



Presented at the FIG Working Week 2023,
28 May - 1 June 2023 in Orlando, Florida, USA

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Protecting
Our World,
Conquering
New Frontiers

Kadaster Knowledge Graph with Augmented Reality

The First results of User Experience



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Kadaster: Dutch Land Registry and Mapping Agency Who we are? What we do?

- BRK: Basisregistratie Kadaster
- BRT: Basisregistratie Topografie
- BAG-LV: Basisregistratie Adressen en Gebouwen
- BGT-LV: Basisregistratie Grootschalige Topografie
- KLIC: Kabels en Leidingen
- RP-LV: Ruimtelijke plannen
- WOZ-LV Waardering Onroerende Zaken
- RCE-Monumentregister
- RD: National network of coordinate points
- AGRS.NL: Global Navigation Satellite Systems



TOP10NL, 1:25.000 – 1:1.000.000



1:1.000 – 1:10.000



Ambitions



Providing certainty of ownership and use of anything above and below the surface



Offering a platform for anyone to handle spatial information anywhere and anytime



Supporting society in using spatial information to solve issues that matter

Public Services on the Map



The screenshot shows the PDOK website homepage. At the top left is the PDOK logo, and at the top right is a 'MENU' button. The main content area features a dark blue background with an aerial view of a city. The headline reads 'Hét platform voor hoogwaardige geodata'. Below the headline are three buttons: 'Bekijk alle datasets', 'Ontdek de PDOK Viewer', and 'Bekijk de PDOK promotiefilm'. At the bottom of the screenshot, there is a paragraph of text and two data boxes.

Bij PDOK vind je open datasets van de overheid met actuele geo-informatie. Deze datasets zijn benaderbaar via geo-webservices en beschikbaar als downloads. Daarnaast vind je hier inspirerende cases over de mogelijkheden van deze geo-datasets. [Meer info over PDOK](#)

87.000.000

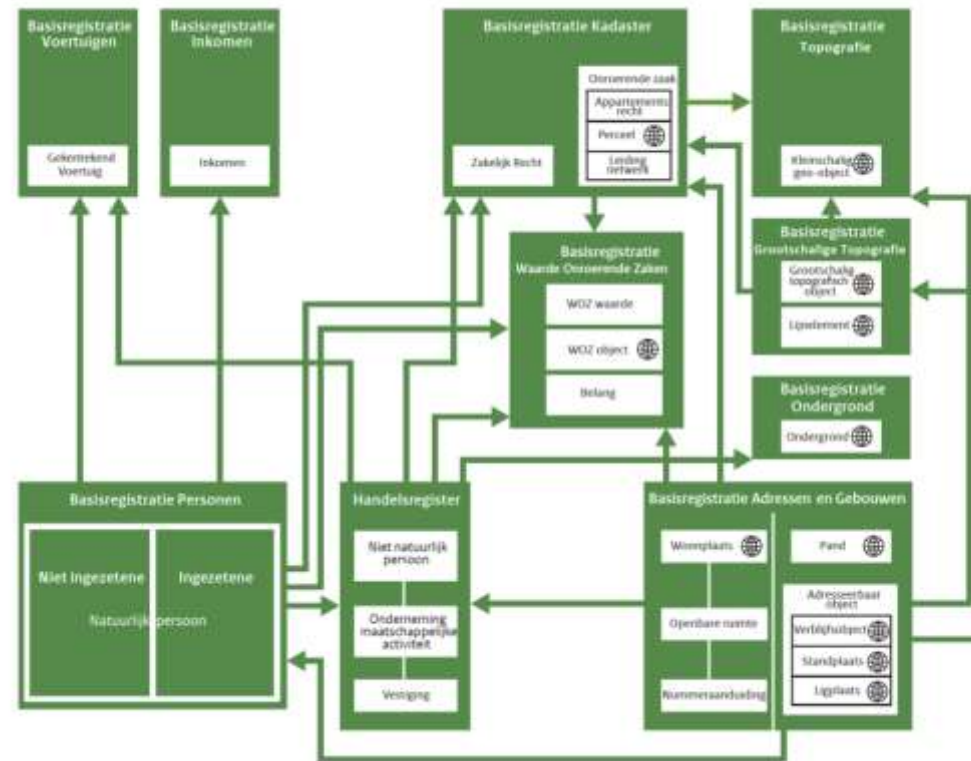
datacalls per dag

239

hoogwaardige datasets

From Data Siloes to Linked Data

- Data siloes are a consequence of needing to organize information.
- More certainty and more reuse calls for integration and ease of use.
- This integration needs to be explicitly modelled, published and easy to use.
- These principles are at the core of our linked data implementation.



Kadaster Knowledge Graph – what is it?

Why?

I want to buy a **palace** with a **surface area of >1500m²** which is a **national monument** and has a value of **> Euro 1,000,000** in the neighborhood of **'Berg en Bos' in Apeldoorn.**

RCE

BRT

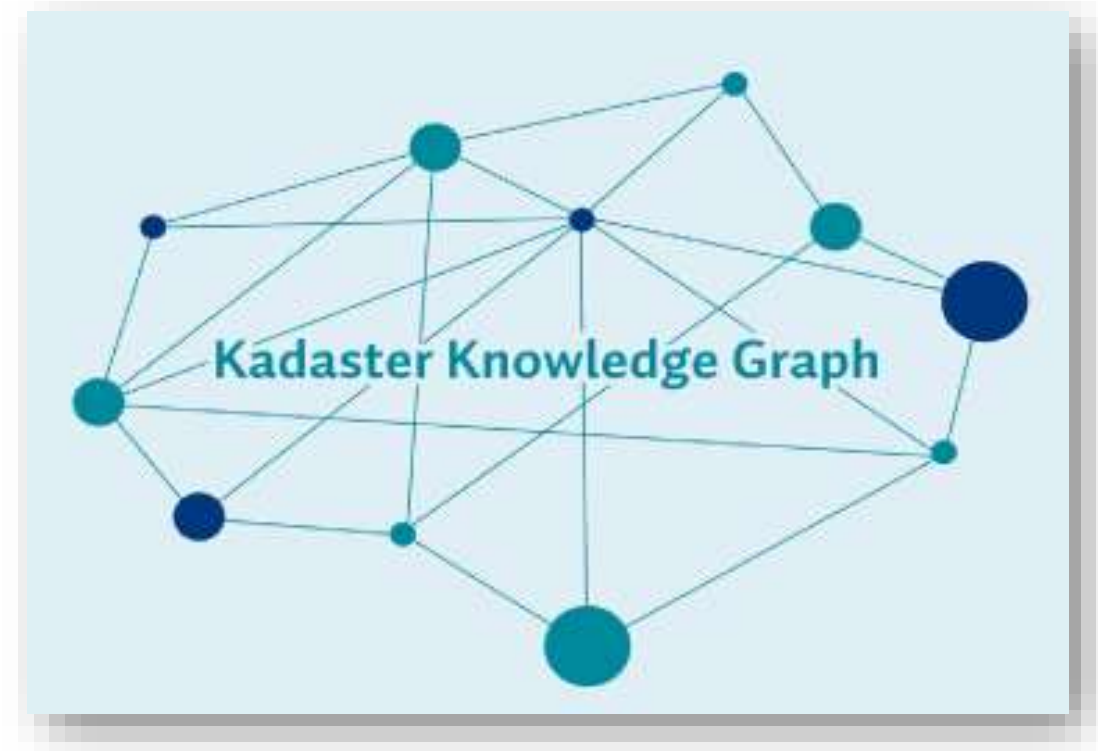
BAG

CBS

WOZ

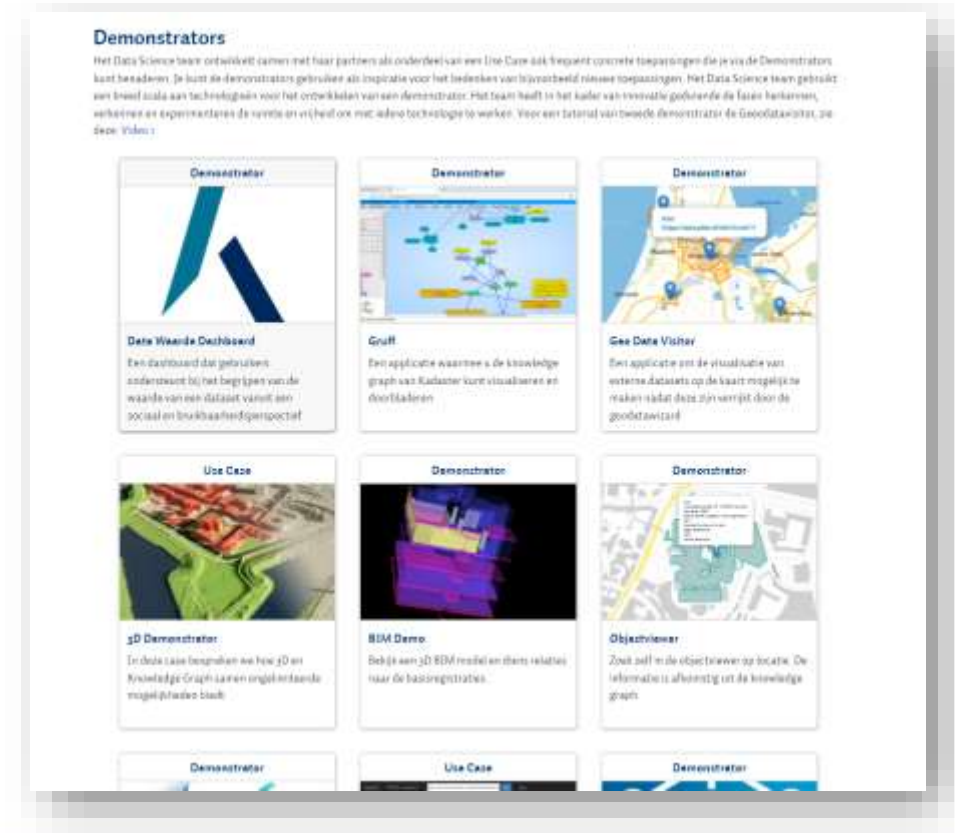
Why? Kadaster Knowledge Graph contains...

- **BRK:** Basisregistratie Kadaster
- **BRT:** Basisregistratie Topografie
- **BAG-LV:** Basisregistratie Adressen en Gebouwen
- **RP-LV:** Ruimtelijke plannen
- **WOZ-LV:** Waardering Onroerende Zaken
- **BGT-LV:** Basisregistratie Grootschalige Topografie
- **LV-Energielabels**
- **KLIC:** Kabels en Leidingen
- **RCE Monumentregister**
- **RD:** National network of coordinate points
- **AGRS.NL:** Global Navigation Satellite Systems



Applications on top of the KKG - experiments

- Loki: Chatbot
- Sparklis: Lowthreshold Querying
- ObjectViewer: Interacting with geospatial data
- Data stories
- AR



KKG with Augmented Reality – how does it start?

- Signals from the users to make data more user-friendly
- More understanding for non-professionals needed
- Trends

Visualisation

Data experience (AR, VR, MR)



 <p>Virtual Reality (VR) Completely digital environment. Fully enclosed, synthetic experience with no sense of the real world.</p>	 <p>Augmented Reality (AR) Real world with digital information overlay. Real world remains central to the experience, enhanced by virtual details.</p>	 <p>Mixed Reality (MR) Real and the virtual are intertwined. Interaction with and manipulation of both the physical and virtual environment.</p>
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- From data to information

KKG with Augmented Reality – how does it start?

INNOVATION BOARD BEOORDELINGSKADER
Data beleving met AR

1. Beschrijving innovatie idee
Naam registrant(s)/indieners: Innovatie: Tony Baving, Magdalena Gino

Korte beschrijving van de innovatie inhoud:
Applicatie prototype waarmee de data van het Kadaster kan worden weergegeven op een gebruiksvriendelijke manier met behulp van **Augmented Reality**. De doelgroep is non-professionals. Met een prototype scherpen we de wensen en behoeftes van de klanten aan en testen we de functionaliteit van de **GebruikersGids** (geïmplementeerd door data **ScienceTeam** in samenwerking met **SDU**).



Korte beschrijving van de innovatie opgepakt moet worden vanuit Kadaster (bijv. verwachting, doel, kans, impact, klant etc):
Er zijn signalen geweest om onze data op een meer gebruiksvriendelijke manier beschikbaar te stellen en de non-professionals doelgroep beter te versterken. De nieuwe AR ontwikkelingen bieden mogelijkheden om Kadaster data op een aantrekkelijkere manier beschikbaar te stellen en daardoor een grotere en geavanceerdere gebruikersgroep te bereiken.
De AR mogelijkheden in de context van Kadaster data passen wij op dit moment nog niet toe. Bovendien zijn we nieuwsgierig of de bestaande **GebruikersGids** (geïmplementeerd door **DataScience Team (L&L, SDU)**) voldoet aan de wensen van de ontwikkelaars.

+ KKG =

Augmented Reality (AR) Mobile Application

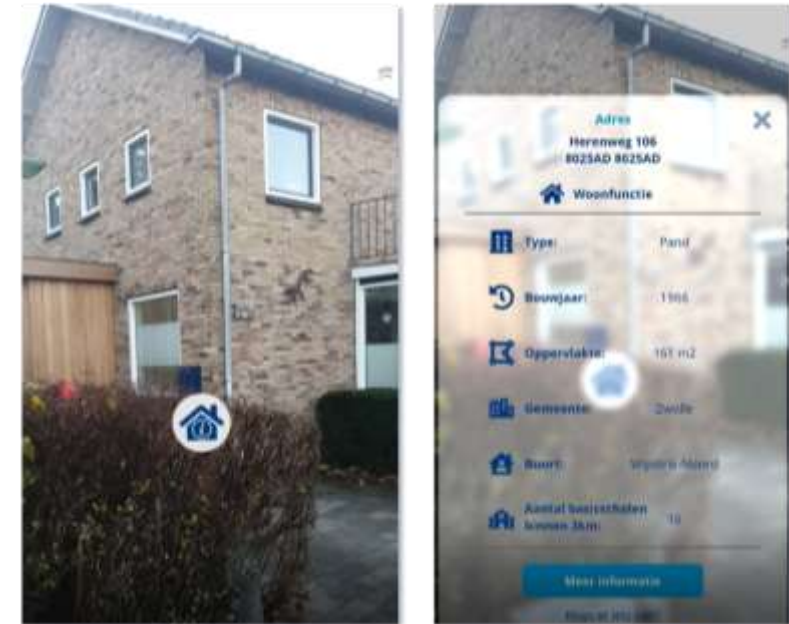




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Demo



Feedback when errors (BAG, BGT, BRT...)



Kadaster's products easier to find



Mixed Reality (MR) HoloLens



Feedback from the users



Target group and method

- Colleagues from the Marketing department
- Friends and family members
- From 30 to 73 years old
- Instructions app and QR code



Feedback: non - professionals

- An actual value of the house
- Plot area
- Information about the neighbourhood
- Houses for sale nearby
- Distance to shops
- Distance to train stations
- Distance to village centre
- Contents of the house
- Energy label
- Whether the house was available for rent or purchase



Feedback: professionals

- AdressNaam en Gebouwnaam different variabels to prevent double data
- Clustering database for faster data access
- Provide necessary API-Keys in advance before building the application
-

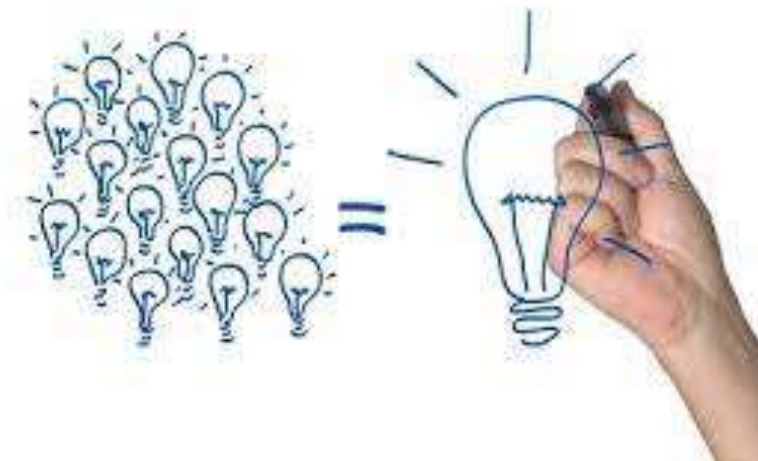


Other ideas...

Welke data zou je graag toegevoegd willen hebben?



Voor welke doelgroep (intern/extern) zou dat interessant kunnen zijn?



Other ideas...

- Virtual variant of “house report”
- The future vision of the land use
- Combination of the cadastral map and the location
- App for surveyors – boundary between lots
- Sensors - what is measured, why and by whom?
- New developments report
- Future constructions





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Questions?

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