Acquisition, Analysis and Advice on underground infrastructure

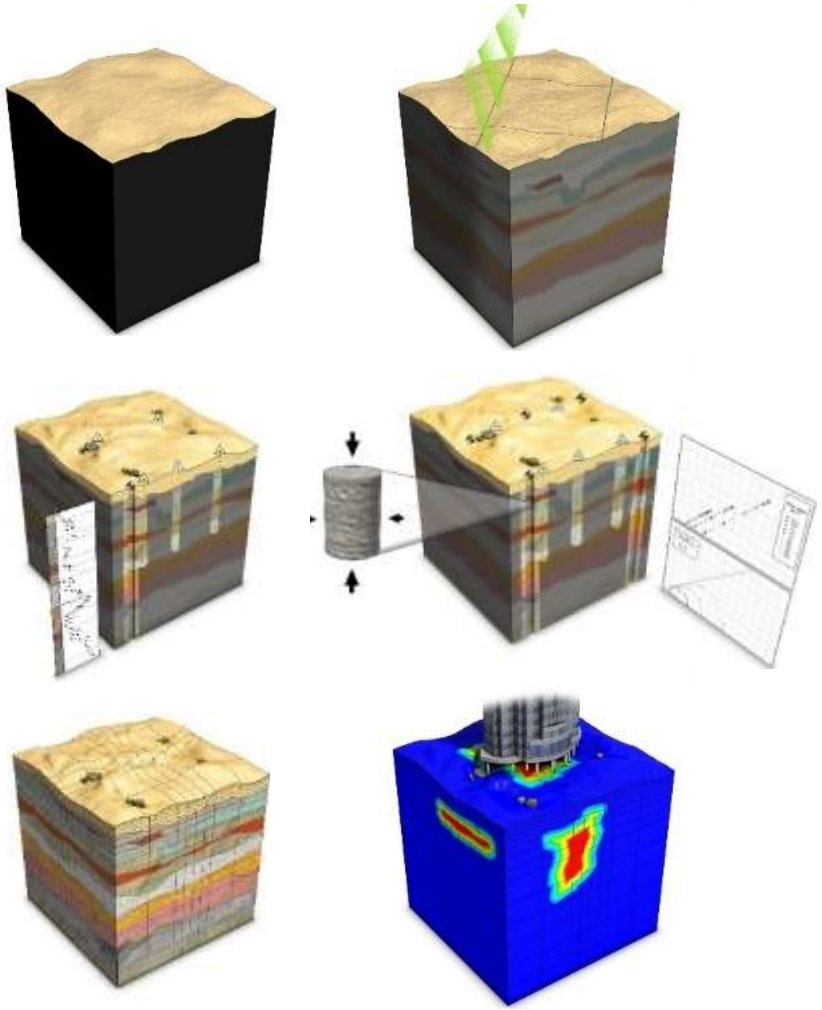
Our planet is extremely complex and continuously changing

And what does Fugro do?

Where

What

How



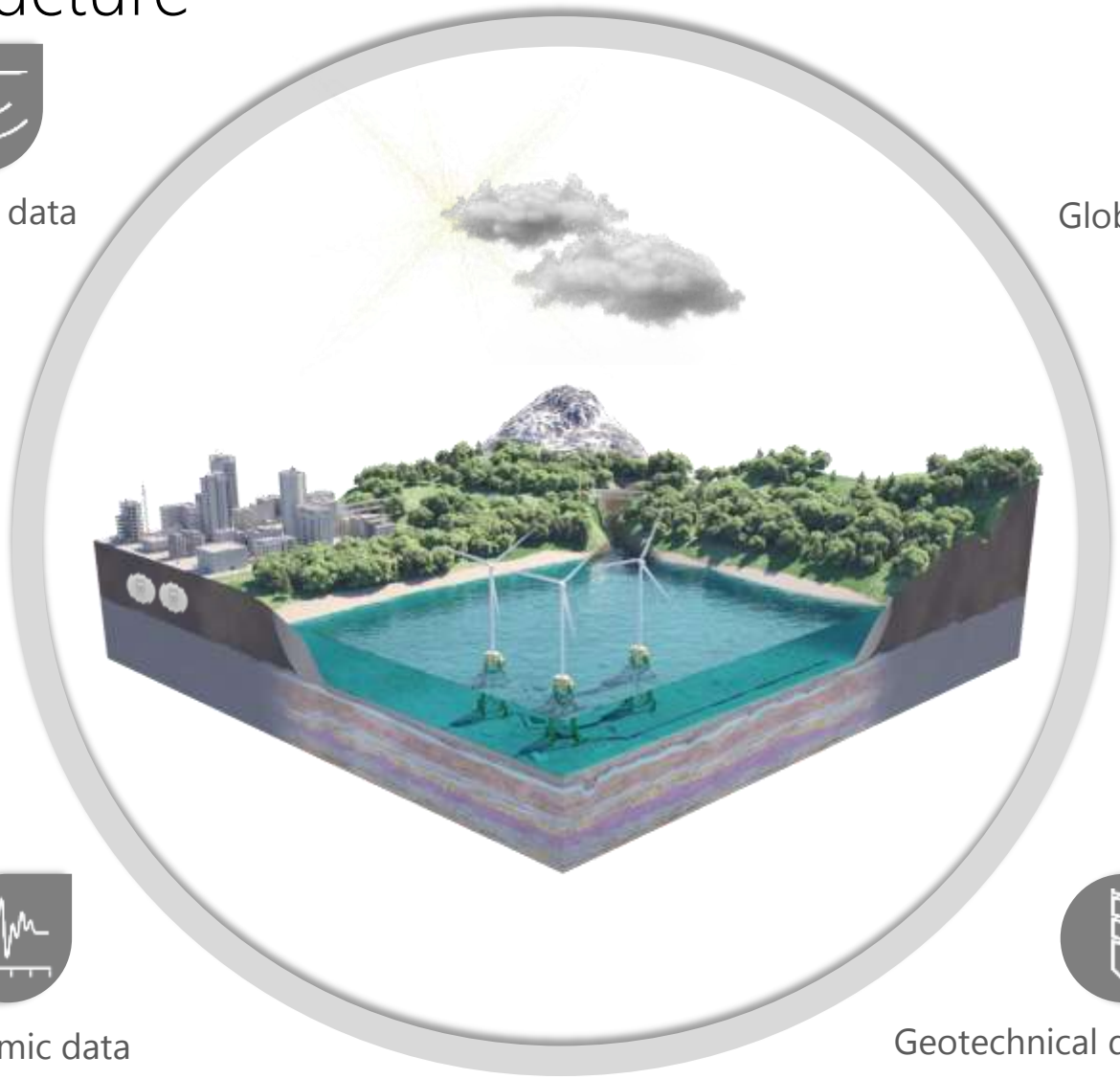
Access and understanding geo-data is the key to design, build & operate any structure

Geophysical data

Global positioning data

Metocean data

Geospatial data



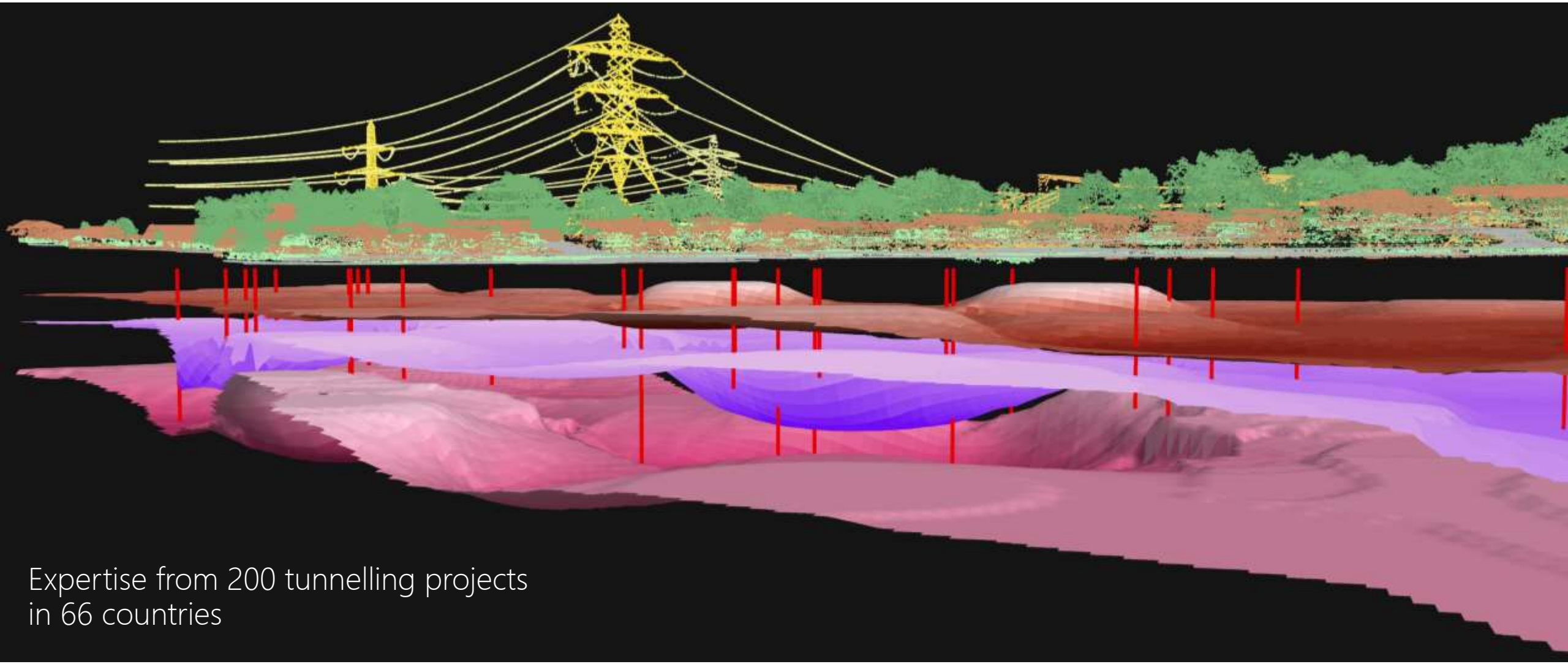
Geohazard data

Geochemical data

Geodynamic data

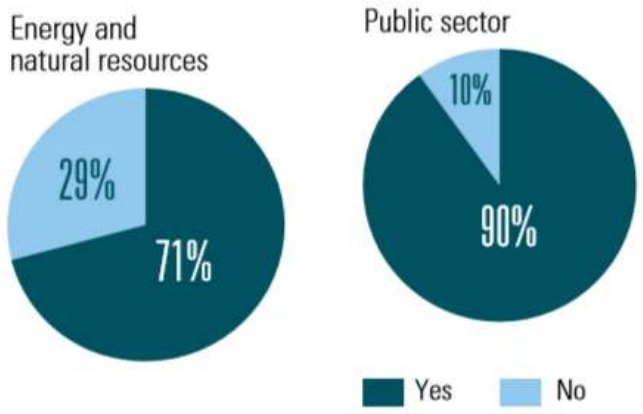
Geotechnical data

Understanding the complexity of the earth is essential



Expertise from 200 tunnelling projects
in 66 countries

The impact on bottom line project result



CONSTRUCTION PROJECTS UNDERPERFORMING

- Typically 10 % contingency, little time to identify overall risk
- Subsurface has a large impact (up to 25% of project result)
- Global problem
- Low adoption rates of new technology
- New developments always under time pressure

KMPG Global Construction Survey 2015, Gupta/EC and Fookes

SITE INVESTIGATION IMPROVEMENTS

- Pre-feed SI only 10% being used for RFQ, not re-used for final FEED
- Techniques used not optimal, split by procurement
- Improve scope, adjust scope or iterate
- Too little attention for dynamic ground component
- Sole focus on CPT/Drill logs, no full coverage (geophysics)
- Wrong interpretation or available information not fully utilized

Factual data

Geotechnical site investigation

Scale 1 km tunnel → 1.8 mln m^3 subsurface impact

hydrology is > 10 x

< 100 m^3 soil volume investigated

Agile → Iteration and detail

Field → Lab → Baseline report

Interpretations and advice: deal with known unknowns…

FEHMARNBELT

Submersed Tunnel, Germany

FUGRO

Dynamic ground behavior

- Independent data acquisition
- Intensive monitoring (1 bn. measurements / month)
- Soil structure interaction
- Validation of design assumptions
- Mitigate ground risk

"Gaia Insight allows us to get fast, real time insight at any wanted moment. In addition, insight is provided in the influence of our construction works on the adjacent environment.
Literally at a glance, we can check and validate if we are in control.

Project Manager, Rotterdamse Baan.

Rotterdamsebaan

Bored Tunnel – The Hague

FUGRO

Actionable Intelligence

- The use of algorithms and decision support
- Real time risk register
- Factual reporting vs key decision KPIs
- Validation of design assumptions

"In the engineering for such works as tunnels, many variables, such as the degree of continuity of important strata or the pressure conditions in the water contained in the soils, remain unknown. Therefore, the results of computations are not more than working hypotheses, subject to confirmation or modification during construction."

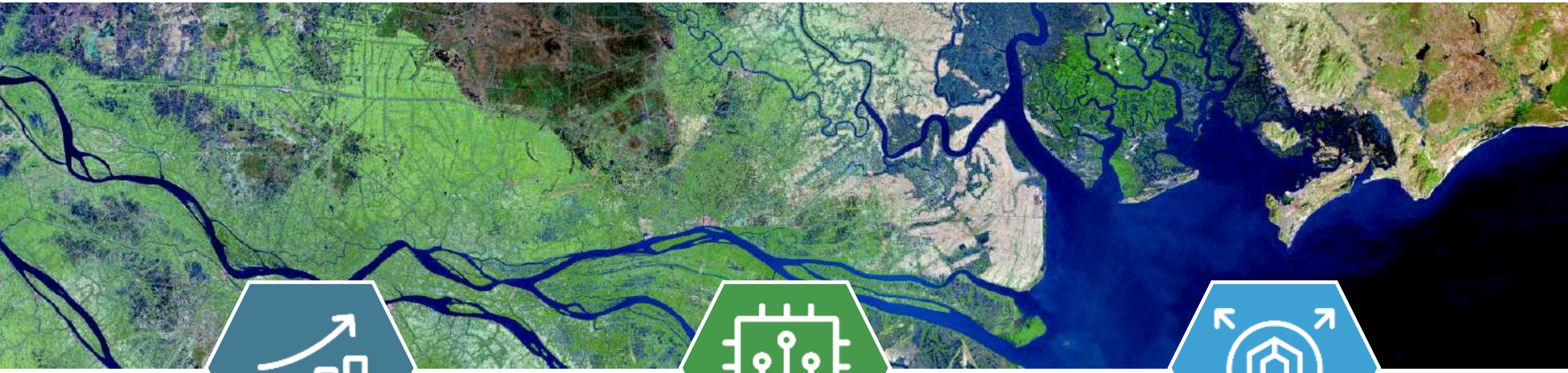
Karl von Terzaghi

Rotterdam CS

Kruisplein Parking and underground space

FUGRO

Our strategy is based on 3 objectives



1. Capture the upturn in Energy & Infrastructure
2. Differentiate by integrated digital solutions
3. Leverage core expertise in new growth markets

Differentiate through digital solutions=changing the way we work

DIGITAL

DIGITALLY TRANSFORMING FUGRO

Transforming the way we work

INTEGRATED

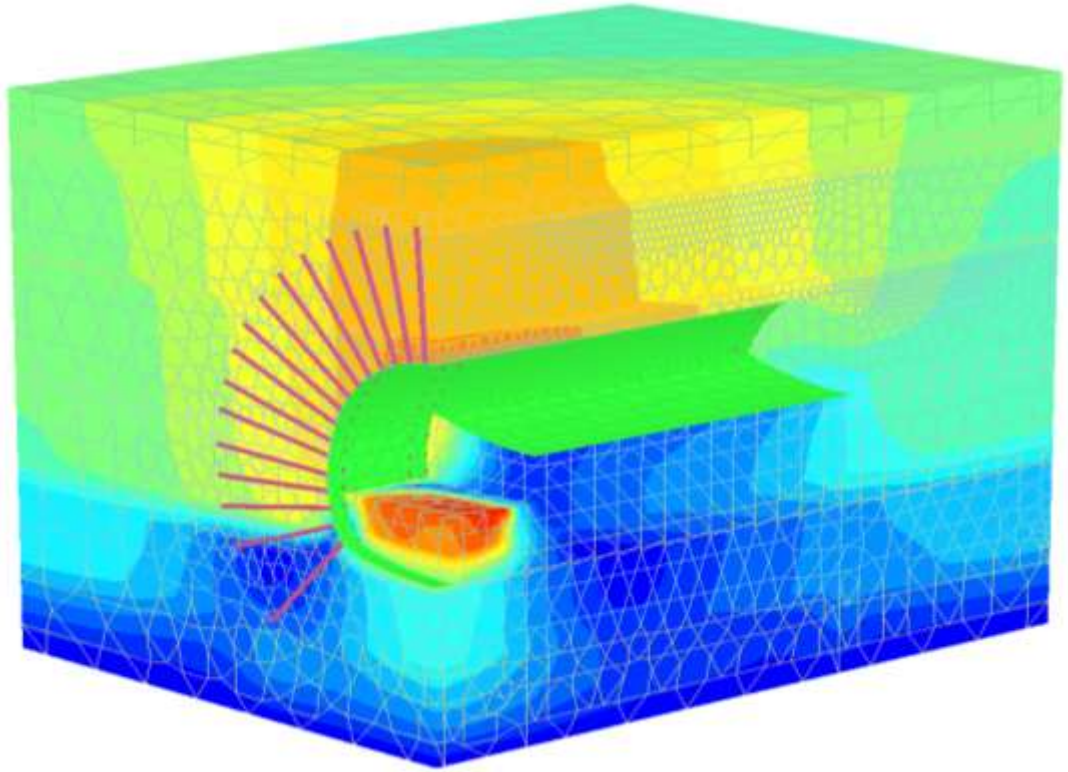
FUGRO DIGITAL FOUNDATION

Transforming our relationship with our clients

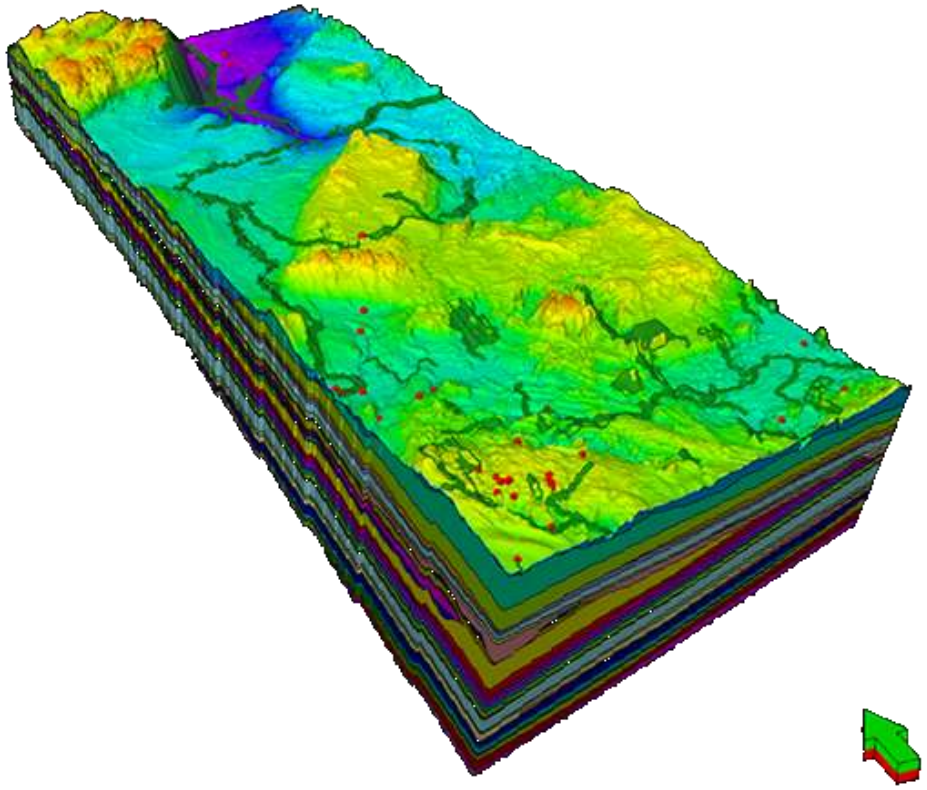
Resulting in differentiating value propositions

SCALE

From detail



To 3D comprehensive overview



Next step

Digital platform, crowd sourcing and open development