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OPTIMATE

An **O**pen simulation **P**latform to **T**est
Integration in **MARkeT** design of
massive intermittent **E**nergy

Event: **ENTSO-E R&D workshop, June 16-th 2010**

Outline

- Background on OPTIMATE
- Key features of the Market design Simulator
- Examples of controversial issues to be addressed in the demonstration
- Dissemination
- Conclusions


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- **Background on OPTIMATE**
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Background on OPTIMATE

- An **O**pen simulation **P**latform to **T**est **I**ntegration in **M**ARket design of massive intermittent **E**nergy
- Brings several TSOs and Academics sharing common views about European market rules & future market designs
 - To specify and build a market design simulator,
 - To demonstrate its uses based on several market issues
 - To disseminate the results towards the TSO community
 - To make recommendations towards regulatory bodies
- 3 year RD&D project, launched on October 1-st 2009
 - First version of simulation platform due 2011
 - Second version due 2012 (agent-based to mimic market player behaviours)
- Total budget of 4.2 Mio. € (60% EU funding by DG Energy)

Background on OPTIMATE

BENEFICIARY	COUNTRY
	TECHNOFI France
	RTE France
	RED ELECTRICA Spain
	ELIA Belgium
	EnBW Energie Baden-Württemberg Germany
	50 HERTZ Transmission Germany
	ARMINES France
	Katholieke Universiteit LEUVEN Belgium
	University of Manchester United Kingdom
	RISOE Denmark
SEAES	Société d'Analyse Economique et Sociale France
	Universidad Pontificia Comillas Spain

Coordinator

TSO, Technical management

TSO

TSO

TSO

TSO

Academic

Academic

Academic

Academic

Academic

Academic

Background on OPTIMATE

The overarching goals

- To clarify future market designs allowing for the efficient integration of large intermittent generation capacities
 - Avoiding system operation reshuffling
 - Based on a portfolio approach of Market players
- To analyse the impacts of RES-E integration into the electrical system with a focus on market issues:
 - Costs & benefits related to Power Exchanges, both Day-Ahead & Intra-Day
 - Costs & benefits related to electrical flows and congestions
 - Costs & benefits related to balancing markets and imbalance settlements
 - The resulting CO2 emissions
- To infer future market rules in view of helping TSOs anticipate on methods & tools

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Key features of the Market design simulation platform

- Key specifications
- Critical assumptions to develop the first versions
- The 50 “clusters”
- The simulation platform architecture
- The simulator modular sequence

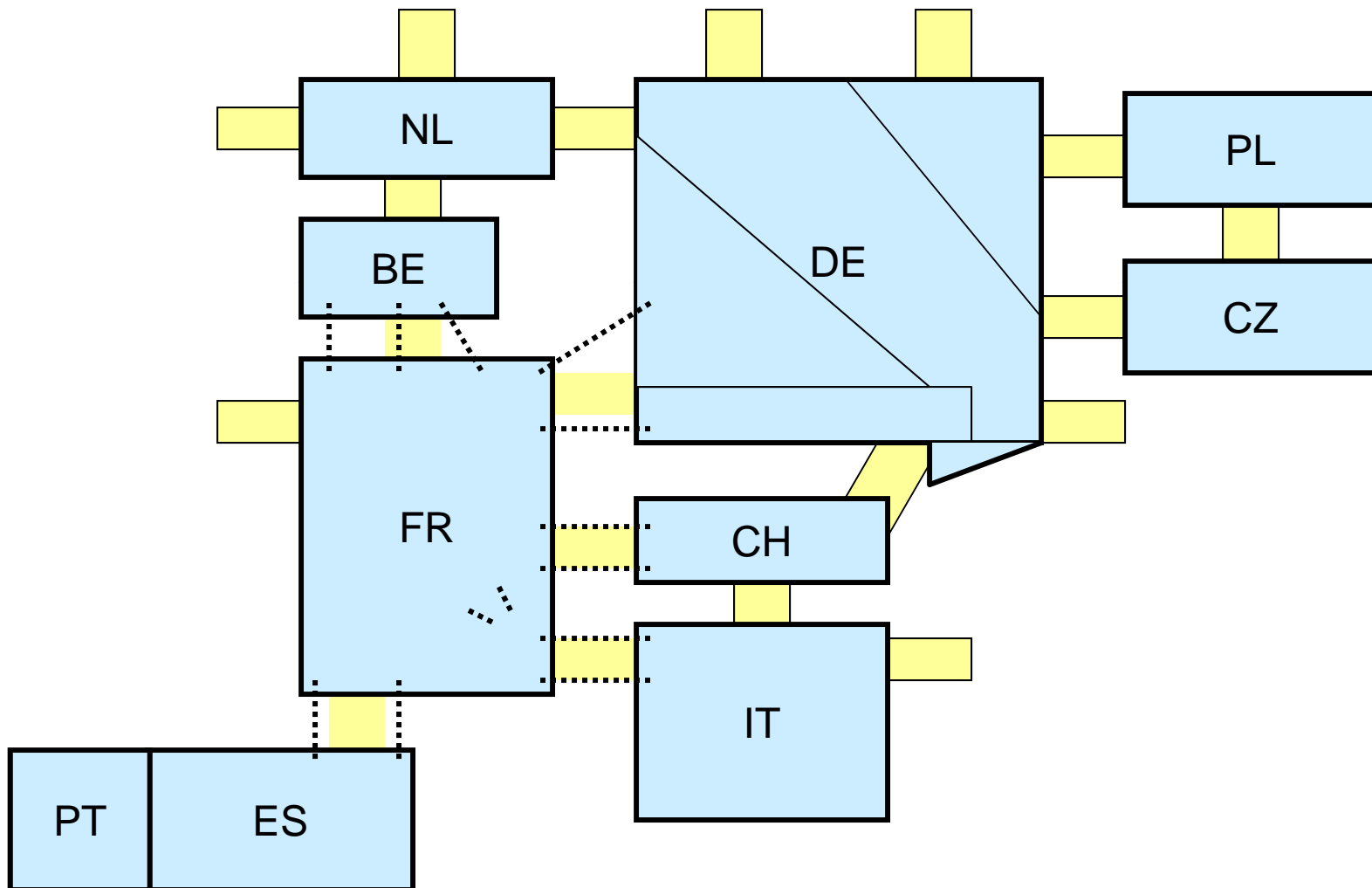
Key specifications

- A stylistic model allowing to choose nearly any combination of European-type DayAhead & IntraDay design, including
 - Proxies of current features (covering CWE, SWE, CSE, Baltic)
 - Coordinated thanks to key target designs
 - Overall market coupling at DA
 - Common ID platform with implicit XB allocation
 - Completed as much as necessary with target features, such as
 - RES-E Market premium replacing Infeed-whatever-it-may-cost
 - Flow-based replacing ATC-based
- Applied on a geographic area related to the Consortium members
 - EHV nodes aggregated into clusters, defined to mitigate discrepancies on critical branches
 - Thermal units standardized but not aggregated

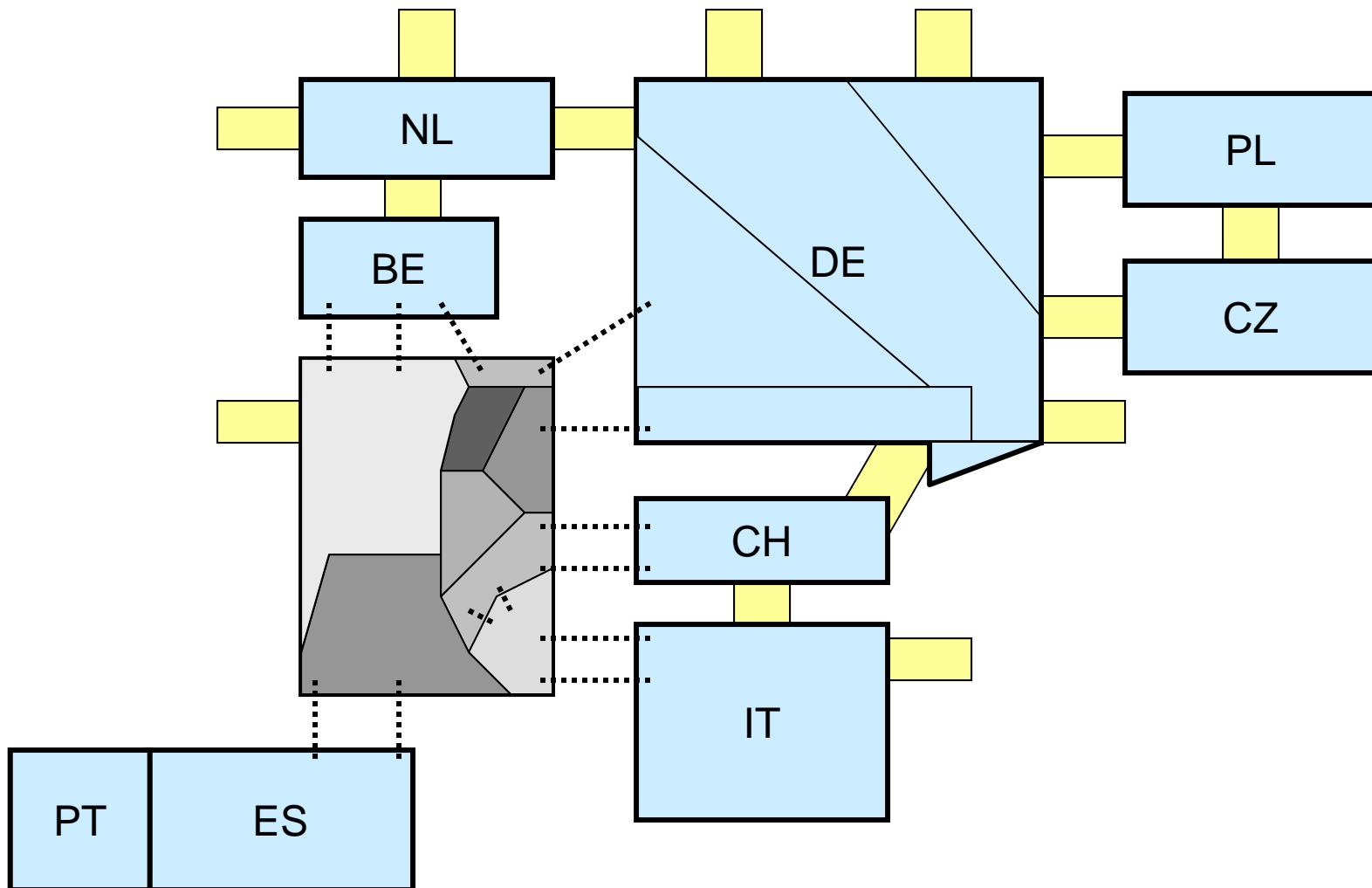
Critical assumptions

- The simulation platform scope is constrained by a few critical assumptions
 - DC lossless network
 - Forward contracts ignored (Everything takes place at DA, ID and RT)
 - Network limits never trespassed at RT (Be it by load curtailment!)
 - Shortest time granularity : 30 mn
 - TSOs jointly responsible for overall congestion management
 - Each Control Block responsible for balancing its own area

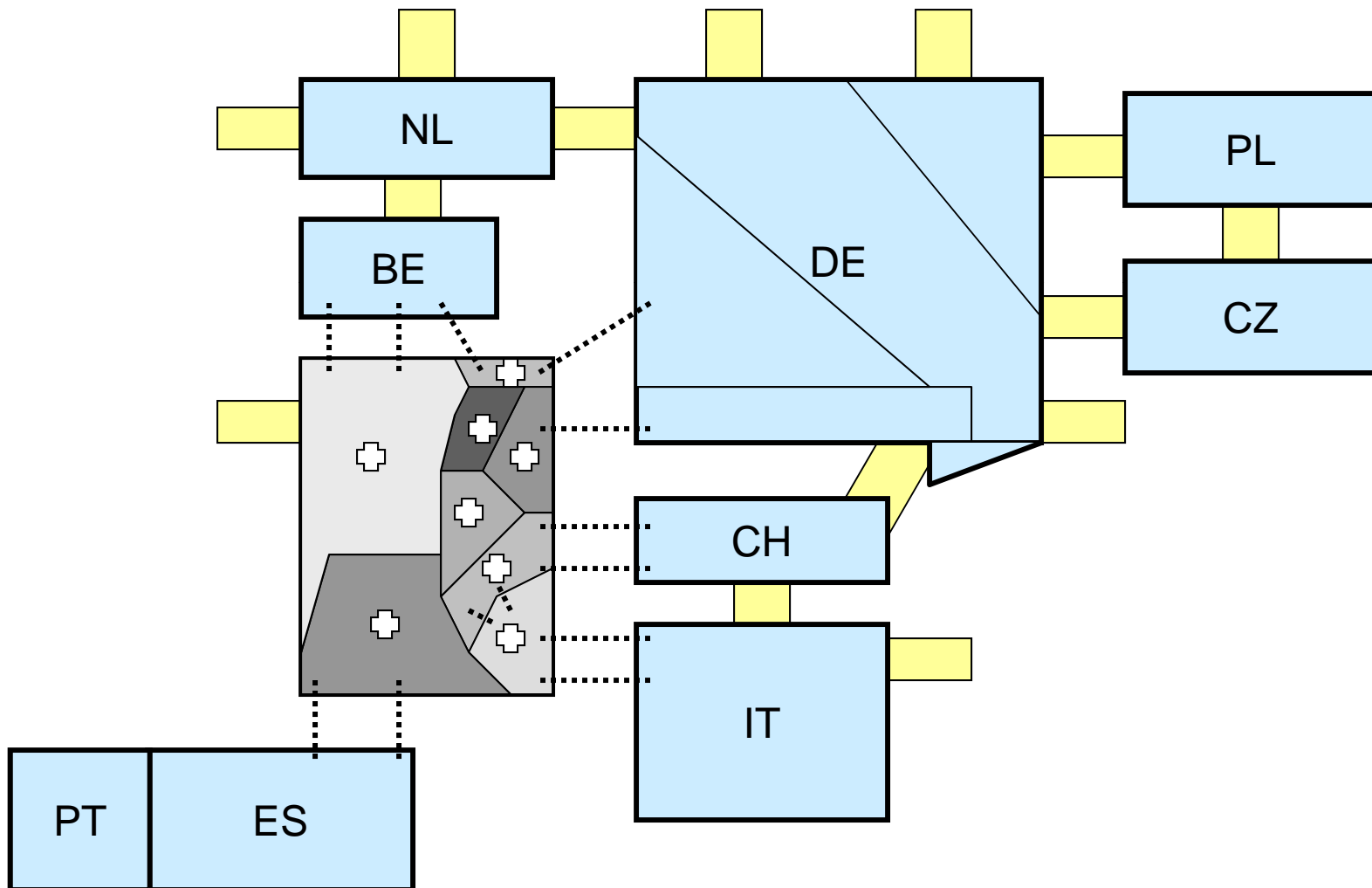
50 clusters expected to represent the area



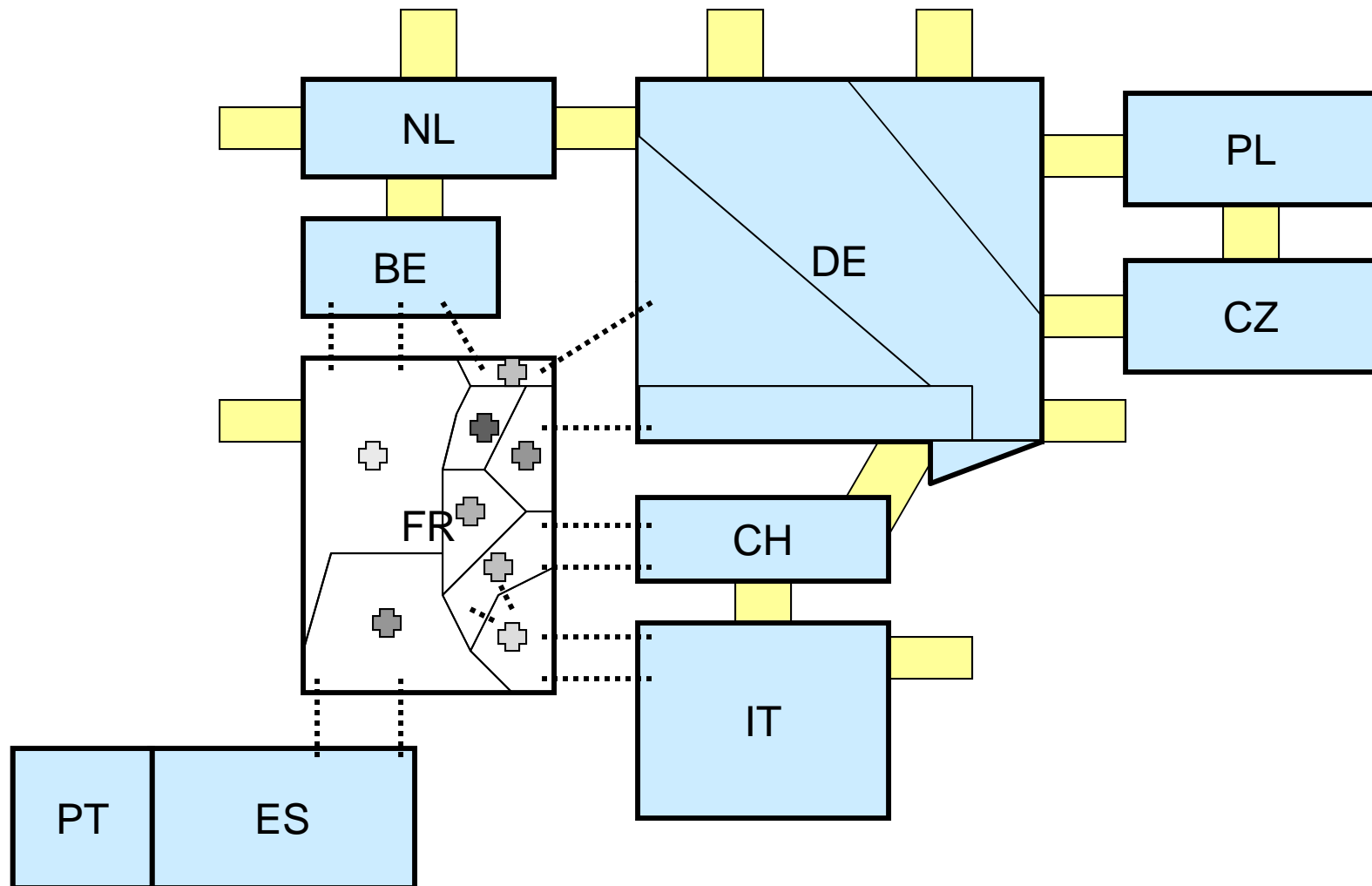
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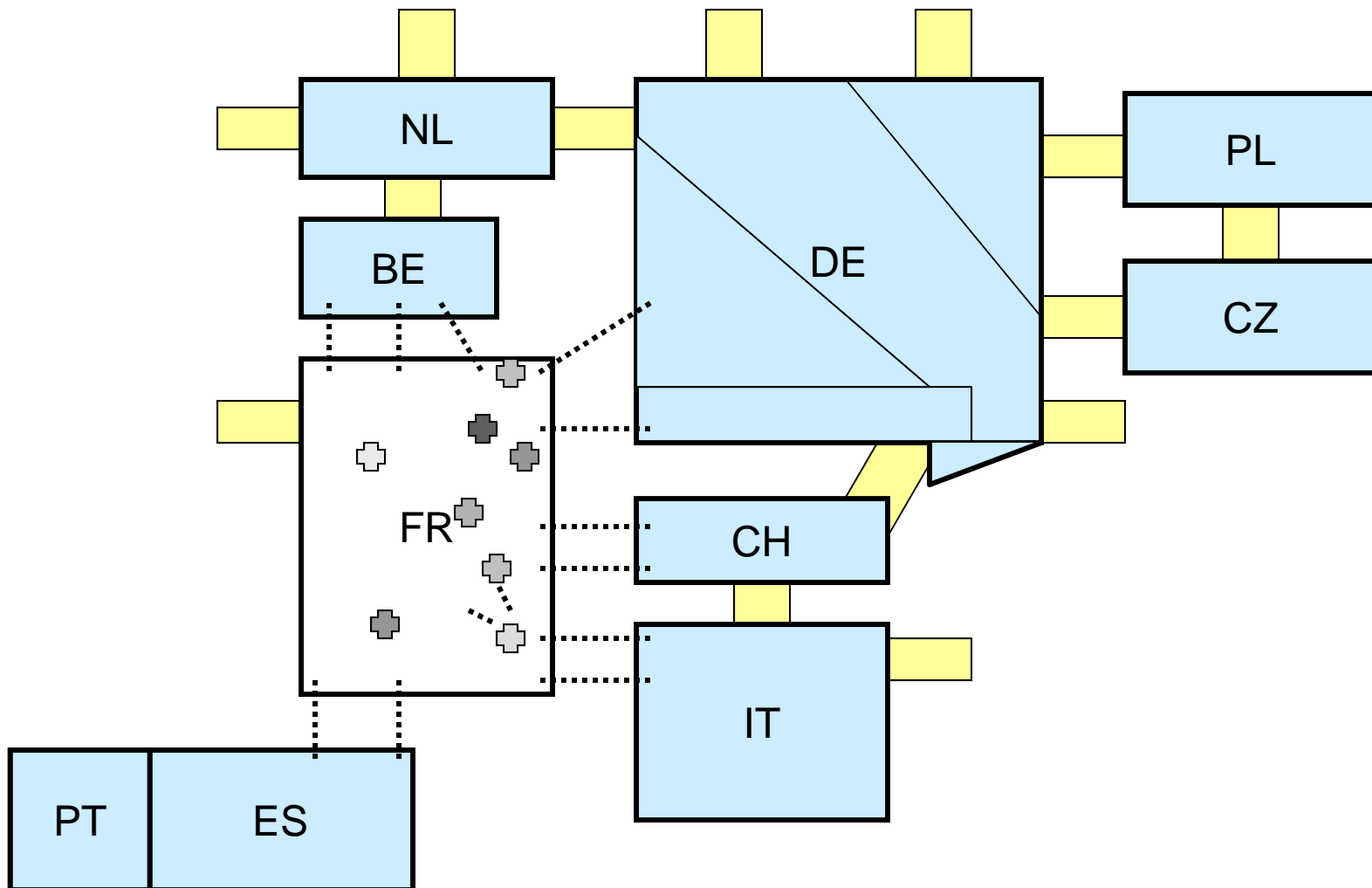
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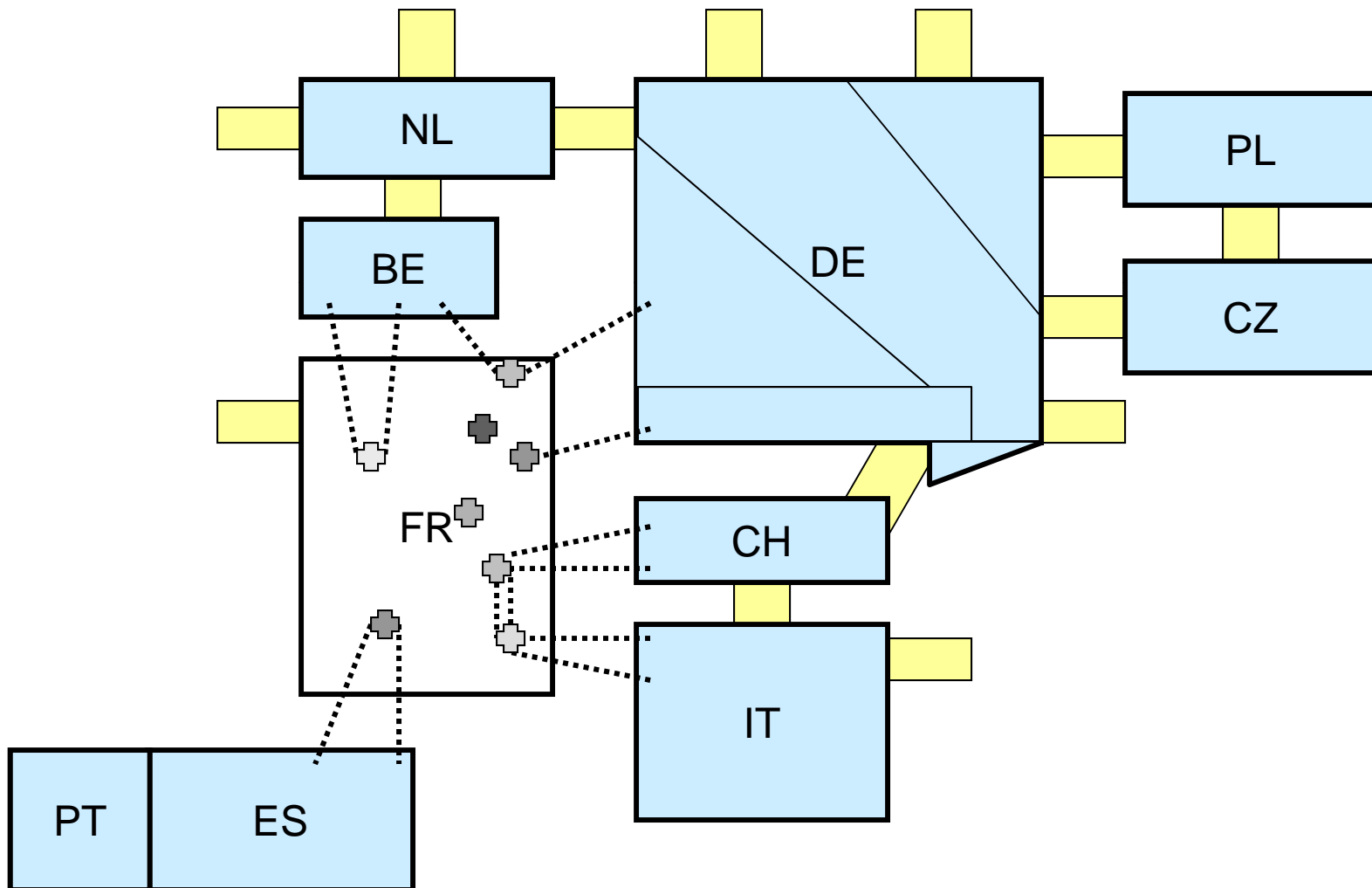
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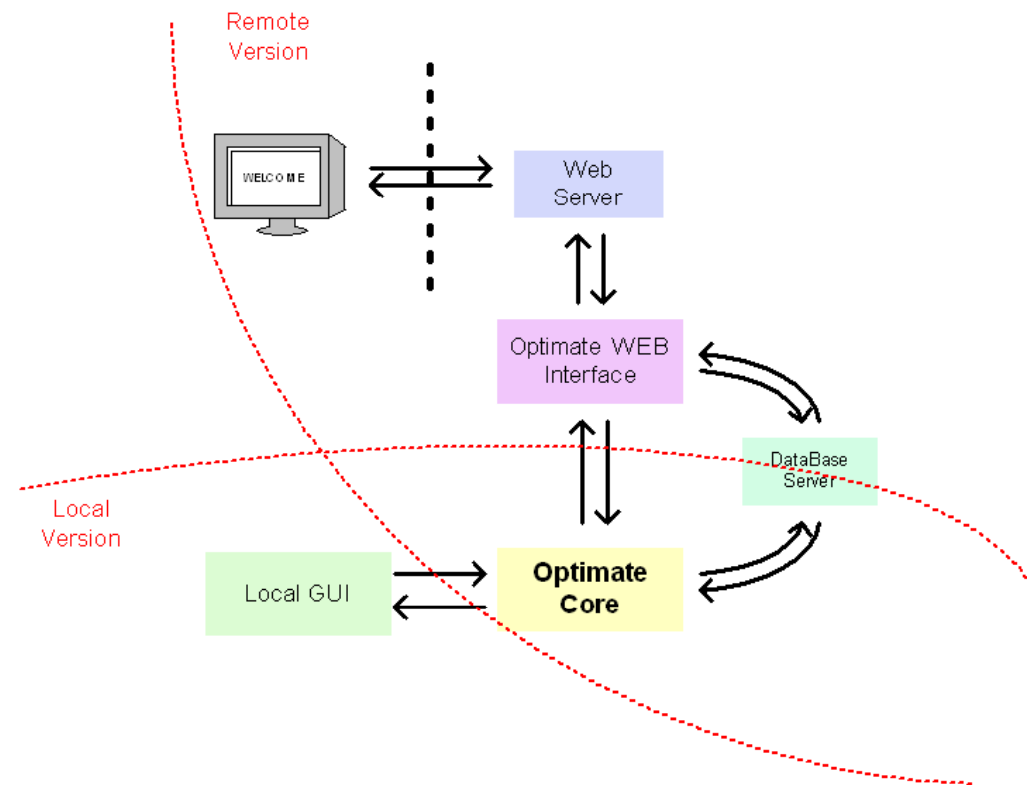


50 clusters expected to represent the area



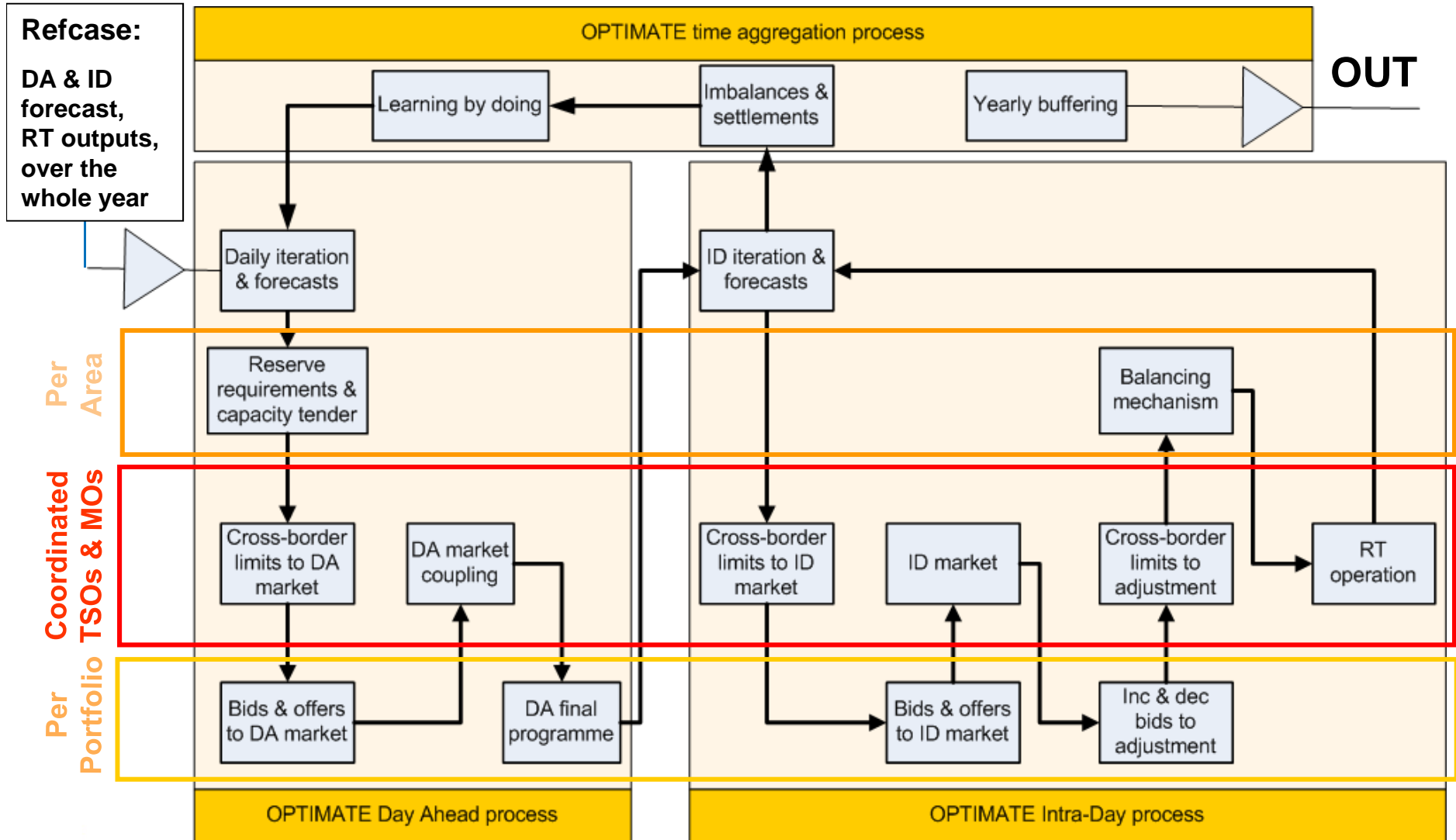
The simulation platform architecture

- First phase:
 - The Optimate platform will be accessible via web client
 - Centralized computations
 - No compatibility problems
 - Easy to schedule the work
 - No need for users to update to the latest version
 - Menu to choose the market design to be applied
 - As a whole or per area

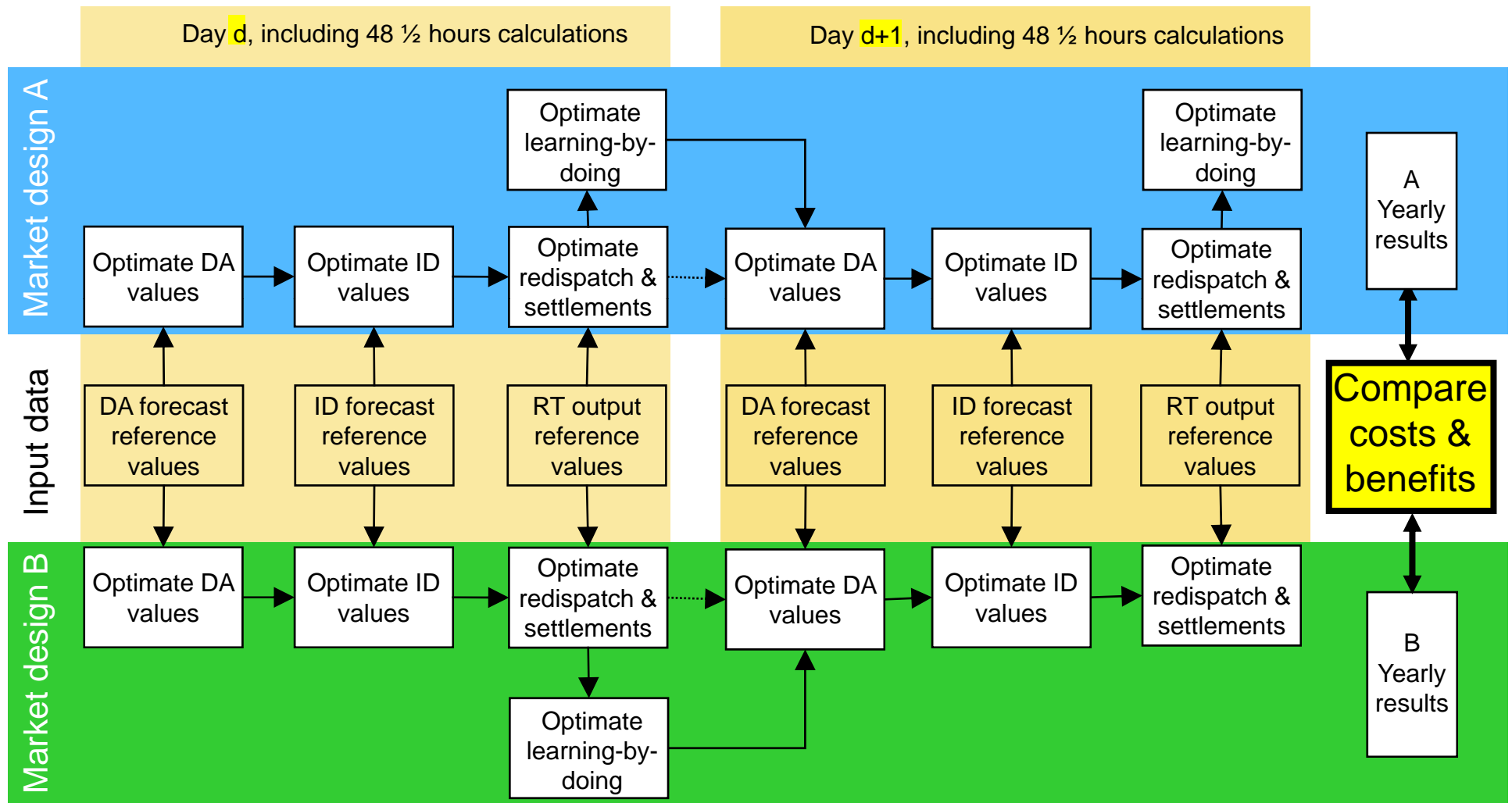


- Second phase:
 - A local version will be provided
 - Windows & Linux compatible

OPTIMATE simulator modular sequence



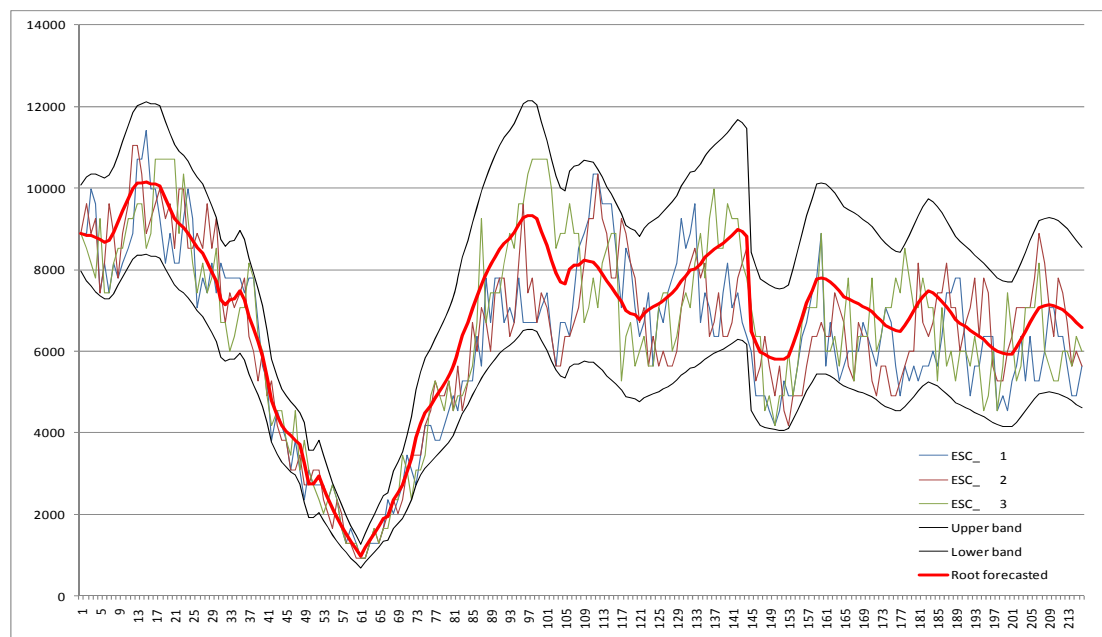
Results significant when two designs are compared



What make the OPTIMATE results moving away from the Refcase?

Forecast errors + market designs impact anticipation

- Market players anticipate all the time their Portfolio imbalances costs
- Any thermal generation may unexpectedly trip off at Real Time
- Load & Intermittent generation forecast error decreases with the time-to-go
 - One draw of forecast errors, then comparison between 2 designs
 - Ideally several draws on forecast errors => average comparative values

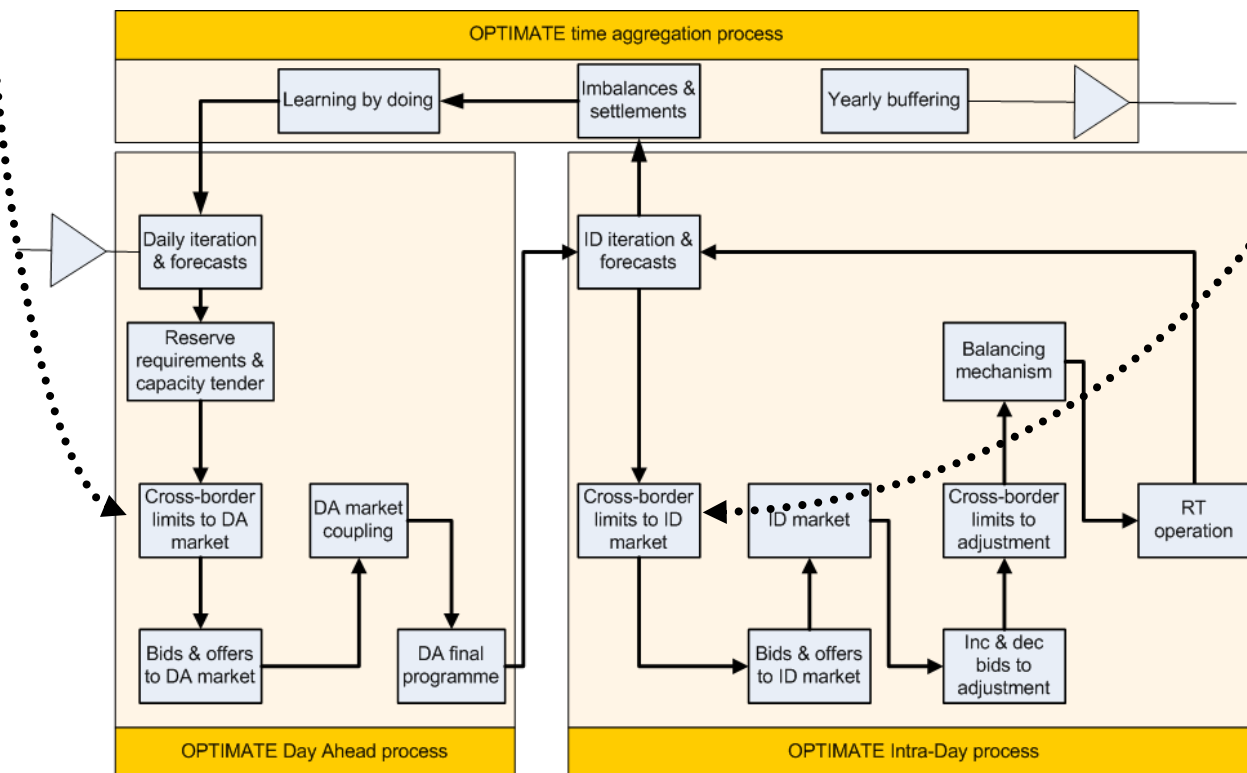


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- Dissemination
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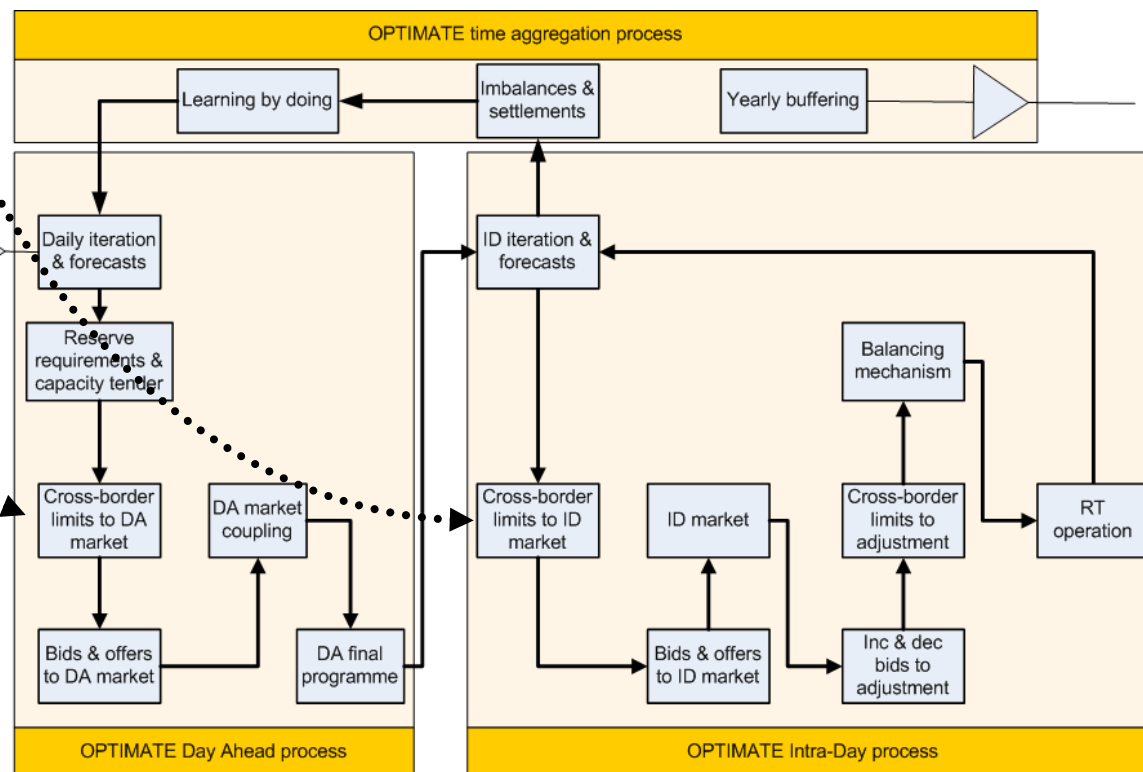
Controversial issues to be addressed: examples

- What if less Xborder capacity given at DA, then more released at ID with similar risk/cost of redispatch at RT ?
 - All the time/ on certain critical branches/ within certain TSO areas/ only in the case of some specific wind/sun conditions
 - Impact on ID market efficiency



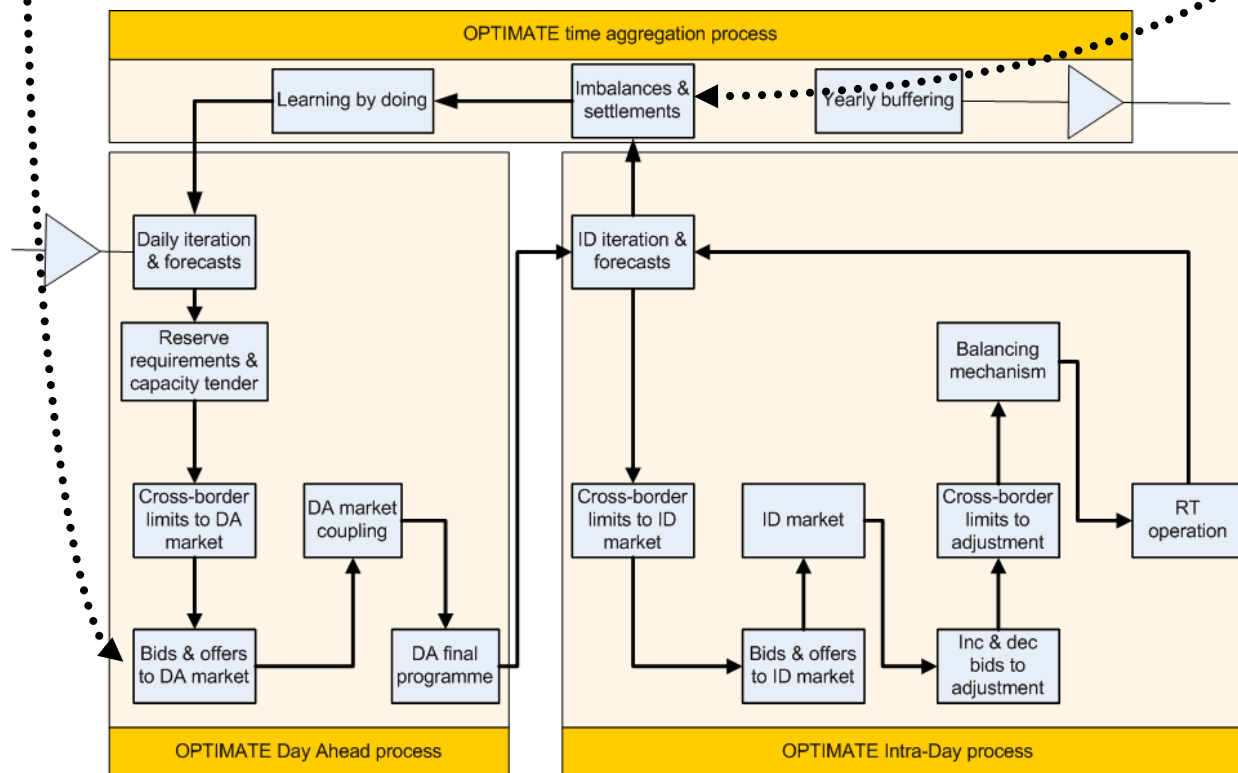
Controversial issues to be addressed: examples

- What if more Xborder capacity given at DA, or at ID, then compensated by extra cost of redispatch at RT?
 - All the time/ on certain critical branches/ within certain TSO areas/ only in the case of some specific wind/sun conditions
 - Impact on ID market efficiency



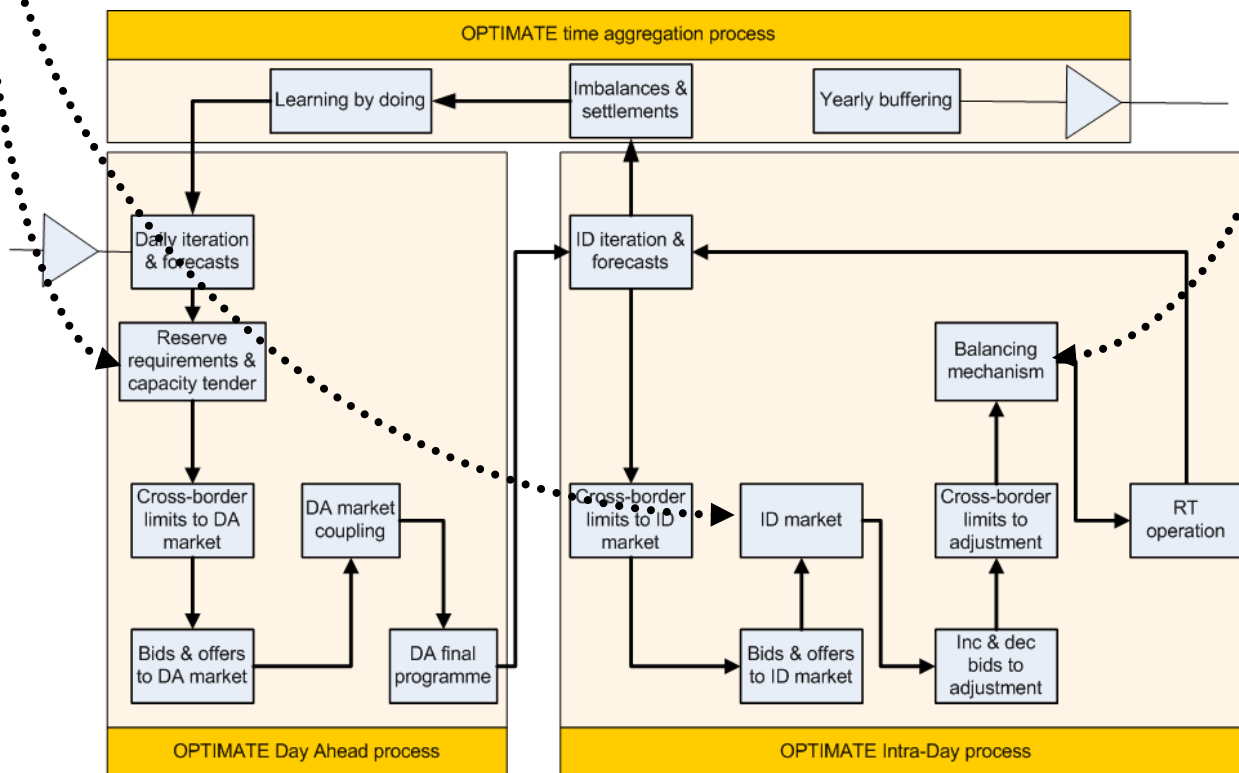
Controversial issues to be addressed: examples

- Variants of RES-E support schemes
 - Market premium schemes vs. In-feed-whatever-it-may-cost
 - With different imbalance price rules: dual vs single pricing, penalties, etc



Controversial issues to be addressed: examples

- ID market closure & Balancing market opening
 - Harmonised scheme applied all over the areas
 - Different schemes in different areas
 - With possible extension of reserve pooling between areas



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Dissemination

- Web site: <http://www.optimize-platform.eu>
- Dissemination towards TSOs/ ENTSO-E
 - N°1: to-day
 - N°2: results on Platform V1 (M25)
 - N°3: results on Platform V2 (M31)
- Training at using the Platform (3 sessions of 10 participants end of Year 3)
- Dissemination towards regulatory bodies (Pr Glachant)
 - results of the project (M36)

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Conclusions

- **OPTIMATE is a tool box**
 - To test a new design within a given area of TSO responsibility, comparing the resulting costs and benefits
 - To pinpoint designs that may differ between areas (with a focus on balancing)
- **OPTIMATE is not the ultimate tool box**
 - Provides economical pros & cons for each studied design, but not the decisions to implement them
 - Uses still constrained by some of the chosen assumptions
- **OPTIMATE targets ENTSO-E members as primary end-users**
 - Dissemination of know-how to make use of it
 - Free of charge access to any ENTSO-E member once validated
- **The OPTIMATE modular structure will allow for future development work and upgrades**
 - Several other issues to be modelled
 - New market features to be added