



# *Generative AI*

MAX WELLING



# Overzicht

- AI Terminologie
- Wat is Generative AI?
- Is er nu een AI Revolutie?
- Kansen en Gevaren
- Nederland AI-Gidsland?

**Artist Wins Photography Contest After Submitting AI-Generated Image, Then Forfeits Prize**

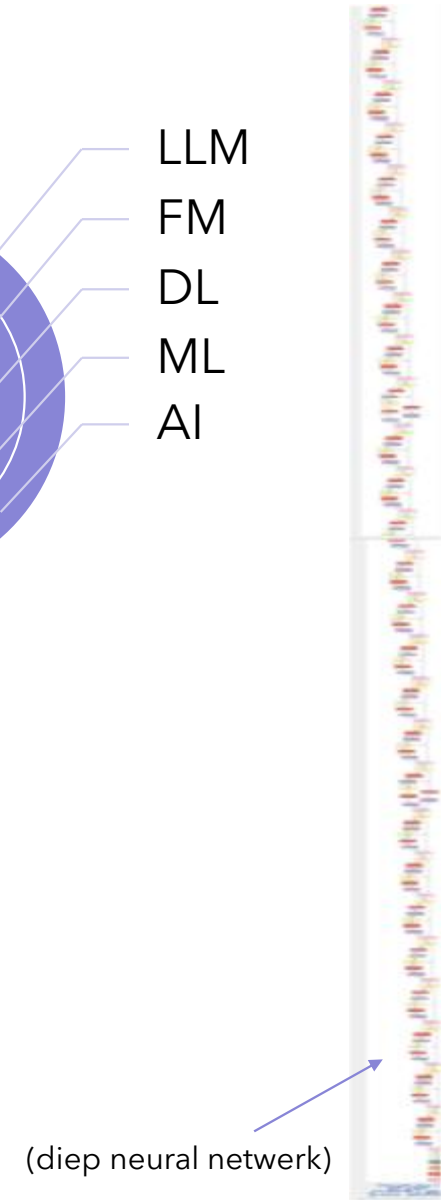
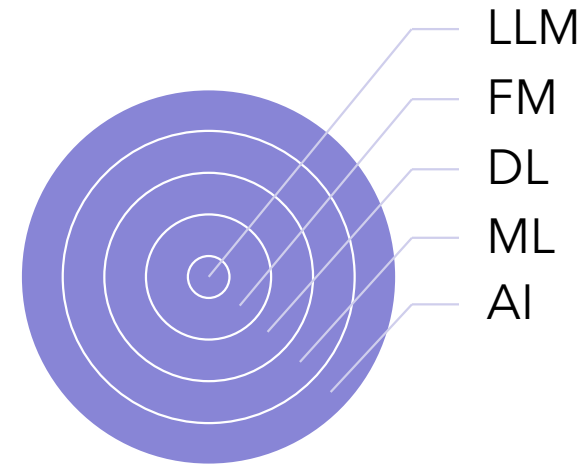


*An A.I.-Generated Picture Won an Art Prize. Artists Aren't Happy.*



# Het ABC van AI

- AI: **Kunstmatige Intelligentie**
  - Het slimmer maken van machines
- ML: **Machine Learning**
  - Machines die leren van observaties/data
- DL: **Deep Learning**
  - Hele grote (diepe) neural netwerken met miljarden parameters.
- FM: **Foundation Models**
  - Enorme modellen getrained op verschillende datasets.
  - Basis model voor vele gespecialiseerde aftakkingen ("finetuning")
- LLM: **Large Language Models**
  - Chatbots (bijv. chatGPT) getrained op enorme tekst corpora
  - Vertonen een brede vorm van intelligentie hebben ("AGI")

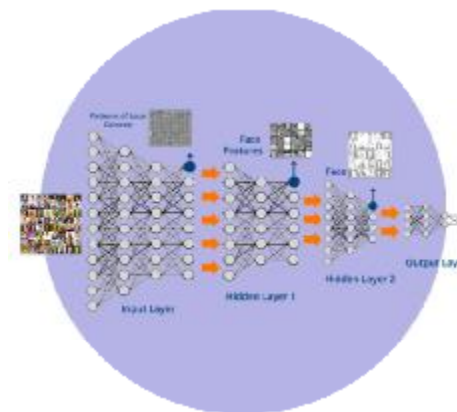


# ML als zichzelf-programmierende software



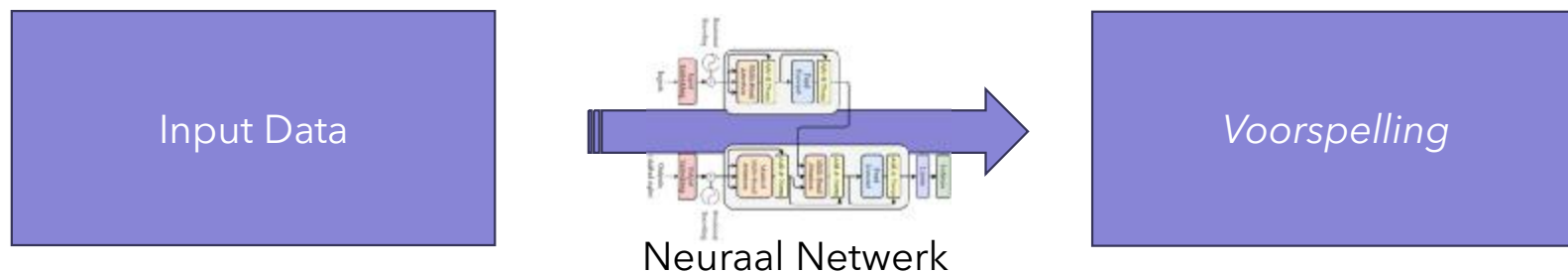
```
43 <code>class Page {
44 </code>
45 <code>  public Page(String url) {
46 </code>
47 <code>    this.url = url;
48 </code>
49 <code>    this.title = "Page Title";
50 </code>
51 <code>    this.content = "Page Content";
52 </code>
53 <code>  }
54 </code>
55 <code>  public void display() {
56 </code>
57 <code>    System.out.println("Page: " + url);
58 </code>
59 <code>    System.out.println("Title: " + title);
60 </code>
61 <code>    System.out.println("Content: " + content);
62 </code>
63 <code>  }
64 </code>
65 </code>
66 </pre>
```

Traditionele software



Zelf-programmerende software

# Wat is "Generative AI"?

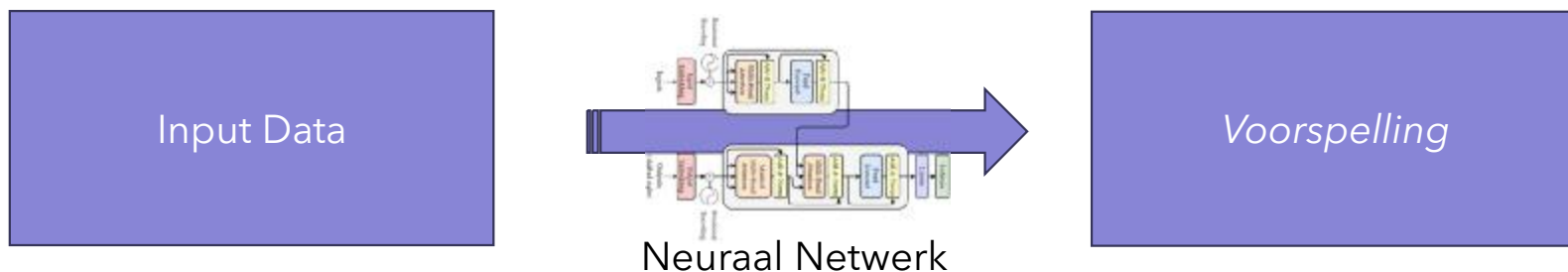


Input (foto)

Voorspelling (wat is waar)



# Wat is "Generative AI"?



"Maak een leuke grap over Robbert Dijkgraaf"

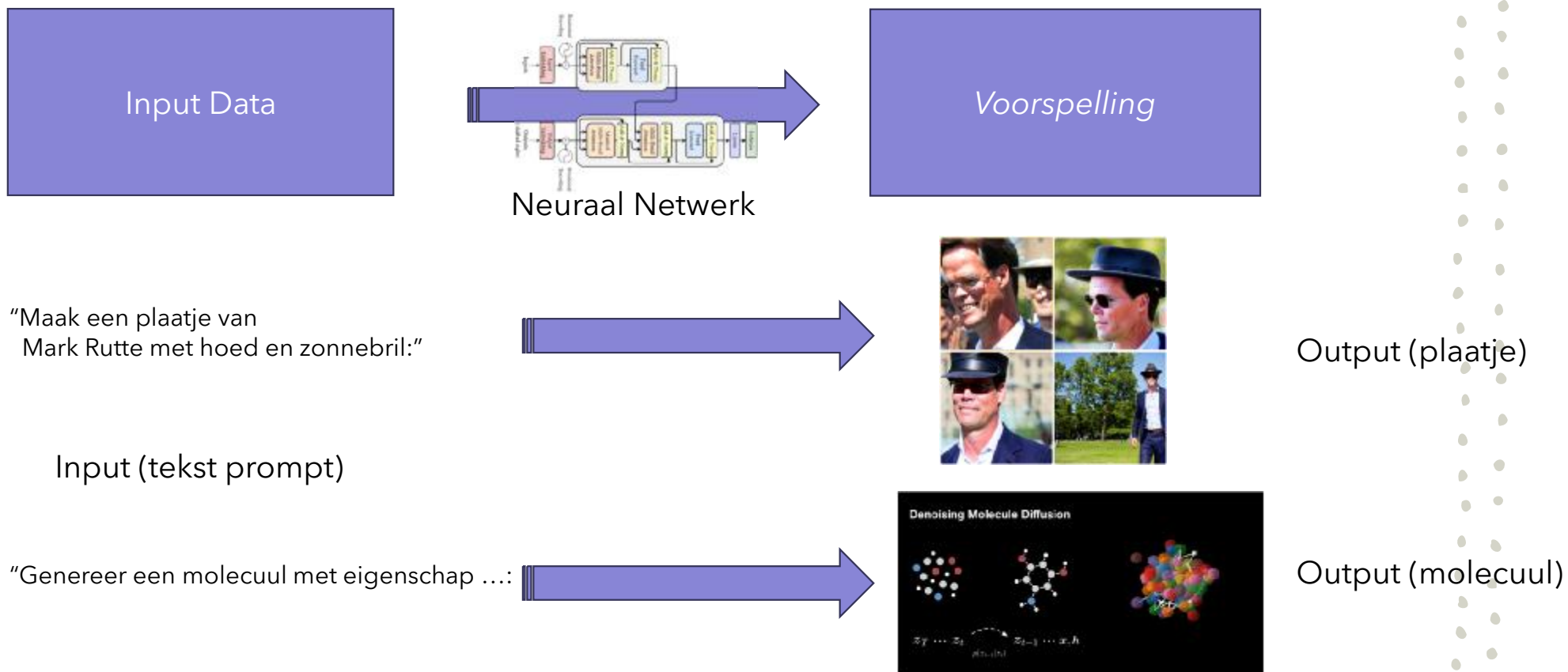


Input (tekst prompt)

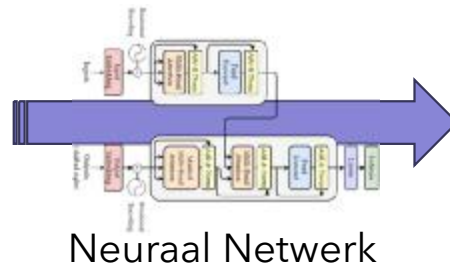
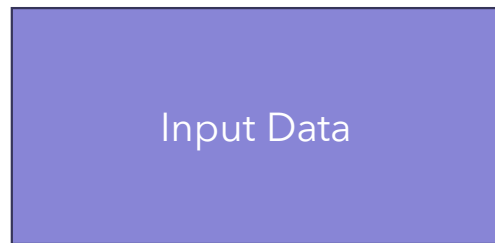
Output (tekst = "leuke grap")



# Wat is "Generative AI"?



# Reinforcement Learning



Input: observaties



Output: serie beslissingen

Input: waar ben ik?



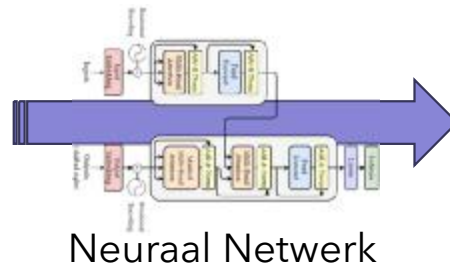
Output: links, rechts, rechtdoor, ...  
(tot de kaas)





# Reinforcement Learning

Input Data



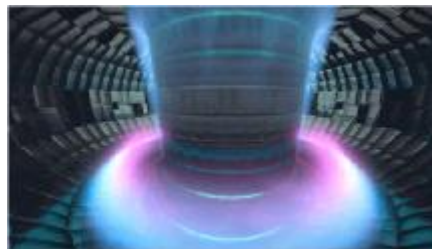
Voorspelling

Input: GO bord



Output: waar leg ik mijn steen?

Input: toestand plasma



Output: magneetveldsterkte

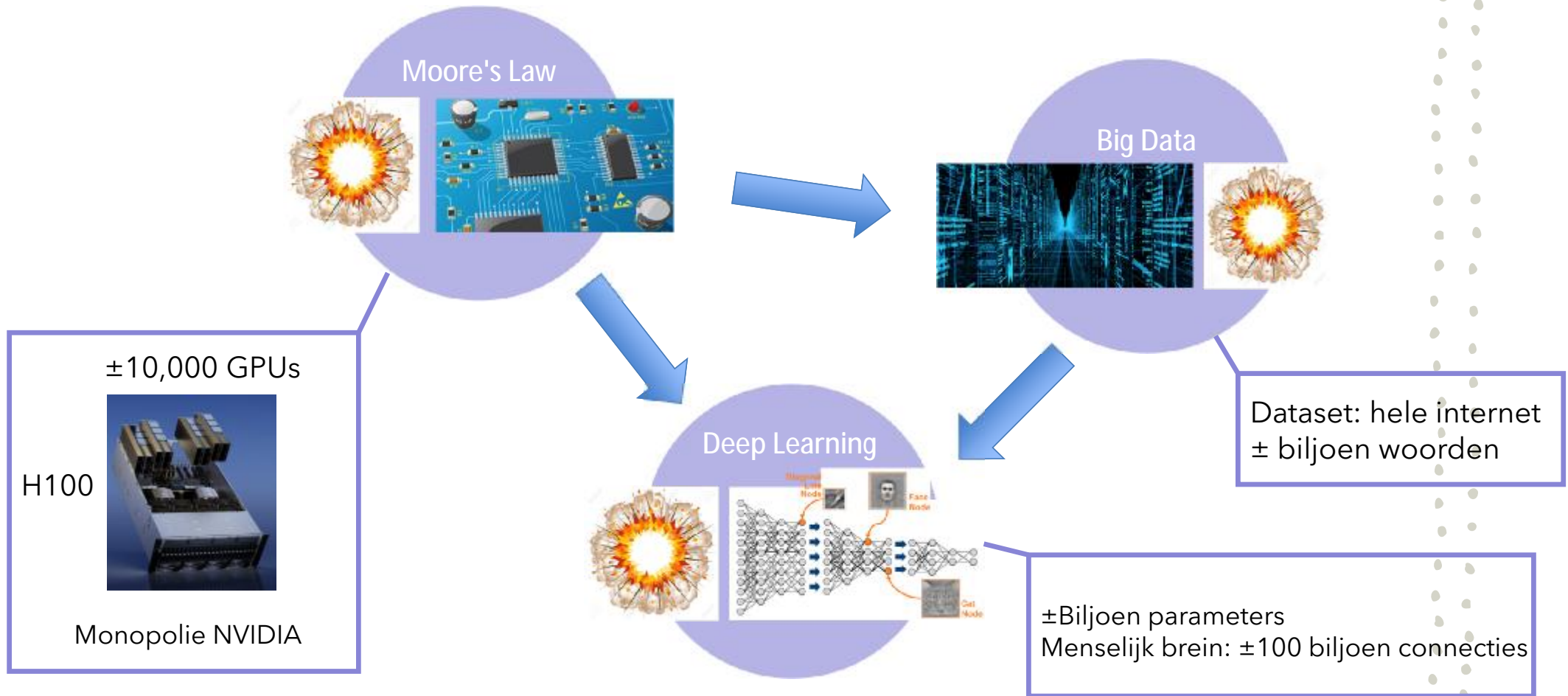


# Het "Groter is Beter" Paradigma



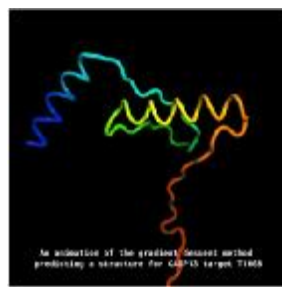
- Groter = Beter
- Kosten zijn heel hoog (tussen €10M-100M)
- Kan Europa concureren?

# Explosieve Groei in Compute, Data en Modellen

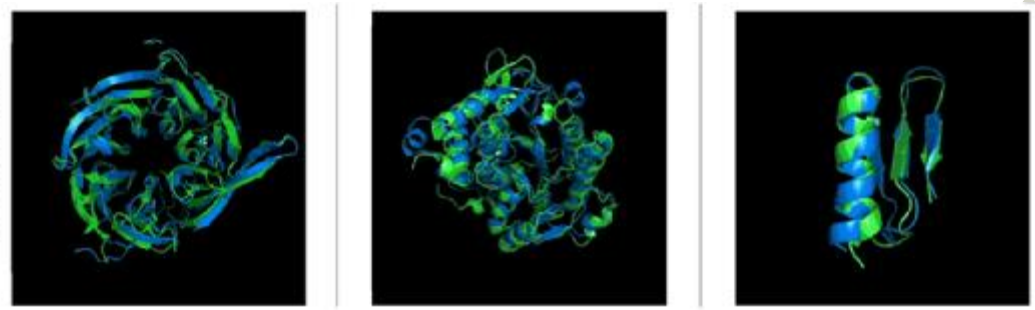


# Voorbeelden van Recente Successen

- AlphaFold:



Structures:  
Ground truth (green)  
Predicted (blue)



- Image/Video Generation

**GPT-4**

Prompt: Can you write a proof that there are infinitely many primes, with every line that rhymes?

GPT-4:

```

Yes, I think I can.
Though it might take a clever plan,
I'll start by noting Euclid's proof,
Which shows that primes aren't just about.
Assume to have a finite list,
Of primes, and that none have been missed.
Multiply them all together,
And add one just to be a guess.
The result will be a number,
That has no prime factor, at all.
But every number has a prime,
That divides it, so it's just a matter of time.
So we've found a contradiction,
And our finite list needs attention.
There must be infinitely many primes,
And that's the end of my rhyming lines.
    
```



"A shot following a hiker through jungle brush."

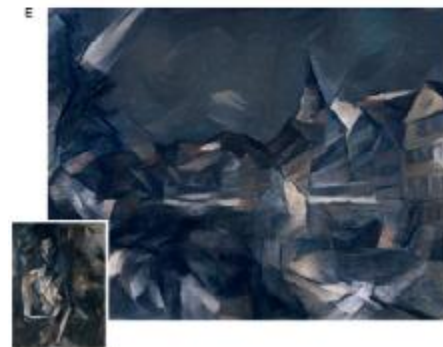


"An aerial shot of a mountain landscape."

- ChatGPT

# Kansen & Gevaren

- Artificial **General** Intelligence (chatGPT) is een "game changer" (geen statistische papagaai)
- Enorme kansen in healthcare & natuurwetenschappen. (Maar het zal heel breed inzetbaar zijn, zelfs in de kunst) →
- Niets reguleren (niks of alles verbieden) is slecht voor NL: reguleer de toepassingen op risico niveau
- Gevaren zijn moeilijk to voorzien: vorm **rapid response team**



# Nederland als AI-Gidsland?

- AI = Systeemtechnologie
- Belangrijkste factoren voor AI succes:
  - Talent
  - Computerkracht
  - Data
  - Ethische kaders
  - Participatie overheid en bedrijven
  - Venture Capital: Sterk Startup & Scaleup ecosysteem
- Concentreer middelen ("CERN" voor AI)
  - Denk Europees: bv. ELLIS & CLAIRE
  - Betrek bedrijfsleven: bv. ICAI
  - Faciliteer met compute, data, ethisch kader

Innovation Center  
for AI



European Lab for Learning  
and Intelligent Systems



Confederation of  
Laboratories for  
Artificial Intelligence  
Research in Europe

