



SMART ENERGY COMMUNITY

VOOR WONINGEN EN
BEDRIJFSGEBOUWEN

Mente Konsman

Wilco Wijbrandi

TNO innovation
for life

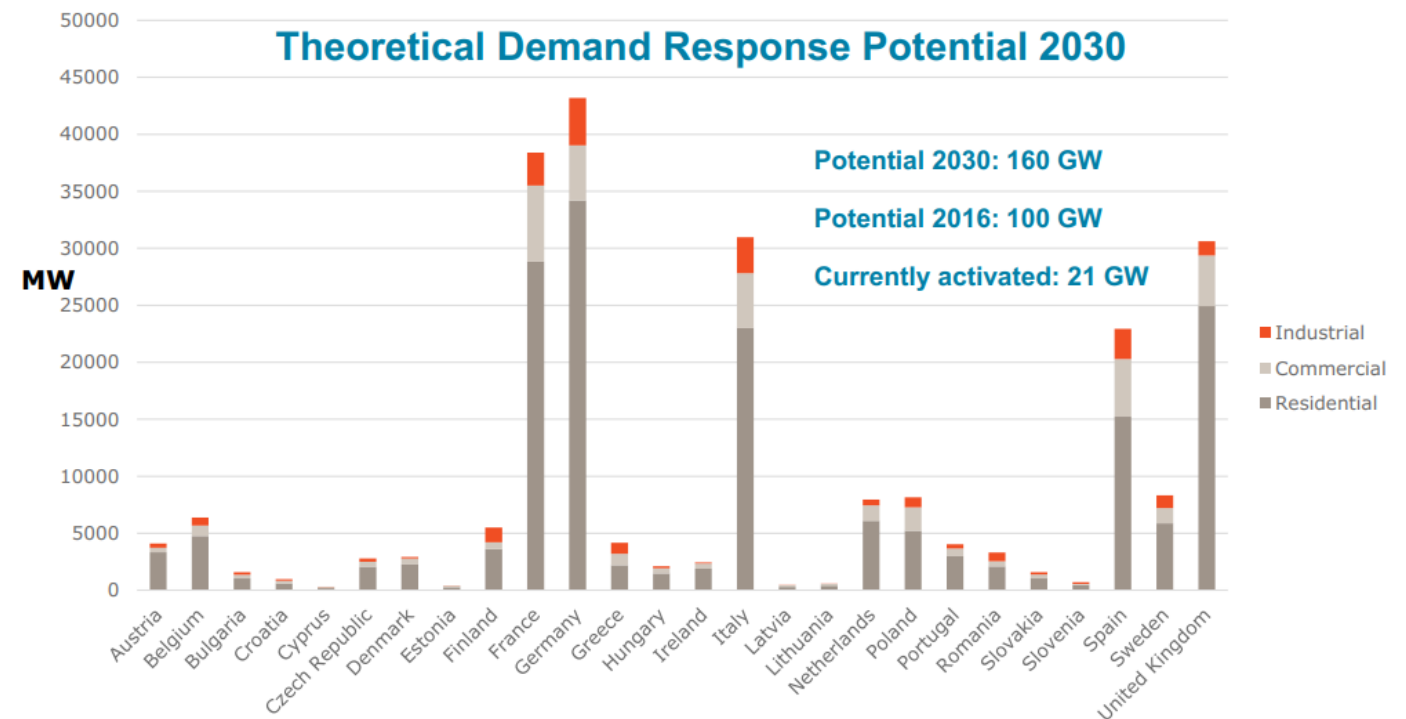
S2: Standaard interface voor Energie Flexibiliteit

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Residential/built environment flexibility potential

- Built environment flexibility potential outweighs industrial flexibility
- Why do we use so little of it?

Flexible generation requires flexible demand to reduce peak electricity prices and system costs



Source: Impact Assessment support Study on downstream flexibility, demand response and smart metering, COWI, 2016

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Differences between flexible assets in industry and built environment



Industrial Flexibility

- *Already being done*
- *Single, or few, flexible asset(s)*
- *High margin per asset*
- *Process is well known and predictable*

Already profitable

VS.

Built environment Flexibility

- *In development*
- *Many flexible assets. Large variety in makes and models/types of devices*
- *Very low margin per asset*
- *Energy flexibility is made available as 'best effort'; no guarantees*

Only scalable when installation and operational costs are minimized





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Flexibility can be utilized/exploited in many different ways

Some examples of optimization goals:

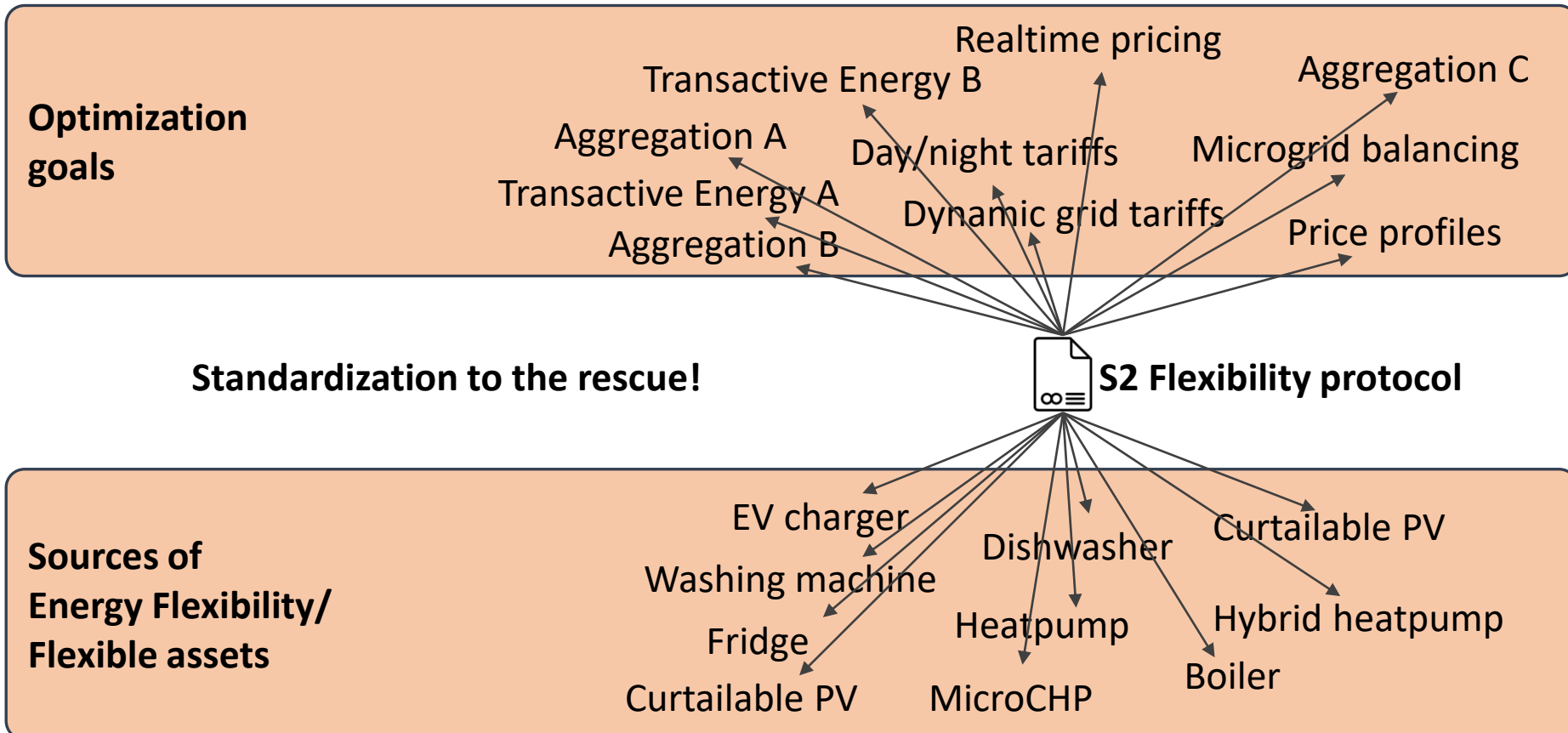
- **Consumer/energy community:** Be as self-sufficient as possible, optimize on dynamic tariff profiles
- **DSO:** Reduce congestion in the distribution grid
- **TSO:** Automated Frequency Restoration Reserve (aFRR)
- **BRP:** React to imbalance price information
- **Aggregator:** Trade on energy markets using aggregated flexibility

**Should work with all kinds
of flexible assets**



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How to combine all these elements?

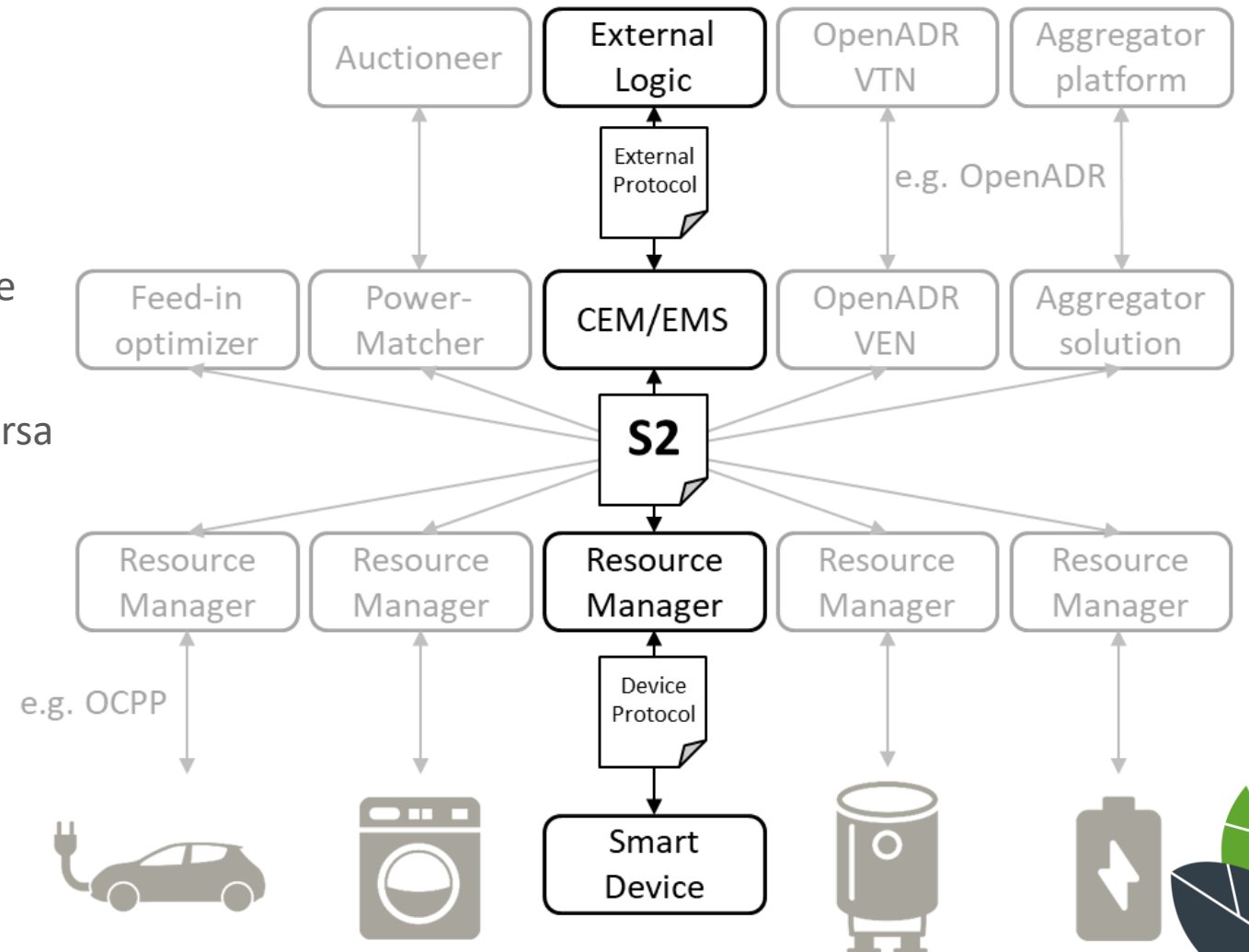


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S2 Architecture

Important role for the Resource Manager:

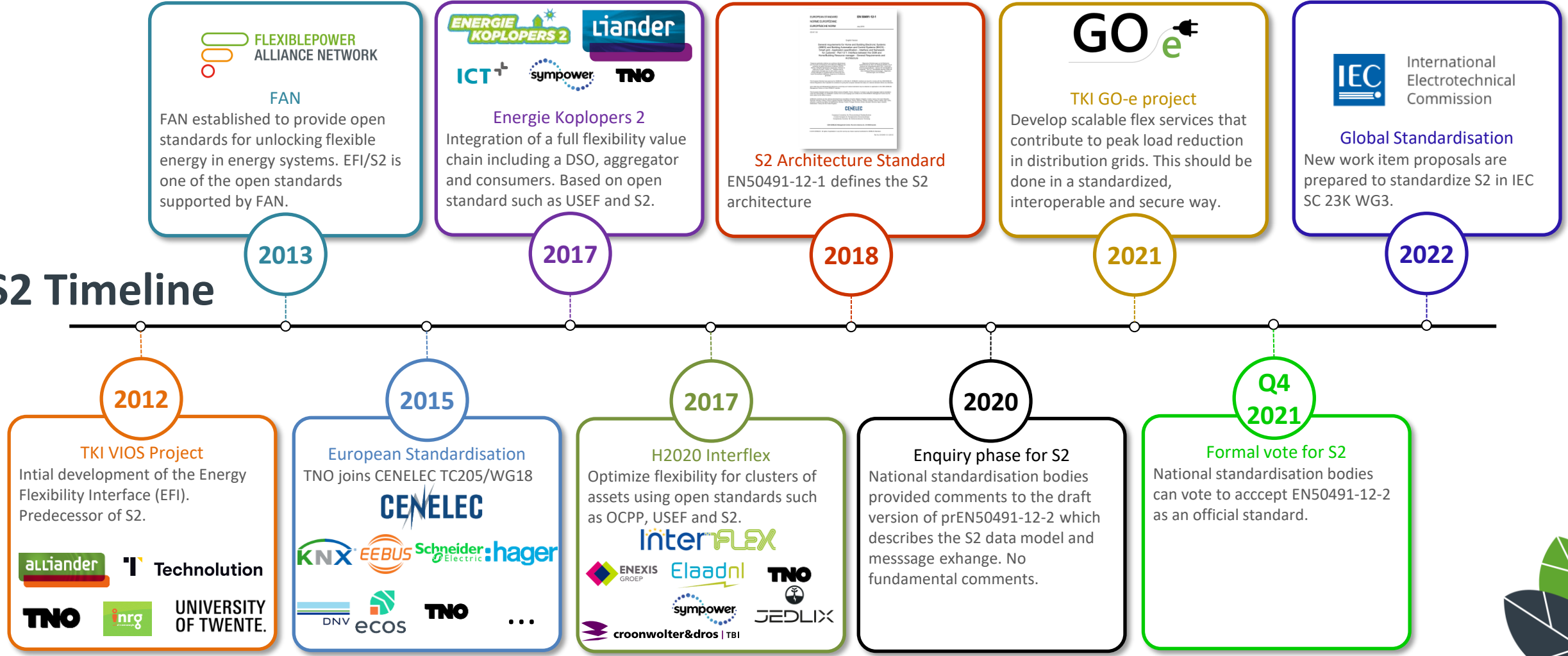
- Represents a single source of flexibility/device
- Translates device protocol into S2 and vice versa
- Resource Manager enriches flexibility information
 - Using a model or digital twin
 - Using external information, e.g. weather forecast



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S2 Timeline



FLEXIBLEPOWER ALLIANCE NETWORK

FAN

FAN established to provide open standards for unlocking flexible energy in energy systems. EFI/S2 is one of the open standards supported by FAN.

2013

ENERGIE KOPLOPERS 2 **Liander**

ICT+ **sympower** **TNO**

Energie Koplopers 2

Integration of a full flexibility value chain including a DSO, aggregator and consumers. Based on open standard such as USEF and S2.

2017

S2 Architecture Standard

EN50491-12-1 defines the S2 architecture

2018

GO e

TKI GO-e project

Develop scalable flex services that contribute to peak load reduction in distribution grids. This should be done in a standardized, interoperable and secure way.

2021

IEC International Electrotechnical Commission

Global Standardisation

New work item proposals are prepared to standardize S2 in IEC SC 23K WG3.

2022

TKI VIOS Project

Initial development of the Energy Flexibility Interface (EFI). Predecessor of S2.

allliander **Technolution**

TNO **inrg** **UNIVERSITY OF TWENTE.**

2012

European Standardisation

TNO joins CENELEC TC205/WG18

CENELEC

KNX **EEBUS** **Schneider Electric** **hager**

DNV **ECOS** **TNO** ...

2015

H2020 Interflex

Optimize flexibility for clusters of assets using open standards such as OCPP, USEF and S2.

InterFLEX

ENEXIS GROEP **Elaadnl** **TNO**

croonwolter&dros | TBI **sympower** **JEDLIX**

2017

Enquiry phase for S2

National standardisation bodies provided comments to the draft version of prEN50491-12-2 which describes the S2 data model and message exchange. No fundamental comments.

2020

Q4 2021

Formal vote for S2

National standardisation bodies can vote to accept EN50491-12-2 as an official standard.

Q4 2021





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Uitnodiging vanuit GO-e WP2



Hoe realiseren we een gedragen strategie voor succesvolle uitrol in-home flexibiliteitsontsluiting

- Wat zijn de rollen en verantwoordelijkheden in de waardeketen?
- Welke businessmodellen moeten ondersteund worden?
- Welke technische en niet-technische barrières moeten overwonnen worden?

Alle betrokken stakeholders (o.a. DSOs, HEMS- en apparaatfabrikanten, brancheorganisaties, consumenten) zijn meer dan welkom om hier in workshops/interviews over mee te denken!





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Vragen?

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