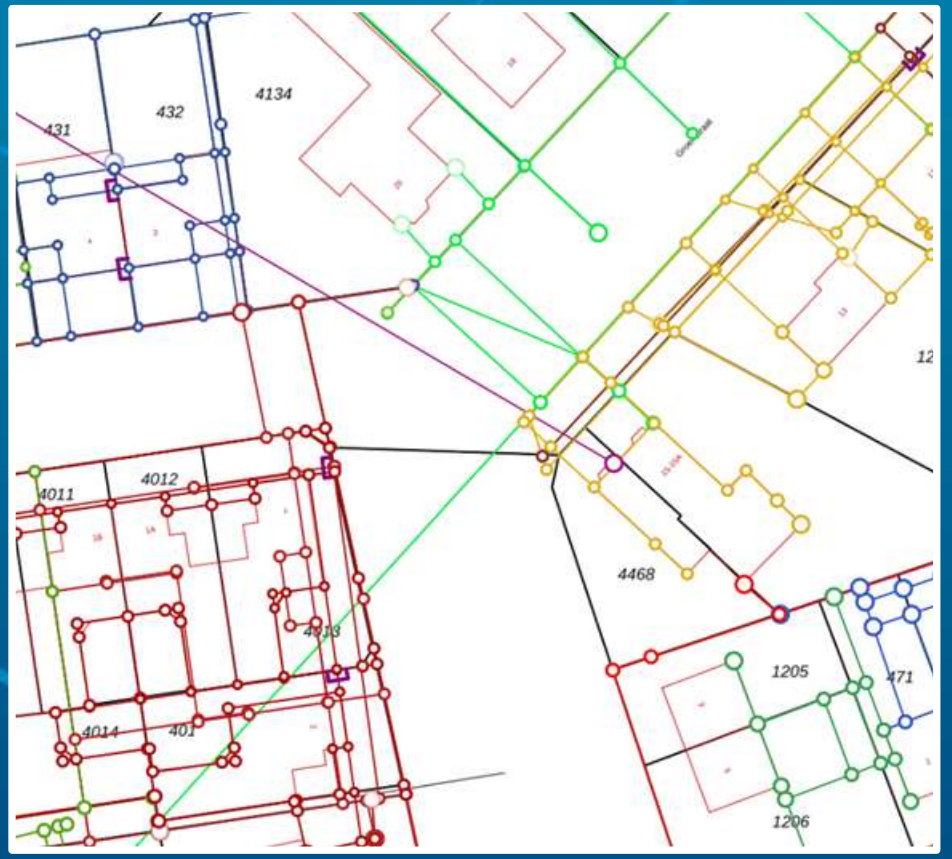
kadaster



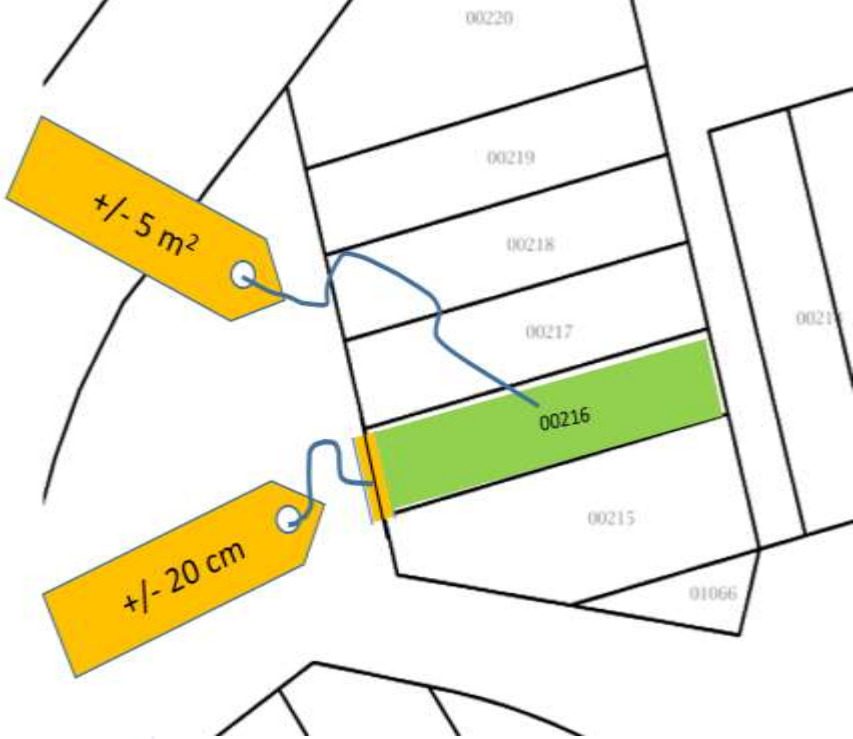
Rebuilding the Cadastral Map of The Netherlands (Cadastral Map 'Next') : the Overall Concept

Eric HAGEMANS, Ruben BUSINK,
Frank SCHOUTEN, Jeroen GRIFT

FIG

e-Working Week 2021

Rebuilding the Dutch Cadastral Map: ambition & drivers



The What

- Significant improvement of the geometric quality and consistency of the cadastral boundary map : upgrading from good to better, or ‘best possible’ !
- In addition: quality of the map (present and future) is known, quantified and visualized

The Why

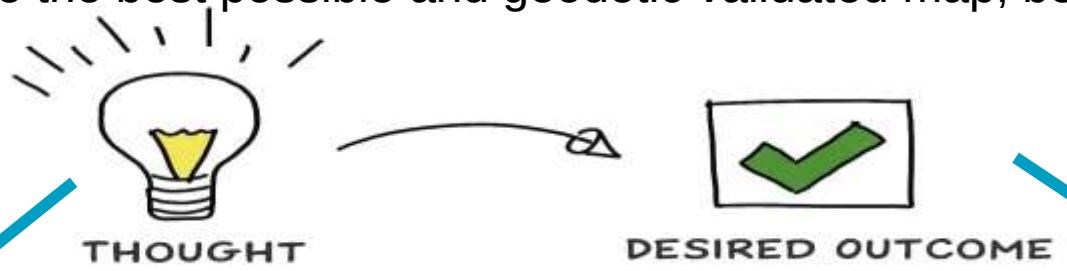
- It’s our ambition to deliver best quality map possible based on our data. And the data-driven and digital society demands for it
- There is a significant positive cost / benefit balance for society
- Prevent repetitive discussions, mistakes and re-work
- more accurate parcel sizes (m^2)
- Stimulate “*do it yourself boundary finding*”

Rebuilding the Dutch Cadastral Map: from idea to reality ?

Main goal:

Rebuilding the Cadastral map for the Netherlands by (re)processing the total digital archive of original field surveys (JPEG scans, 5.1 million) :

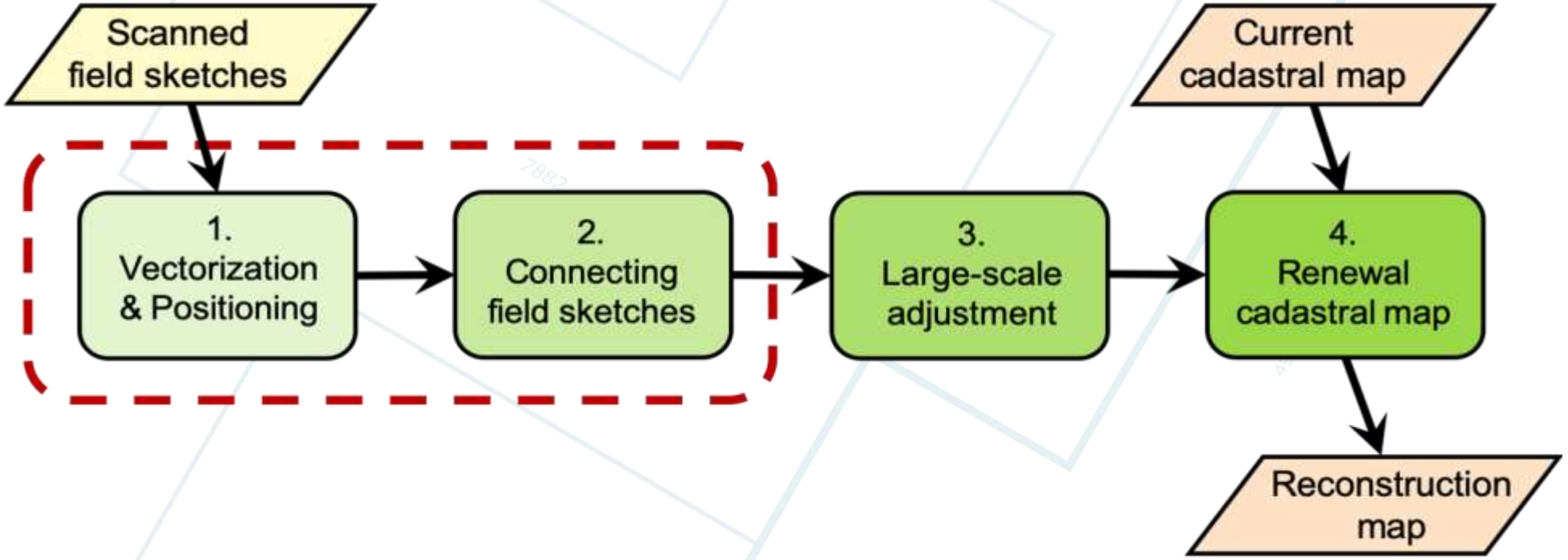
- with the highest automation grade possible (AI involved)
- Result should be the best possible and geodetic validated map, being a significant improvement



Timeline & phases of the program

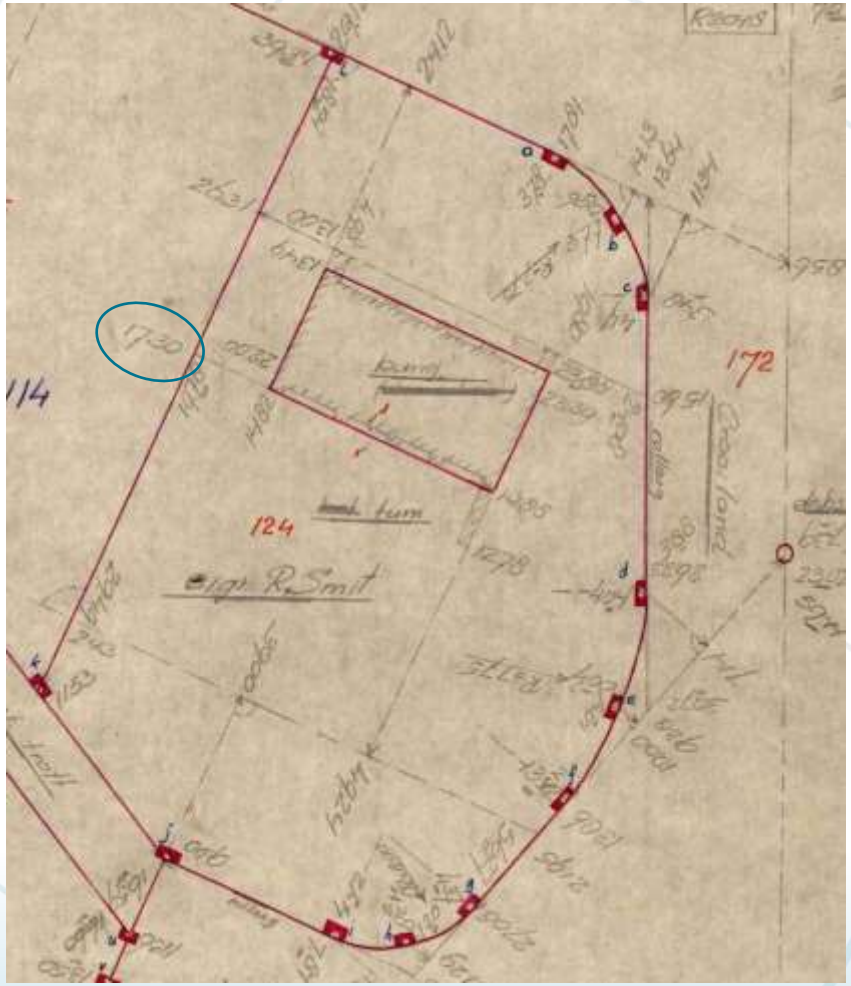
2017 – 2018	2018 – 2019	2019 – 2020	2021 – 2022	2023 – 2027
Proof of concept phase	Prototyping phase	Pre-production phase	Preparation & validation phase	Production & implementation phase
Market consultations PoC's	Automated vectorisation (AI) Production scenario's	Production pilots Work proces design Cost / benefit analysis Communication & transition strategy	Governance Communication & stakeholder-management IT infrastructure Involve market	Production & implementation

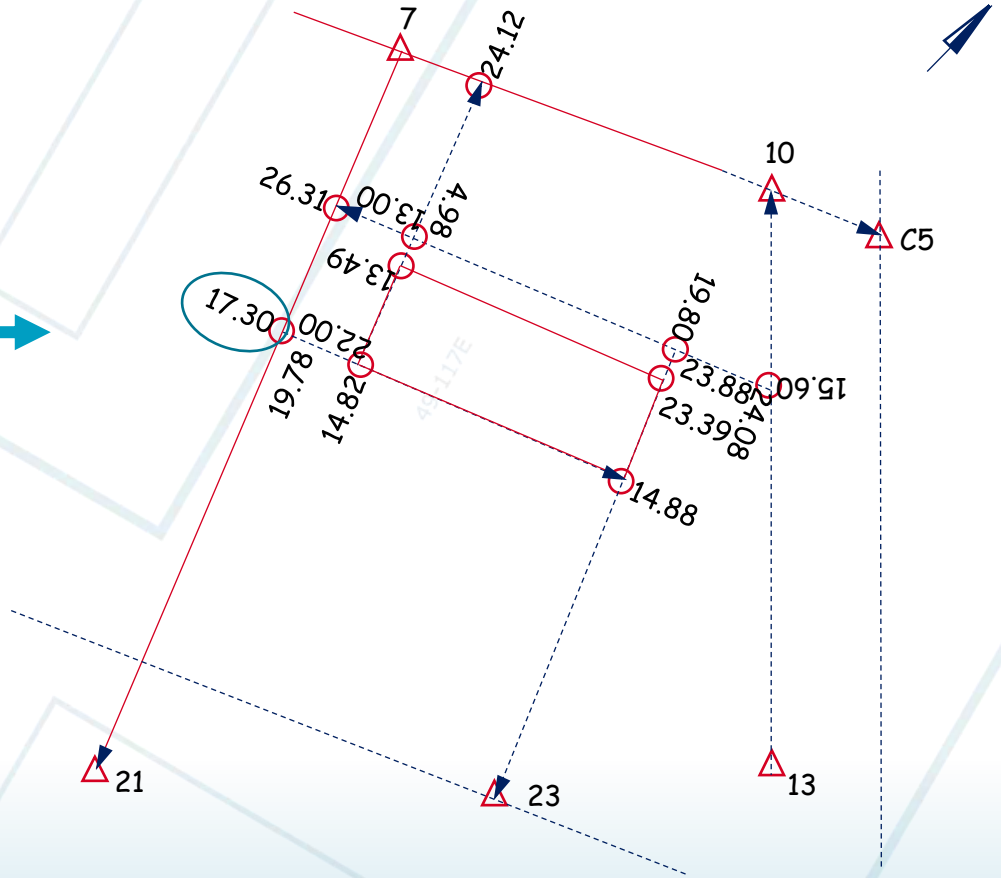
Production process: vectorization (retrieval of data) & connecting



More information on automating the vectorization step in FIG-paper:
Franken, J., Florijn, W., Hagemans, E., Hoekstra, M.,
”Rebuilding the cadastral map of The Netherlands, the artificial intelligence solution”

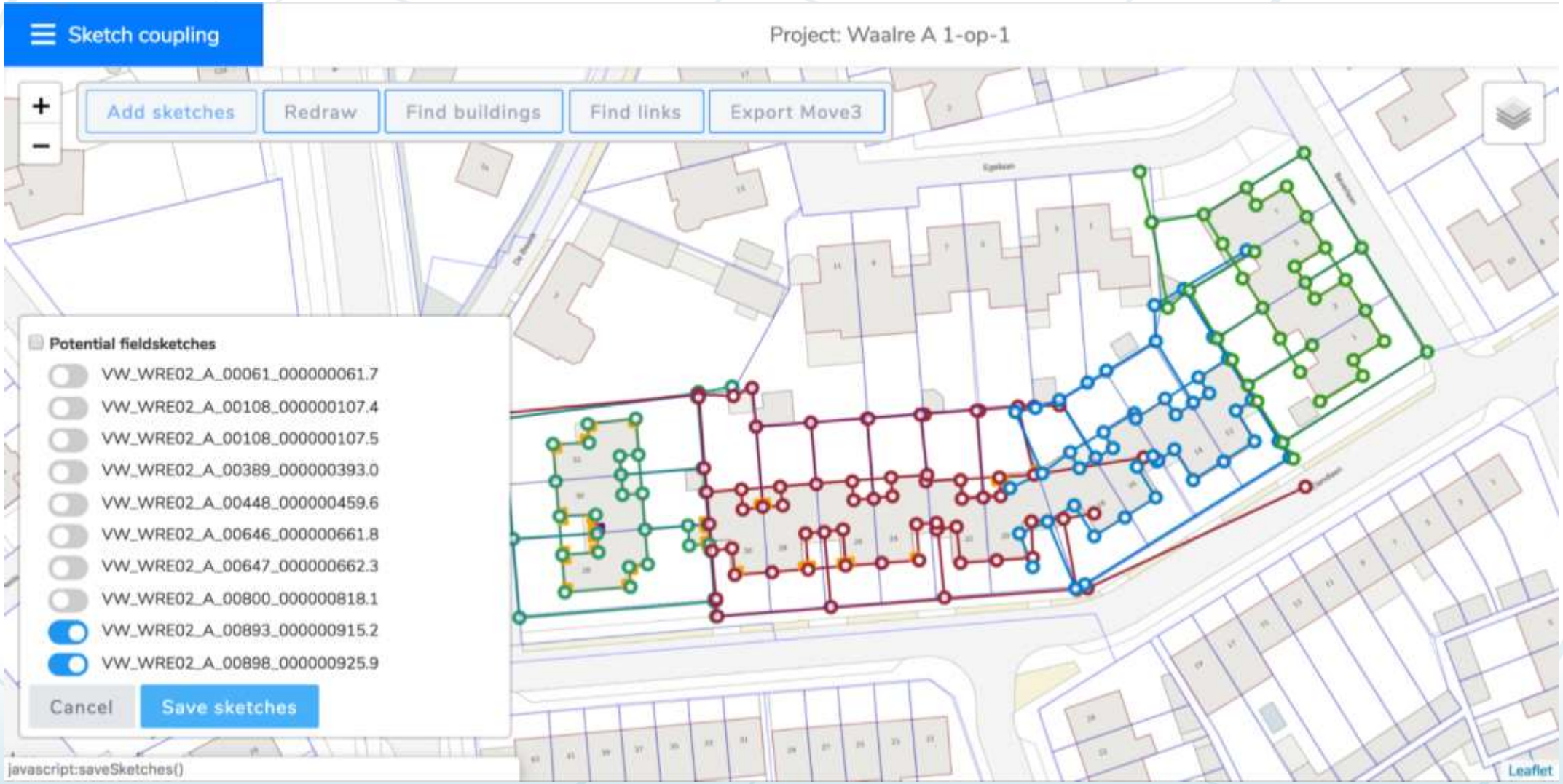
Goal of vectorising: automatic conversion of handwriten technical documents (fieldsketches) to well-structured data



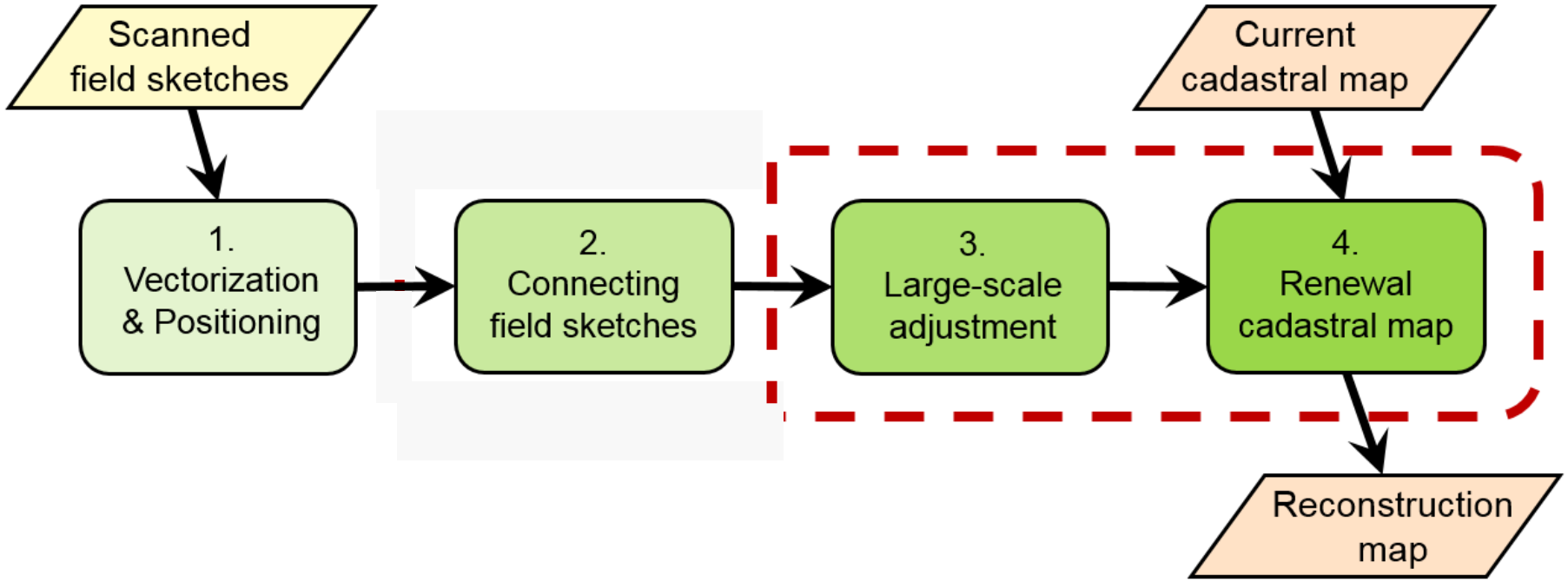


Vectorization: preview production process

Positioning & connecting



Production process: adjustment & mapping



More information on automating the vectorization step in FIG-paper:
Broek, M. van den, Heuvel, F. van den, Verkuijl, G., Vestjens, G.
”Rebuilding the cadastral map of The Netherlands, the geodetic concept”

Large scale adjustment & renewal cadastral map

Large scale adjustment

- Building the geometric basis of the reconstruction map by calculating very large amounts of connected field sketches
- -> result: all historic line elements: boundaries, buildings and measurement lines, accurate positioned

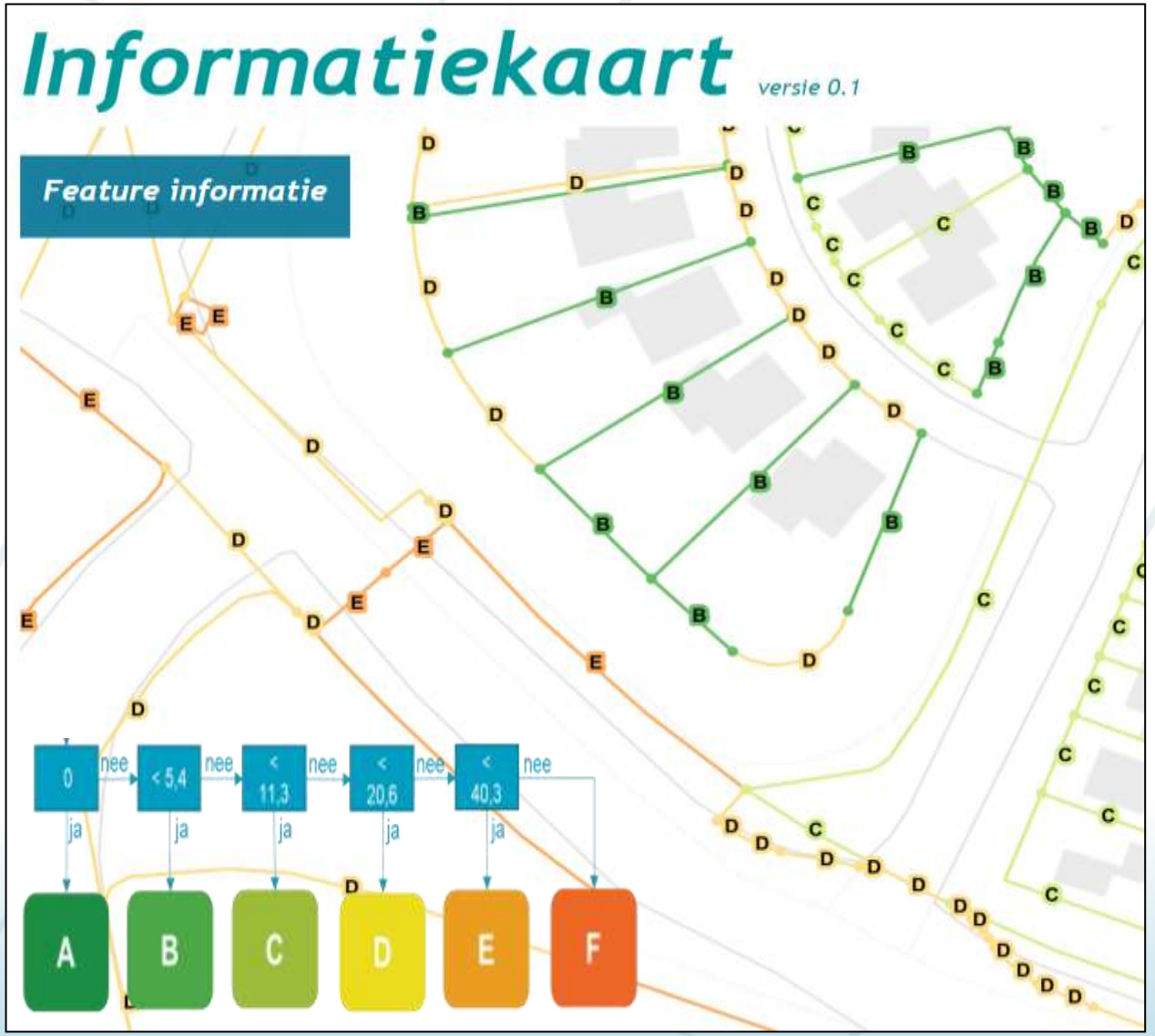
Renewal cadastral map

- Creating the reconstruction map by combining measured boundary points with existing map points
- -> result: reconstruction map with the same topology as the actual map but more accurate positioned boundary lines

Mapping by mathematical calculating

Adding quality / accuracy – information to the Cadastral Map

- More transparancy about quality levels
- Applicable to both
  - Actual Cadastral map &
  - Cadastral Map Next
- Fully automatic generation
- The quality information layer is of importance for:
  - better insights and knowledge
  - production and transition CM-next
  - communication and stakeholdermanagement



Production & transition

Information layer:

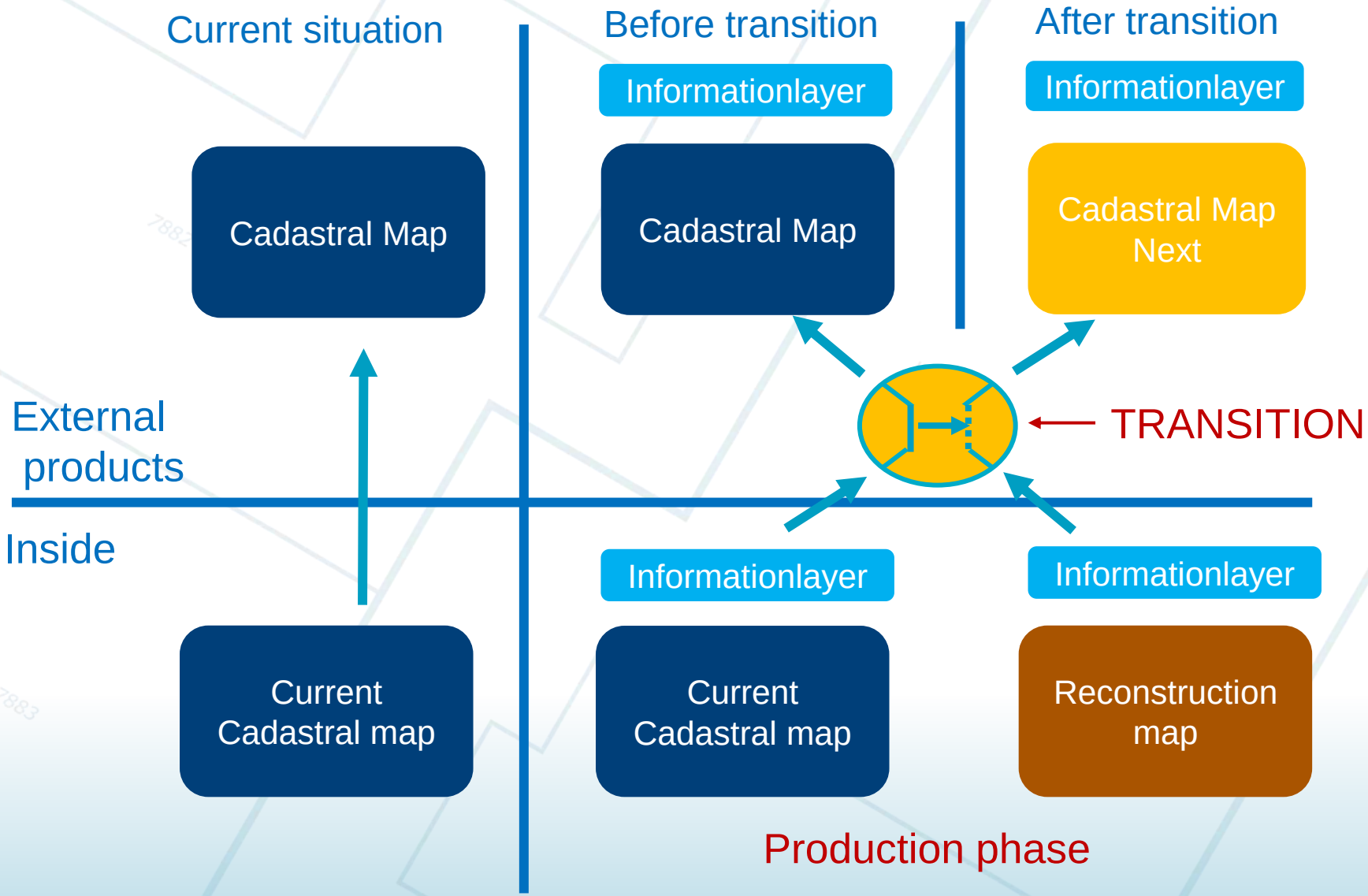
- metadata on boundaries

Production:

- 2 internal maps
- 1 external

Transition:

- switch of map
- demands tuning



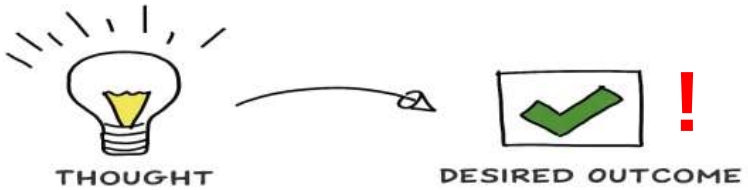
Justification of the investment: cost / benefit analysis

- Independent study executed with acknowledged and standardized / accepted methods

- Outcome: Significant positive cost / benefit balance at society level in all three scenario's : benefits 2 – 5 times higher than costs

- Benefits are widely distributed over the stakeholders, highest benefits for project developers, municipalities and regional water boards (appr. over 70% cumulative)

Conclusions



The approach is possible !
Rebuilding the map with intensive AI-involvement is possible, with a high level of automation (up to 80%). The pilots have proven it can be done with ‘the market’

Benefits & value of the Cadastral Map Next:
The Cadastral Map Next contributes to a more uniform, unambiguous Cadastral map with a significant improved and known (quantified) quality. It will be the best possible result based on the available measurements

Responsible investment
The cost / benefit analysis shows a significant positive balance in perspective of society. Preconditional is the validation of the investment needed (result of tender procedure). Cost/benefit balance shows positive outcome (estimation: 3-5 times more benefits than costs at society level)

Risks :
Blocking technical issues are no longer present, but still we will encounter challenges. Intensive and **pro-active communication** and **stakeholdermanagement** will be necessary and in place before production starts

Acknowledgements:

The team and all the colleagues involved for the never ending and uncompromising enthusiasm and expertise

The colleagues of the Australian Cadastres:

- **Land Use Victoria | Department of Environment, Land, Water and Planning (DELWP)**
- **New South Wales Government (NSW), Spatial Department**

For the time and effort investment in the extensive knowledge exchange over the past 2 years

We welcome any input, questions or knowledge exchange !

kadaster

Rebuilding the Cadastral Map of The Netherlands

the Overall Concept

Eric HAGEMANS
Ruben BUSINK

Frank SCHOUTEN
Jeroen GRIFT

FIG

e-Working Week 2021