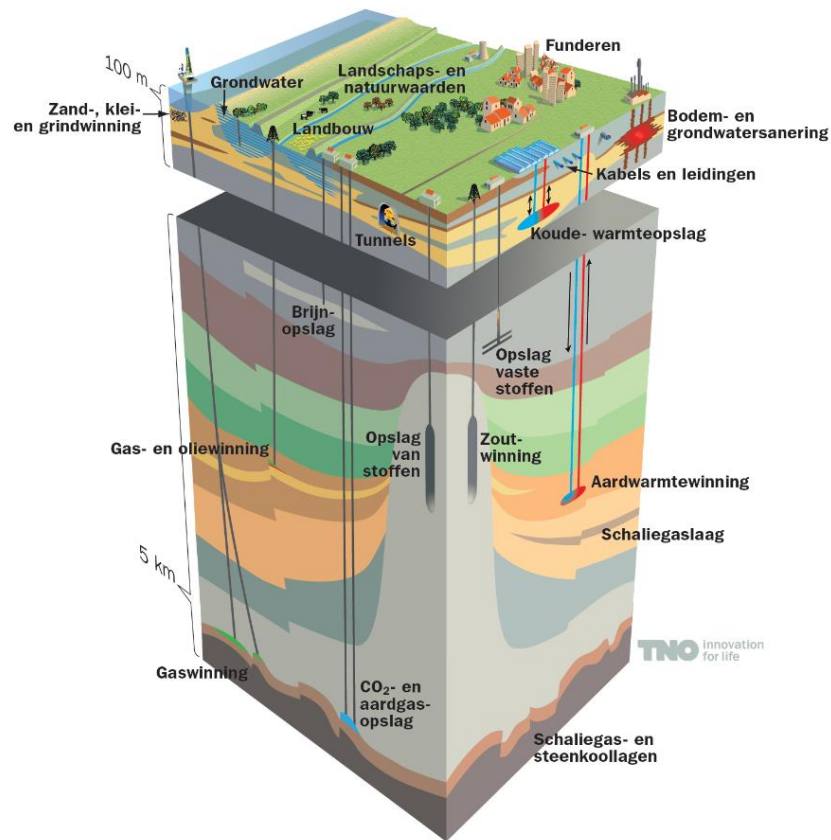




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National Base Register for Subsurface Data

Erik van der Zee
Lead Architect BRO

Geotechnical Data Standardization Workshop,
January 22-24, 2019 at Maison de la Géologie. An
initiative of the Integrated OGC and Bsi Digital
Built Environment Working Group (IDBE-WG)



Topics

- National Framework of Base Registers
- National Base Register for Subsurface Data (BRO)
- HDSR Digital Twin Pilot (integration of surface + subsurface)
- Q&A

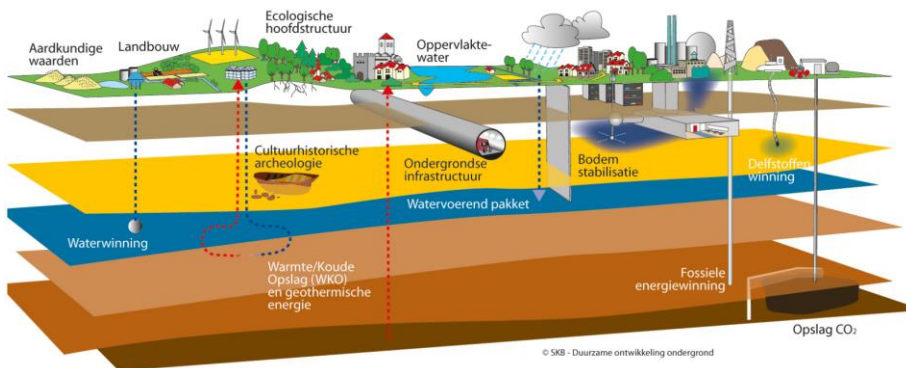


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National Framework of Base Registers in The Netherlands

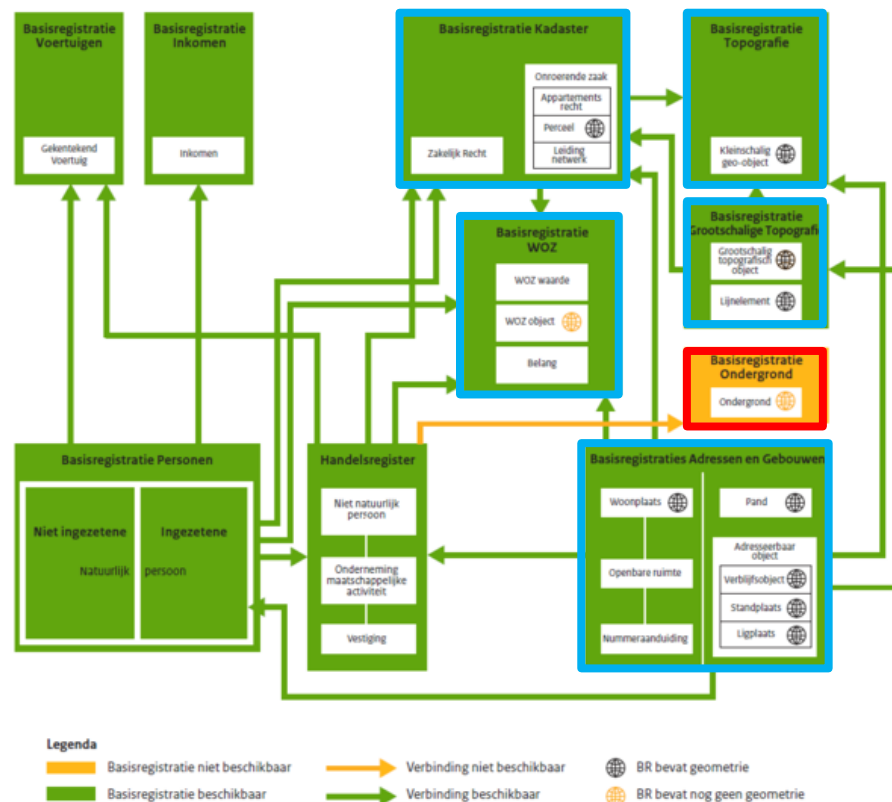
Introduction



© SKB - Duurzame ontwikkeling ondergrond

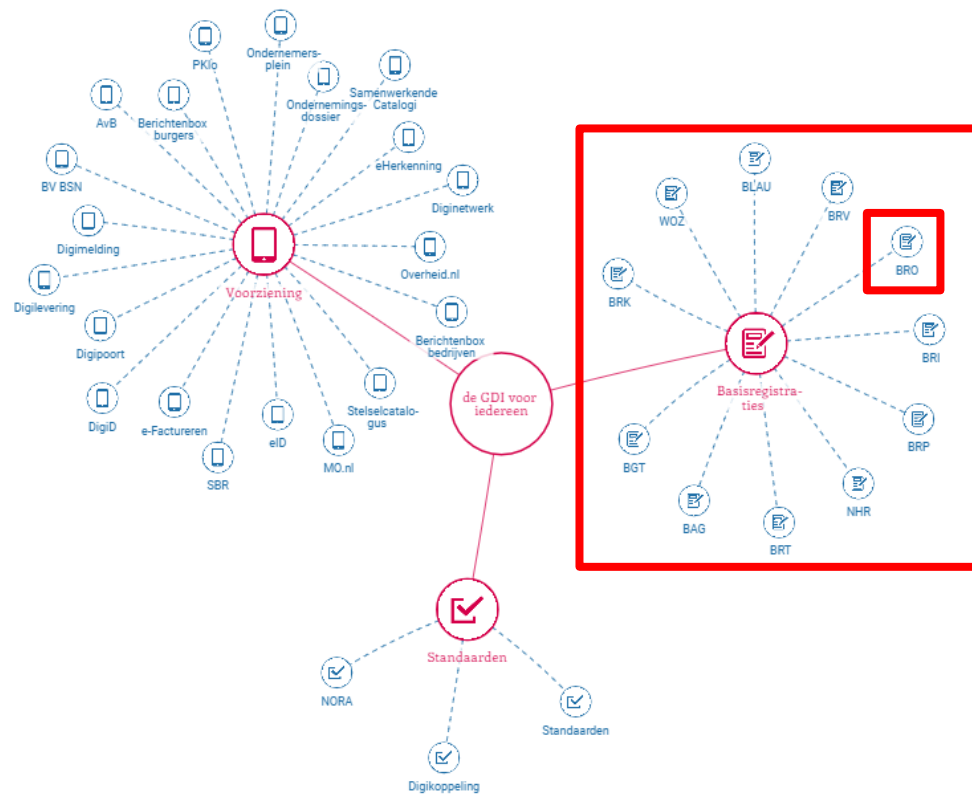
National Framework of Base Registers

- 11 National Base Registers
- 6 Administrative Base Registers (BLAU, BRI, BRP, BRV, NHR)
- 5 Geospatial Base Registers
 - **Surface** (BRT, BGT, KAD, BAG, WOZ)
 - **Subsurface** (BRO)
- BRO = Basis Registratie Ondergrond (Base Register for Subsurface)
 - Under development
 - 5 year program (2017-2022)
 - 50M euro budget
 - 28 (36) object types



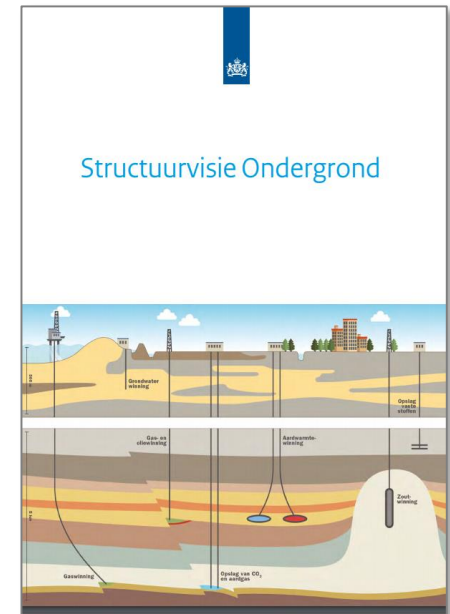


The National Framework of Base Registers is part of the E-Government Generic Digital Infrastructure (GDI)



National Policy on (deep) Subsurface (STRONG)

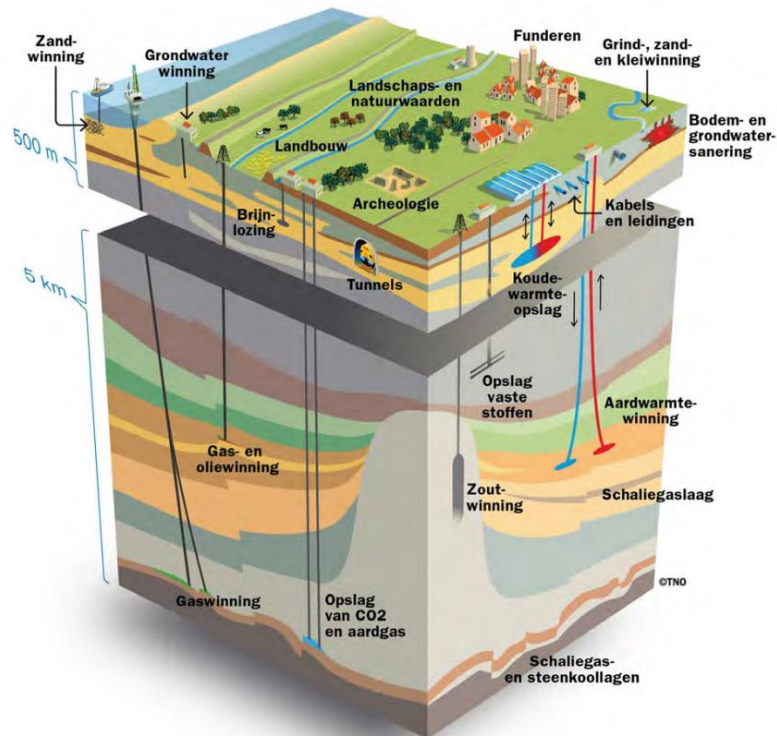
- Finalized in June 2018
- Topics covered by STRONG
 - Geothermal Energy
 - CO₂-storage
 - Groundwater extraction
 - Oil and Gas extraction
 - Salt extraction
 - Shale gas (fracking) extraction
 - Extraction of building materials (sand, clay)
 - ...
- <https://www.rijksoverheid.nl/documenten/rapporten/2018/06/11/structuurvisie-ondergrond>





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Base Register for Subsurface Data

Introduction

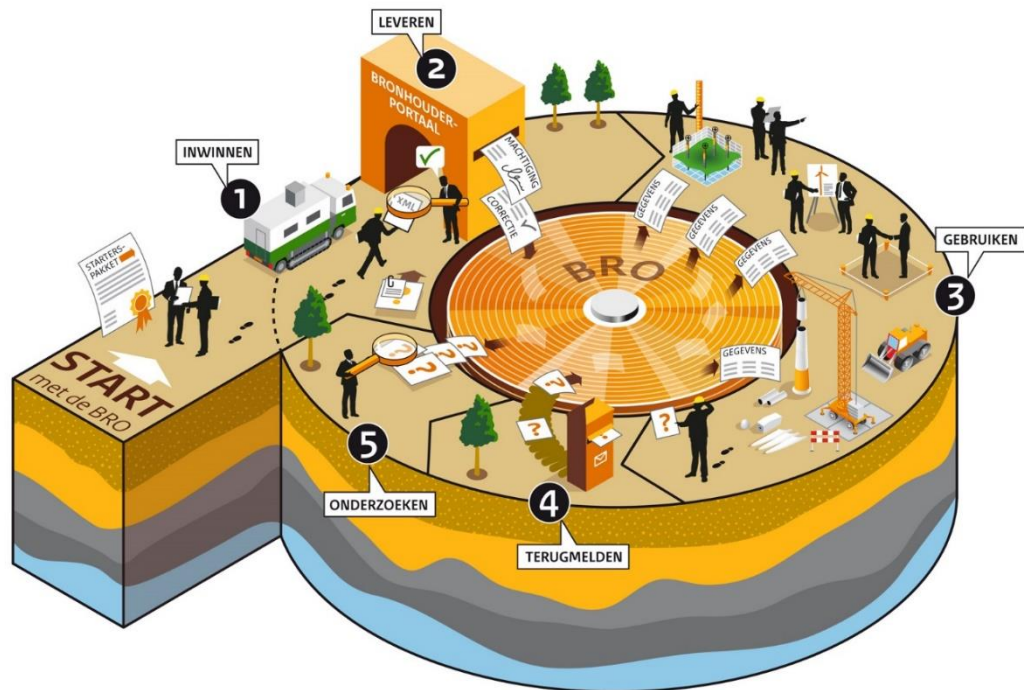


BRO Introduction (and Digital Twin HDSR)

- <https://www.basisregistratieondergrond.nl/documenten/videos/2018/11/08/sterke-lekdijk>

BRO Chain

1. Initial Data Capture →
2. Deliver and Register →
3. Disseminate and Use →
4. Provide Feedback →
5. Investigate →
6. Improve (update) Data





Scope of BRO (BRO I vs BRO II)



Civil
Engineering



Agriculture

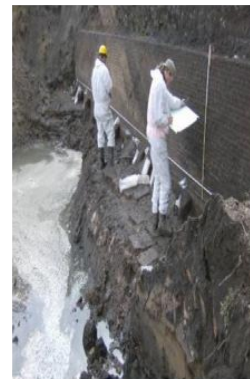


Water
Management



Natural
Resources

Currently
debated for
BRO I



Soil Con-
tamination



Archeology

← Current scope BRO I →

← BRO II →

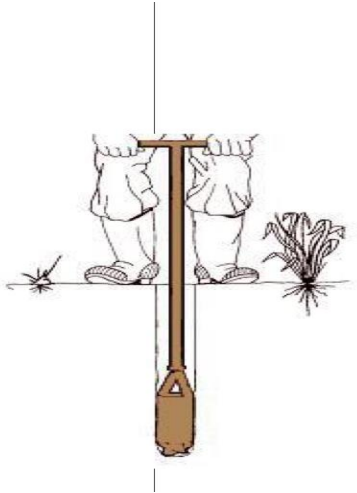


Out of Scope for BRO

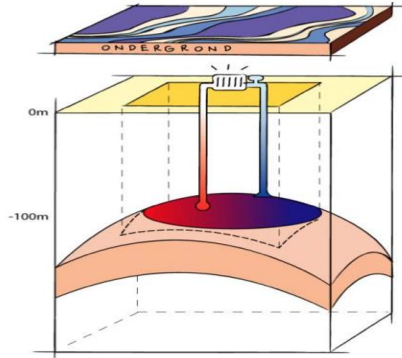
- Man made subsurface structures
 - E.g. Tunnels, Parkings, Bunkers, etc.
 - Part of Base Register for Large Scale Topography (BGT)
- Cables and Pipelines
 - Covered by a separate national law (WION)
 - Datamodel (IMKL) and systems already established



Data types BRO



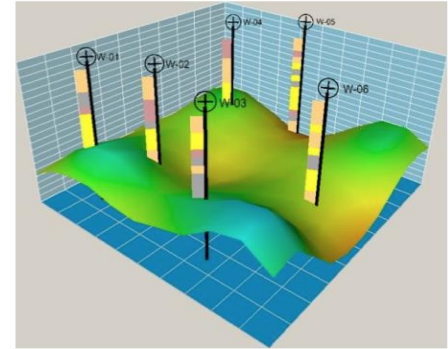
Surveys
(CPTs, bore
samples, seismic)



Licenses (e.g. for
production)



Subsurface
Constructions
(e.g. wells)



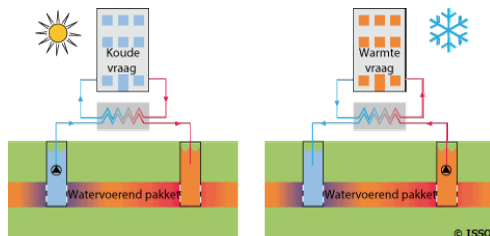
Subsurface
Models



BRO Data Models

BRO Data Models

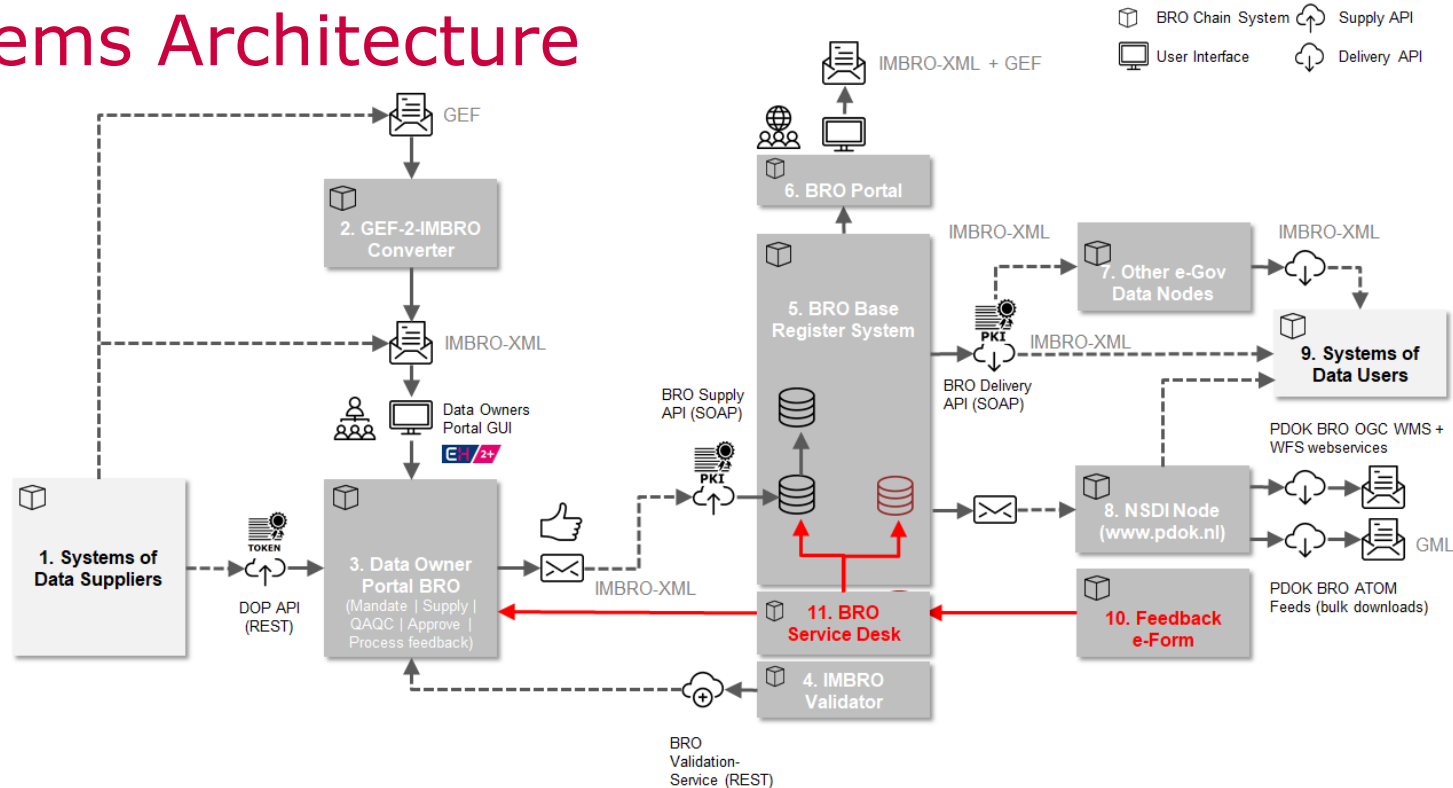
- <https://github.com/BROprogramma>
- Seasonal thermal energy storage (STES) systems in BRO is under investigation



BRO Registratiedomein	Mnm	BRO Registratieobject (type)	Mnm
Bodem- en grondonderzoek	Subsurface Research	SR	Geotechnisch sondeeronderzoek
			Cone penetration test
			Geo-elektrisch onderzoek
			Geo-electric survey
			Seismisch onderzoek
			Seismic survey
			Booronderzoek
			Borehole research
			Bodemkundig booronderzoek
			Borehole research-Pedology
			Geotechnisch booronderzoek
			Borehole research-Geotechnics
			Bodemkundig wandonderzoek
			Soil face research
Bodemkwaliteit	Soil Quality	SQ	Bodemmeetnet
			Soil monitoring network
			Bodemsamenstellingsonderzoek
Grondwater-monitoring	Groundwater Monitoring	GM	Soil analysis report
			Grondwatermonitoringput
			Groundwater monitoring well
			Grondwaterstandonderzoek
			Groundwater level dossier
			Grondwatersamenstellingsonderzoek
			Groundwater analysis report
			Grondwatermonitoringnet
			Groundwater monitoring network
			Synthese Grondwaterkwantiteit
			Groundwater level synthesis
			Synthese Grondwaterkwaliteit
Mijnbouwwet	Exploration & Production	EP	Groundwater quality synthesis
			QGS
			Mijnbouwwet boorgatsysteem
			Exploration borehole
			Mijnbouwwet booronderzoek
			Exploration borehole research
			Mijnbouwwet putsysteem
			Production well system
			Mijnbouwwet productiedossier
			Production figures dossier
			Mijnbouwwetvergunning
			Exploration production (and storage) licence
Grondwater-gebruik	Groundwater Utilisation	GU	Koolwaterstof reservedossier
			Hydrocarbon reserves dossier
			Grondwatergebruikssysteem
Modellen	Models and Maps	MM	Groundwater utilisation facility
			Grondwaterproductiedossier
			Groundwater production dossier
			Bodemkaart
			Soil and groundwater map
			Geomorfologische kaart
			Geomorphological map
			REGIS
			Hydrogeological model
			DGM
			Digital Geological Model
			GeoTOP
			GeoTOP model
			Koolwaterstofvoorkomen
			Hydrocarbon accumulation
			HCA
Modellen			Mijnbouwwet productiedossier
			20
			Koolwaterstof reservedossier
			21
			Bodemkaart van Nederland schaal 1:50.000 (WENR)
			22
			Geomorfologische kaart schaal 1:50.000 (WENR)
			23
			Grondwaterdynamiek (WENR)
			24
			REGIS (TNO GDN)
			25
			GeoTOP (TNO GDN)
			26
			DGM (TNO GDN)
			27
			DGM Diep (TNO GDN)
			28



BRO Systems Architecture





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HDSR Digital Twin Prototype

Integration of surface and sub-surface
geospatial base registers (BGT, KAD, BAG,
BRO)

HDSR Digital Twin Pilot

- Integration of Surface and Subsurface data in a 3D Data Room
- 3D GIS data and BIM models (Civil 3D corridors)
- Civil Engineering (BIM) and Geologists / Geographers (GIS) domains working together
- HDSR pilot (story map)
<https://labs.geodan.nl/ondergrond/lekdijk/>
- Other BRO Pilots
<https://labs.geodan.nl/ondergrond/kaart>





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The End – Q&A

More info www.basisregistratieondergrond.nl