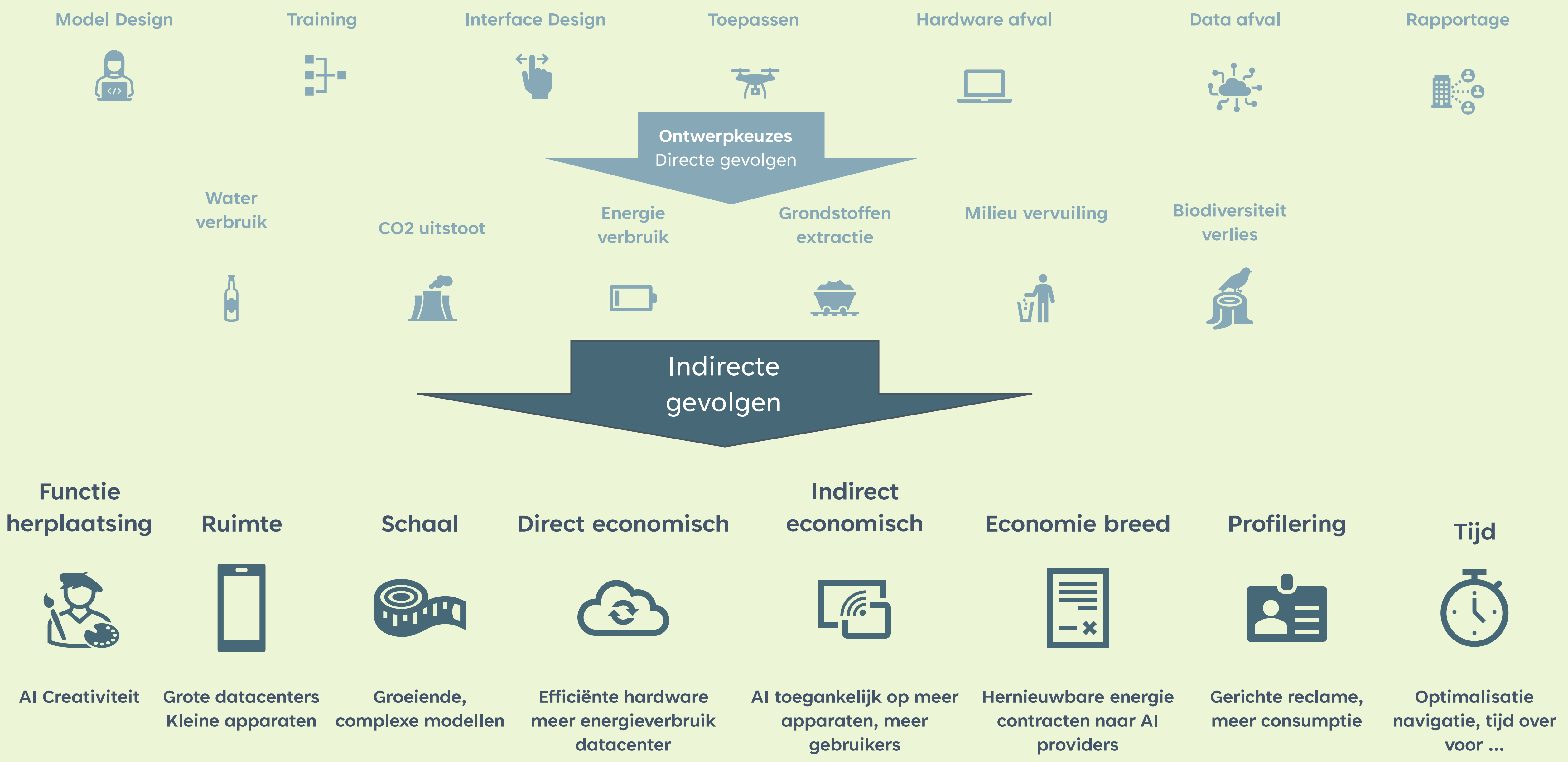
Model Design
Training
Interface Design
Toepassen
Hardware afval
Data afval
Rapportage
Ontwerpkeuzes
Directe gevolgen
Water verbruik
CO2 uitstoot
Energie verbruik
Grondstoffen extractie
Milieu vervuiling
Biodiversiteit verlies



From Efficiency Gains to Rebound Effects: The Problem of Jevons' Paradox in AI's Polarized Environmental Debate (Luccioni et al. 2025)

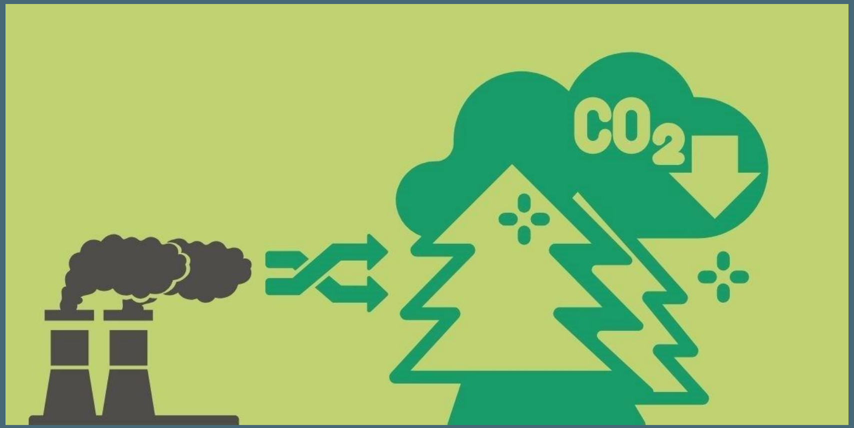
PRAKTIJK CASUS

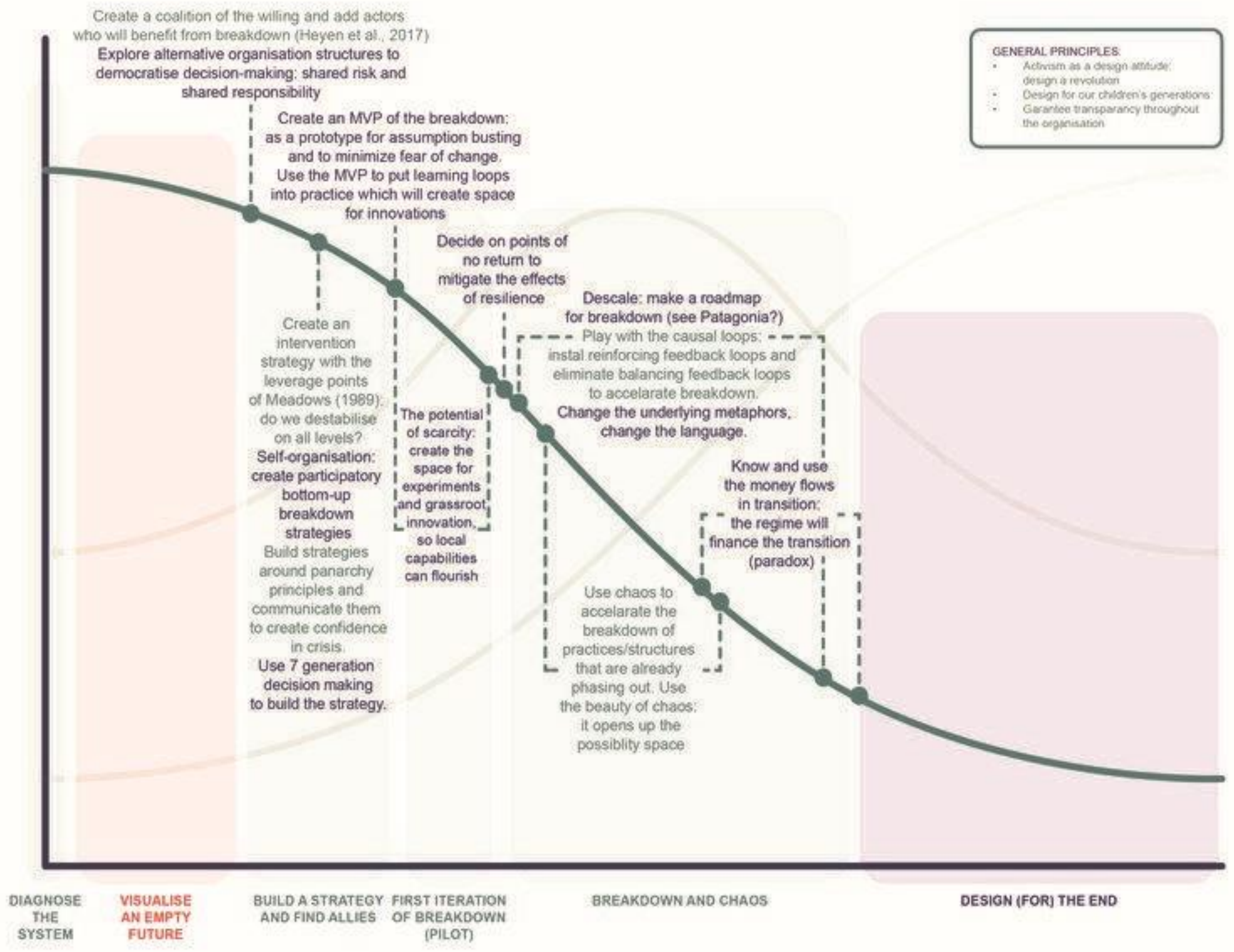
GENERATIEVE AI – CURSOR – TOEPASSEN OM TE CODEREN

ONDERZOEK CASUS:

DECARBONISEREN EN EXNOVEREN

DECARBONISEREN EN EXNOVEREN





Exnovation framework:
A proposal for an exnovation process to 'design away' unsustainable practices in sustainability transitions. PLATE 2023, Helsinki. (Noëth et al. 2023)
Exnovation for Decarbonisation: Digital Decompute. STS Hub, Berlin, March 2025. Joanna Boehnert, Alexander Alistair.

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DESIGNING FOR THE END: PERMACOMPUTING

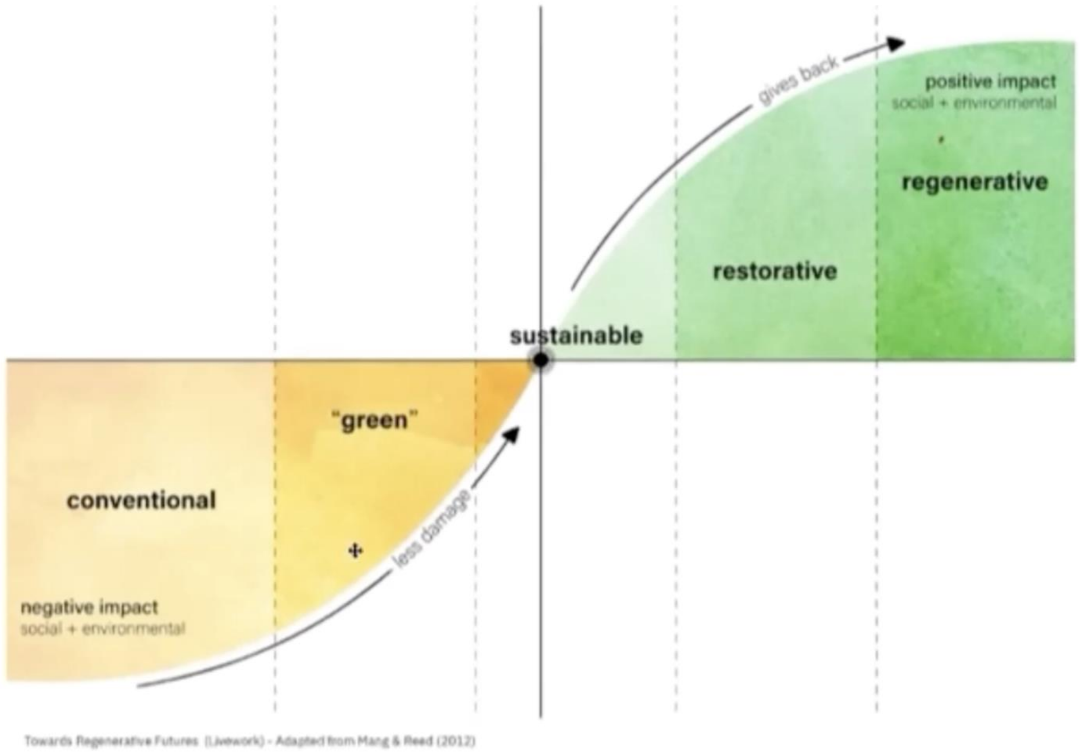
Permacomputing wiki: https://permacomputing.net/

Figure 4: A cartridge of the game What Remains, made by player mi213 by repurposing an old game, and following the project DIY instructions. Photography, mi213, 2021.

awareness of environmental consequences work well with obsolete, low-power hardware and afford a calmer and more reflective pattern of use.

Permacomputing Aesthetics: Potential and Limits of Constraints in Computational Art, Design and Culture. (Mansoux et al. 2023)

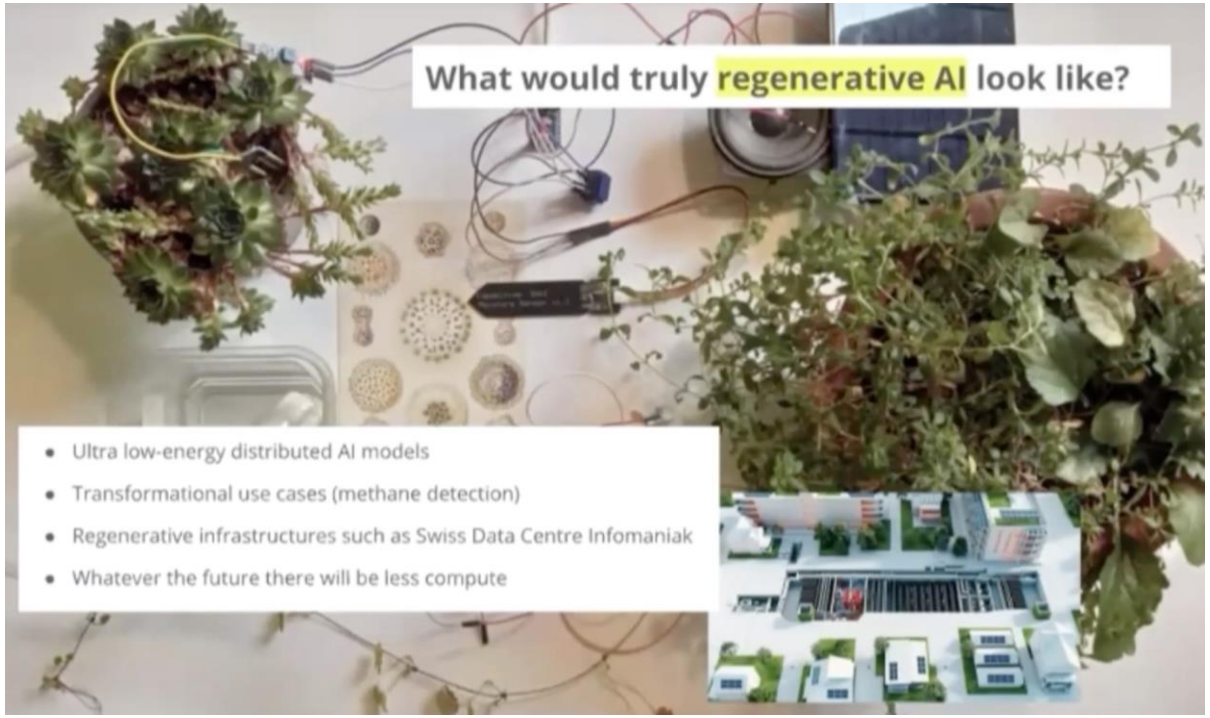
REGENERATIVE TECHNOLOGY



Towards Regenerative Futures (Livework) - Adapted from Mang & Reed (2012)

Pathways for Net Zero+, Joanna Boehnert, Alexander Alistair, Bath Spa University.
www.youtube.com/watch?v=HjNGSSX6Qjcum.com/symposium-program

REGENERATIVE TECHNOLOGY



www.youtube.com/watch?v=HjNGSSX6Qjcum.com/symposium-program
The Ecological in AI Fictions & Futures. Joanna Boehnert & Alexander Alistair. After AI symposium. May 2025.

DUURZAAM ONTWERPEN MET BESTAANDE AI
CASUS: GENERATIEVE AI – CURSOR - TOEPASSEN OM TE CODEREN

Uitdagingen:

AI systemen worden steeds efficiënter, waardoor hardware waar AI op kan draaien toegankelijker wordt. Hierdoor zullen er wel steeds meer mensen deze tools gaan gebruiken.

AI systemen zijn er nu eenmaal, we moeten leren hoe deze het beste toe te passen.

Duurzaam ontwerpen met bestaande AI:

Bedenk van te voren wat je wil creëren: betere prompt engineering leidt tot minder ecologische impact (energieverbruik, CO2 uistoot).

Coderen met AI kan er voor zorgen dat we minder tijd kwijt zijn aan, nu nog, tijdsintensieve arbeid.

Welke menselijke behoefte vervult deze AI?

Wat win je met het inzetten van generatieve AI?

Wat kost het inzetten van generatieve AI jou? Wat kost het inzetten van generatieve AI de planeet en ecosystemen?

AI DUURZAAM ONTWERPEN
CASUS: DECARBONISEREN EN EXNOVEREN

Uitdagingen:

Initiatieven voor het decarboniseren van digitale infrastructuur zijn gestoeld op het verminderen van CO2 emissies, zonder het verminderen van decarbonisatie initiatieven in andere sectoren.

We mobiliseren het concept exnovatie (Noeth and Moons 2024).

We (her)gebruiken alleen nog hardware die er al is. ‘Permacomputing’ (Mansoux et al. 2023)

AI duurzaam ontwerpen:

Hoe maken we technologie die de ecologie centraal zet?

Hoe schalen we onze afhankelijkheid op digitale infrastructuren terug voor lage impact, gedistribueerde netwerken?

Hoe maken we technologie die actief kan bijdragen aan het restaureren van de planeet en ecosystemen?

Exnovation for Decarbonisation: Digital Decompute Authors: Joanna Boehnert, Alistair Alexander (2025)

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AI DUURZAAM ONTWERPEN
CASUS: DECARBONISEREN EN EXNOVEREN

KIES DE CASUS WAAROVER JIJ IN GESPREK WIL GAAN

IN GESPREK

GROEPEN VAN 4 PERSONEN

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Wanneer gebruik je een AI om iets voor jou te genereren?

Wanneer niet?

Wat heb je als gebruiker nodig om duurzaam gebruik te maken van bestaande AI?

AI DUURZAAM ONTWERPEN

CASUS: DECARBONISEREN EN EXNOVEREN

Hoe dient generatieve AI ontworpen te worden om te opereren binnen planetaire grenzen (het ecosysteem in balans te houden)?

En wat is er voor nodig vanuit regulering en/of onderzoek om dit te faciliteren?

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AI DUURZAAM ONTWERPEN
CASUS: DECARBONISEREN EN EXNOVEREN

DELEN INZICHTEN

Tiwánee van der Horst

Rotterdam University of Applied Sciences

t.s.van.der.horst@hr.nl

Lectorates

Cybersocial Design, Anja Overdiek

AI & Society, Maaike Harbers

Research group

Responsible Applied Artificial InTelligence

www.raait.nl