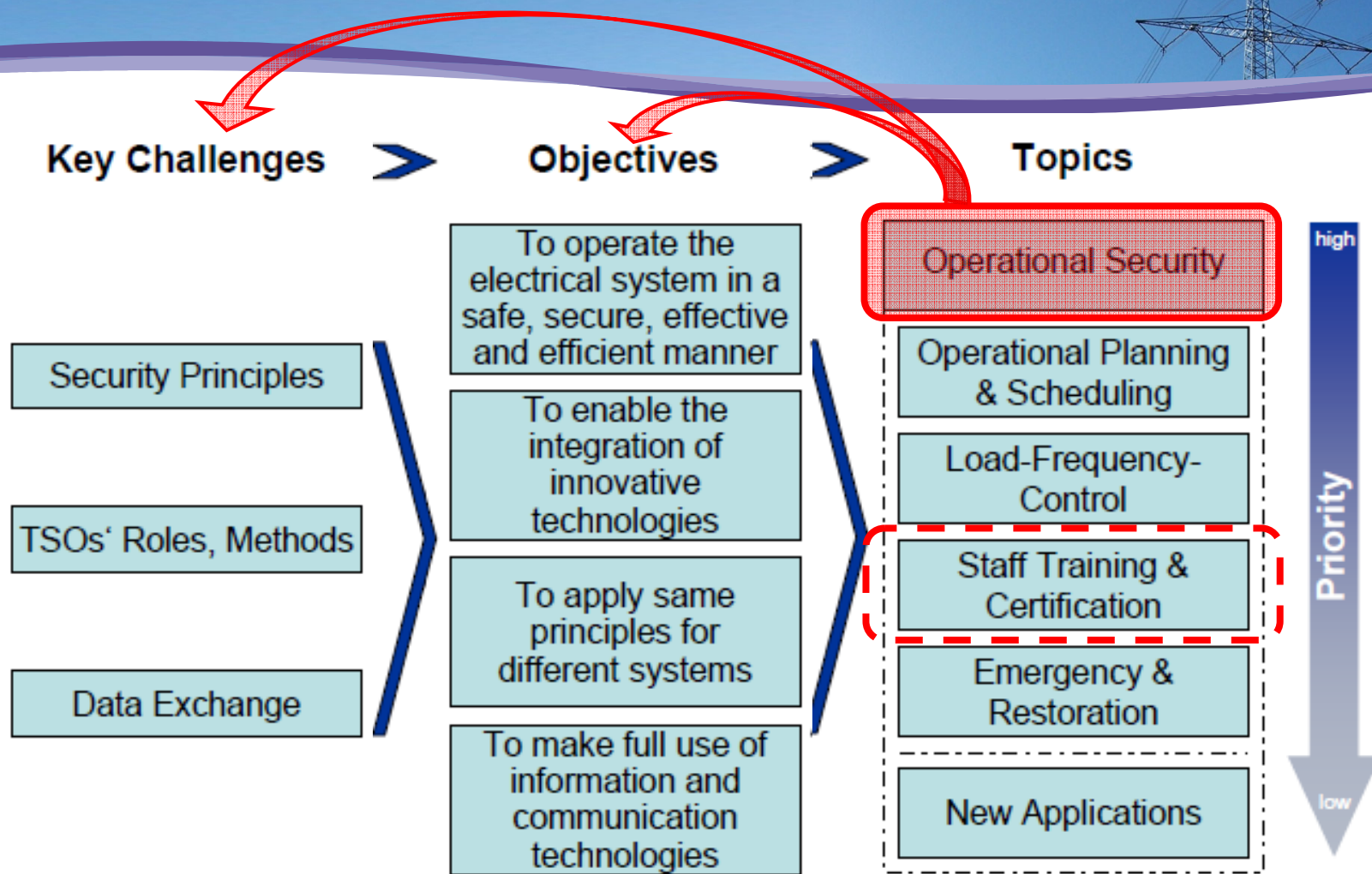


A satellite image of Europe at night, showing city lights and coastlines against a dark blue background with stars.

Status of the Draft and 1st Workshop of 20th April 2012 Operational Security Network Code

Operational Security NC Framework



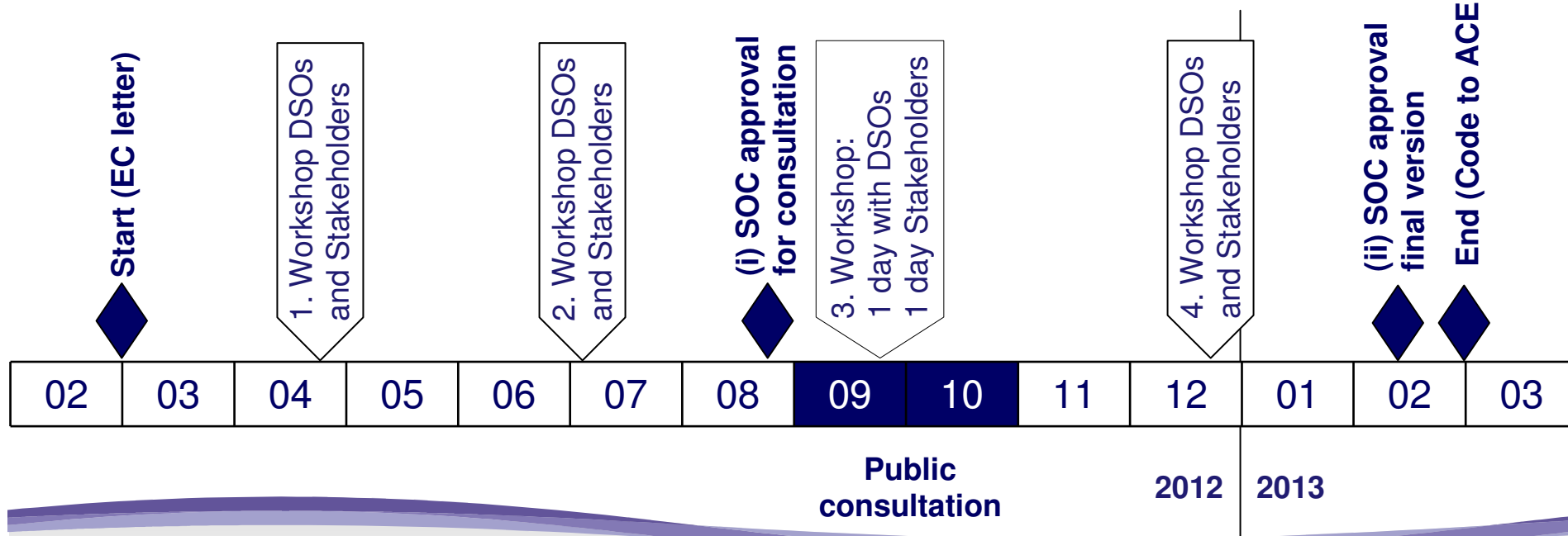
Source: ACER Framework Guidelines on Electricity System Operation (Fig.2, p.8)

Speaker Notes

- **ACER FWGL initially published summer 2011, finalised Dec 2011, slides shows main objectives and the Network Codes to be produced.**
- **Draft 1 of Op Security NC was released in April to industry by ENTSO-e. Seen as a 'umbrella' code for the other Operational NCs. High level principles of System Operation, bit like our GB SQSS.**
- **OS NC includes chapter on Training and Certification, so may not be a separate Code on this topic as the FWGL request.**

Operational Security Code Roadmap

- Start 03/2012, end 03/2013
- 2 approvals by SOC: (i) consultation; (ii) final version
- 4 WS (3x1-day and 1x2-days, during consultation)



Speaker Notes

- **Drafting team for Op Security NC was formed summer 2011.**
- **Draft 1 of OS NC is early draft, we do expect changes.**
- **First workshop held 20/4. AM session with DSO expert group, PM session with all industry. ACER video conference into both sessions, EU rep attended.**
- **Next workshop is early July. With next external draft of OS NC**
- **Consultation planned Sept-Oct, with whole day workshops**
- **ACER suggested might need to see the other priority Op Codes done in parallel (NC Op Planning and NC Freq control)**

OS NC guiding principles & Drafting Team

(„how we do it“ and „who is doing it“)

- Setting out clear and objective **minimum requirements** for the real-time operational security
- Defining goals to be reached to keep the transmission system in **continuous operation**
- Contributing to a **harmonised framework for cross-border exchange** of electricity
- Supporting **non-discrimination**, effective **competition** and efficient functioning of the **Internal Electricity Market**

**SO Codes
Drafting Teams
Members**



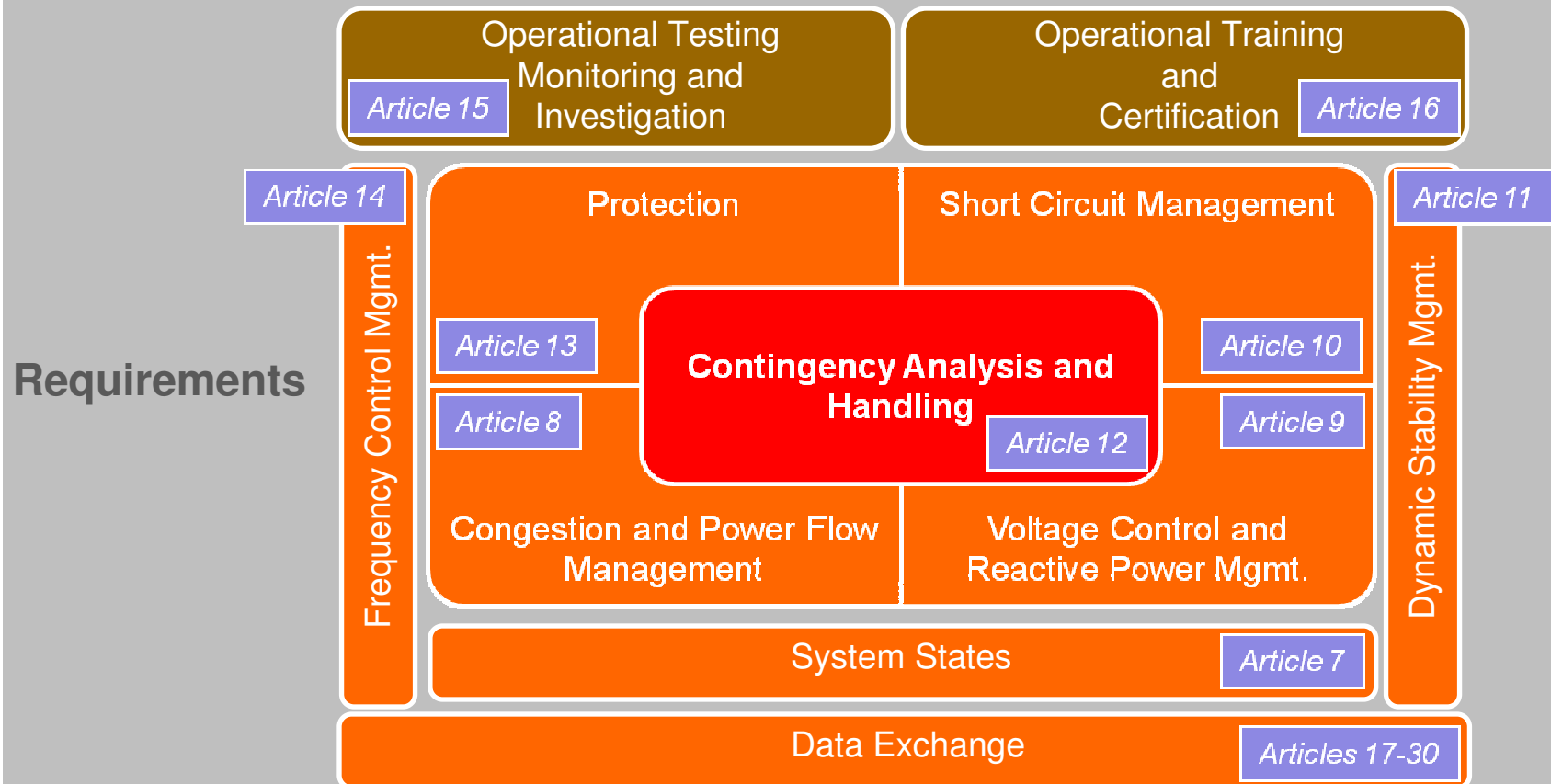
Speaker Notes

- **Drafting team for Op Security NC was formed summer 2011, reps from c.14 TSO, at least one from each sync areas.**
- **Main objectives of the OS NC are stated**

Operational Security NC Structure

Articles 1-6

General Provisions: Subject matter, Definitions, Scope, Regulatory aspects, Confidentiality, Relation with National Law



Articles 31-41

Compliance

Derogations

Liability

Final provisions

Speaker Notes

- Slide shows structure of the Op Security NC
- N-1 principle is at heart of OS NC. The N-1 terminology differs from common use of N-1 and N-2 in GB. In OS NC the term N-1 includes all contingencies, which can include a double circuit on same towers. OS NC says National Regulators approve which exceptional contingencies (eg double circuits, busbars, switch faults,..) are secured against by their TSO.
- Lots of the obligations in OS NC are on TSOs and between TSOs to co-operate and exchange data etc. But some obligations are on DSO and users
- Hot topics are probably
 - Data obligations
 - What is the level of a 'Significant User'
 - Costs allocations/sharing principles between TSOs (to minimise constraints etc)
 - Calculation of reliability margin for cross border capacity

Chapter 2: Data Exchange

Essential provisions for Operational Security, Operational Planning, Scheduling, Capacity Calculation:

- Structural, forecast and real-time **data between TSOs** (Articles 18, 19)
- Structural and real-time **data between TSOs and DSOs** (Articles 20, 21)
- Structural, scheduled and real-time data of the **directly connected system users** (Articles 22-24, 29)
- Data between TSOs, DSOs and **system users connected to the Distribution System** (Articles 25-28, 30)

Speaker Notes

- **These data provision obligations chapters are recent additions into the draft Code, so very early drafts.**
- **Describes data flows between TSO, from DSO to TSO, and users to DSO / TSOs.**
- **They are at quite a high level of description of the detail of the data to be provided, not like the detail in say the GB Grid Code under Data Registration Code and the GB GC Ocs which have far more detail.**

Attachments

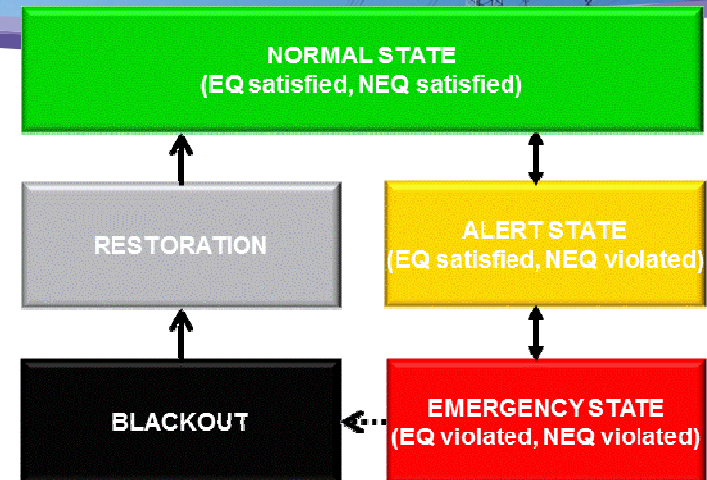


Speaker Notes

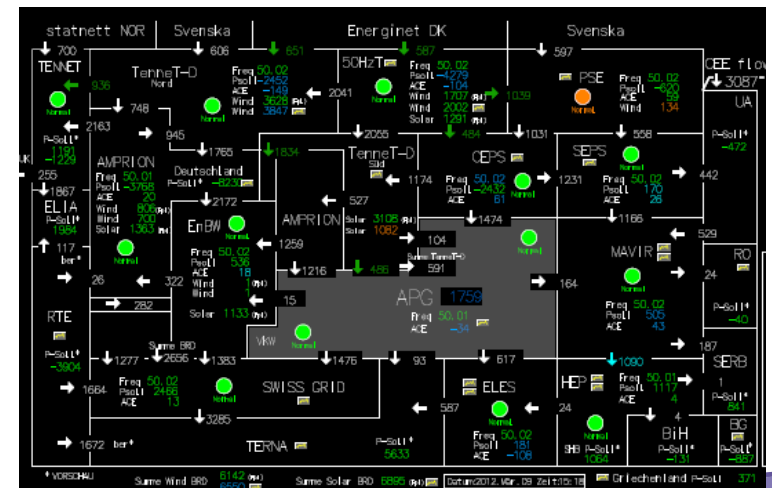
- **These attachment/appendix slides describe in a few bullet points the content of each main chapter in draft OS NC.**
- **Its possible the chapter (Article 14) on frequency control in the OS NC may get removed as there is a separate NC on frequency control yet to be drafted and released**

Article 7: System States

- System States' monitoring, determination, description
- Operational security limits
- System operation tools & facilities
- Security analysis
- Information → awareness
- System users' support

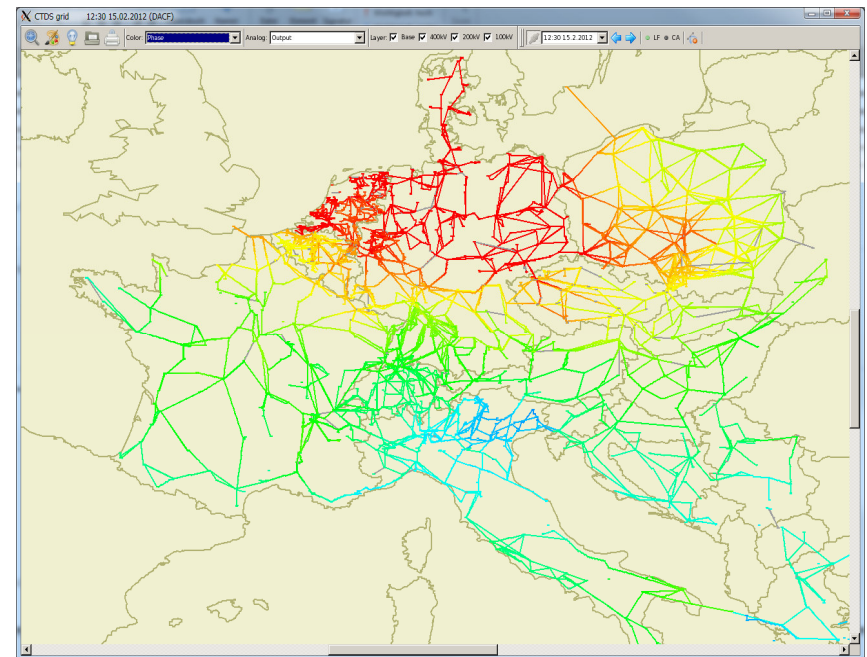


EQ=Equality constraints (e.g. generation/demand balance)
 NEQ = inequality constraints (e.g. voltage thresholds, (n-1)-violations)



Article 8: Congestion and Power Flows Management

- Coordination, forecast and real-time analysis
- Common methodology for reliability margins
- Preventive and remedial actions incl. re-dispatch
- Active power reserves, possible adjustments & info
- Transmission system model
- Observability areas



Article 9: Voltage Control and Reactive Power Mgmt.

- Voltage stability and reactive power „household“
- Reactive power reserves in the Transmission system and from system users
- Reactive power limits at the connection to system users
- Automatic and manual measures
- Preventive and remedial V/Q-control actions

Article 10: Short Circuit Current Management

- Current limits: circuit breakers capability vs. protection selectivity
- Short-circuit calculation including generators / information
- Considering other Transmission and Distribution Systems
- Prevent / relieve violation of short-circuit limits
- Information and communication to other TSOs and system users

Article 11: Dynamic Stability Management

- Dynamic stability assessment offline studies on:
 - Voltage
 - Rotor angle
 - Frequency
- Dynamic stability influences → coordination with affected TSOs
- Dynamic stability vs. steady state operational security limits:
 - a) Offline
 - b) In Operational Planning when needed
 - c) In Operational Planning periodically / daily

Article 13: Protection

- Verify & update protection settings
- Selectiveness, backup, coordination
- System and Special Protection Schemes
- Under-Frequency Load Shedding scheme development and implementation with DSOs (cf. Demand Connection Network Code)

Article 12: Contingency Analysis and Handling

- (N-1)-criterion and operational security limits
- Forecast and real-time parameters, topology
- Preventive and remedial actions + coordination and consideration in/outside of the own system
- Contingency list (int./ext.): ordinary, exceptional, out-of-range
- Common Grid Model
- Re-synchronisation

State Estimator

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Article 14: Frequency Control Management

(To be lined-up with the P/f Code)



- Sufficient active power reserve for demand / generation unbalances + procurement in and out of the own control area
- Frequency containment, restoration & replacement reserve
- P/f monitoring, balancing, coordination
- Preventive and remedial actions: control, reserves' activation, load shedding
- Technical framework (e.g. ramping) for system users

Article 15: Operational Testing, Monitoring and Investigation

- Monitoring, investigation, testing of system events
- Test plan, standards, compliance at the grid connection point
- Minimize impact on operational security and economic operation
- Always keep normal state!
- Monitoring of provisioning of the ancillary services
- Additional tests and post-incidents investigation

Article 16: Operational Training and Certification

- Normal & exceptional operation
- Continuous training programme, contents & plans
- Training coordinator: qualification, training, documentation, certification, on-the-job training
- Annual review / update
- Coordinate with DSOs and system users to reflect latest development
- Certification, exchange with other TSOs, training in interoperability