HIGH-RESOLUTION 3D GEOLOGICAL MODELLING OF THE LEK RIVER DIKE FOR ENHANCED FLOOD PROTECTION

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- Background
- High data density
- 3D subsurface model
- Digital Twin
The Northern Lek River dike protects a large and densely populated area of the Netherlands, including the cities Utrecht and Amsterdam.

Water Authority Hoogheemraadschap De Stichtse Rijnlanden (HDSR) maintains the dike and launched the project ‘Sterke Lekdijk’ for large scale reinforcements.

The strength and stability of the dike depends on:
- its design
- the composition of the subsurface

Detailed insight into the geology is vital to assess the risk of e.g. piping and macro instability.
We developed a high resolution 3D geological model of the subsurface beneath the Northern Lek River dike that facilitates HDSR in using subsurface knowledge for dike protection.
Multiple datatypes were used: bore descriptions AND cone penetration tests (CPT).

Geotechnical data from CPTs was translated to geological data using artificial neural network analysis (Meijninger et al., poster at NAC 2020).

Each 3D cell (voxel) shows the most probable lithology AND gives the uncertainty.
Our 3D geological model has a 32x higher resolution than the nationwide Geotop model.
**DIGITAL TWIN**

**COMBINE SURFACE AND SUBSURFACE INFORMATION**

- Water authority uses a digital twin to:
  - Identify dike segments that need further investigation
DIGITAL TWIN
ADAPT REINFORCEMENT TO THE SUBSURFACE AND SURFACE

- Design location specific and fit-for-purpose dike reinforcement measures
Public support is generated by informing stakeholders and the general public. Information is given not only on WHAT measures are taken, but also on WHY measures are taken.
THANK YOU FOR YOUR TIME