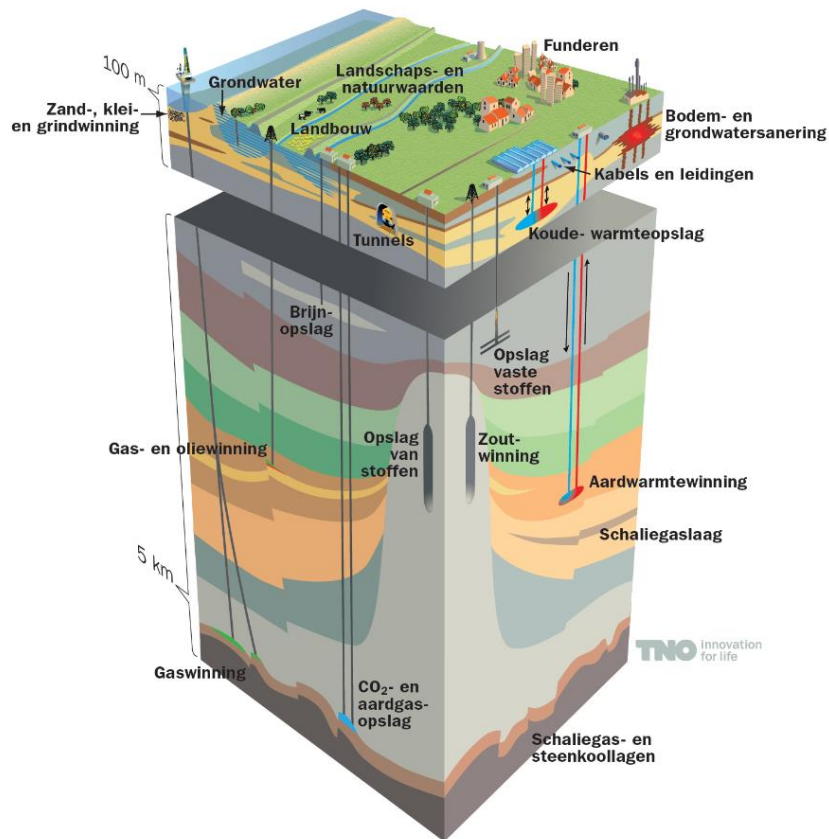




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National Base Register for Subsurface Data

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

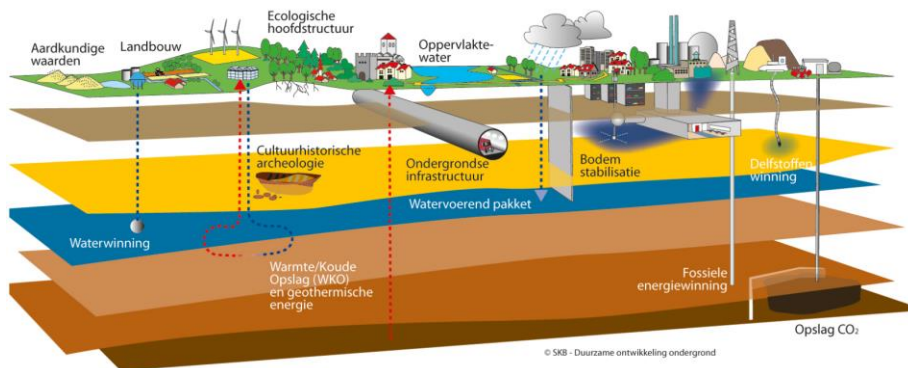


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National Framework of Base Registers in The Netherlands

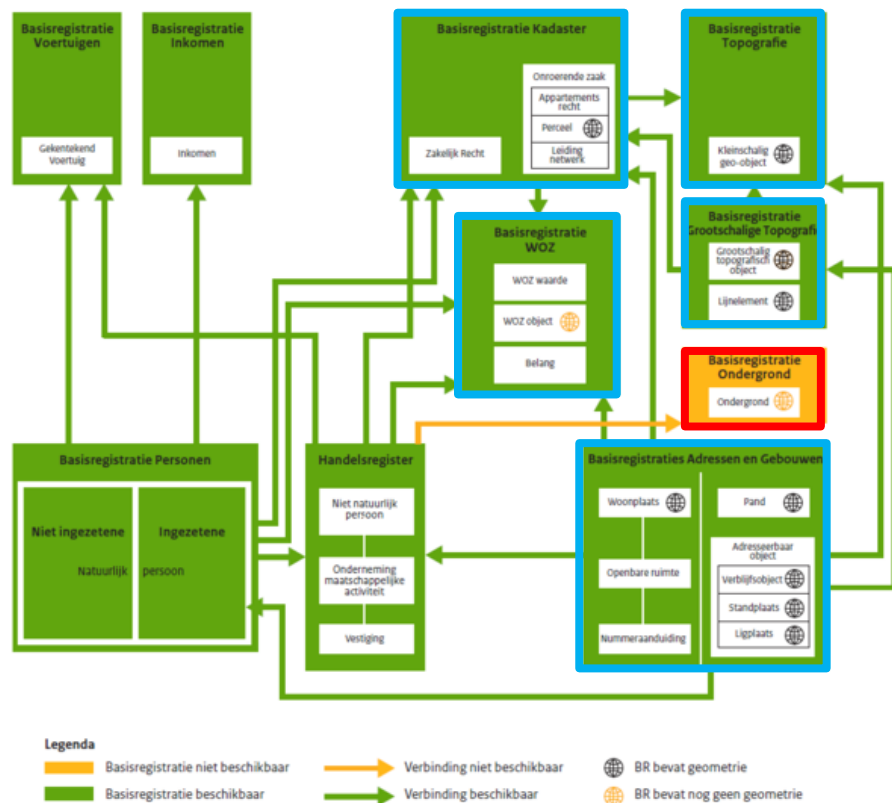
Introduction





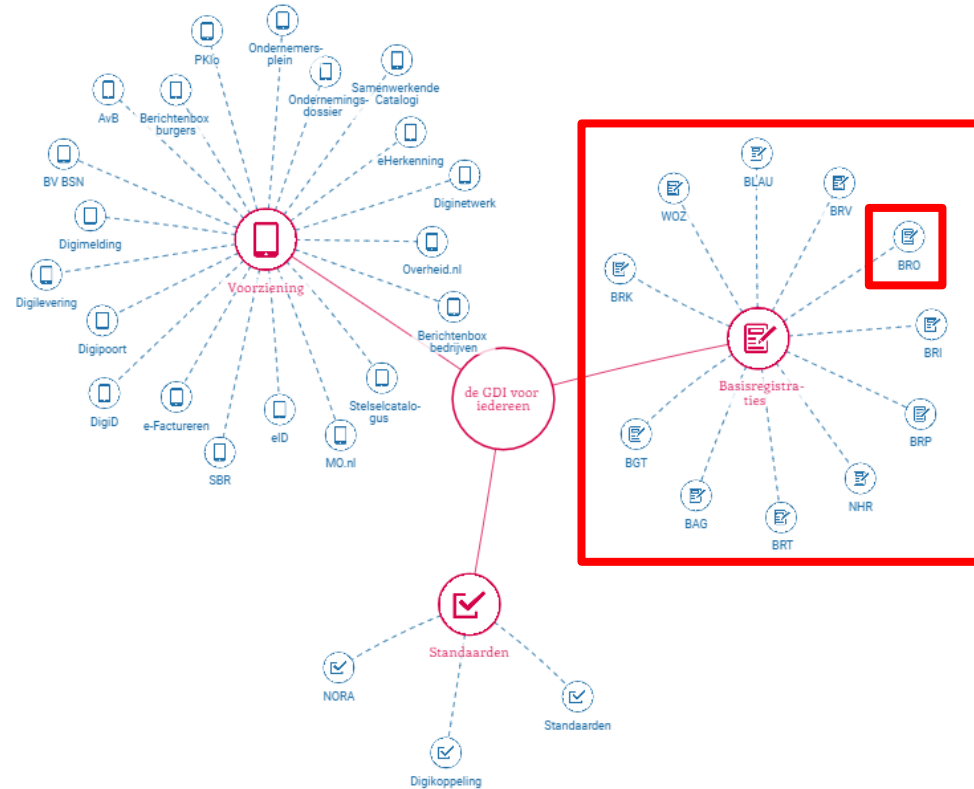
National Framework of Base Registers

- 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





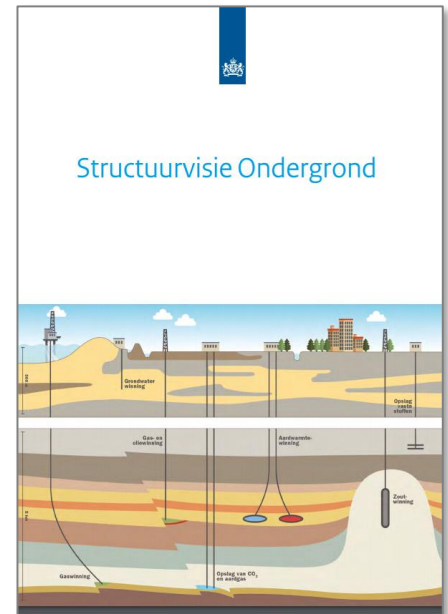
The National Framework of Base Registers is part of the E-Government Generic Digital Infrastructure (GDI)





National Policy on (deep) Subsurface (STRONG)

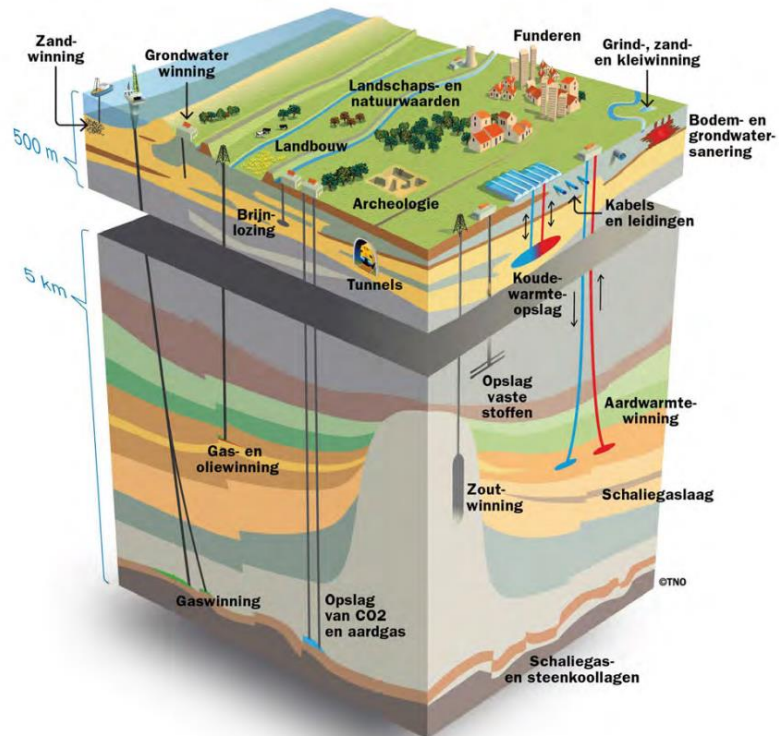
- Finalized in June 2018
- Topics covered by STRONG
 - Geothermal Energy
 - CO2-storage
 - Groundwater extraction
 - Oil and Gas extraction
 - Salt extraction
 - Shale gas (fracking) extraction
 - Extraction of building materials (sand, clay)
 - ...
- <https://www.rijksoverheid.nl/documenten/rapporten/2018/06/11/structuurvisie-ondergrond>





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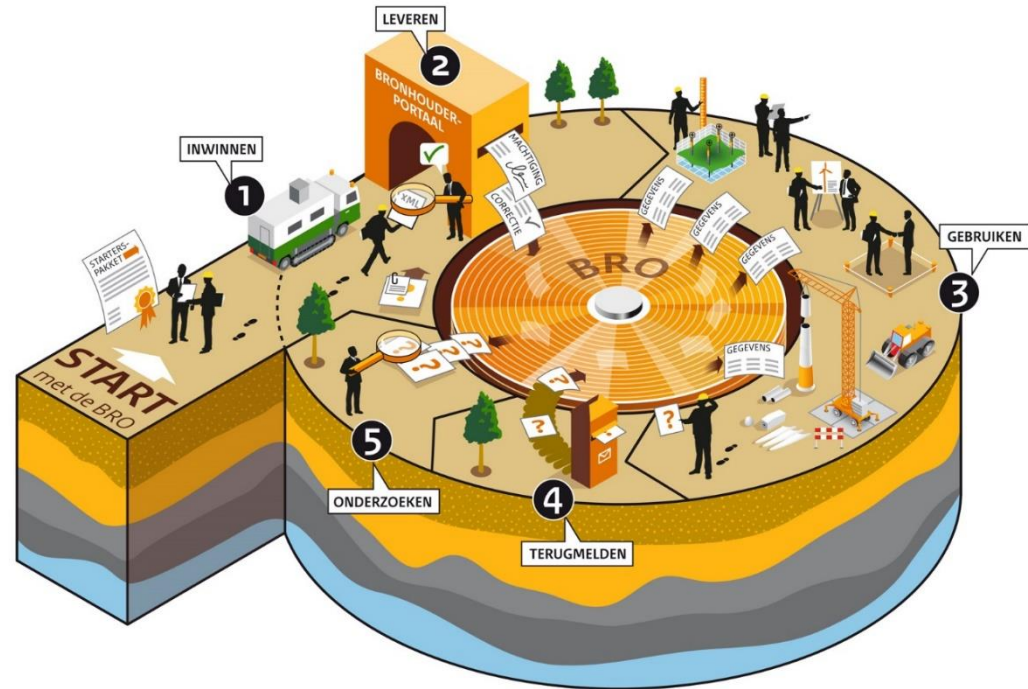


Base Register for Subsurface Data

Introduction

BRO 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

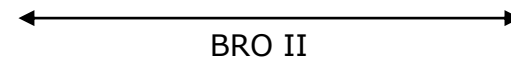
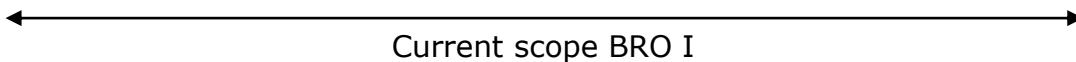
Currently debated for BRO I



Soil Contamination



Archeology





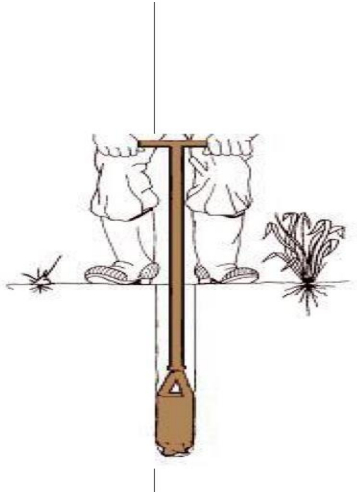
Out of Scope for BRO

- 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

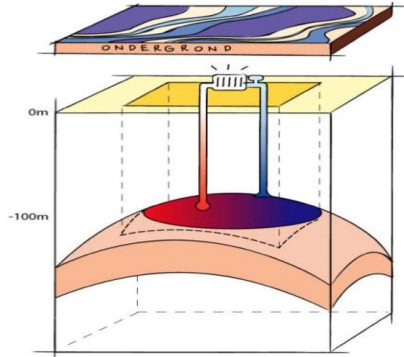




Data types BRO



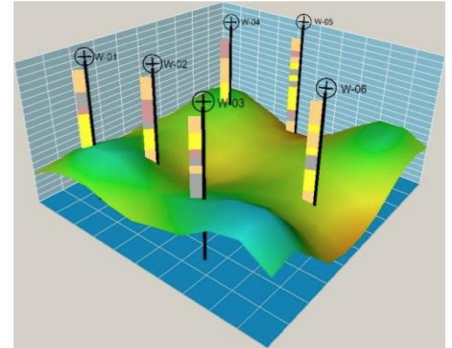
Surveys
(CPTs, bore
samples, seismic)



Licenses (e.g. for
production)



Subsurface
Constructions
(e.g. wells)



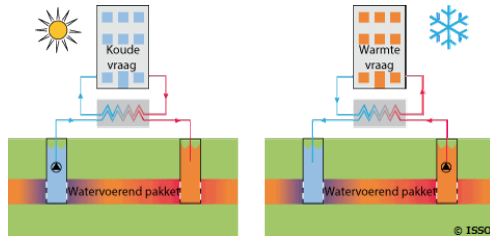
Subsurface
Models



BRO Data Models

BRO Data Models

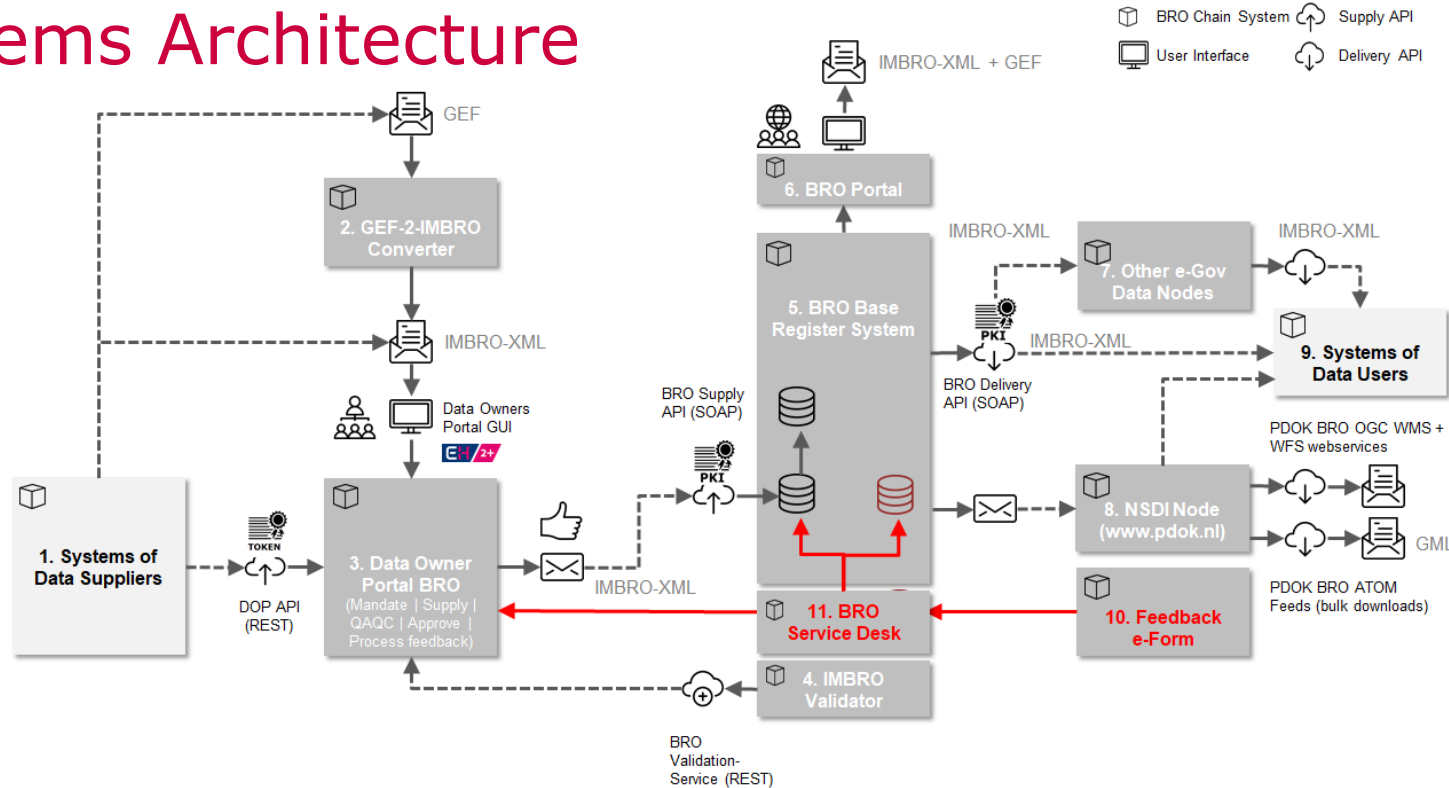
- <https://github.com/BROprogramma>
- Seasonal thermal energy storage (STES) systems in BRO is under investigation



BRO Registratiedomein	Mnm	BRO Registratieobject (type)	Mnm		
Bodem- en grondonderzoek	Subsurface Research	SR	Geotechnisch sondeeronderzoek	Cone penetration test	CPT
			Geo-elektrisch onderzoek	Geo-electric survey	GES
			Seismisch onderzoek	Seismic survey	SMS
			Booronderzoek	Borehole research	BHR
			Bodemkundig booronderzoek	Borehole research-Pedology	BHR-P
			Geotechnisch booronderzoek	Borehole research-Geotechnics	BHR-GT
			Bodemkundig wandonderzoek	Soil face research	SFR
Bodemkwaliteit	Soil Quality	SQ	Bodemmeetnet	Soil monitoring network	SMN
			Bodemsamenstellingsonderzoek	Soil analysis report	SAR
Grondwater-monitoring	Groundwater Monitoring	GM	Grondwatermonitoringput	Groundwater monitoring well	GMW
			Grondwaterstandonderzoek	Groundwater level dossier	GLD
			Grondwatersamenstellingsonderzoek	Groundwater analysis report	GAR
			Grondwatermonitoringnet	Groundwater monitoring network	GMN
			Synthese Grondwaterkwantiteit	Groundwater level synthesis	GLS
			Synthese Grondwaterkwaliteit	Groundwater quality synthesis	QGS
Mijnbouwwet	Exploration & Production	EP	Mijnbouwwet boorgatstelsel	Exploration borehole	EBH
			Mijnbouwwet booronderzoek	Exploration borehole research	EBR
			Mijnbouwwet putsysteem	Production well system	PWS
			Mijnbouwwet productiedossier	Production figures dossier	PFD
			Mijnbouwwetvergunning	Exploration production (and storage) licence	EPL
			Koolwaterstof reservedossier	Hydrocarbon reserves dossier	HRD
Grondwater-gebruik	Groundwater Utilisation	GU	Grondwatergebruiksstelsel	Groundwater utilisation facility	GUF
			Grondwaterproductiedossier	Groundwater production dossier	GPD
Modellen	Models and Maps	MM	Bodemkaart	Soil and groundwater map	SGM
			Geomorfologische kaart	Geomorphological map	GMM
			REGIS	Hydrogeological model	HGM
			DGM	Digital Geological Model	DGM
			GeoTOP	GeoTOP model	GTM
			Koolwaterstofvoorkomen	Hydrocarbon accumulation	HCA
Modellen			Mijnbouwwet productiedossier		ZU
			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>

