Eurocodes evolution - what will it mean to you?

Evolution of the Structural Eurocodes - Aims, timing, process

28.09.2016

Steve Denton
Head of Bridges and Ground Engineering
Visiting Professor at the University of Bath
Chairman of CEN/TC 250 - Eurocodes

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500 000 Engineers	**€65** Billion	**10-58**	**5000** Pages	**1055** NDPs
33 Countries	**97** SCs/WGs/ TGs	**€4.3** Million	**€11** Million	**49/50**
75+ Project Teams	**25** Phase 1 PTs	**170+** Phase 1 Contracts	**Dec** **2016**	**2021**

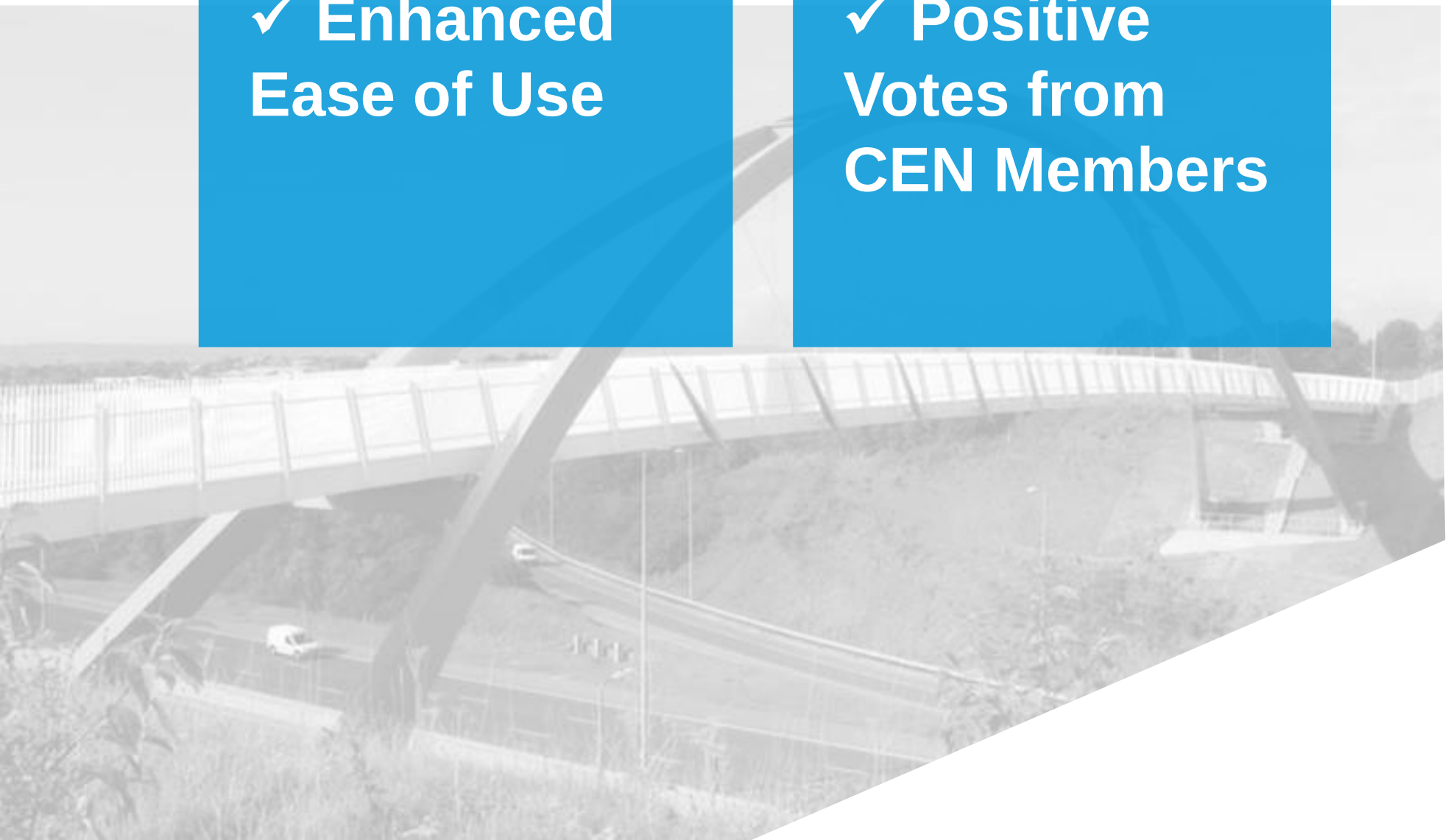
Agenda

- → Aims
- → Process
- → Timing

Aims

✓ **Enhanced Ease of Use**

✓ **Positive Votes from CEN Members**

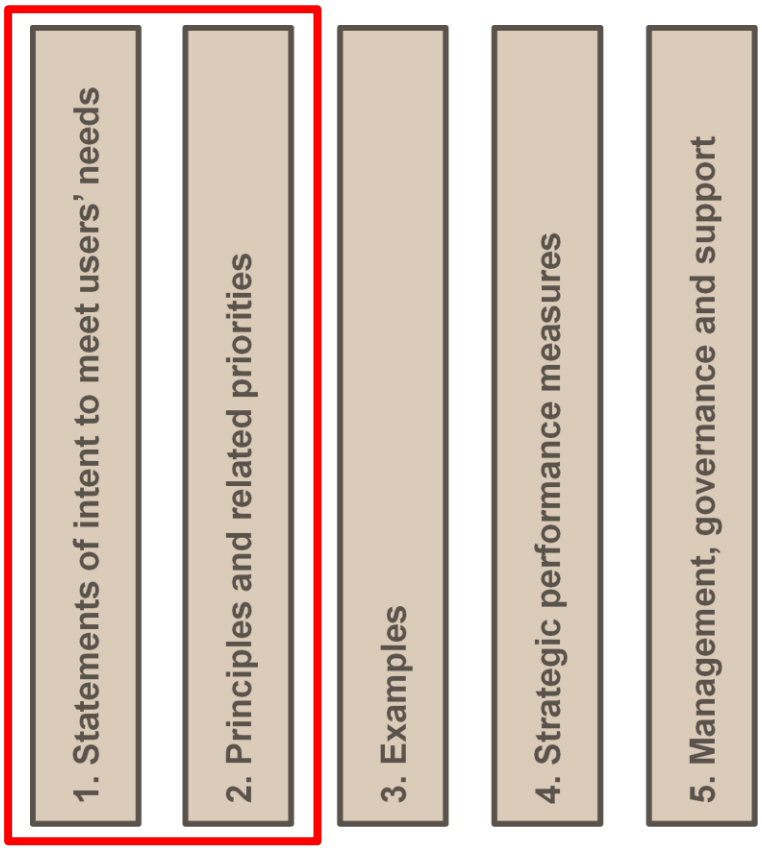


The Structural Eurocodes

CEN/TC 250's vision for the second generation of the Structural Eurocodes:

Whilst respecting the achievements of the past, our vision for the second generation of Structural Eurocodes is to create a more user-orientated suite of design standards that are recognised as the most trusted and preferred in the world.

CEN/TC 250 Position on Enhancing Ease of Use



Five pillars to enhance ease of use of the Eurocodes

CEN/TC 250 Position on Enhancing Ease of Use

Recommendation 1: Statements of intent to meet users' needs

PRIMARY TARGET AUDIENCE	DEFINITION
Practitioners – Competent engineers	Competent civil, structural and geotechnical engineers, typically qualified professionals able to work independently in relevant fields

CEN/TC 250 Position on Enhancing Ease of Use

Recommendation 1: Statements of intent to meet users' needs

CATEGORIES OF EUROCODES' USERS	CEN/TC 250 STATEMENTS OF INTENT
Practitioners – Competent engineers [Primary target audience]	We will aim to produce Standards that are suitable and clear for all common design cases without demanding disproportionate levels of effort to apply them
Practioners – Graduates	We will aim to produce Eurocodes that can be used by Graduates where necessary supplemented by suitable guidance documents and textbooks and under the supervision of an experienced practitioner when appropriate
Expert specialists	We will aim not to restrict innovation by providing freedom to experts to apply their specialist knowledge and expertise
Product Manufacturers	Working with other CEN/TCs we will aim to eliminate incompatibilities or ambiguities between the Eurocodes and Product Standards
Software developers	We will aim to provide unambiguous and complete design procedures. Accompanying formulae will be provided for charts and tables where possible
Educators	We will aim to use consistent underlying technical principles irrespective of the intended use of a structure (e.g. bridge, building, etc.) and that facilitate the linkage between physical behaviour and design rules
National regulator	We will endeavour to produce standards that can be referenced or quoted by National Regulations
Private sectors businesses	We will continue to promote technical harmonization across European markets in order to reduce barriers to trade
Clients	We will produce Eurocodes that enable the design of safe, serviceable, robust and durable structures, aiming to promoting cost effectiveness throughout their whole life cycle, including design, construction and maintenance
Other CEN/TCs	We will engage proactively to promote effective collaboration with those other CEN/TCs that have shared interests

EoU - Statements of intent to meet users' needs

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CEN/TC 250 Position on Enhancing Ease of Use

Recommendation 2: Principles and related priorities

General principles (primary)	
1	Improving clarity and understandability of technical provisions of the Eurocodes
2	Improving accessibility to technical provisions and ease of navigation between them
3	Improving consistency within and between the Eurocodes
4	Including state-of the-art material the use of which is based on commonly accepted results of research and has been validated through sufficient practical experience
5	Considering the second generation of the Eurocodes as an “evolution” avoiding fundamental changes to the approach to design and to the structure of the Eurocodes unless adequately justified
Specific principles (secondary)	
6	Providing clear guidance for all common design cases encountered by typical competent practitioners in the relevant field
7	Omitting or providing only general and basic technical provisions for special cases that will be very rarely encountered by typical competent practitioners in the relevant field
8	Not inhibiting the freedom of experts to work from first principles and providing adequate freedom for innovation
9	Limiting the inclusion of alternative application rules
10	Including simplified methods only where they are of general application, address commonly encountered situations, are technically justified and give more conservative results than the rigorous methods they are intended to simplify
11	Improving consistency with product standards and standards for execution
12	Providing technical provisions that are not excessive sensitive to execution tolerances beyond what can be practically achieved on site

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EoU - Principles and related priorities

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Agenda

- → Aims
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European Commission Specific Mandate M/515

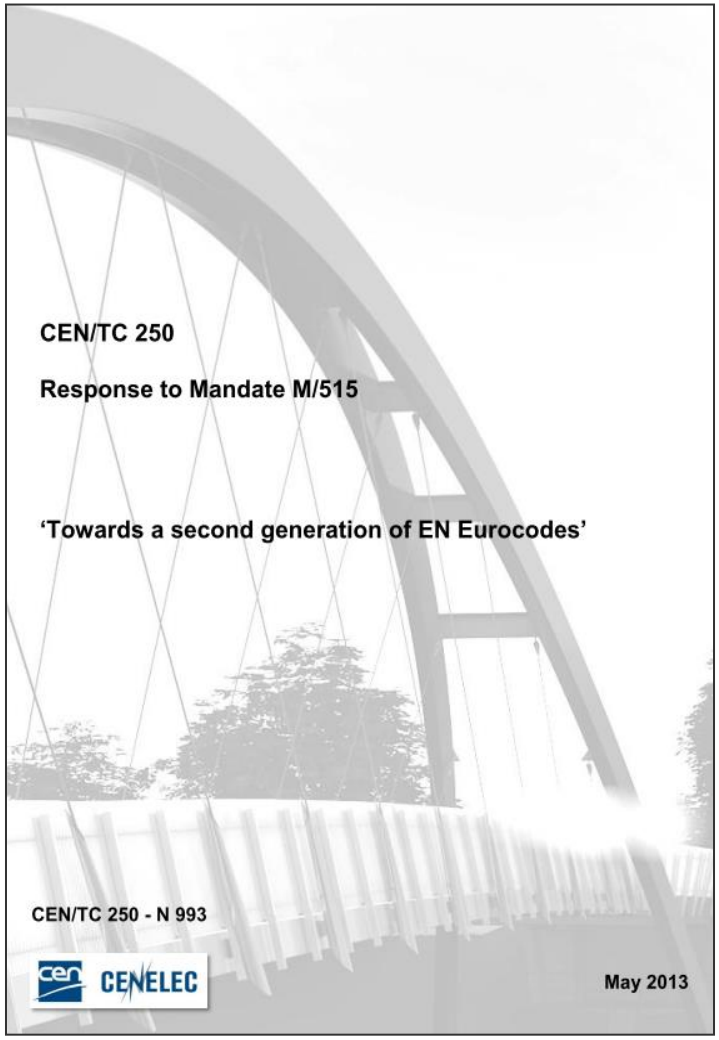
EUROPEAN COMMISSION
ENTERPRISE AND INDUSTRY DIRECTORATE-GENERAL

Sustainable Growth and EU 2020
Sustainable Industrial Policy and Construction

Brussels, 12 December 2012
M/515 EN

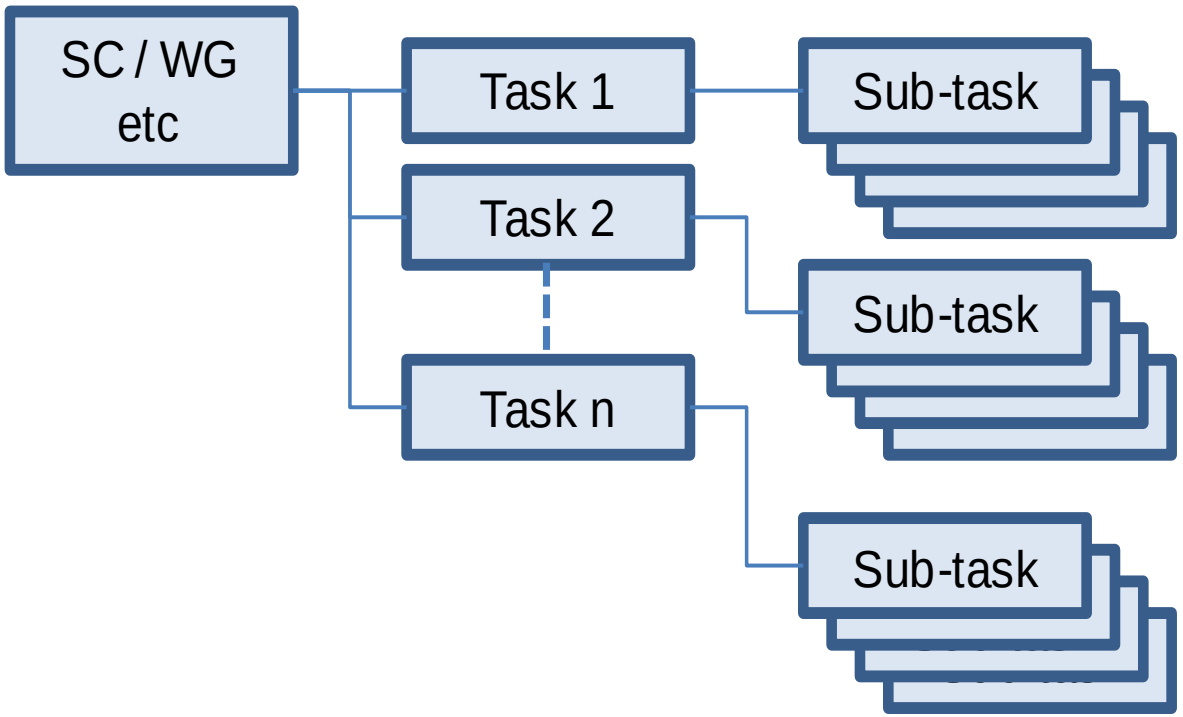
MANDATE FOR AMENDING EXISTING EUROCODES AND EXTENDING THE SCOPE OF STRUCTURAL EUROCODES

CEN/TC 250 Technical response

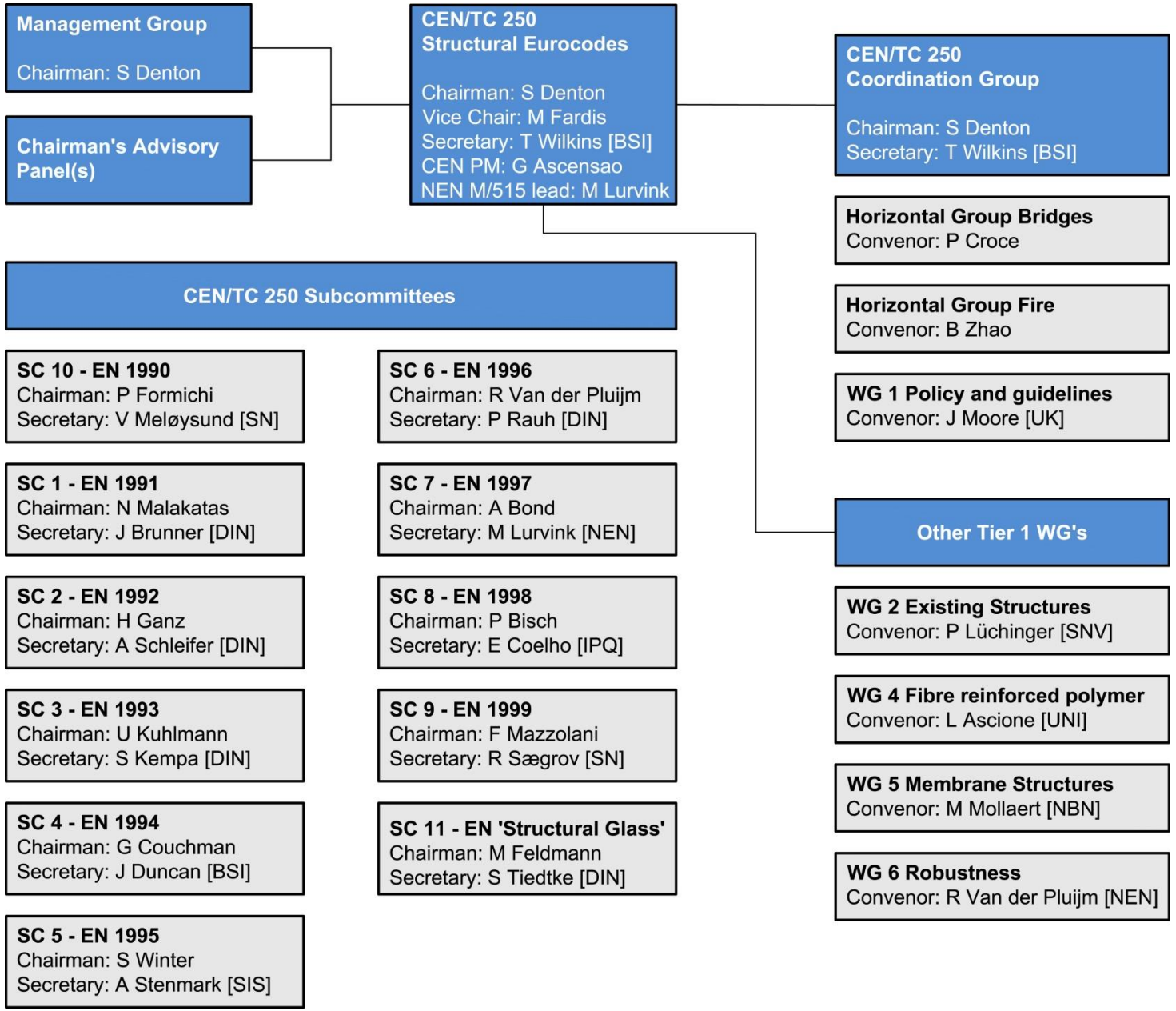


- 138 pages
- Over 1000 experts from across Europe involved
- Structure of tasks and sub-tasks
- Phased programme

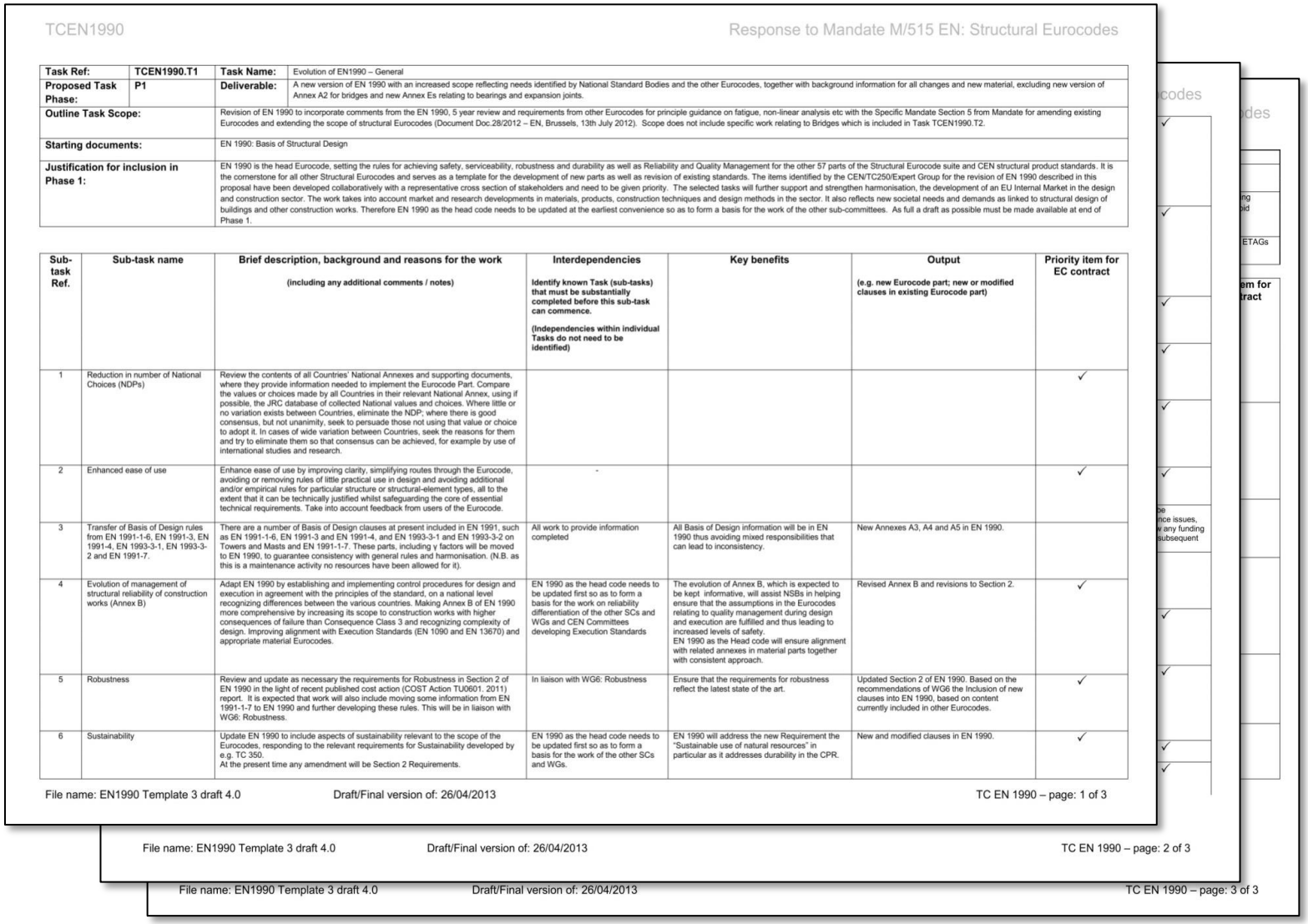
CEN/TC 250 Work Programme Structure



CEN/TC 250 Structural Eurocodes



CEN/TC 250 Detailed Task Plans



TCEN1990 Response to Mandate M/515 EN: Structural Eurocodes

Task Ref:	**TCEN1990.T1**	**Task Name:**	Evolution of EN1990 – General
Proposed Task Phase:	**P1**	**Deliverable:**	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.
Outline Task Scope:			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.
Starting documents:			EN 1990: Basis of Structural Design
Justification for inclusion in Phase 1:			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.

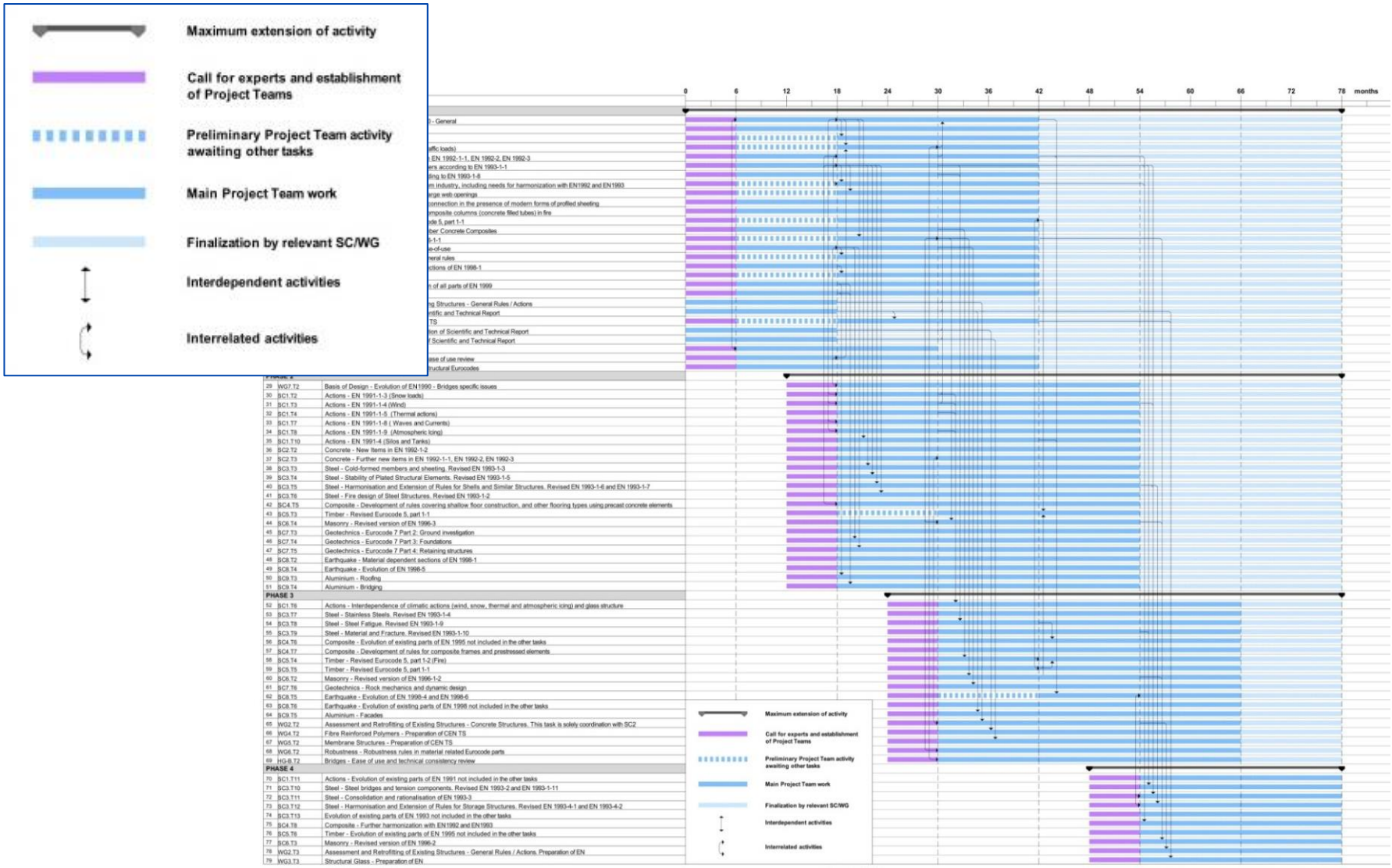
Sub-task Ref.	Sub-task name	Brief description, background and reasons for the work (including any additional comments / notes)	Interdependencies Identify known Task (sub-tasks) that must be substantially completed before this sub-task can commence. (Independencies within individual Tasks do not need to be identified)	Key benefits	Output (e.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 γ 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 it).	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 kept informative, will assist NSBs in helping 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

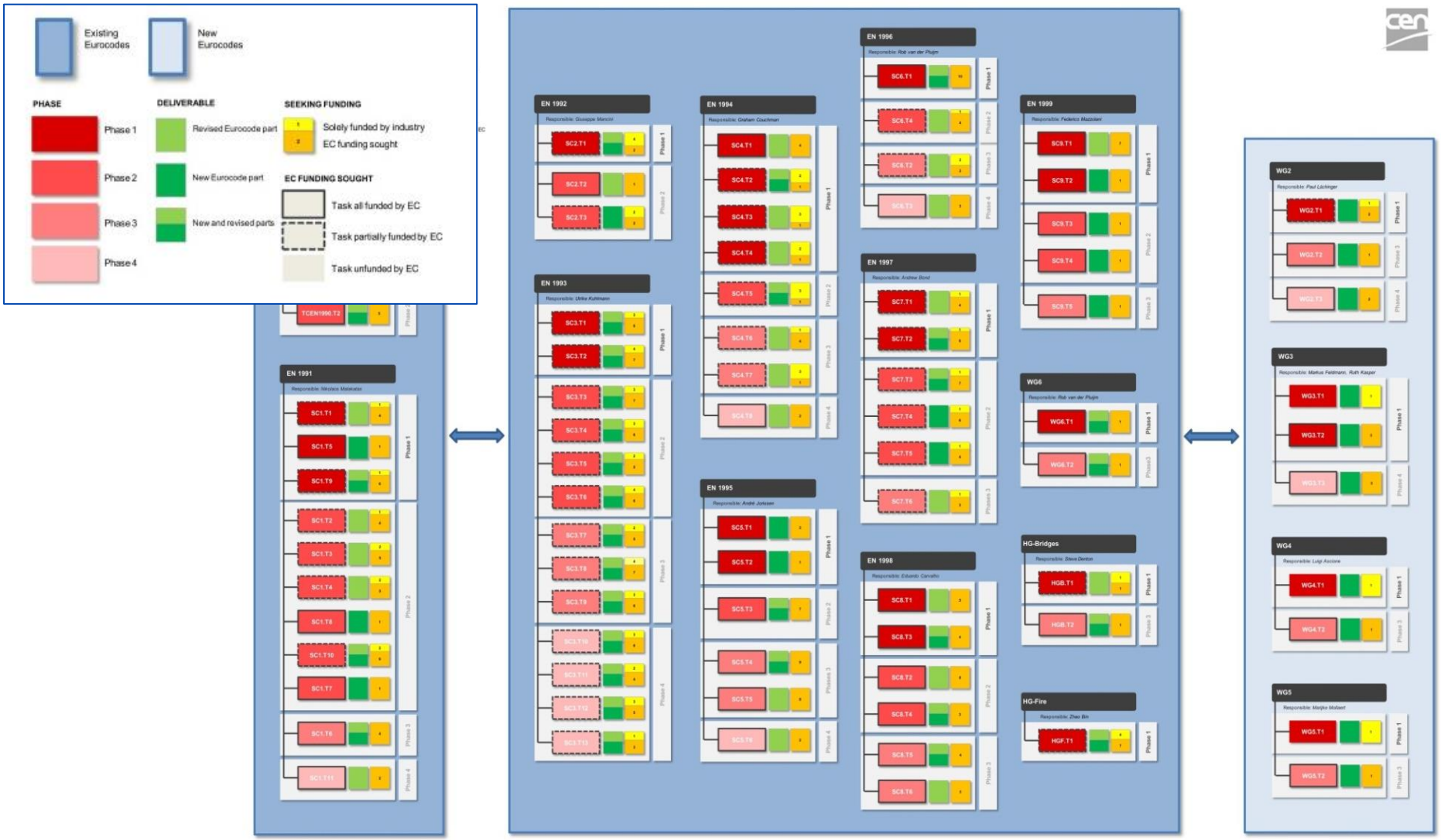
File name: EN1990 Template 3 draft 4.0 Draft/Final version of: 26/04/2013 TC EN 1990 – page: 2 of 3

File name: EN1990 Template 3 draft 4.0 Draft/Final version of: 26/04/2013 TC EN 1990 – page: 3 of 3

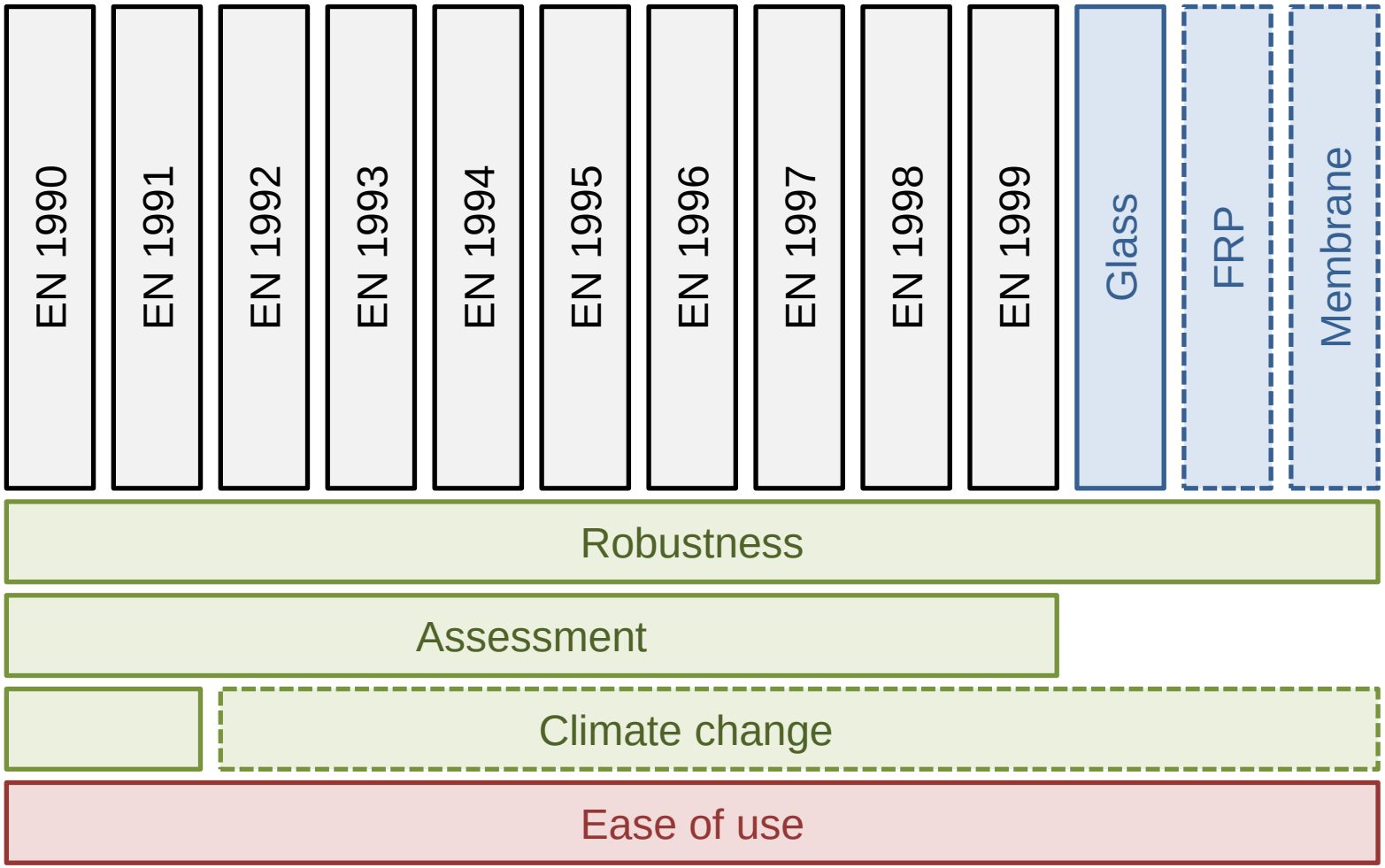
CEN/TC 250 Phased Programme



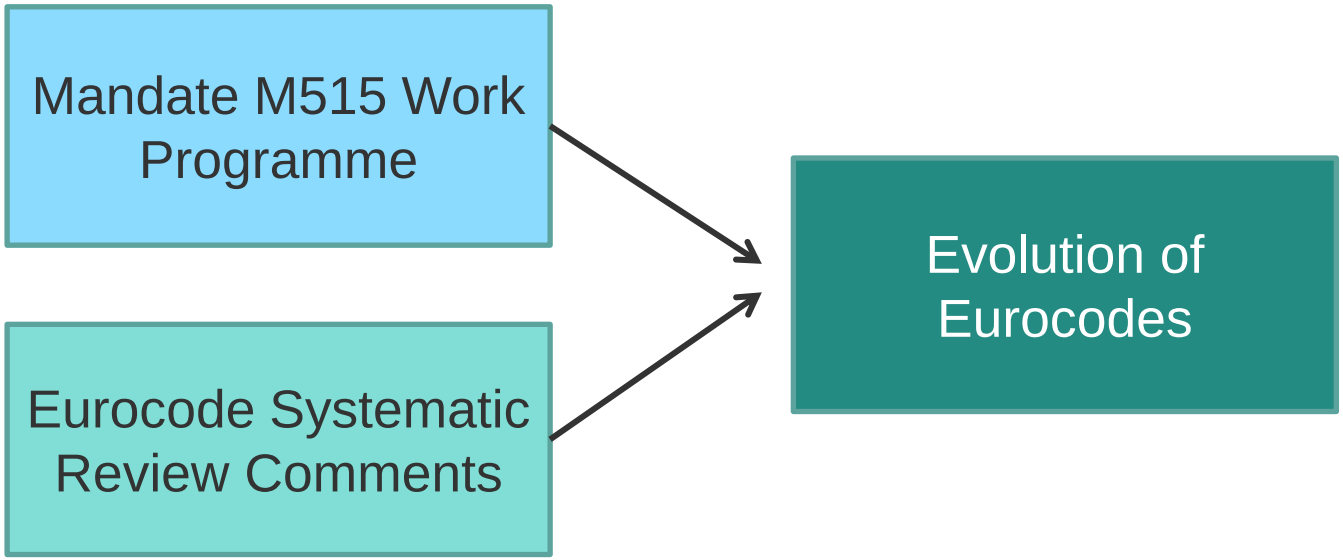
CEN/TC 250 Work Programme Structure



CEN/TC 250 Evolution Overview

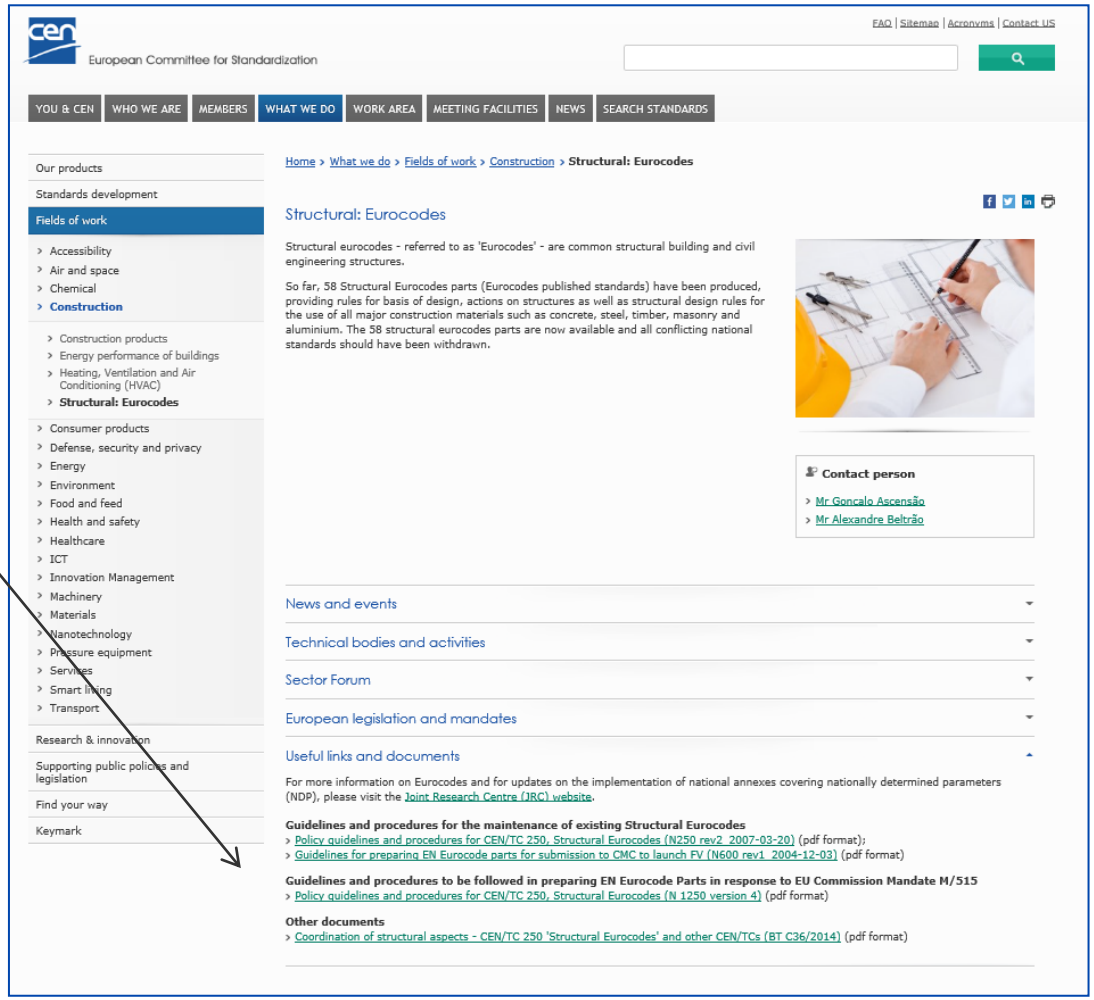


Systematic Review Comments



Eurocode Evolution Process

- Follow CEN Internal Regulations
- Specific information available in CEN/TC 250 document N1250
  [CEN, Eurocodes]
- Further details available in Phase 1 call for experts specification (Vol 3)
  [NEN, Eurocodes 2020]



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Call for tender - Evolution of Structural Eurocodes

Call for Tender for experts for the development of the second generation of Structural Eurocodes.

- Updated 20th of May 2015 -

The Eurocodes (EN 1990 – EN 1999) enable the design of building and civil engineering works, and comprises of 10 European Standards in 58 parts. The first generation of EN Eurocodes were the most comprehensive and technically advanced suite of standards for structural and geotechnical design in the world. Their development was a tremendous achievement and represented the culmination of over 30 years collaborative effort. Their impact has been considerable. It has been estimated that they affecting the work of around 500.000 professional

Volume 1: Instructions to Tenderers – This volume provides full instructions on how the Tender Process shall be organized and how and when Tenderers should submit their responses to the questions contained within and to the award criteria;
Volume 2: Contract terms and Conditions - This Volume contains the documentation for Contracts and general terms and conditions;
Volume 3: The Specification – This volume contains the scope/brief, outlining the requirements;
Volume 1 Annex 2: Template for quality submission – This word document provides the template for the quality submission;
Volume 1 Annex 3: Template for financial submission – This excel document provides the template for the financial submission.

Agenda

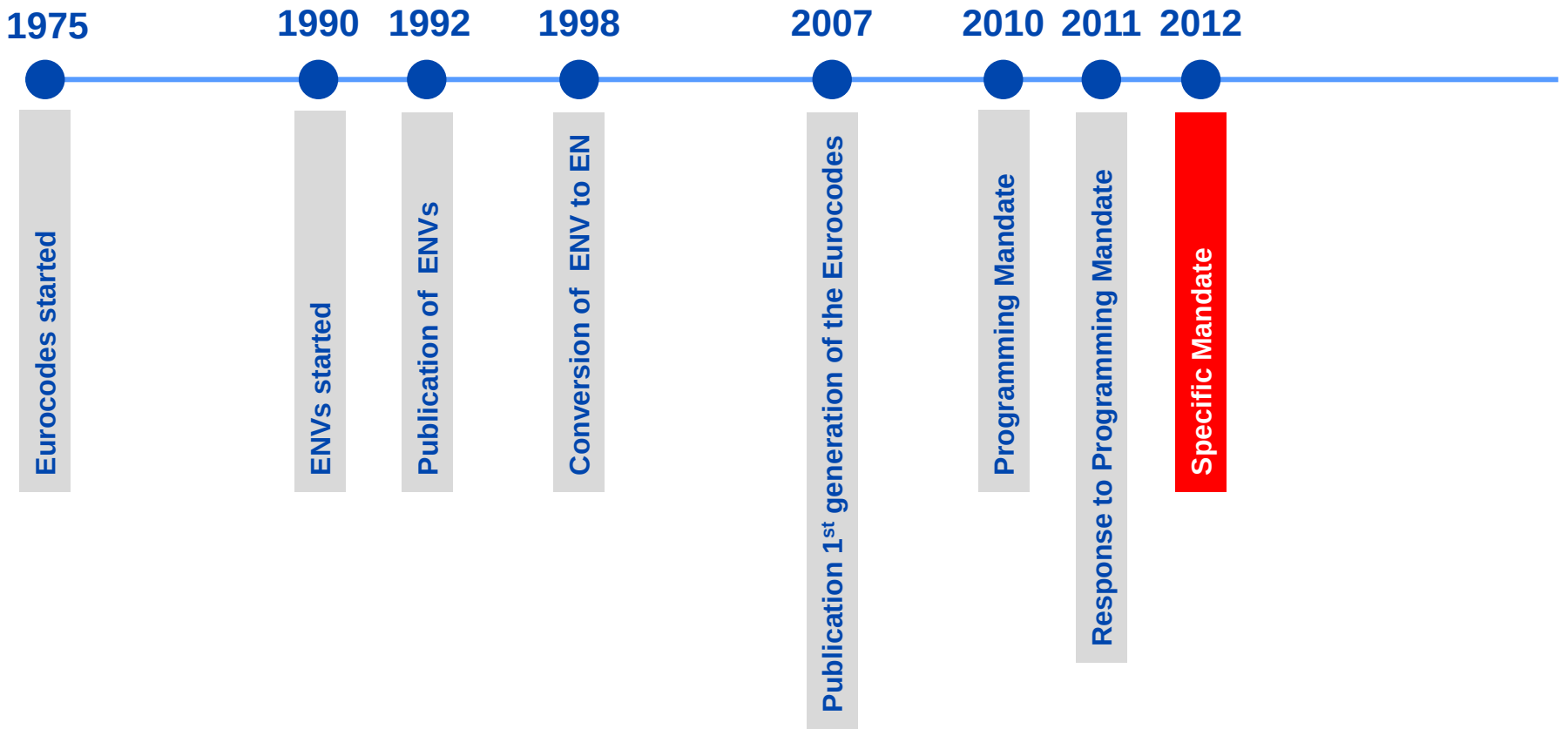
→ Aims

→ Process

→ Timing

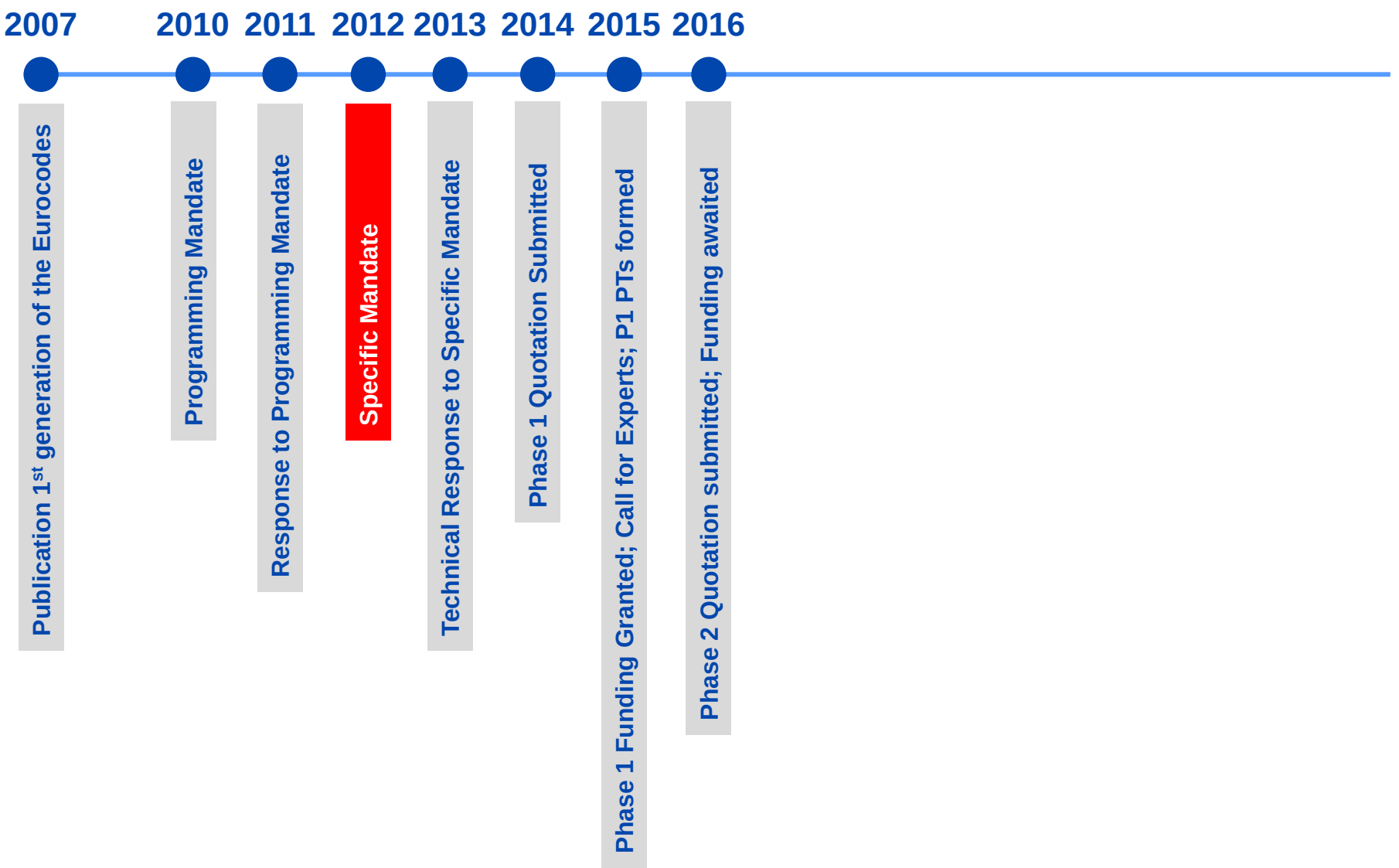
The Structural Eurocodes

Timeline - Historic

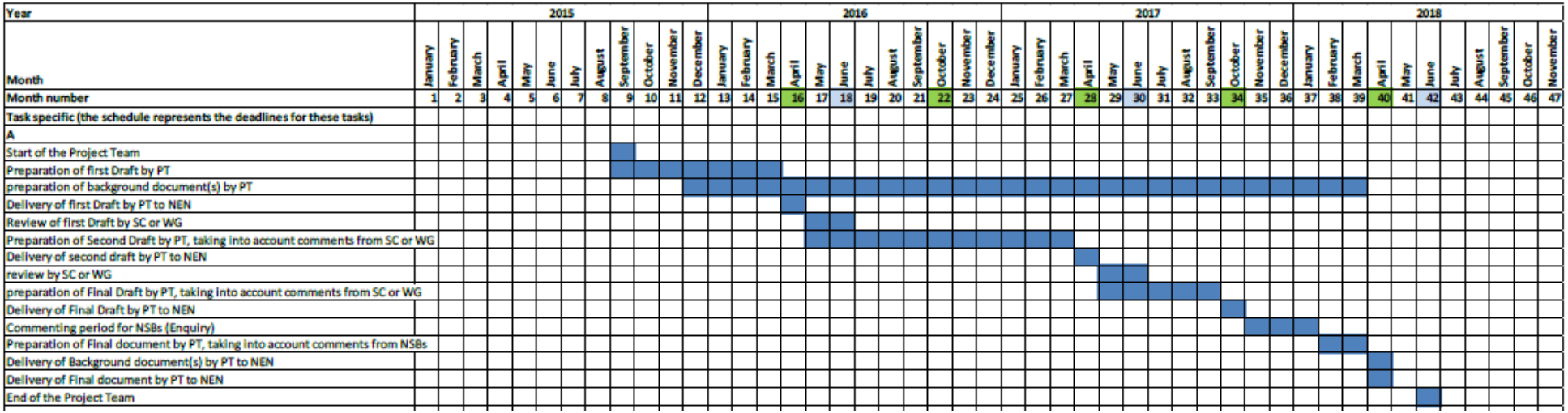


The Structural Eurocodes

Timeline – Latest status



Phase 1 – Project Team Programme



See Call for Experts, Specification, Annex C

Community participation - Why your involvement is vital, how it can be achieved

Why Design Standards Matter?

Impact

International trade

Verification of adequacy

Feedback

New societal demands

Research to application

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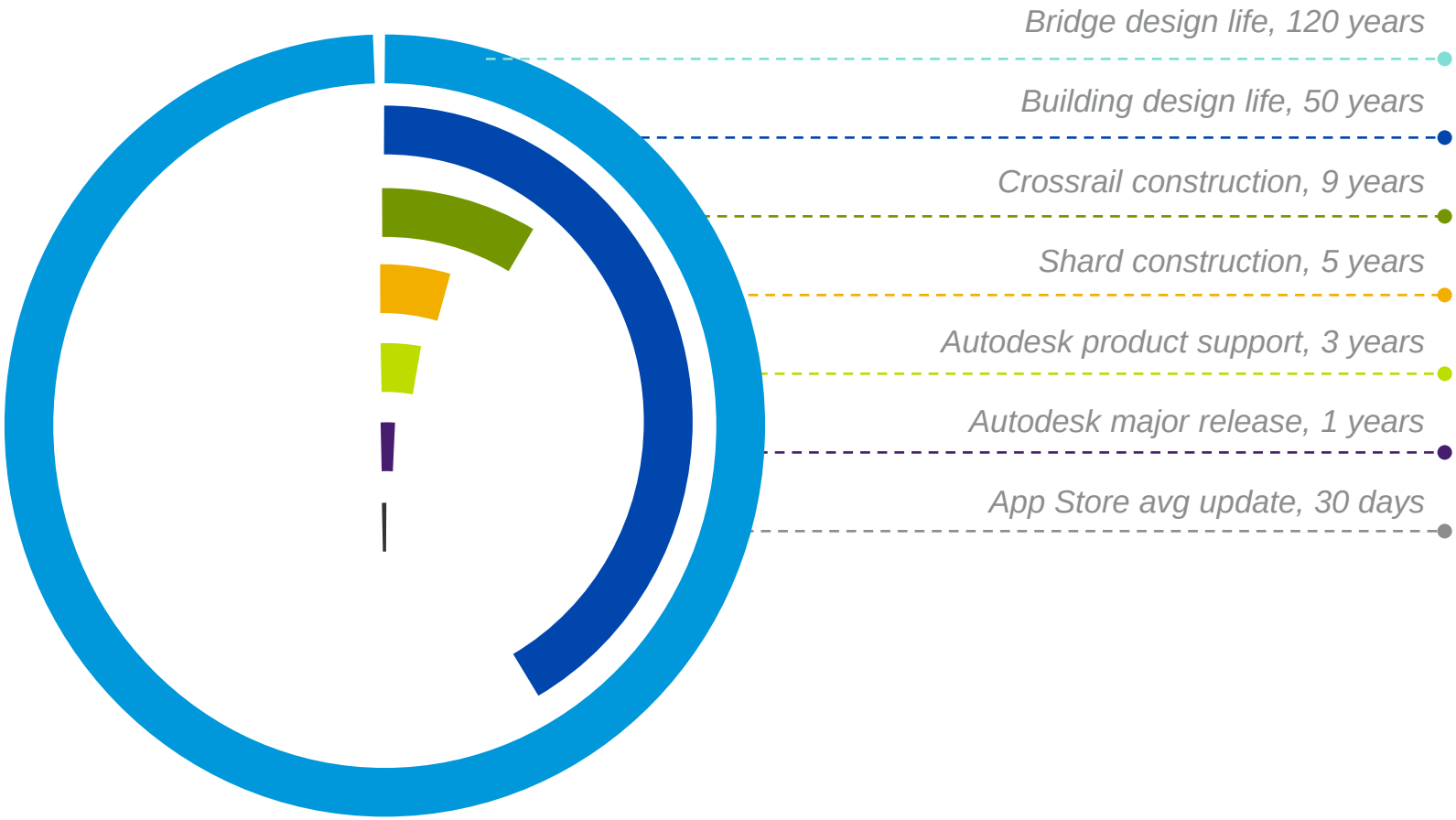
Development Cycles

Comparing infrastructure and digital technology



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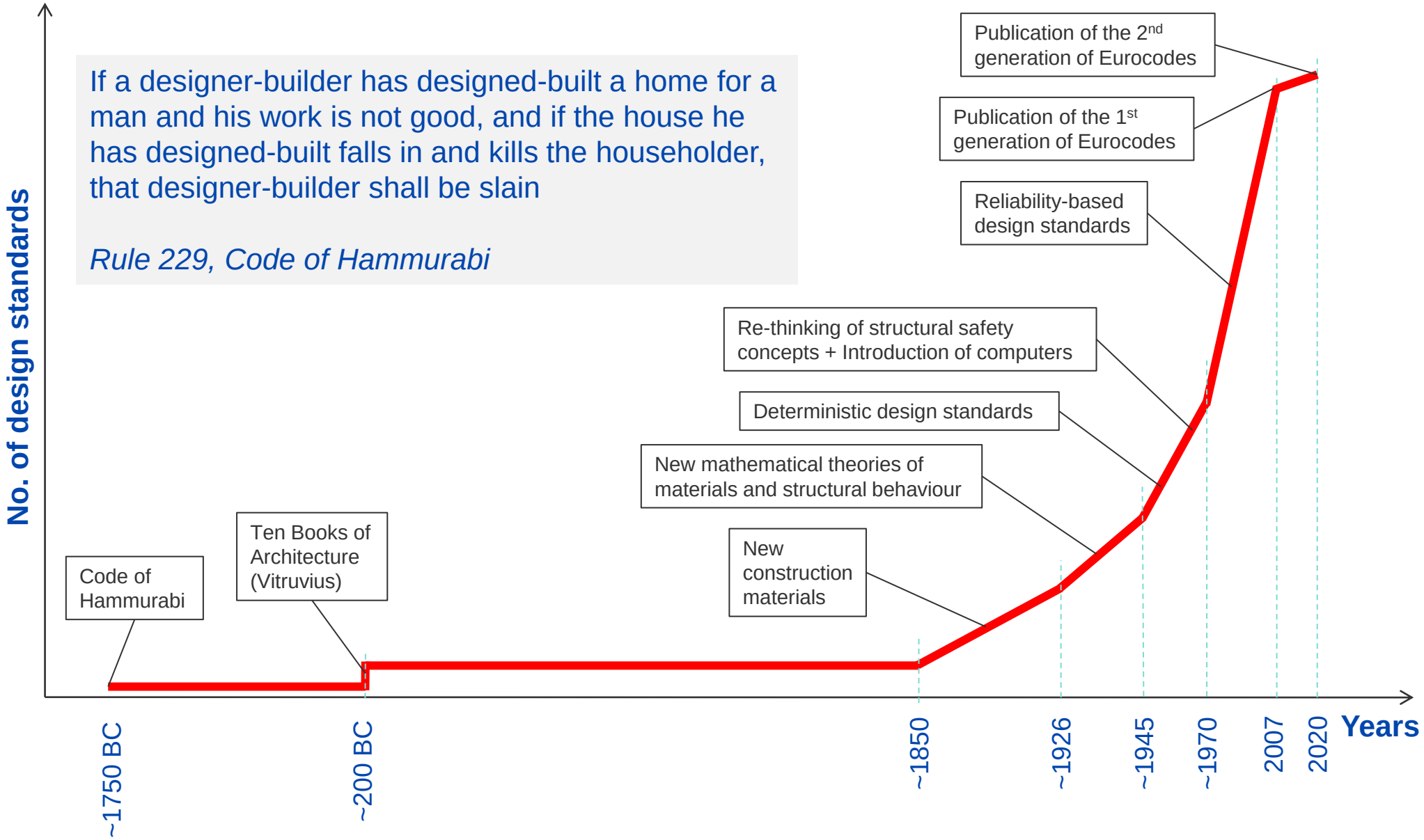
Historical evolution (*)

If a designer-builder has designed-built a home for a man and his work is not good, and if the house he has designed-built falls in and kills the householder, that designer-builder shall be slain

Rule 229, Code of Hammurabi



(*) The graph is indicative

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Who develops design Standards?

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Concerns for the UK

28.09.2016

Steve Denton
Head of Bridges and Ground Engineering
Visiting Professor at the University of Bath
Chairman of CEN/TC 250 - Eurocodes

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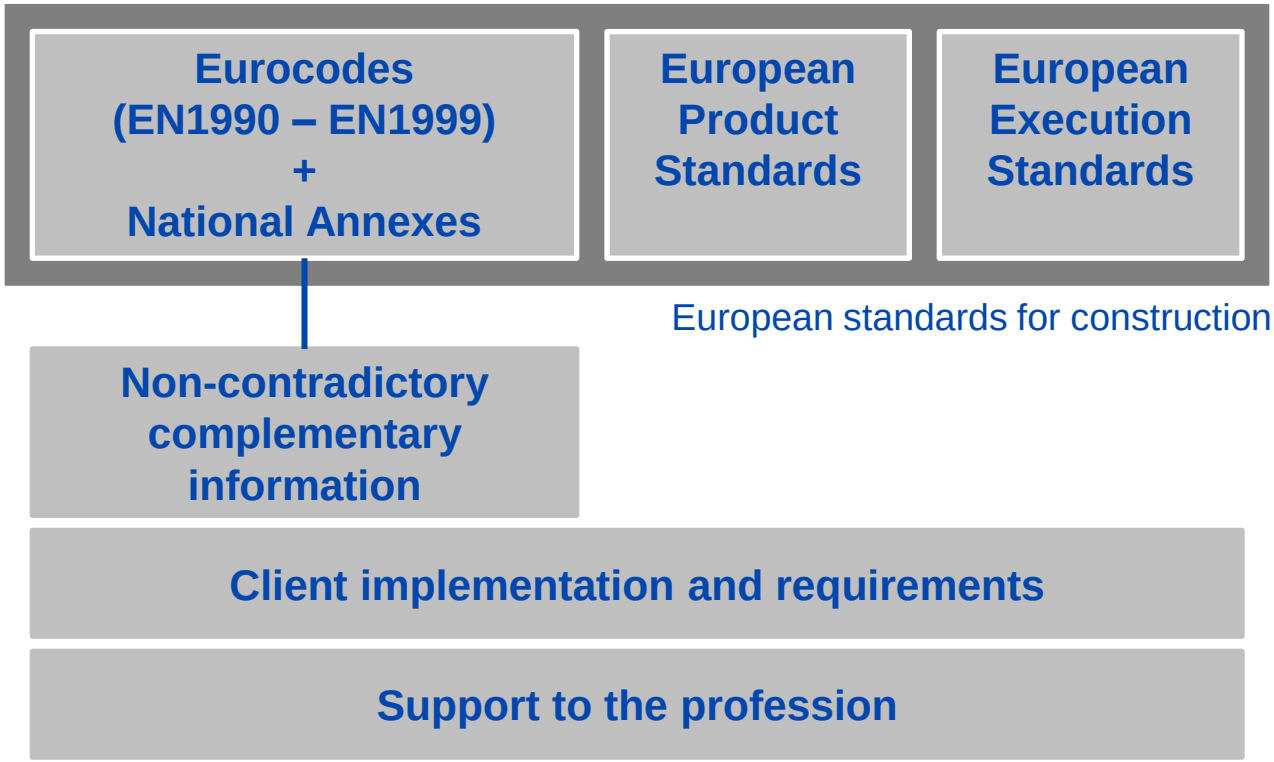
The Structural Eurocodes



Concerns …

- → Thank you for written submissions
- → Opportunity to raise specific concerns
  - Will be recorded by BSI and discussed by B525

What happens next

28.09.2016

Steve Denton
Head of Bridges and Ground Engineering
Visiting Professor at the University of Bath
Chairman of CEN/TC 250 - Eurocodes

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Some key dates …

- → December 2016 – Call for Experts for Phase 2
- → April 2017 – 2nd draft deliverables from Phase 1 PTs
- → Sept 2017 – (informal) enquiry on Phase 1 PT deliverables