



# Eurocodes

Background and Applications

## Design of **Steel Buildings** with worked examples



16-17 October 2014  
Brussels, Belgium

## The present and the future of the Eurocodes

Dr Steve Denton FREng  
Chairman, CEN/TC 250

### Organised and supported by

European Commission

DG Enterprise and Industry  
Joint Research Centre

European Convention for Constructional Steelwork

European Committee for Standardization

CEN/TC250/SC3

Joint  
Research  
Centre

# Content

- Welcome
- Background
- Implementation
- Future developments
- Final remarks



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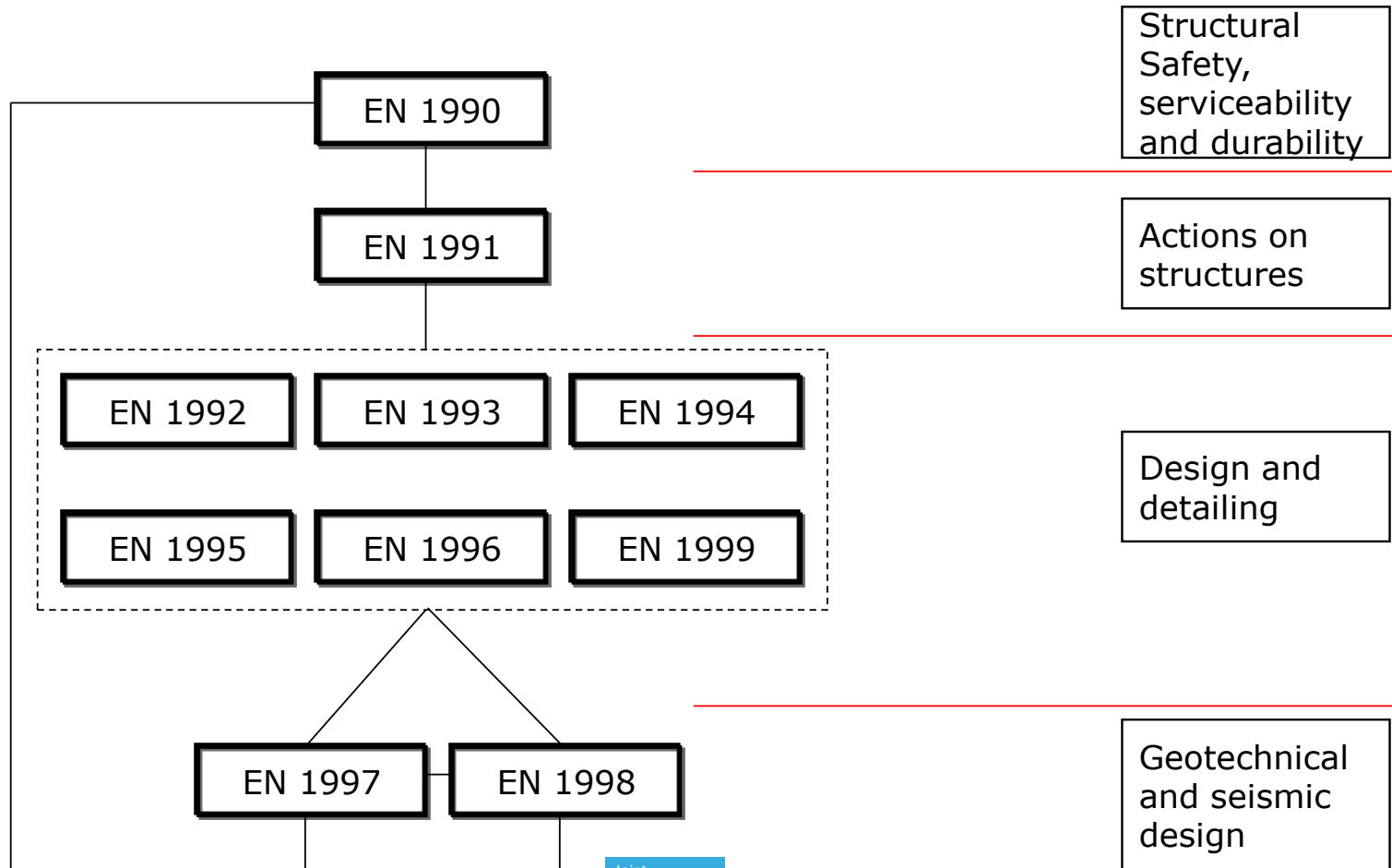


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# Eurocodes: 10 Standards in 58 Parts for Structural and Geotechnical Design



## Management Group

Chairman: S Denton

Chairman's  
Advisory Panel(s)

## TC 250 Structural Eurocodes

Chairman: S Denton  
Vice Chair: G Breitschaft and M Fardis  
Secretary: T Wilkins [BSI]  
CEN PM: G Ascensao

## TC 250 Coordination Group

Chairman: S Denton  
Secretary: T Wilkins [BSI]

### Horizontal Group Bridges

Convenor: S Denton\*

### Horizontal Group Fire

Convenor: B Zhao

### WG1 – Policy and guidelines

Convenor: J Moore

## Other WG

### WG2 – Existing Structures

Convenor: P Lüchinger [SNV]

### WG3 – Structural Glass

Convenor: M Feldmann [DIN]

### WG4 – Fibre reinforced polymer

Convenor: L Ascione [UNI]

### WG5 – Membrane Structures

Convenor: M Mollaert [NBN]

### WG6 – Robustness

Convenor: R Van der Pluijm [NEN]

## SC/WG for Existing Eurocodes

### WG7 – EN 1990

Convenor: P Formichi  
Secretary: V Meløysund [SN]

### SC5 – EN 1995

Chairman: S Winter  
Secretary: A Stenmark [SIS]

### SC1 – EN 1991

Chairman: N Malakatas  
Secretary: A Schleifer [DIN]

### SC6 – EN 1996

Chairman: R Van der Pluijm  
Secretary: P Rauh [DIN]

### SC2 – EN 1992

Chairman: H Ganz  
Secretary: A Schleifer [DIN]

### SC7 – EN 1997

Chairman: A Bond  
Secretary: M Lurvink [NEN]

### SC3 – EN 1993

Chairman: U Kuhlmann  
Secretary: S Kempa [DIN]

### SC8 – EN 1998

Chairman: E Carvalho  
Secretary: E Coelho [IPQ]

### SC4 – EN 1994

Chairman: G Couchman  
Secretary: B Borchert [BSI]

### SC9 – EN 1999

Chairman: F Mazzolani  
Secretary: R Saegrov [SN]

# Understanding Eurocode implementation

**Eurocodes  
(EN1990 – EN1999)**

European standards for construction

# Understanding Eurocode implementation

**Eurocodes  
(EN1990 – EN1999)  
+  
National Annexes**

European standards for construction



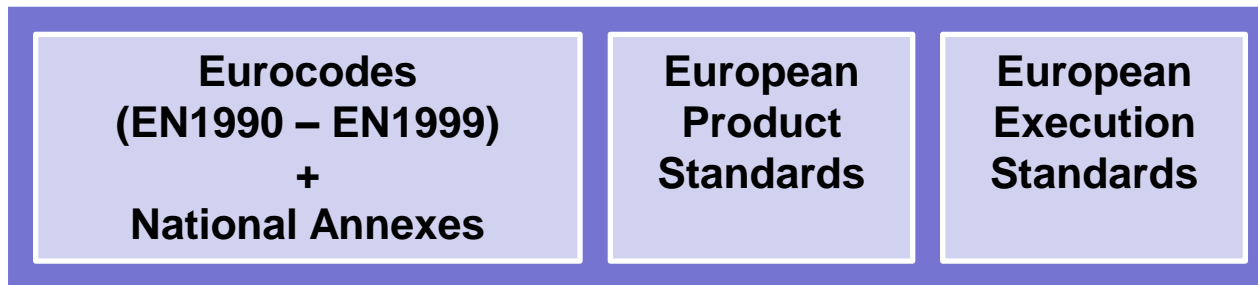
## Understanding Eurocode implementation

**Eurocodes  
(EN1990 – EN1999)  
+  
National Annexes**

**European  
Product  
Standards**

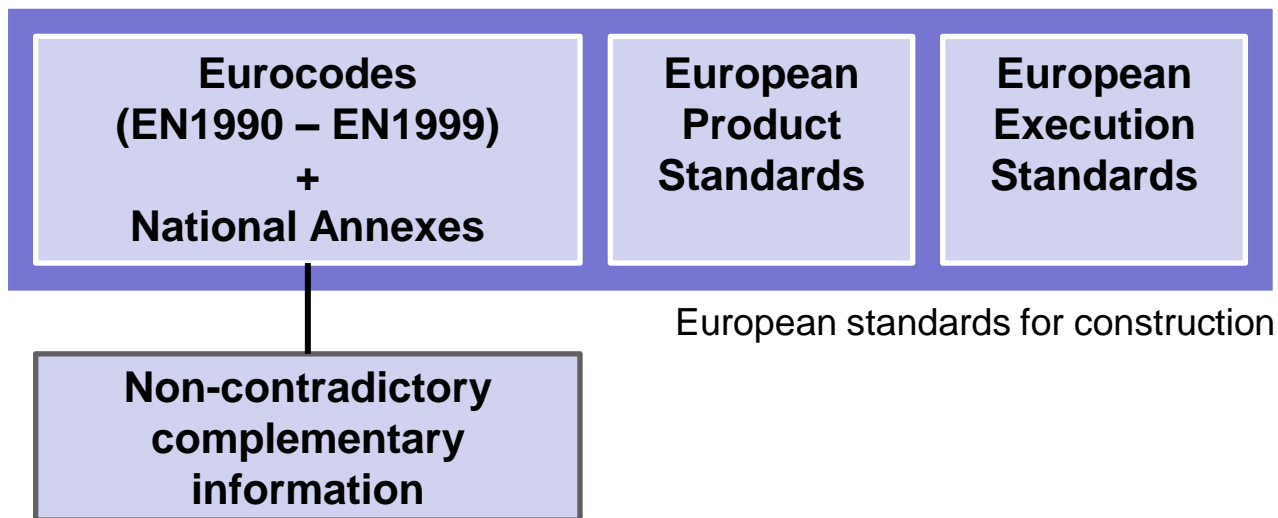
European standards for construction

## Understanding Eurocode implementation

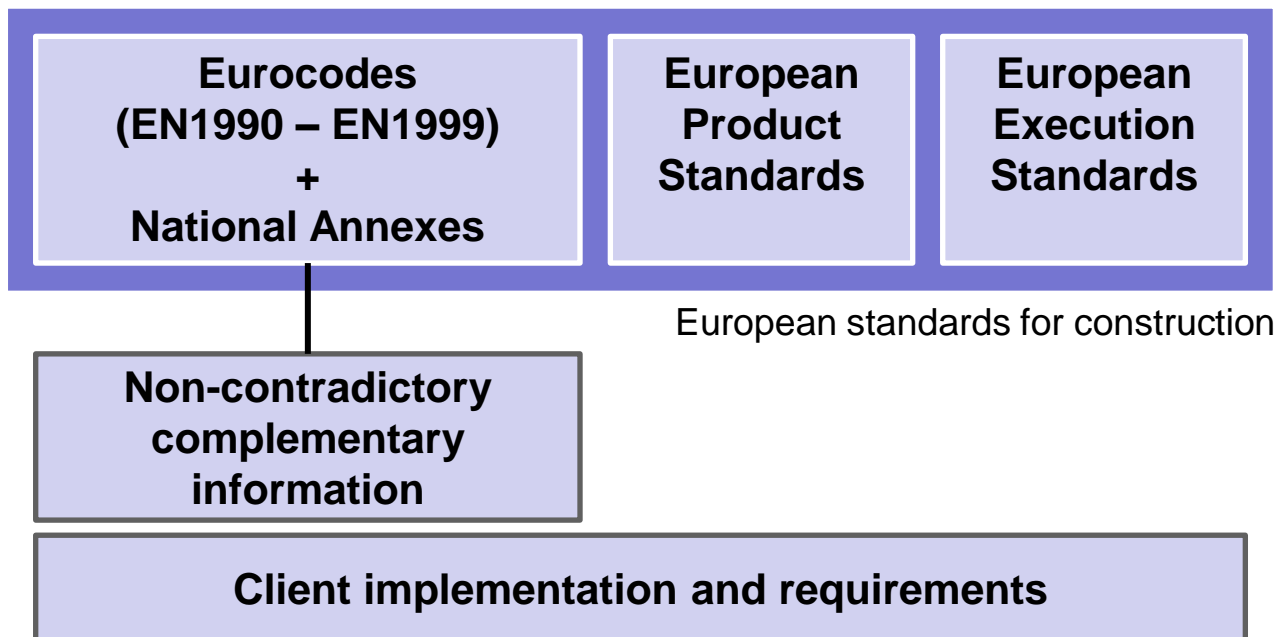


European standards for construction

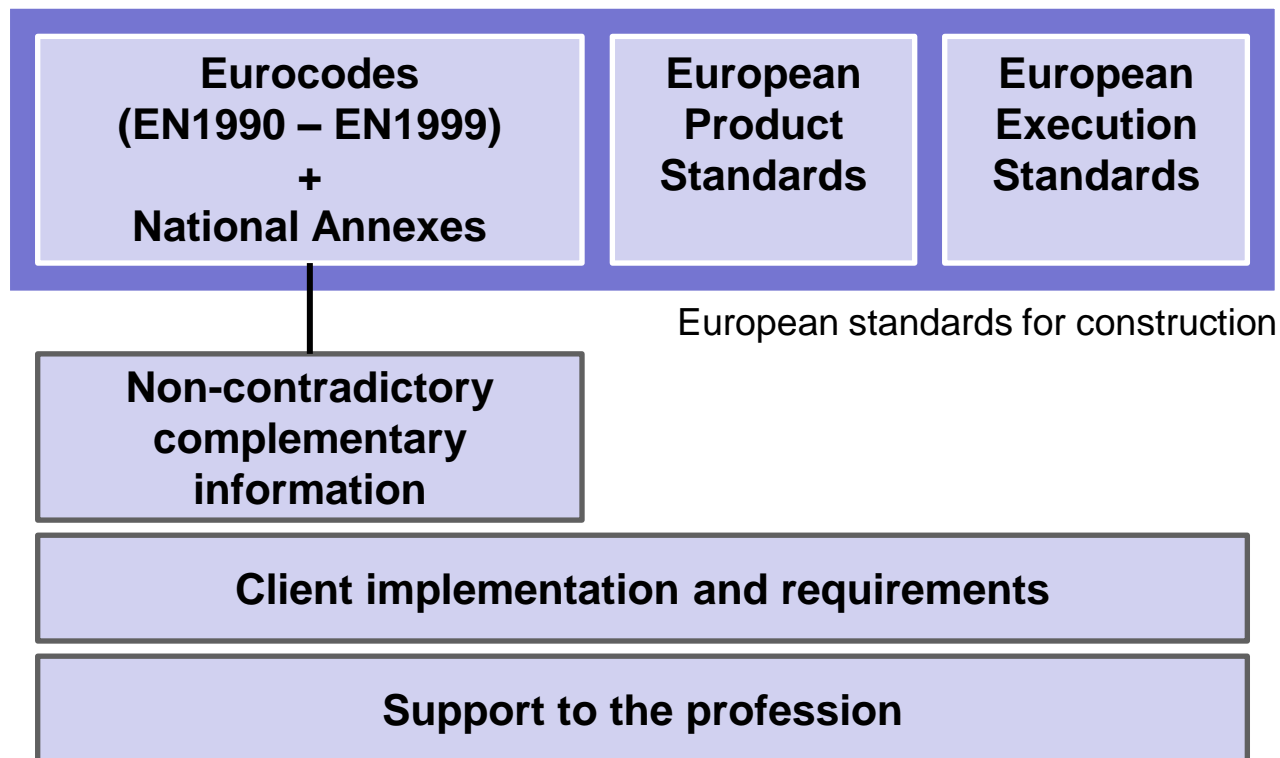
## Understanding Eurocode implementation



## Understanding Eurocode implementation



## Understanding Eurocode implementation



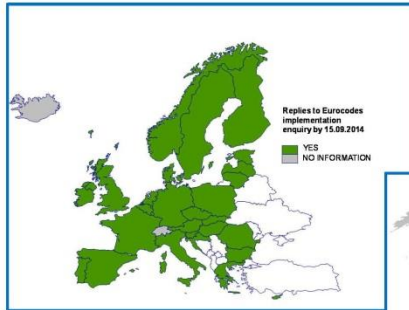
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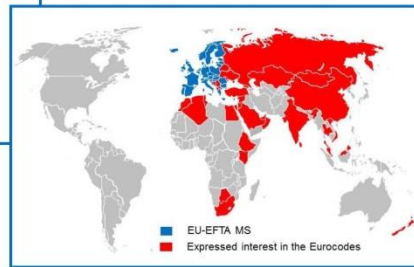


## Are/will be the Eurocodes implemented?

EU/EFTA MS: on-going Commission enquiry



All-over the world

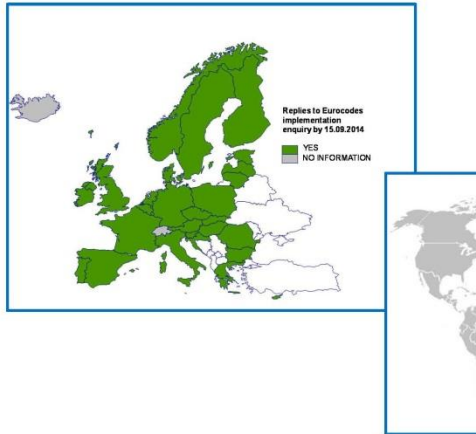


Source: European  
Commission

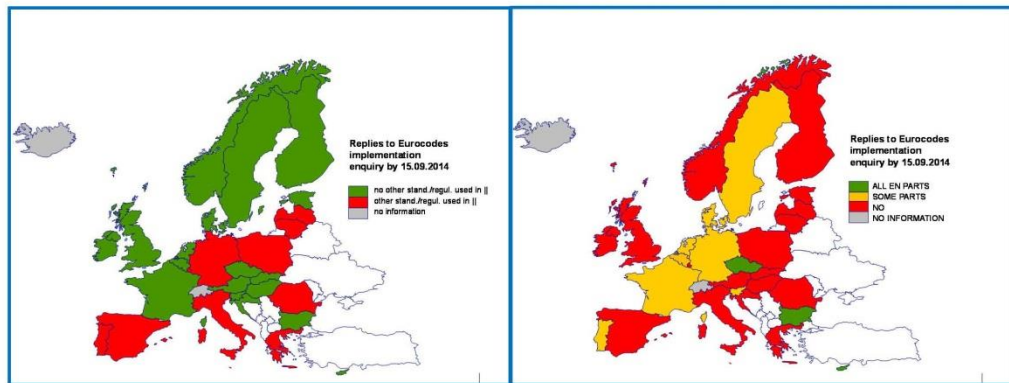


## Are/will be the Eurocode

EU/EFTA MS: on-going Commission enquiry



## Eurocodes implementation



No other standards/regulations (will be) used in parallel

Are/will be the Eurocodes obligatory?

Joint Research Centre

Source: European Commission



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# Timeline

1975

Eurocodes started

## Timeline

1975

1990

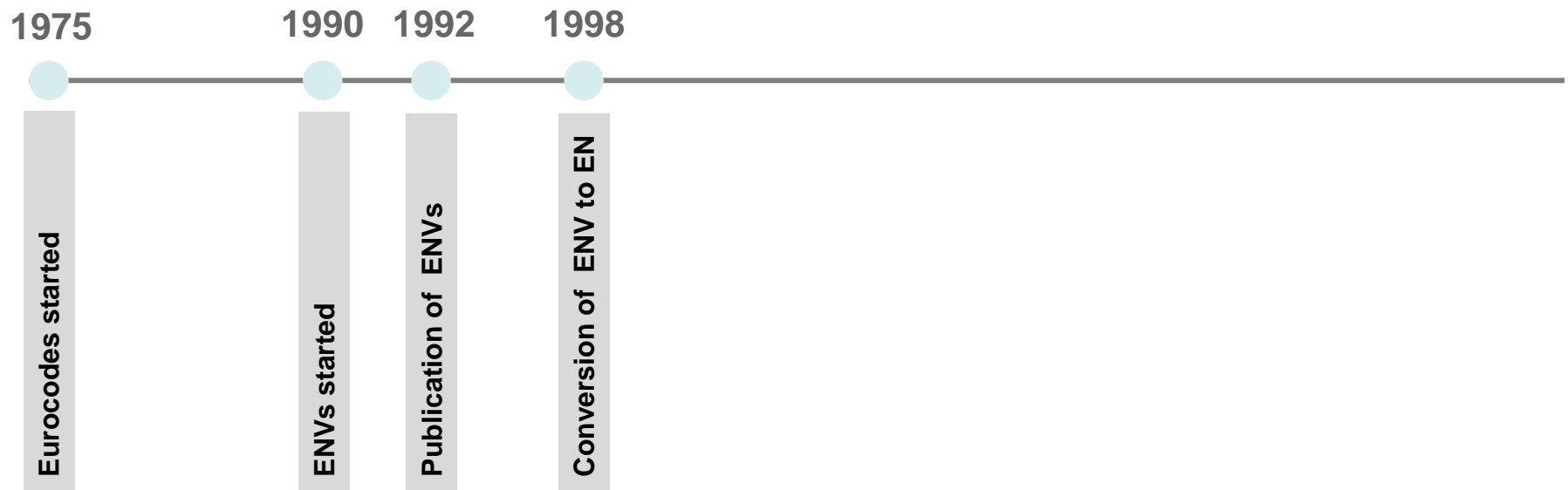
Eurocodes started

ENVs started

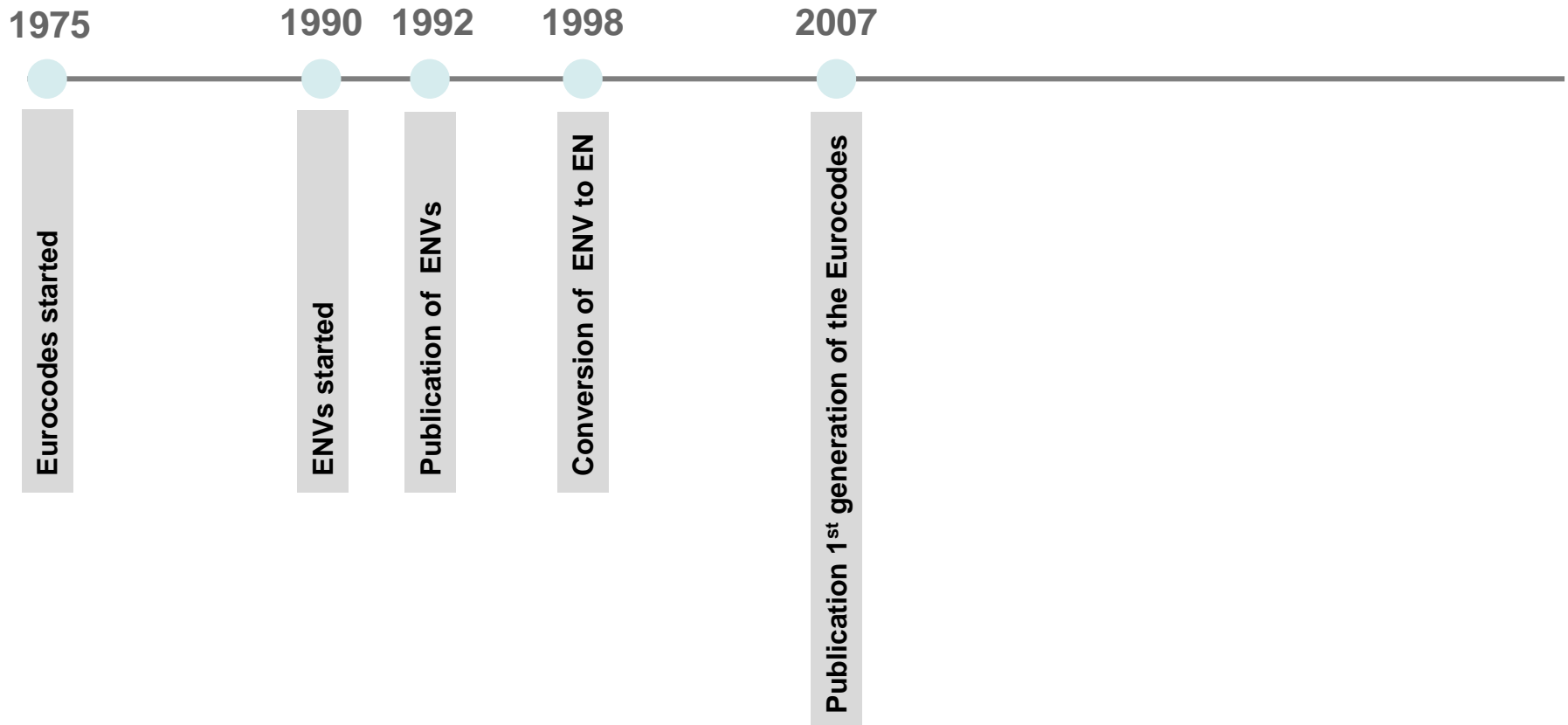
## Timeline



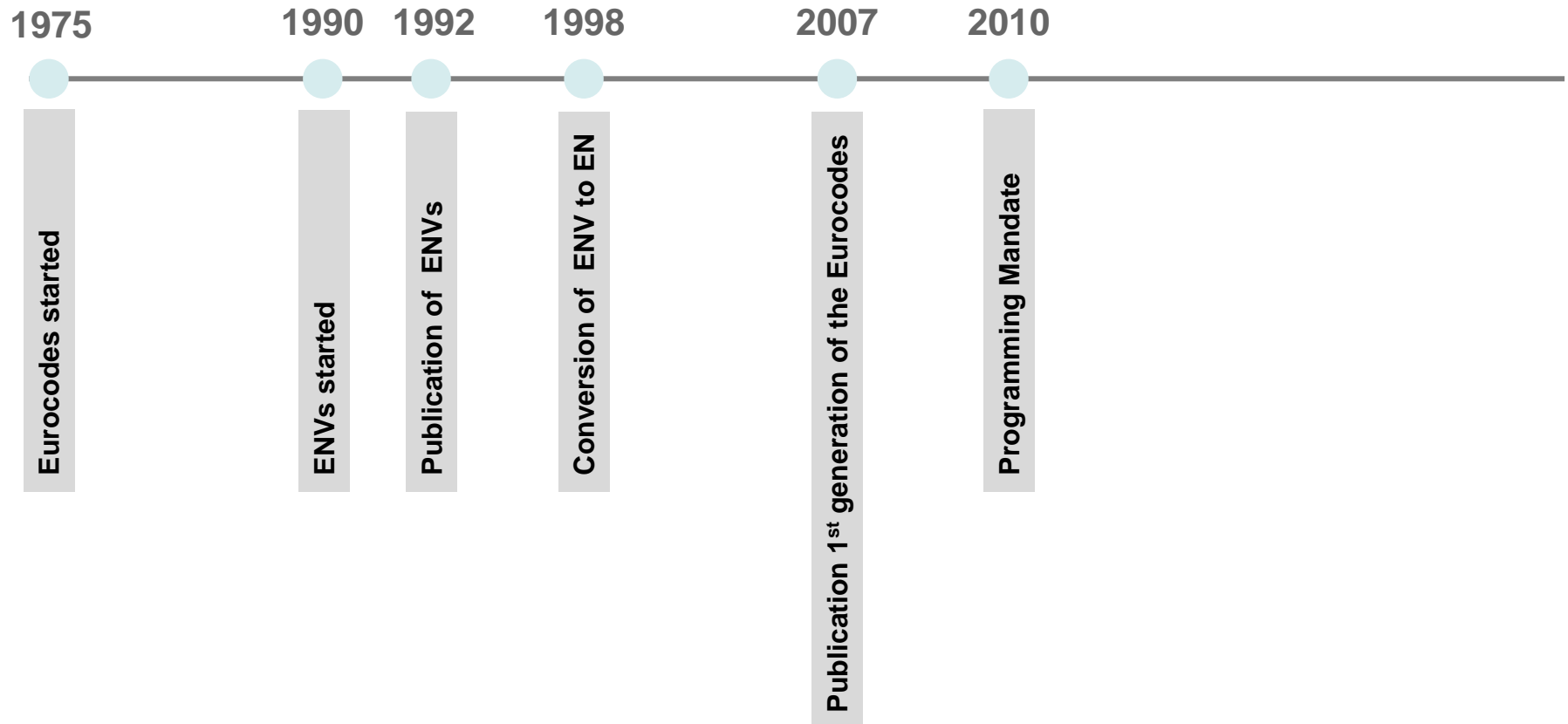
## Timeline



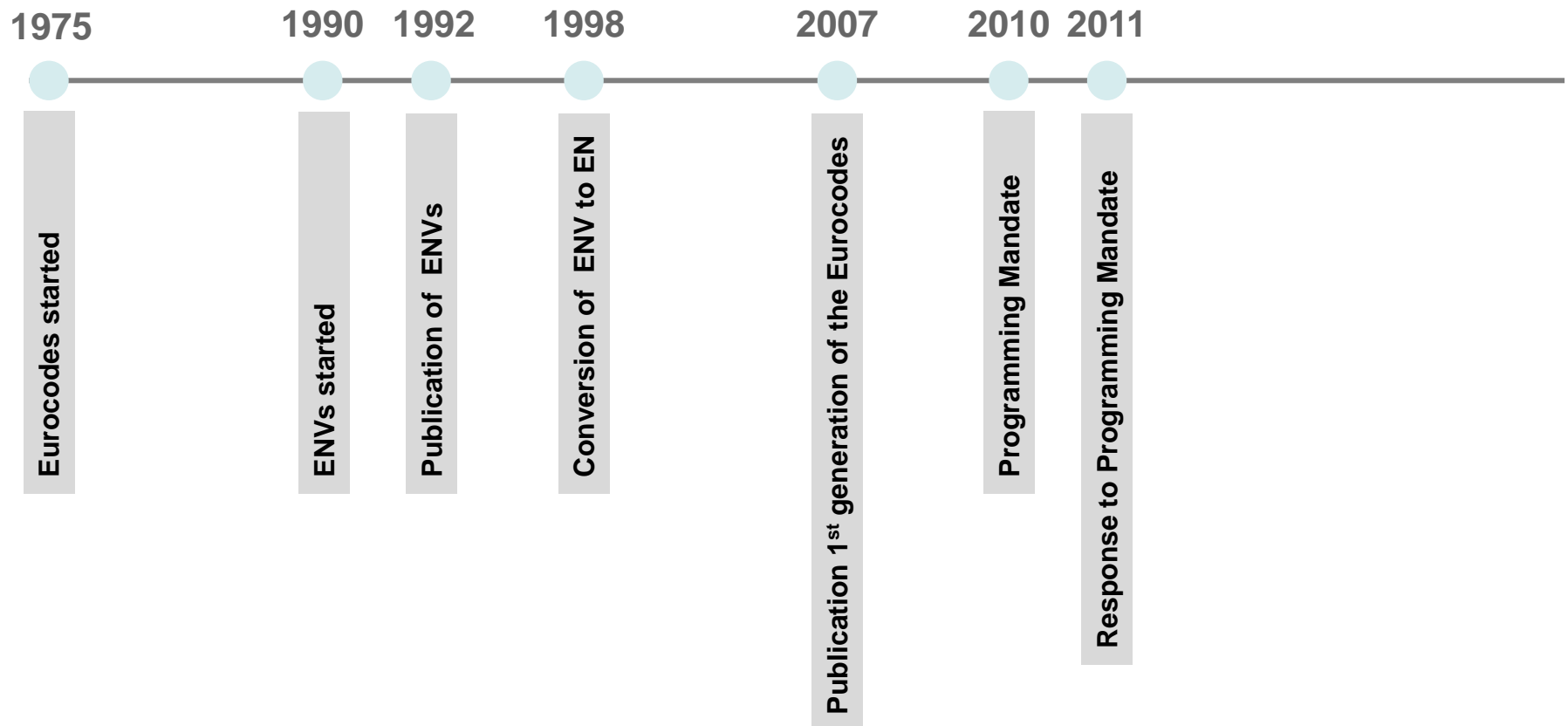
## Timeline



## Timeline

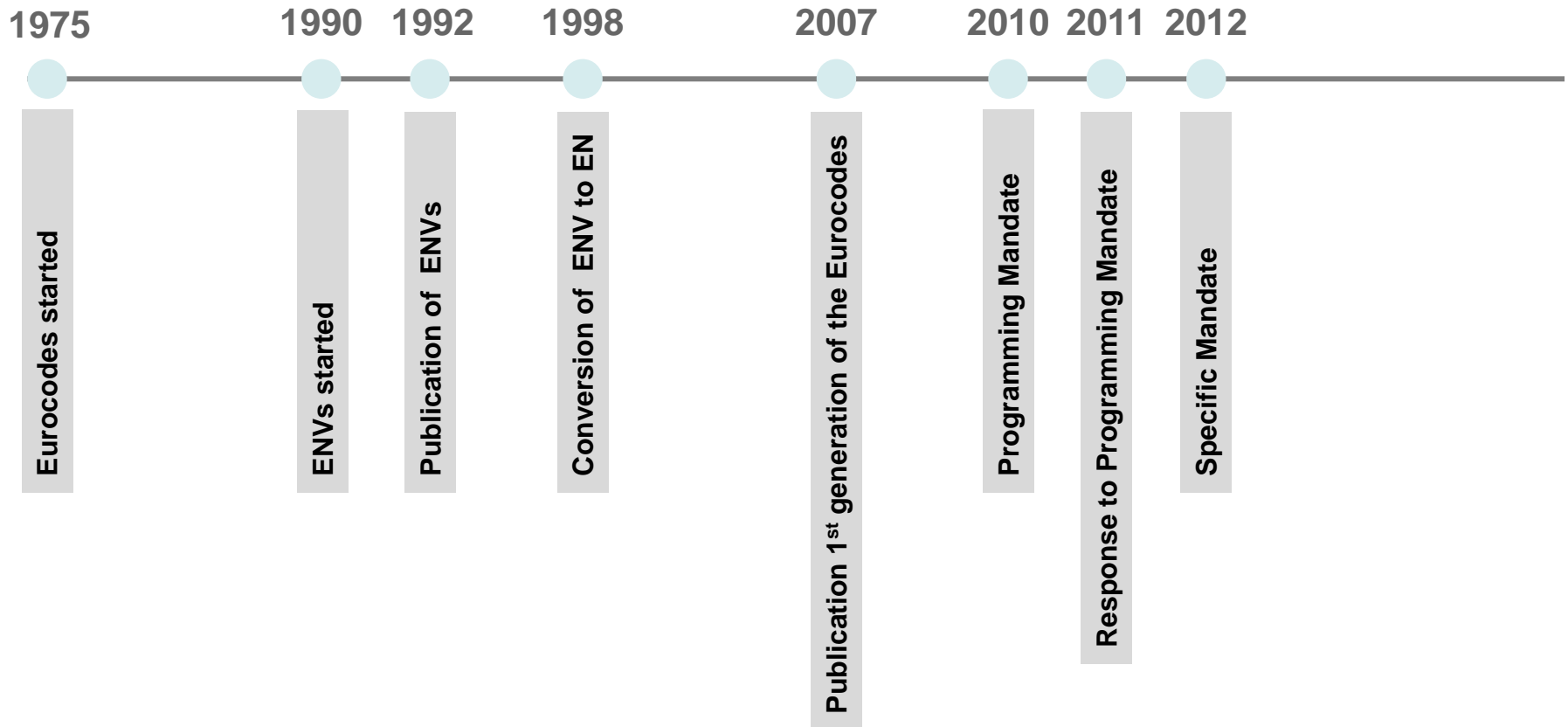


## Timeline

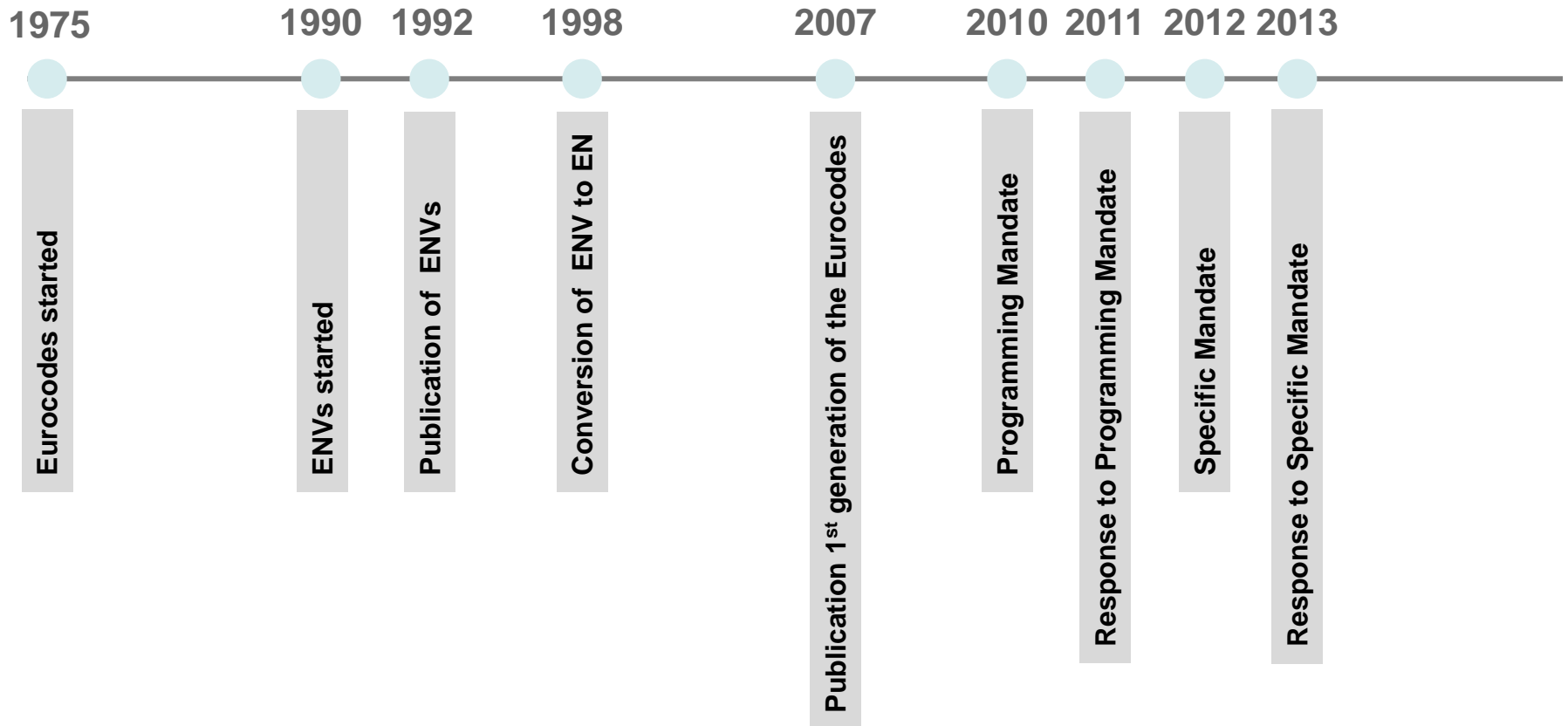




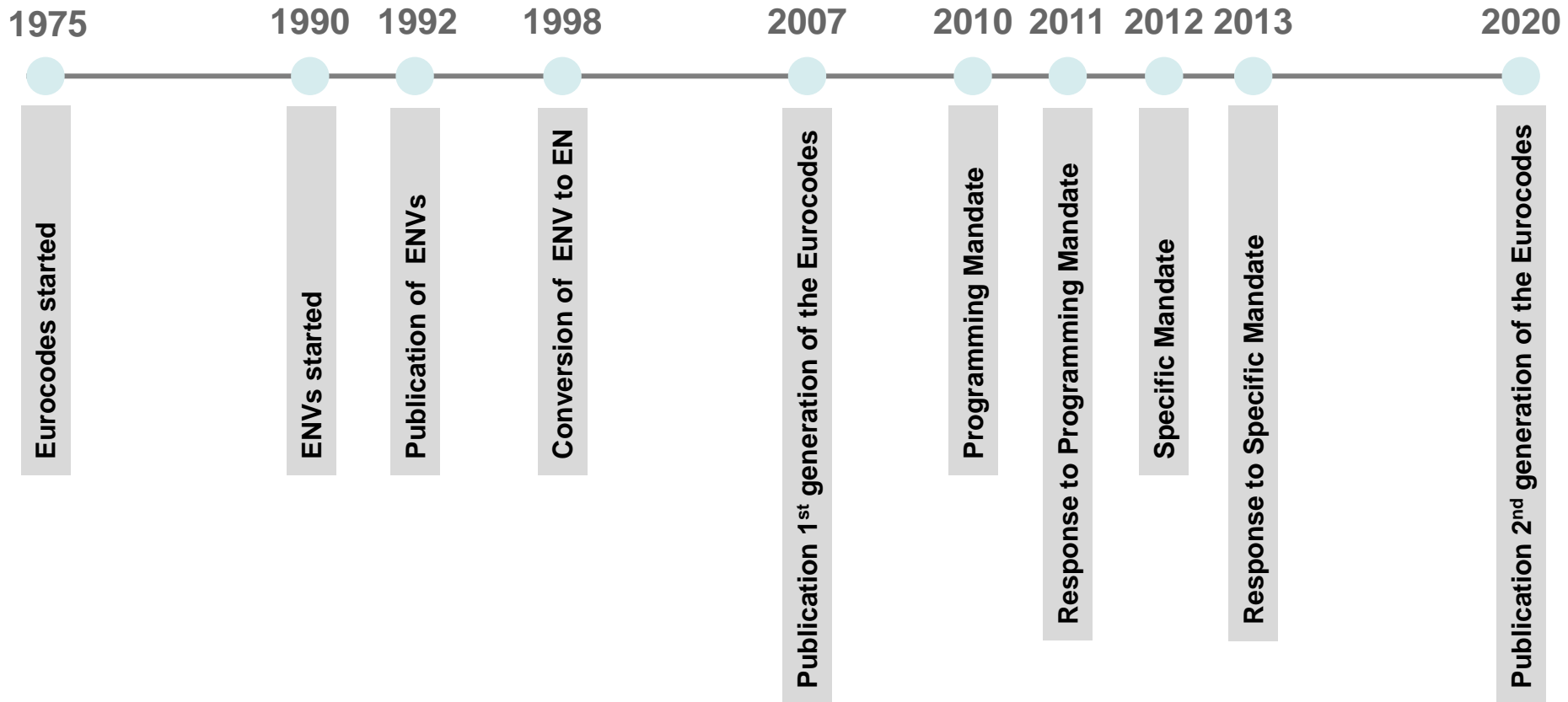
## Timeline



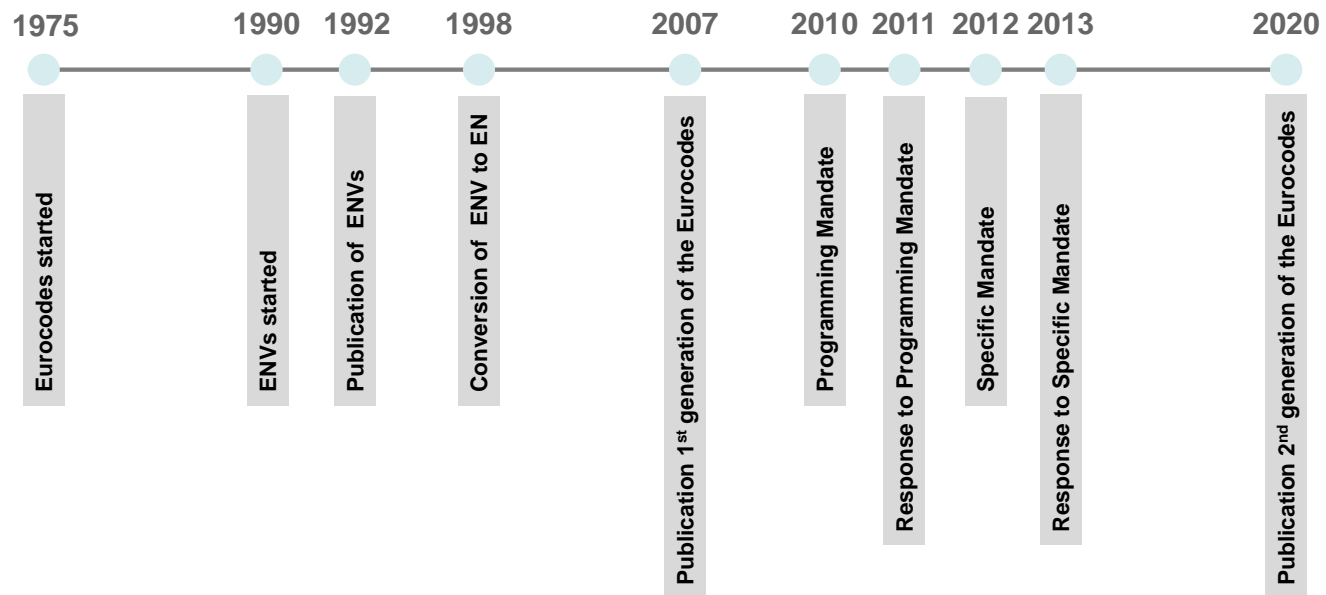
## Timeline



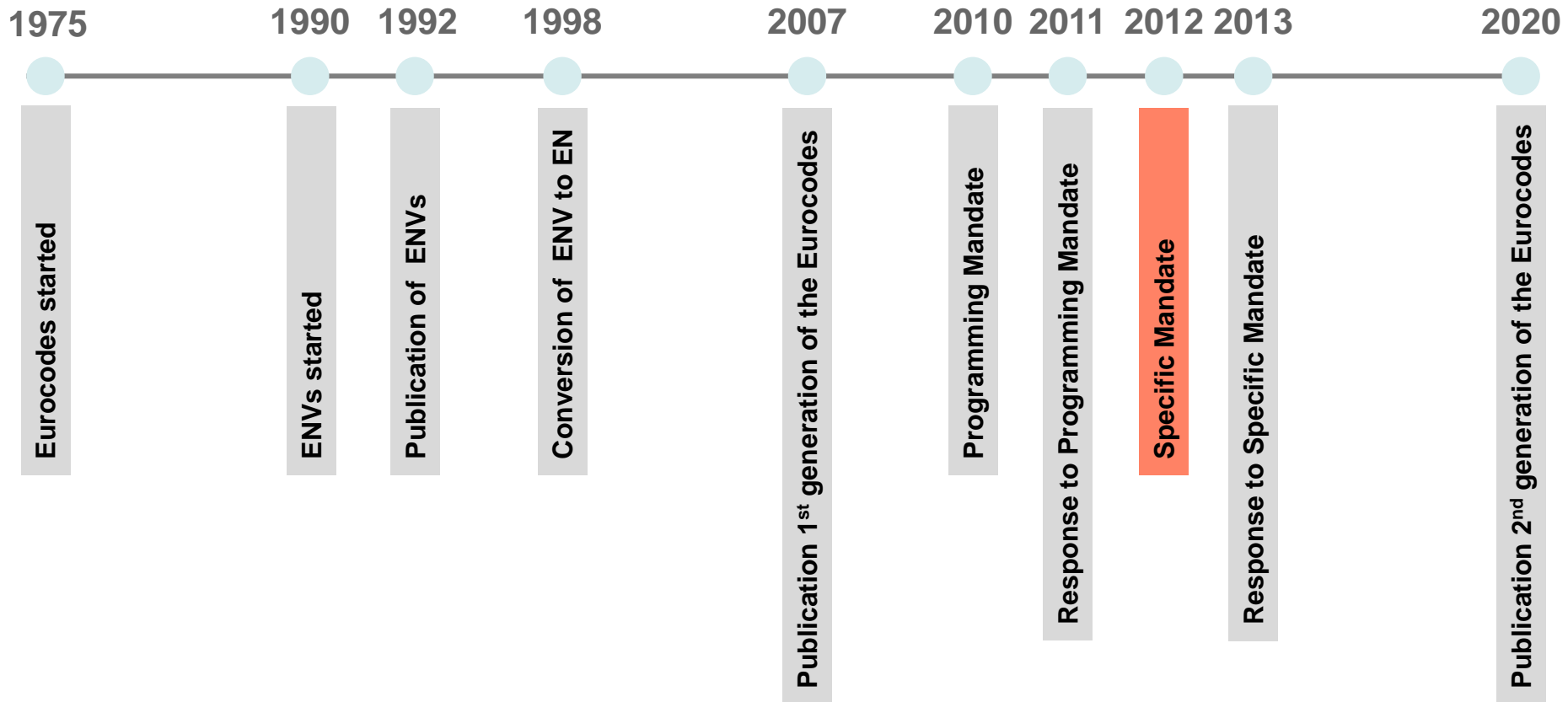
# Timeline



# There will be a period of stability for the published Eurocodes until 2020



# Timeline



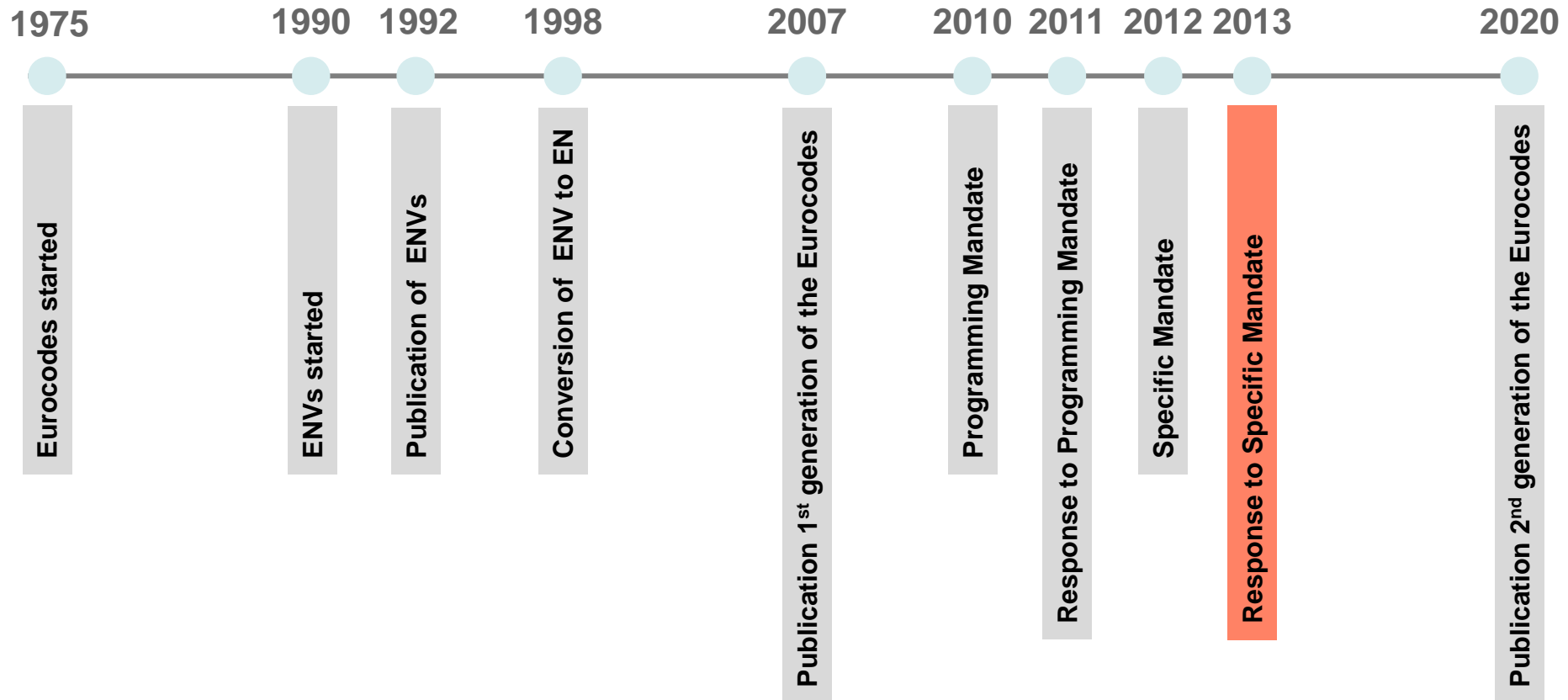
## Specific mandate



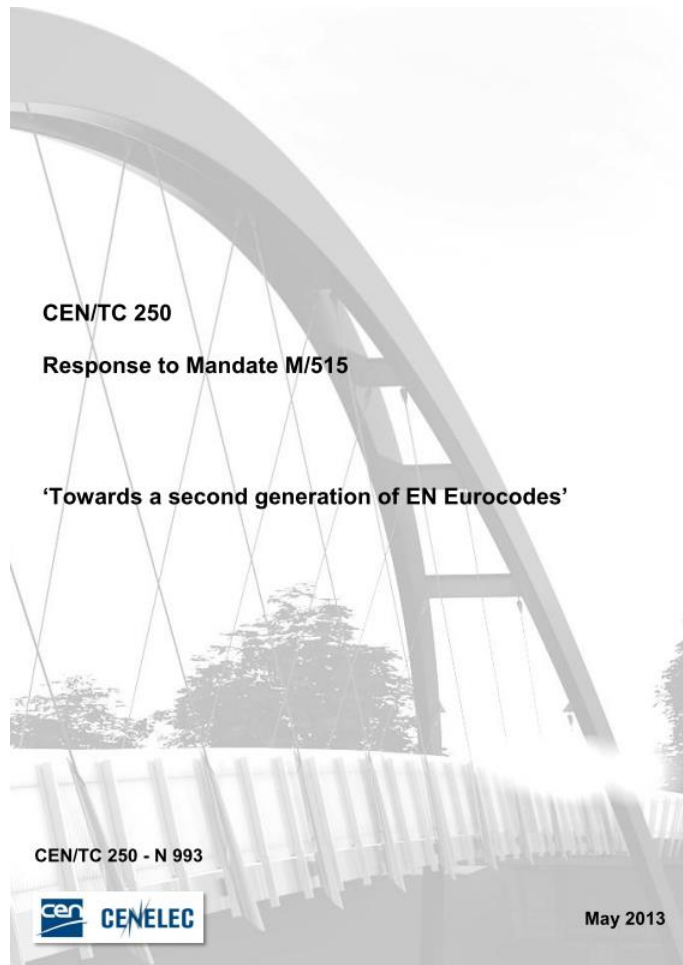
Eurocodes development should:

- Encourage innovation
- Take into account new societal demands and needs
- Facilitate the harmonisation of national technical initiatives on new topics of interest for the construction sector
- Enhance user-friendliness

## Timeline



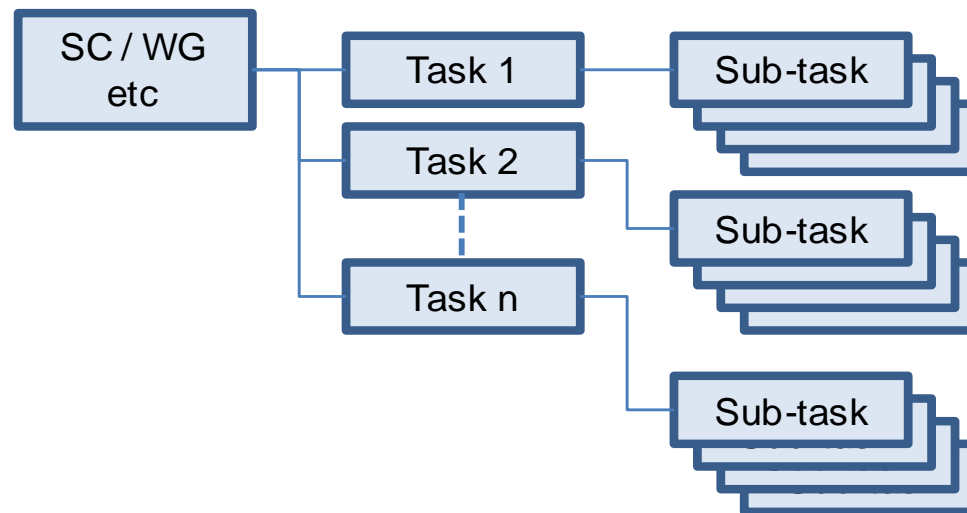
## Response to mandate



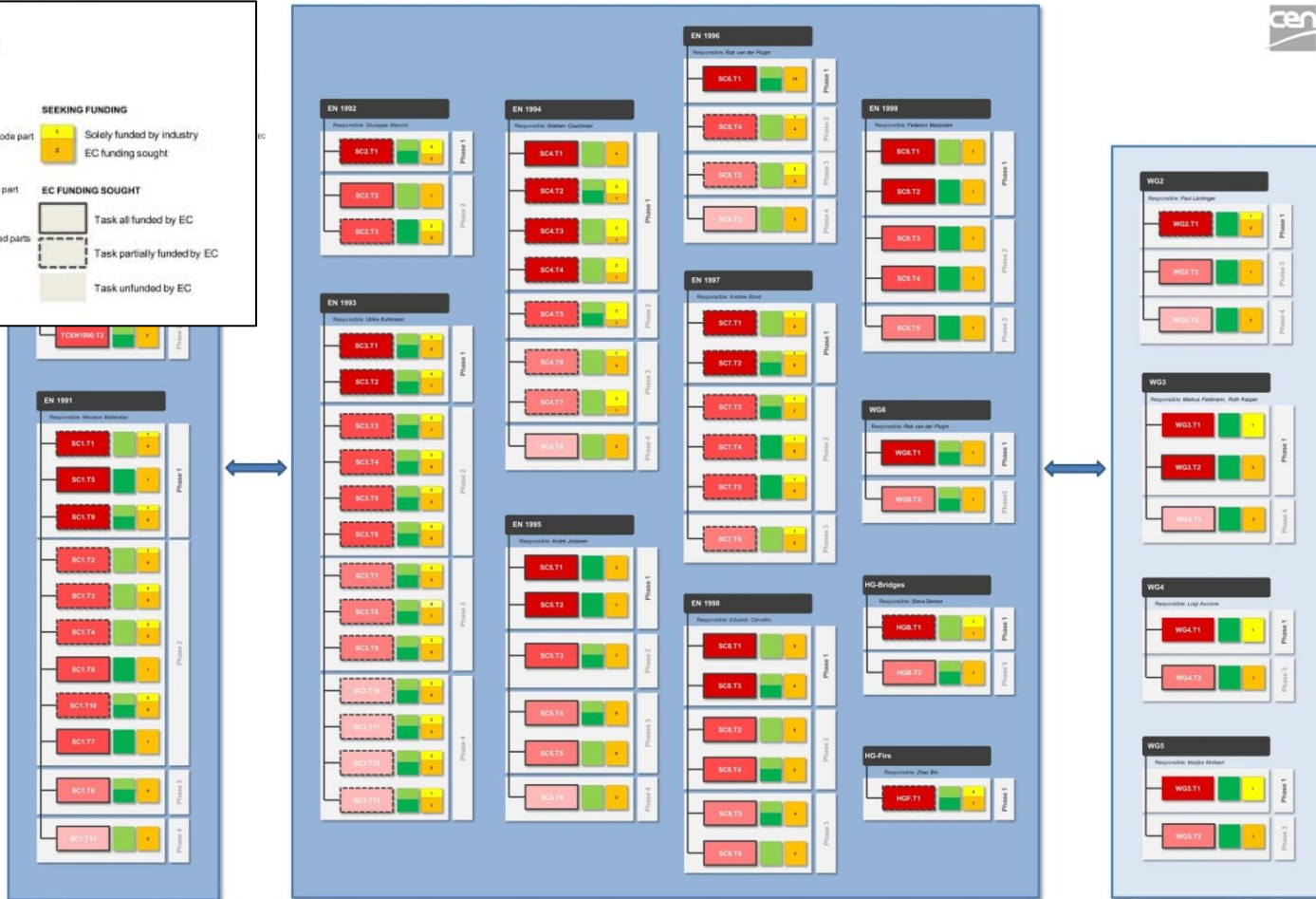
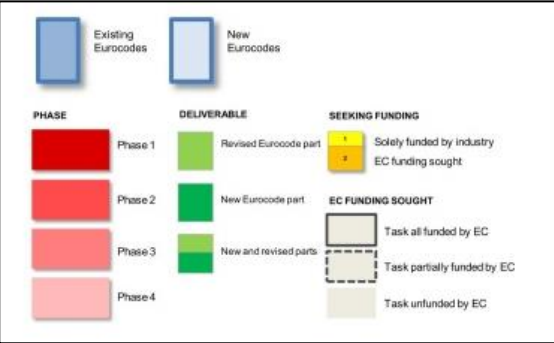
- 138 pages
- Over 1000 experts from across Europe involved
- Structure of tasks and sub-tasks
- Phased programme



## Structure of tasks and sub-tasks



# Overall structure of work programme (Annex 2)





# Complete work programme (Annex 1)

TCEN1990		Response to Mandate M/515 EN: Structural Eurocodes				
<b>Task Ref:</b>	<b>TCEN1990.T1</b>	<b>Task Name:</b>	Evolution of EN1990 – General			
<b>Proposed Task Phase:</b>	<b>P1</b>	<b>Deliverable:</b>	A new version of EN 1990 with an increased scope reflecting needs identified by National Standard Bodies and the other Eurocodes, together with background information for all changes and new material, excluding new version of Annex A2 for bridges and new Annex Es relating to bearings and expansion joints.			
<b>Outline Task Scope:</b>	Revision of EN 1990 to incorporate comments from the EN 1990, 5 year review and requirements from other Eurocodes for principle guidance on fatigue, non-linear analysis etc with the Specific Mandate Section 5 from Mandate for amending existing Eurocodes and extending the scope of structural Eurocodes (Document Doc.28/2012 – EN, Brussels, 13th July 2012). Scope does not include specific work relating to Bridges which is included in Task TCEN1990.T2.					
<b>Starting documents:</b>	EN 1990: Basis of Structural Design					
<b>Justification for inclusion in Phase 1:</b>	EN 1990 is the head Eurocode, setting the rules for achieving safety, serviceability, robustness and durability as well as Reliability and Quality Management for the other 57 parts of the Structural Eurocode suite and CEN structural product standards. It is the cornerstone for all other Structural Eurocodes and serves as a template for the development of new parts as well as revision of existing standards. The items identified by the CEN/TC250/Expert Group for the revision of EN 1990 described in this proposal have been developed collaboratively with a representative cross section of stakeholders and need to be given priority. The selected tasks will further support and strengthen harmonisation, the development of an EU Internal Market in the design and construction sector. The work takes into account market and research developments in materials, products, construction techniques and design methods in the sector. It also reflects new societal needs and demands as linked to structural design of buildings and other construction works. Therefore EN 1990 as the head code needs to be updated at the earliest convenience so as to form a basis for the work of the other sub-committees. As full a draft as possible must be made available at end of Phase 1.					
Sub-task Ref.	Sub-task name	Brief description, background and reasons for the work (including any additional comments / notes)	Interdependencies Identify known Task (sub-tasks) that must be substantially completed before this sub-task can commence.  (Interdependencies within individual Tasks do not need to be identified)	Key benefits	Output (a.g. new Eurocode part; new or modified clauses in existing Eurocode part)	Priority item for EC contract
1	Reduction in number of National Choices (NDPs)	Review the contents of all Countries' National Annexes and supporting documents, where they provide information needed to implement the Eurocode Part. Compare the values or choices made by all Countries in their relevant National Annex, using if possible, the JRC database of collected National values and choices. Where little or no variation exists between Countries, eliminate the NDP; where there is good consensus, but not unanimity, seek to persuade those not using that value or choice to adopt it. In cases of wide variation between Countries, seek the reasons for them and try to eliminate them so that consensus can be achieved, for example by use of international studies and research.				✓
2	Enhanced ease of use	Enhance ease of use by improving clarity, simplifying routes through the Eurocode, avoiding or removing rules of little practical use in design and avoiding additional and/or empirical rules for particular structure or structural-element types, all to the extent that it can be technically justified whilst safeguarding the core of essential technical requirements. Take into account feedback from users of the Eurocode.				✓
3	Transfer of Basis of Design rules from EN 1991-1-6, EN 1991-3, EN 1991-4, EN 1993-3-1, EN 1993-3-2 and EN 1991-7.	There are a number of Basis of Design clauses at present included in EN 1991, such as EN 1991-1-6, EN 1991-3 and EN 1991-4, and EN 1993-3-1 and EN 1993-3-2 on Towers and Masts and EN 1991-1-7. These parts, including y factors will be moved to EN 1990, to guarantee consistency with general rules and harmonisation. (N.B. as this is a maintenance activity no resources have been allowed for.)	All work to provide information completed	All Basis of Design information will be in EN 1990 thus avoiding mixed responsibilities that can lead to inconsistency.	New Annexes A3, A4 and A5 in EN 1990.	✓
4	Evolution of management of structural reliability of construction works (Annex B)	Adapt EN 1990 by establishing and implementing control procedures for design and execution in agreement with the principles of the standard, on a national level recognizing differences between the various countries. Making Annex B of EN 1990 more comprehensive by increasing its scope to construction works with higher consequences of failure than Consequence Class 3 and recognizing complexity of design. Improving alignment with Execution Standards (EN 1090 and EN 13670) and appropriate material Eurocodes.	EN 1990 as the head code needs to be updated first so as to form a basis for the work on reliability differentiation of the other SCs and WGs and CEN Committees developing Execution Standards	The evolution of Annex B, which is expected to be updated first so as to form a basis for the work on reliability ensure that the assumptions in the Eurocodes relating to quality management during design and execution are fulfilled and thus leading to increased levels of safety. EN 1990 as the Head code will ensure alignment with related annexes in material parts together with consistent approach.	Revised Annex B and revisions to Section 2.	✓
5	Robustness	Review and update as necessary the requirements for Robustness in Section 2 of EN 1990 in the light of recent published cost action (COST Action TU0601, 2011) report. It is expected that work will also include moving some information from EN 1991-1-7 to EN 1990 and further developing these rules. This will be in liaison with WG6: Robustness.	In liaison with WG6: Robustness	Ensure that the requirements for robustness reflect the latest state of the art.	Updated Section 2 of EN 1990. Based on the recommendations of WG6 the inclusion of new clauses into EN 1990, based on content currently included in other Eurocodes.	✓
6	Sustainability	Update EN 1990 to include aspects of sustainability relevant to the scope of the Eurocodes, responding to the relevant requirements for Sustainability developed by e.g. TC 350. At the present time any amendment will be Section 2 Requirements.	EN 1990 as the head code needs to be updated first so as to form a basis for the work of the other SCs and WGs.	EN 1990 will address the new Requirement the "Sustainable use of natural resources" in particular as it addresses durability in the CPR.	New and modified clauses in EN 1990.	✓

File name: EN1990 Template 3 draft 4.0

Draft/Final version of: 26/04/2013

TC EN 1990 – page: 1 of 3

File name: EN1990 Template 3 draft 4.0

Draft/Final version of: 26/04/2013

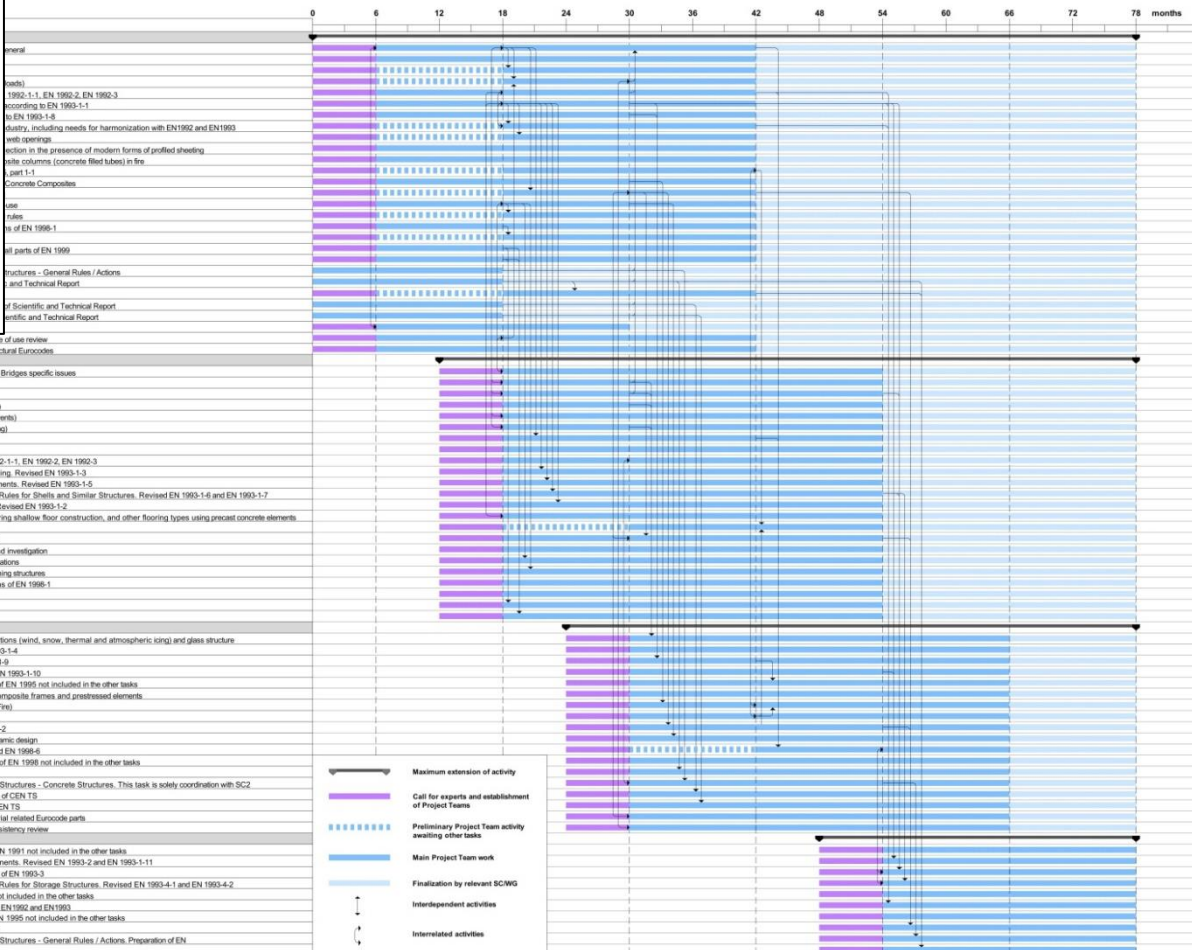
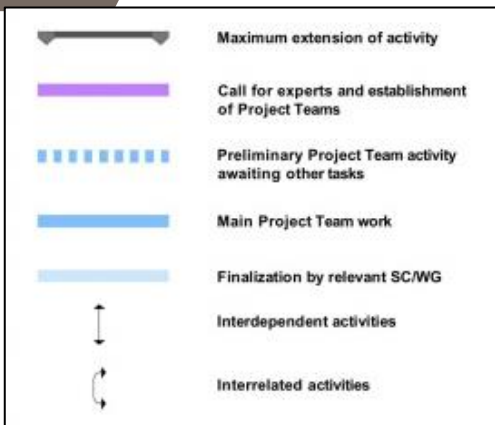
TC EN 1990 – page: 2 of 3

File name: EN1990 Template 3 draft 4.0

Draft/Final version of: 26/04/2013

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# Outline Schedule (Annex 3)



EN 1990

EN 1991

EN 1992

EN 1993

EN 1994

EN 1995

EN 1996

EN 1997

EN 1998

EN 1999



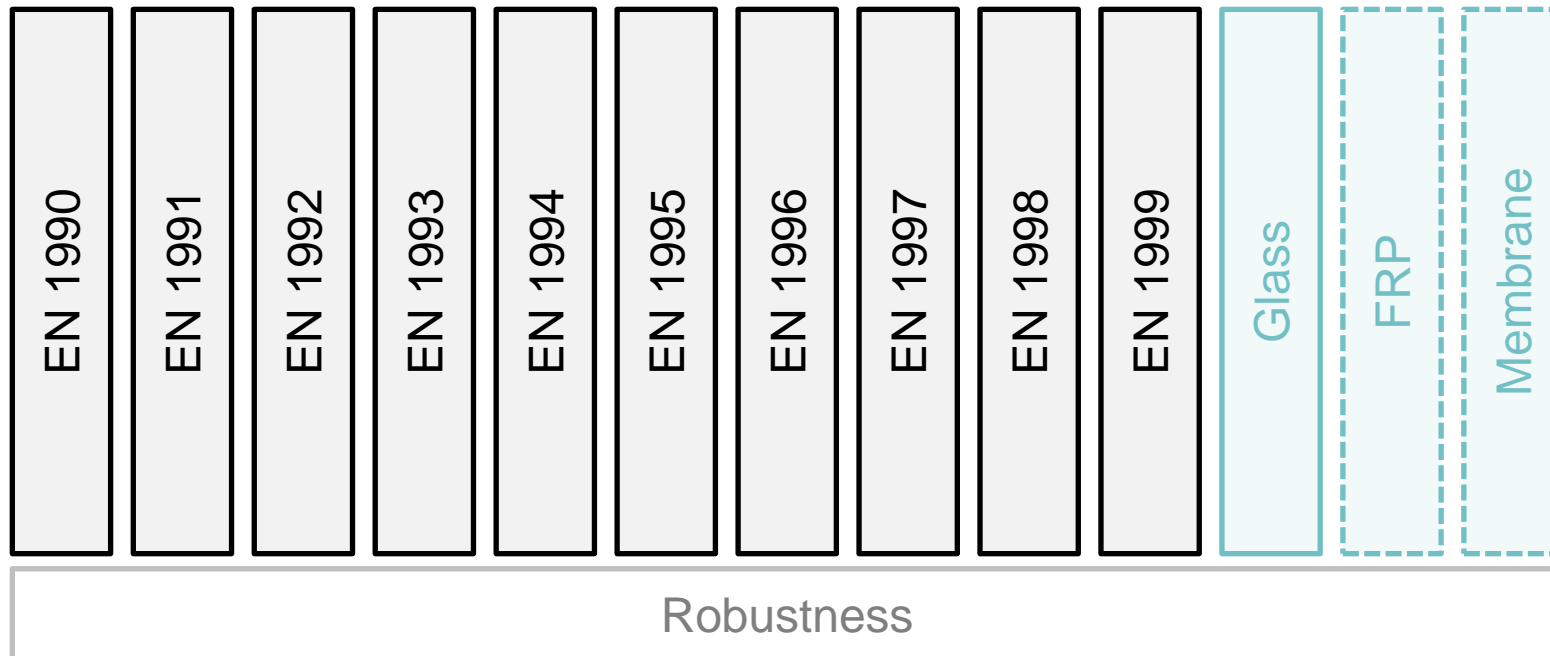


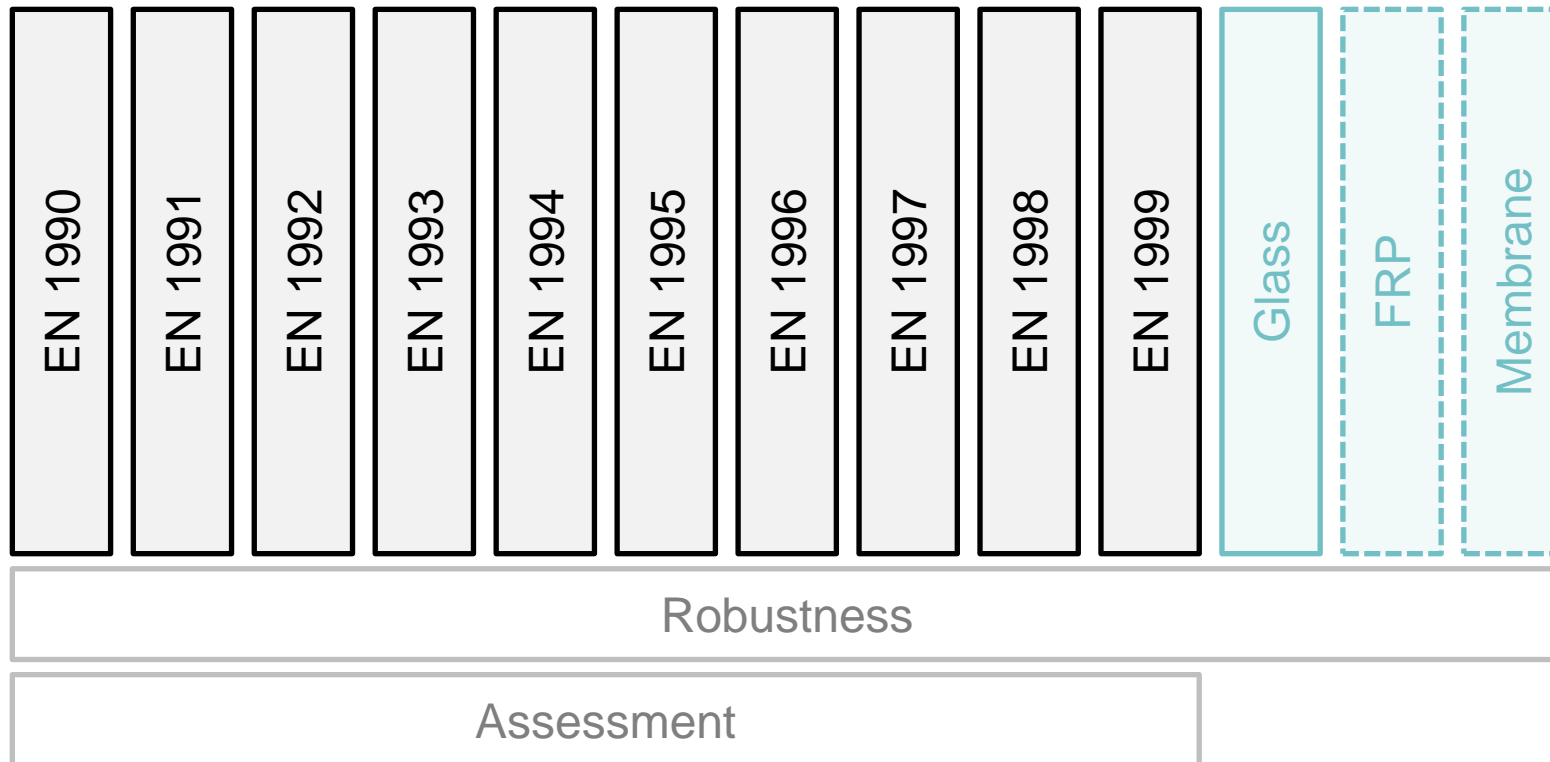


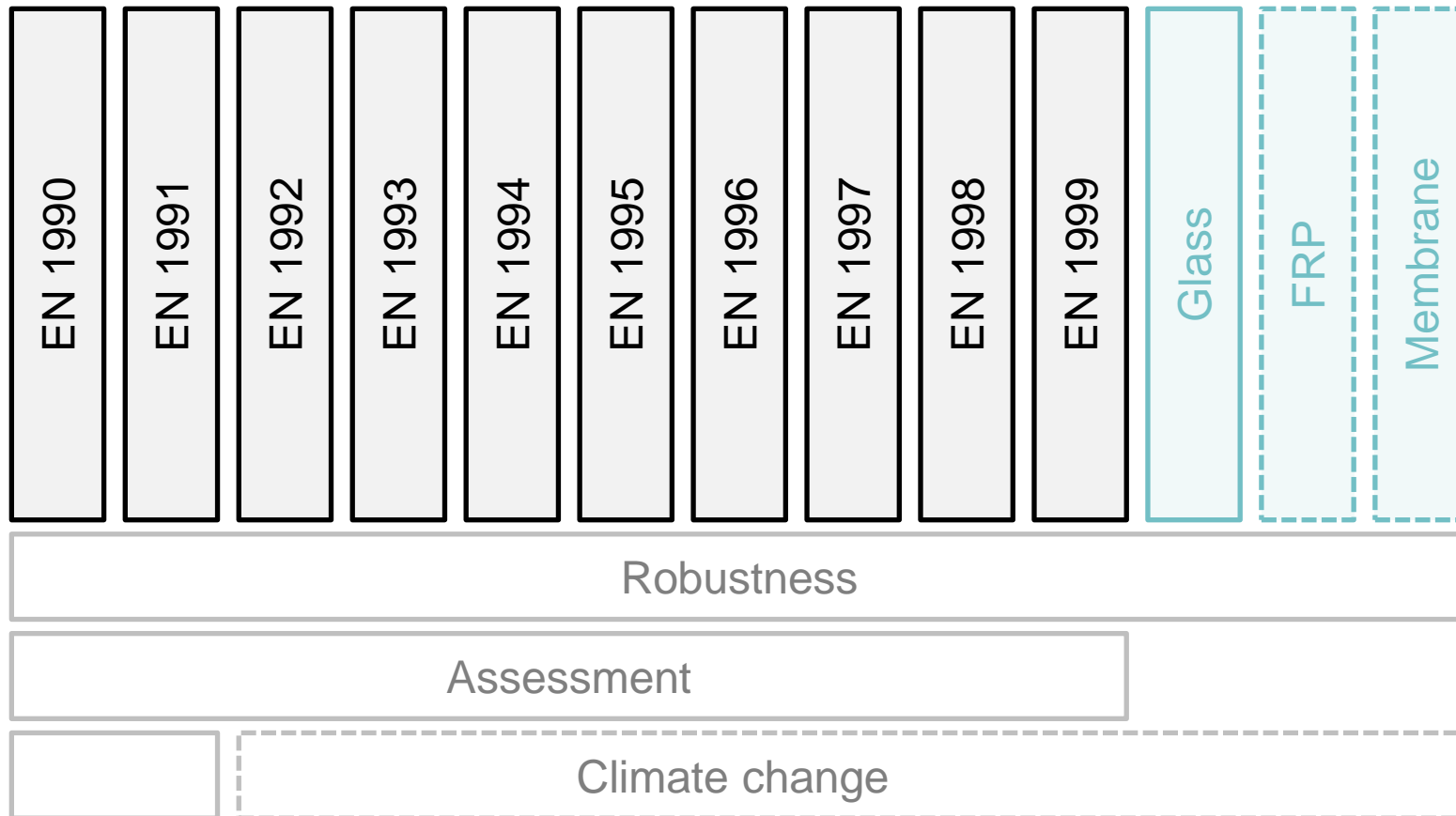


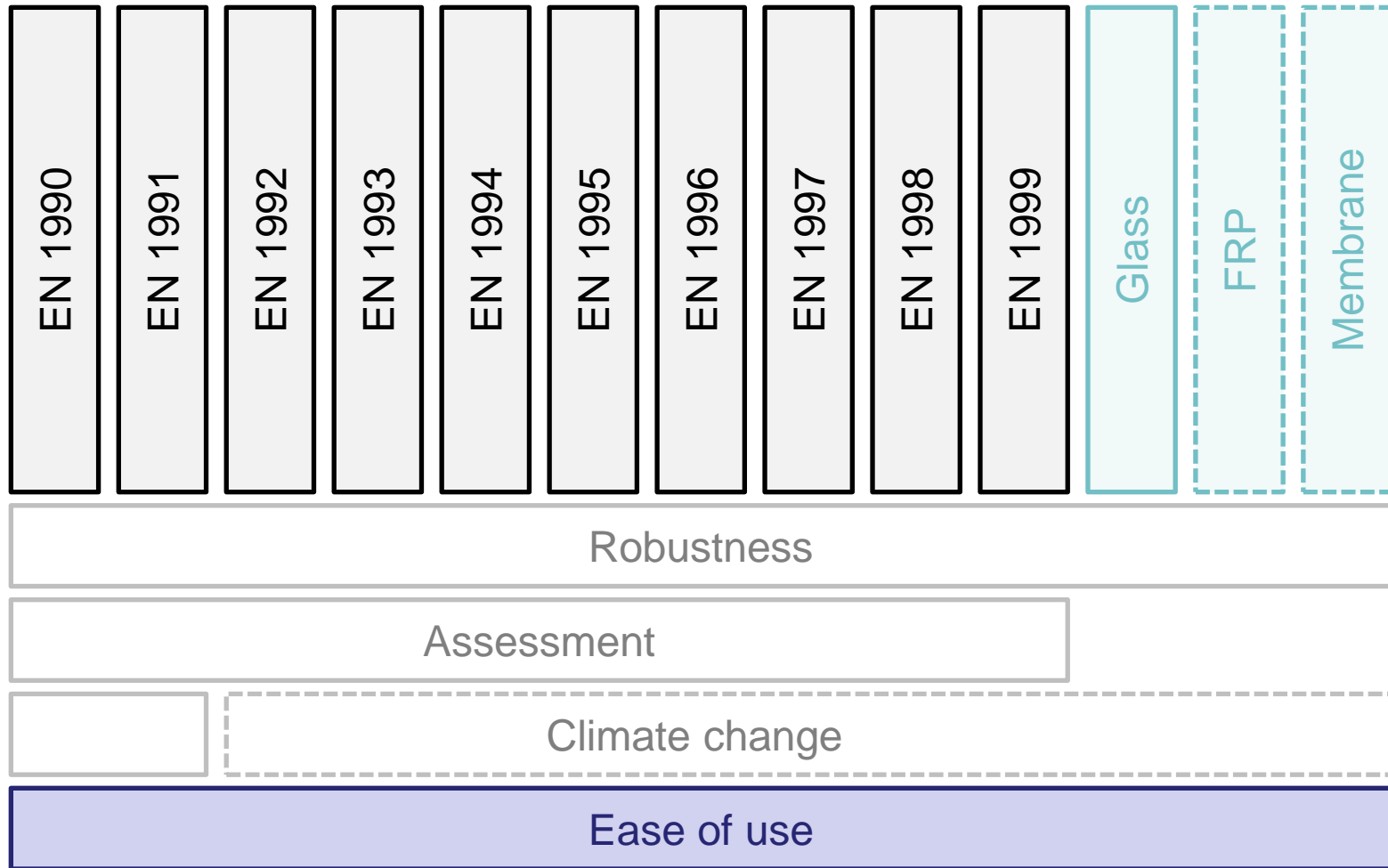


European  
Commission

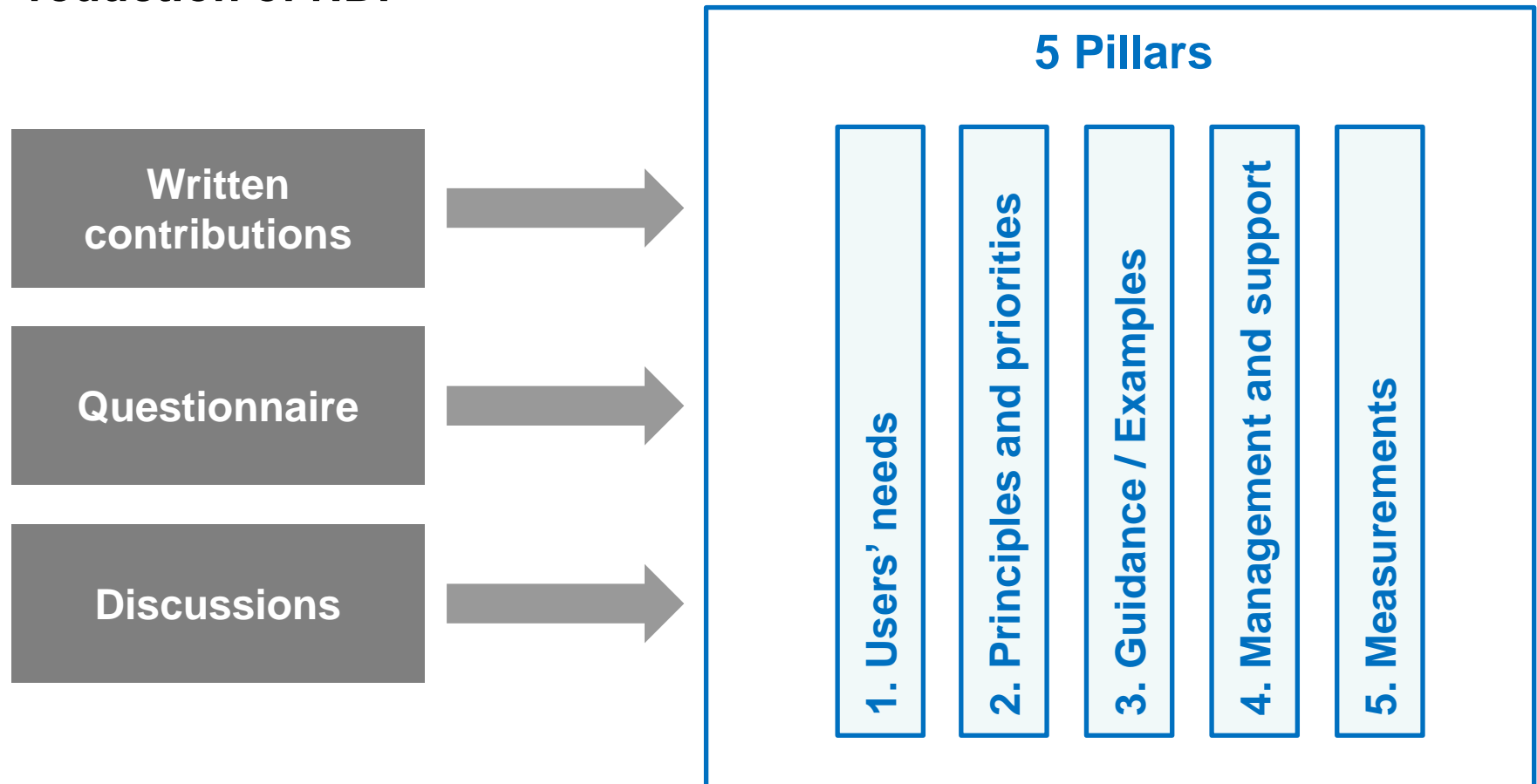








## Chairman's Advisory Panel on 'Ease of use and reduction of NDP'



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