

OneNet Open Days

Northern Cluster: Regional approach

Cross-border, harmonized, and TSO & DSO coordinated market-based approach

Poria Divshali (Enering) - General Aspects
Kalle Kukk (Elering) - Standardized Products

Marko Petron (Cybernetica) - Interactive Platform and Middleware
Luciana Marques (VITO) - Market Clearing Optimization



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Northern Cluster Demonstrator

Implement in TSO-DSO pairs from

- Finland
- Estonia
- Latvia
- Lithuania



Market operators

- Nordpool (Norway)
- Pico (UK)



Energy retailer & flexibility service provider

- VattenFall (Sweden)



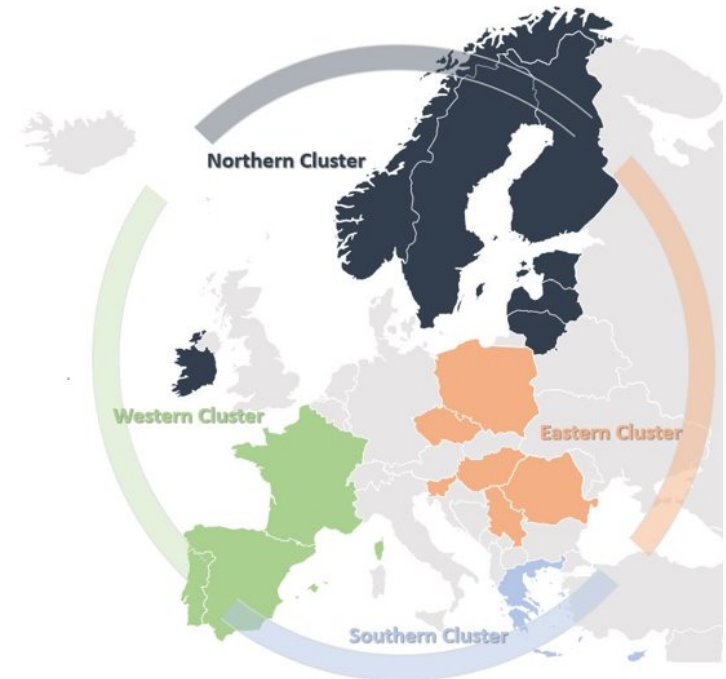
Energy market service provider, IT company

- Enerim (Finland)
- Cybernetica (Estonia)



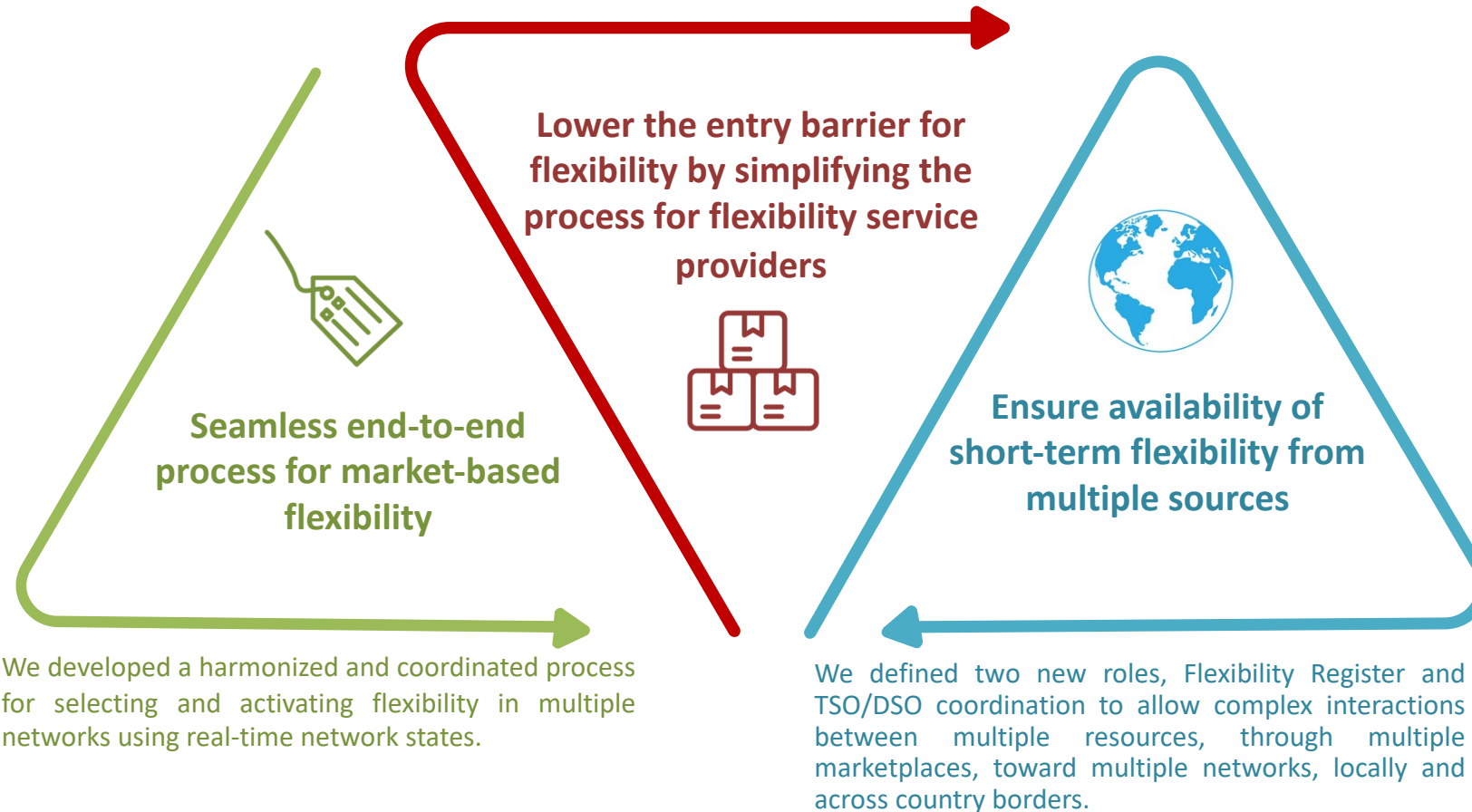
Research Center

- Vito (Belgium)

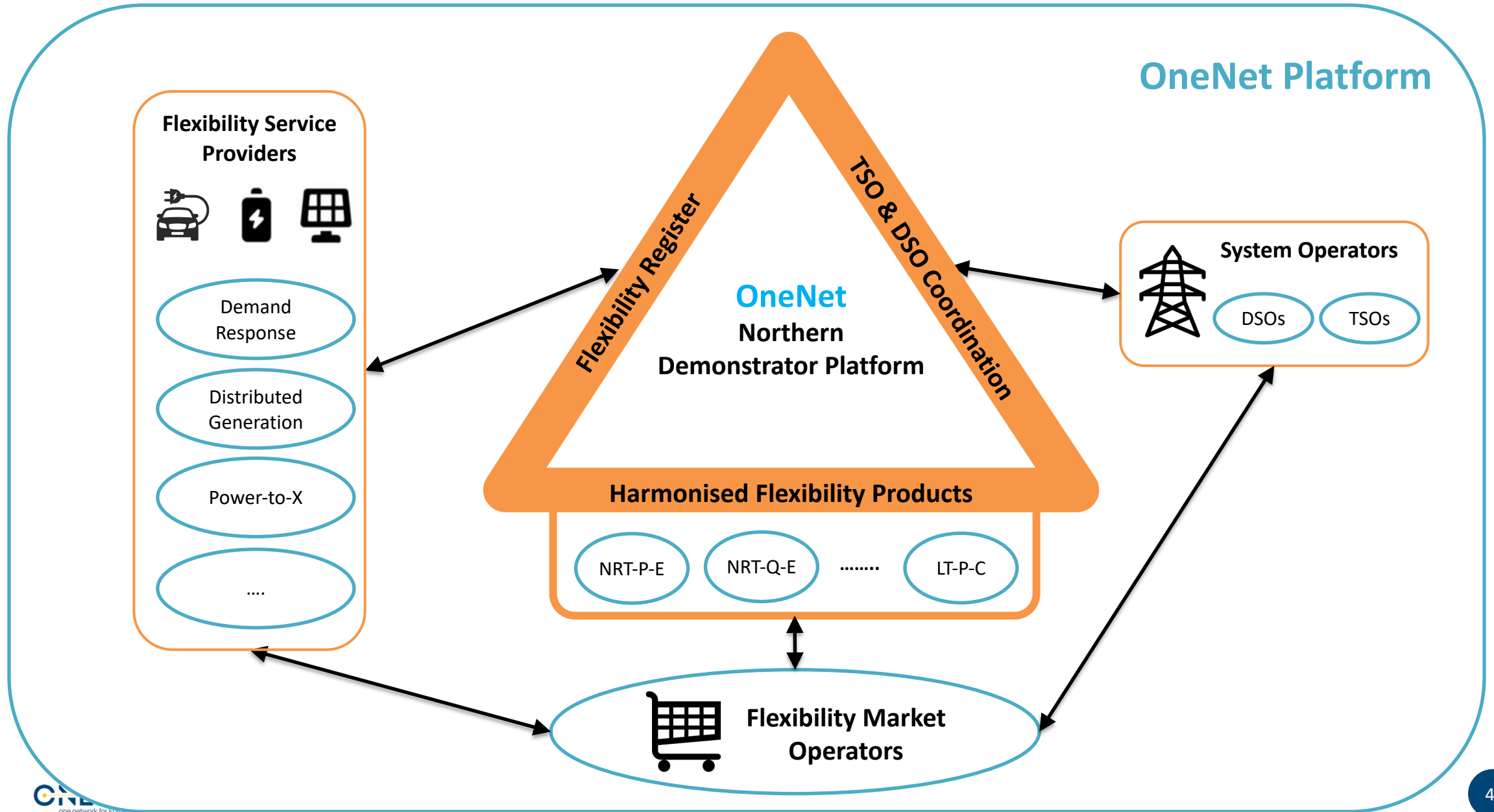


Innovative solution

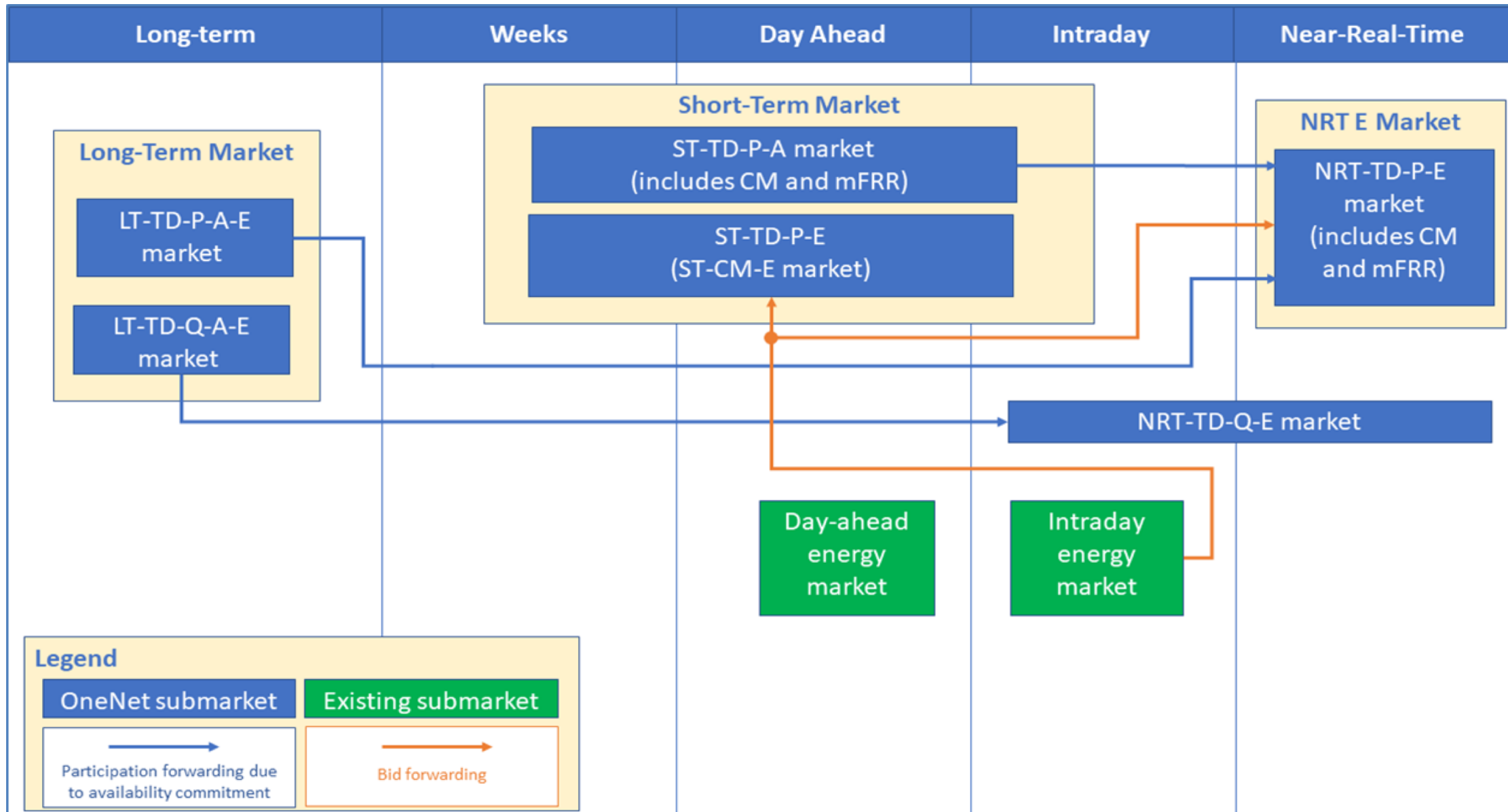
We defined six general-purpose flexibility products; simplified and standardized prequalification, selection, and settlement processes.



Architecture of Northern Cluster platform



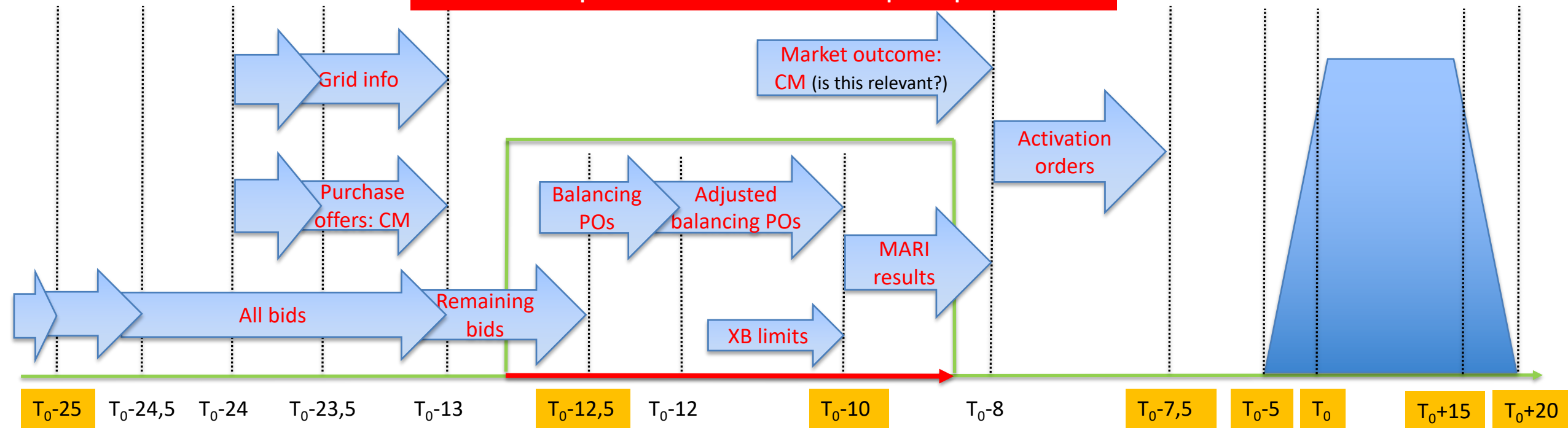
Northern Demo products



SA – scheduled activation
 DA – direct activation: informing FSPs between T_0-7 and T_0+7 ; delivery between $T_0-4,5$ and T_0+35 (incl. ramping)

T&D Coordination Platform
 MARI Platform

No time for grid qualification in activation phase!
 SO activation requests not needed: activation request = purchase offer

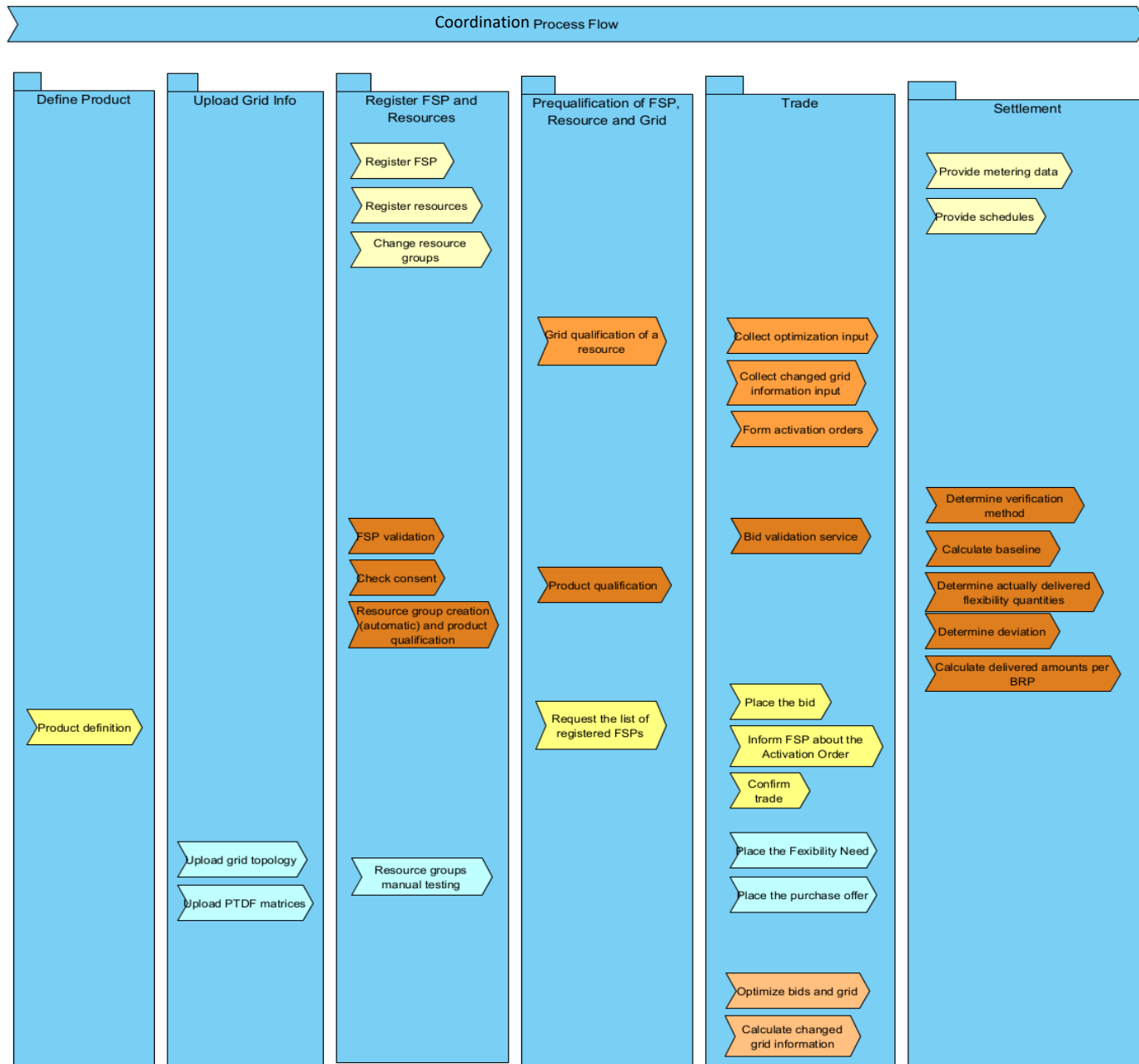
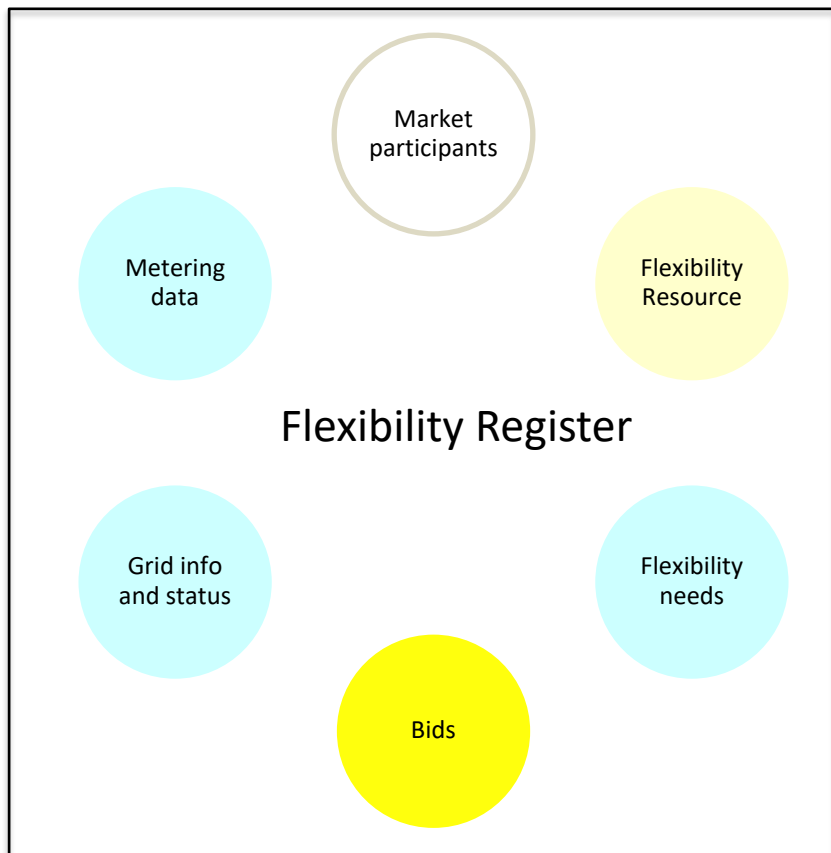


FSPs submit bids to Market Operators	MOs send bids to T&D CP	T&D CP identifies impacted SOs	Grid information & CM purchase offers from SOs to T&D CP	Local optimisation & grid qualification	T&D CP: qualified bids not selected for CM to MARI	Balancing POs from TSOs to T&D CP	T&D CP: adjusted POs to MARI; TSO: cross-border capacity limitations	MARI optimisation results and MOs' market outcomes notified to T&D CP	Flexibility activation orders (incl. MARI SA results) to FSPs	Delivery (SA)
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Implementation plan

	NRT-P-E	ST-P-E	ST-P-C / LT-P-C
Finland			
Estonia			
Latvia			
Lithuania			

Flexibility Register and Coordination platform

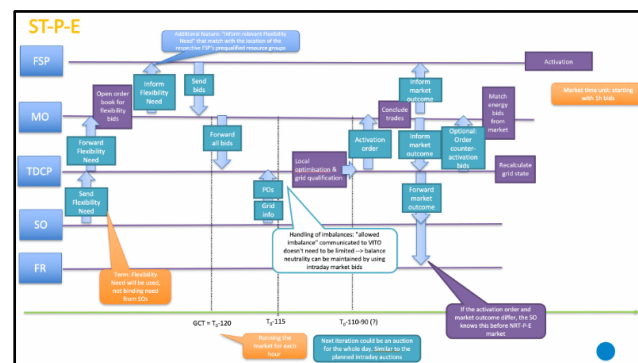
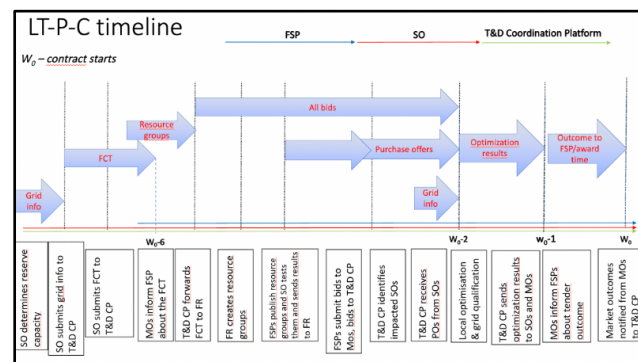
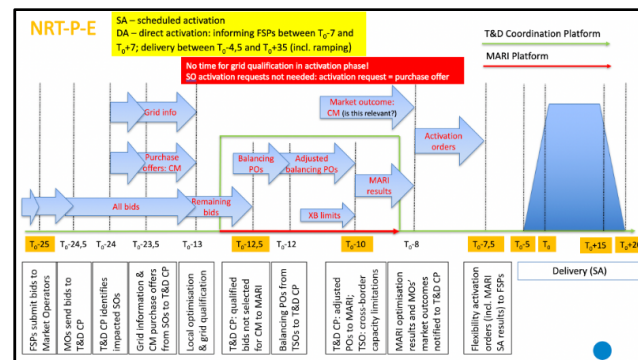


Scalable and expandable software solution

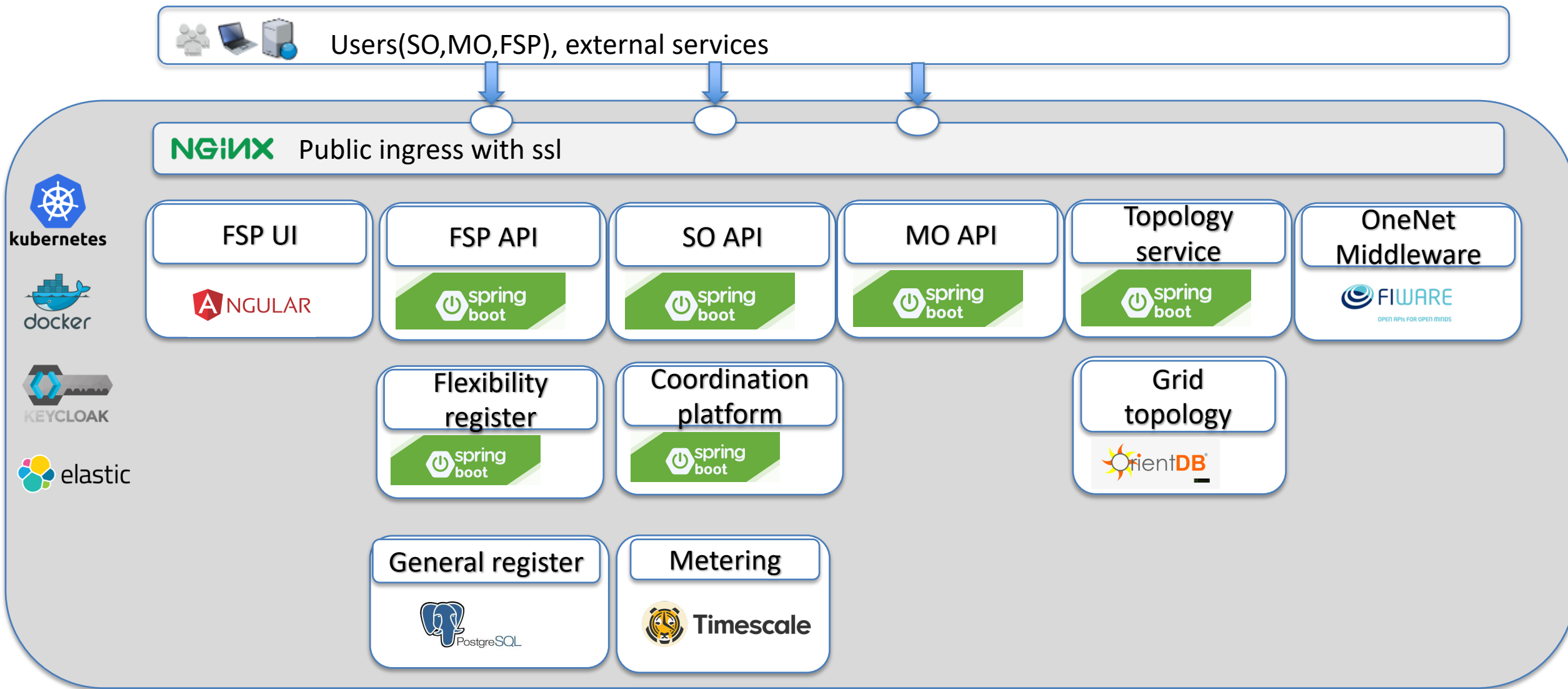
- Covers single or multiple regions
- Generalized energy products
- Intelligent trading by bid optimization
- Expandable through Middleware



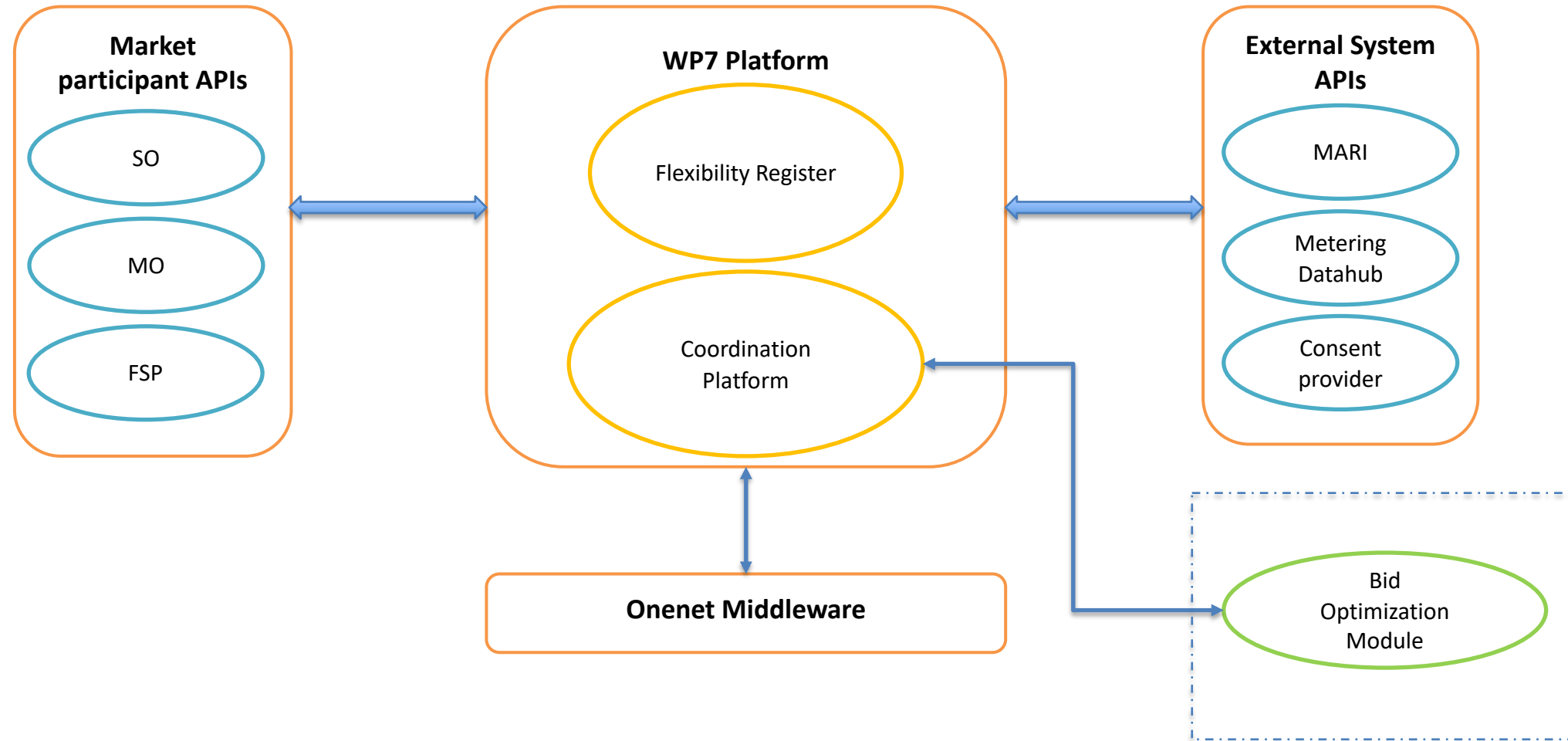
OneNet
Middleware



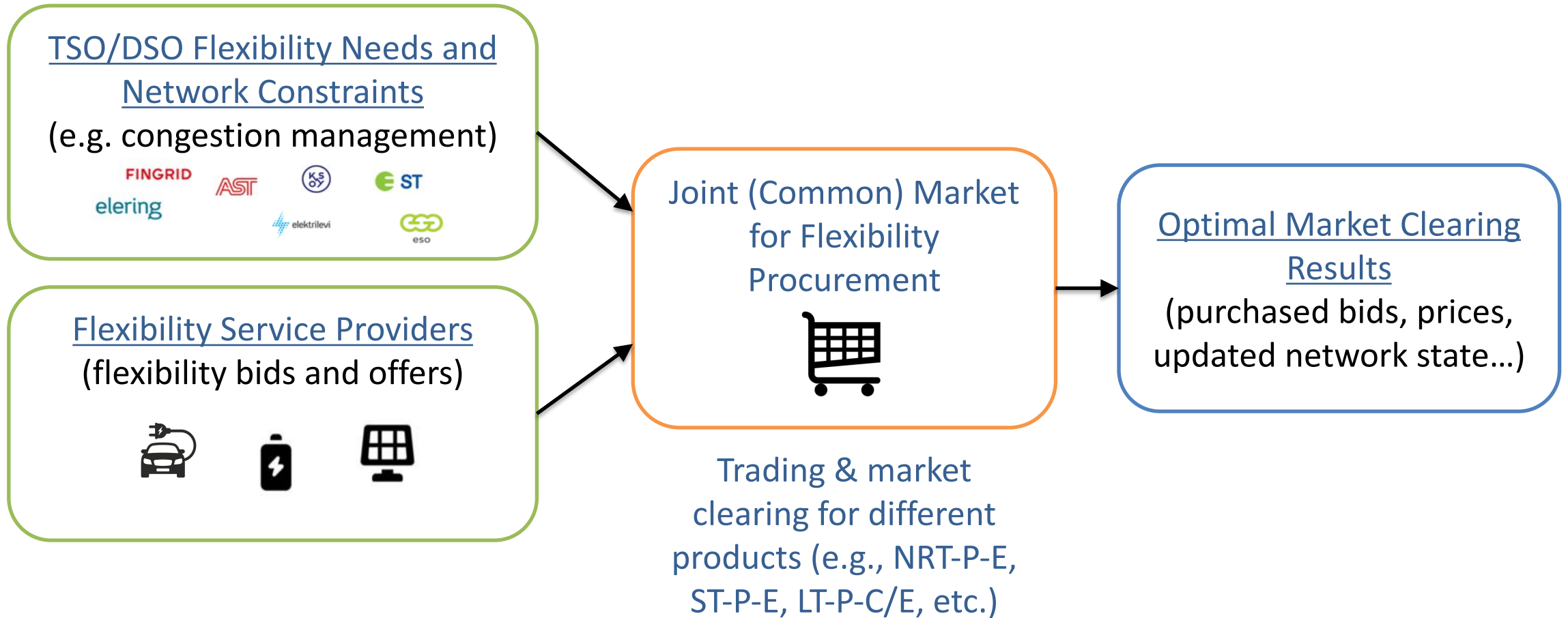
Modern Technical Stack



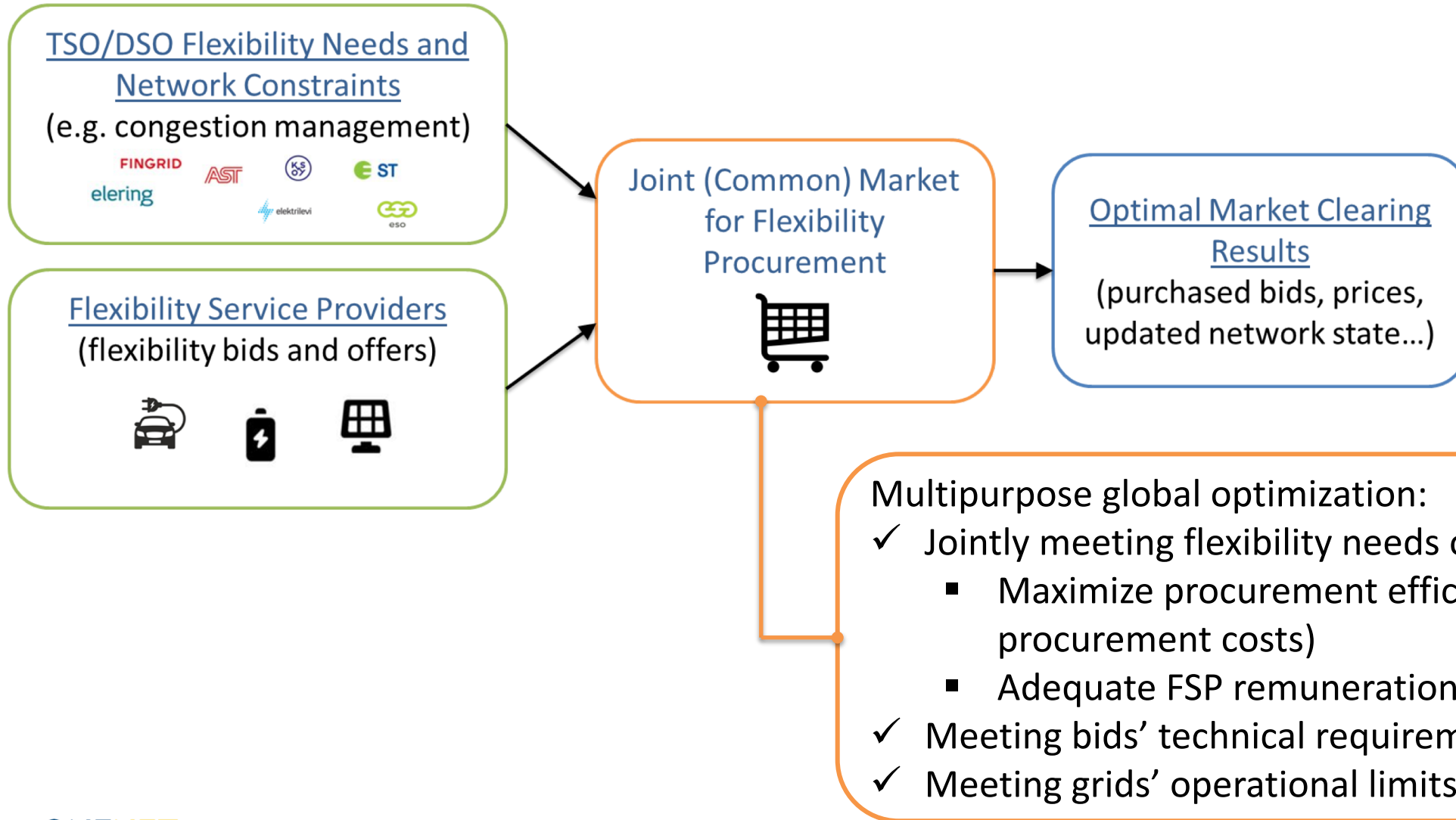
Technical architecture - common view



Optimization-Based Market Clearing

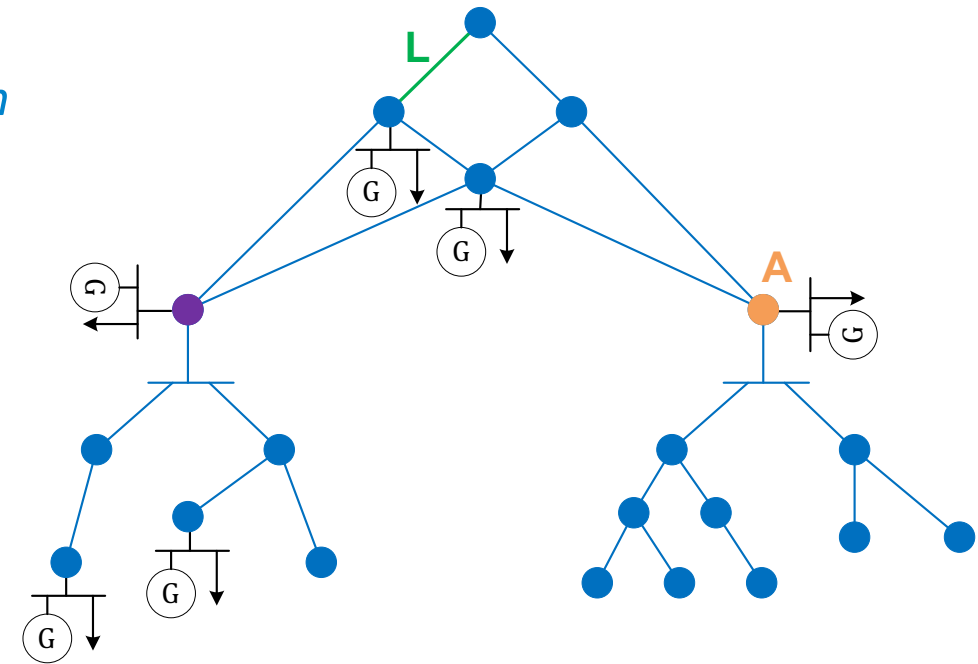


Optimization-Based Market Clearing



Network Representation: Impact and Constraint

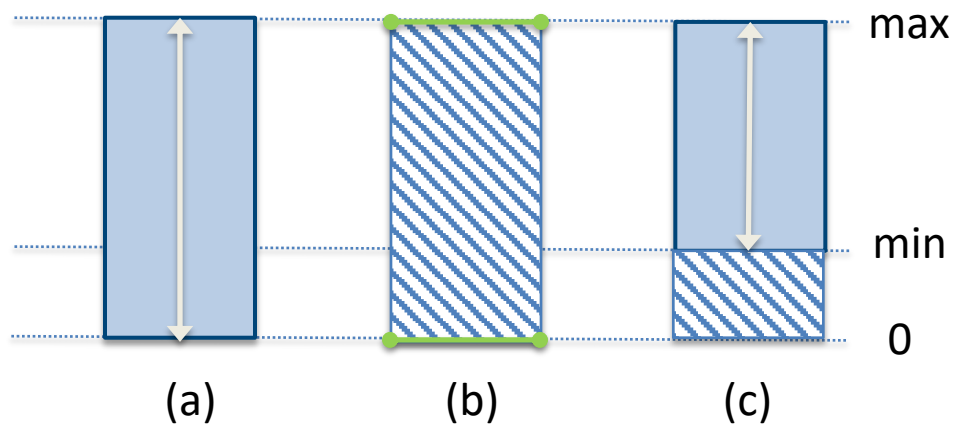
- Quantifying value of a bid in meeting the flexibility need → *E.g.: How much does 1 MW of flexibility purchased at location A in the grid help resolving congestions over line L?*
- Ensuring that any purchased flexibility for meeting initial system needs does not cause other network operational issues → *Grid impact assessment*
- Considering all lines and all bids → *Beyond traditional Merit Order Lists*
- Optimization-based market clearing: approach based on *Power Transfer Distribution Factors*



Different Types of Bids

SIMPLE BIDS:

- Fully divisible: $[0, \text{max}] \rightarrow (a)$
- Indivisible (block): 0 or max $\rightarrow (b)$
- Partially divisible: $[\text{min}, \text{max}] \rightarrow (c)$



COMPLEX BIDS:

- Multipart bids (Parent-Children bids): children bids purchasing possible only if parent bid is purchased
- Exclusive bids: only one block bid can be purchased in an exclusive set

Toward pan-European approach

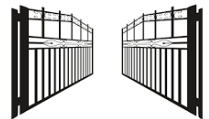
Demonstrating a joint, regional, market-based approach



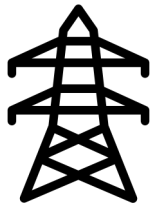
End-to-end approach (Distributed resources <> system operators)



Simplified and harmonized processes



Lowers the entry barriers for both flexibility providers and flexibility users (e.g. TSO and DSO)



TSO & DSO coordinated and global optimisation



Thank You

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