

OpenEarth data management

KIVI Geotechnical yearly meeting 5 March 2015

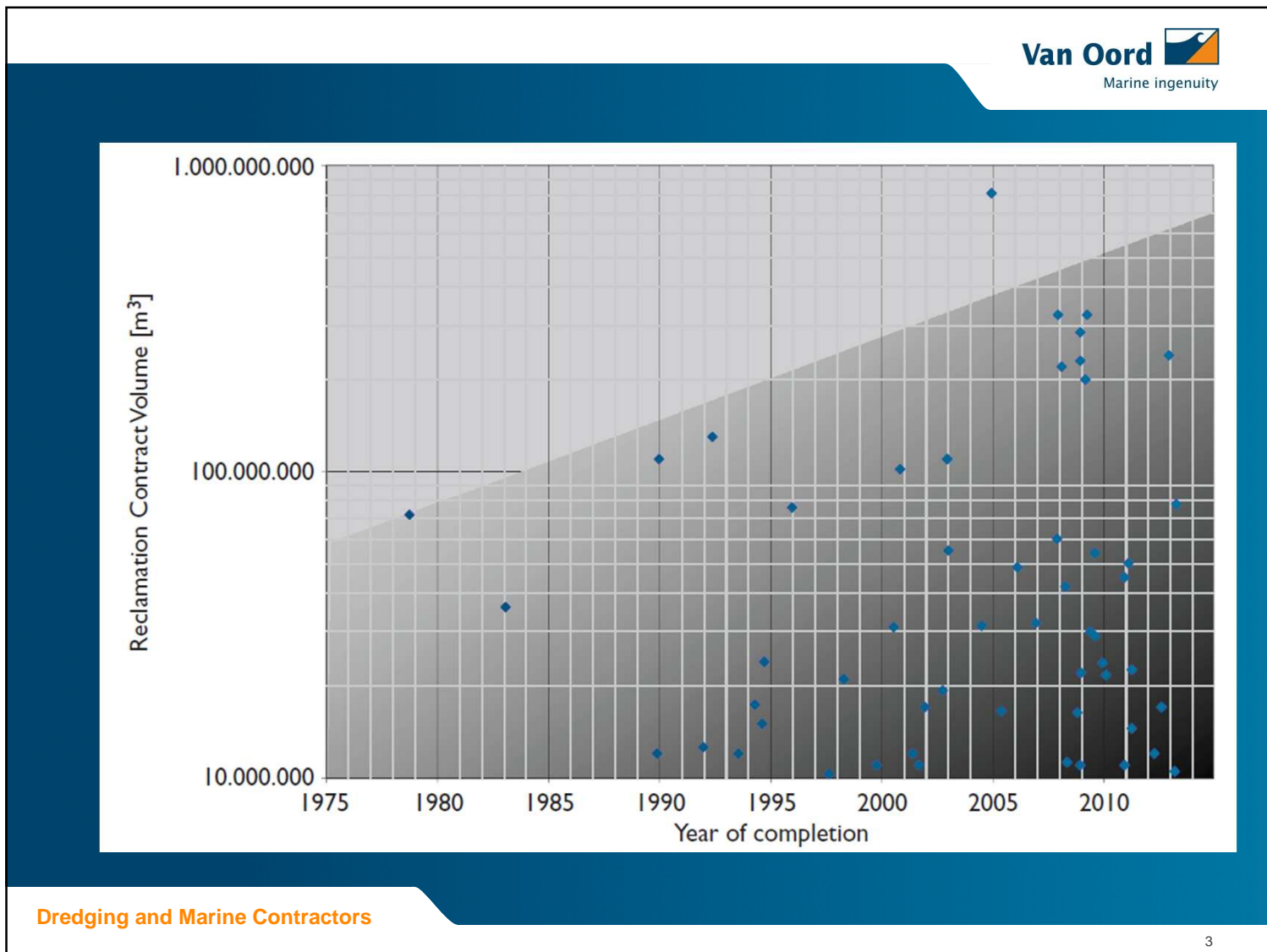
Thijs Damsma and Wouter Karreman

Introduction

“Classical” capital dredging projects are disappearing.

Move towards D&C, EPC and DBFM projects.





Van Oord
Marine ingenuity

Introduction

Increasing size of reclamation projects

+


Increasing desire for “ready to use” land (and quickly please)

=

Significant need for ground improvement works

Dredging and Marine Contractors

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Introduction

Example project – Land reclamation in the Middle East


Reclamation of 14km²
Large surface area site → long pumping distances
Difficult subsoil (sabkha deposits and loose sands)

Ground improvement by:

- Dynamic Replacement of subsoil
- Roller compaction of fill and subsoil
- Rapid Impact Compaction of fill


Dredging and Marine Contractors

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Introduction

Land reclamation project in Middle East

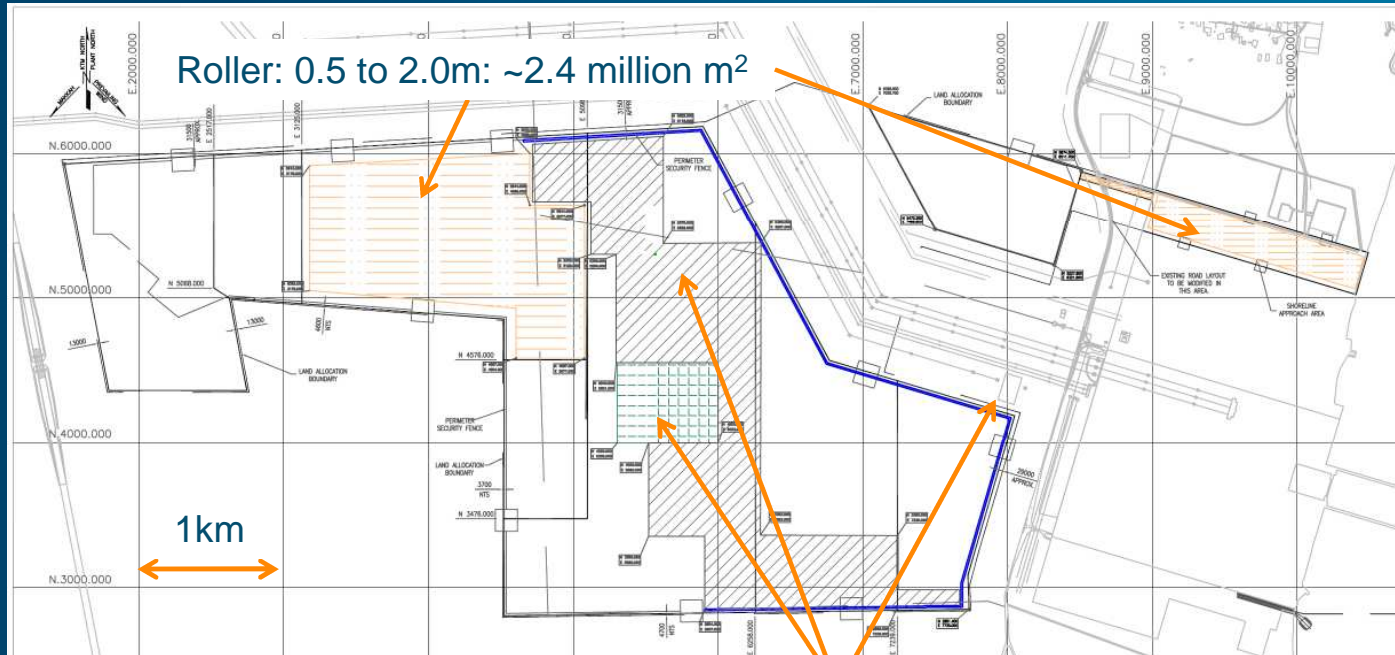


Dredging and Marine Contractors

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Introduction

Subsoil improvement scope



Dredging and Marine Contractors

Ground improvement

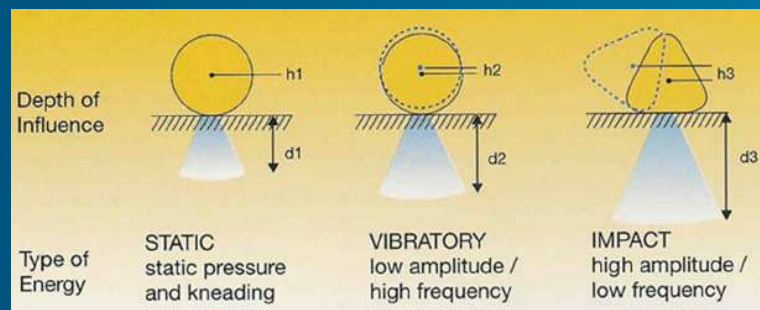
Ground improvement works



Dredging and Marine Contractors

Ground improvement

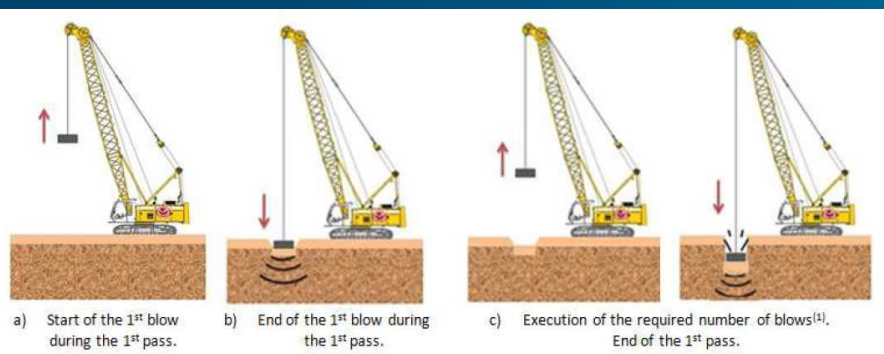
Roller compaction



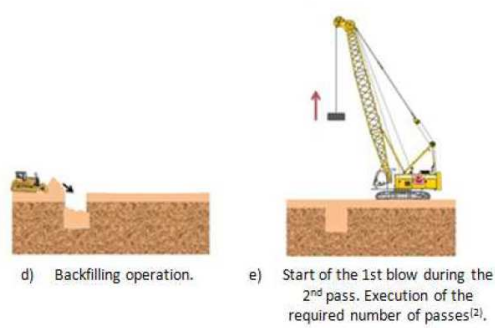
Dredging and Marine Contractors

Ground improvement

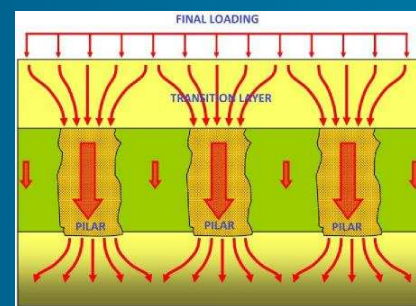
Dynamic Replacement



a) Start of the 1st blow during the 1st pass. b) End of the 1st blow during the 1st pass. c) Execution of the required number of blows⁽¹⁾. End of the 1st pass.

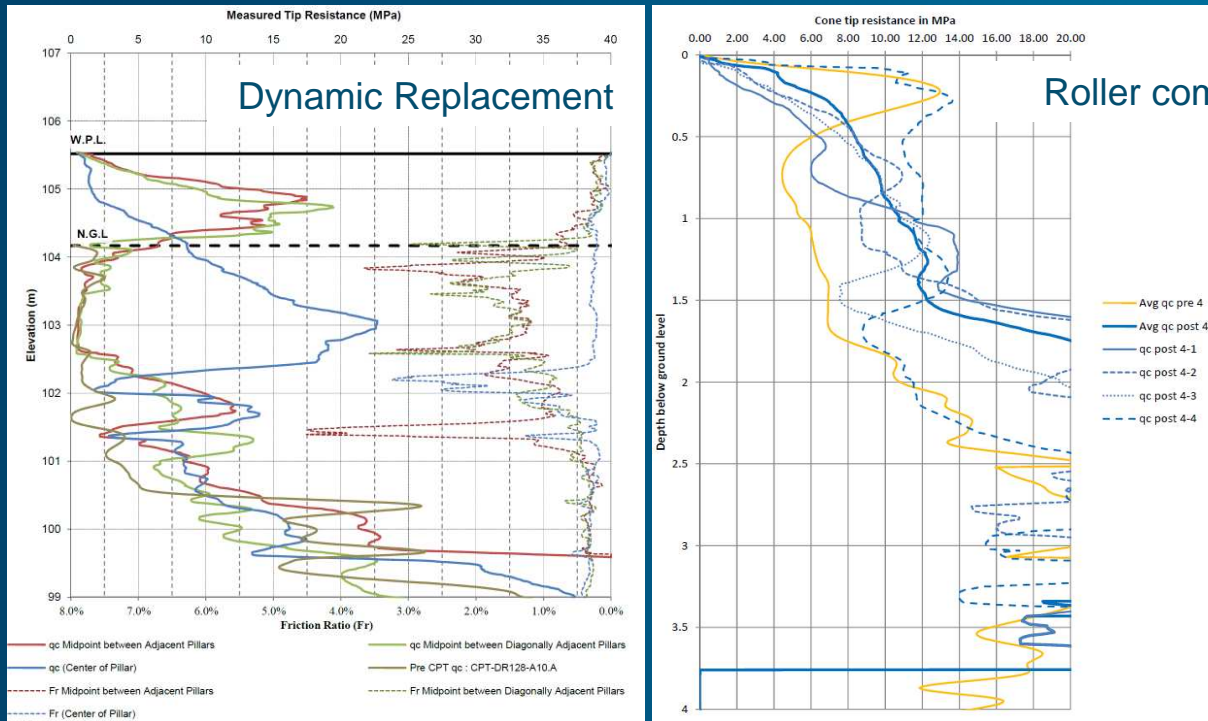


d) Backfilling operation. e) Start of the 1st blow during the 2nd pass. Execution of the required number of passes⁽²⁾.



Ground improvement

Post testing improved soil




Quality control

Post improvement testing:

- **Dynamic Replacement: 3 CPTs per 50x50m area**
- **Roller compaction: 1 CPT per 50x50m area**
- **Fill: 1 CPT per 50x50m area, Field density testing during filling**
- **Zone load testing**



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Quality control

Total testing in 2 years:

- ~20,000 CPT (excluding progress testing)
- >80 zone load tests
- Large number of classification tests and in situ tests

- Subject to internal and external quality control
- CPT testing require validation based on project criteria
 - Determination of stiffness of composite soil in DR areas
 - Settlement predictions for each 50x50m area

→ **Need for robust and multifunctional data management and analysis tool**

Dredging and Marine Contractors

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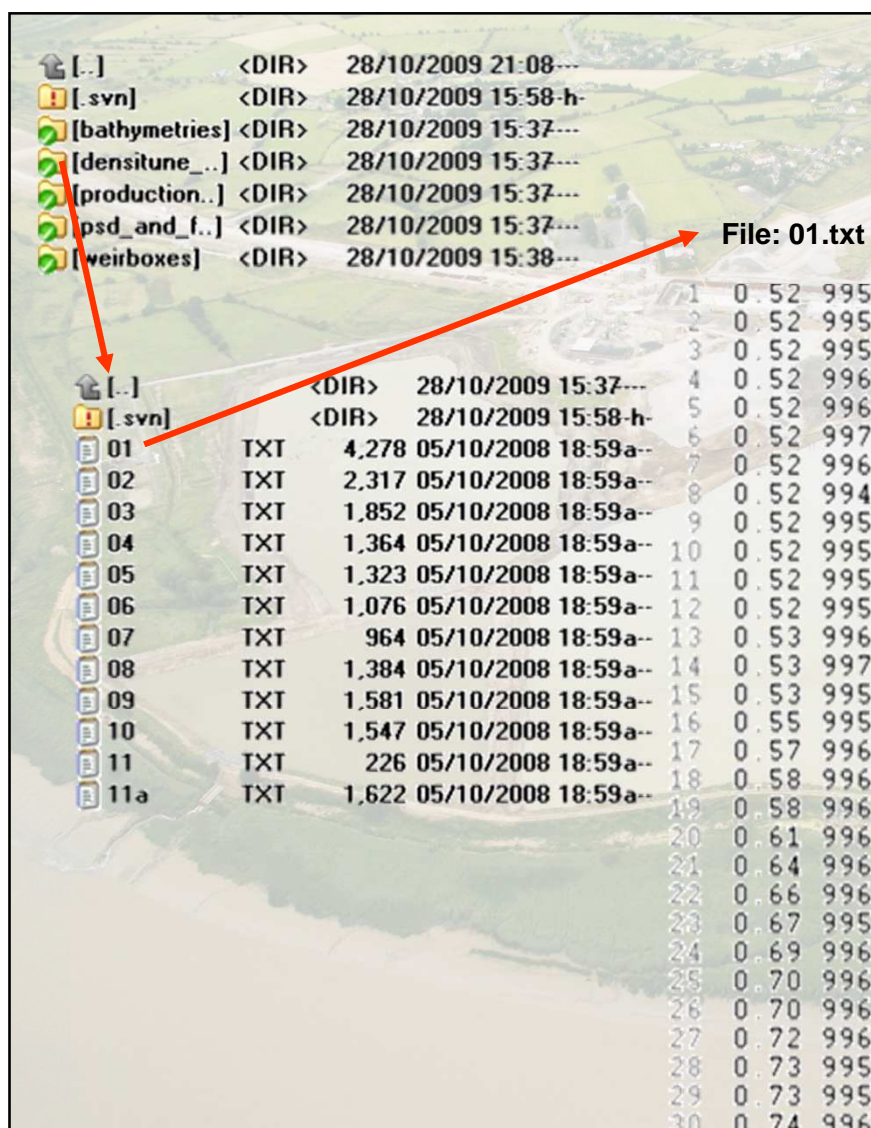
Data management

Dredging and Marine Contractors

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Data management system

- Collect data
- Analyse / compare to requirements
- Access to data and analysis results
- Reliable, flexible, automated
- Based on OpenEarth philosophy



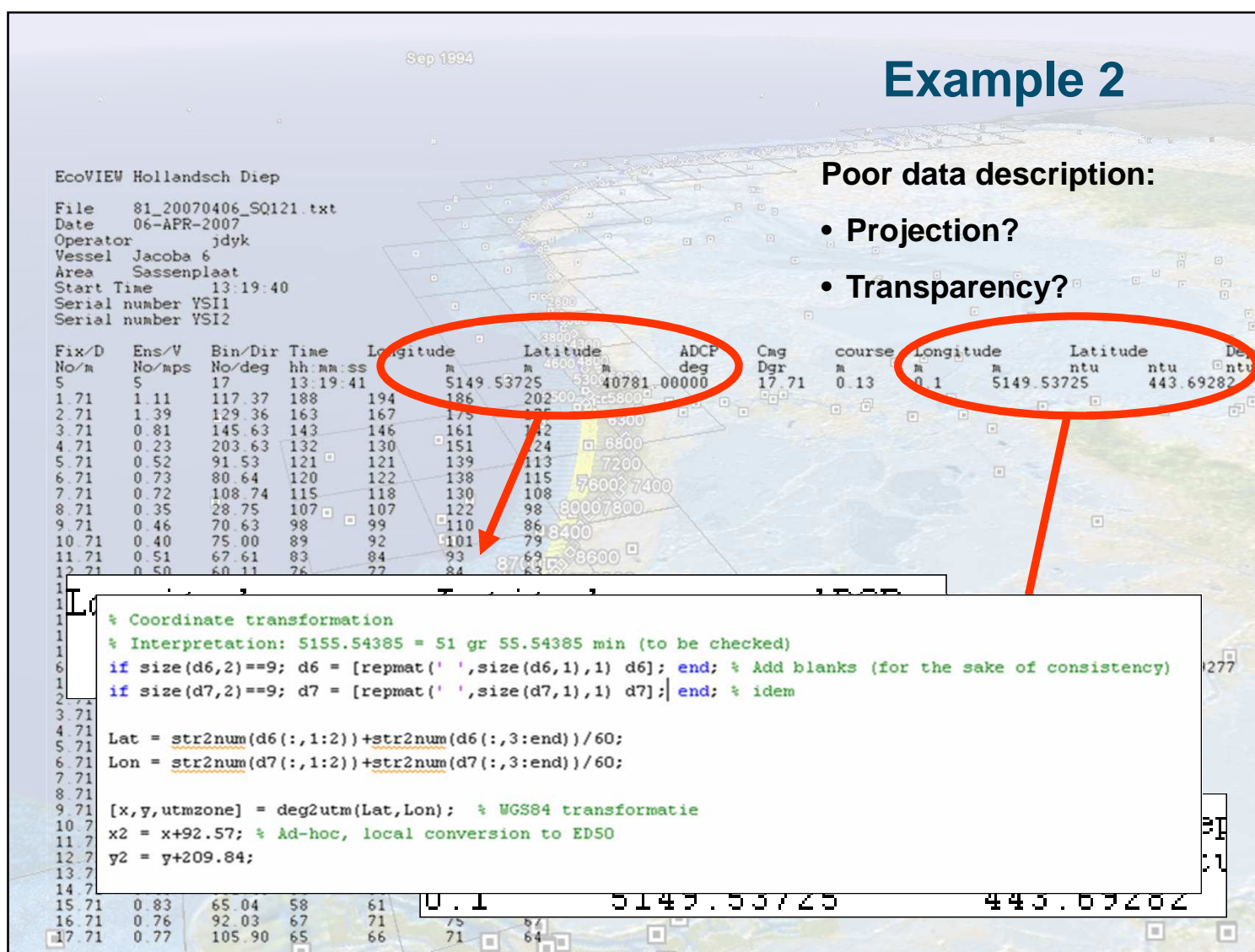
File: 01.txt

1	0	52	995
2	0	52	995
3	0	52	995
4	0	52	996
5	0	52	996
6	0	52	997
7	0	52	996
8	0	52	994
9	0	52	995
10	0	52	995
11	0	52	995
12	0	52	995
13	0	53	996
14	0	53	997
15	0	53	995
16	0	55	995
17	0	57	996
18	0	58	996
19	0	58	996
20	0	61	996
21	0	64	996
22	0	66	996
23	0	67	995
24	0	69	996
25	0	70	996
26	0	70	996
27	0	72	996
28	0	73	995
29	0	73	995
30	0	74	996

Example 1

Poor data description:

- What is measured?
- What units?
- What locations?
- Which projection?
- When measured?
- With what instrument?
- With what settings?

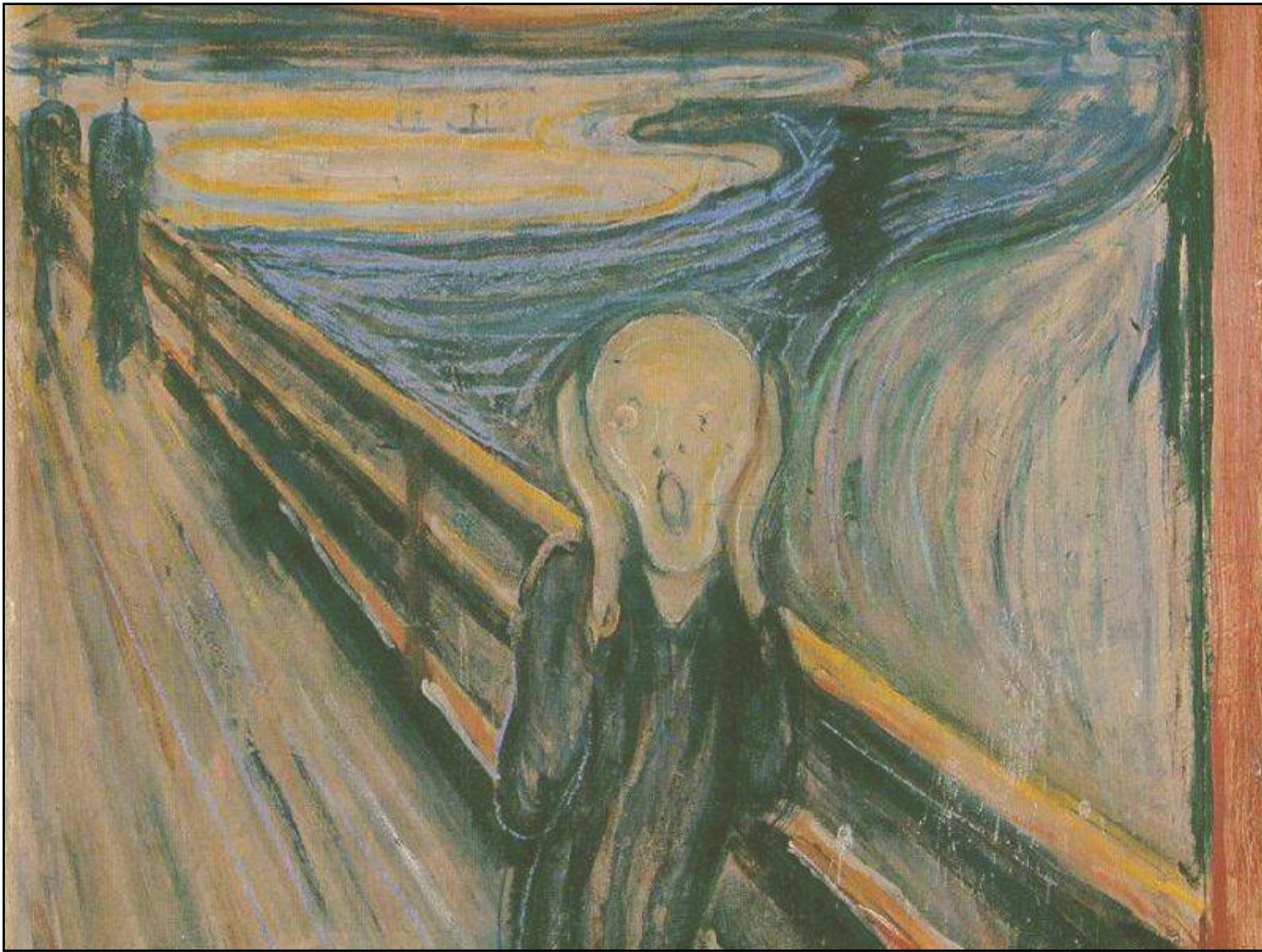


Poor data description:


- Projection?
- Transparency?

Recognisable frustrations?


- hmm, what was measured here?
- huh, where was it measured exactly?
- oops, when was it measured?
- aarghh, is there still someone around who knows what was done there?
- ohhh, why does it take so long to collect data!
- #*\$! , has that data been deleted?!?
- ah yeah, yet another data format ... again!!!
- sigh, this problem must have been solved by someone else before me!
- oh oh, I used an old version of this tool!
- euh, what/where is the most recent version of this tool?
- why is everybody using a different tool for the same analysis?
- oh no, we've made the same mistake again!
- WHY CAN'T I BUILD ON THE HERITAGE OF PREVIOUS PROJECTS?



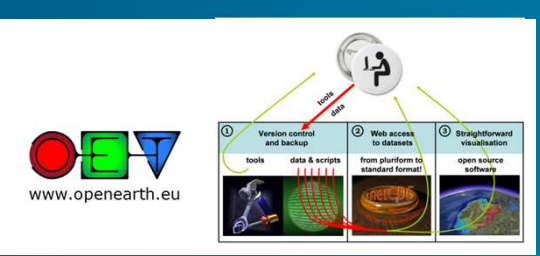
OpenEarth analog to WikiMedia/Wikipedia?

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WikiMedia & MediaWiki



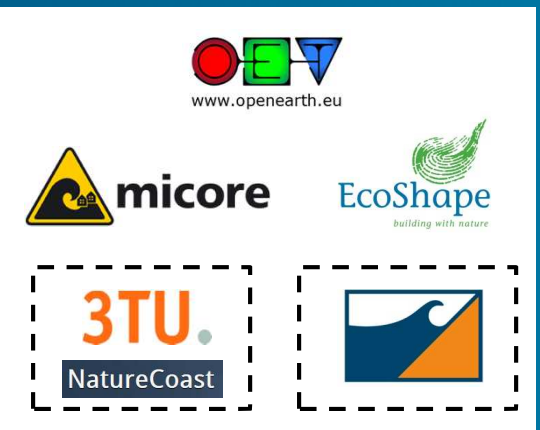
OpenEarth & Workflow



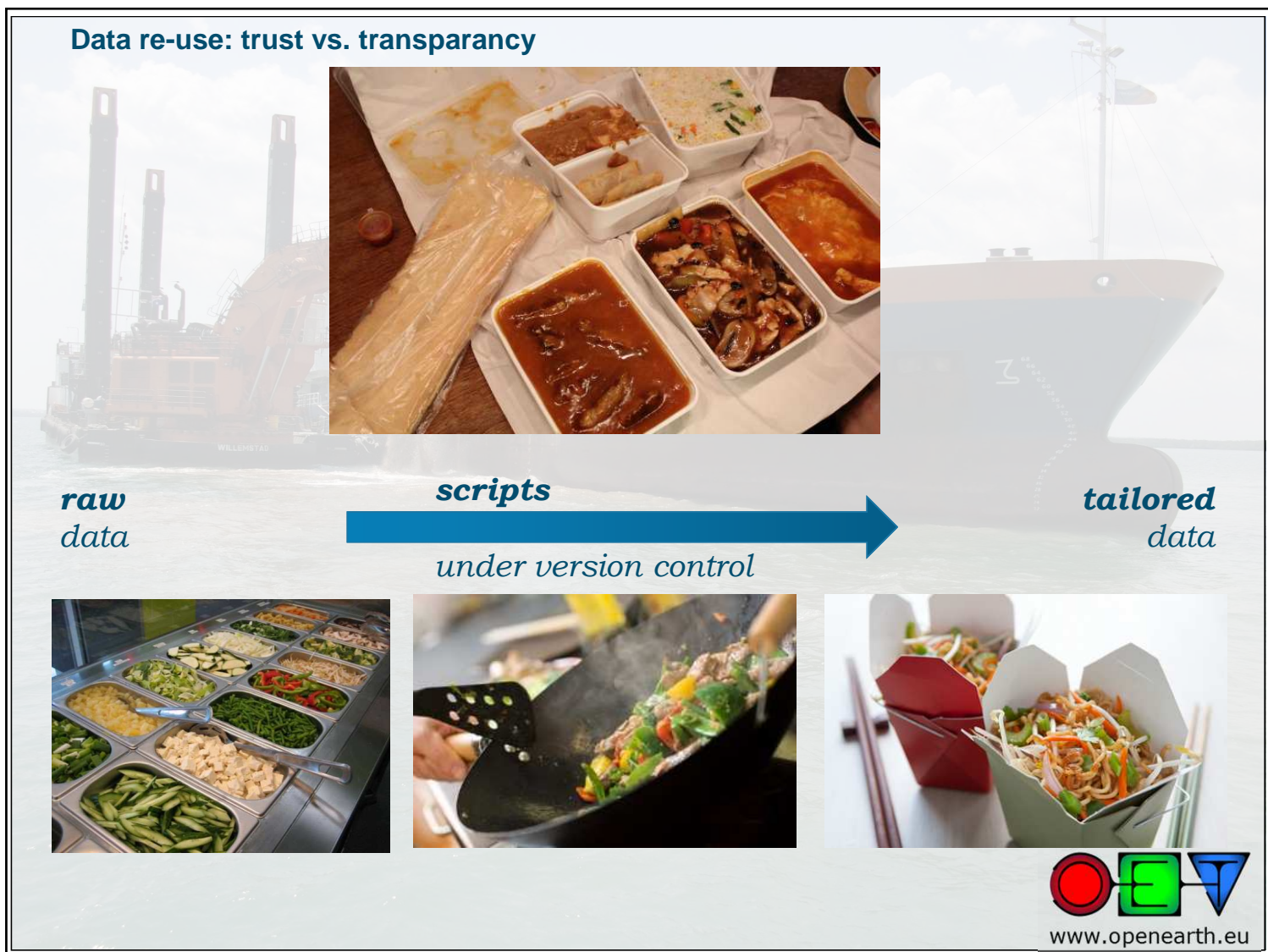
Various applications

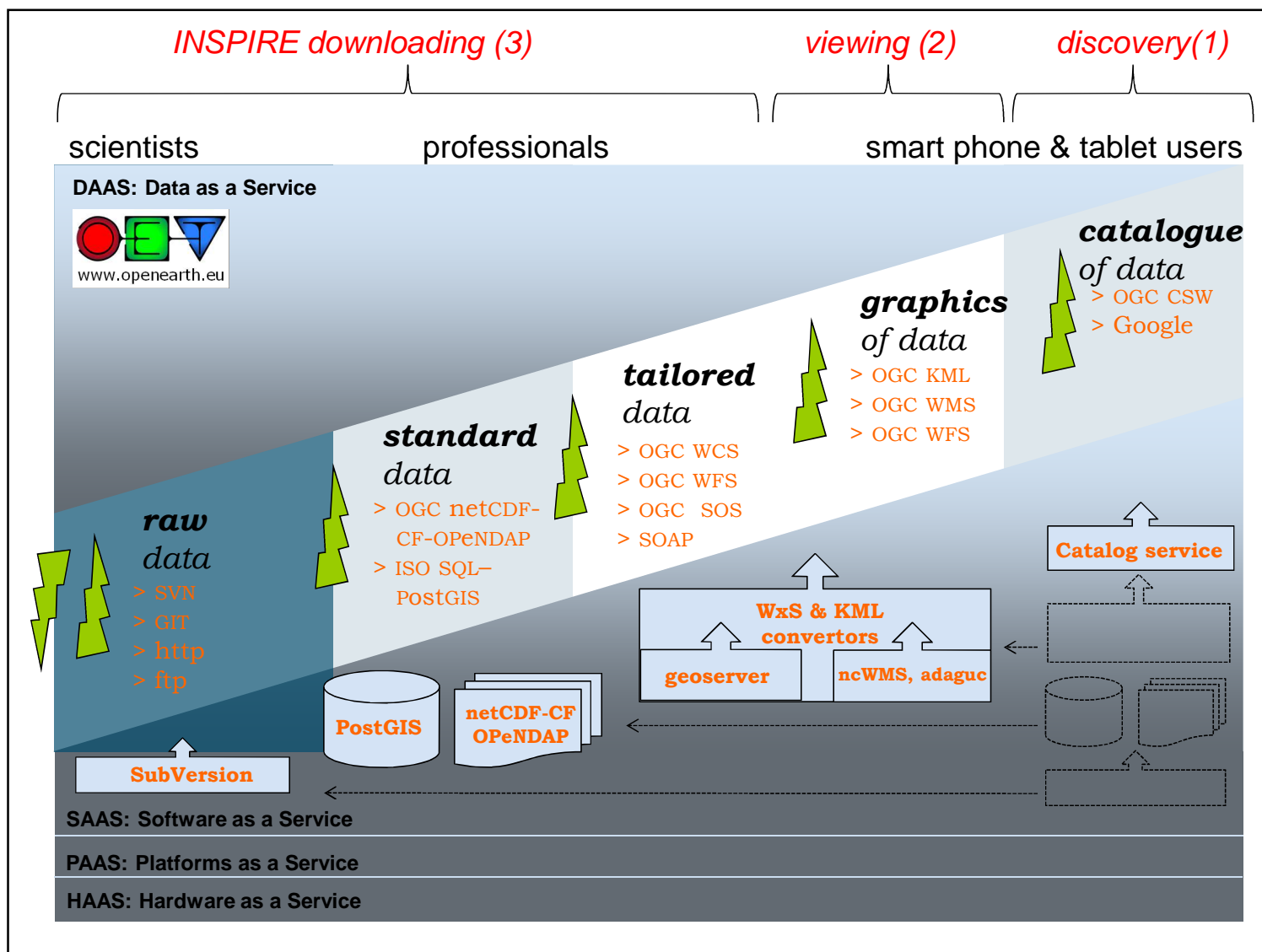


Various applications



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TUDELTA
WEEKBLAD VAN DE TECHNISCHE UNIVERSITEIT DELFT LAATSTE UPDATE 22 OKTOBER 2012 23.17

HOME NIEUWS SCIENCE REPORTAGE INTERVIEW OPINIE LIFESTYLE SPORT INTERNATIONAL STUDENTS nederlands & english

19 OKTOBER 2012 DOOR JOS WASSINK AANTAL KEER BEKEKEN: 263 WEB ONLY

Vind ik leuk 2 Tweet 5

OpenEarth en Political Mashup winnen Dataprijs 2012

De Nederlandse Dataprijs gaat dit jaar naar Political Mashup (Dataprijs humaniora en sociale wetenschappen) en OpenEarth (Dataprijs exacte en technische wetenschappen).

De prijswinnaars vlnr: Maarten Marx (Political Mashup) en Thijs Damsma, Gerben de Boer en Mark van Koningsveld (OpenEarth) - Foto: Bart van Vliet

OpenEarth is een open source initiatief dat data, modellen en gereedschappen in waterbouw wil delen. Een flink deel van het budget van waterbouwkundige en kustverdedigingsprojecten gaat naar het vergaren en het beheren van data over stromingen en waterstanden, zo weten de onderzoekers. Maar als het project eenmaal is afgesloten, gebeurt er meestal verder niets met die gegevens. OpenEarth wil daar verandering in brengen door een onderdak te bieden voor de bestanden. Onderzoekers kunnen hier hun data opslaan, hosten en ter beschikking stellen van anderen.

IN NIEUWS
MEEST GELEZEN LAATST GEPLAATST
Duwo gaat verder met huuropzeggingen
"Beste opleiding volgens Elsevier"
Langstudeerboete, leenstelsel... wie kan er ...
"Erasmusbeurs dit studiejaar niet in gevaar"
Bouwkundemiljoenen terug bij TU
"Bij ons zijn de problemen veel erger"
Rumoer rond it-onderwijs
Achtste university college
Universiteiten Zuid-Holland maken ...
ALLE ARTIKELN VAN DE LAATSTE WEEK »

ACTUELE DOSSIERS BEKIJK ALLES
LANGSTUDEREN 111 artikelen
FUSIE 37 artikelen

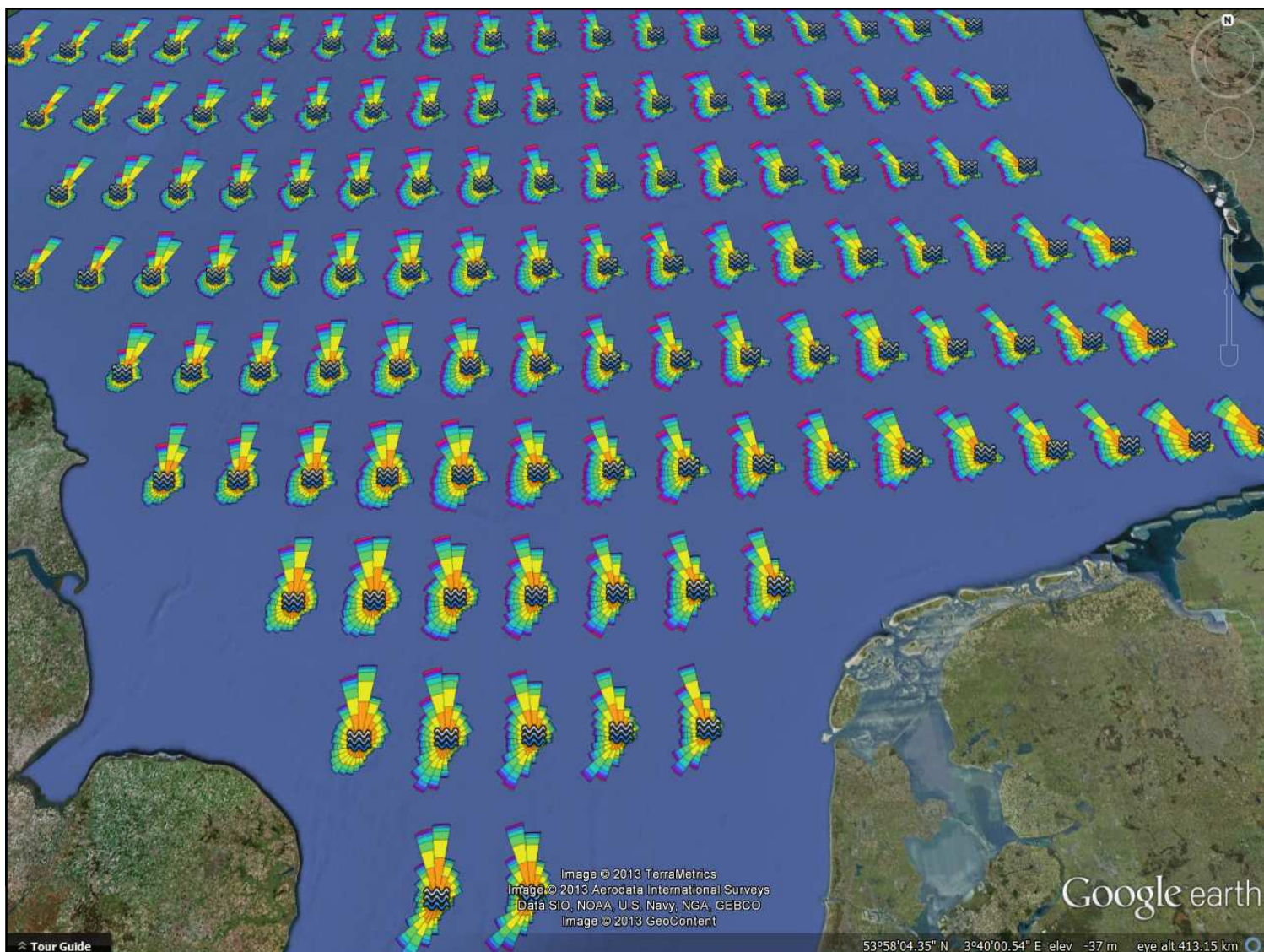
IN BEELD BEKIJK ALLES
STUDENTENPROJECTEN Pijpfitterij ...
STUDENTENPROJECTEN SDE-Germany

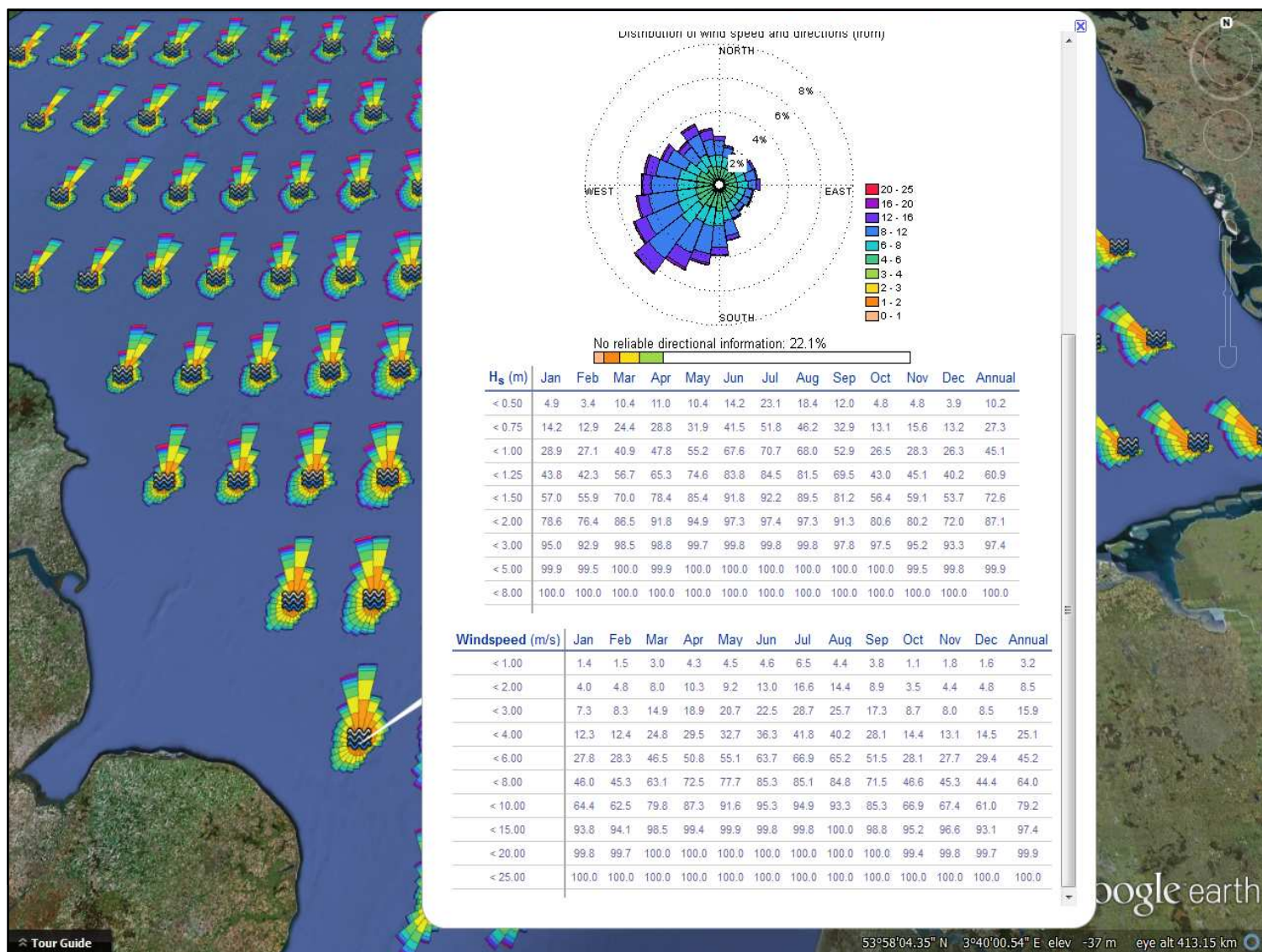
FACEBOOK LIKES
Vind ik leuk You and one other like this.

FACEBOOK ACTIVITY FEED
Thor-dames hebben een probleempje

OpenEarth benefits for Van Oord

1. Enables the safe use of a data cloud in combination with light weight applications
2. Promotes collaboration of specialists from various departments
3. Promotes continuous improvement of approaches/tools from project to project





Ground improvement

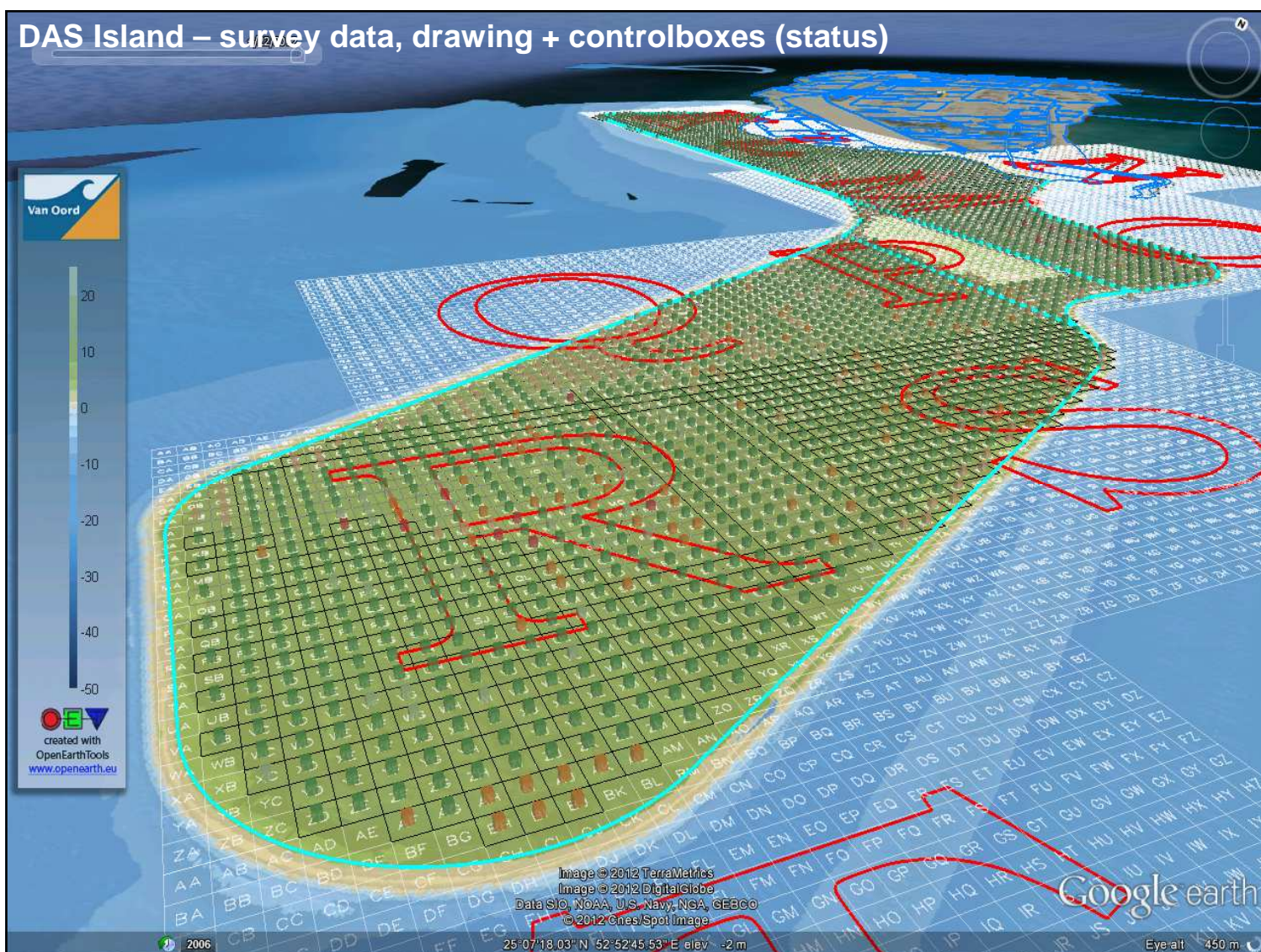
Ground improvement works

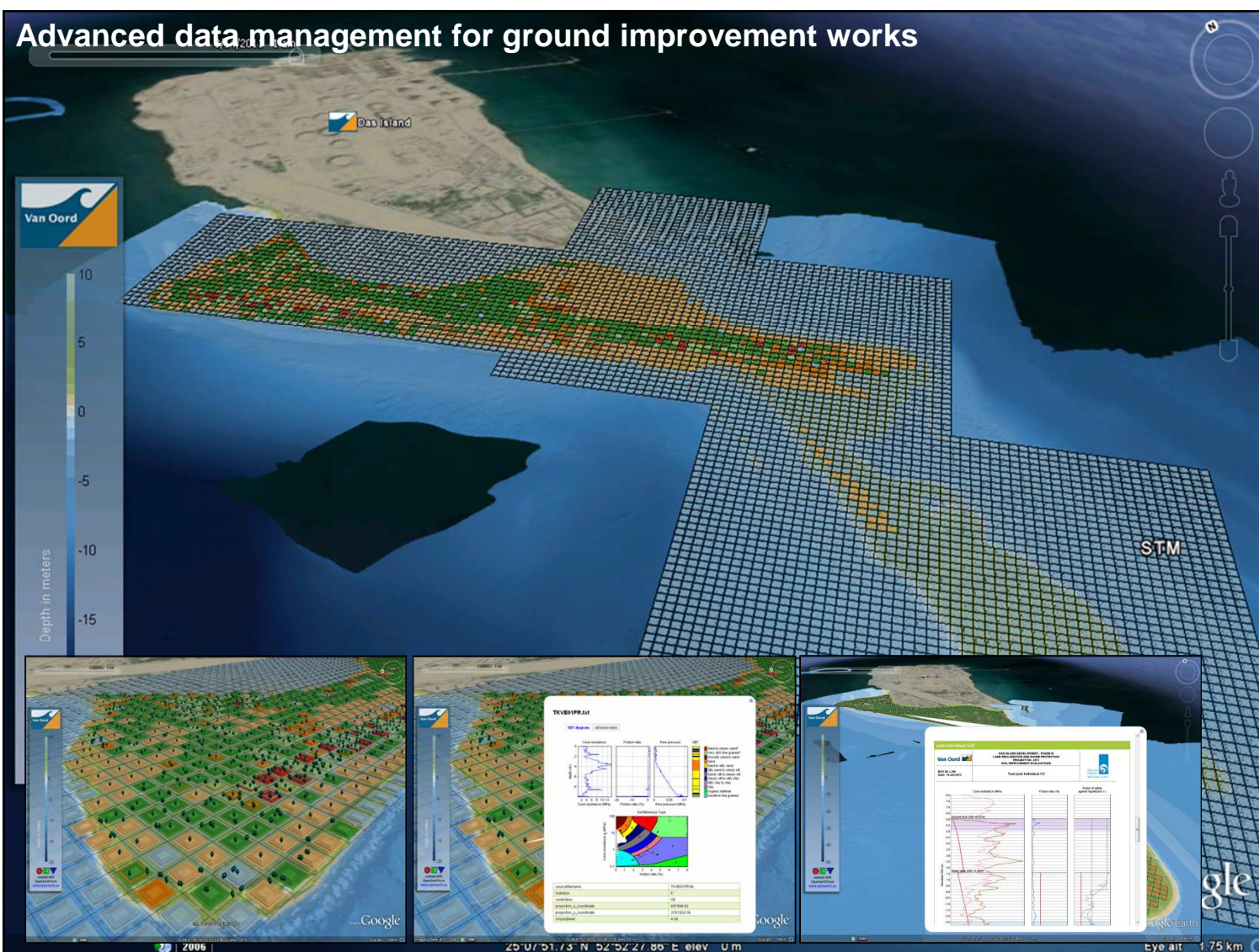
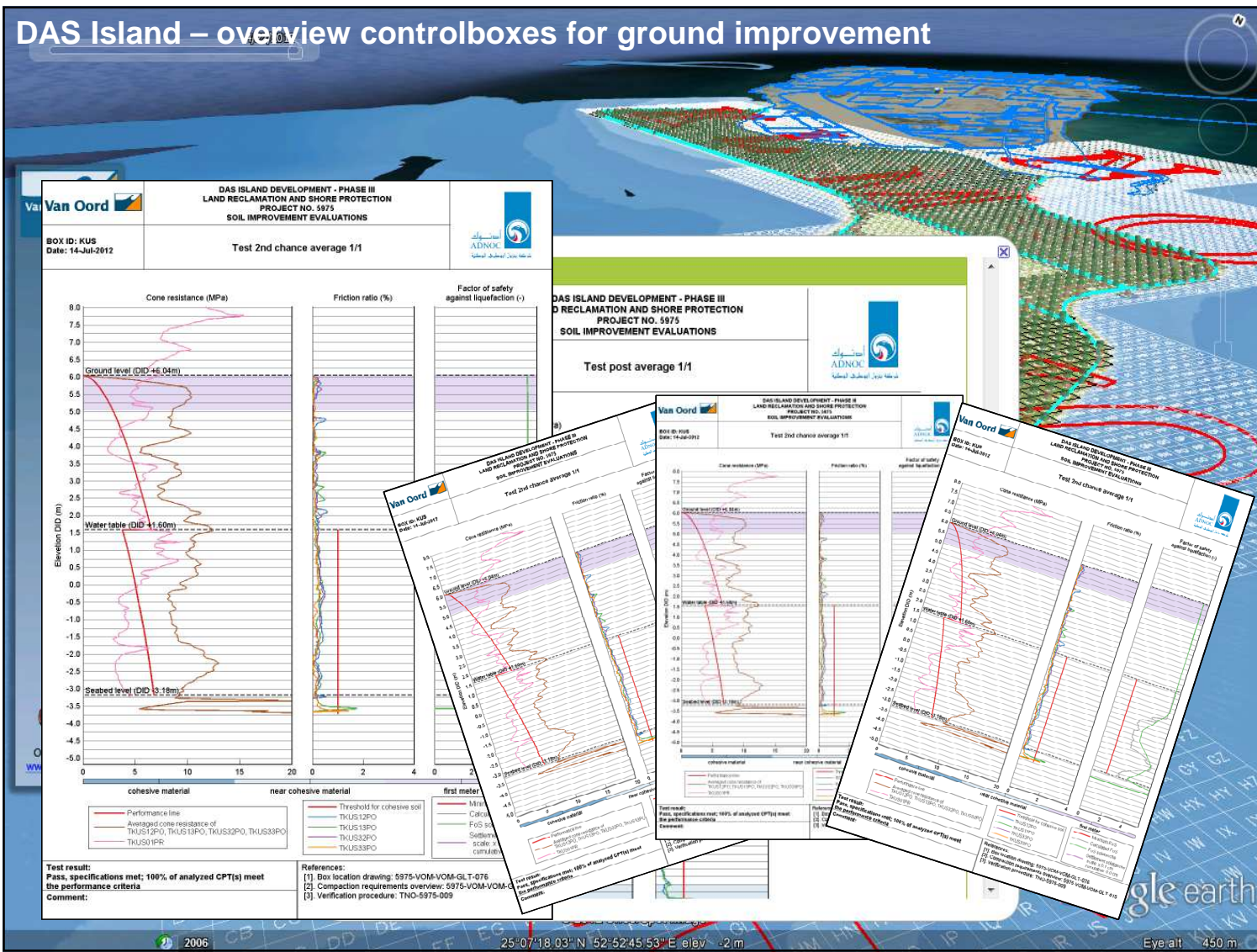


Dredging and Marine Contractors

DAS Island – visualisation progress land reclamation







Demo large reclamation project

- **10k CPT's**
- **20 test types (CPT, MDD, FDT, sievings, etc, etc)**
- **Fully web based**
 - Users don't need to install anything
 - One version, always up to date
- **Direct client access**
- **Interactive demo**