

**TNO** innovation  
for life

# DIGITAL STRATEGY GEOLOGICAL SURVEY OF THE NETHERLANDS

GWF ROTTERDAM, 4<sup>TH</sup> MAY 2023



# GEOLOGICAL SURVEY OF THE NETHERLANDS



GSN provides independent knowledge of the Dutch subsurface and subsurface technologies. Such knowledge is prerequisite to answer societal questions and needs, both now and in the future. Hence, GSN operates within a complex multi-stakeholder environment.



## ECONOMIC

e.g. resources: geo-energy, raw materials, groundwater



## SOCIETAL

e.g. climate, energy transition



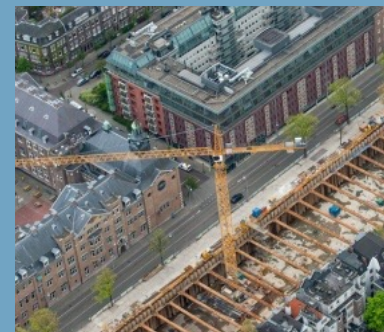
## RISK MANAGEMENT

e.g. earthquakes, subsidence, safe abandonment



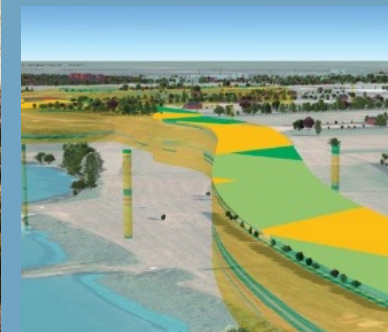
## BUILT ENVIRONMENT

e.g. subsurface spatial planning, ground conditions



## FUTURE CHALLENGES

e.g. digital twins, emerging societal questions



## › OUR DIGITAL VISION

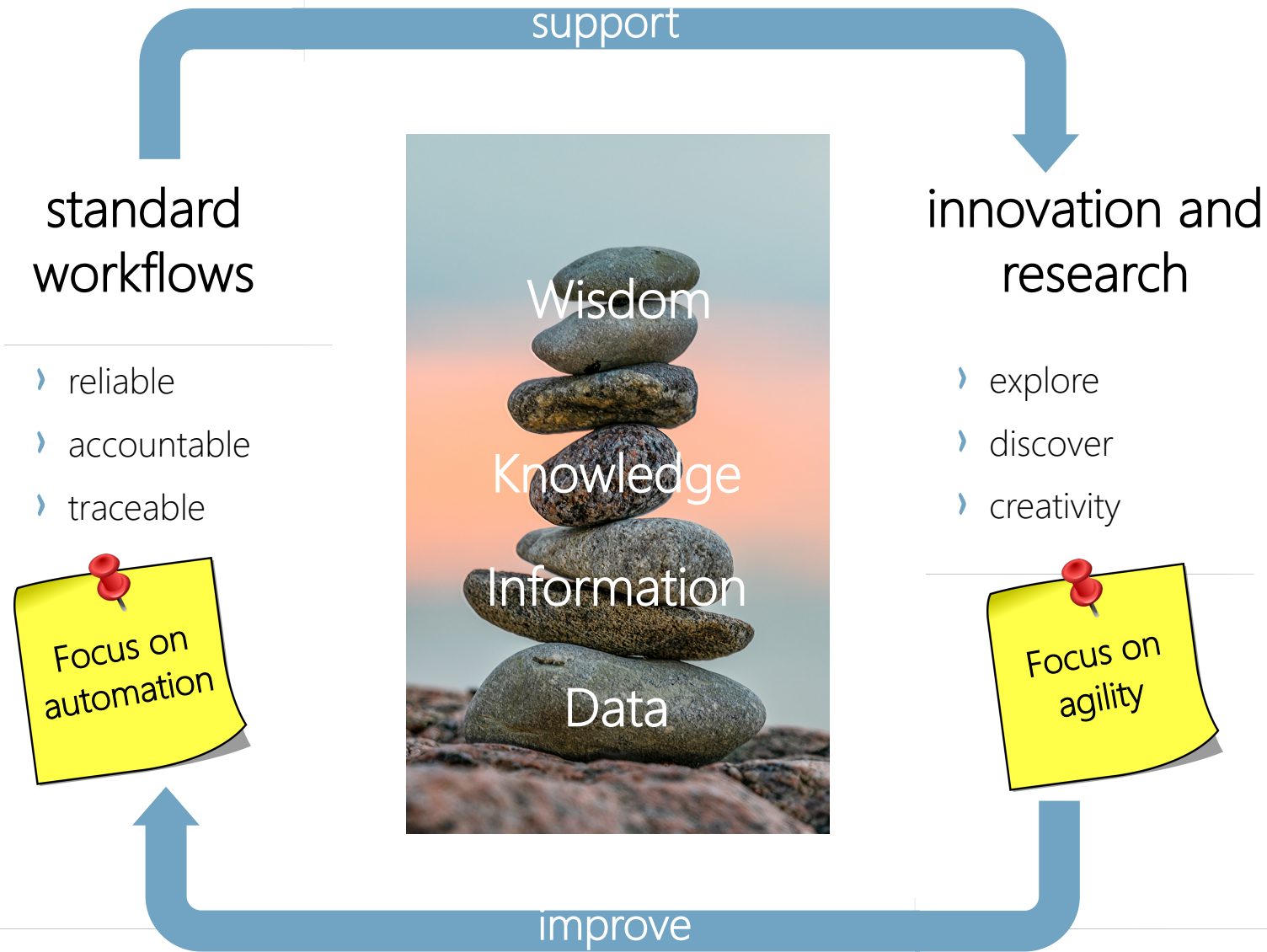
Create a digital leading Survey where modern information technology improves the value of Geological knowledge for the societal challenges of today and tomorrow.

This means:

- › Supporting our researchers with trusted data, easily accessible and fit for purpose.
- › Opening up to new technologies that help access to and interpretation of the ever increasing volumes of data.
- › Improve existing business processes by automation where possible and flexibility where needed.
- › Disseminate our data and information products both in vivid web applications for our users and fast and standardised API's for their systems.
- › Design, build and maintain modern, stable and manageable information systems to support this and that keep meeting our dynamic requirements.



# › BUSINESS IS LEADING



# › BUSINESS IS LEADING: DATA

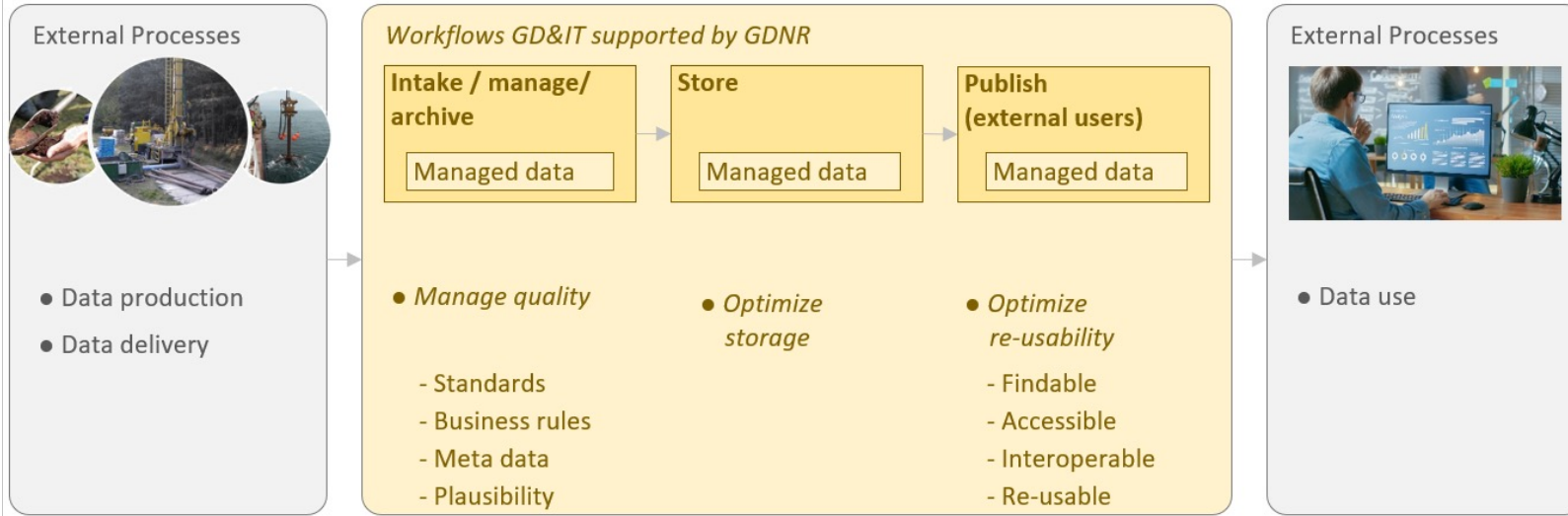
Data as the oxygen that fuels the fire of the Fourth Industrial Revolution \*)

- › Data is key
  - Structured, transparent, traceable, trustable
- › Access is essential
  - Open, findable, re-usable

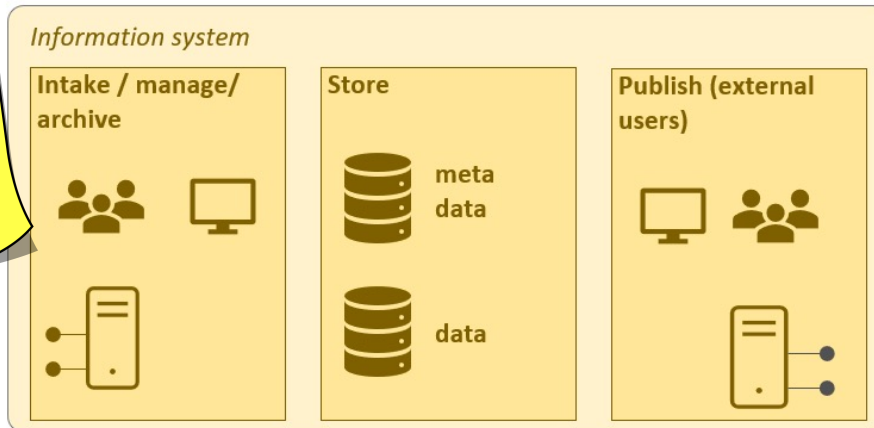
\*) [Federated Data Systems: Balancing Innovation and Trust in the Use of Sensitive Data, World Economic Forum, 2019](#)



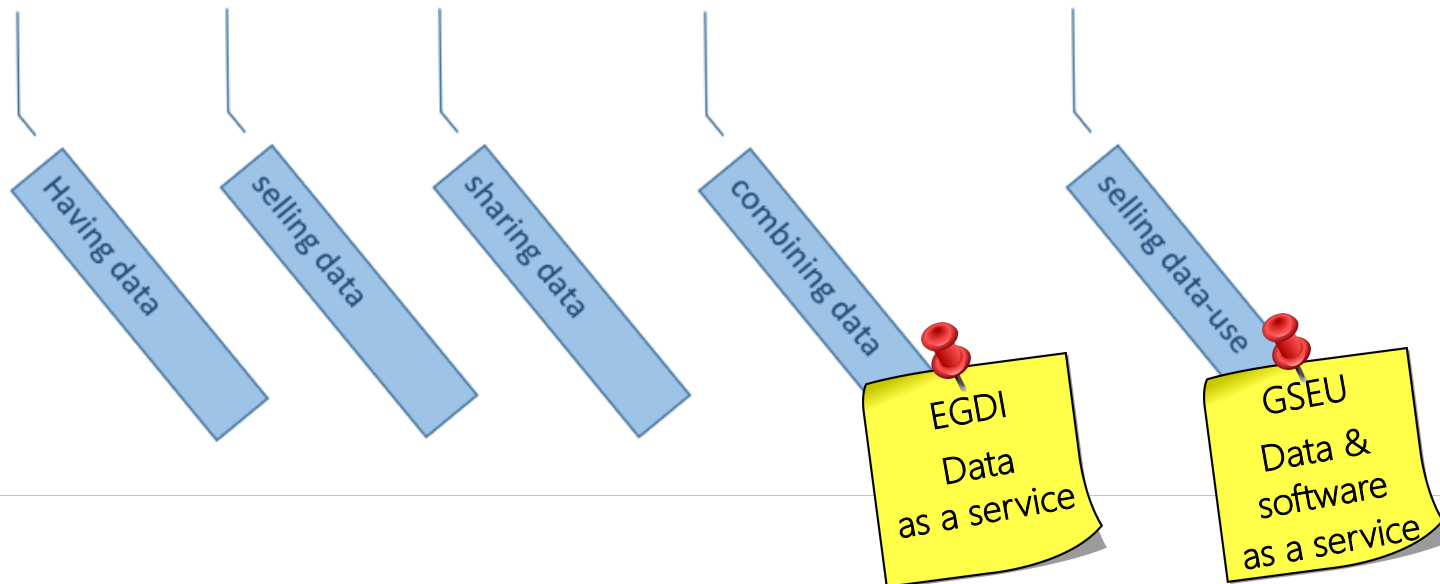
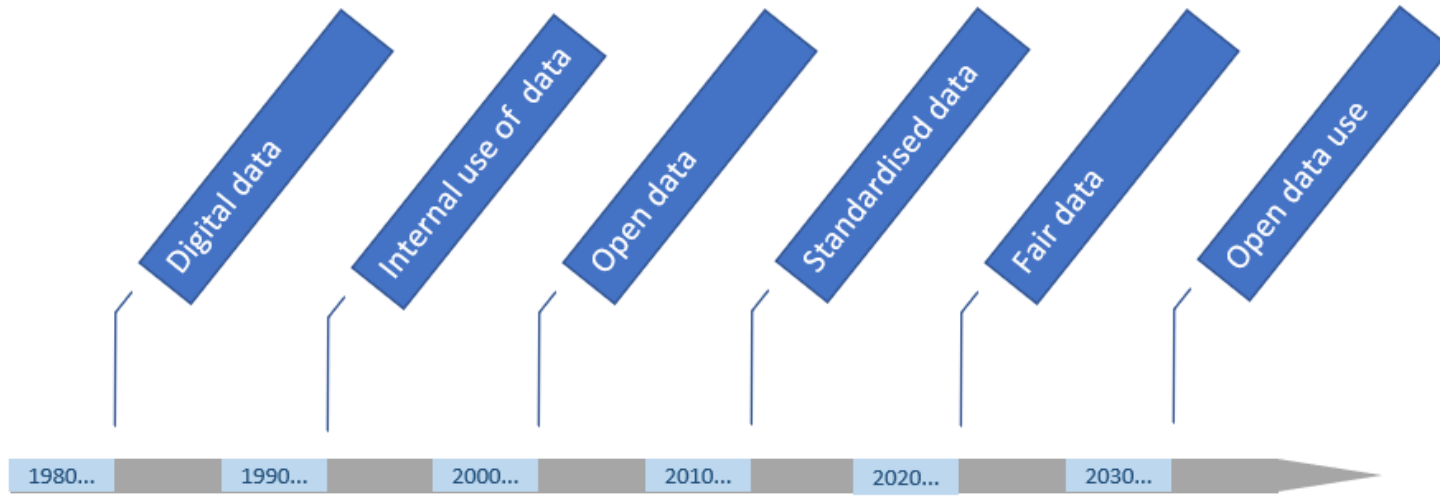
# BUSINESS IS LEADING: SYSTEMS



Lean,  
effective,  
efficient



# › (USING) DATA IS BUSINESS



## › DIGITAL TWINS

### *It's all about scale and expectations*

- › On-surface we can see all details; in the subsurface we are nearly blind
- › On-surface we understand what we see, in the subsurface not-geologists don't

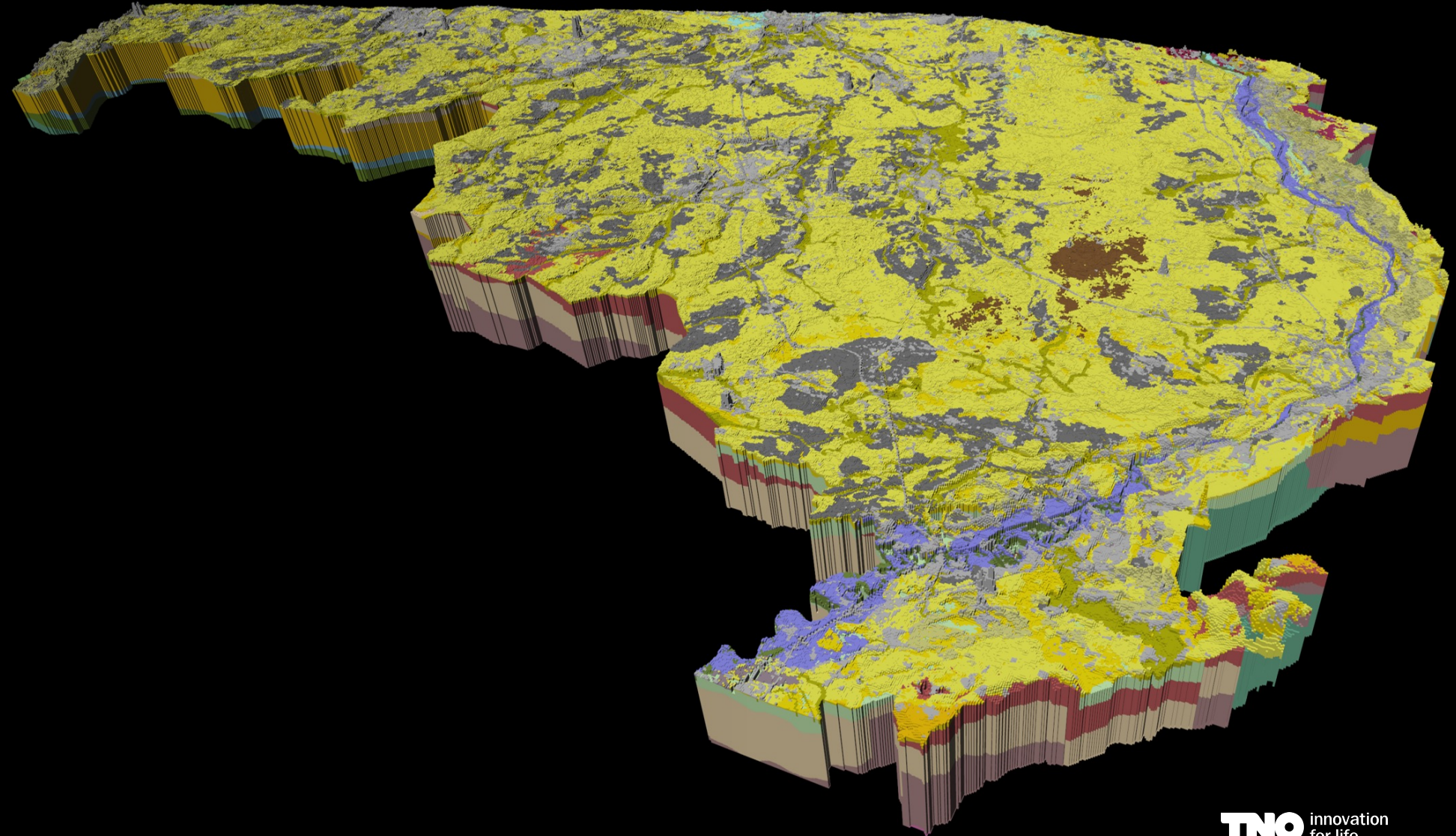
### *Open up to new techniques*

- › Process more data, release updates more frequent
- › Be flexible with scales: provide more detail where it is needed
- › Be creative in finding new ways of visualisation
- › Think 4D: what will happen if ... changes
- › Translate Geology into the language of the users

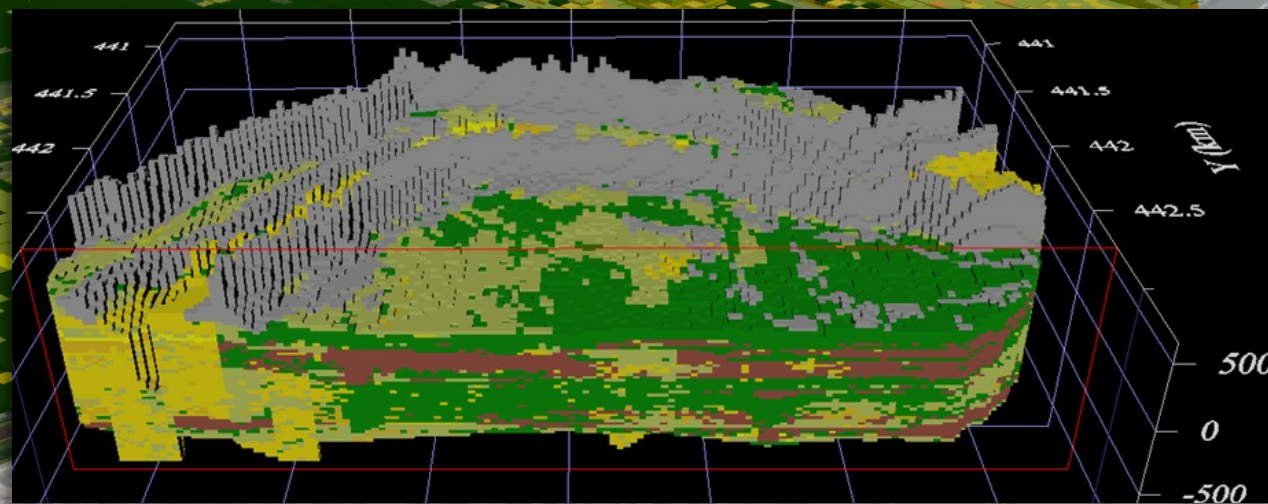
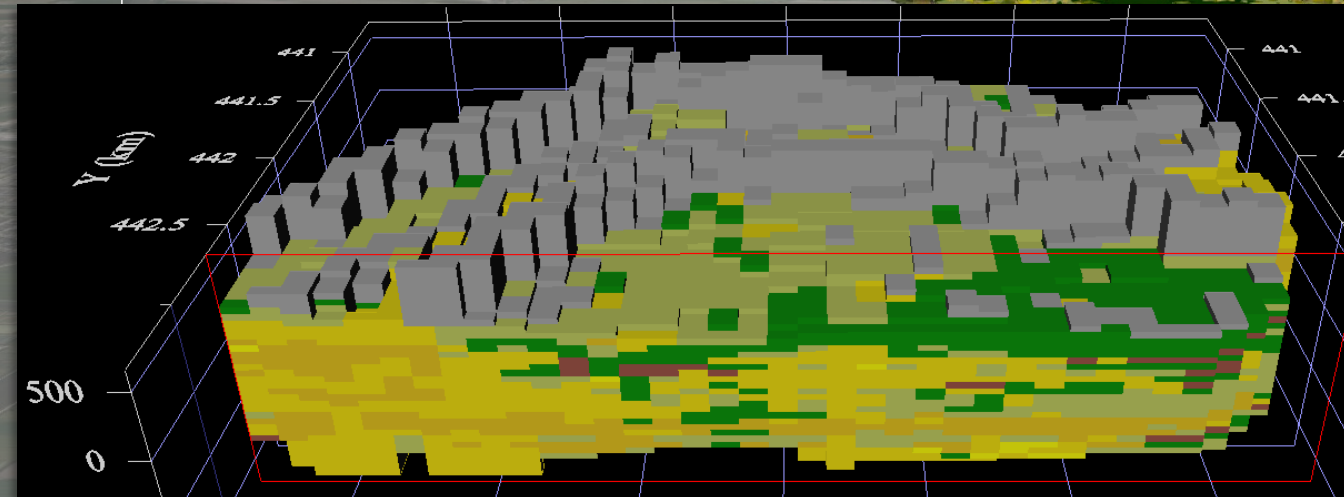




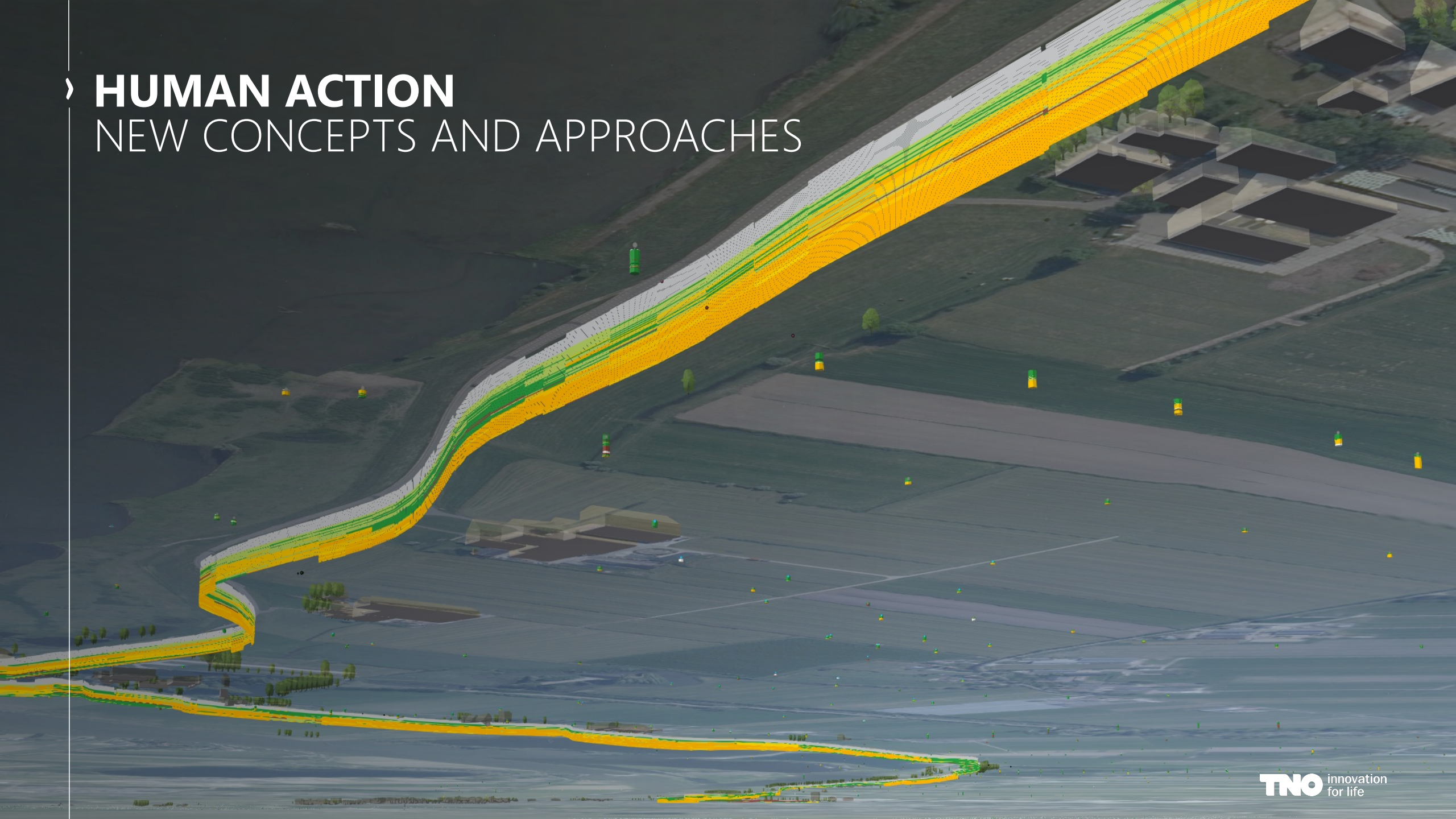
# › DUTCH GEOLOGICAL MAPPING SYSTEMATIC 3-D



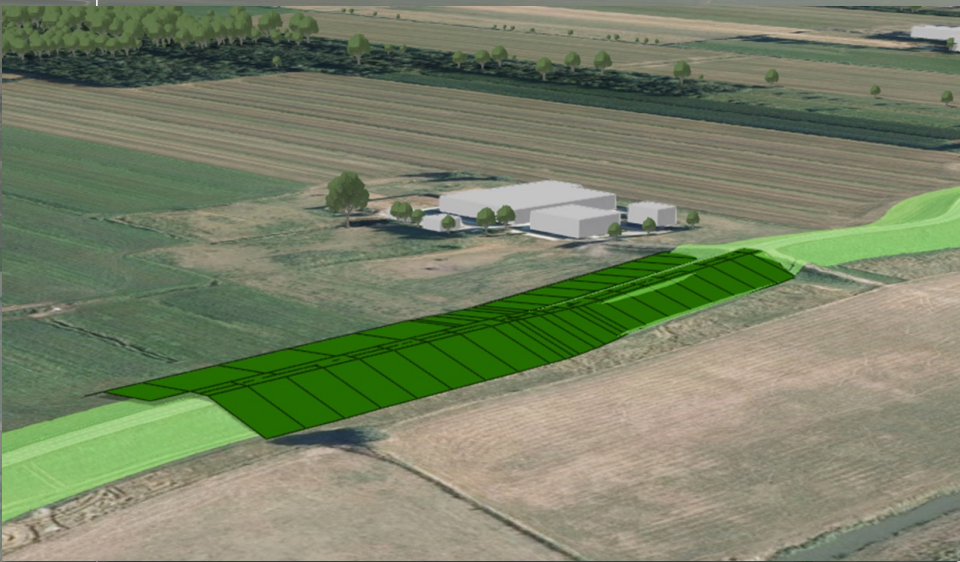
› **HIGHER RESOLUTION REQUIRED**  
MORE DATA, IMPROVED DATA PROCESSING



# › HUMAN ACTION NEW CONCEPTS AND APPROACHES



# › INTEGRATION FOR NOW: A 3-D MEETING PLACE

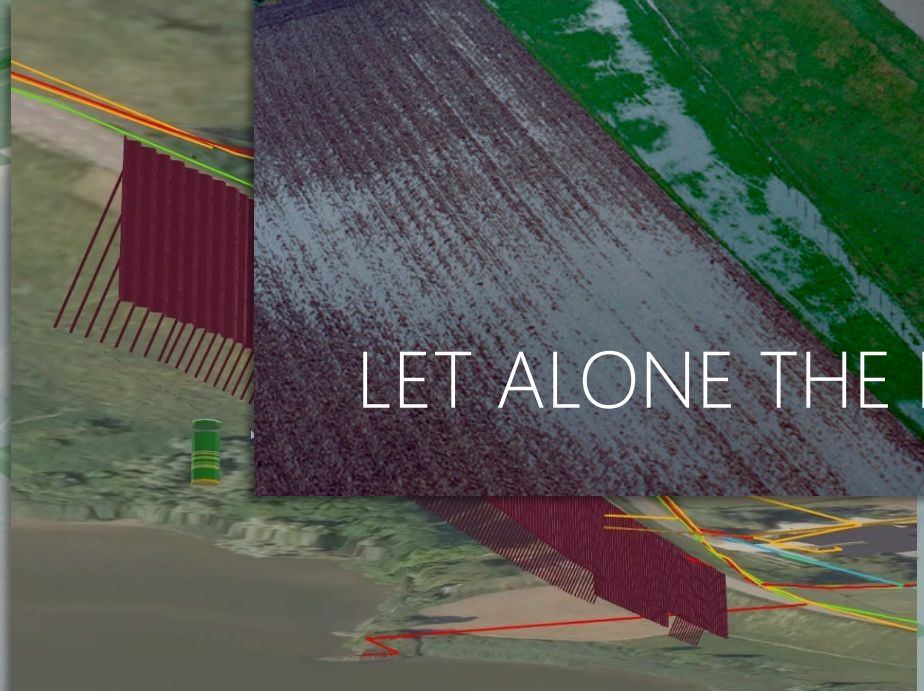
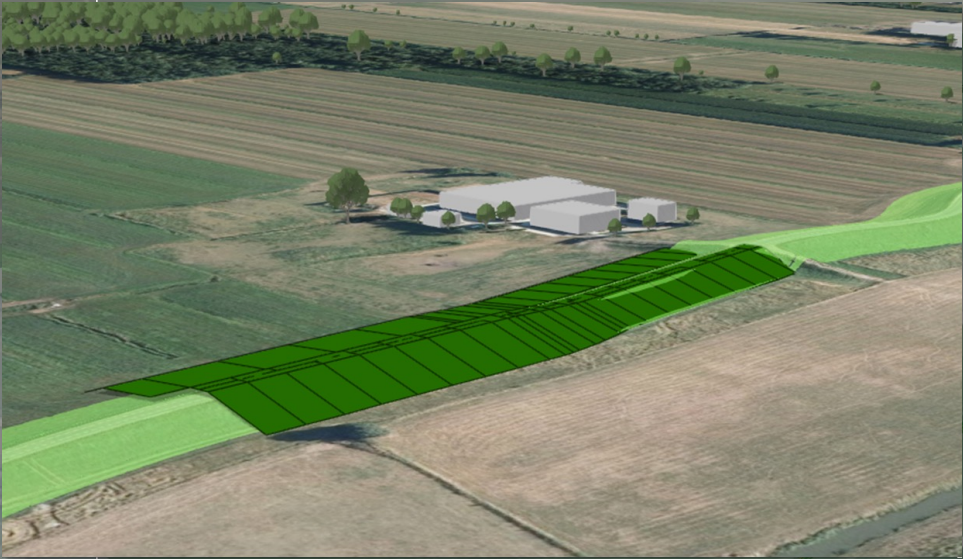


Legend:

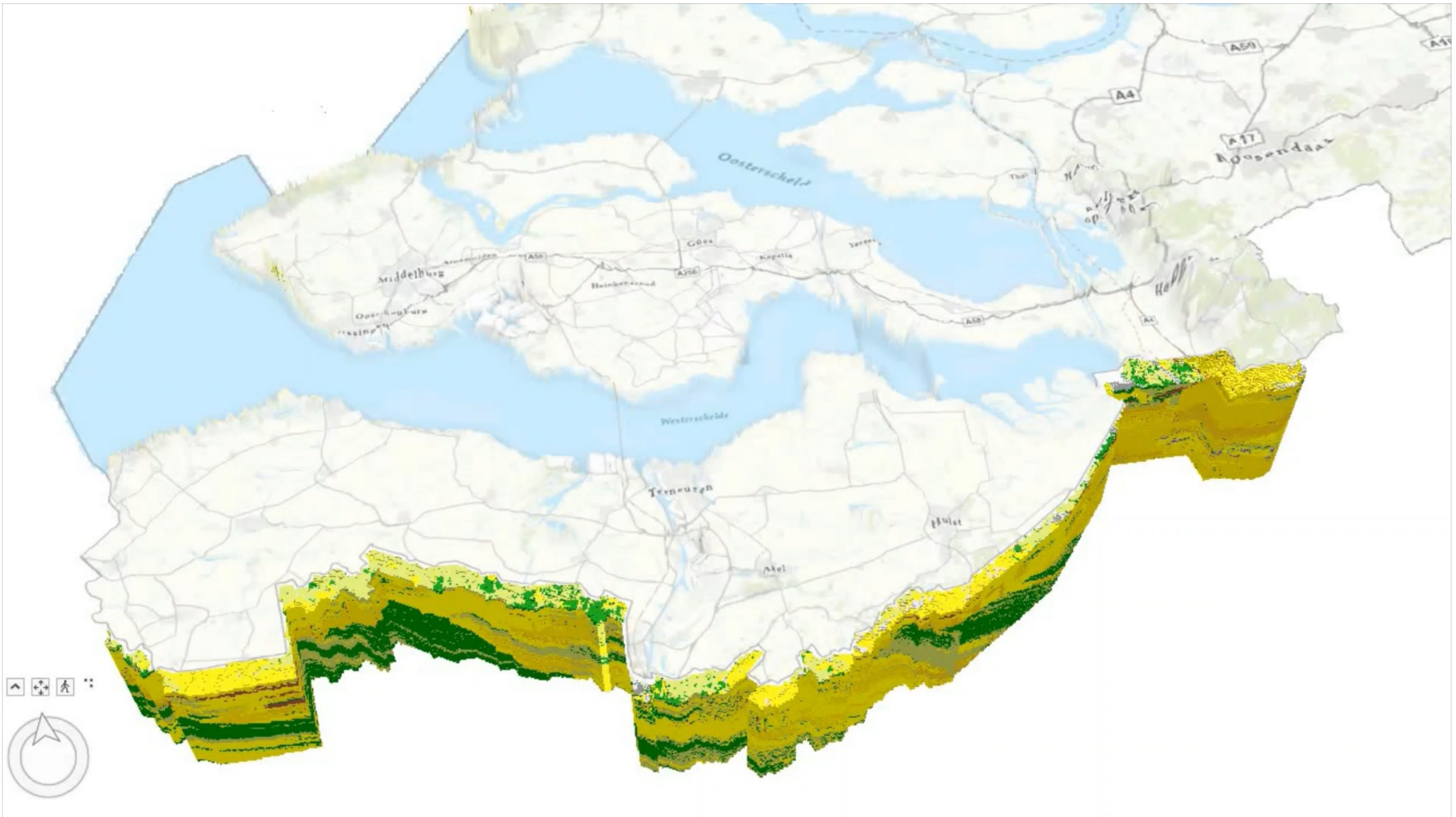
- Grof zand
- Grind
- others

Berendsen Alleboringen 3D -  
Berendsen Alleboringen 3D

› **REAL-TIME?**  
FAST UPDATES – NOT TRIVIAL



LET ALONE THE REAL DEAL



# › CHALLENGES

## › Connecting

- › With other geological datasets
- › With datasets from other domains



## › Access

- › From data as a service
- › To using data as a service

## › Maintainability

- › Sustainable
- › Lean, effective, efficient



› **THANK YOU!**  
FOR YOUR ATTENTION

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