

UCTE overview

Data Exchange Format – project report

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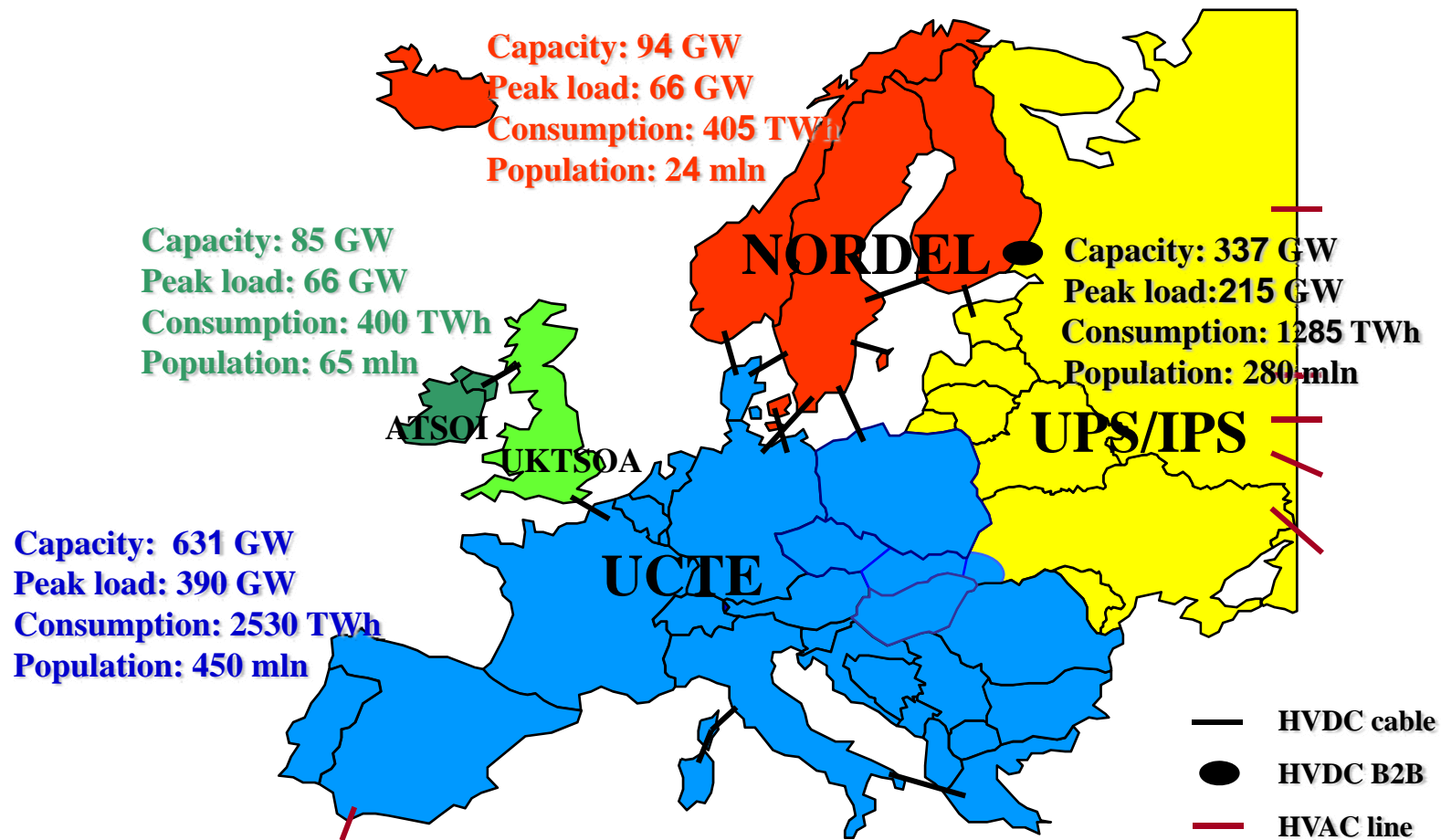
CIM User Group meeting, 10-13th June 2008, Vasteras, Sweden



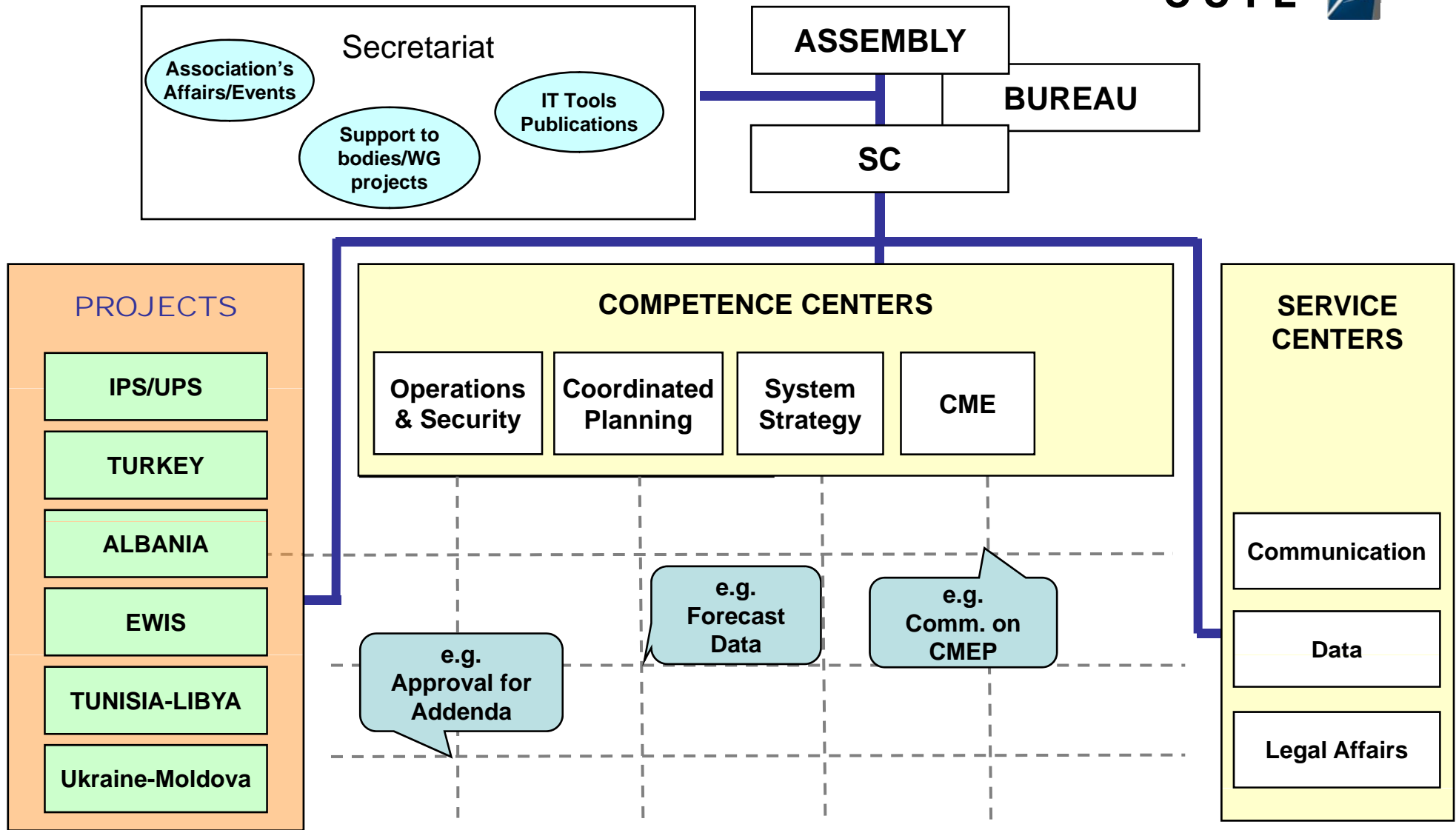
UCTE...?

- an association of transmission system operators in continental Europe
- the UCTE network provides a safe electricity supply for about 450 million people in one of the biggest electrical synchronous interconnections worldwide
- responsible for technical and operational co-ordination in the synchronous area
- controlling the short-term security of the system with regard to load-frequency control and stability
- monitoring the medium to long-term adequacy between generation and load
- responsible for the extension of the UCTE synchronous area

European synchronous areas

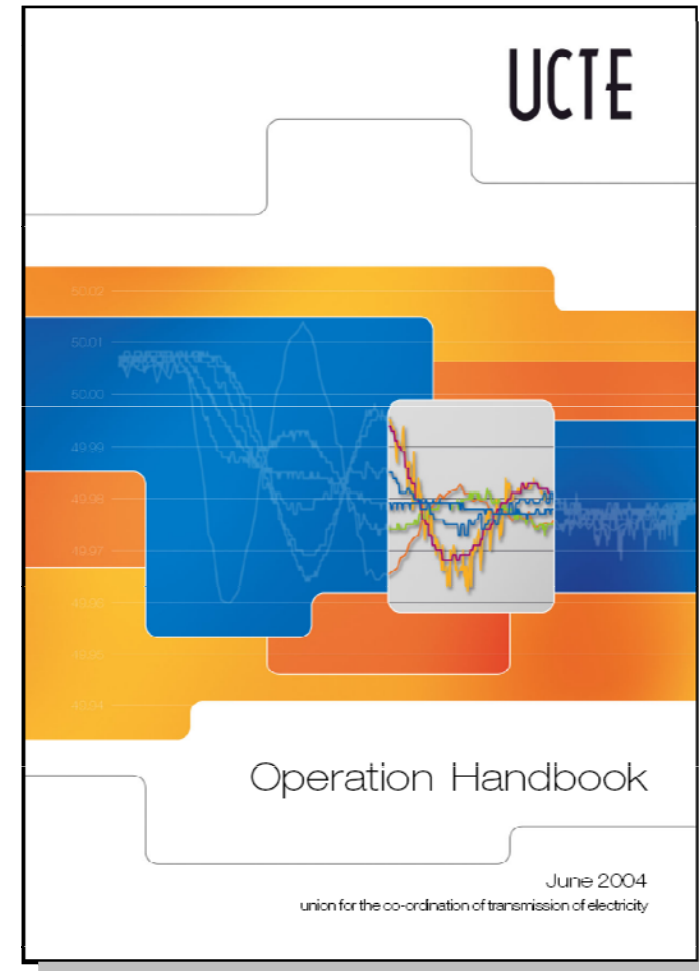


Working Structure of UCTE



UCTE security package

- **Operation Handbook** – a complete set of standards for TSOs of the UCTE interconnected system
- **Multilateral Agreement** with the Operation Handbook as the cornerstone for the **legal framework ensuring the security** of the interconnected systems
- **Compliance Monitoring Process** as a **permanent process** evaluating the implementation of the rules



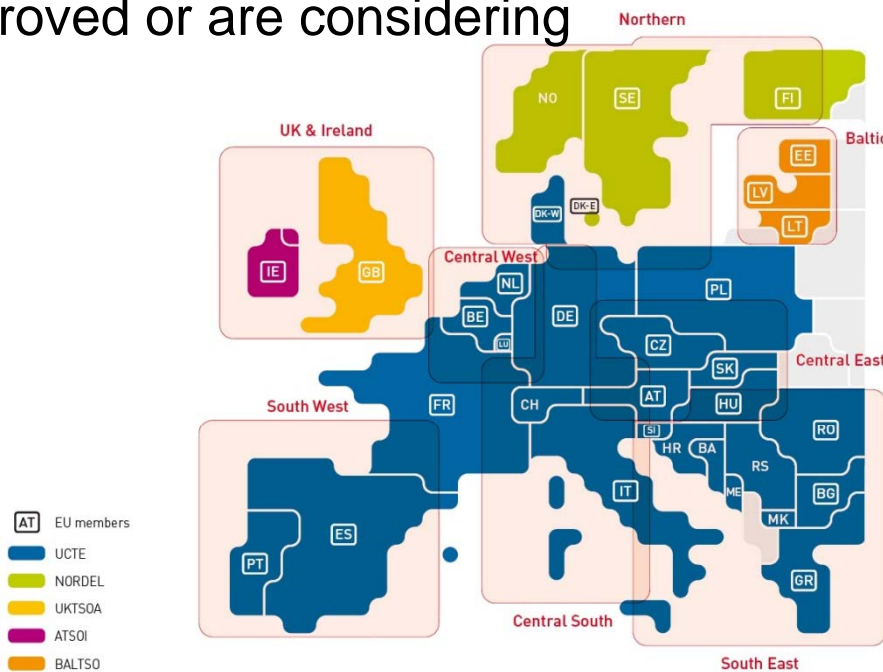
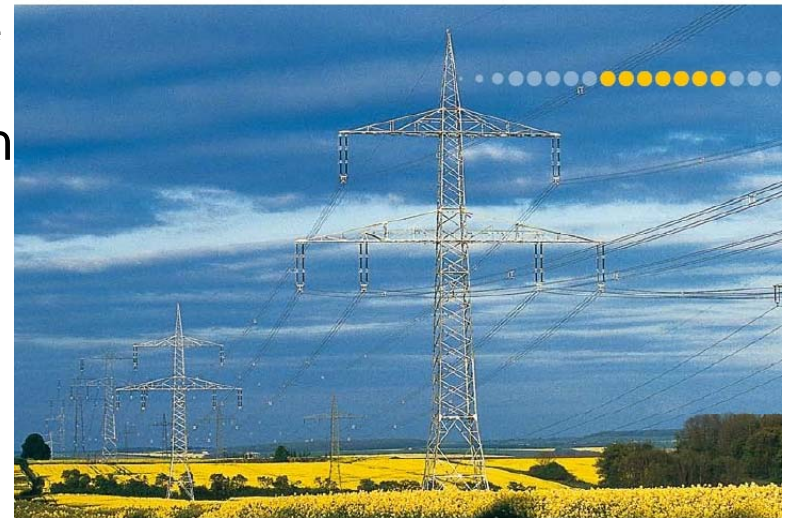
First UCTE Data Handbook

- Data Handbook – a core document for a proper management of all current data activities in UCTE
- Development of a harmonized and traceable confidentiality policy for all UCTE data
- Development of the new role of „National Data Coordinator“



First UCTE Transmission Development Plan

- In the coming 5 years UCTE TSOs should devote a total investment of approximately 17000 M€ to the development of interconnections and the main internal transmission grid
- A survey of investments that UCTE TSOs have either approved or are considering



UCTE Transmission Development Plan

Edition 2008

union for the co-ordination of transmission of electricity

UCTE Synchronous Area Extension

UCTE Priority: not to jeopardize the present performance of the UCTE system with respect to system security and reliability

- System Extension Projects:
 - Feasibility Study for interconnection of **IPS-UPS** Systems with UCTE
 - Study for the interconnection of **Turkey** System with UCTE
 - Project for the interconnection of **Ukraine-Moldova** Systems with UCTE
 - Project for the interconnection of **Albania** System with UCTE
 - Project for the interconnection of **Tunisia – Libya** Systems with UCTE
- EWIS – First Study on Wind Power Integration at European Level (100% funded and supported by EC)
 - Objectives:
 - Enhance technical compatibilities to facilitate further wind development, minimize industry costs and maintain security of supply
 - Identify transmission investments to address wind energy requirements

Data exchanges in UCTE

- DACF (Day Ahead Congestion Forecast) process - load flow data
- UCTE projects – data for performing steady state and dynamic analyses
- UCTE coordinated planning activities at regional and UCTE level
- Regional and bilateral data exchanges serving specific studies

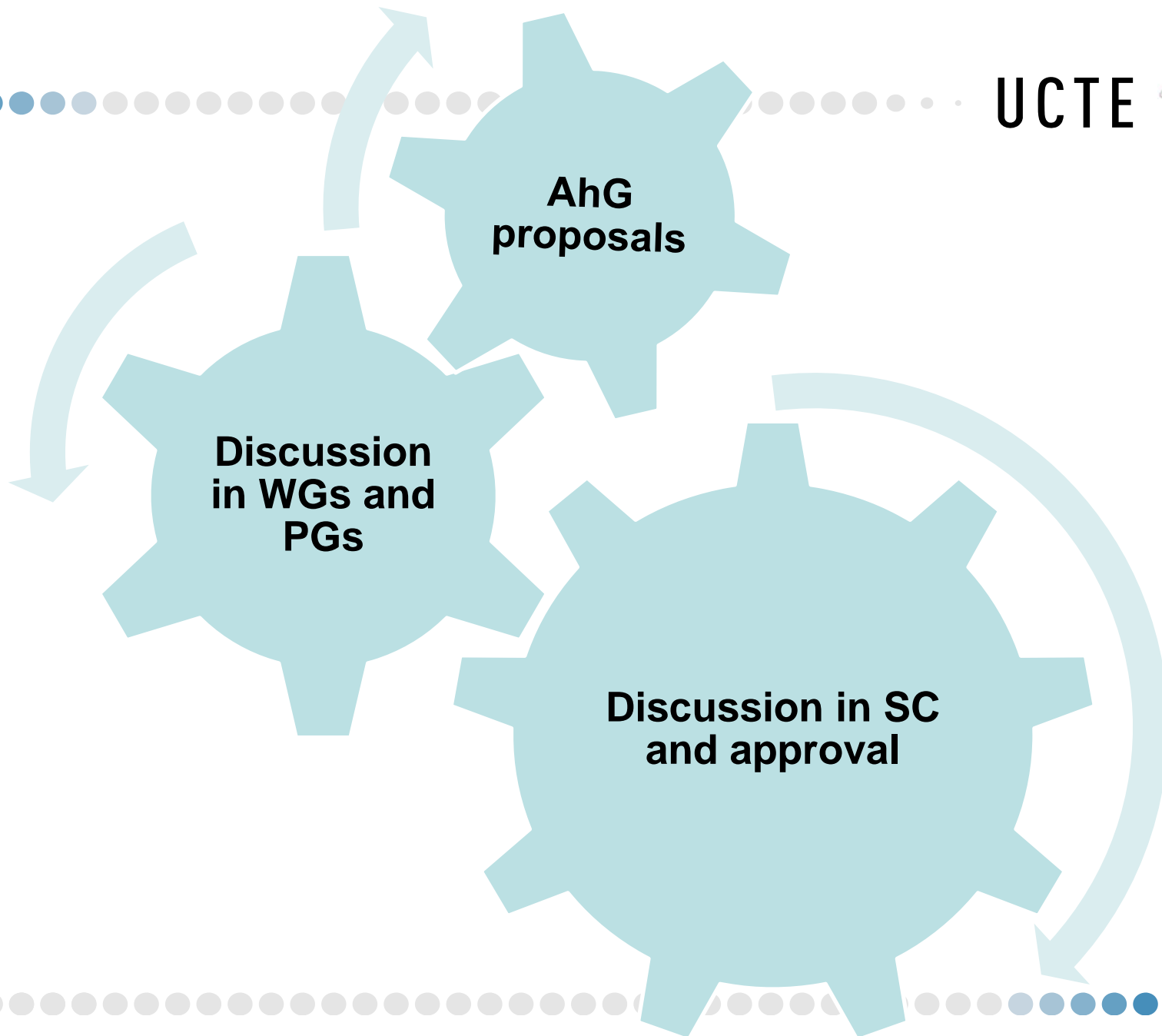
Why discussions about a new common format?

- A lot of software tools are being used among the UCTE TSOs
- The current UCTE format data exchange format is suitable for the DACF (Day Ahead Congestion Forecast) process. Its possibilities for other purposes (planning and various system studies) are limited
- The idea about a mutual acceptance of another existing commercial format as a standard for data exchanges is not supported

From ASCII to CIM.....

- UCTE decided to launch an initiative for development of new UCTE XML (Extensible Markup Language) based data exchange format that is considered as a standard for exchange of load flow and dynamic data and allows performing of all kind of analyses as follows: steady state, unbalanced short circuit and dynamic analyses.
- AhG UCTE format was established. Members from TSOs of DE, FR, ES, NL, BE, CH, SK, IT, CZ, LU.
- In order to prevent development of a new format which is either in contradiction with existing standards or has the same features such as other existing data exchange formats, AhG UCTE format launched an investigation concerning the status of development of CIM/XML exchange format.

Approval process



UCTE Steering Committee decision taken on 7th May

.....SC approves the cooperation of AhG “UCTE format” with international organizations aiming at inclusion of UCTE needs into international standard.

.....SC approves the UCTE participation in EPRI project (CIM for Dynamics).

CIM development and implementation – UCTE project milestones



Now

- Mutual agreement on UCTE proposals for extension of CIM for Planning, CIM user group meeting, June 2008

To be defined

- Contribution to the CIM version 13 and preparation of interoperability tests in September 2008

To be defined

- Interoperability tests (taking into account UCTE profile): Exchanges between planning applications (Planning-Planning), Operational model – Planning model

CIM development and implementation – UCTE project milestones



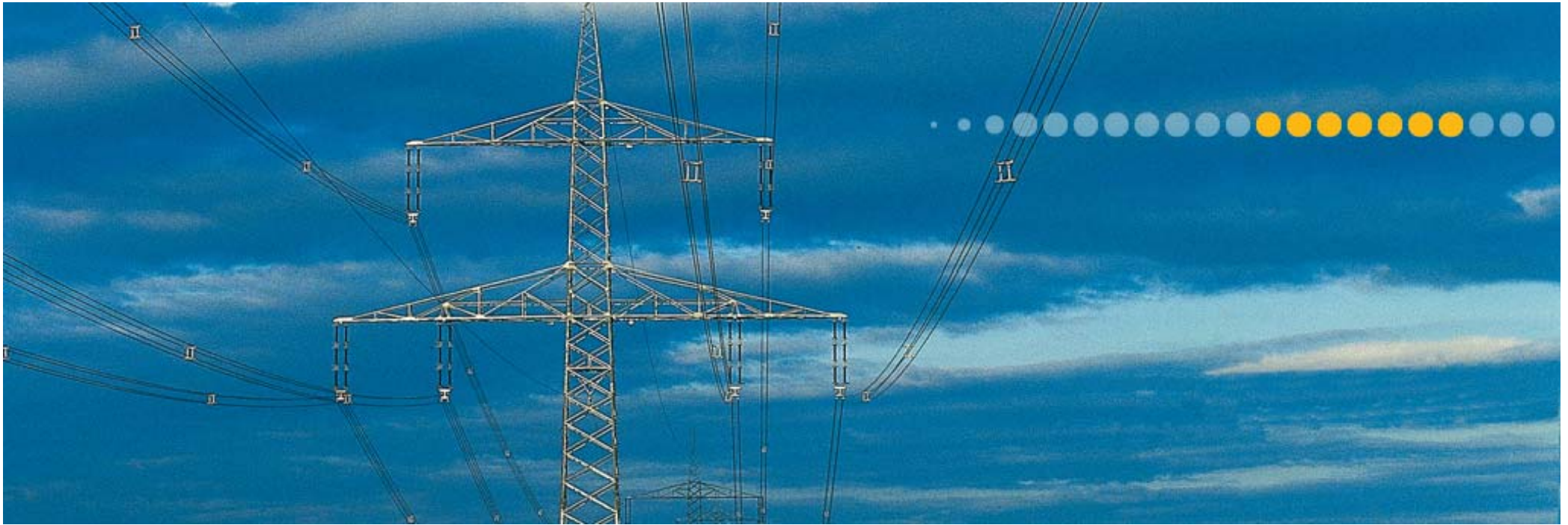
- Defining of a migration policy, December 2008
 - First data exchanges (tests) for coordinated planning needs – beginning of 2009 => planning tools should be ready
 - First data exchanges (tests) of operational data – 2009



- Contribution in the frame of CIM for Dynamics project



- Cooperation with IEC: UCTE-IEC liaison



UCTE requirements and needs

Erik Wolfs, Elia



CIM User Group meeting, 10-13th June 2008, Vasteras, Sweden



- **High Level Requirements New UCTE Format**



- Preferable based on existing standard

- Support data needed for

- Static calculations
- Short Circuit calculations
- Dynamic calculation

- Expandable and Flexible

- **High Level requirements continued**

- User Readable
- Possibility to work with change cases
- No performance issues due to file sizes
- Conversion between old and new format possible
- Validation on model level possible
- Networks TSO's mergeable to one global Network

Definition of the needed objects and attributes

B element-specific record structure

MIN (NODES)

columns	type	length	contents
1-5	character	5	Node (code)
6	character	1	Node (geographical name)
10-21	character	12	Node (geographical name)
22	character	1	Status: 0 = real, 1 = equivalent
23	integer	1	Status: 0 = real, 1 = equivalent
24	integer	1	Node type code (0 = P and Q constant (PQ node), 1 = Q and G constant, 2 = P and U constant (PU node), 3 = U and G constant (global slack node, only one in the whole network))
25	integer	1	Node type code (0 = P and Q constant (PQ node), 1 = Q and G constant, 2 = P and U constant (PU node), 3 = U and G constant (global slack node, only one in the whole network))
26	character	1	
27-32	real	6	Voltage (reference value, 0 not allowed) (kV)
33	character	1	
34-40	real	7	Active load (MW)
41	character	1	
42-48	real	7	Reactive load (MVar)
49	character	1	
50-56	real	7	Active power generation (MW)
57	character	1	
58-64	real	7	Reactive power generation (MVar)
65	character	1	
66-72	real	7	Minimum permissible generation (MW) *
73	character	1	
74-80	real	7	Maximum permissible generation (MW) *
81	character	1	
82-88	real	7	Minimum permissible generation (MVar) *
89	character	1	
90-96	real	7	Maximum permissible generation (MVar) *
97	character	1	
98-102	real	5	Static of primary control (%) *
103	character	1	
104-110	real	7	Nominal power for primary control (MW) *
111	character	1	
112-118	real	7	Three phase short circuit power (MVA) **
119	character	1	
120-126	real	7	X/R ratio (j) **
127	character	1	
128	character	1	Power plant type * (H: hydro, N: nuclear, L: lignite, C: hard coal, G: gas, O: oil, W: wind, F: fuel cell)
129	character	1	

* optional ** only on demand

UCTE

Plan for the co-ordination of transmission of electricity

- Breaker status for every element? (connection type / connection status)

NODES

Parameter name	Type	Maximal length	Description	Units	Remark: Mandatory / Optional
Substation name (S)	string	12	Substation name. Substation name needs to be unique.	-	1
Node number (N)	string	2		-	1
Country (1)	string	2	ISO country code	-	1
Zone (Z)	string	2	zone number. zone = a two letter code if the country has more than one TSO	-	1
Status	integer	1	0 = real, 1 = T-Test node, 2 = other kind of equivalent node	-	1
Type	integer	1	0 = P and Q constant (PQ node), 1 = Q and G = 0, 2 = P and U constant (PU node), 3 = U and G = 0 (global slack node, only one in the whole network), 4 = U constant (country string node, only one per each country + node of type 4 should not be defined for border area as well as for country where global slack node (type 3) is defined)	-	1
Vnom	real	-	nominal (base) voltage of the node	kV	1
V	real	-	node voltage magnitude	kV	0
θ	real	-	node voltage phase angle	deg	0
Vmax	real	-	maximum voltage of the node	kV	1
Vmin	real	-	minimum voltage of the node	kV	1
Time frame	char	1	0 = existing element (commissioned element at the time of providing of data), 1 = element to be implemented in short term time frame (commissioning is expected in a short time, from 0 to 5 years from time horizon of the model), 2 = element to be implemented in mid term time frame, 3 = element to be implemented in long term time frame	-	0

- **Following Objects were defined as needed**

- Nodes
- Generators
- Loads
- Lines + mutual impedances
- Transformers + regulation
- Asymmetrical branches
- Capacitors

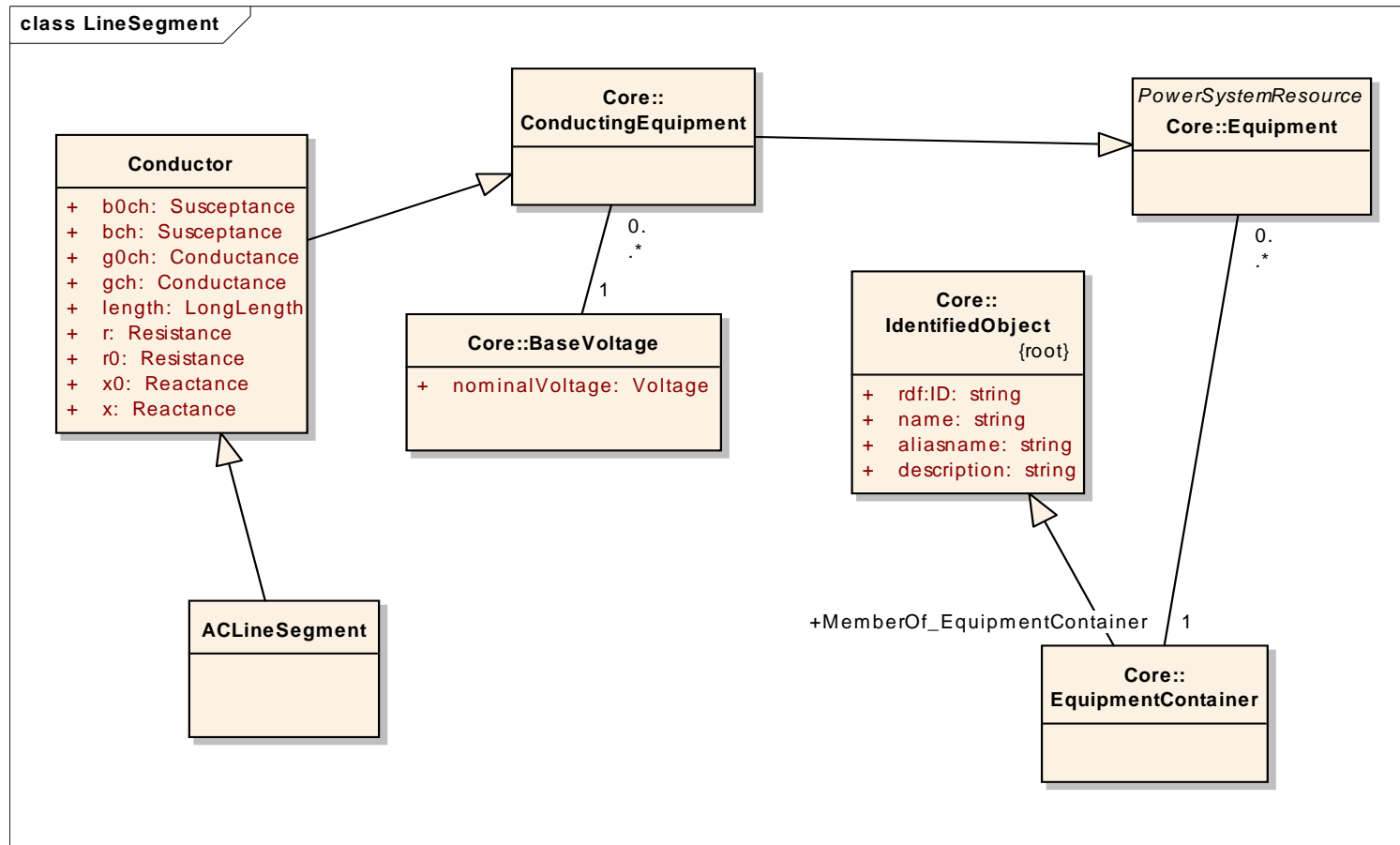
- **Remarks**

- Transformer regulation uses the (A)symmetrical model
- Initially no breaker data in the messages
- Option to implement Outages by using change cases

- **Mapping was done using existing CIM model including Planning extensions**
 - 90 % of needs were covered by existing CIM model with the addition of the CIM for planning profile
 - Still some open questions about the transformer regulation model
 - Most other missing attributes can be covered by using the measurement object

Mapping UCTE - CIM for Nodes

UCTE			CIM			
Attribute	Data Type	Unit	Object	Attribute	Data Type	Unit
Substation Name	string		VoltageLevel	Name	string	
Node Number	string		ConnectivityNode	Name	string	
Country	string		GeographicalRegion	Name	string	
Zone	string		SubGeographicalRegion	Name	string	
Status	integer		if real node connect busbar to connectivity node			



Specific UCTE CIM Wishes to be discussed

- A PlanningConnectivityNode object
 - Inherits from ConnectivityNode
 - With specific attributes needed for planning
- UCTE Transformer Regulator model

Thank you for your attention

Questions ?