Network Codes Overview

1st SEM RA/TSO Stakeholder Forum

Mark Lane

17 January 2013

Overview of Current & Future Network Codes

System Operation Related Codes

- Operational Security Network (OS)
- Operational Planning & Scheduling (OPS)
- Load Frequency Control & Reserves (LFCR)
- Operational Procedures in an Emergency (EP)
- Staff Training (ST)

Connection Related Codes

- Requirements for Generators (RfG)
- Demand Connection Code (DCC)
- HVDC Connection Code (HVDC)
- Connection Procedures (CP)

Market Related Codes

- Capacity Allocation & Congestion Management (CACM)
- Forward Capacity Allocation (FCA)
- Balancing Network Code (BAL)

Order of Work on Network Codes

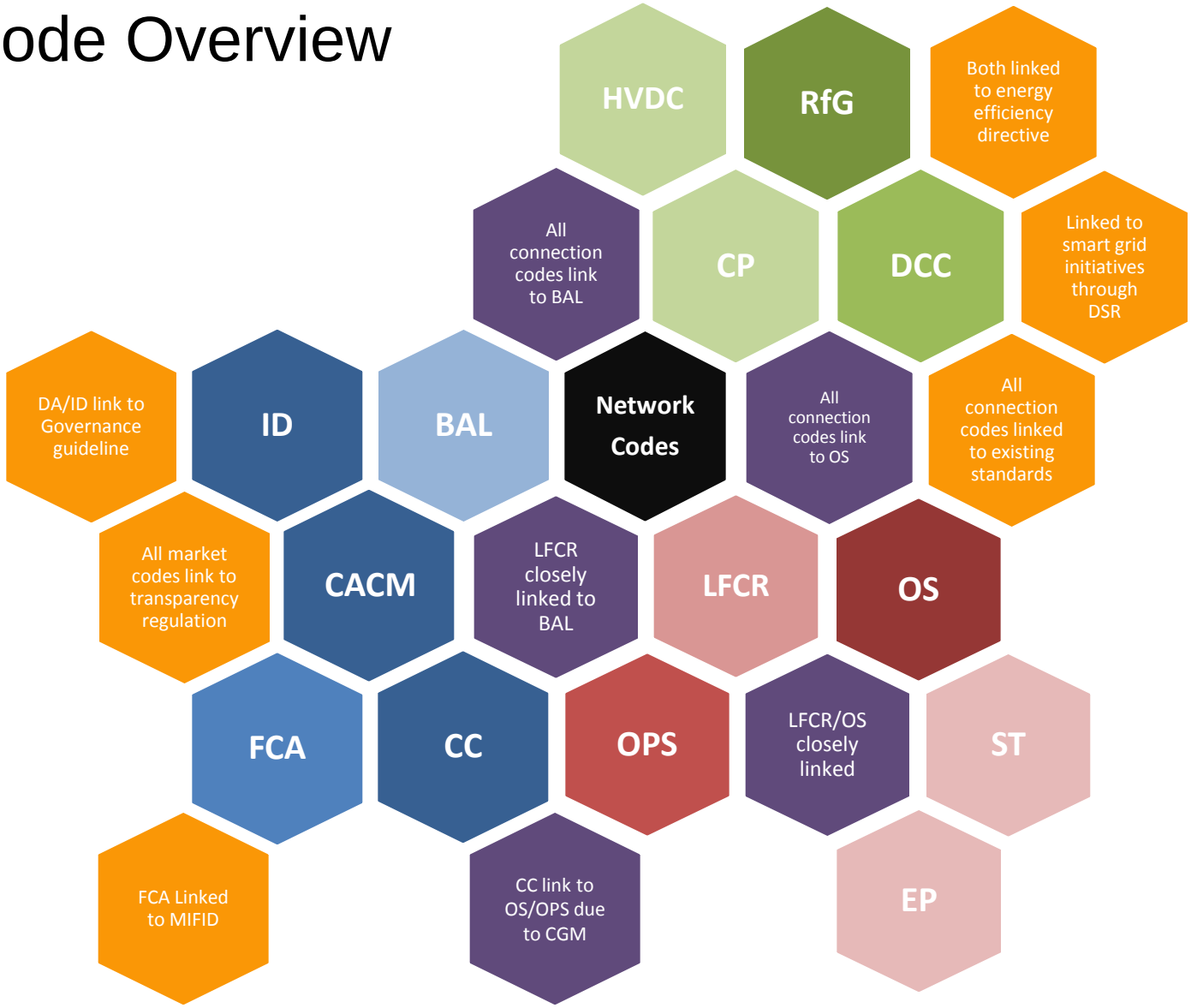
Decided By EC — Through a 'Priority List' agreed upon through consultation with ACER/ENTSO-E

Influenced by and informs — ENTSO-E's 3 year work plan

Therefore current Network Codes developed in this order

- RfG — Requirement for Generators
- CACM — Capacity Allocation and Congestion Management
- DCC — Demand Connection Code
- OS — Operational Security
- OPS — Operational Planning and Scheduling
- LFCR — Load Frequency Control and Reserves
- FCA — Forward Capacity Allocation
- BAL — Electricity Balancing
- HVDC — High Voltage Direct Current Connection requirements

Code Overview



Network Codes

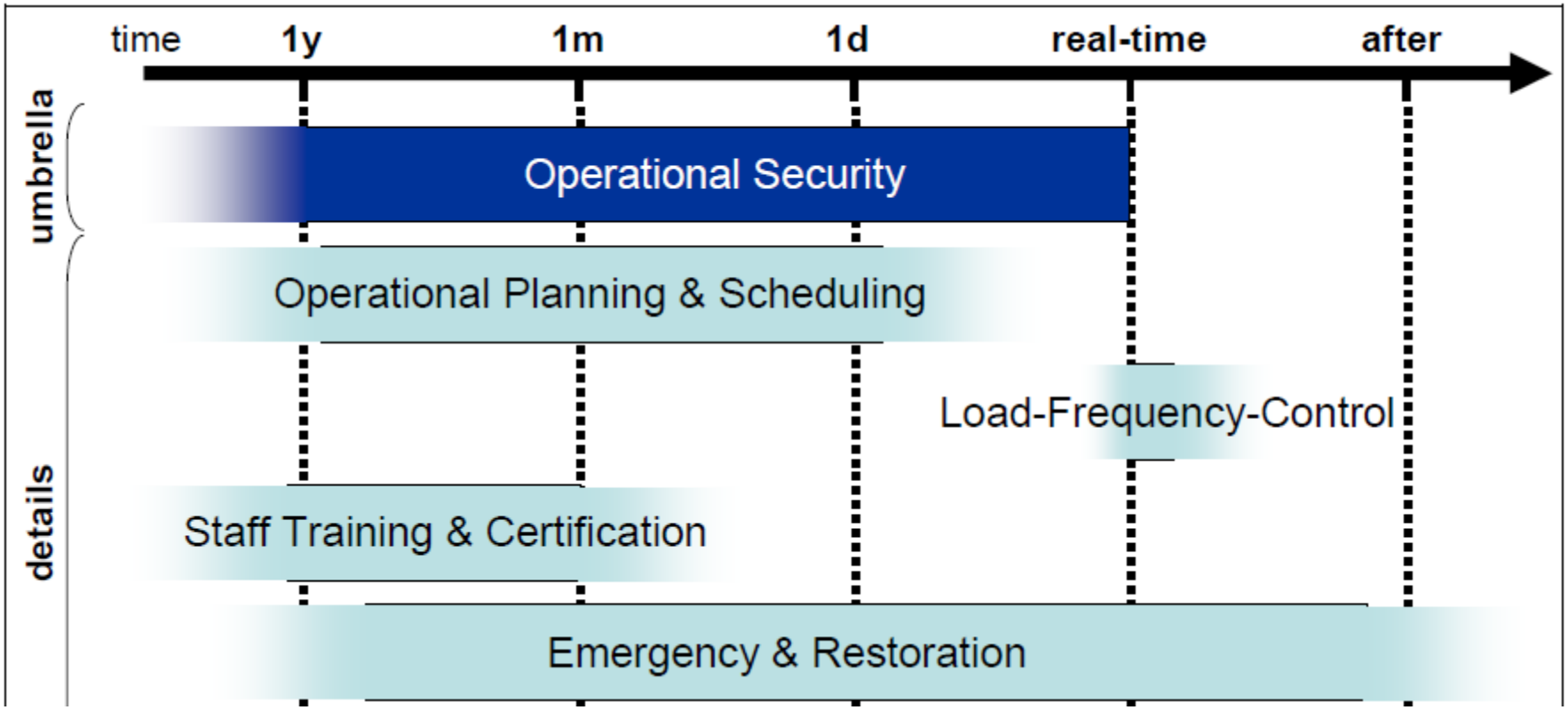
System Operation Related Codes Update

SEM RA/TSO Stakeholder Forum

Liam Ryan

17 January 2013

System Operation Related Network Codes



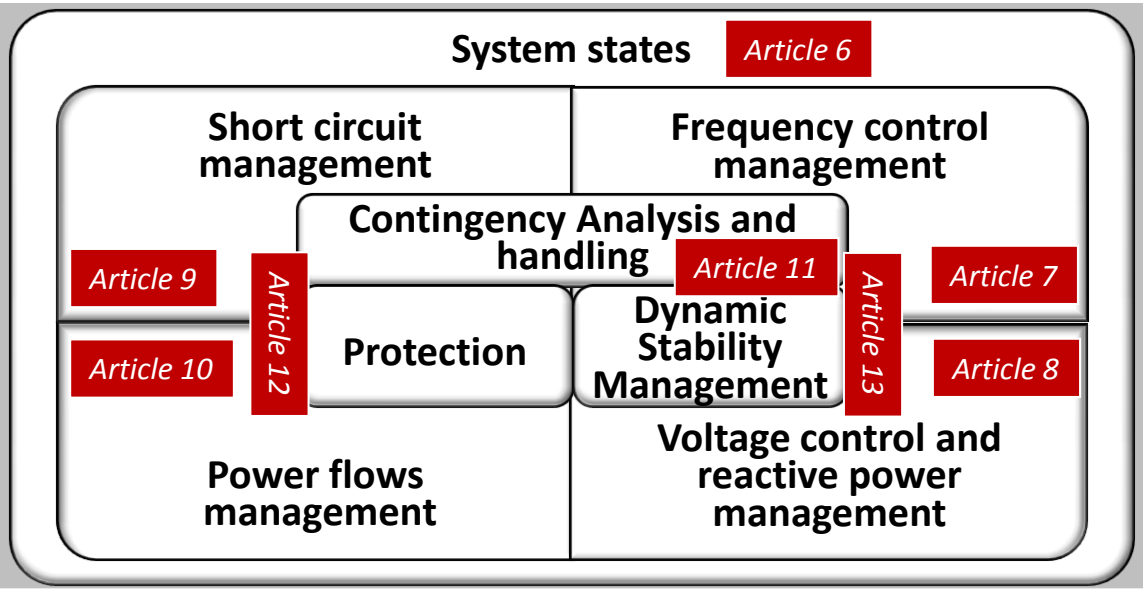
Purpose of the Operational Security

To set common rules for ensuring the operational security of the pan European power system.

Operational Security Network Code Contents

1. General provisions: Subject matter and scope, Definitions, Regulatory aspects, Recovery of costs, Confidentiality obligations — *Articles 1-5*

2. Requirements



3. Data exchange

Data exchange — *Articles 14-27*

4. Training

Operational training and certification — *Article 28*

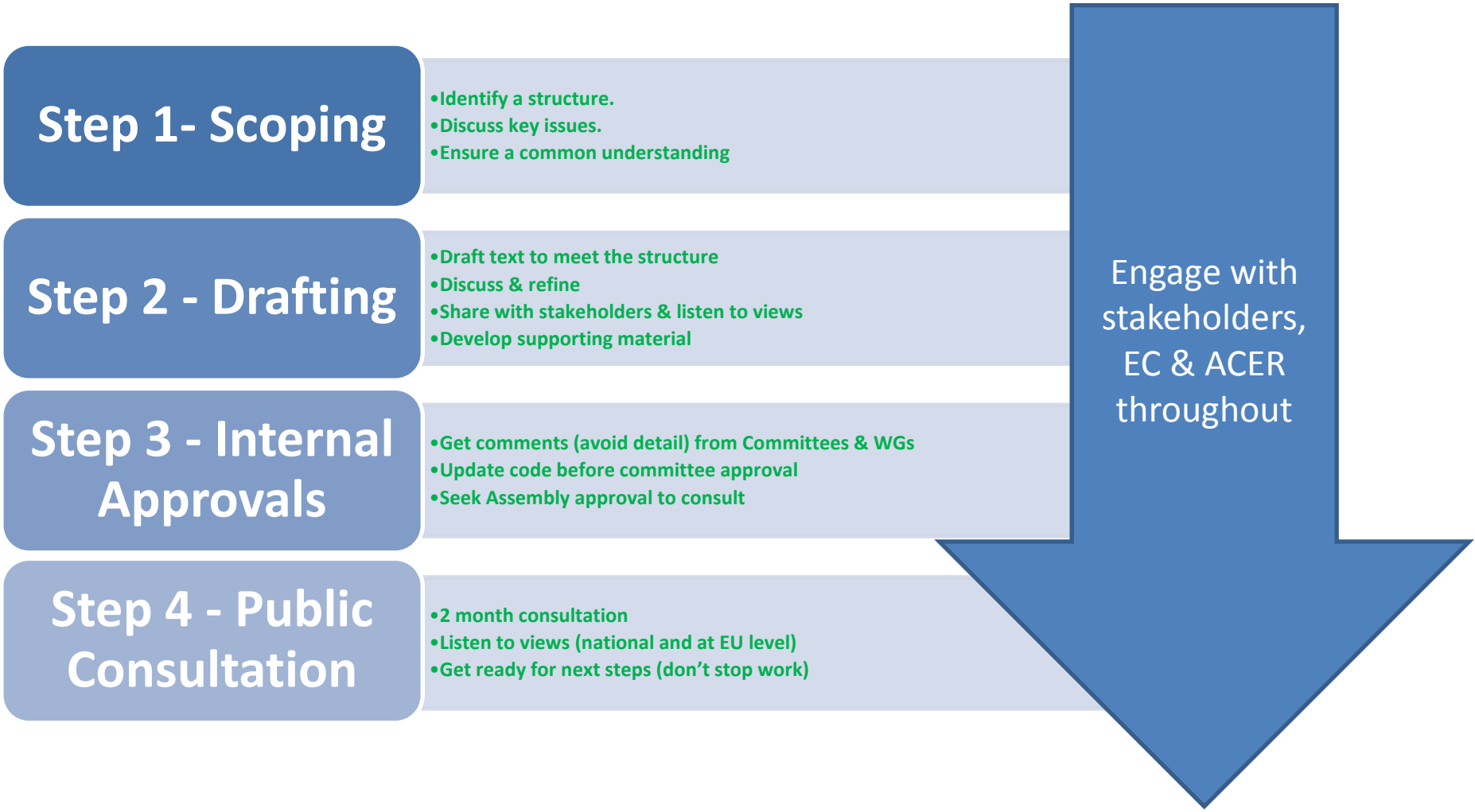
5. Compliance

Responsibilities, Testing, Analysis (incl. PI) — *Articles 29-31*

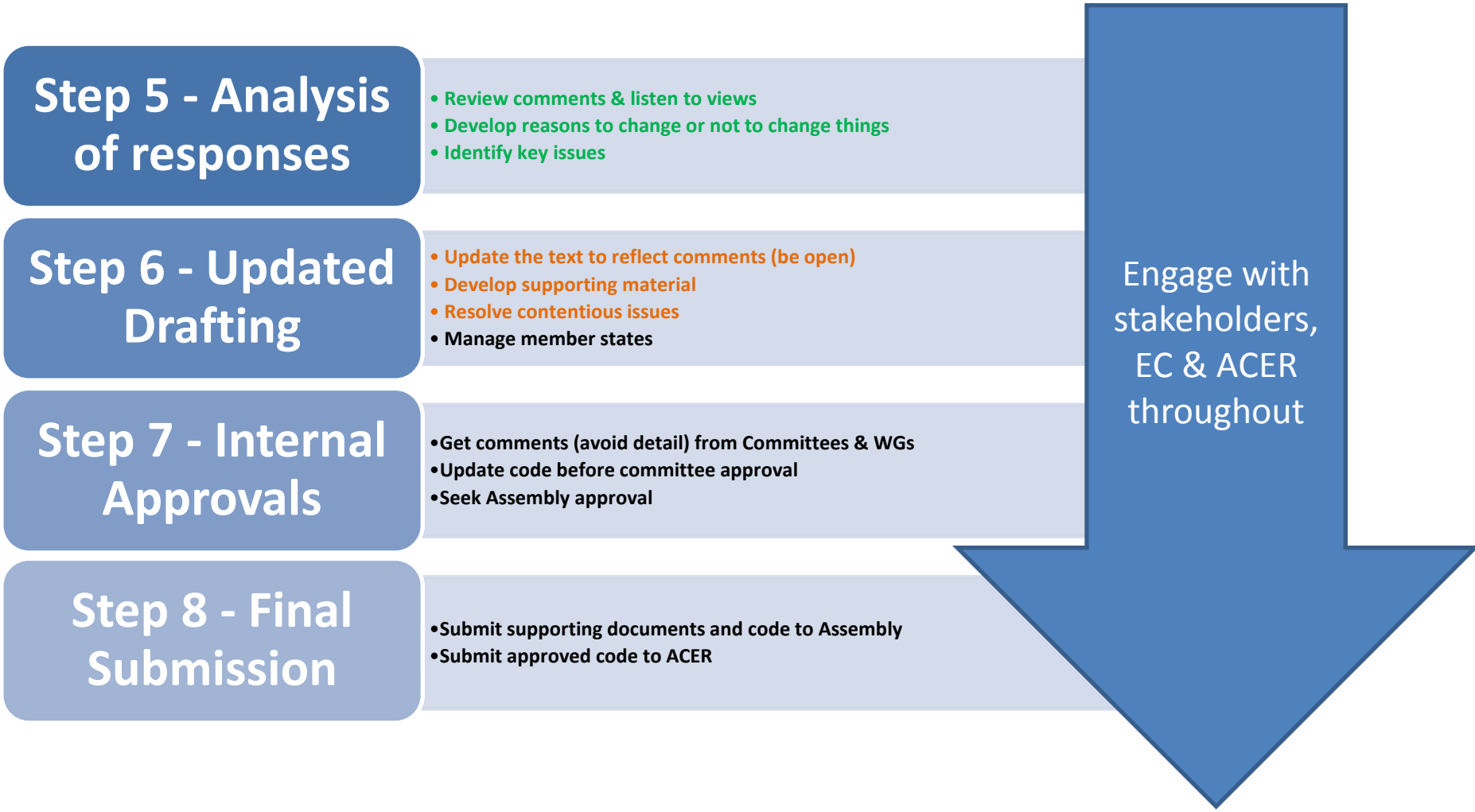
6. Final provisions — *Articles 32-33*

Annex I Incidents Classification Scale

Stages of Network Code Development (I)

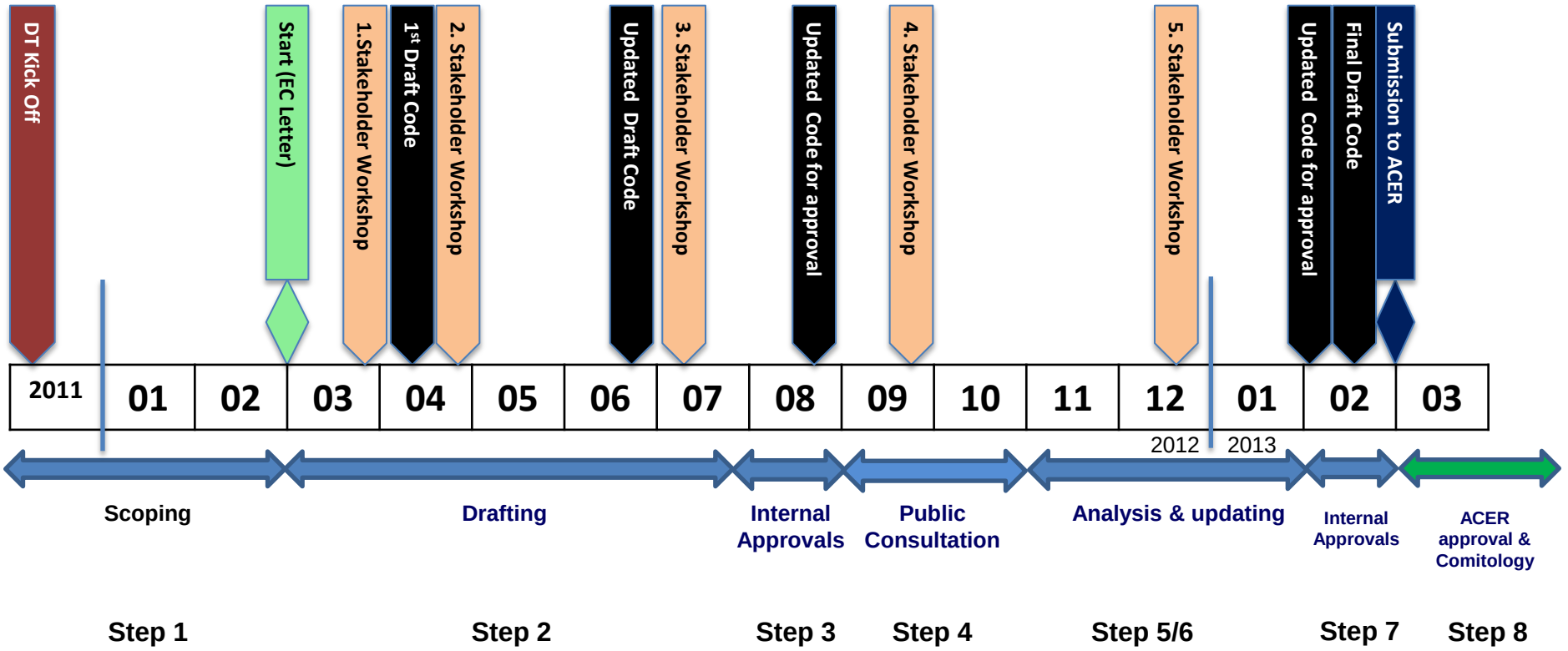


Stages of Network Code Development (II)

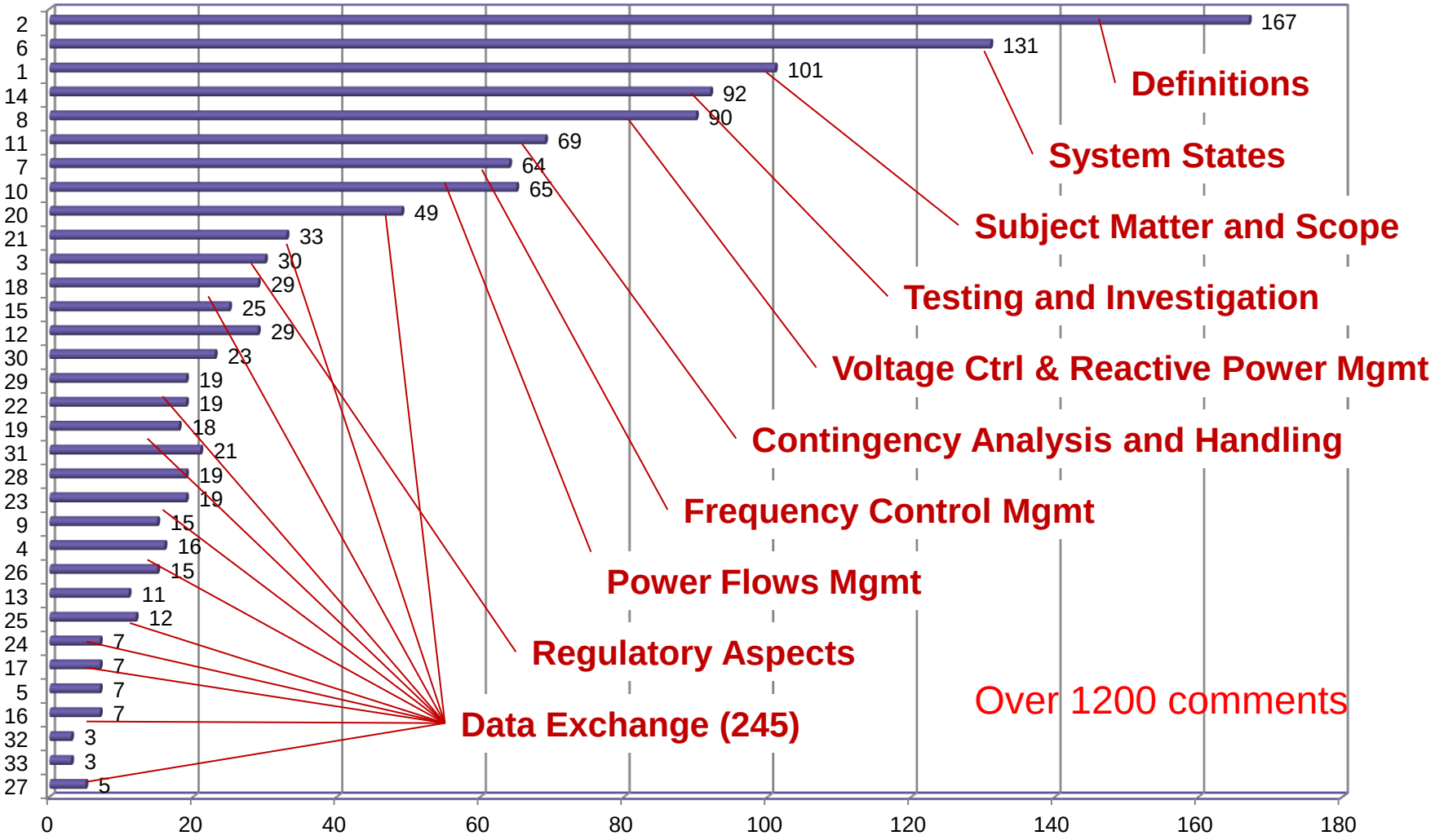


Network Code Development
Operational Security Code

2012 / 13



Public Consultation



Next steps

- Work continuing to incorporate the requests of stakeholders and ACER

- Develop final version and submit to ACER by the end of Feb 2013

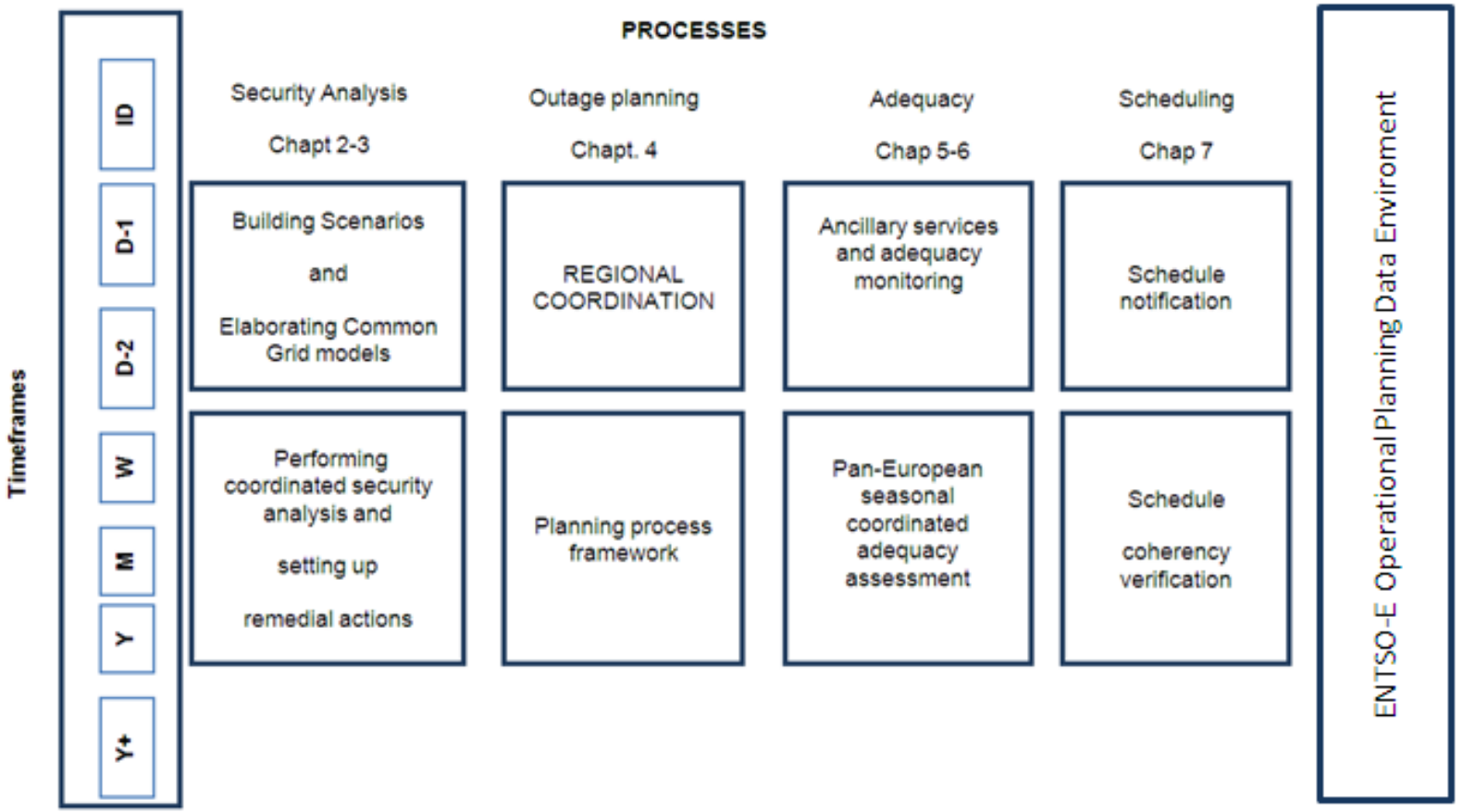
Operational Planning and Scheduling Network Code

(OP&S NC)

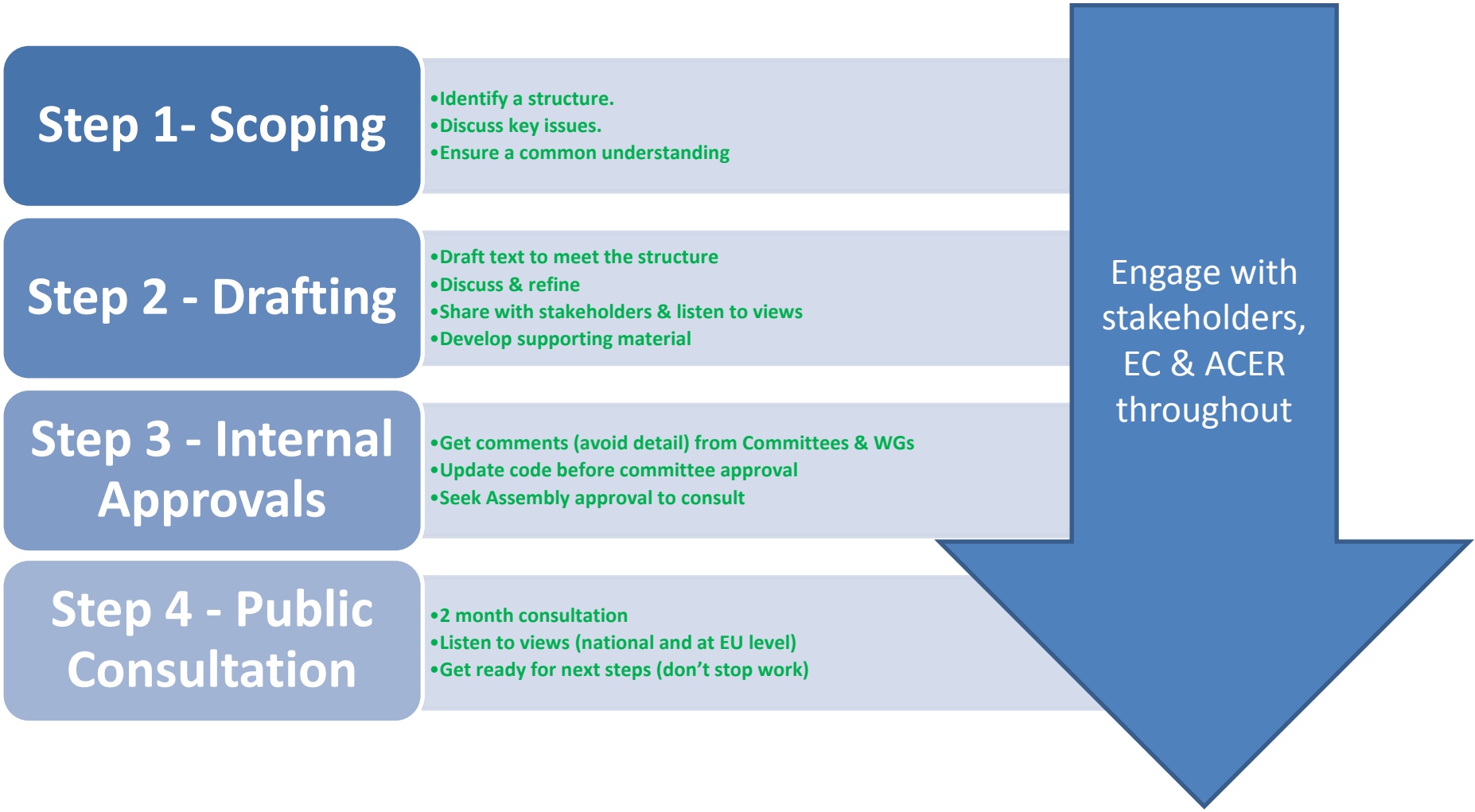
Purpose of the Operational Security

Sets requirements, ranging from the year ahead timeframe to real time , for assessing the adequacy and operational security of the interconnected power system and for planning outages required by TSO's and grid users when they have cross borders impacts on power flows.

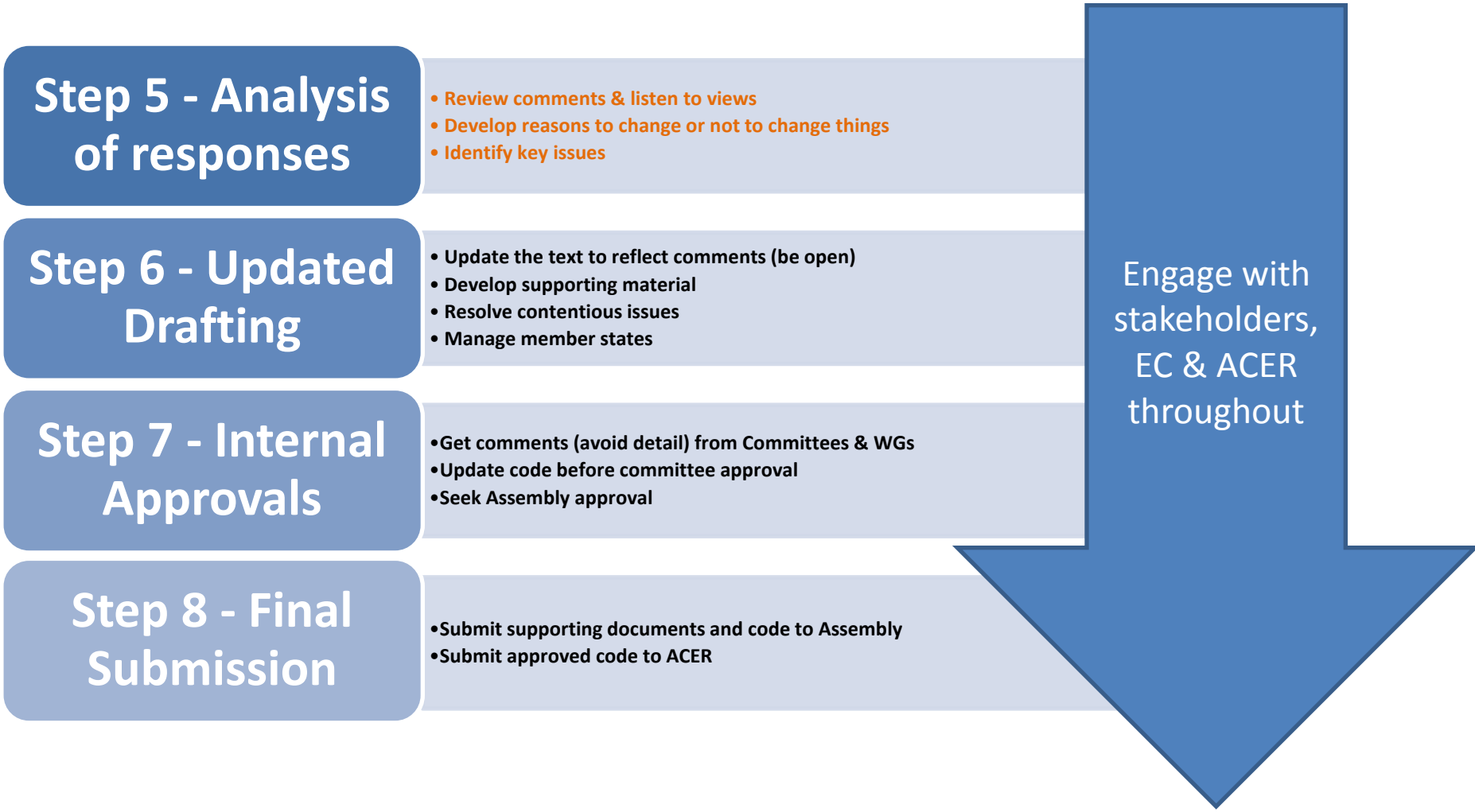
Contents of OP&S Network Code



Stages of Network Code Development (I)

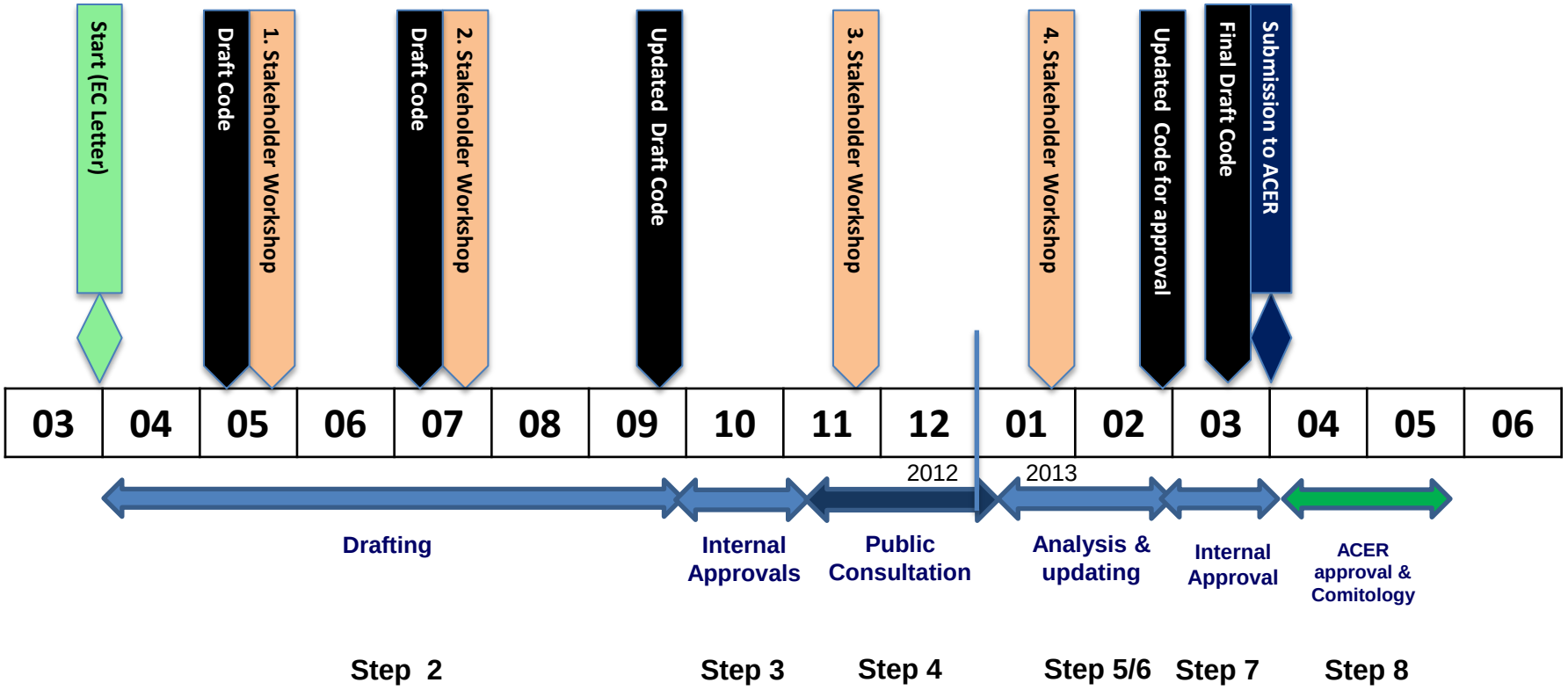


Stages of Network Code Development (II)



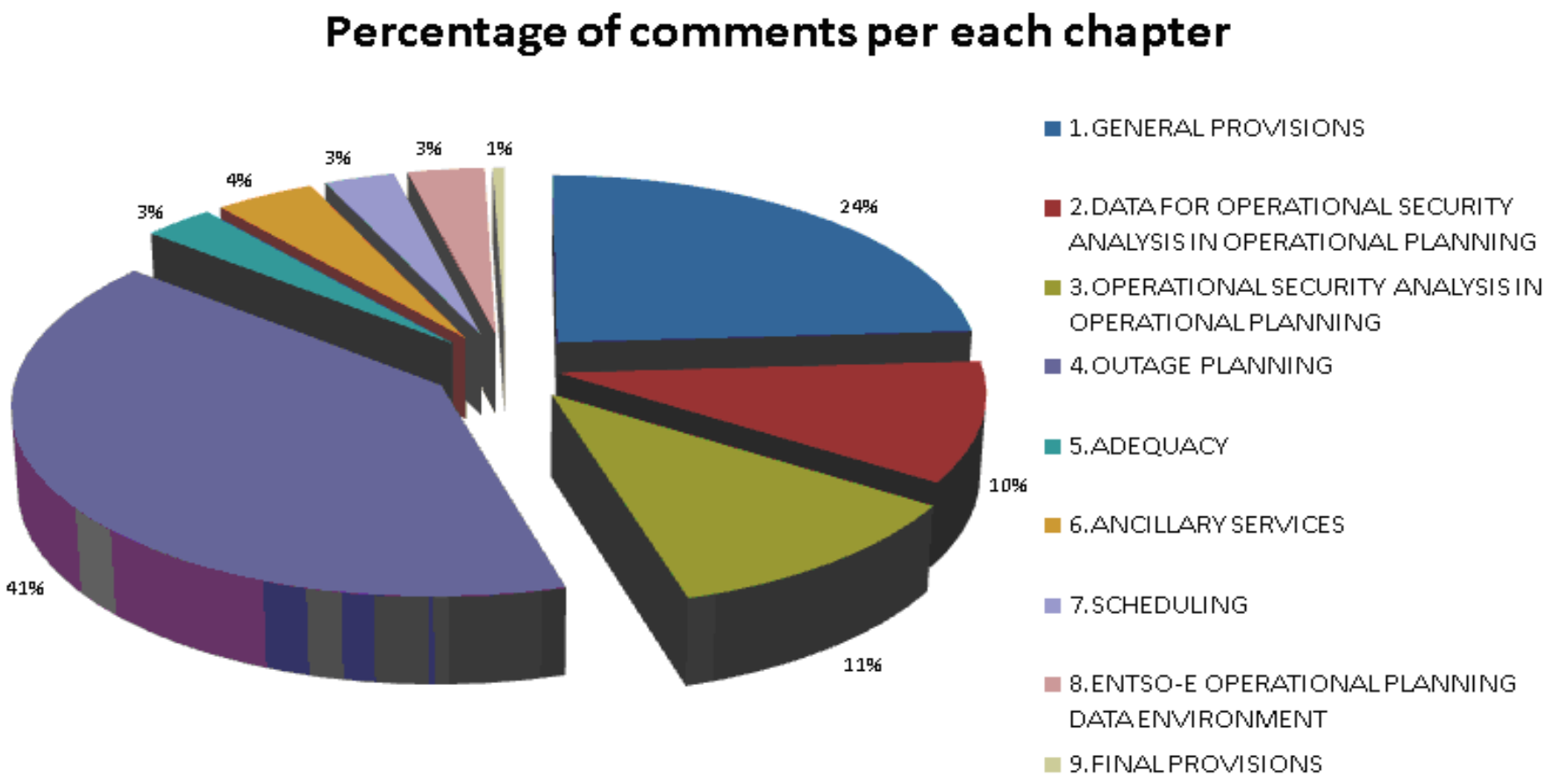
Network Code Development
Operational Planning and Scheduling Code

2012 / 13



Public Consultation

850 comments received



What's next?

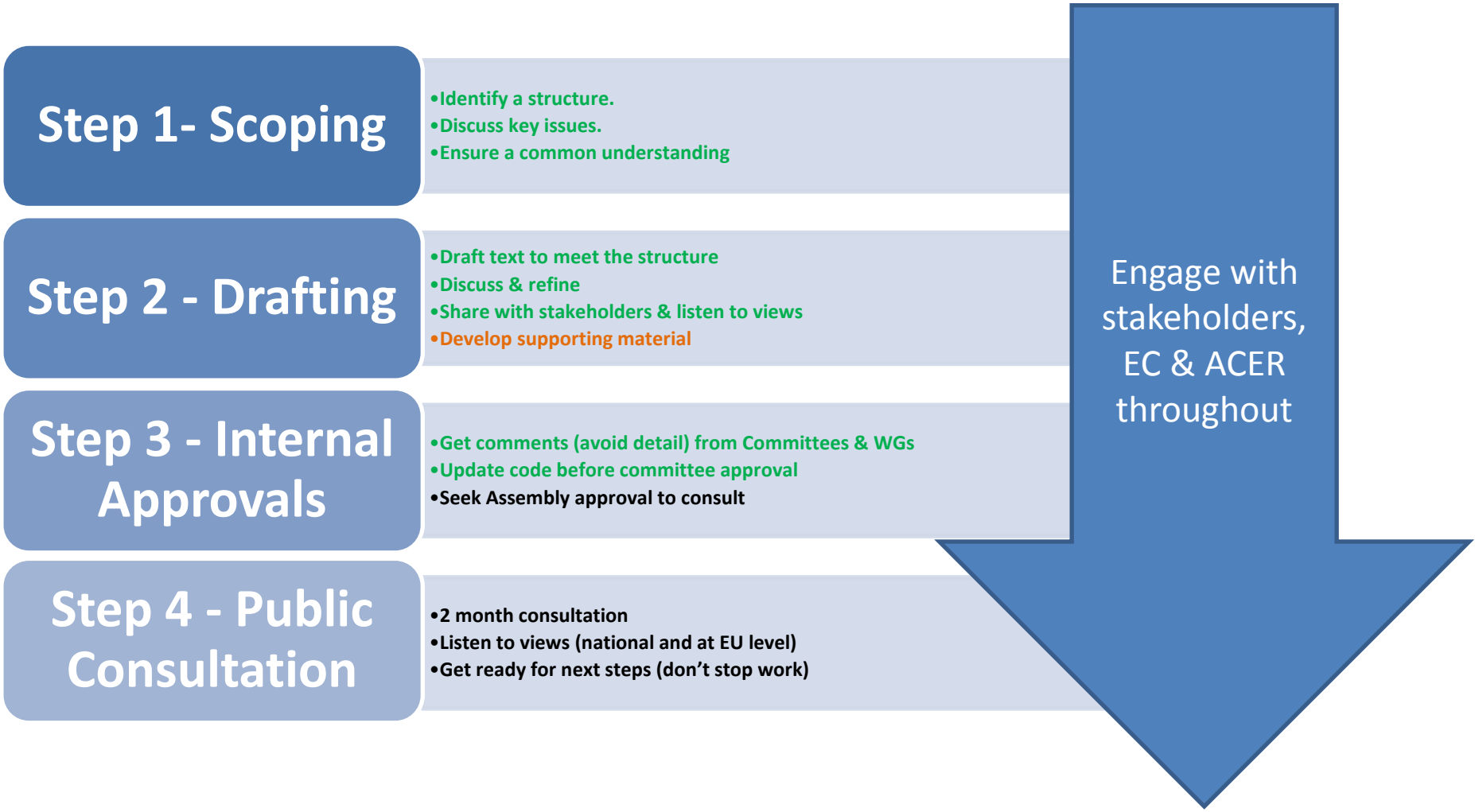
- Review comments & listen to views for consultation
- Identify key issues
- Work continuing to incorporate the requests of stakeholders and ACER
- Develop final version and submit ACER by the end of March 2013

Network Codes
Load Frequency Control & Reserves (LFC&R)

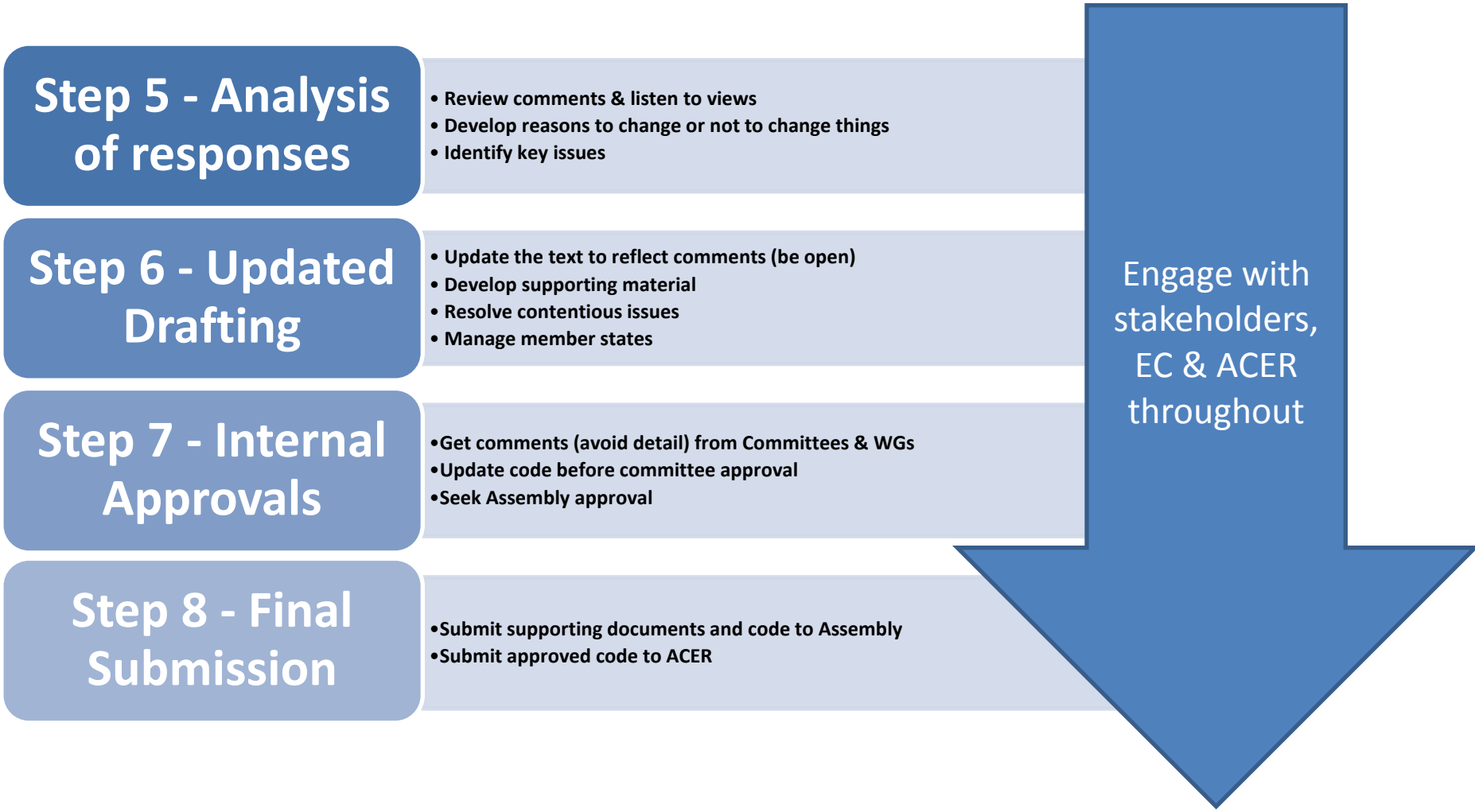
Purpose of the Load Frequency Control & Reserves NC

- To set out coordinated and clearly specified load frequency control processes and rules regarding the levels and location of reserves (back-up) which TSOs need to hold.

Stages of Network Code Development (I)



Stages of Network Code Development (II)

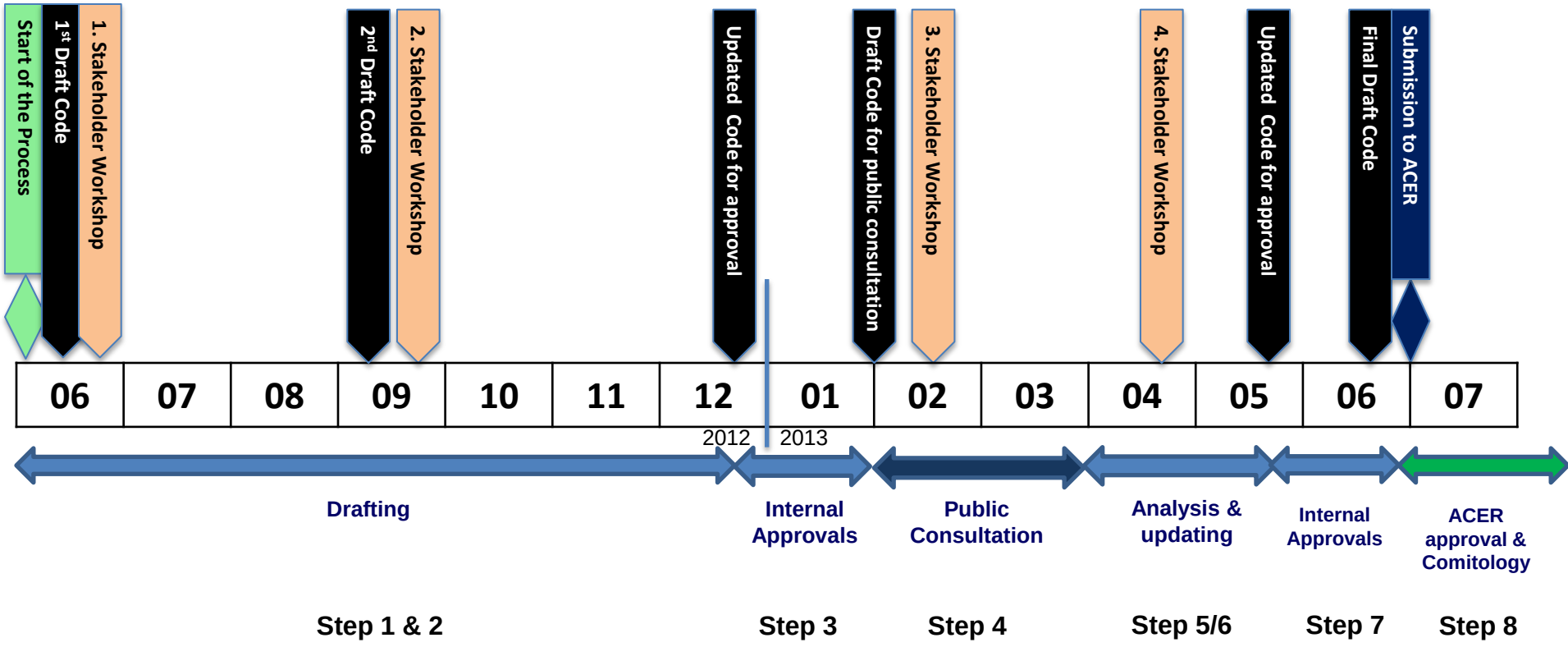


LFC&R Network Code Contents

- Frequency Quality
- Load – Frequency Control Structure
- Frequency Containment Reserves
- Frequency Restoration Reserves
- Replacement Reserves
- Cross Border Reserves
- Synchronous Time Control
- Cooperation with DSO

Network Code Development – LFC&R Code

2012 / 13



Key Areas for Participants

- Requirements on Reserve Providers
- Exchange of Reserves between Synchronous Areas
- Frequency Quality Evaluation
- Your input to the Public consultation is essential

What's next?

- Issue paper for publication consultation for 2 months, beginning of Feb 2013

- Stakeholder workshop early Feb

Thank you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RfG Network Code

1st SEM RA/TSO Stakeholder Forum

Mark Norton

17 January 2013

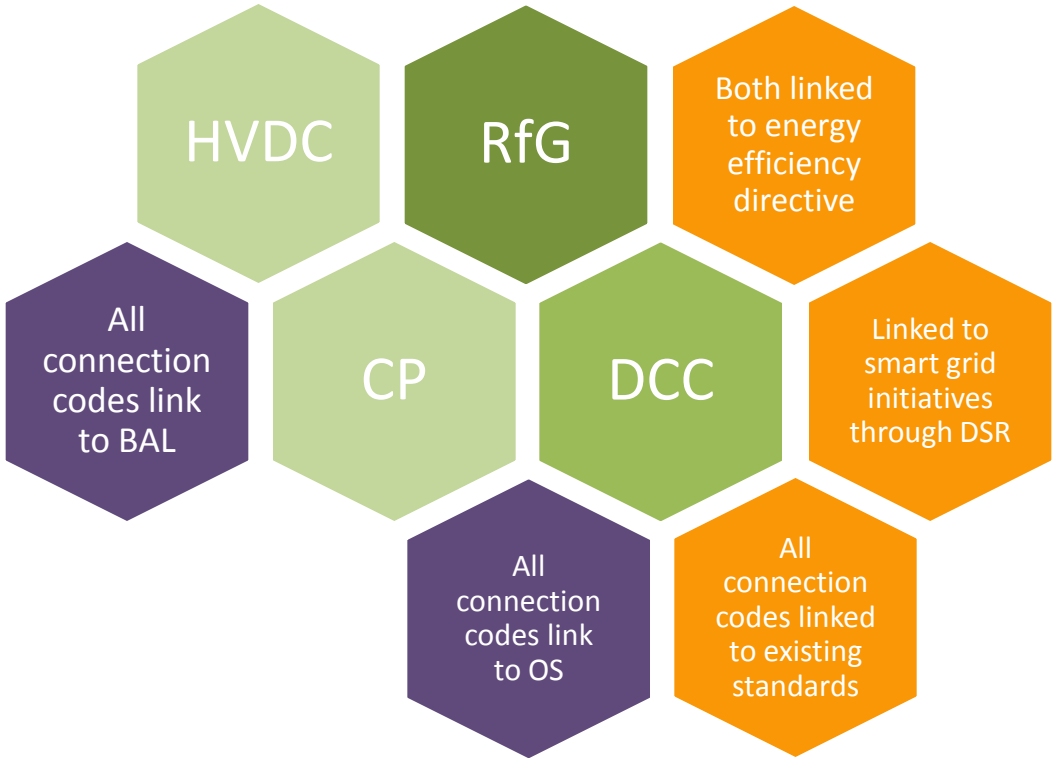
Grid Connection Codes

- RfG was developed first
- Followed by DCC
- Soon HVDC will begin & CP will follow

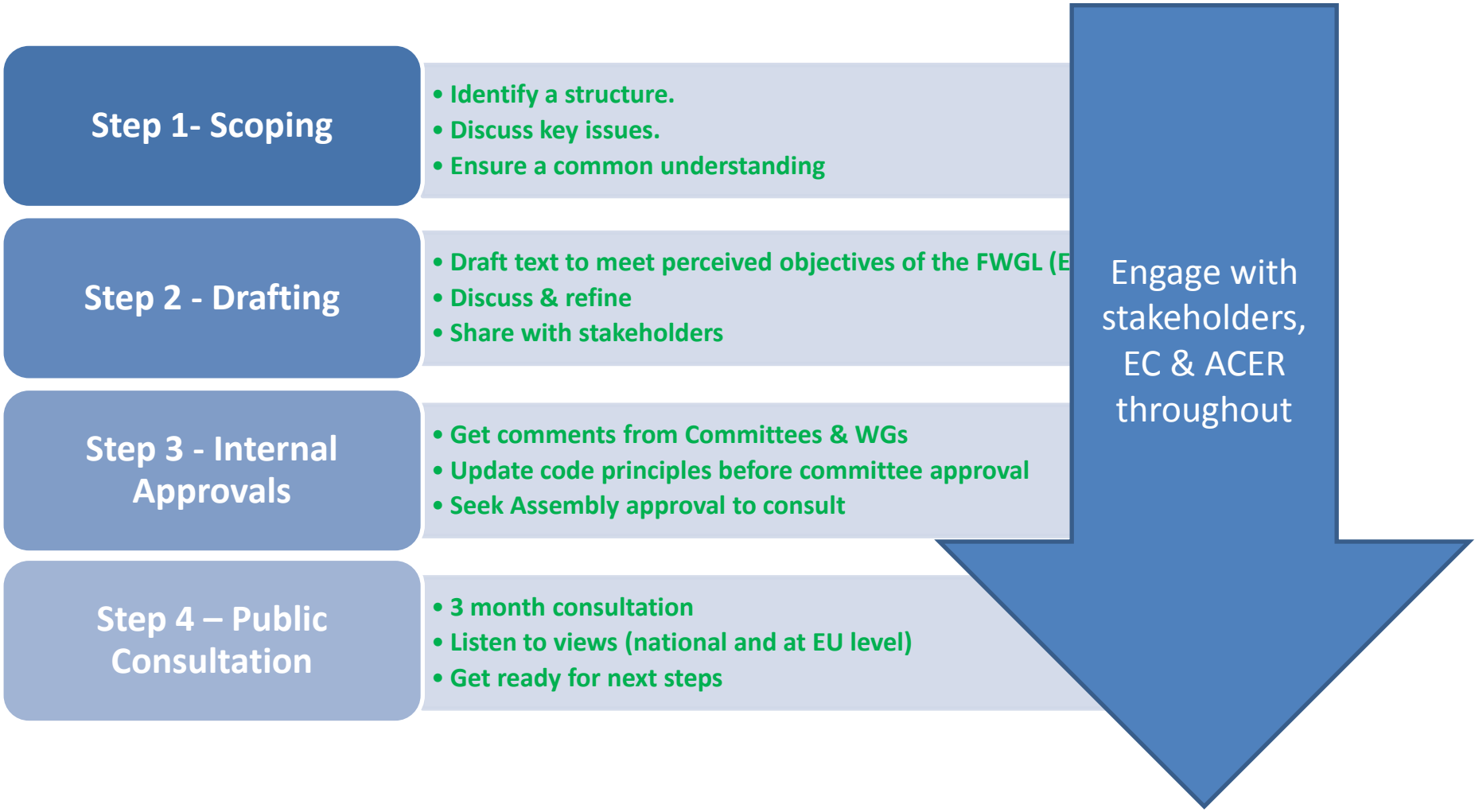
- These codes link into (and are influenced by) several important policy areas
- And are also related to existing standards

Some of the more substantial links to others codes are;

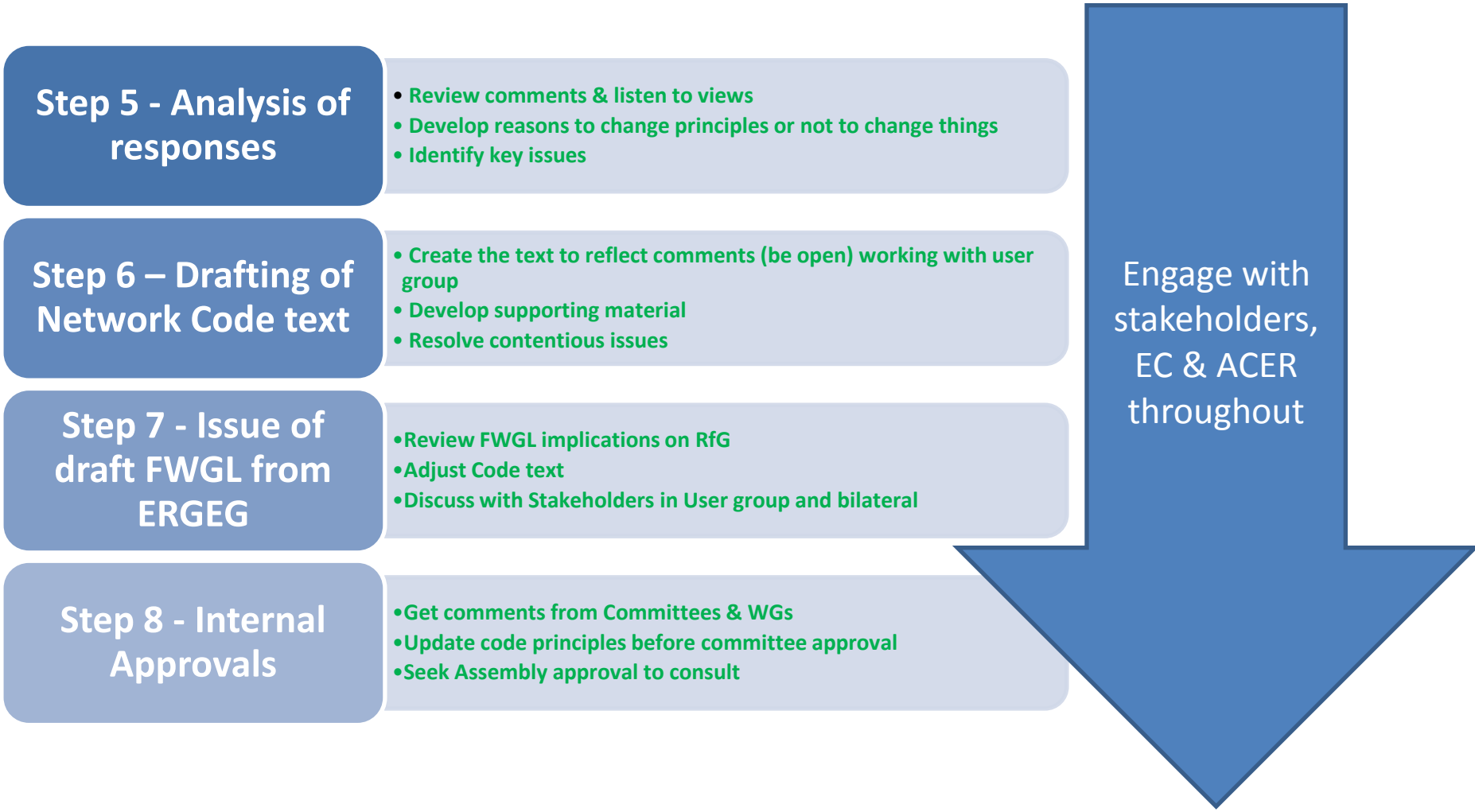
- Electricity Balancing; and
- Operational Security



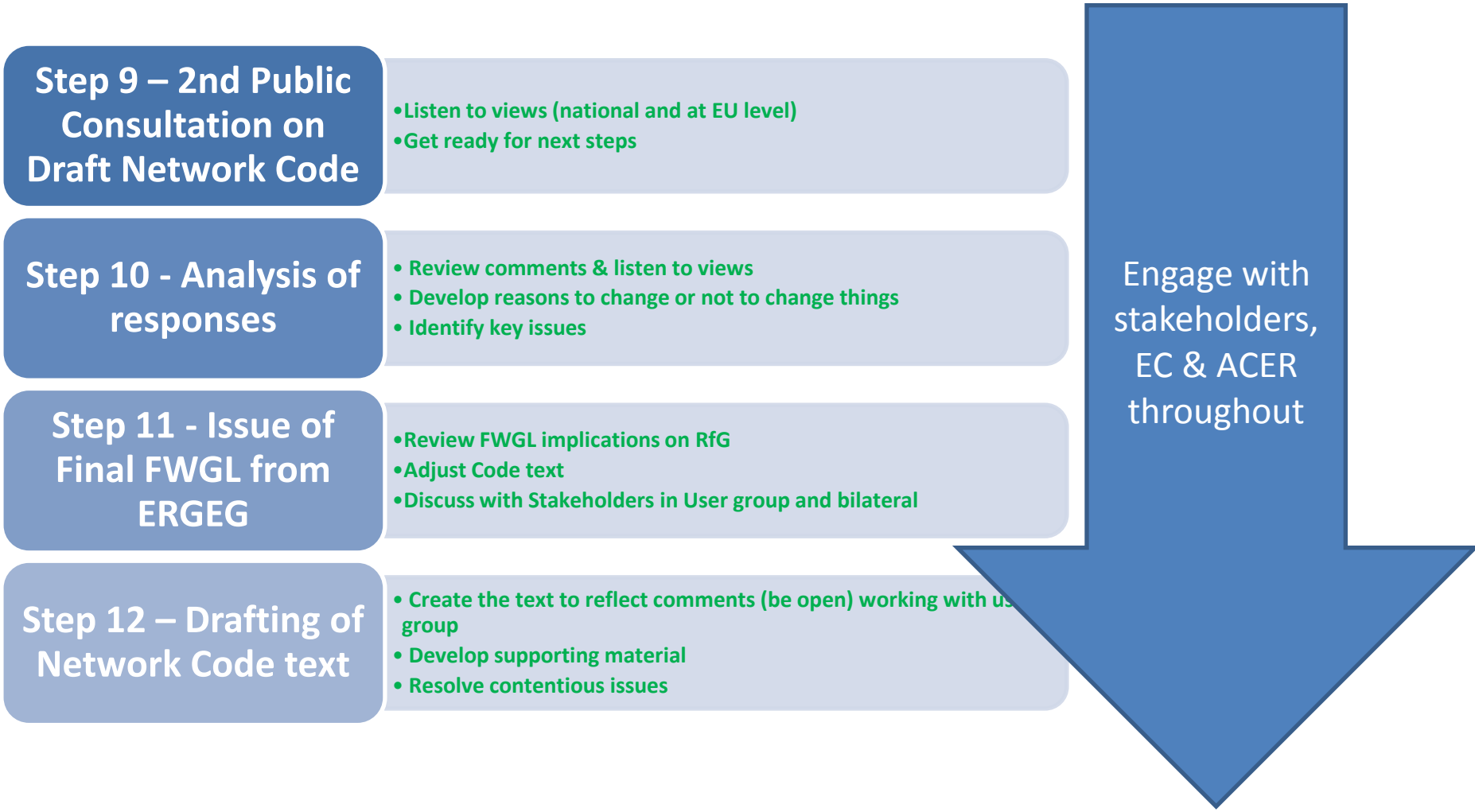
Stages of Network Code Development (Pilot I)



Stages of Network Code Development (Pilot II)



Stages of Network Code Development (Pilot III)



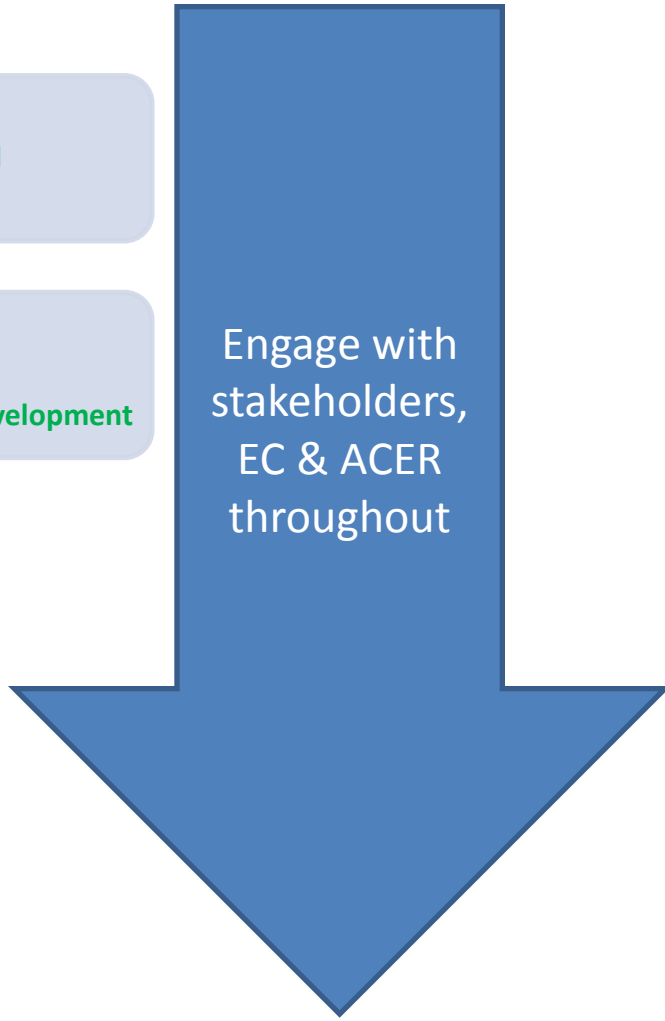
Stages of Network Code Development (Pilot IV)

Step 13 - Internal Approvals

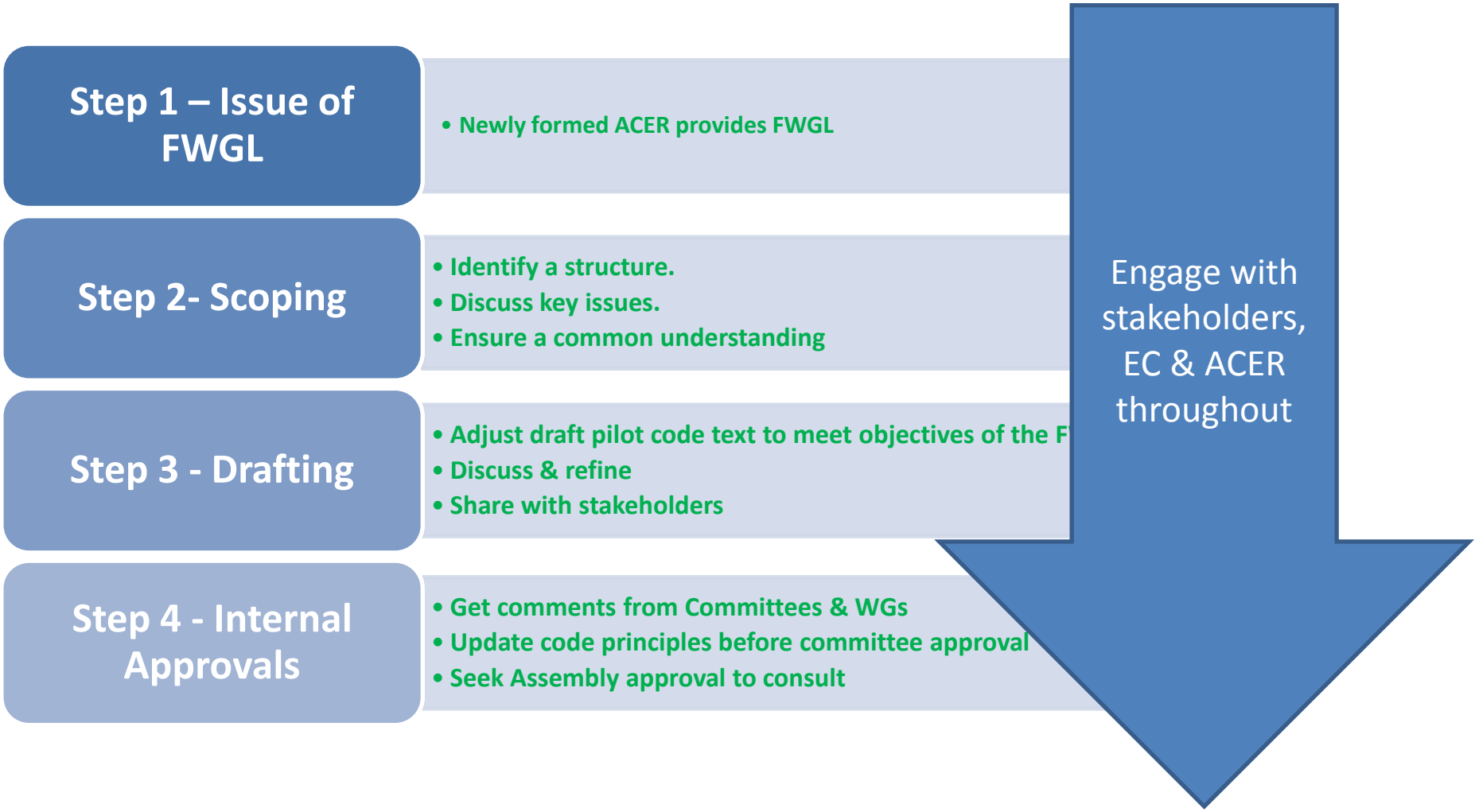
- Get comments from Committees & WGs
- Update code principles before committee approval
- Seek Assembly approval to consult

Step 14 – Publish final code

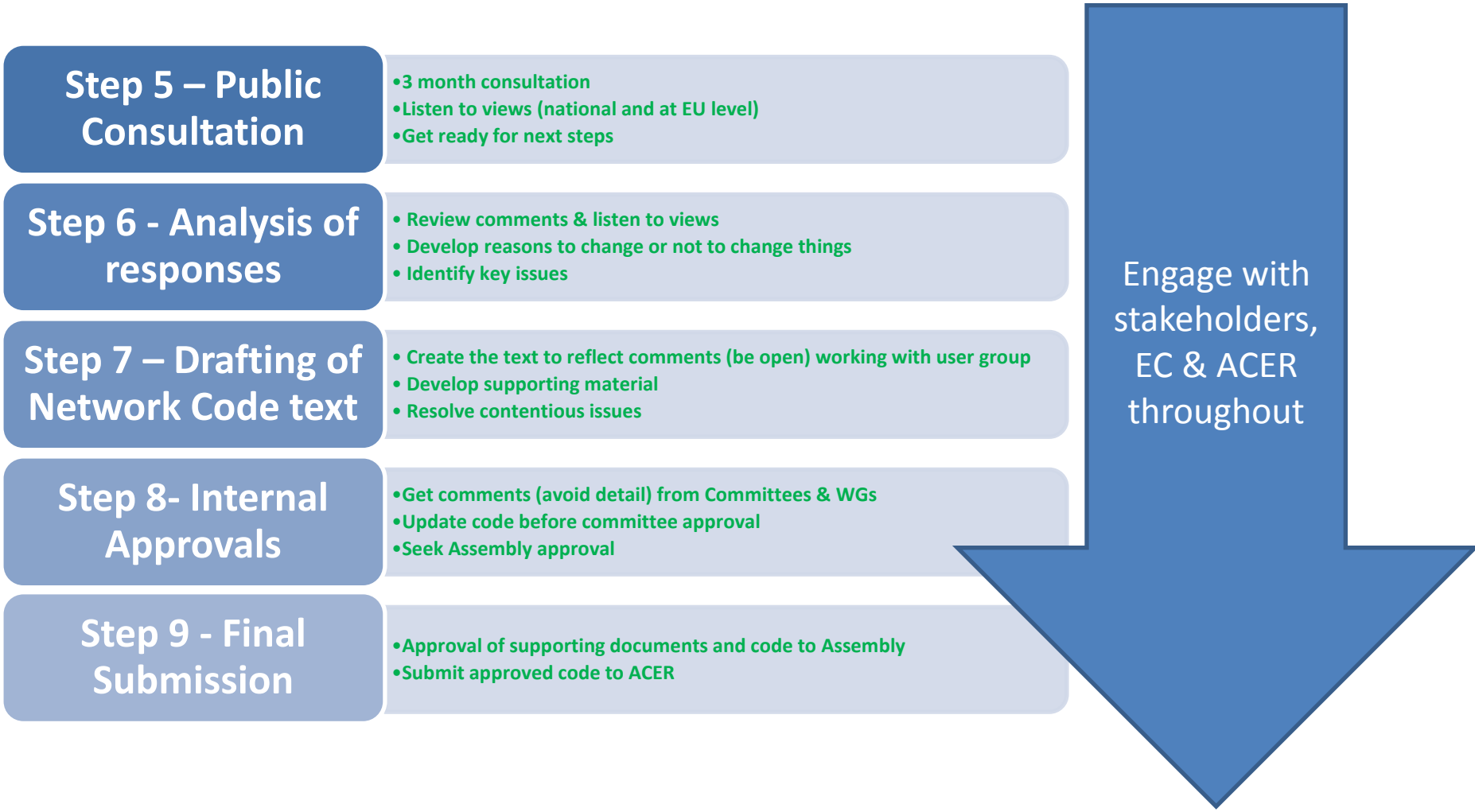
- Finish pilot project
- Publish final draft
- Provide proposals for future procedure of code development



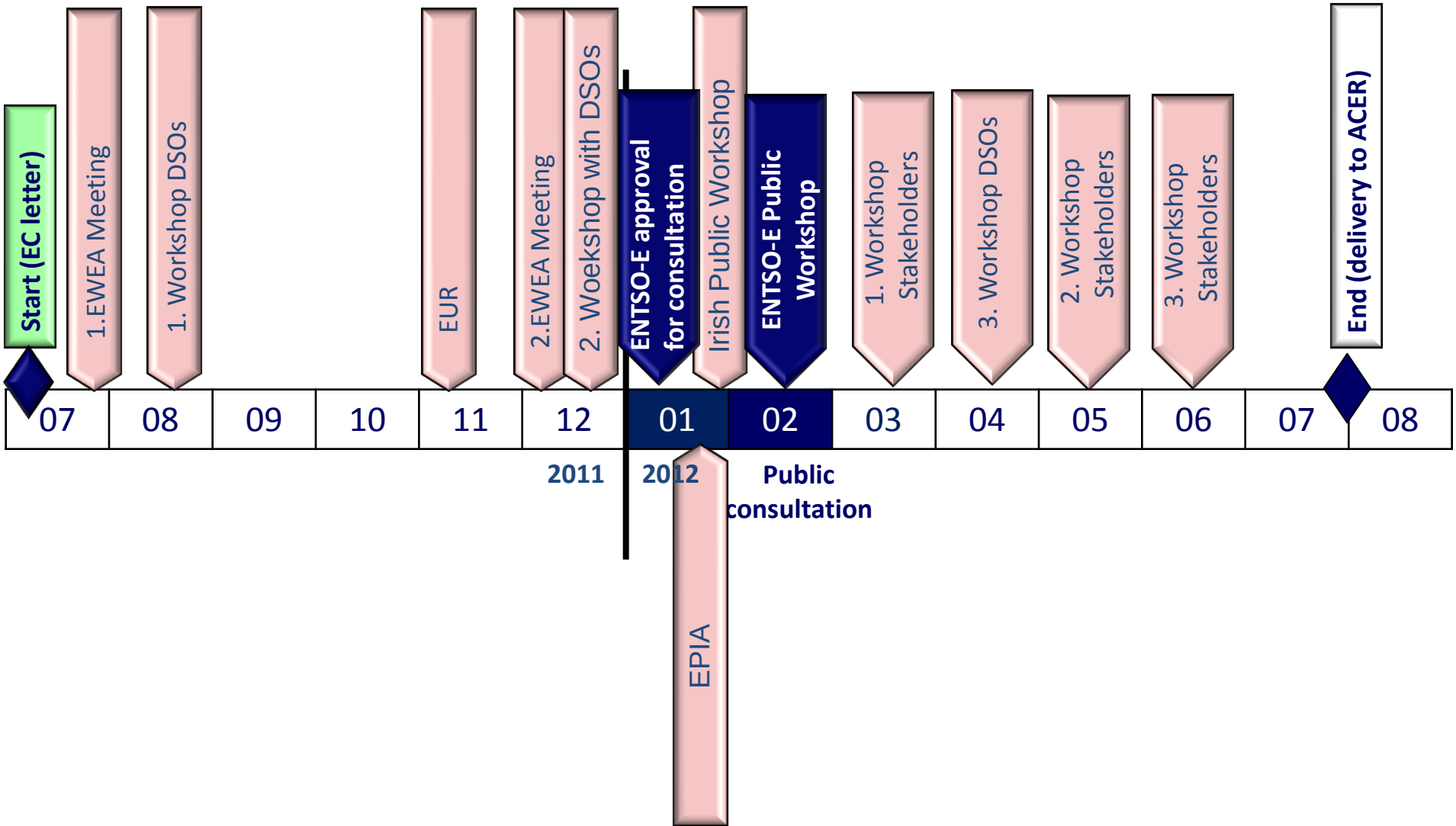
Stages of Network Code Development (I)



Stages of Network Code Development (II)



Network Code Development



Objective/Scope of the Code

To define "Significant Grid User" consistent with the FWGL and other network codes and to develop functional specifications that are applicable to different Generators, from 800W upwards. The requirements should be non-discriminatory, and utilise the inherent capabilities of Generators to ensure or improve power system security and enhance market integration and wind energy penetration.

Significant users

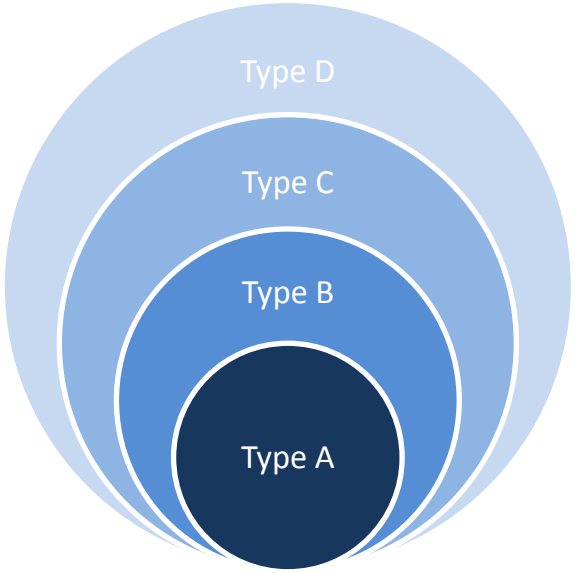
- Generator capabilities are formulated from a system performance perspective, independent from technology
- Need to be able to cope with evolutions in generation mix
- Significance is regarded per requirement

Wide-scale network operation and stability including European-wide balancing services

Stable and controllable dynamic response capabilities covering all operational network states

Automated dynamic response and resilience to operational events including system operator control

Basic capabilities to withstand wide-scale critical events; limited automated response/operator control



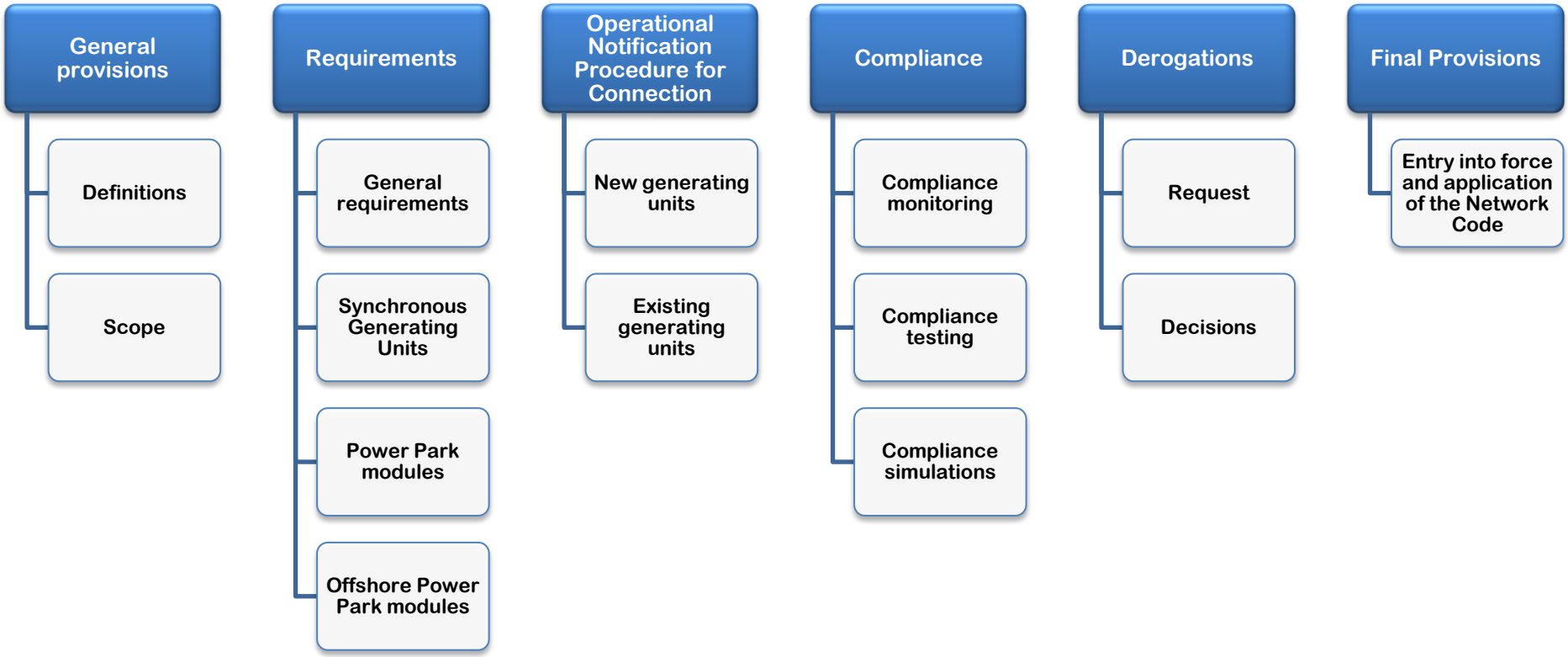
Significant users

Network Code gives max. thresholds at synchronous system level

- Criteria based on voltage level (> 110kV → Type D) and MW capacity (table)

Synchronous Area	maximum capacity threshold from which on a Generating Unit is of Type B	maximum capacity threshold from which on a Generating Unit is of Type C
Continental Europe	0.1 MW	10 MW
Nordic	1.5 MW	10 MW
Great Britain	1 MW	10 MW
Ireland	0.1 MW	5 MW
Baltic	0.1 MW	5 MW

Contents of Code



Key Areas for Participants

- At present stage in ACER approval phase, no further consultation is expected until comitology.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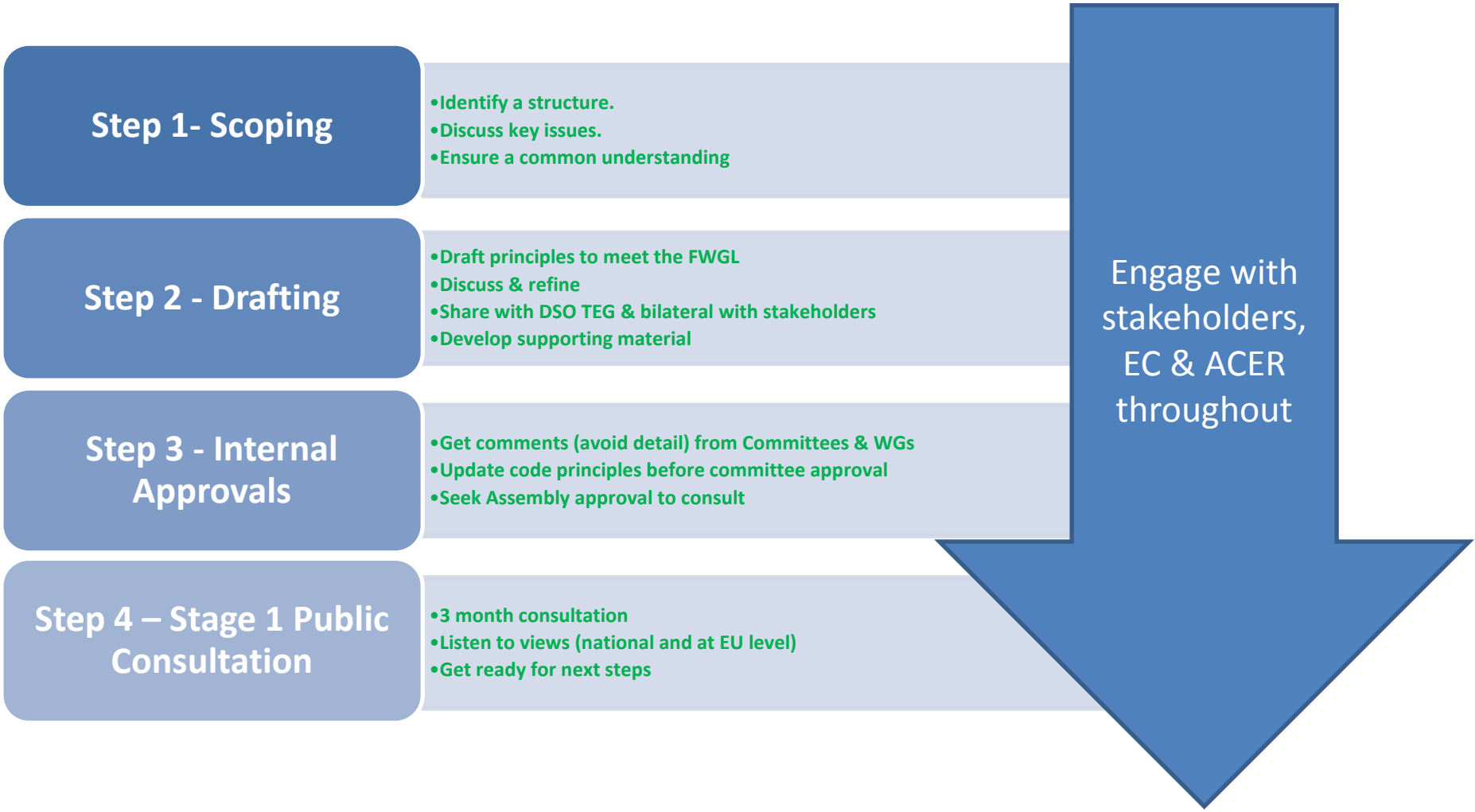
DCC Network Code

1st SEM RA/TSO Stakeholder Forum

Mark Norton

17 January 2013

Stages of Network Code Development (I)



Stages of Network Code Development (II)

Step 5 - Analysis of responses

- Review comments & listen to views
- Develop reasons to change principles or not to change things
- Identify key issues

Step 6 – Drafting of Network Code text

- Create the text to reflect comments (be open) working with DSO TEG and user group
- Develop supporting material
- Resolve contentious issues

Step 7 – Stage 2 Public Consultation on Draft

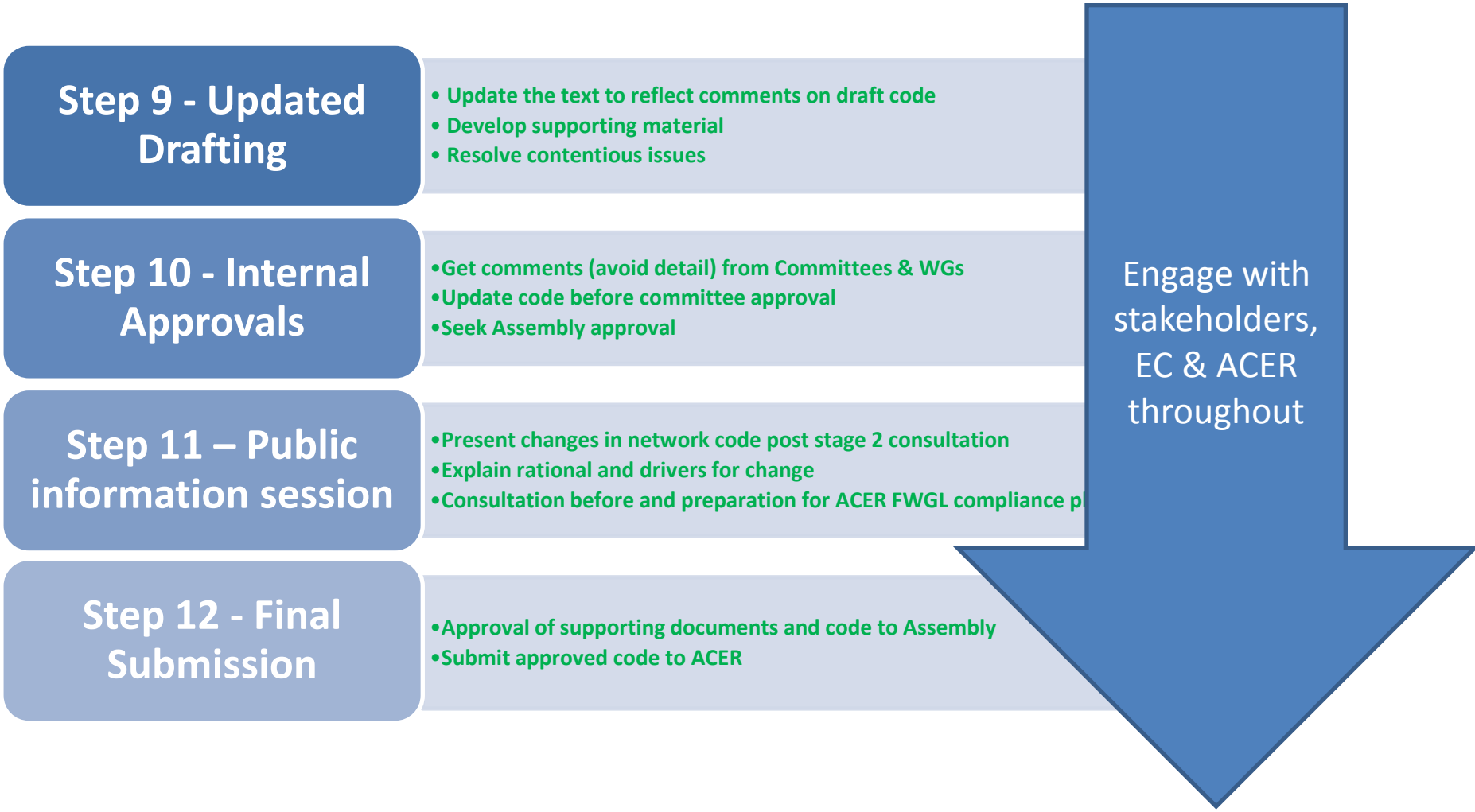
- 3 month consultation
- Listen to views (national and at EU level)
- Get ready for next steps

Step 8 - Analysis of responses

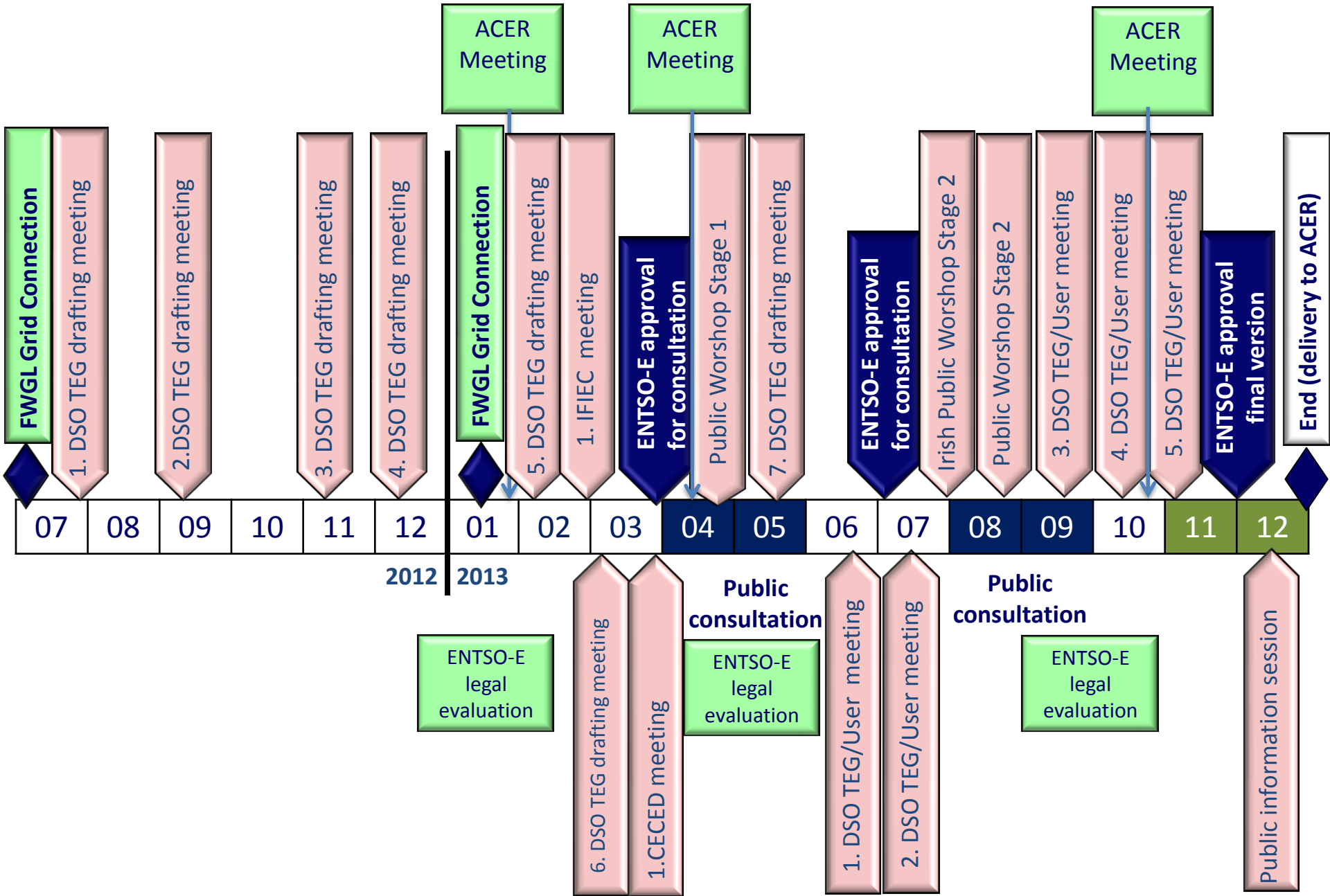
- Review comments & listen to views
- Develop reasons to change or not to change things
- Identify key issues

Engage with stakeholders, EC & ACER throughout

Stages of Network Code Development (III)



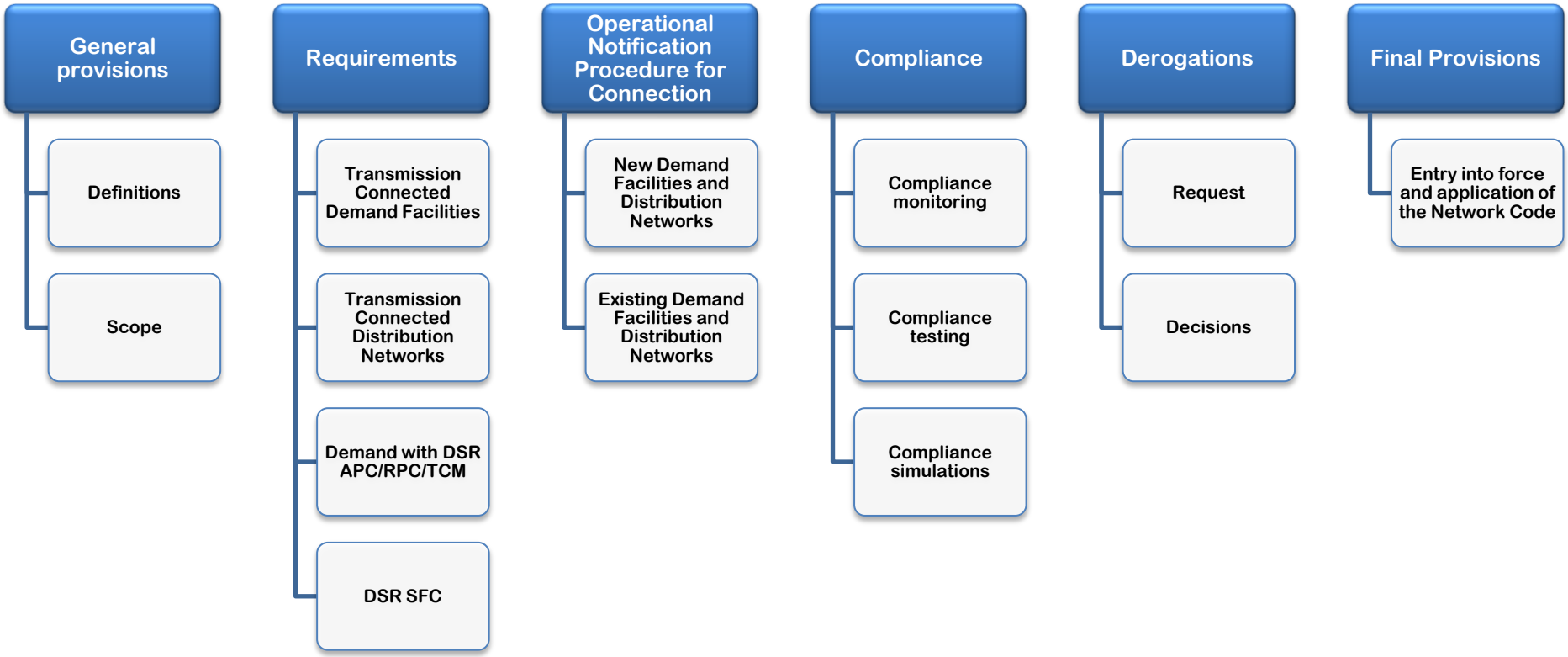
Network Code Development



Objective/Scope of the Code

To define "Significant Grid User" consistent with the FWGL and other network codes and to develop functional specifications that are applicable to different Demand users, notably Transmission Connected Demand Facilities and DSOs, and Demand Side Response. The requirements should be non-discriminatory, and utilise the inherent capabilities of Demand Users to ensure or improve power system security and enhance market integration and wind energy penetration.

Contents of Code



Key Areas for Participants

- As code now submitted to ACER, participants have an opportunity to attend ACERs workshop on the DCC on the 24th Jan 2013 in Slovenia.
- Assuming successful approval of the compliance with the FWGL then subsequent to this during the comitology phase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HVDC Network Codes

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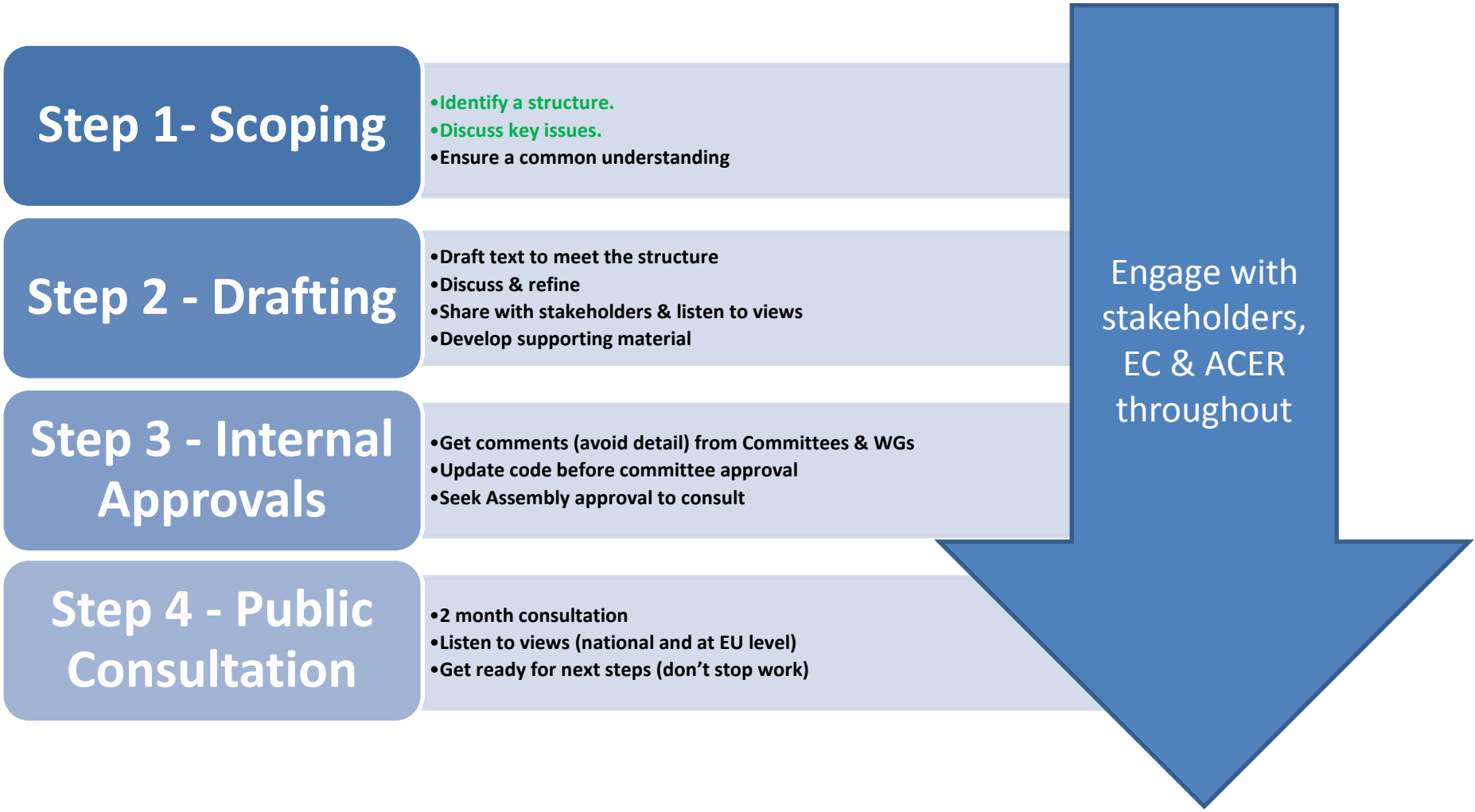
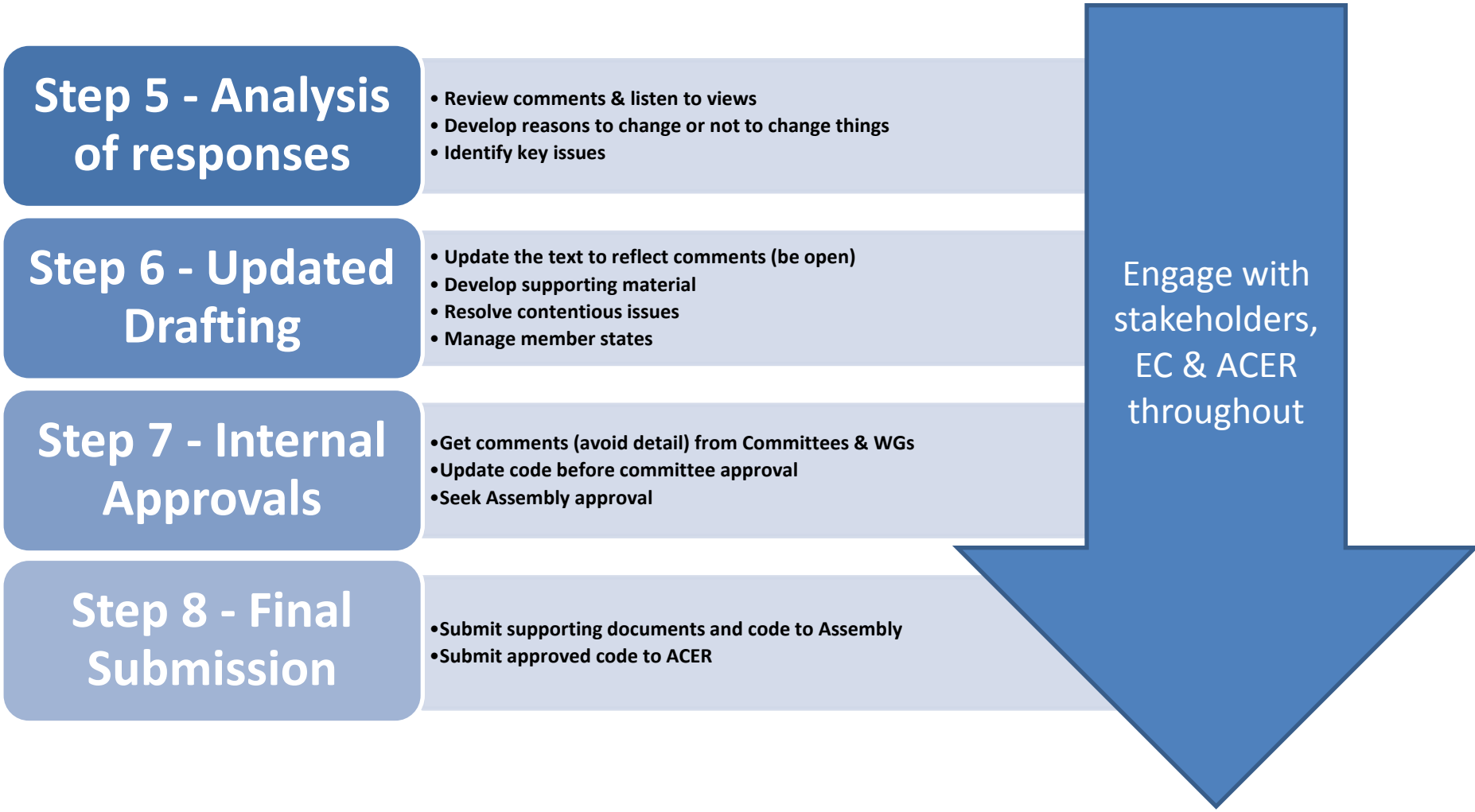
Salim Temtem/Mark Norton

17 January 2013

Stages of Network Code Development (I)

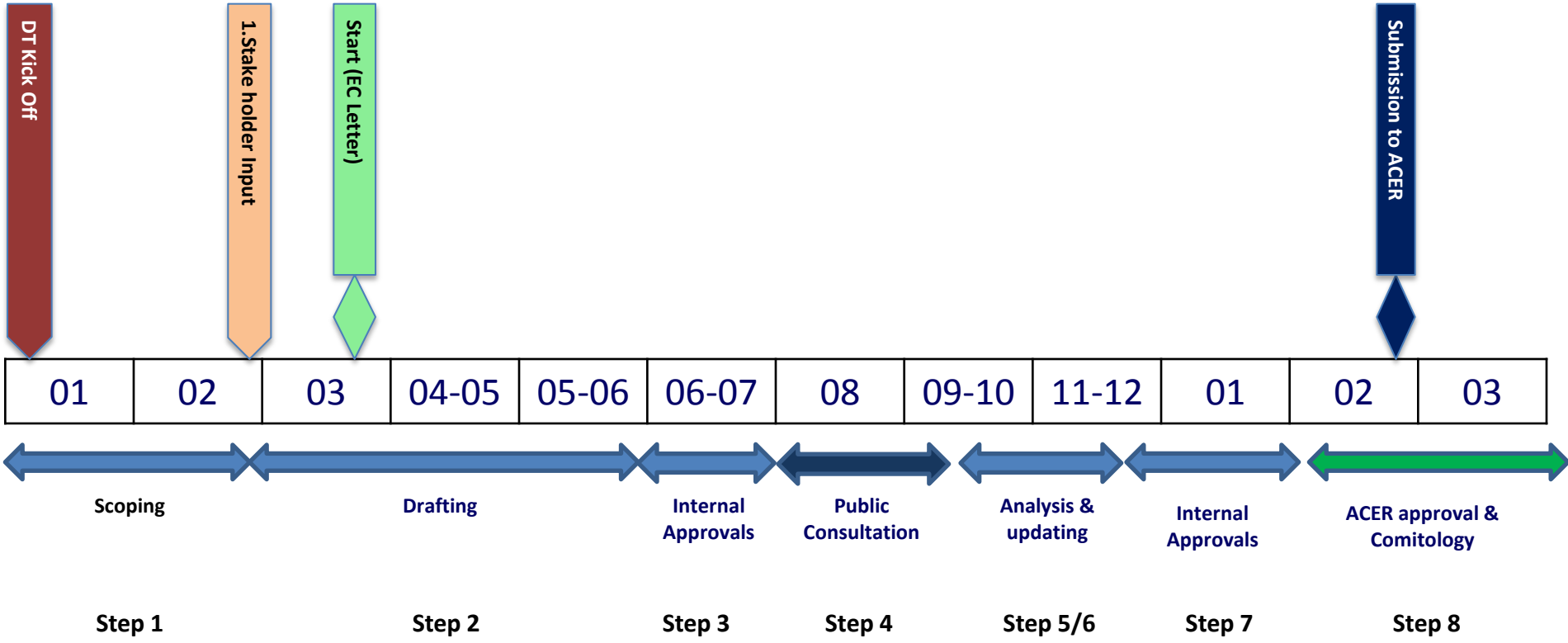


Stages of Network Code Development (II)



Network Code Development – HVDC Code

2013



Objective/Scope of the Code

To define "Significant Grid User" consistent with the FWGL and other network codes and to develop functional specifications that are applicable to different HVDC and DC connected offshore PPM configurations. The requirements should be non-discriminatory, and utilise the inherent capabilities of HVDC systems and DC connected offshore PPMs to ensure or improve power system security and enhance market integration and wind energy penetration.

Cross-border issues and signifiant Grid User

(EC) 714/2009 – Art. 8 (7)

- *"The network codes shall be developed for **cross-border network issues and market integration issues** and shall be without prejudice to the Member States' right to establish national network codes which do not affect cross-border trade"*
- *The network code(s) developed according to these Framework Guidelines shall define appropriate minimum standards and requirements applicable to all significant grid users."*

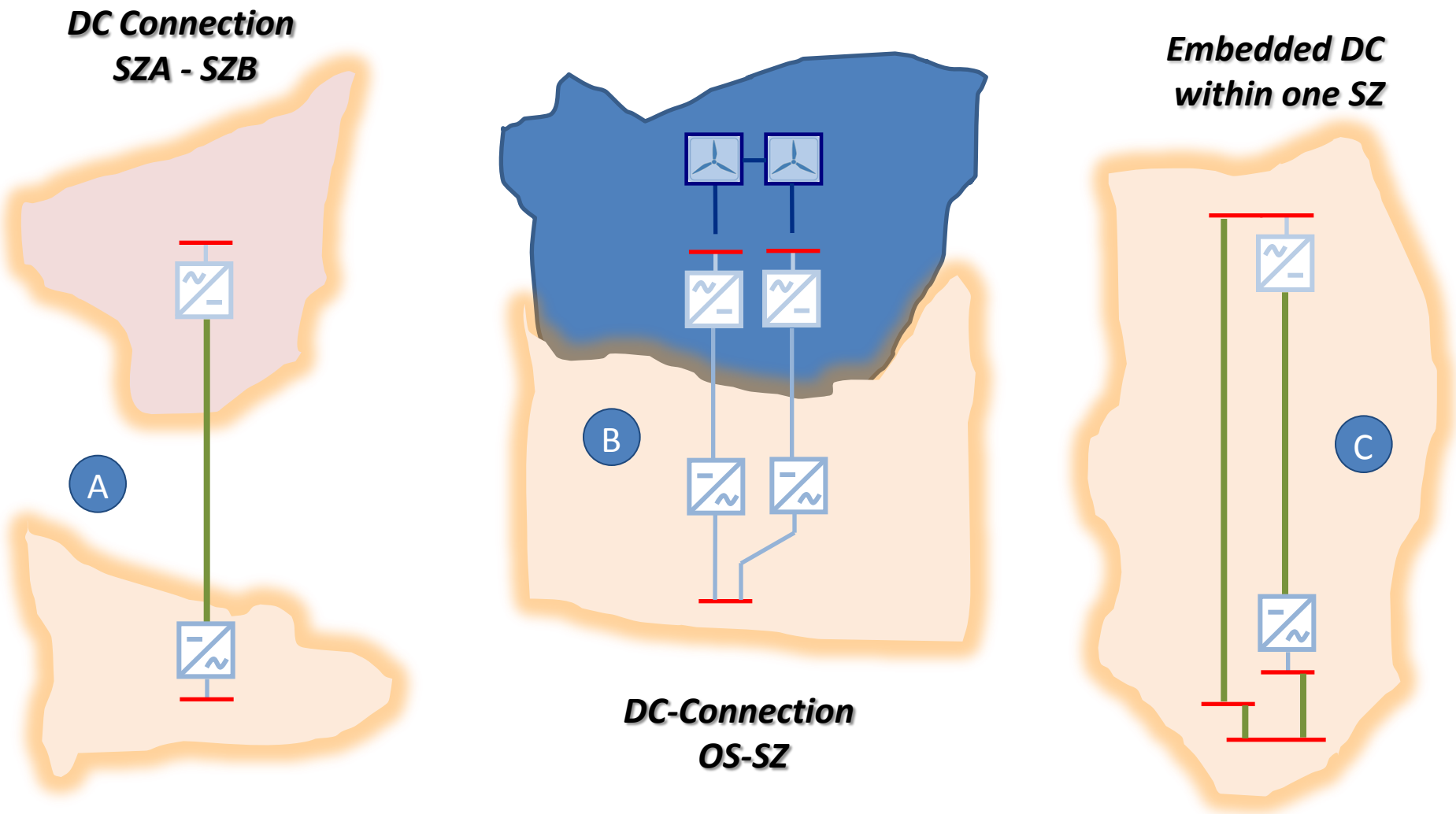
Context 3rd Energy Package

- supporting the completion and functioning of the internal market in electricity and cross-border trade
- facilitating the targets for penetration of renewable generation
- maintaining security of supply

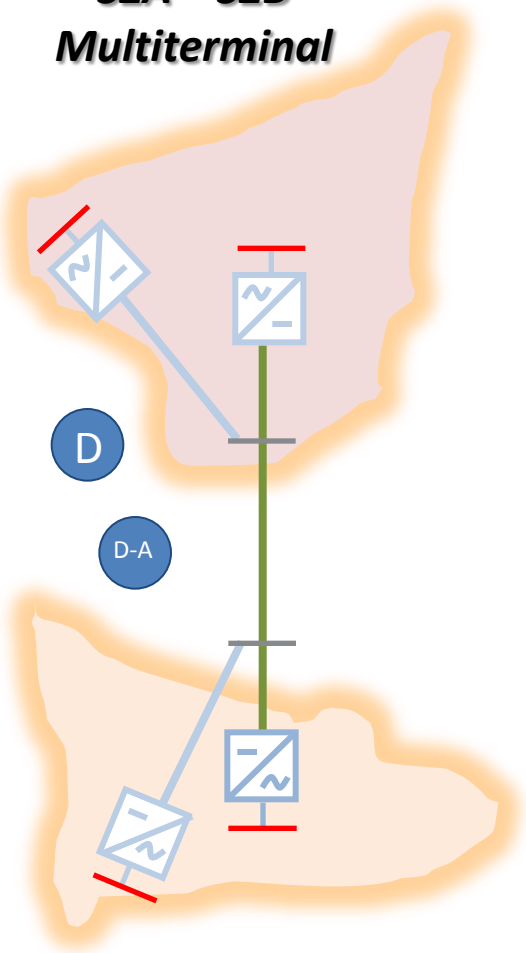
Rfg definition

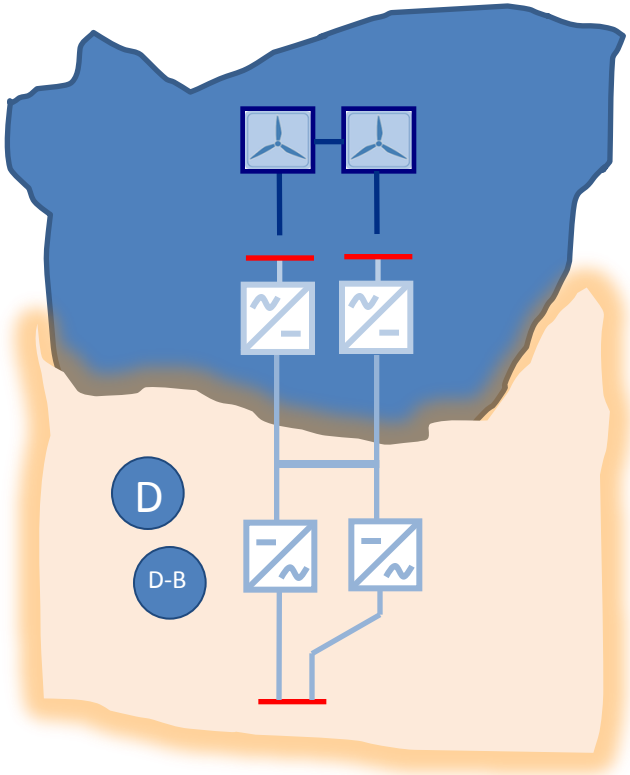
- All requirements that **contribute to maintaining, preserving and restoring system security** in order to **facilitate proper functioning of the internal electricity market** within and between synchronous areas, and to **achieving cost efficiencies through technical standardization** shall be regarded as "**cross-border network issues and market integration issues**".

Types of HVDC and DC offshore Power Park Module


DC Connection
SZA - SZB
A
B
DC-Connection
OS-SZ
Embedded DC
within one SZ
C

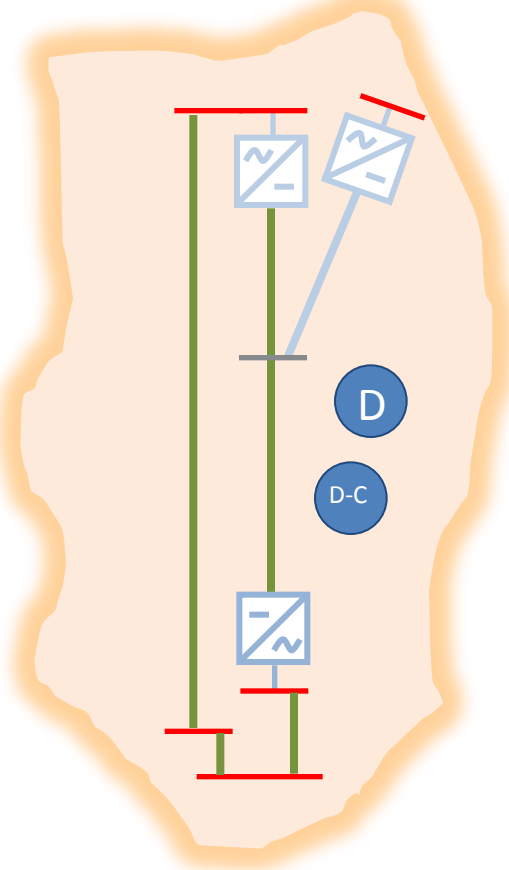
DC Connection SZA – SZB Multiterminal

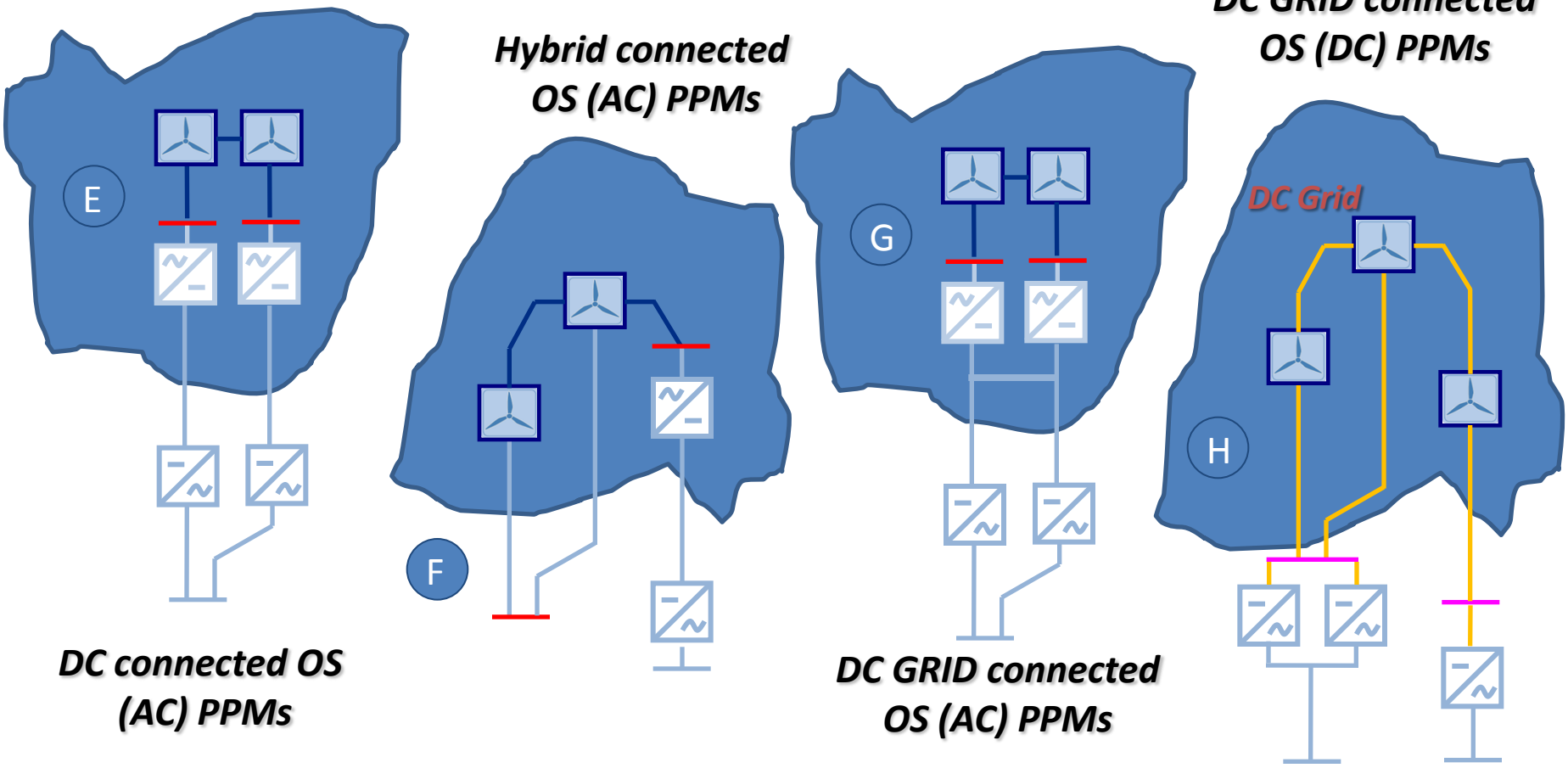




DC-Multiterminal Connection OS-SZ

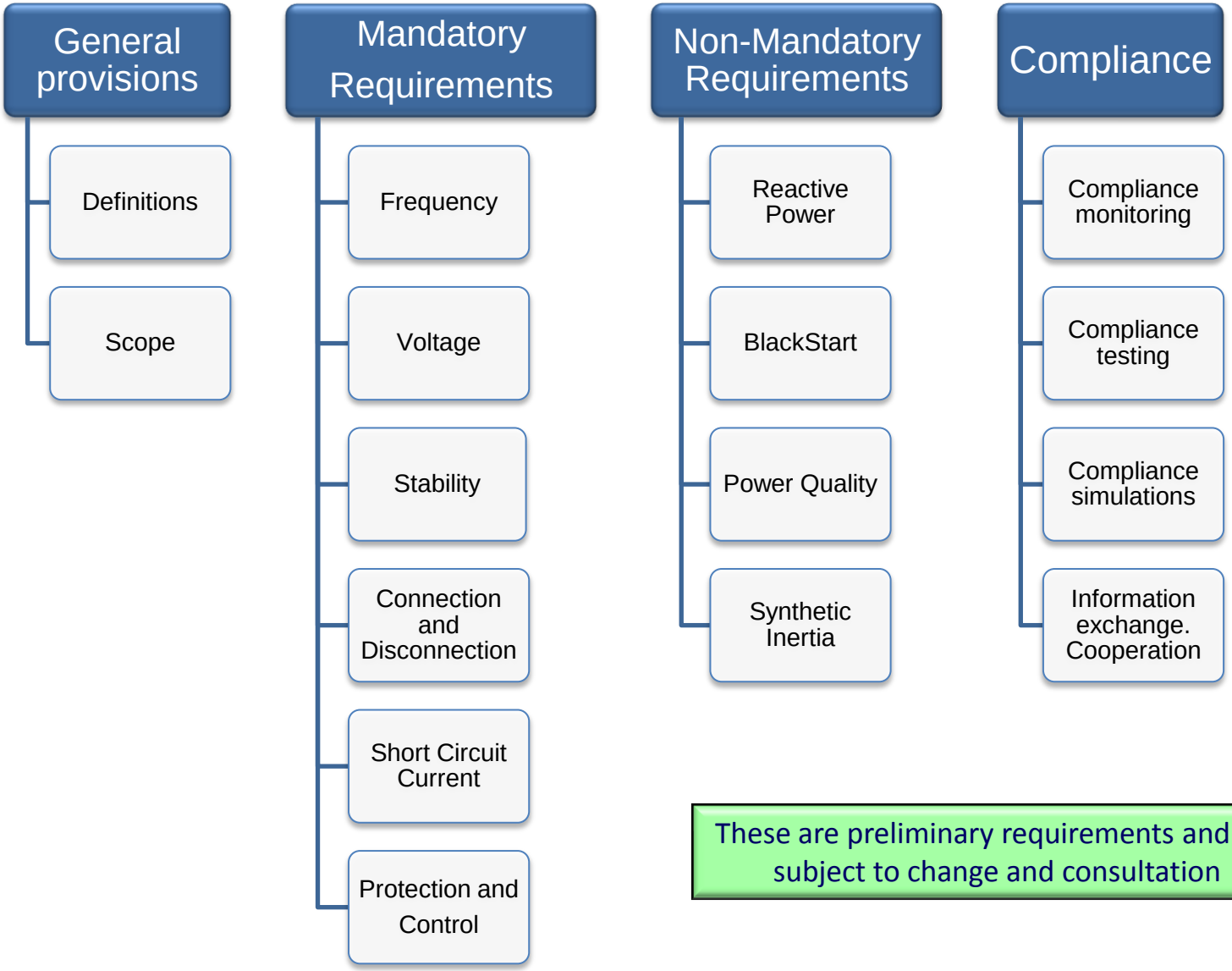
Embedded Multiterminal DC within one SZ




E
F
G
H
DC Grid
DC connected OS (AC) PPMs
Hybrid connected OS (AC) PPMs
DC GRID connected OS (AC) PPMs
DC GRID connected OS (DC) PPMs

Example of Requirements

Example of requirement



These are preliminary requirements and are subject to change and consultation

Network Code requirements

Exhaustive requirements (Prescriptive)

- The Network Code lays down requirements and specific parameters
- ***E.g. Frequency per area***

Non-Exhaustive requirements (Framework)

- The Network Code gives a coherent approach to formulate requirements
- Avoids divergence of requirements throughout Europe
- Specific setting of parameters based on a given legal framework, e.g. NRA approval, consultation, in mutual agreement, other Network Codes, …
- ***E.g. reactive power provision***

Principle requirements (Process)

- High level requirement on functionality
- Specific implementation prescribed by other agreements, national legislation, Network Codes, …
- ***E.g. information exchange or cooperation***

Key Areas for Participants

- Call for interest to join the user group is coming shortly on the ENTSO-E website.

What is the expectation of the audience for this Code?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Network Codes
CACM

1st SEM RA/TSO Stakeholder Forum

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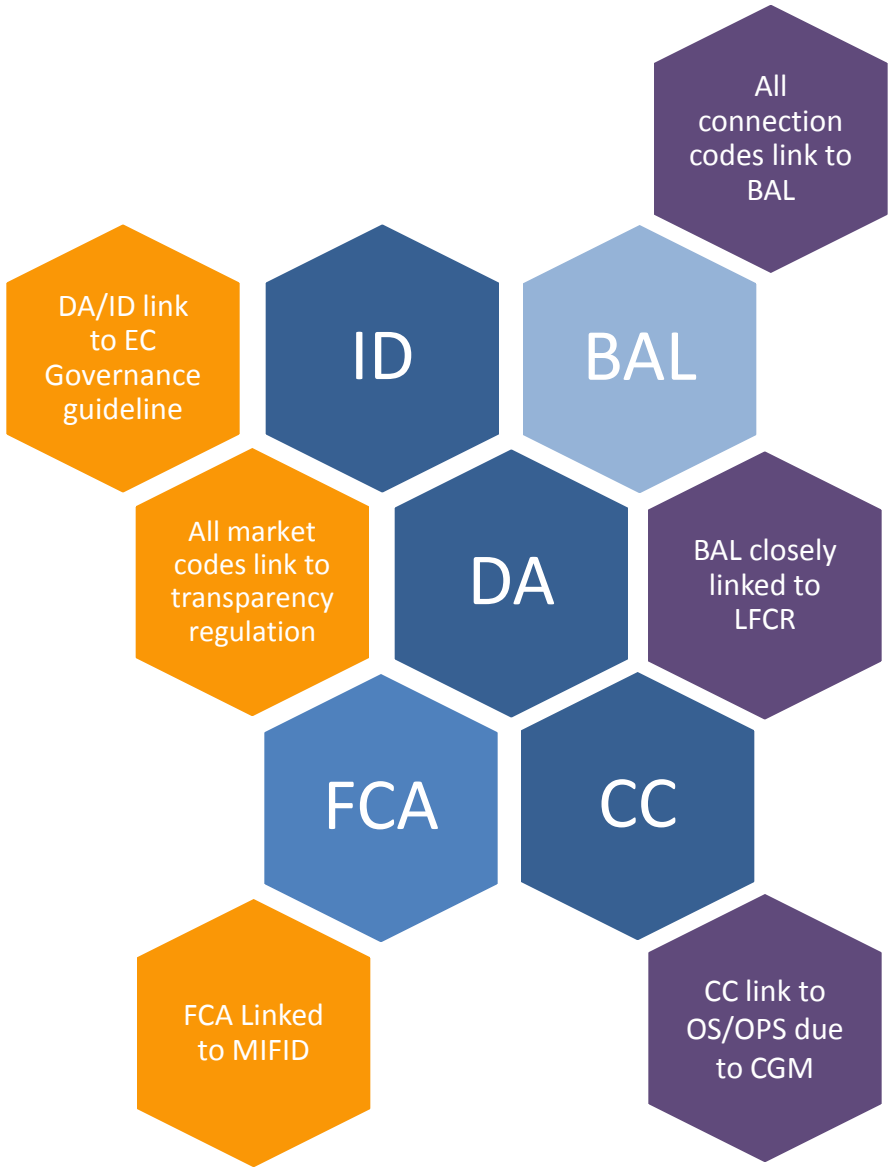
Market Based Codes

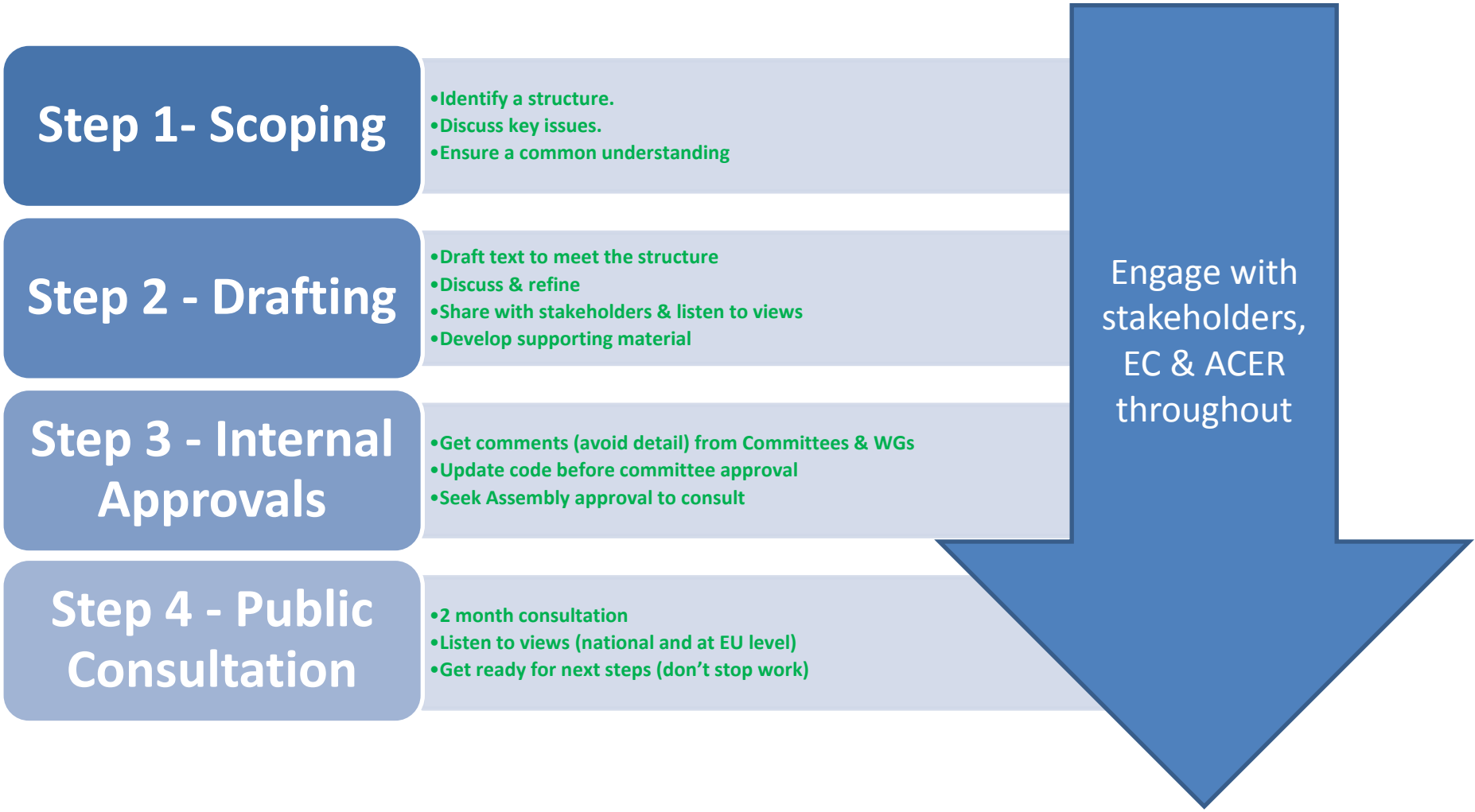


- Capacity Allocation and Congestion Management was the first market code to be developed
- Followed by Forward Capacity Allocation
- The Electricity Balancing code will begin shortly.
- All market related codes tie into transparency regulation
- Day Ahead & Intra Day are closely linked to Governance Guideline
- FCA has strong links to MIFID

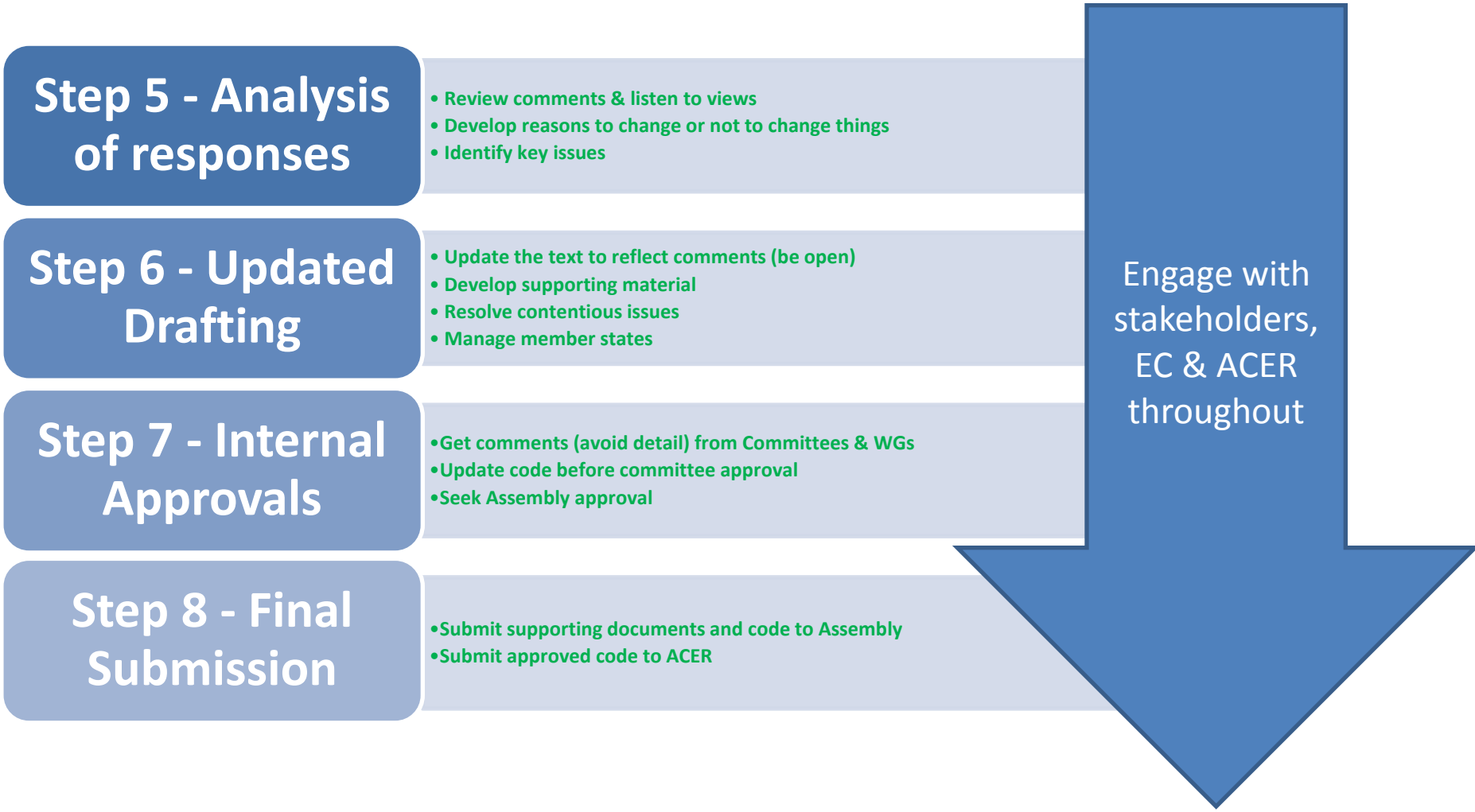
These codes have direct links to others;

- BAL to all connection codes
- Also to LFCR operational code
- Capacity Calculation links to both OS and OPS

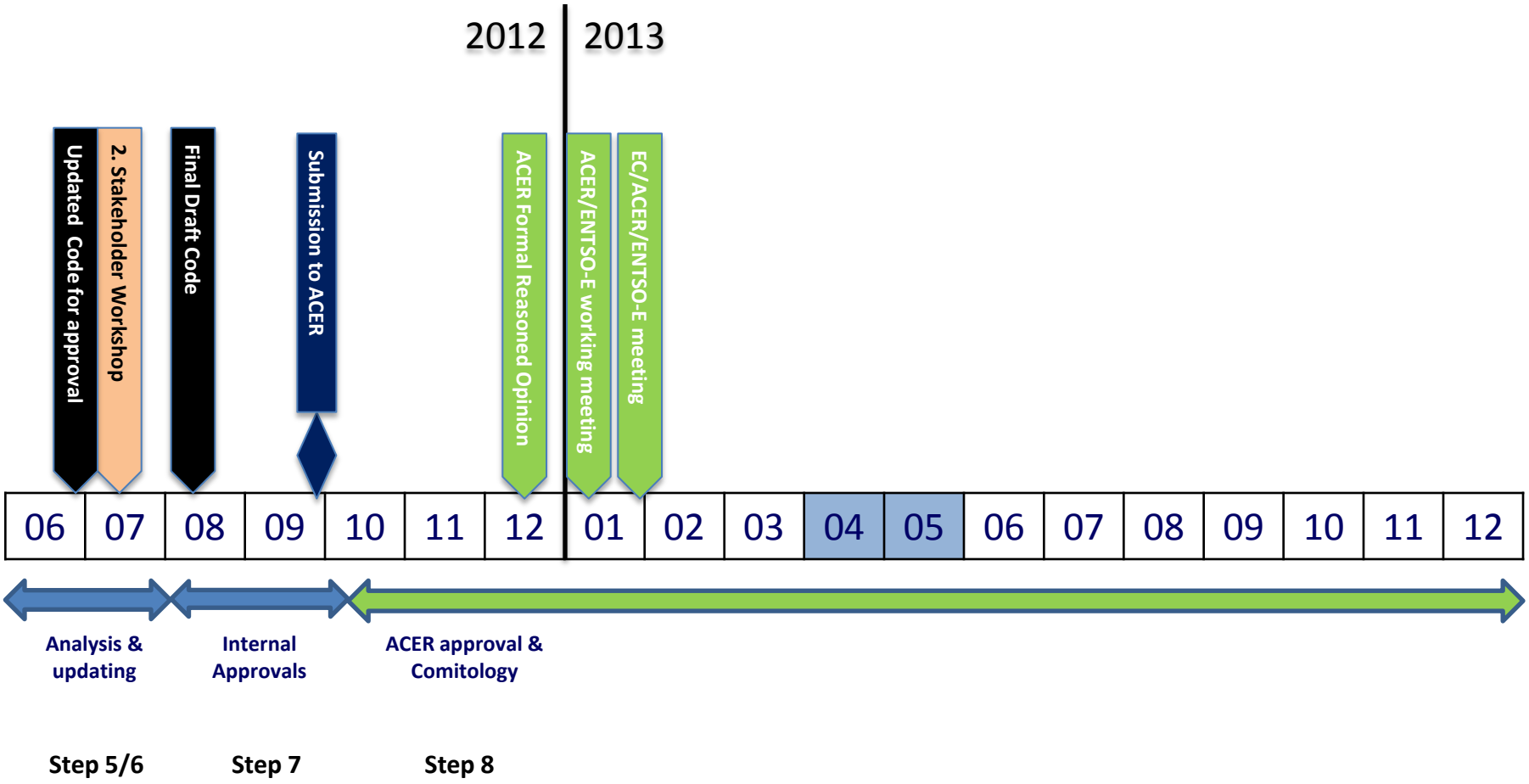
Stages of Network Code Development (I)



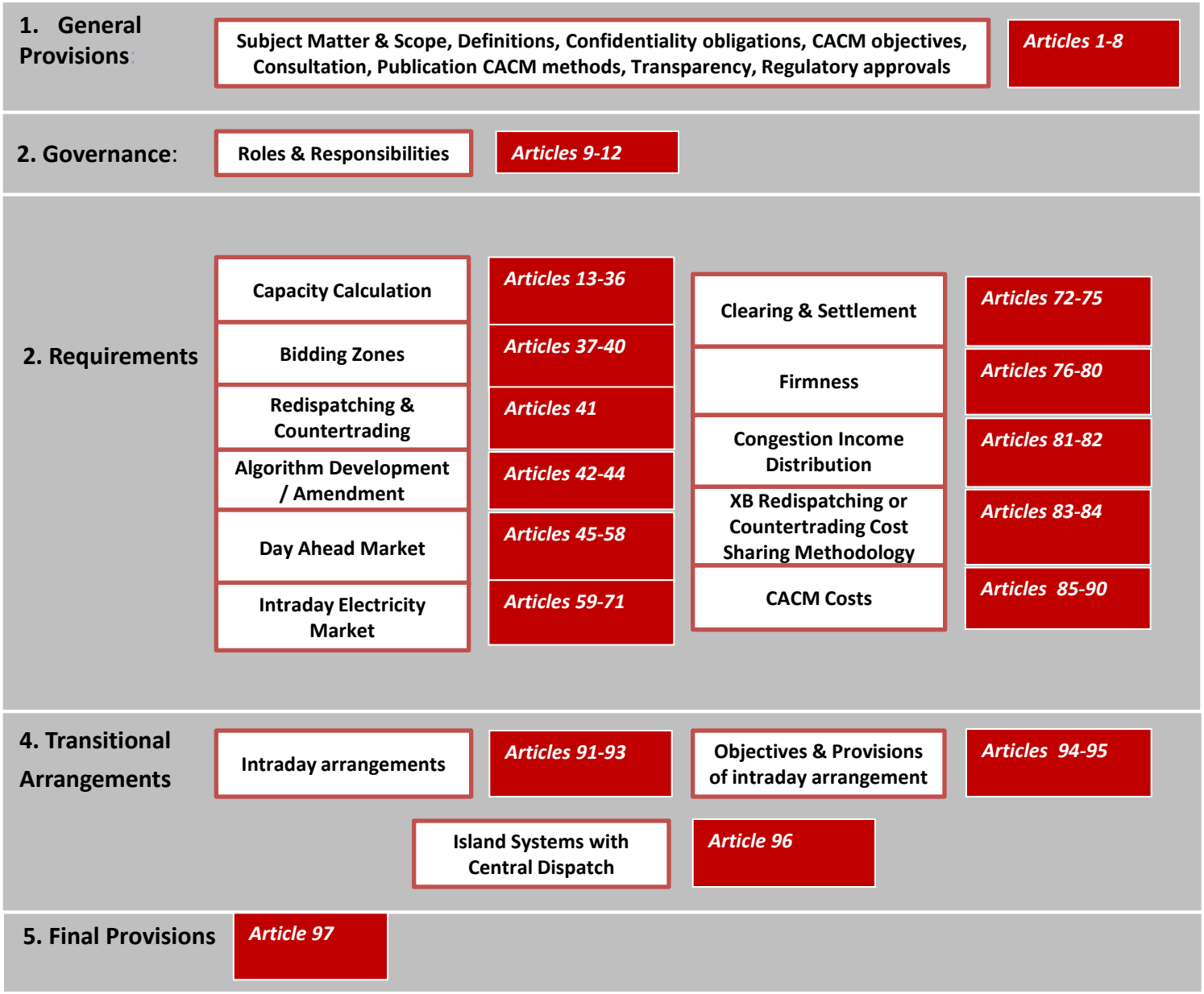
Stages of Network Code Development (II)



Network Code Development – CACM



CACM Network Code Contents (final)



Other Developments

- Governance Guideline
  - meeting on 25 Jan

- CEMC
  - non-NWE TSOs

- Bidding Zone pilot study
  - Bidding Zone review of CWE, Denmark-West, CEE, Switzerland & Italy

- Cross-Border Redispatch
  - ACER/ENTSO-E joint task force – next meeting 29 Jan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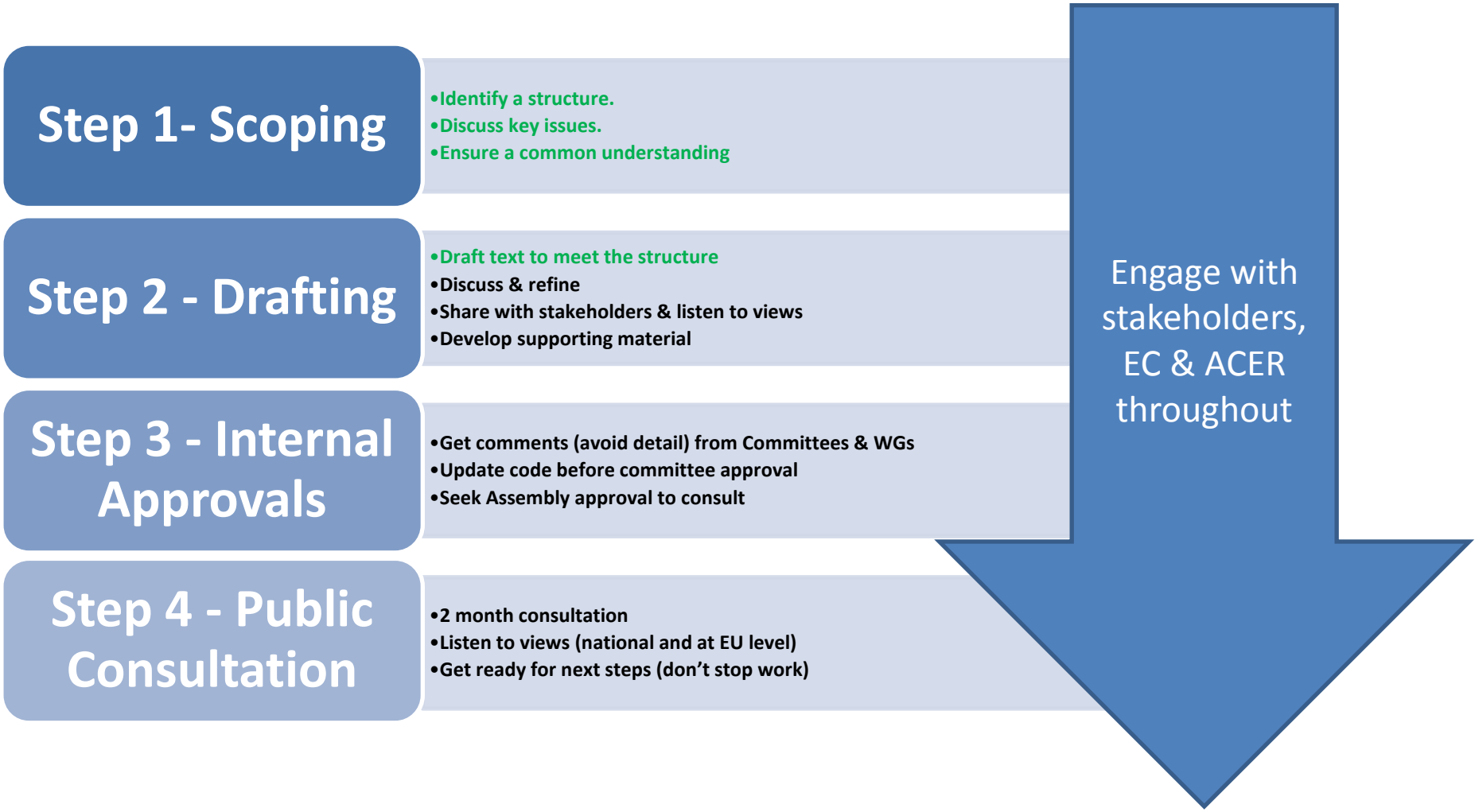
Network Codes Balancing

1st SEM RA/TSO Stakeholder Forum

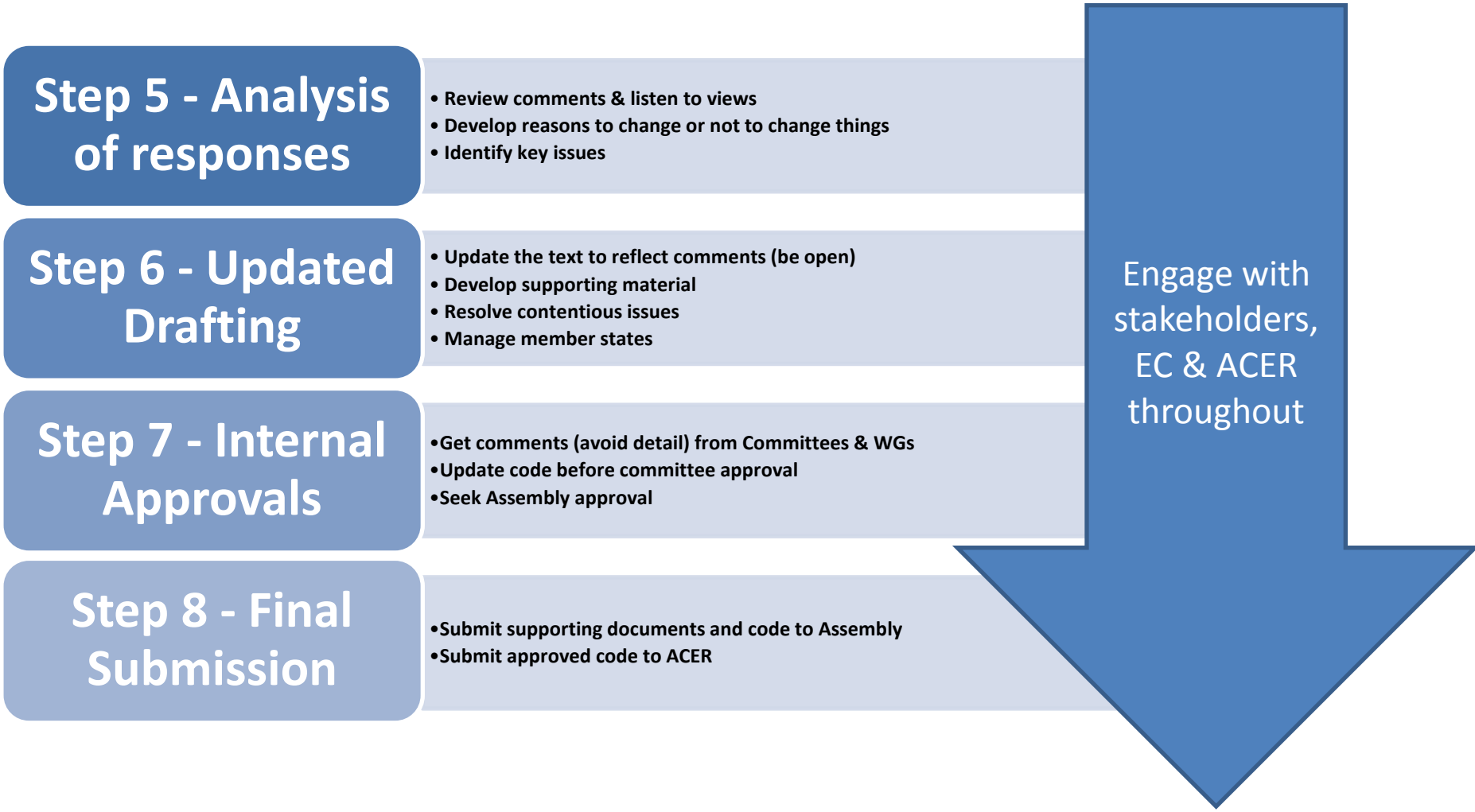
Mark Lane

17 January 2013

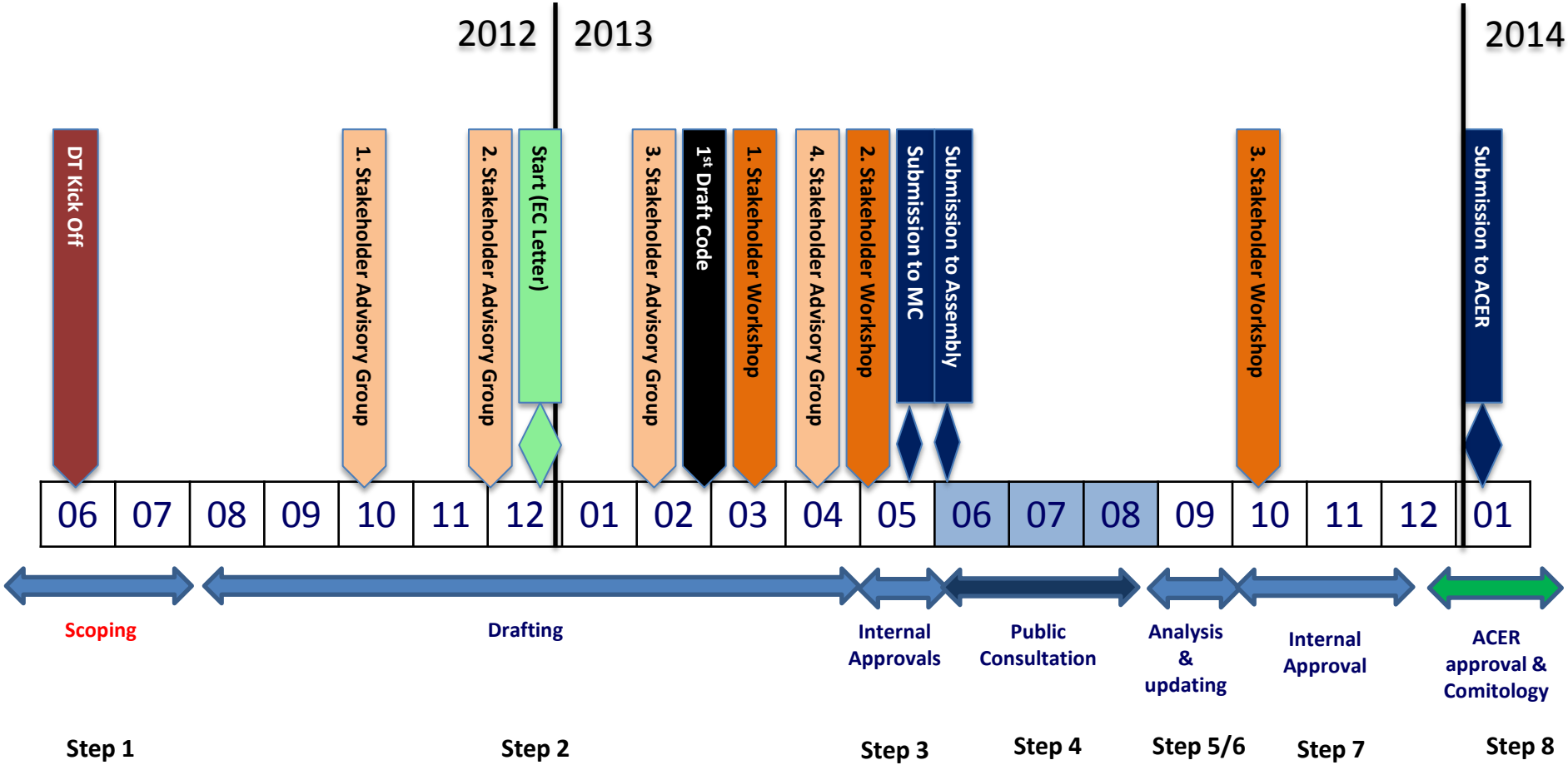
Stages of Network Code Development (I)



Stages of Network Code Development (II)



Network Code Development – Balancing



Other Developments

Balancing Pilot Project(s)

- AESAG – June 2012 – request ENTSO-E to develop pilot project for balancing
  1. Test the feasibility of the balancing target model and intermediate steps established in the ACER Framework Guidelines on Electricity Balancing.
  2. Evaluate the associated implementation impact.
  3. Report on the experience gained.

- ToR being developed by ENTSO-E

- Call for pilot project nominations expected shortly with deadline for nominations likely by summer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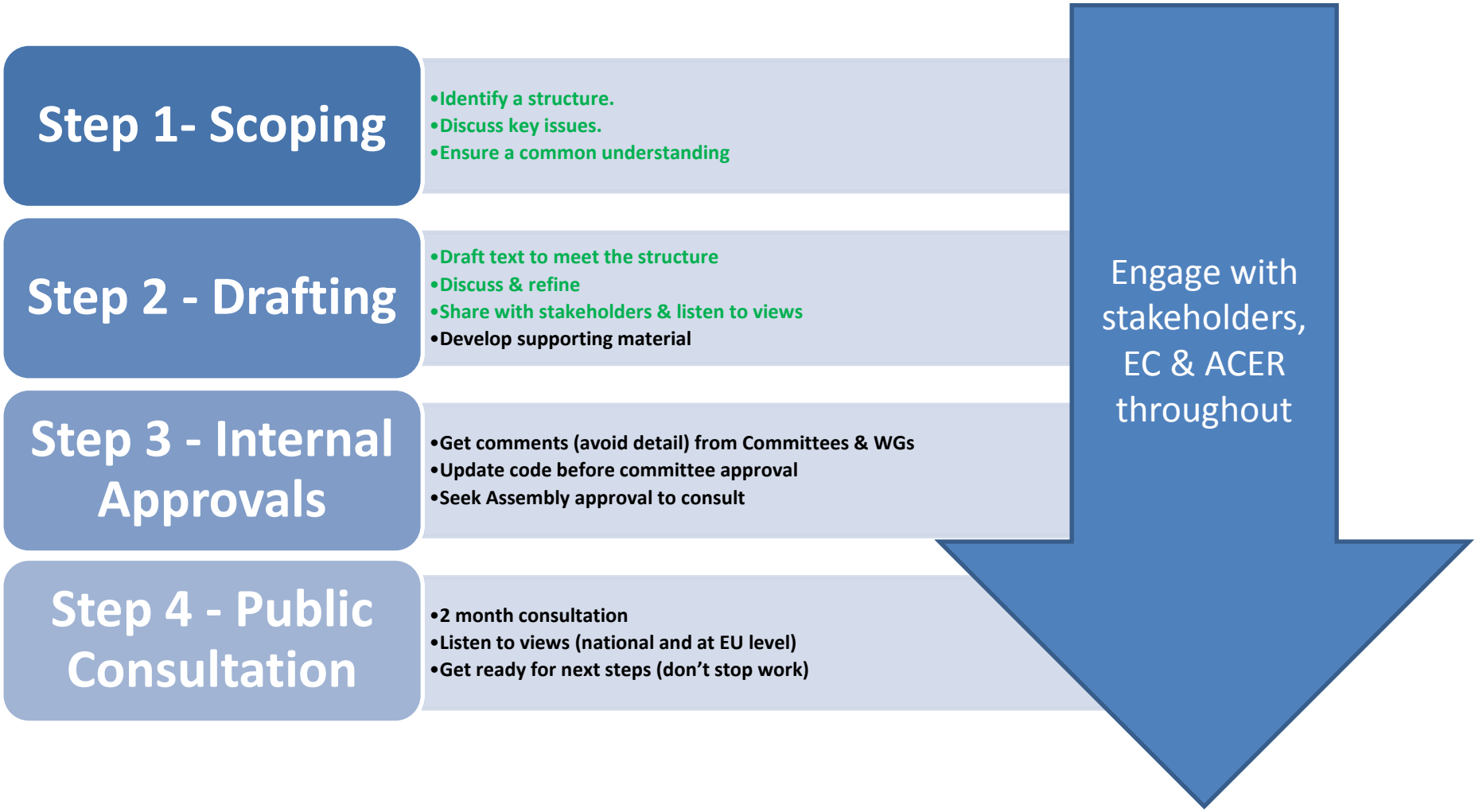
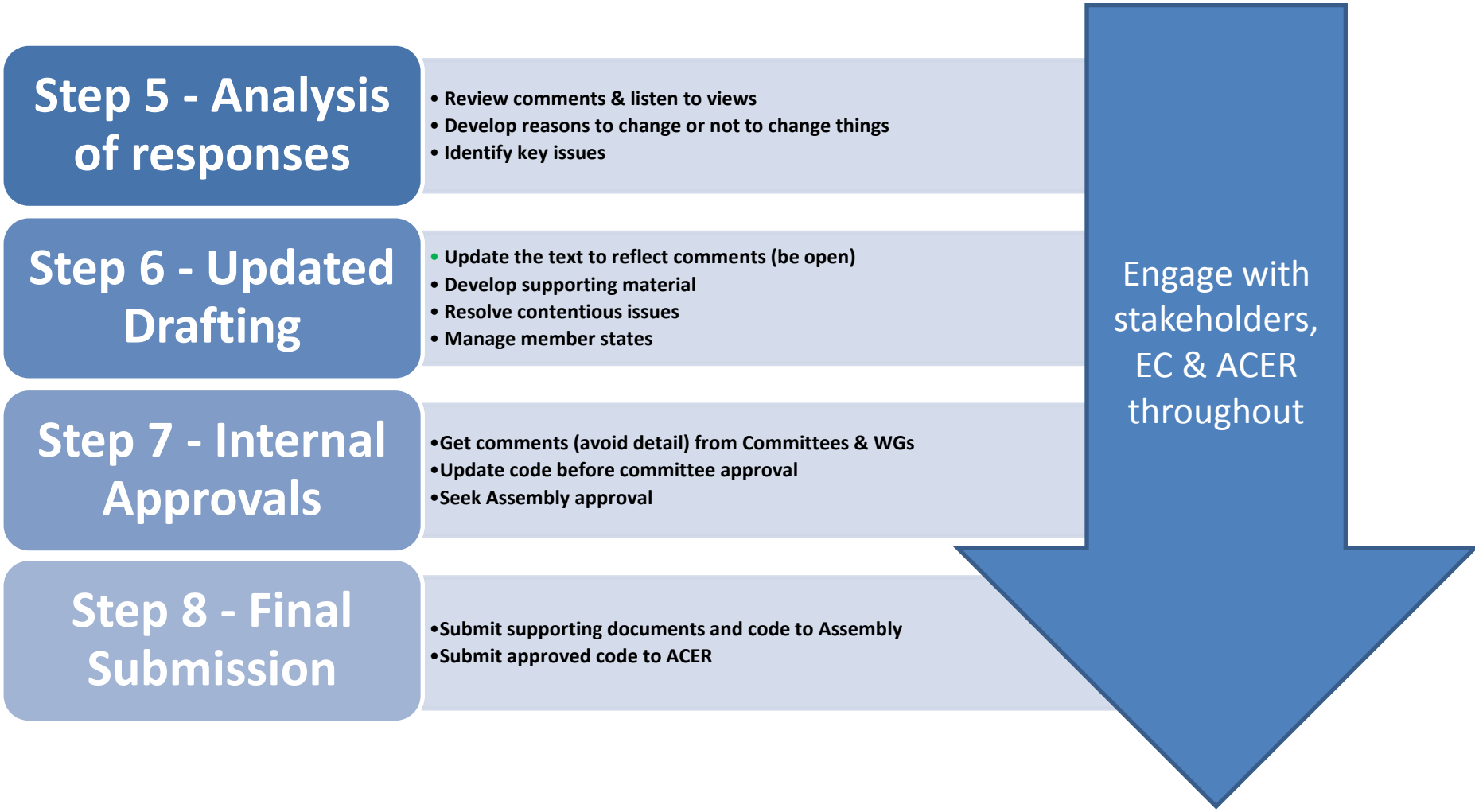
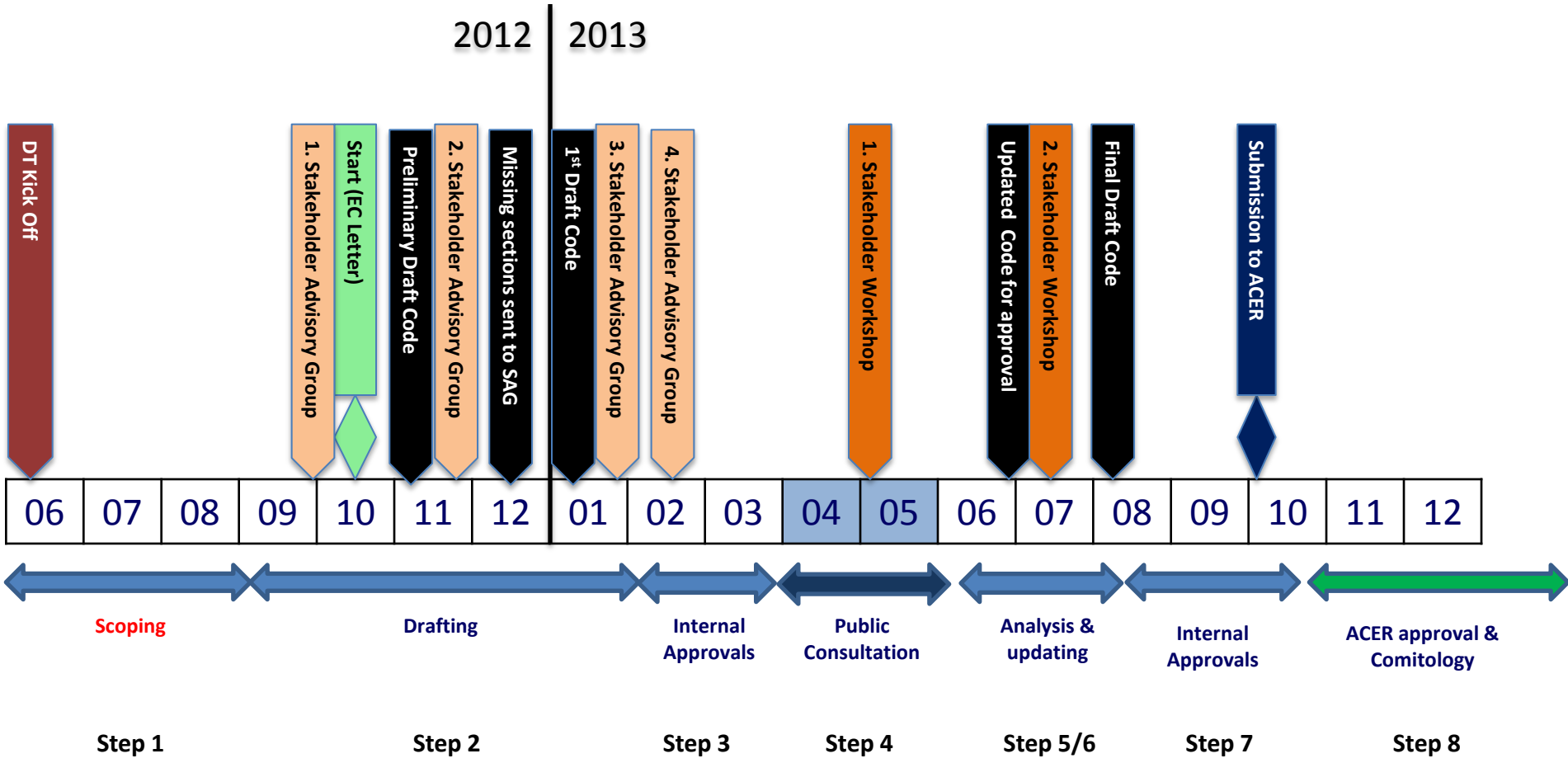
Stages of Network Code Development (I)



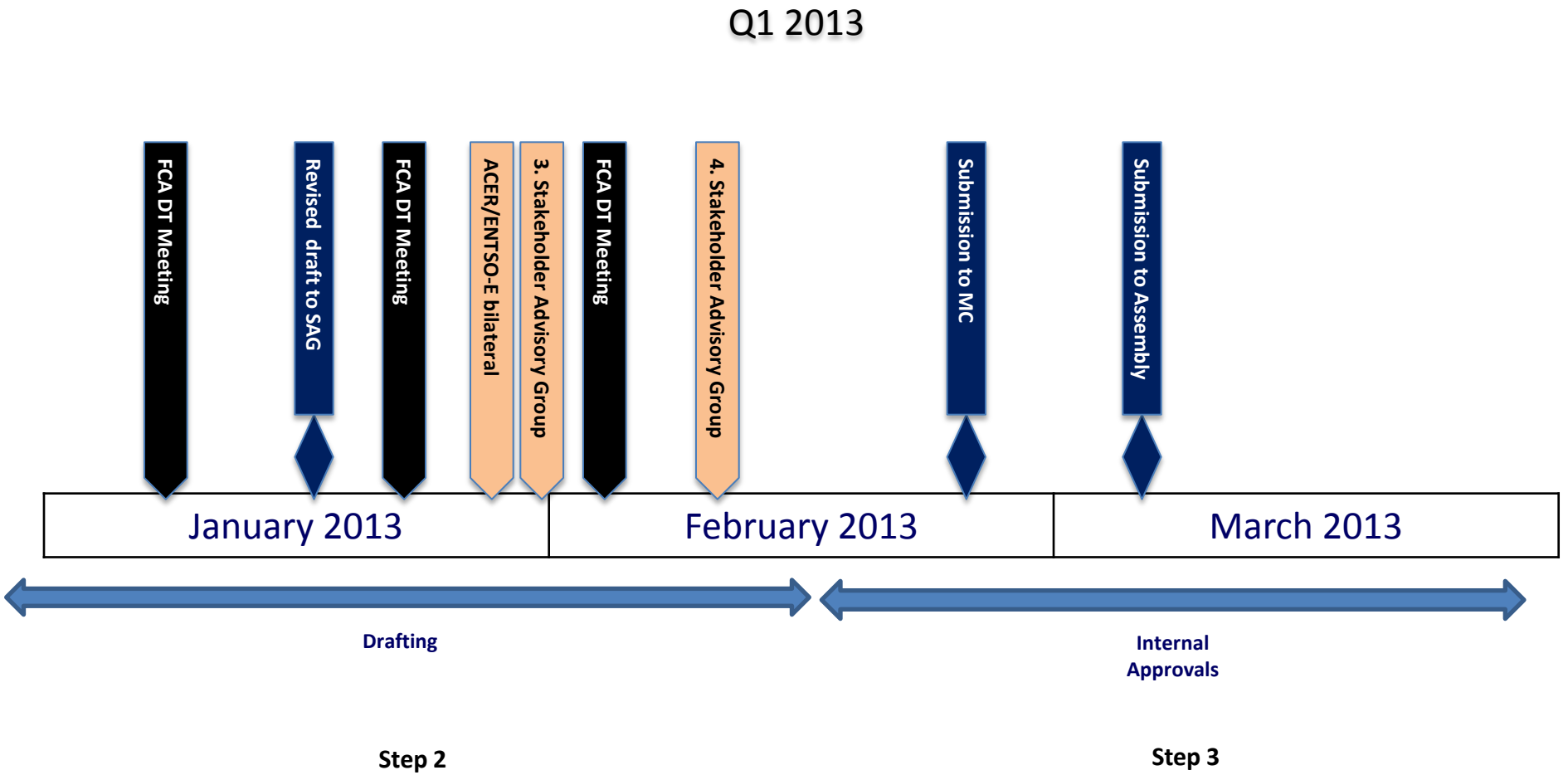
Stages of Network Code Development (II)



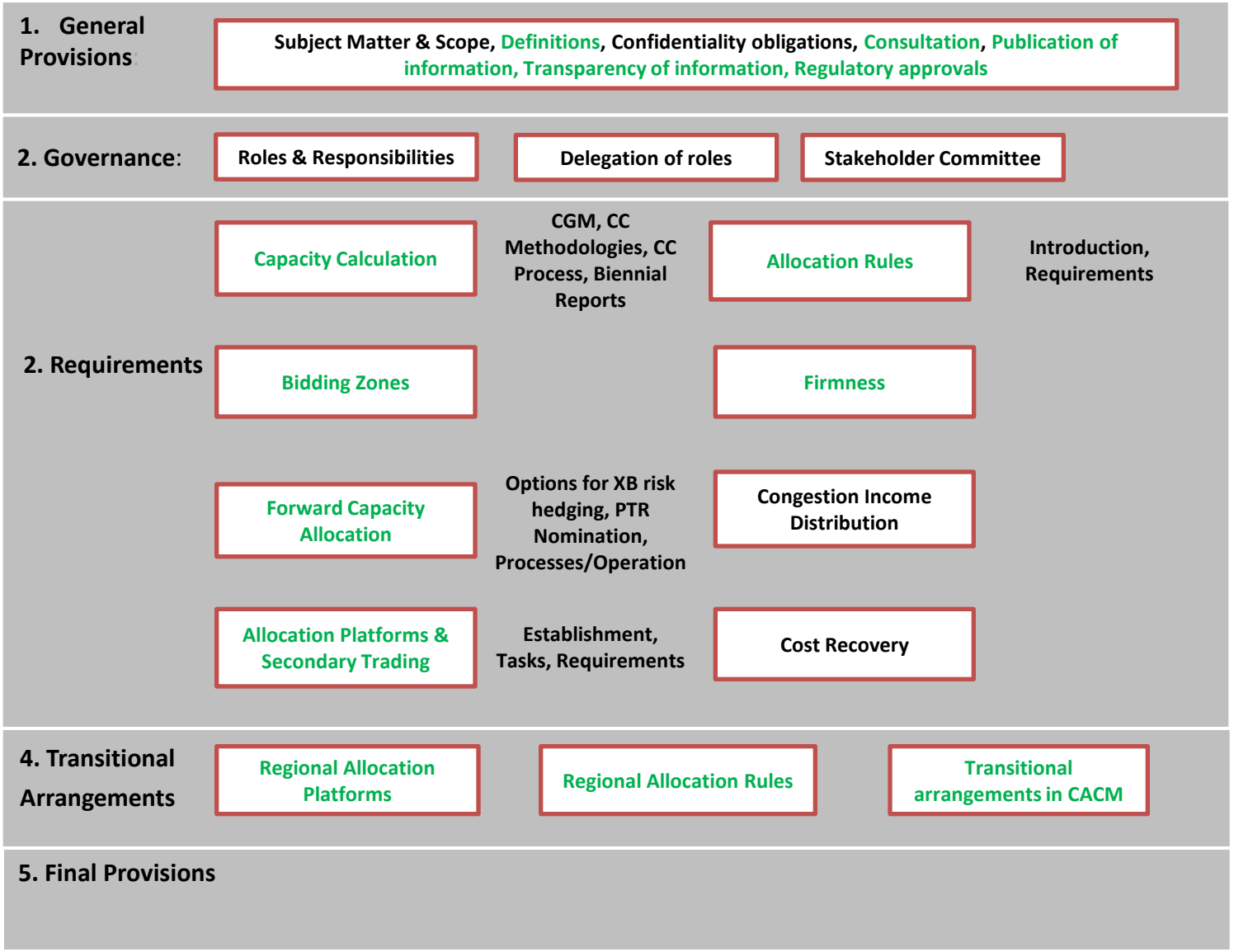
Network Code Development – FCA



Network Code Development – FCA



FCA Network Code Draft Contents (1/10/12)



Other Developments

MiFID II

- 3 December – Council compromise
  - Exempts auction offices
  - Secondary markets may not be covered under exemption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