Initiatives on regulations from R&D projects Focus: Fire safety

Presented by:

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E-LASS seminar #14 – Afternoon session: Regulations

Thursday, June 17th, 2021

Outline

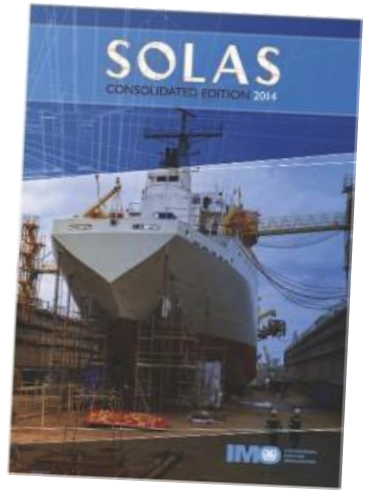
- Part 1 (CMT) – The context: Towards safety of Composite Ships
- Part 2 (BV) – Fire Safety of FRP Materials: Outcomes from R&D Projects

Part 1 (CMT) – The context: Towards safety of Composite Ships

- Motivations
- The RAMSSES approach
- The road to IMO

Motivations Current regulatory regime

Very little number of FRP ships registered at IMO



SOLAS Ch.II-2 Regulation 2:

"The hull, superstructures, structural bulkheads, decks and deckhouses **shall be constructed of steel or other equivalent material.** " **= barrier**

SOLAS Ch.II-2 Regulation 17:
"Alternative design and arrangements"
On basis of Equivalent Safety **= opportunity**

Main issue to be addressed: **fire safety**

Motivations Current regulatory regime

Guidance available

- MSC.1/Circ.1455 Guidelines for the approval of alternatives and equivalents as provided for in various IMO instruments
  - **Uncertainty of getting approval in contract phase**
- MSC/Circ. 1002 Guidelines on alternative design and arrangement for fire safety
- MSC.1/Circ.1574 Interim guidelines for use of fibre reinforced plastic (FRP) elements within ship structures: Fire safety issues.
  - **Adopted June 2017, 4 years evaluation period**

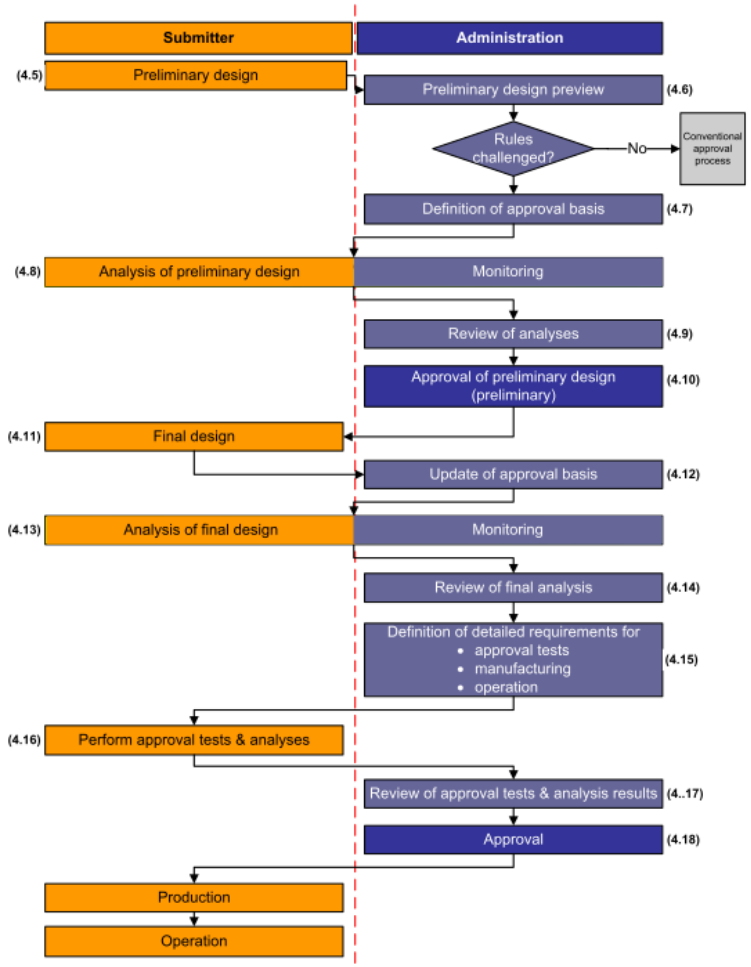


Figure 2: Design and Approval Process

Developed Approaches

Short term approach

- Based on existing rules and **a Smart Track to Approval**
  - Database of pre-approved solutions and materials test results
  - Fire risk scenarios
  - Analysis and modelling tools, including numerical or statistical models

Long term approach

- Development of **new prescriptive rules** in:
  - Structure
  - Fire
  - Production
- Validation by simulations, tests and full-scale demonstrator

Realisation and Demonstration of Advanced Material Solutions for Sustainable and Efficient Ships

01.06.2017
30.11.2021

Budget: €13.5 M
Funding: €10.8 M

36 partners
12 countries

www.ramsses-project.eu

Call Topic: MG-2.2-2016 Development and Use of High Performance and Lightweight Materials … (IA)

Coordinator: CETENA (Italy) – Financial and Administrative

CMT (Germany) – Technical and Dissemination

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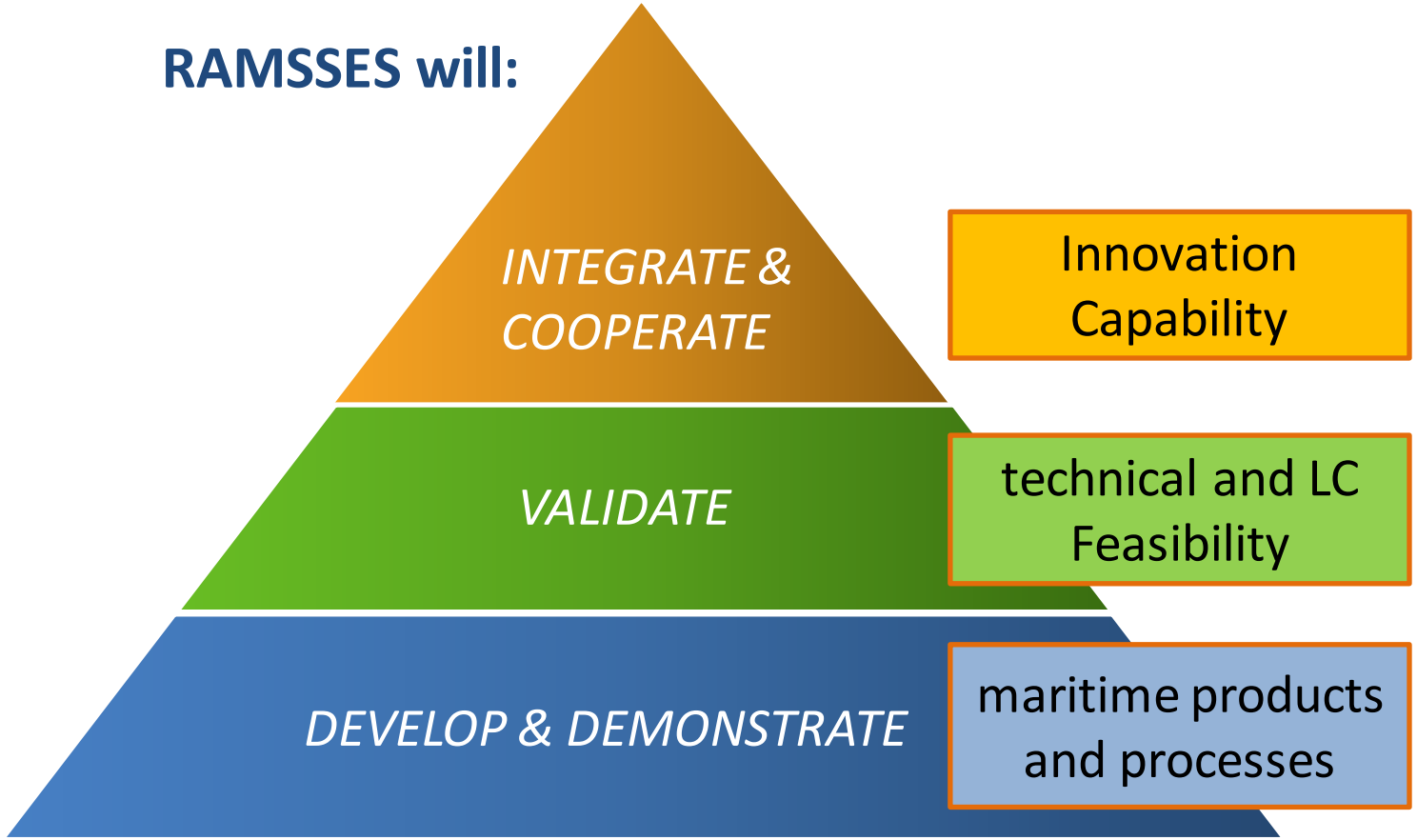
Motivation and ambition

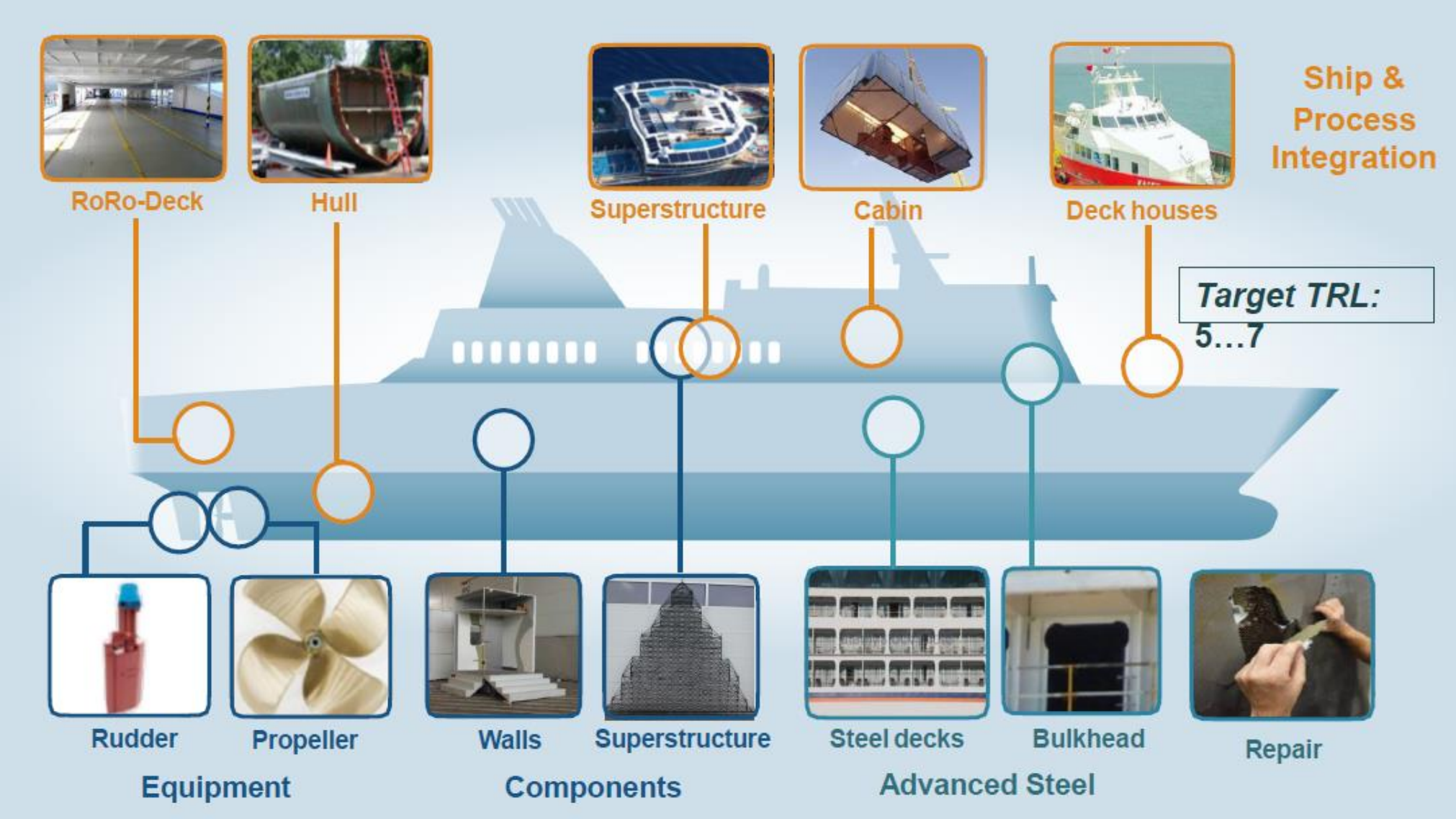
Innovative Materials for Ships:

- less fuel and emissions
- efficient and competitive
- safe and comfortable
- smart and functional

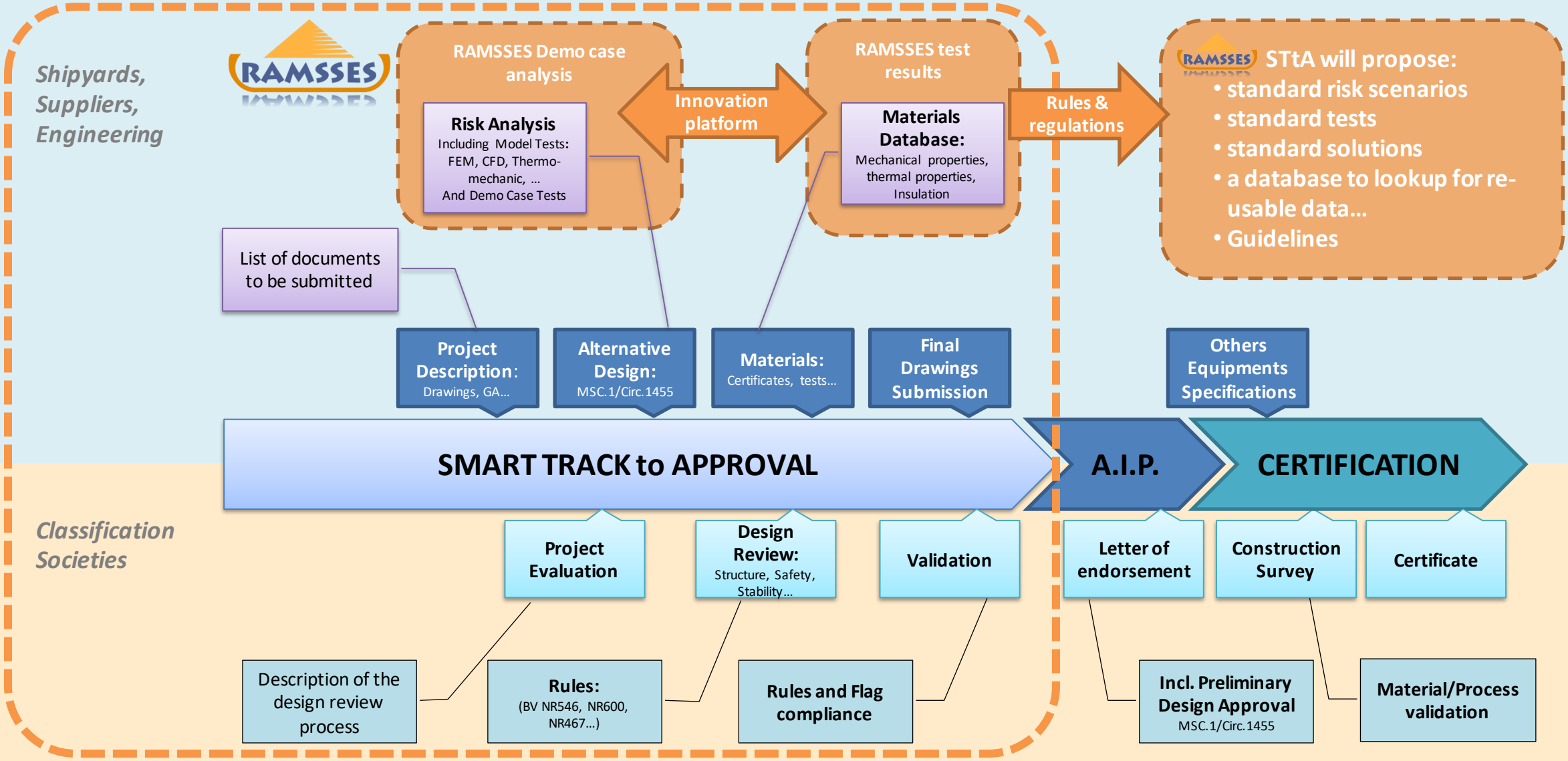
RAMSSES will:



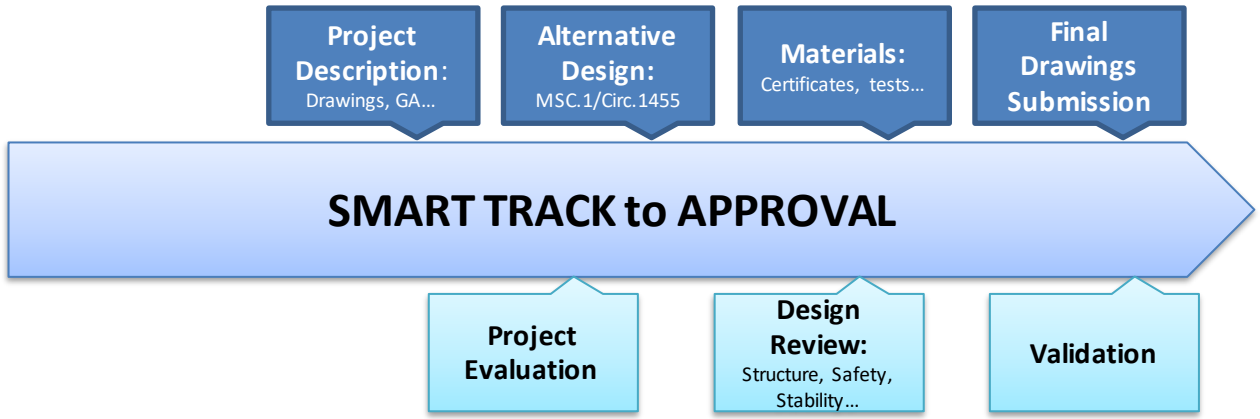
RAMSSES – Demo Cases



Smart Track to Approval



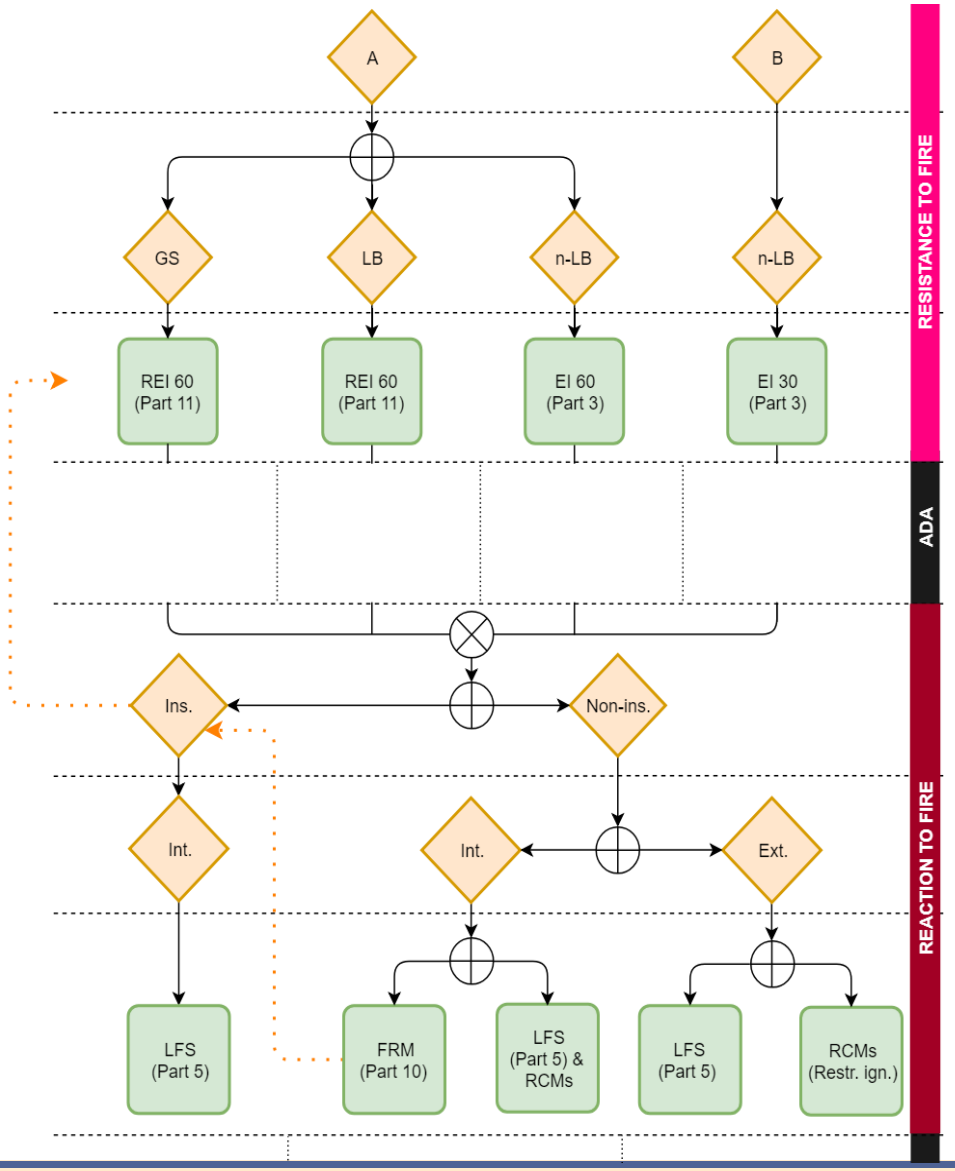
Standard Fire Risk Scenarios



Fire

- A and B Class Division
- Resistance Class Definition
  - REI or EI
- Insulation / No insulation
  - Fire-Restricting Materials (FRM)
  - Low Flame-Spread (LFS)
  - Restricting ignitability

In accordance with FTP Code



RAMSSES Innovation Platform

Project Description: Drawings, GA...

Alternative Design: MSC.1/Circ.1455

Materials: Certificates, tests...

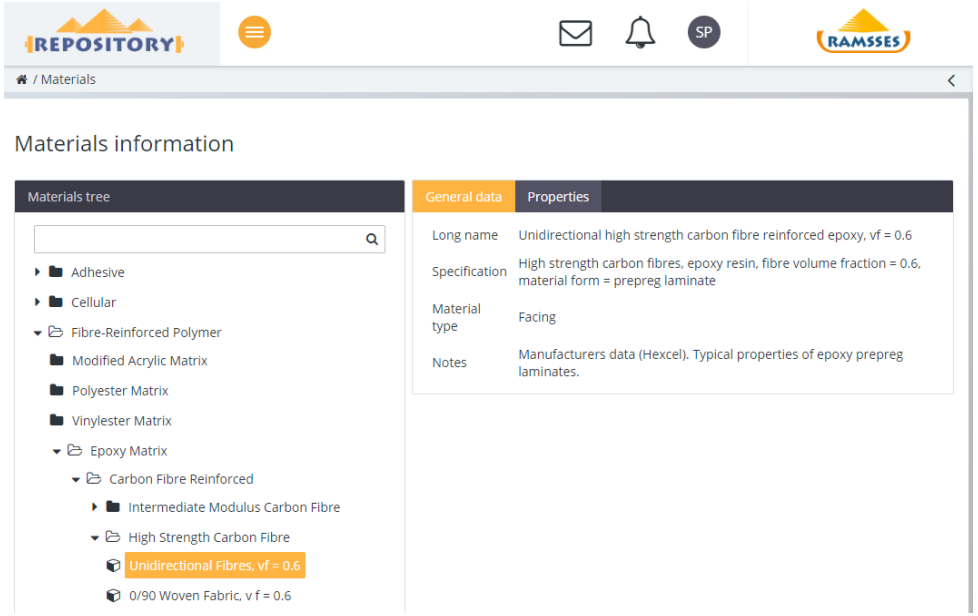
Final Drawings Submission

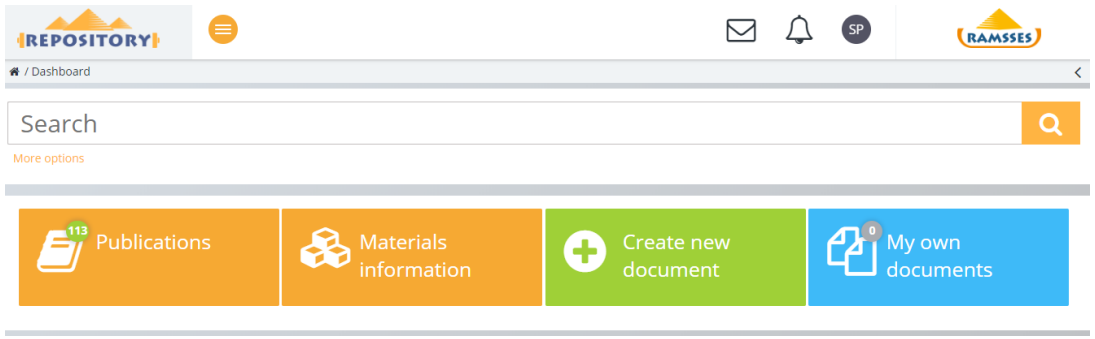
SMART TRACK to APPROVAL

Project Evaluation

Design Review: Structure, Safety, Stability...

Validation





General data | Properties

Property	Value	Unit	Value type	Reference
Compressive Stiffness 1	115.0	GPa	Typical	Hexcel (2005)
Compressive Stiffness 2	10.0	GPa	Typical	Hexcel (2005)
Compressive Strength 1	1300.0	MPa	Typical	Hexcel (2005)
Compressive Strength 2	250.0	MPa	Typical	Hexcel (2005)
Poisson's Ratio 12	0.25	no unit	Typical	Hexcel (2005)
Shear Stiffness 12	4.4	GPa	Typical	Hexcel (2005)
Shear Strength 12	95.0	MPa	Typical	Hexcel (2005)
Tensile Strength 1	2000.0	MPa	Typical	Hexcel (2005)
Tensile Strength 2	80.0	MPa	Typical	Hexcel (2005)
Young's Modulus 1	130.0	GPa	Typical	Hexcel (2005)
Young's Modulus 2	9.0	GPa	Typical	Hexcel (2005)
Thermal Conductivity	1.0	W/m.K	Typical	Hexcel (2005)
Thermal Expansion Coefficient	-0.1	μstrain/K	Typical	Hexcel (2005)

Finding pre-approved solutions

- Suggestion to use selection tables to find existing solutions

Material selection	Test Compliance			
	Test A	Test B	Test C	Test D
Material 1	✓	✓		
Material 2		✓	✓	✓
Material 3	✓		✓	
Material 4			✓	✓

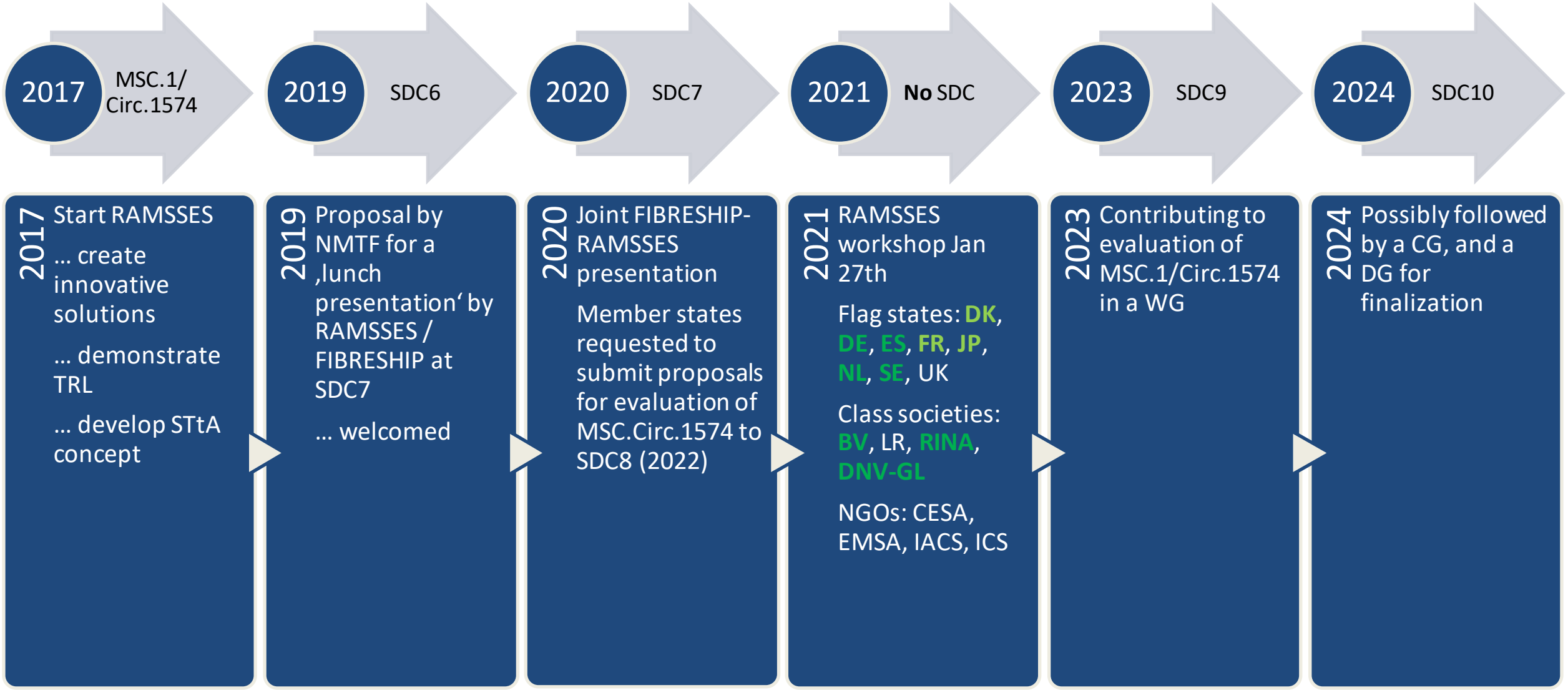
Pre-approved solutions	Standard fire risk scenarios			
	Scenario A	Scenario B	Scenario C	Scenario D
Solution 1			✓	✓
Solution 2		✓	✓	
Solution 3	✓		✓	
Solution 4	✓	✓		

- Quickly known what is already possible, and what is not
- More time available to assess safety of new elements

FIBRESHIP & RAMSSES:

- Demonstrated **advantages** of composite materials in shipbuilding,
- Proved the **ability** to build large structure in composite,
- Proposed **new approach** for fire division rating,
- Ask Member States to:
  - **support using our results in evaluation of MSC.1/Circ.1574** and,
  - **encourage to submit your own experiences to IMO**

Road to IMO


2017
MSC.1/ Circ.1574
2019
SDC6
2020
SDC7
2021
No SDC
2023
SDC9
2024
SDC10
2017
Start RAMSSES
… create innovative solutions
… demonstrate TRL
… develop STtA concept
2019
Proposal by NMTF for a ‚lunch presentation‘ by RAMSSES / FIBRESHIP at SDC7
… welcomed
2020
Joint FIBRESHIP-RAMSSES presentation
Member states requested to submit proposals for evaluation of MSC.Circ.1574 to SDC8 (2022)
2021
RAMSSES workshop Jan 27th
Flag states: DK, DE, ES, FR, JP, NL, SE, UK
Class societies: BV, LR, RINA, DNV-GL
NGOs: CESA, EMSA, IACS, ICS
2023
Contributing to evaluation of MSC.1/Circ.1574 in a WG
2024
Possibly followed by a CG, and a DG for finalization