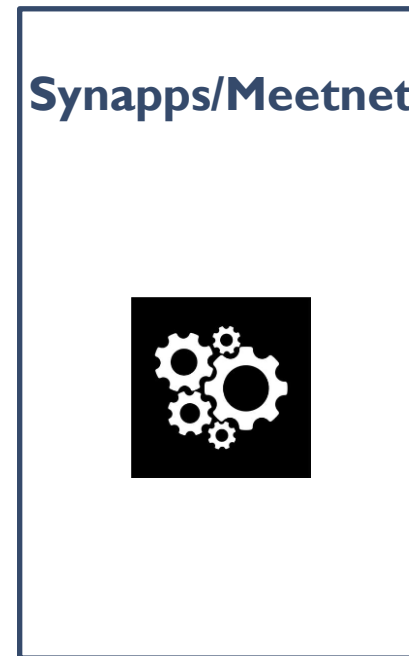
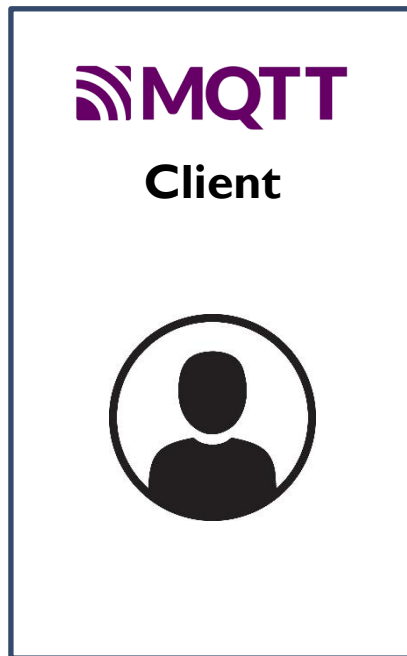
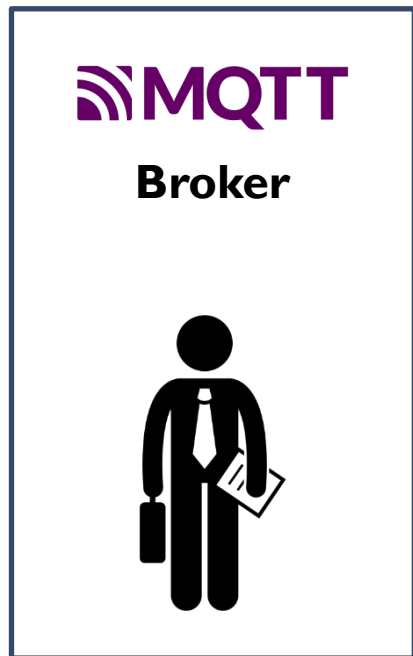


Grondwaterproject in de praktijk – Automatisatie van grondwatermetingen

Brecht Martens & Jan Claus



Inleiding



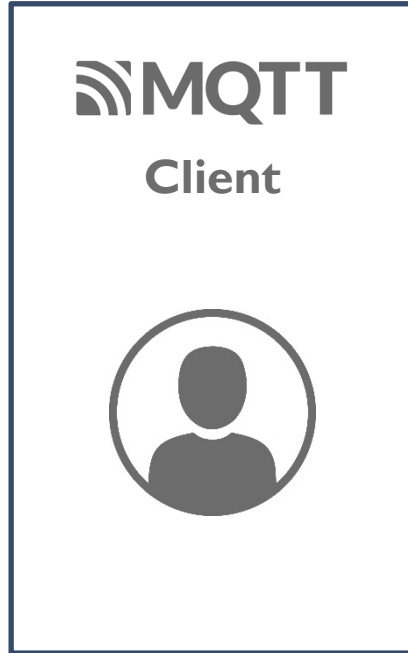
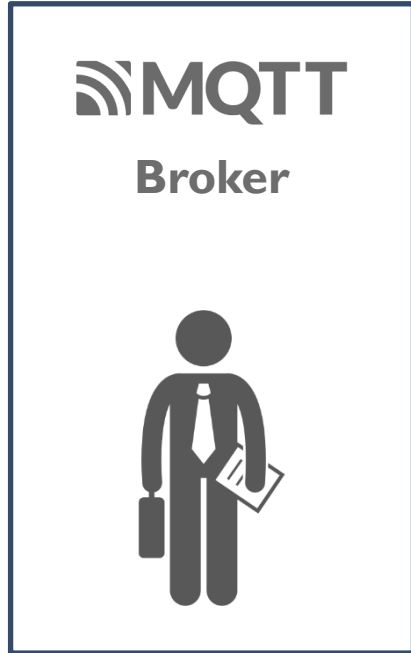
Installatie grondwatermeetnet



- 3 jaar (2023 – 2026)
- ~440 putten & ~700 filters/sensoren
- Druksensor (VEGAWELL 52)
- PCB unit “op maat”
- Firmware “op maat”



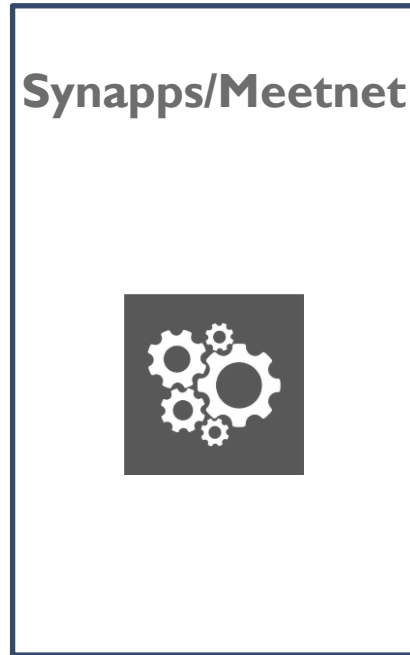
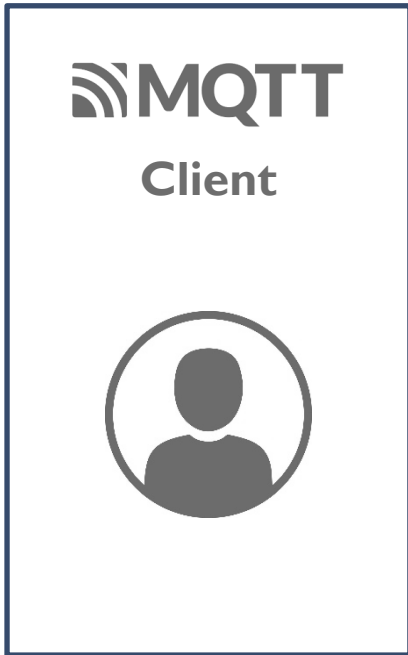
Data communicatie: sensor → MQTT broker → client



- SigFox/NB-IoT
- MQTT protocol:
 - Simpel & efficiënt
 - Stabiel & betrouwbaar
 - Flexibel & schaalbaar
 - IoT standard
- Ruwe JSON payload



Data communicatie: MQTT client → Synapps Meetnet



- Meetnet REST API
- Interpretatie JSON payload
 - Kanalen
 - Vlaggen



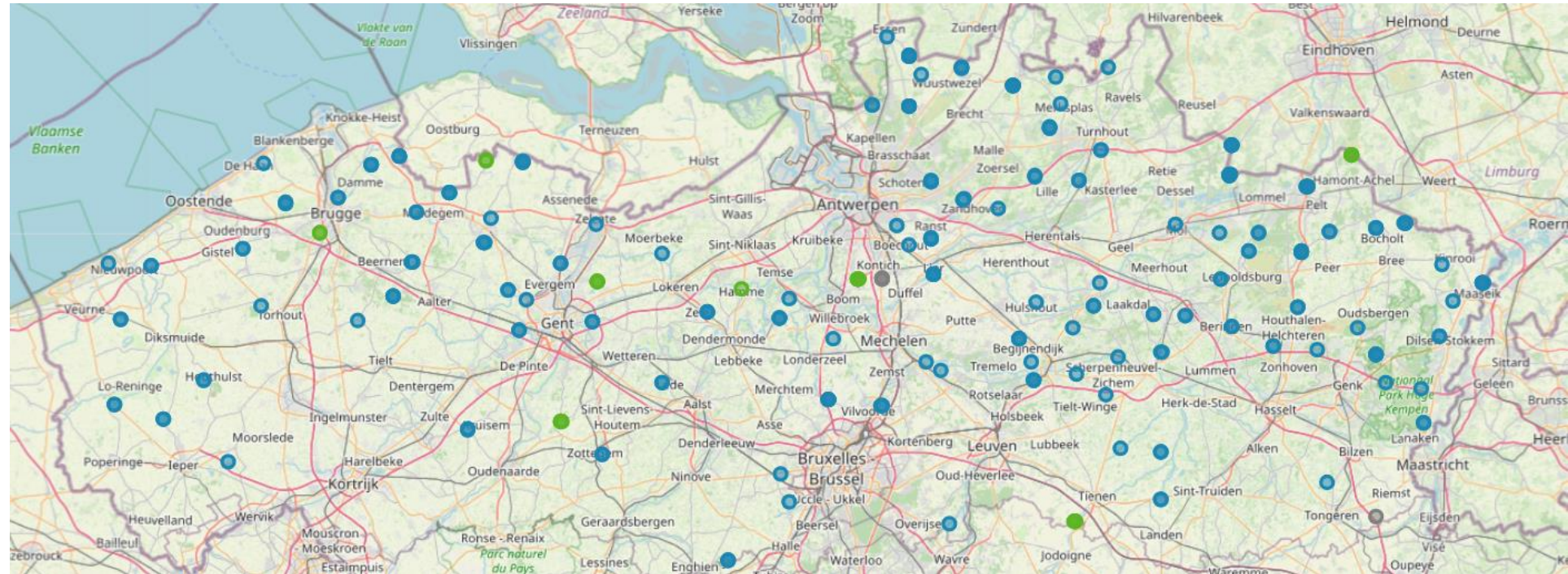
```
{
  "timestamp": "2024-02-17T16:00:28+01:00",
  "flags": 0,
  "battV0": 3.6526,
  "temp": 20.20,
  "rssi": -60,
  "chan": {
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      "id": "1",
      "raw": 3030048,
      "mA": 14.8248,
      "flags": 0
    },
    "2": {
      "id": "2",
      "raw": -67,
      "mA": -0.0003,
      "flags": 2
    },
    "3": {
      "id": "3",
      "raw": -45,
      "mA": -0.0002,
      "flags": 2
    },
    "4": {
      "id": "4",
      "raw": -34,
      "mA": -0.0002,
      "flags": 2
    }
  }
}
```

Data interpretatie & validatie: Synapps Meetnet

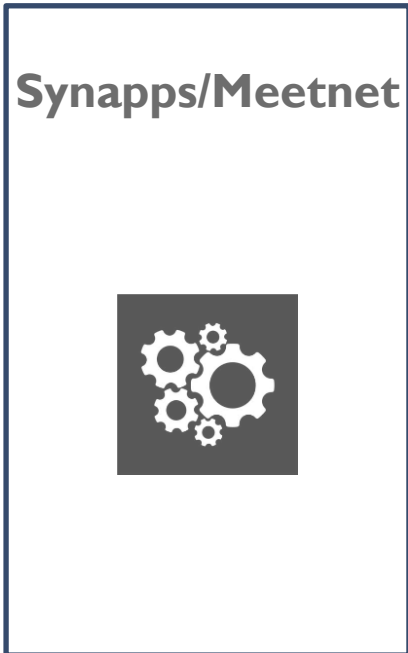
Synapps/Meetnet



- Webapplicatie
 - REST API
 - GUI:
 - GIS viewer
 - Meetnet dashboard
- Data transformatie
- Automatische validatie
- Opvolging netwerk
- Email alerting
- ...













Data interpretatie & validatie: Synapps Meetnet



- Analooog signaal → grondwaterstanden
 - Druk
 - Diepte onder maaiveld
 - Diepte onder referentiepunt (validatie)
 - ...

Series Operators

Sensor ↓	Input variable	Output Variable	Start Date	End Date	Actions
865234034247329-2	Analog Signal [mA]	GW Pressure [sensor] [bar]	2023-06-23 09:54	Present	 
865234034247329-2	GW Pressure [sensor] [bar]	GW Level [sensor] [m]	2023-06-23 09:54	Present	 
865234034247329-2	GW Depth [well] [m]	GW Depth [surface] [m]	2023-06-23 09:54	Present	 
865234034247329-2	GW Depth [well] [m]	GW Level [TAW] [mTAW]	2023-06-23 09:54	Present	 
865234034247329-2	GW Level [sensor] [m]	GW Depth [well] [m]	2023-06-23 09:54	Present	 

Rows per page: 5 1-5 of 5

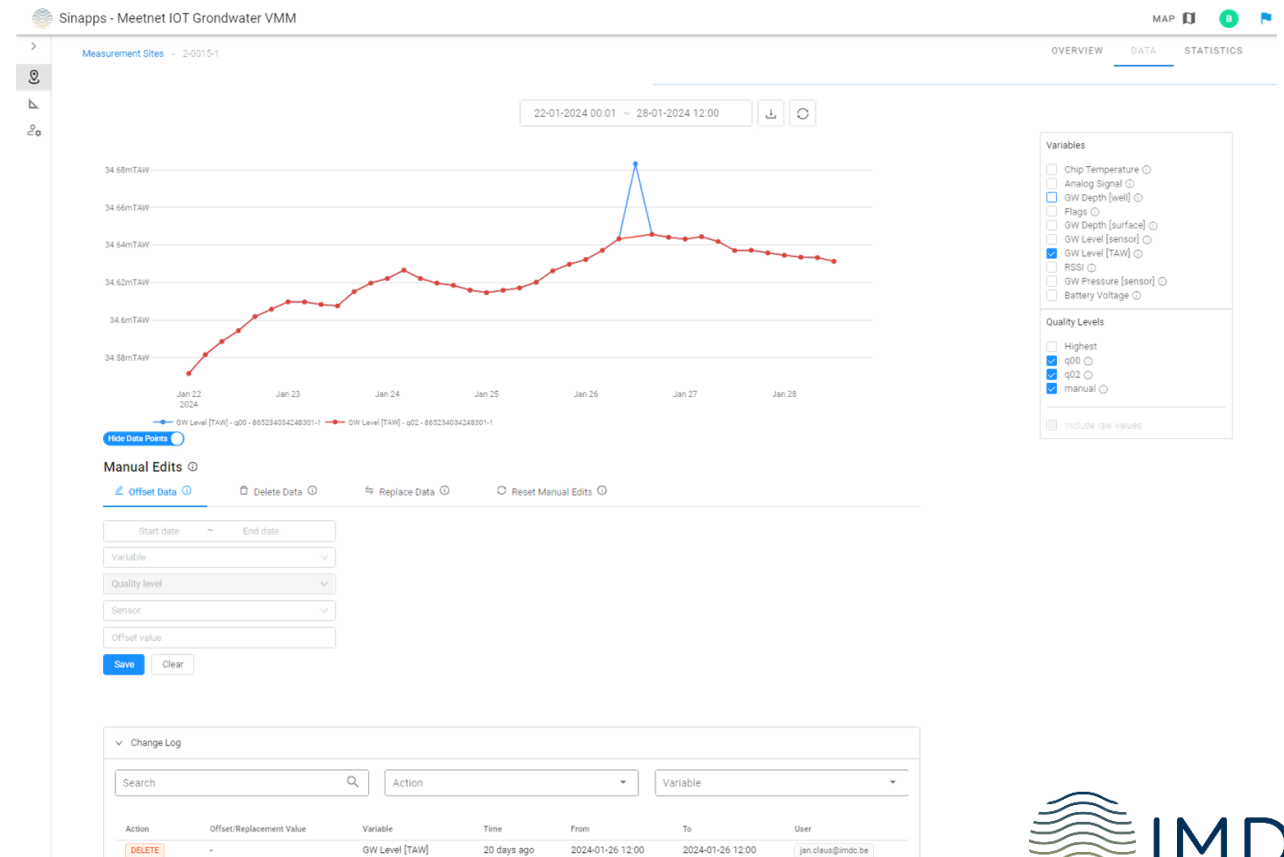


Data interpretatie & validatie: Synapps Meetnet

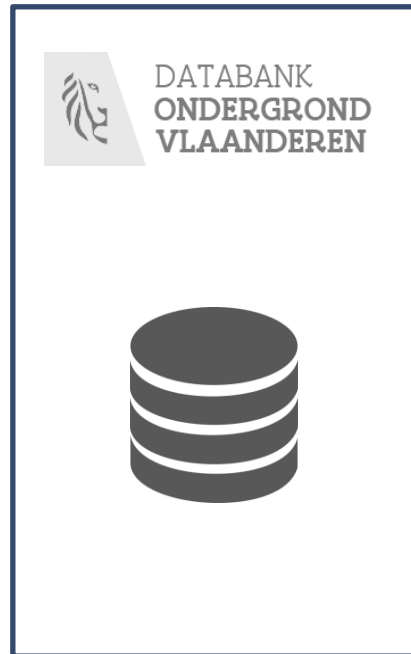
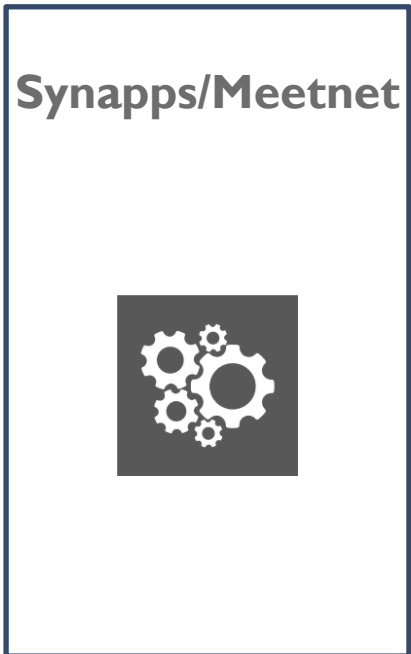
Synapps/Meetnet



- Outlier detectie
- Detectie vlaggen
- Detectie ontbrekende metingen
- Manuele validatie
- ...

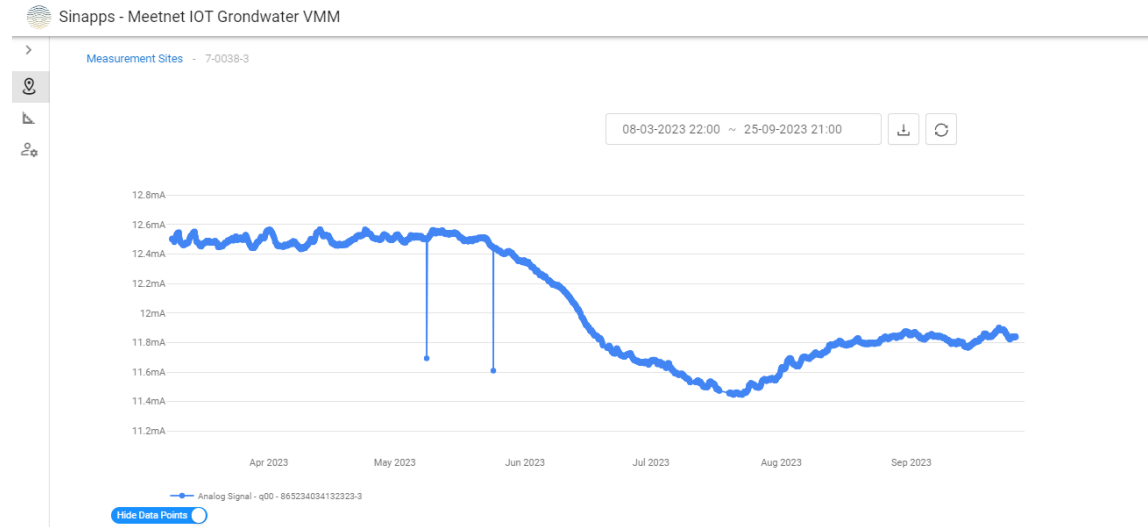
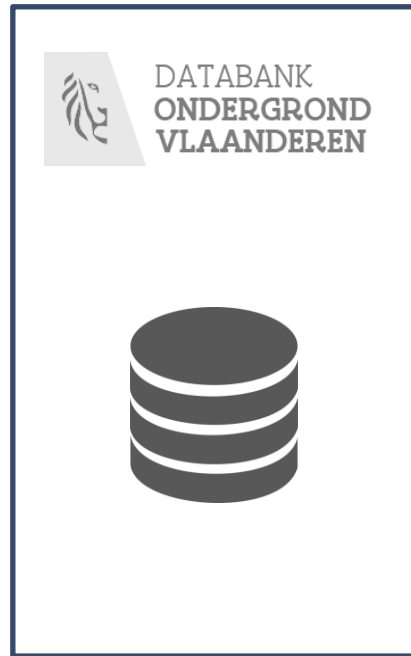
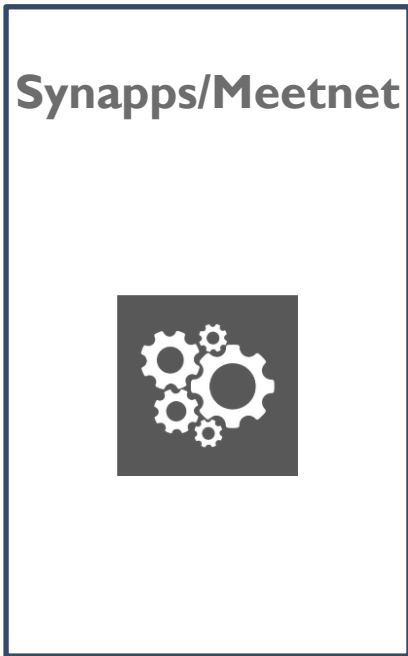


Data communicatie: Synapps Meetnet → DOV



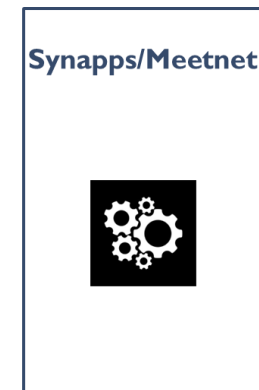
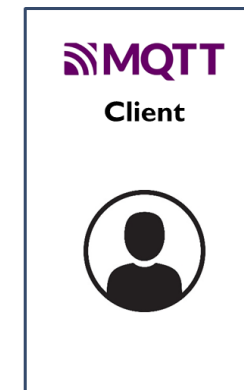
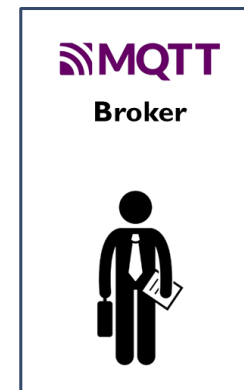
- DOV REST API (webservices)
- Gevalideerde data
- Ontsluiting “grote publiek”

Data communicatie: Synapps Meetnet → DOV



Conclusie

- Automatisatie grondwatermetingen
 - Efficiëntie
 - Automatische dataflow: sensor → DOV
 - Automatische verwerking + validatie
- Publicatie DOV
 - Ontsluiting “grote publiek”



Vragen?

- Vragen kunnen altijd later gesteld worden via: brecht.martens@imdc.be of jan.claus@imdc.be

