

stowa

50
JAAR

DE KRACHT VAN KENNIS



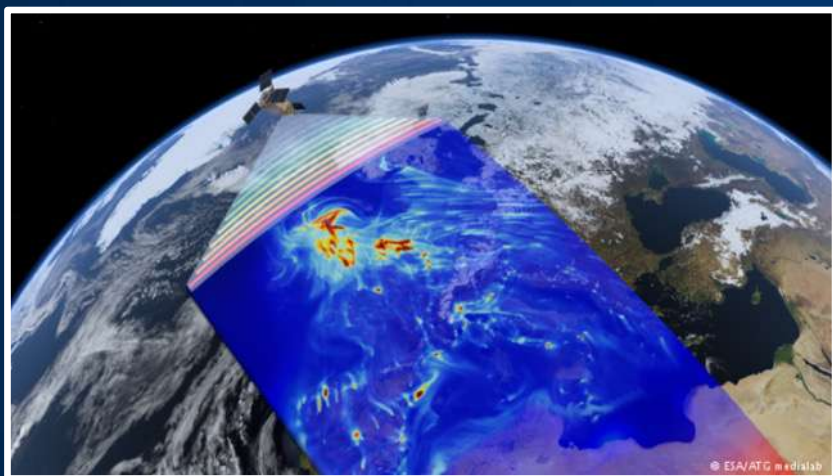
Nu en in de toekomst

Water Management from space in NL

The SAT-WATER program



DigiShape
14 march 2023, Lelystad



Dr. Hans J.C. van Leeuwen, STOWA
Programleader SAT-WATER
&
WaterBoards & Dutch Ministries, Het
Waterschapshuis





Agenda:

- *Introduction: The Sat-Water Program for the Dutch WaterBoards*
- **SAT-WATER Program: blue print for operational Information for national policies?**
- **SAT-WATER Program & Cooperation in European context**



Information production Watermanagement
Satellite Applications = SATWATER Program

*Slogan: “Van Wetenschap naar Waterschap” or
“From Science to WaterManagement*

Landingsbaan/Launch: “from innovation to
implementation”

Users: Waterboards, Ministries, DrinkingWatercompanies, etc





Wetenschap
(universiteiten;
kennisinstututen)

Science

Toegepaste
Wetenschap
(STOWA)



5-10 jaar

Landing in ICT-
Informatiesysteem
structuren (HWH)



5-10 jaar

Landing op de
werkvloer

Het
Landingsbaan
Principe

2-5 jaar

Implemen
tation

Disruptive

12-25 jaar

- Information acquisition (Satellite & Field)
- Knowledge, Algorithms, Field experience
- Processing & integration (Data Science)
- Implementation of Application (Open data & SW)
- Validation (Technical & Use/Organization)
- Organization (acceptation, Business case, & Procurement Process)
- Hybrisation with working process (CoP)
- Acceptance and Scaling up (more use)
- Management & Maintenance/continuity (Archive)

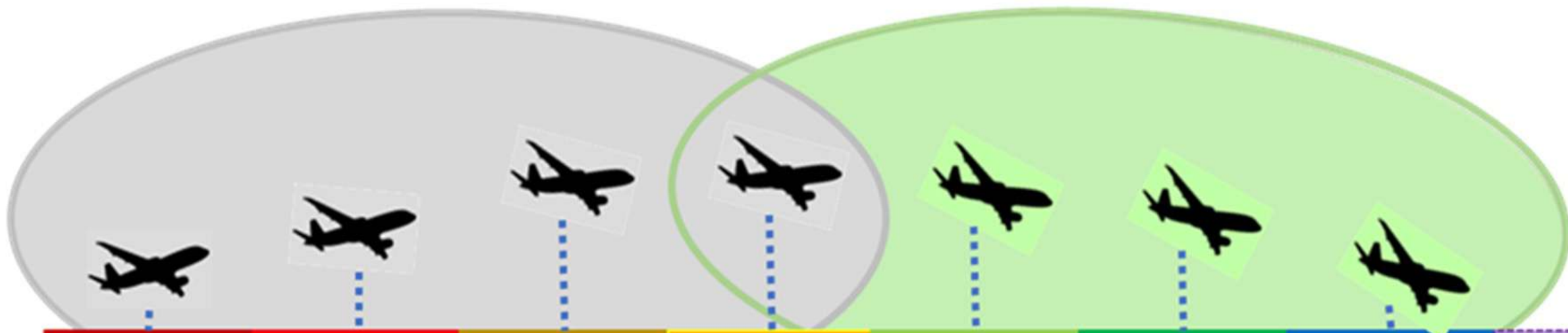


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hetWaterschapshuis



Idee/ nieuwe
toepassing

Onderzoek

Pilot / Demo

Validatie/
toepassing op
kleine schaal

Businesscase
voor bredere
toepassing

Centrale
inkoop

Operationeel
geaccepteerd

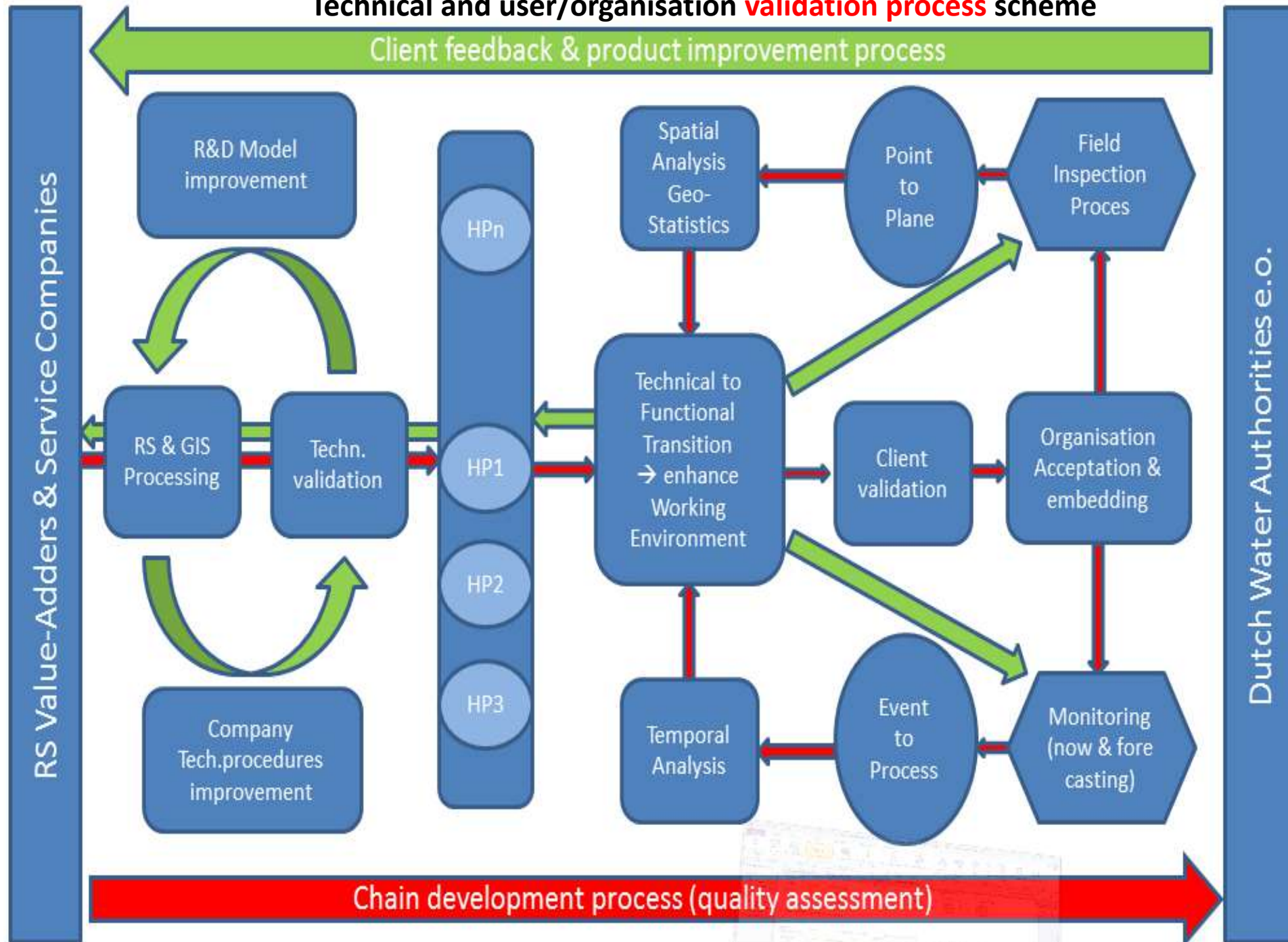
Beheer



Samenwerking STOWA en Het Waterschapshuis



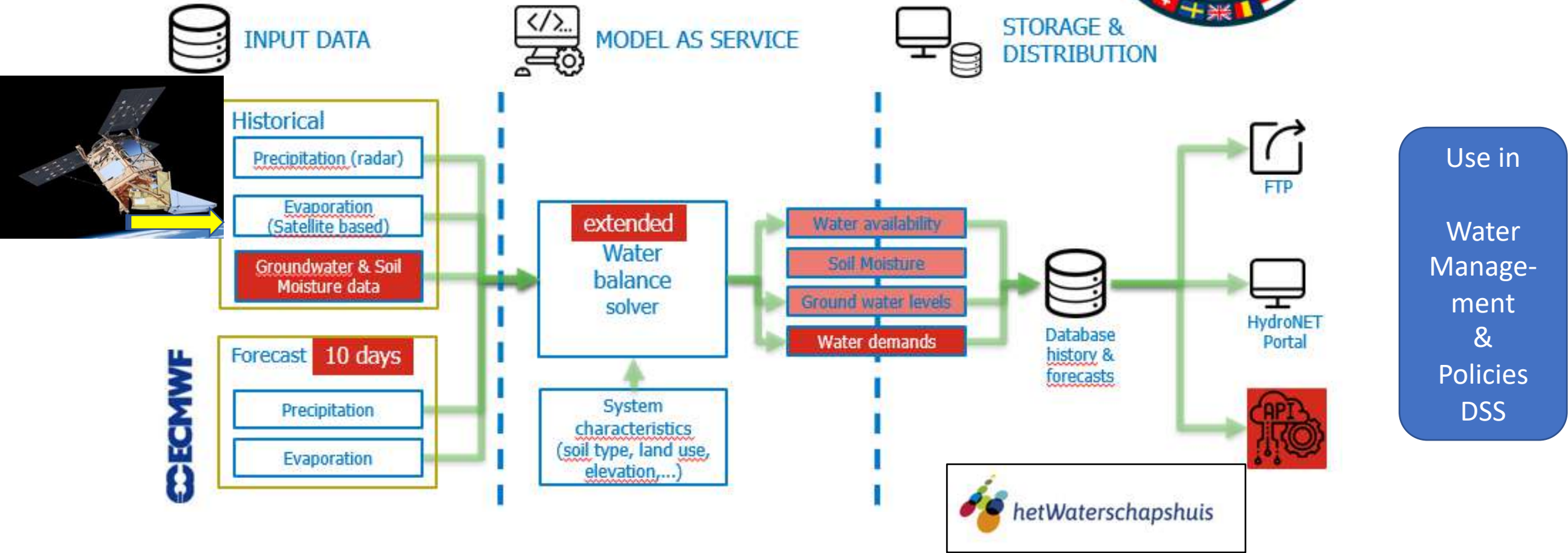
Technical and user/organisation validation process scheme



Satellite information input to Models/DSS !!

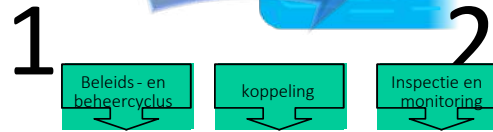


OWASIS 2.0

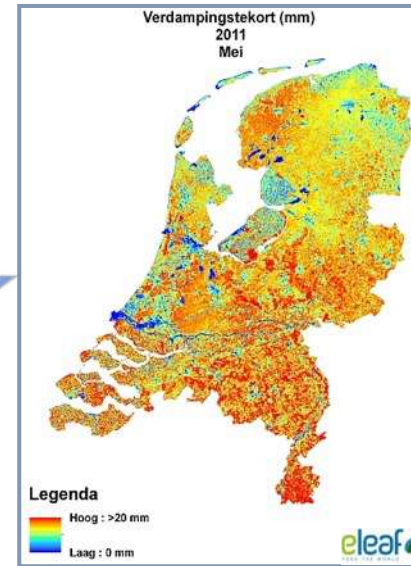


Input to integral systems (BIGDATA & AI)

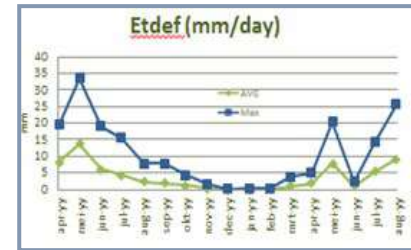
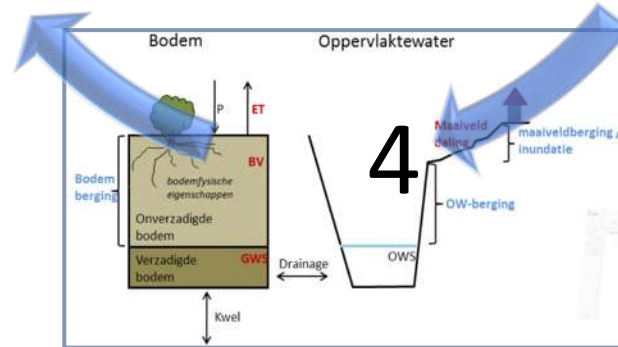
Smart Governance on water management



- 1. Governance: smarter & better cooperation
- 2. Meteo & Info Network &
- 3. RS monitoring &
- 4. Modelling, AI
- 5. Smart management by better information



Operationele Sturing



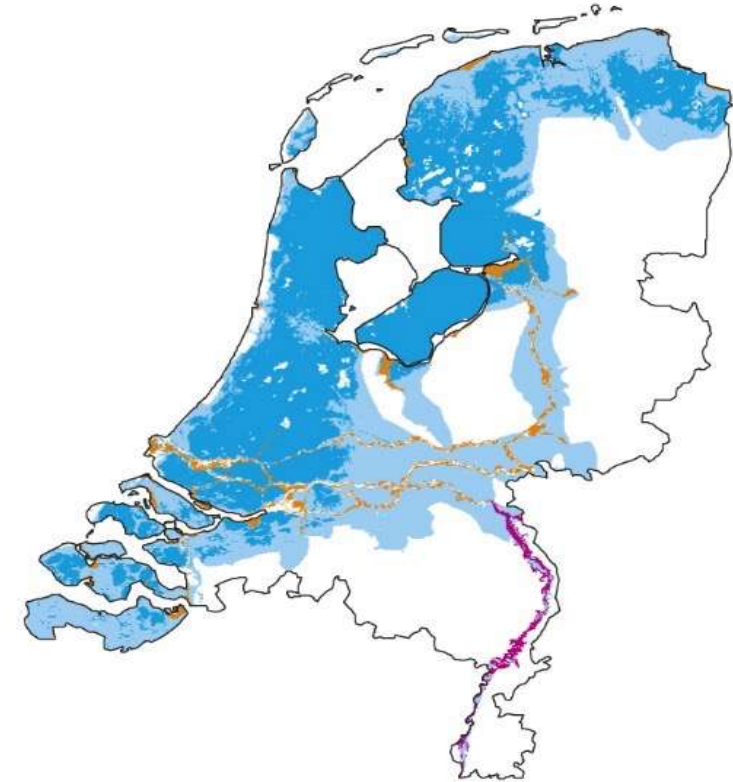
Dutch Deltaprogramma Zoetwater



OWASIS-NL Improved water availability information for water manager

- **Efficient water management** is crucial to the Netherlands dry.
- **Drought** en **availability of sweet/fresh water** is becoming more and more problematic due to climate change.
- Lack of information on wateravailability and **available storage capacity** is a growing issue in current operational watermanagement.

Overstromingsgevoelig gebied, 2005



Bron: PBL (2009)

Binnen dijkringen

■ Beneden NAP: 26%

■ Boven NAP: 29%

Monitoring Drought en Wateraccess

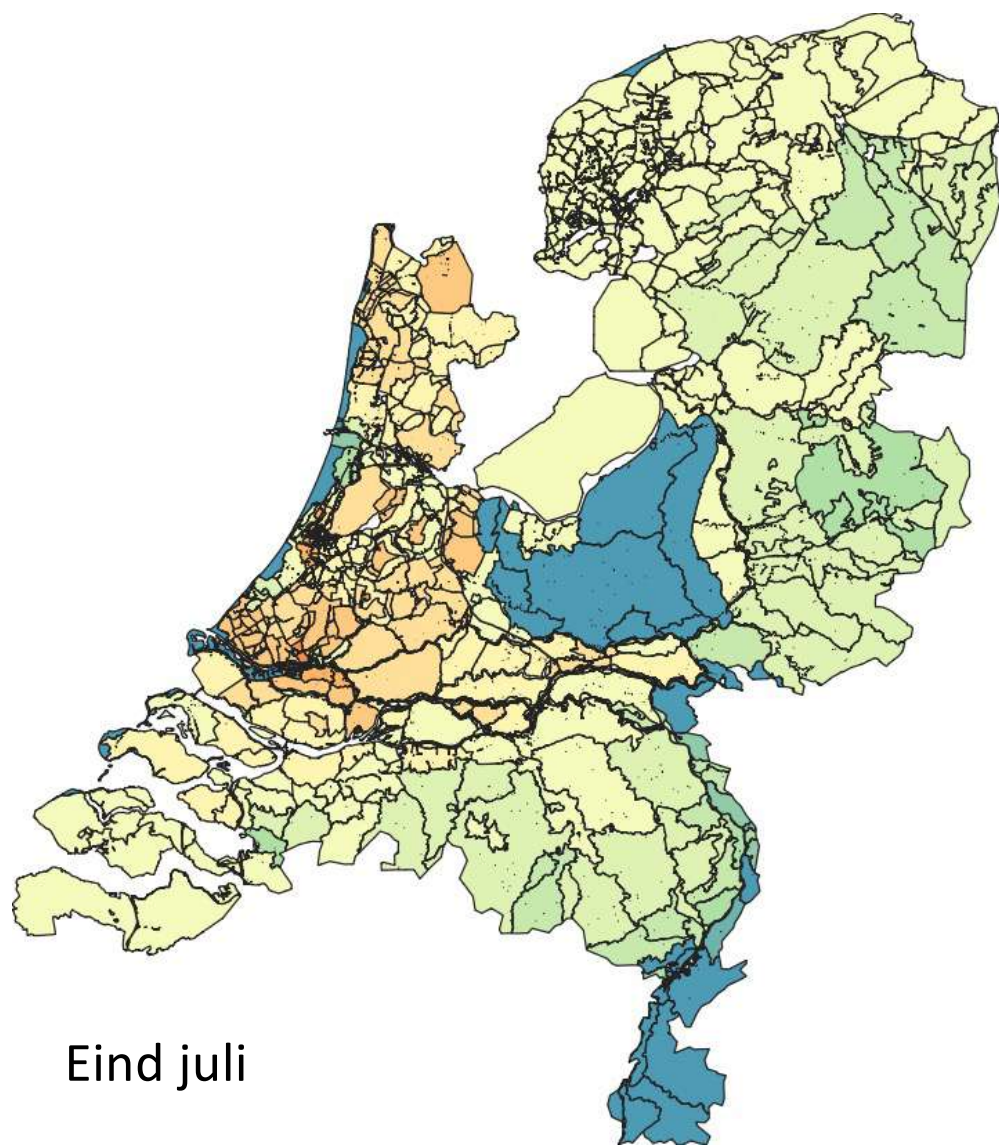
using available soilmoisture storage (info from OWASIS)

with actual evapotranspiration SATDATA 3.0 data in watermanagement areas

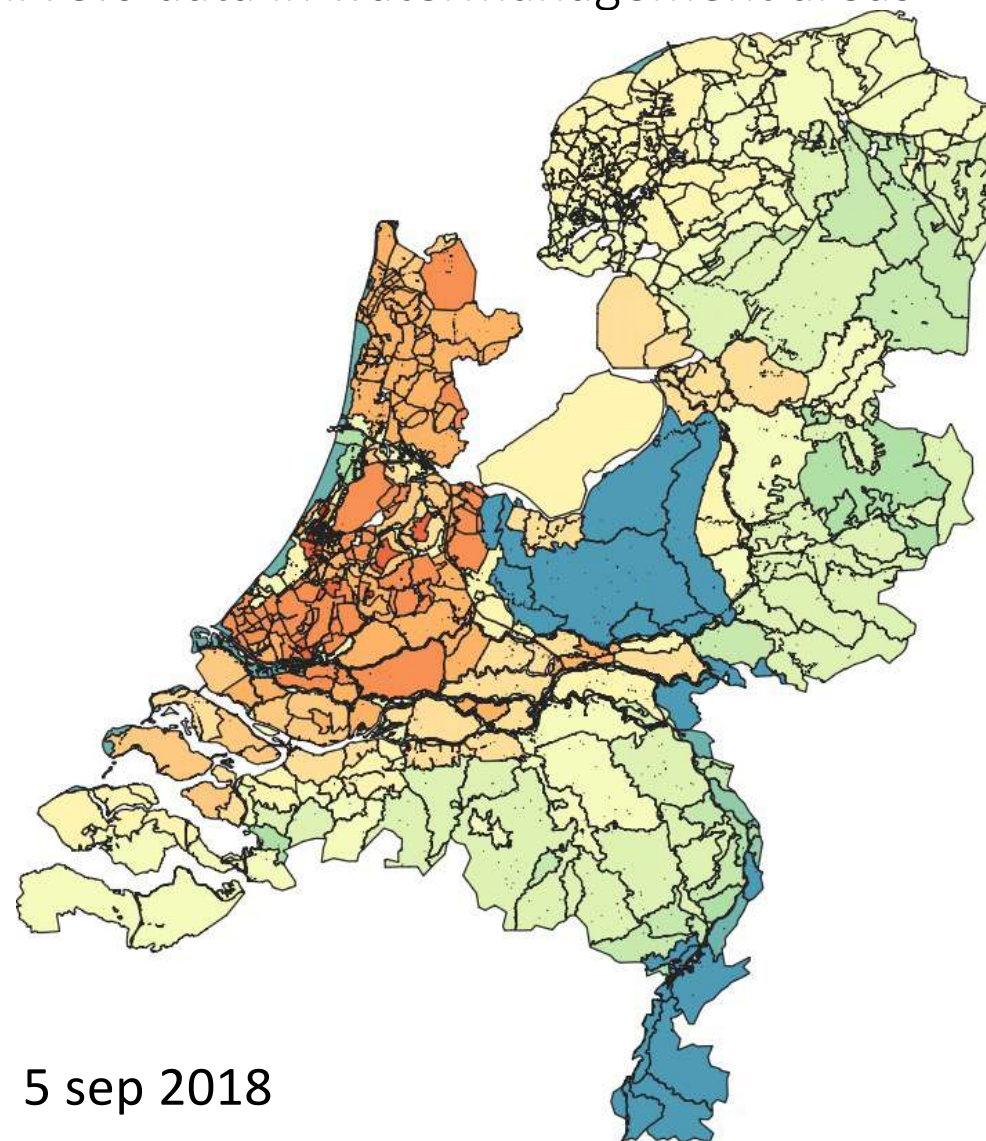
HydroLogic



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Eind juli



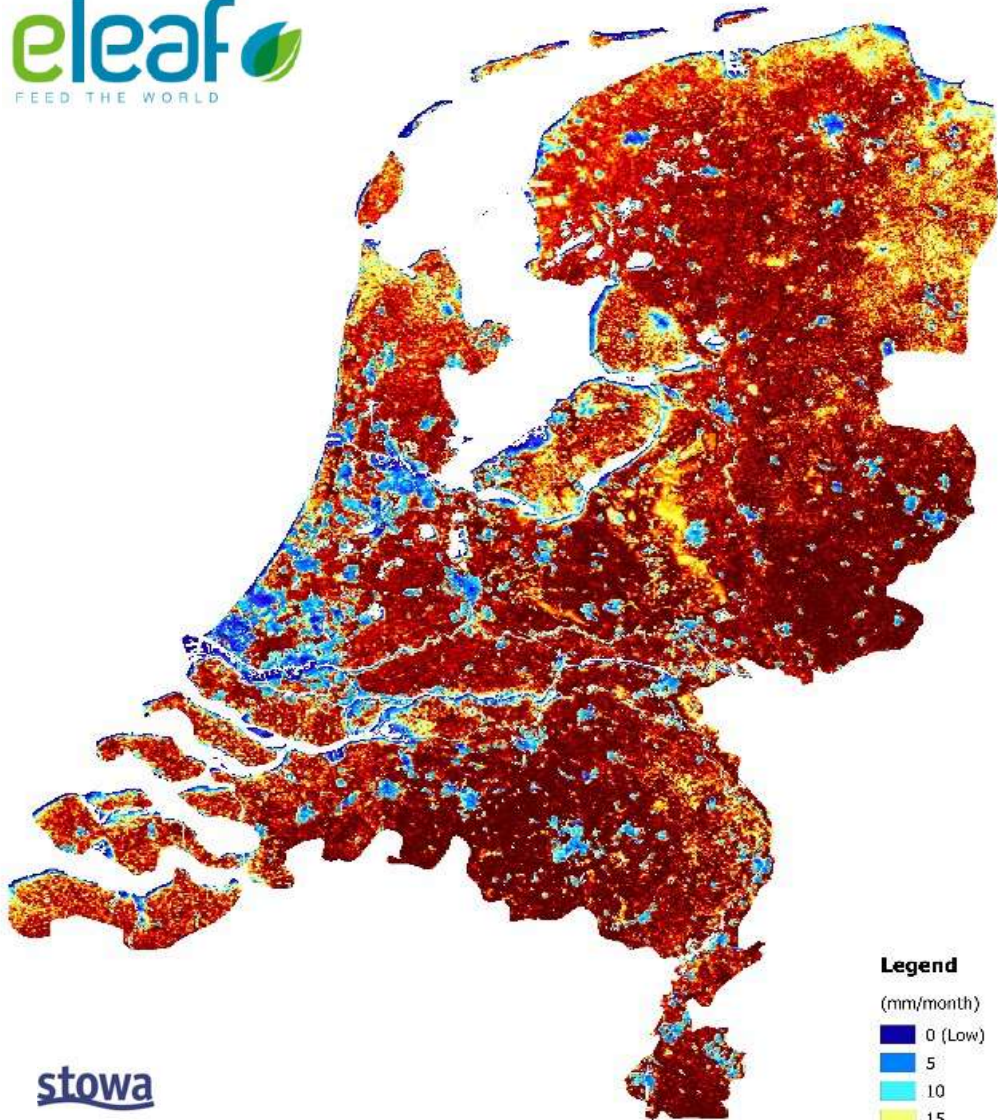
5 sep 2018

Legenda

Beschikbare bodemberging (mm)



Evapotranspiration deficit (mm)
1-23 July 2018



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Legend



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Bodemvocht

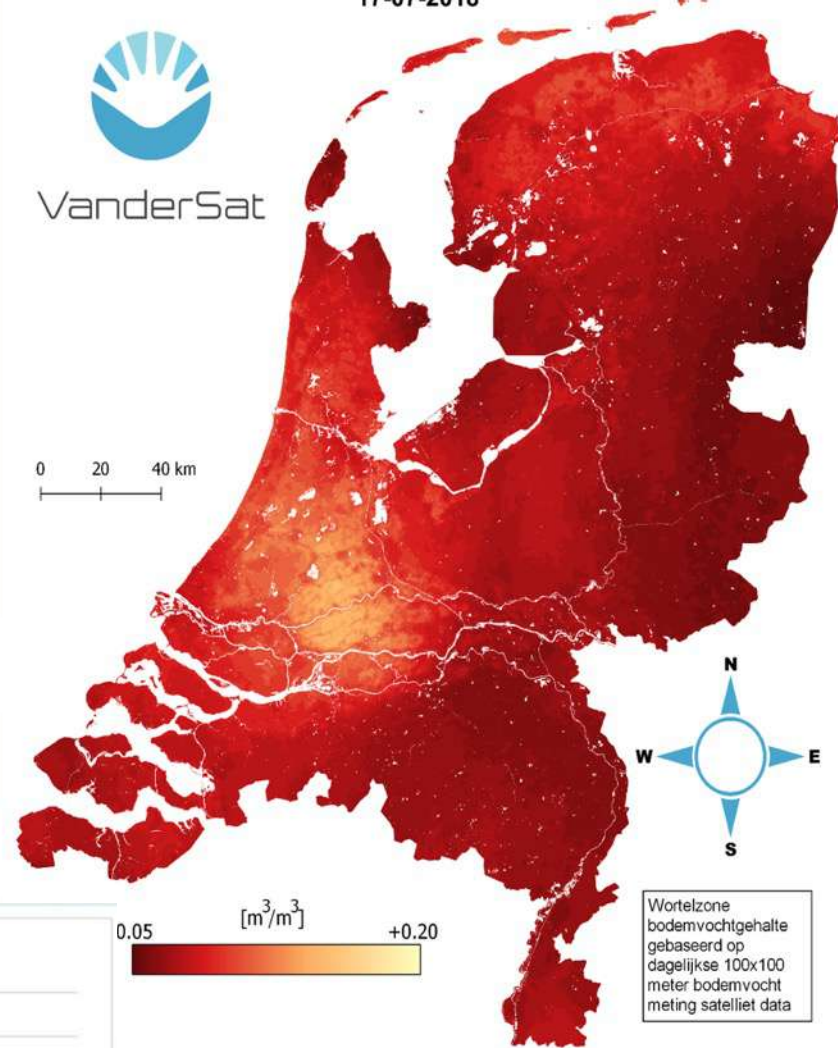
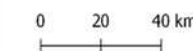
Wortelzone
Gebaseerd op 100x100m
bodemvocht data uit satelliet
(zie later Planet/VdS)

Letop:
Hoge Zandgronden Z & O NL
Veen-weide gebied West NL

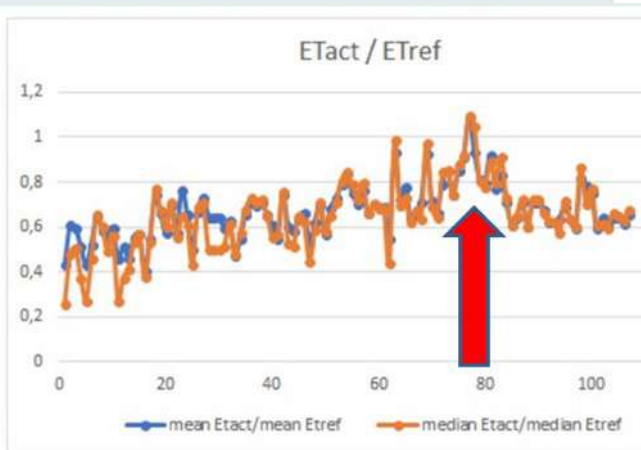


VanderSat

17-07-2018



Wortelzone
bodemvochtgehalte
gebaseerd op
dagelijkse 100x100
meter bodemvocht
meting satelliet data



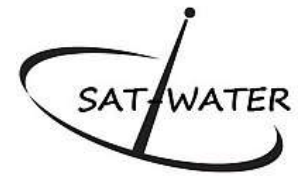
Relatieve verdamping eind juni slaat om:
groeibeperking van gewassen zichtbaar:
er is bijna geen water meer om te
verdampen door gewas

OWASIS on drought & waterexcess: practical level

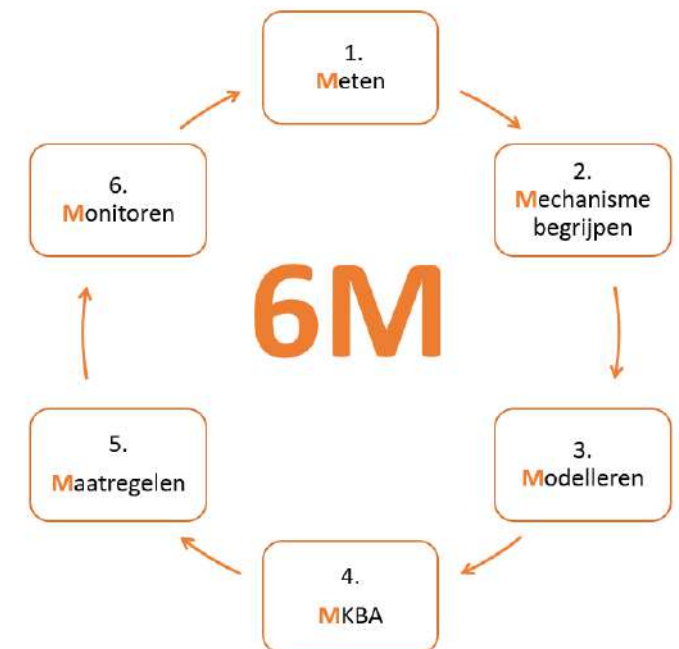
- 1. Actual Moisture Content soil profile Water management area (peilgebied):** Waterboards use OWASIS to assess the status of profile watercontent every day (for operational measures in times of waterexcess and drought)
- 2. To pump or keep the water in management area:** Waterboardrds use OWASIS in combination with weather predictions to advice the water managers
- 3. Waterbalance:** Waterboards use OWASIS as indicator for interactive waterbalance insights (e.g. Waterschap Brabantse Delta in their crisisroom for alerting and communication or water management measures)
- 4. Information dashboard ARK/NZK (amsterdam region):** Ministry Infra & Water (Rijkswaterstaat) use OWASIS to present regional difference in soil moisture for mutual smart management (between the water areas).



OWASIS: what on policy level?



1. **Effect/impact monitoring:** Waterboards use OWASIS to evaluate the impact/effects on the change from winter to summer waterlevels
2. **Validation - waterbalance.** Indirectly OWASIS is used as indicator to validate waterbalance models and daily (field)measurements
3. Operational **Decision Support systems** (VIDENTE, peilbeheer)
4. To **advise waterboards** on the transition from summer to winter water levels (& vice versa)
5. And **many other functions in the policy cycle** not yet discovered (reference level (0-meting), time-series (trends/anomalies), monitoring & evaluation, Cost-benefits and efficiency, etc.



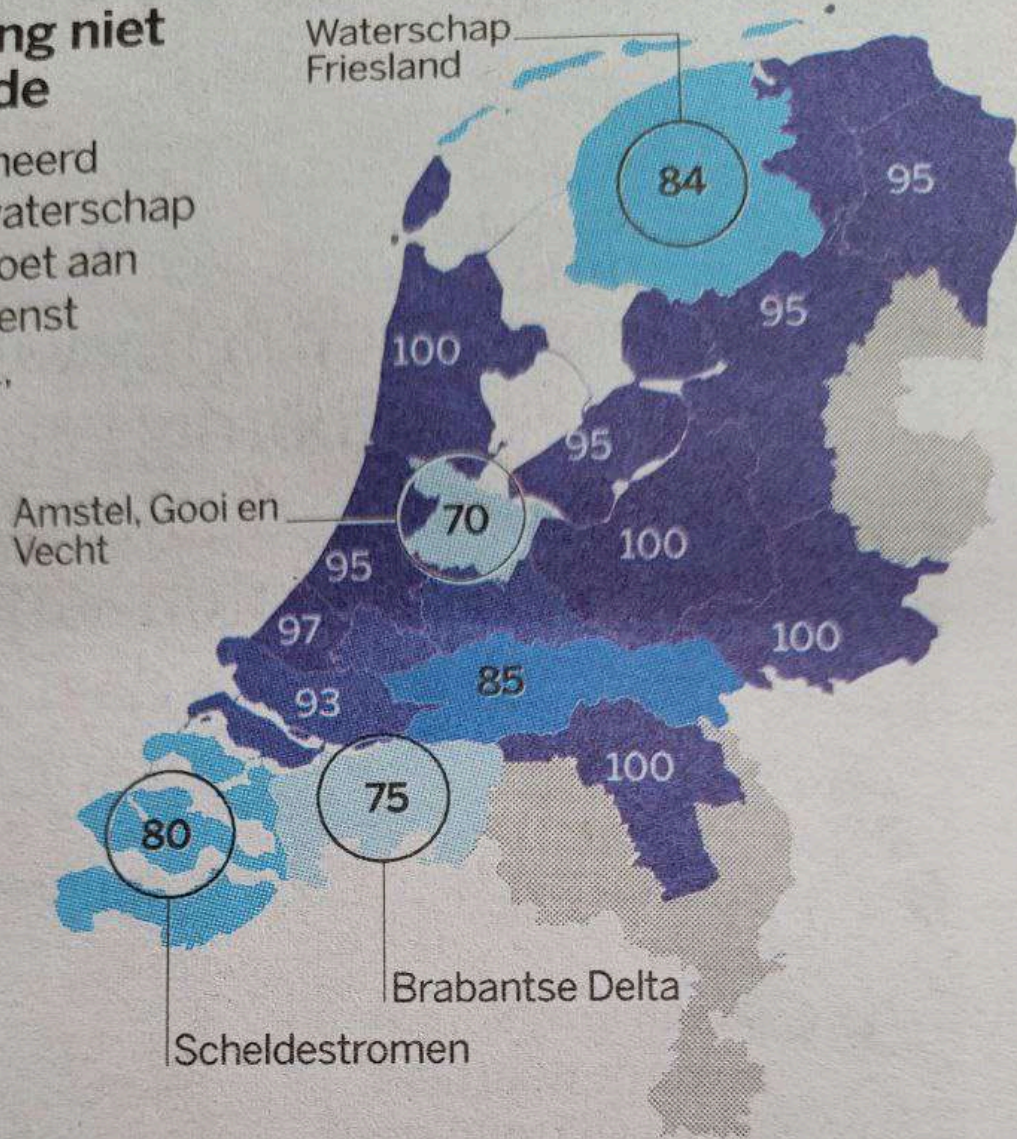
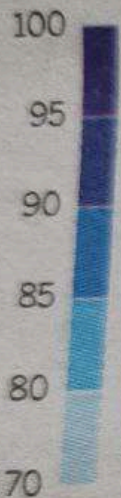
Examples RS use for Climate Adaptation (on top of former water excess and drought examples)



- Greenhouse gas emission indicators (water management):
 - In case of droughts: CO₂ emission by peat oxidation (subsidence)
 - In case of water excess: CH₄ en N₂O emission in anaerobic soil conditions
- Salinization risks (due to increase of drought and seepage pressure by sea level rise)
- Insight in the available sweet water storage in large Lakes like IJsselmeer (relevant for the Dutch National LCW commission decision support)
- Insight in the amount of local water storage (saturation level) in soils in times extreme climate conditions in management areas (to anticipate timely for local flooding (e.g. Limburg 2021))
- Insight in drought conditions (agriculture & nature), irrigation limitations/ban, etc
- Transition/monitoring of the rural area functions in future (distribution of blue, green grey infrastructure)
- etc.

Waterpeil lang niet overal op orde

Aandeel van beheerd gebied waarin waterschap structureel voldoet aan peilbesluit (gewenst waterpeil), 2021, in procenten



In de grijze gebieden kent het waterschap een 'vrij afwaterend watersysteem' en zijn er geen peilbesluiten

VK'14mrt23

140323 © de Volkskrant
Bron: Unie van Waterschappen, Waterschap Scheldestromen; kaartgegevens hWh

Gewenst waterpeil niet altijd haalbaar

Aandeel van gebied waarin het waterpeil technisch haalbaar is

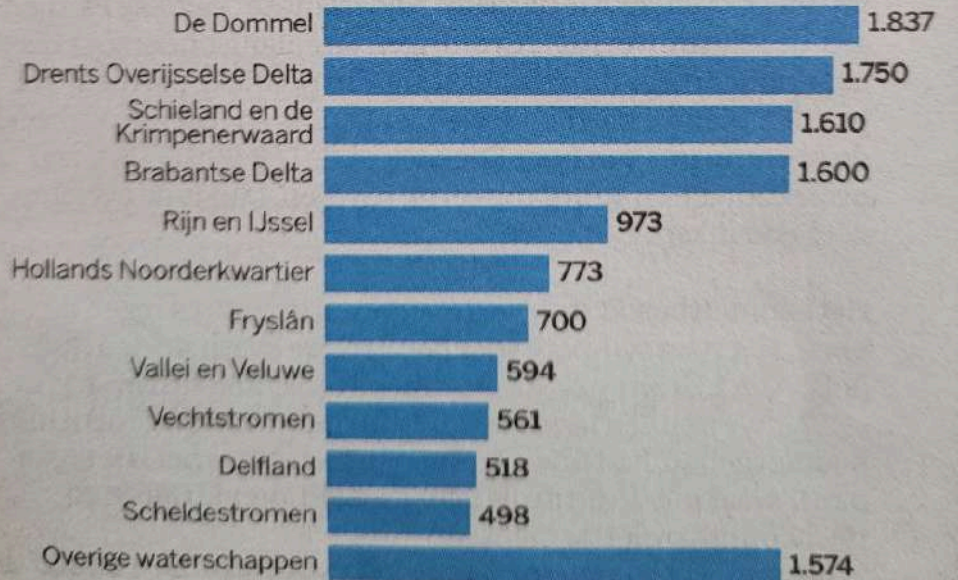


Voor de overige water- en hoogheemraadschappen is het peilbesluit voor 99% of 100% technisch op orde.

140323 © de Volkskrant. Bron: Unie van Waterschappen

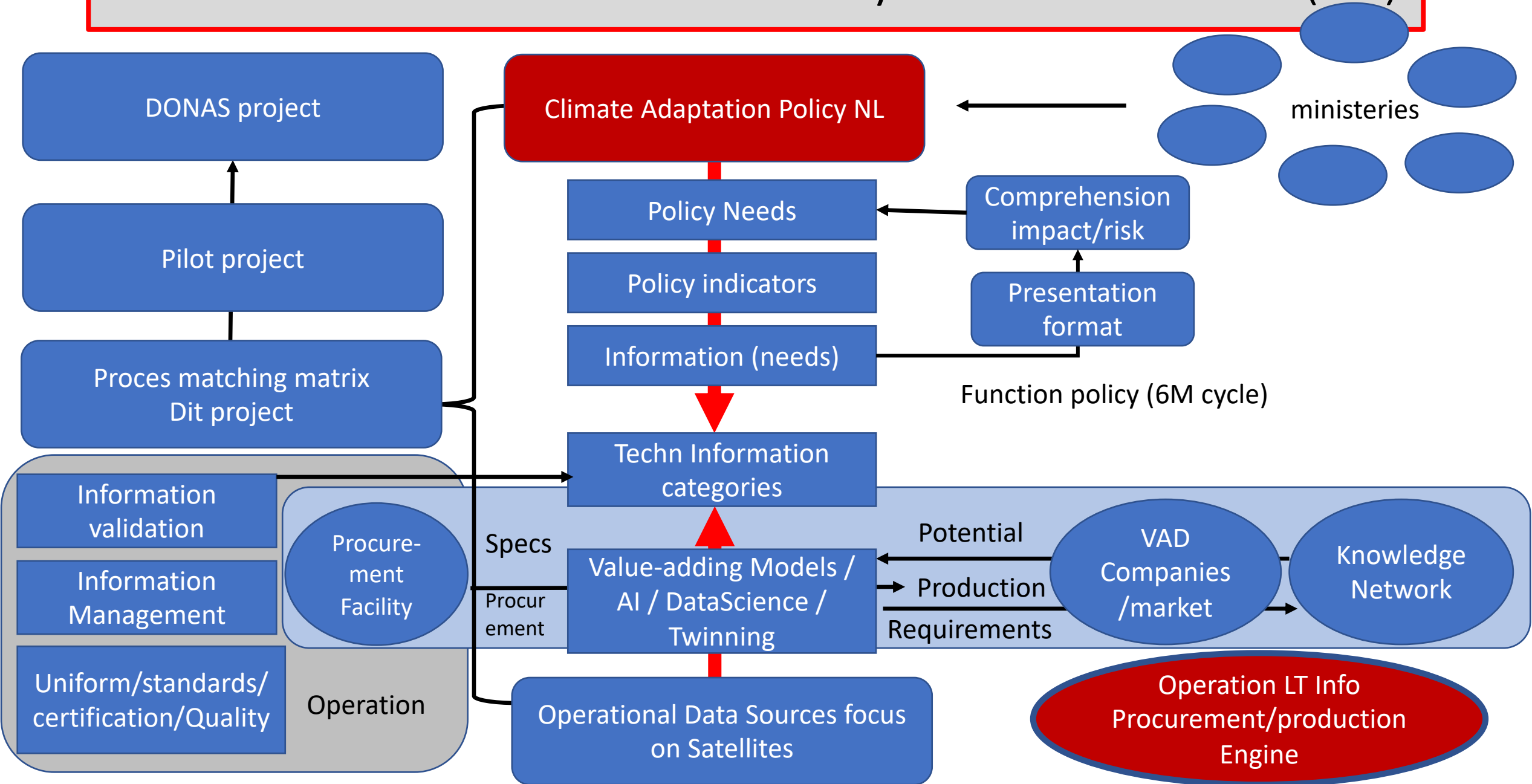
Duizenden hectaren voldoen niet aan overlastnorm

Aantal hectaren waar (nog) niet wordt voldaan aan normen voor wateroverlast, per waterschap (2021)

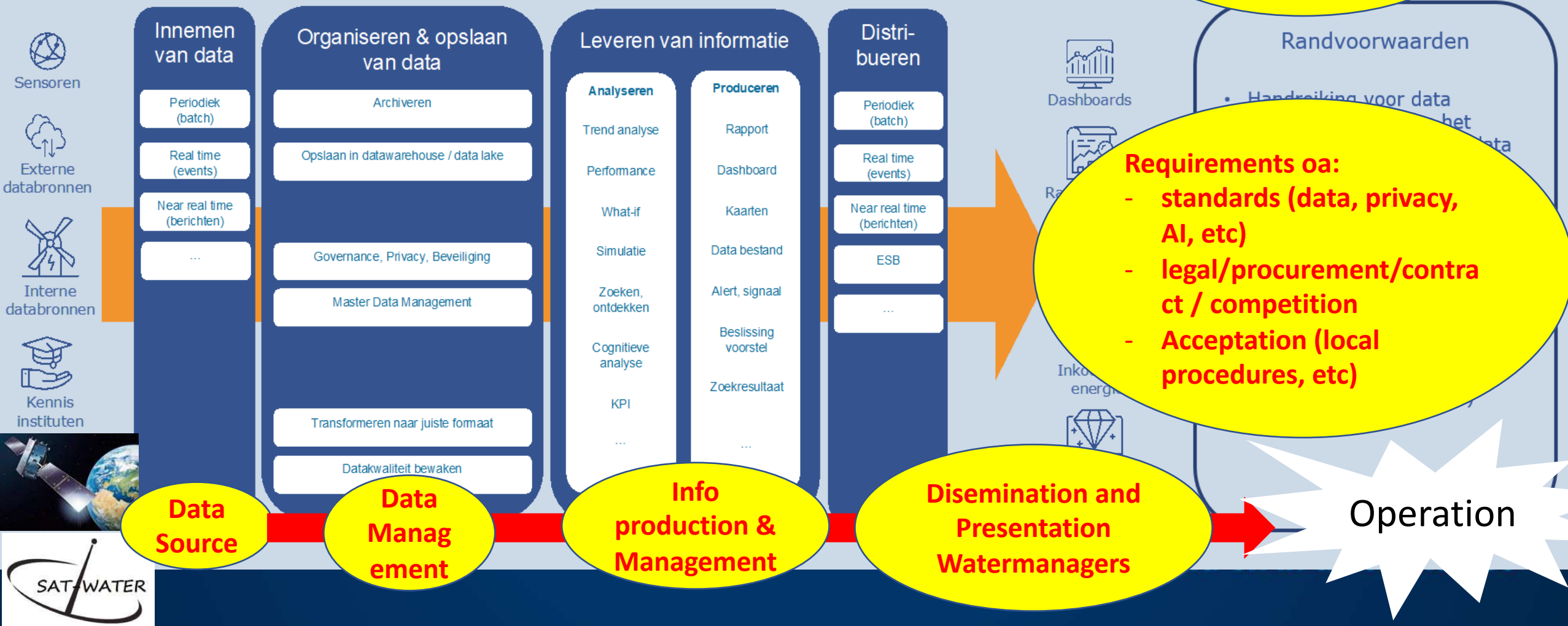


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Translation Process from Policy to Information (RS)



Belangrijkste functionaliteiten van een data platform



Business case based on needs WaterBoards

Requirements oa:

- standards (data, privacy, AI, etc)
- legal/procurement/contract / competition
- Acceptation (local procedures, etc)

Data Source

Data Management

Info production & Management

Disemination and Presentation Watermanagers

Operation



SAT-WATER Program: Blue print for National use

Waterboards, ministries: monitoring needs in the frame of:

- Delta Program (oa. DPRA), Sweet/Silt Water, Subsidence, etc.
- Agriculture transition (oa. subsidence, waterquality, waterquantity)
- Natura2000 policy (waterquality, waterquantity)
- Climate Adaptation (DONAS, 6 ministries) (drought, waterexcess, heat, sealevel-rise/floods) & related emissions of greenhouse gasses
- Etc.



SAT-WATER Program & reach out for Europe

National monitoring (water management) and **need for cooperation** with other similar EU-member states programmes on the EC policies in order to learn from each other and cooperate on supra national level is essential (e.g. watershed level, atmosphere and coastal issues, etc.) !!

Exchange mechanisms between national & European (member state) programmes need to be encouraged! Discussion on how to join?
(Copernicus, ESA or user groups?)





Questions
& Discussion