

# The Rotorcraft Safety Roadmap and enabling VTOL

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Rotorcraft and VTOL Symposium – December 2019

**Your safety is our mission.**

# Risk mapping

## ROTORCRAFT ACCIDENTS IN EUROPE BY TYPE OF OPERATION (2008-2017)

### Risk mapping

24%

SPO

Most critical operations:

- Agricultural and Sling-load

18%

CAT (HEMS, Air Taxi, Offshore)

Key risk areas:

- Obstacle Collision
- Helicopter Upset

3%

Unknown

36%

NCO - Pleasure+Others

Key risk areas:

- Helicopter Obstacle See and Avoid
- Intentional Low Flying
- Flight Planning and Preparation
- Handling of Technical Failures

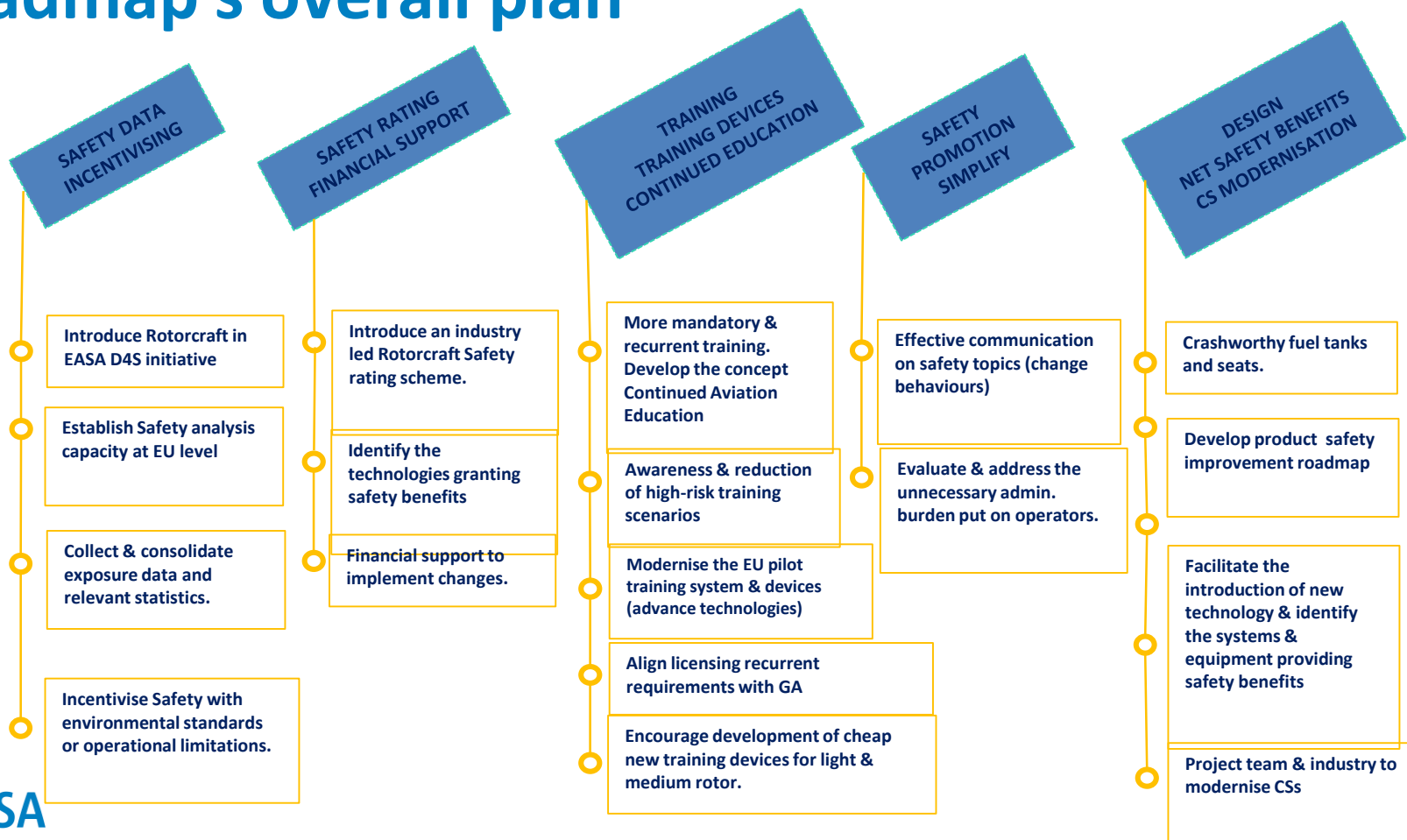
19%

NCO - Flight Training

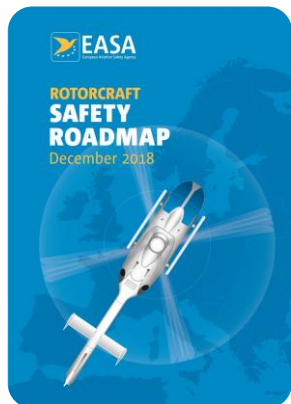
Key risk areas:

- Helicopter Upset
- Terrain Collision

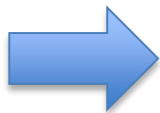
# Roadmap's overall plan



# Overview of the EASA Work-Streams



Roadmap report



Project Management Plan

- Safety Data
- Training Safety
- Training Devices and simulators
- Safety Promotion
- CS Modernisation
- Simplification
- Helicopter Design improvements
- General Aviation common actions
- New concepts:
  - Safety Rating
  - Net Safety Benefits
  - Continued Aviation Education

# Safety Data

- Objective – Gather an accurate picture of helicopter safety risks
- Activities
  - Complete data set reviewed and consolidated
  - European helicopter safety analysis group/team/capability set up
    - HEMS and SPO were the first area of focus
  - Cooperation with HeliOffshore started
  - Rotorcraft will be included in D4S Phase 2



# Safety Rating

- Objective: to develop a concept for a European safety rating scheme for rotorcraft.
- Activities:
  - Comparative review of different safety rating schemes worldwide,
  - Identification of the strengths and success factors,
  - Discussion with EuroNCAP (car star rating),
  - Initial concept developed for rotorcraft,
  - Discussion with Airbus and Leonardo and link with the project Cassopia from Shell (gather HeliOffshore and all rotorcraft manufacturers).



# Training Safety

- Objective - Revamping Rotorcraft Training to become more effective
- Activities
  - Survey to European DTOs and ATOs engaged in helicopter training primarily for PPL on Light Helicopters as well as NAAs
  - EASA staff engaged in PPL(H) for in situs evaluation from an end user point of view
  - Revision of some helicopter specific training procedures.

# Training Safety

## → Next Steps

- Evaluate and identify the training requirements against the current regulation in FCL.210H PPL and FCL.110.H LAPL.
- Review the instructor qualification and training for PPL(H) – Training vs Checking concept and Mandatory 15 min Safety Briefing in recurrent training concept
- Review areas that impose a high risk to fulfil the requirements in FCL.210H (PPL) and the practical execution of the manoeuvres and in which relation this could be replaced or trained for by alternative means



# Training Devices and simulators

- Objective: facilitate and promote the development and use of new innovative and cost-effective training devices.
- Activities :
  - IPC signed with a Virtual Reality simulator company,
  - FSTD evolution currently under development – RMT.0196 – ATO and Authority Requirements
  - A survey was made to European ATOs and NAAs to identify potential shortcomings in the rules,
- Next steps:
  - The identified changes will need to feed into existing Rulemaking tasks listed in EPAS or major changes might lead to new rulemaking programming



# Safety Promotion

- Objective: Ensure that the EASA-led Safety Promotion is established as source of material and to help promote important safety topics in new and innovative ways.
- Activities:
  - Initial EASA web-portal for rotorcraft online – Full set up in Q1 2020
  - ESPN-R Safety Workshop (EPAS SPT.096) organised within the EASA Rotorcraft Symposium 2019
  - Safety Videos and Podcast prepared
  - EASA Webpage with Safety Apps
- Next Steps
  - 2020 comprehensive plan and Nov. 2020 teaser

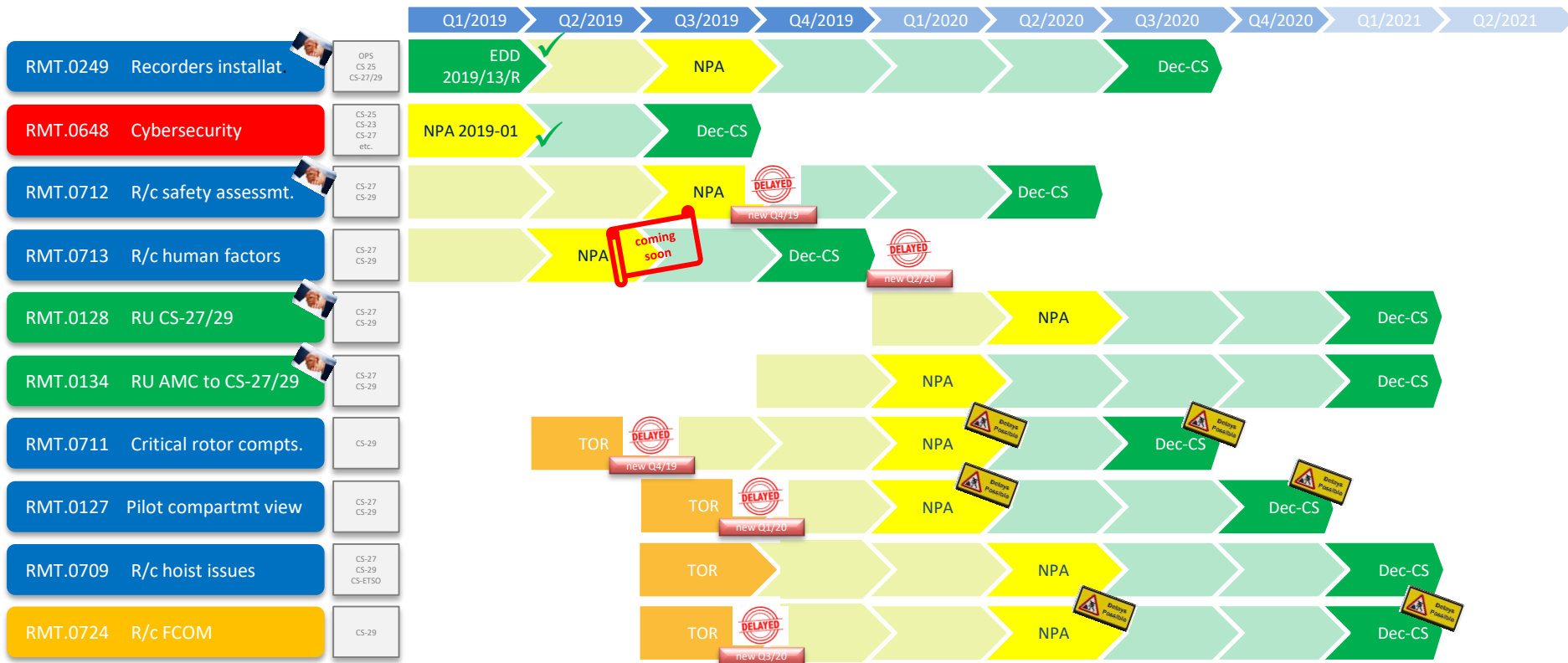
# European roadmap but global footprint (2019)

- Rotorcraft Safety Roadmap presentation and promotion at ICAO:
  - Working Paper endorsed at ICAO-EUR IE-REST in
  - Information Paper at the General assembly – very well received
- The Roadmap was presented (thanks to AH who included it in its roadshows):
  - China EU-China APP
    - Helicopter Safety workshop, Deyang
    - Helicopter Safety workshop, Kunming
    - Helicopter Safety Management Workshop, Beijing
  - EU-South East Asia APP
    - Helicopter Safety workshop, Bangkok Thailand
    - South-Asia, Kathmandu, Nepal
    - Costa-Rica...

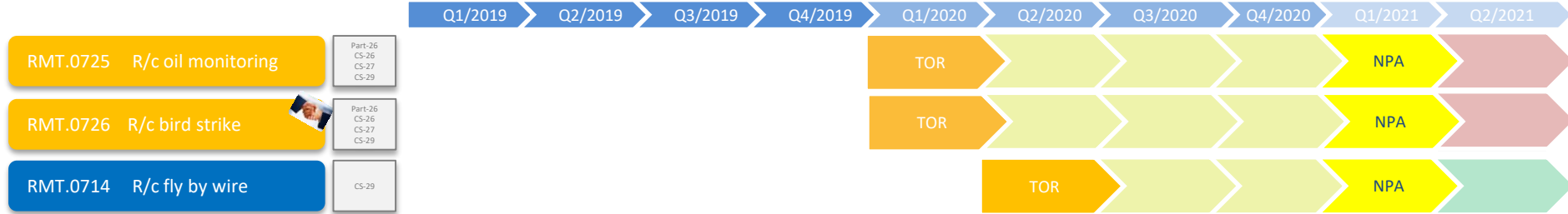
# European roadmap but global footprint (2020)

- For 2020:
  - 3 events planned in LATAM,
  - Leverage international outreach of Airbus Helicopter Safety Roadshows and workshops (180+ worldwide),
  - Maintain good contact and cooperation.
- What is missing – Do the same in Europe!
- More cooperation with NAA needed

# CS-27/29 Modernisation



# RMTs affecting CS-27/29



→ CS27 is now at amendment 6

→ CS29 is now at amendment 7

# Helicopter design improvement

- Airbus Helicopter slide
- Bell will give a flavor

# Research

→ EASA 1,6 M€– Helicopter Capsize Survivability

→ EASA 1.9 M€ - Integrity Improvement of Rotorcraft MGB

- Task 1: Evaluate and define rotor and rotor drive system design options to prevent single points of catastrophic failure;
- Task 2: Define adequate design parameters for component reliability and tolerance to flaws;
- Task 3: Develop design parameter limitations;
- Task 4: Determine threats that cannot be addressed by design;
- Task 5: Investigate crack development in components utilising case-hardened materials



# General Aviation and Rotorcraft Safety Roadmap



Under the GA Roadmap:

- Net Safety Benefit (under T4S)
- Addressing the risk of mid-air collisions VFR/VFR in uncontrolled airspace.

Common issues:

- Access to data (flying hours),
- Safety promotion and reaching out to individual pilots and small operators
- More affordable training methods.



## ROTORCRAFT SAFETY ROADMAP December 2018



# Industry-led tasks

- Securing financial support for safety improvements
  - Need tangible projects (Recorders, Conspicuity Devices...)
- Continued Aviation Education
  - Initial concept is being defined – dedicated workshop early 2020
- Simplify
  - EASA contracted a study to evaluate the financial size of the European Helicopter industry.
  - A study to assess the administrative burden on small/medium size operators
  - Ease of FAA STC Validation on single MSN as in General Aviation
- Initial review of what digitalisation means for rotorcraft

# The Roadmap

- The Rotorcraft Safety Roadmap project:
- Project initiation: January 2019
- Mid-term review: June 2021
- Project final review: December 2023
  
- Main Message
  - Project running, implementation started, some tangible results already
  - Need to keep the pace for the years to come
  - **A big thank to all contributors!**

# Enabling VTOL development

**Your safety is our mission.**

# Market Outlook

## → Main Markets

- Air Metro
- Air Taxi

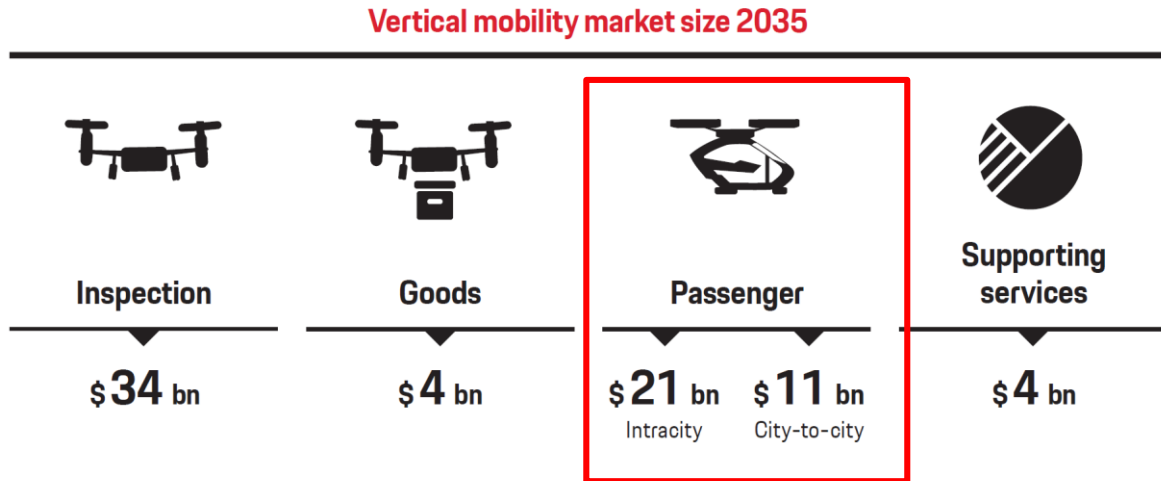


Figure 13. Billions in play: market size for inspection, passenger, and goods drones plus supporting services.

Graphic: Porsche Consulting

The range of market assessment is from \$15 billion to \$1,5 trillion with the most bullish forecast at \$2,9 trillion by 2040.

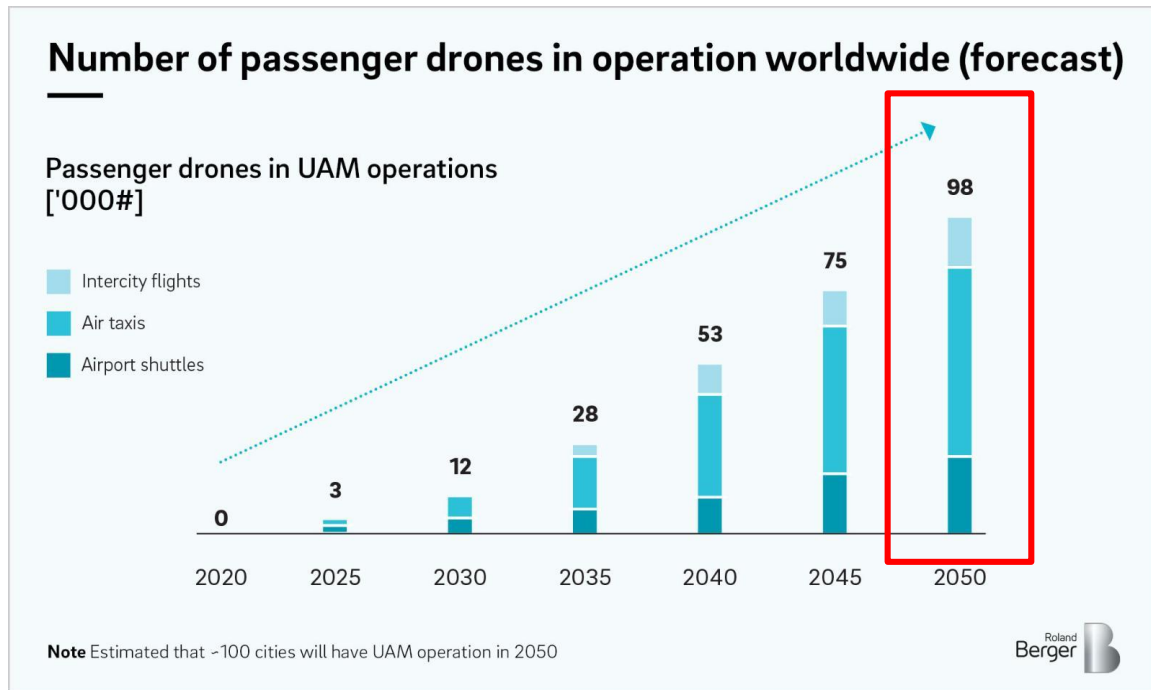
Airbus evaluate the market at \$50 billion

Market value forecast for Commercial Air Transport is \$6,3 trillion

Not a negligible “Niche”

# Forecasted number of vehicles

- Currently, around 21,500 Commercial Air transport Aircraft are flying . To reach this figure, it took 60 years. Around 100,000 UAM vehicles are forecasted in the next 30 years.
- Mass production compared to today aerospace industry
- All business models foresee a large scalability



# Main Market Enablers

- **Safety – Number 1**
- Technology breakthrough at vehicle level
  - Energy Management (Electrical engines, Batteries, hybrid systems)
  - More automated and connected flights
  - Autonomous flights
  - Low cost high computing power
- Sustainability
- Social Acceptance
  - Noise level
  - Privacy aspects
  - Involvement of local communities
- Incorporation in ATM/UTM and beyond
  - Service provider for seamless multi-modal integration
- Infrastructures

## New Regulatory Framework

- EASA
- EASA
- EC/EASA
- EC/EASA
- EC/EASA
- EC/EASA/Local



eVTOL compared  
to a helicopter

**4x**  
quieter



**15x**  
higher reliability



**2x**  
safer



**10x**  
less expensive

Figure 7. Quiet, reliable, safe, and inexpensive:  
the main advantages of eVTOL over conventional  
helicopters.

Graphic: Porsche Consulting

# Safety Aspects

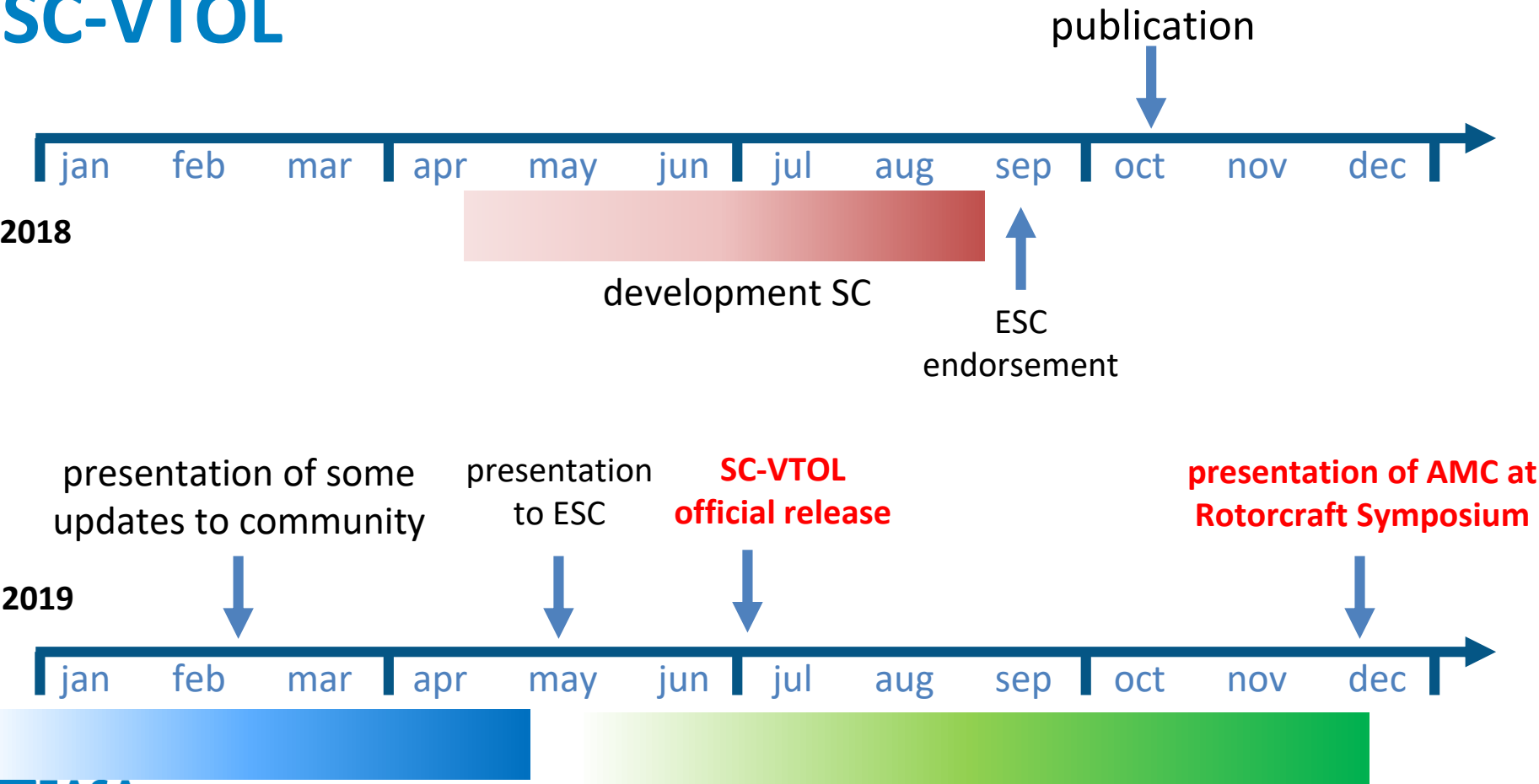
- Safety has to be tailored to the risk.
- Risk is a function of
  - Kind of operation – CAT, SPO, Private
  - Area of operation – Congested hostile, congested, remote...
  - Number of occupant(s)
  - Number of vehicles in operation
- There are 2 main ways to « derail » from regulatory perspective
  - Being over-conservative/Being under-conservative
  - Fooling the industry by targetting only prototype kind of vehicles



# SC-VTOL

- VTOL Safety target(s) have been defined to into account
  - The identified risks
  - Reasonnable exposure – low to medium market forecast
  - Current products service experience both on design and operations
  - Current VTOL main drawback
- Requirements are all performance-based
- Include proportionality linked to type of operations
- Compatible with further development
- Provide visibility and level playing field for an emerging industry

# SC-VTOL

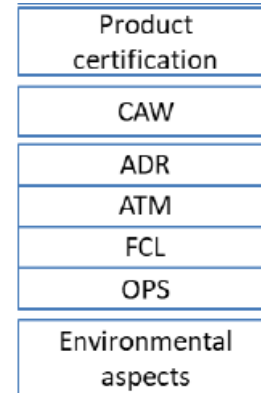
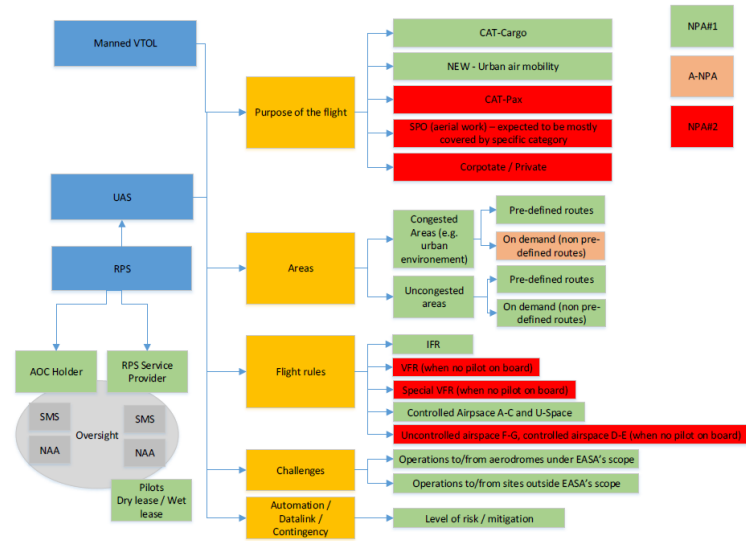


# Development of Means of Compliance

- Partnership with Eurocae – WG-112
  - 5 sub-groups created
- EASA developed
  - Priorities defined based on potential impact on design
  - 11 draft AMC presented
  - Hybrid and Electric propulsion
- Further detailed presented by Volker Arnsmeier and in dedicated sessions

# VTOL Operations

- Urban Air Mobility - manned and unmanned addressed within the UAS regulatory activities
- Tackling all domains
- Guidelines on Vertiport will be established



# Introduction Wrap-up

- Activities related to
  - Rotorcraft Safety Roadmap
  - VTOL regulatory framework development
  - 2020 partnership with EHA
- Is driving a huge work from all stakeholders of the VTOL Community
- You will have only a flavor during these 2 days
- **A big THANK YOU to all who are involved, in particular to EASA staff**

# Any Questions?

**Your safety is our mission.**

An Agency of the European Union



# Enjoy YOUR Symposium!

## THANK YOU

**Your safety is our mission.**