

# Embracing FSTD Innovations: FSTD Capability Signature (FCS)

Session on Training and Simulation

## Rotorcraft and VTOL Symposium

Daan Dousi

Aircrew and Medical Standards & Implementation Section Manager

**Your safety is our mission.**

An Agency of the European Union 

# Why are we here?

- To present to you the FSTD Capability Signature concept (FCS) based on the ICAO doc 9625
- We will show you how the concept:
  - Strengthens the link between training task and training tool
  - Caters for new innovative training tools
  - Enables better standardization of training tools used
- And how we intent to amend the European regulatory framework to enable the concept

# FSTD Tailored to Training Needs - Background

- Existing paradigm for use of FSTDs in use since 1990s
- Paradigm strong focus on FFS; a high fidelity but costly device
- Regulatory framework restrictive and inflexible in use of other devices
- New paradigm to provide more flexibility and access to other innovative training devices

# FSTD Tailored to Training Needs - Objectives

- Whilst maintaining the safety level:
  - Reconnect and strengthen the connection between training and FSTD
  - Enable tailored FSTDs to industry training needs
  - Make use of all FSTD's individual capabilities
  - Ensure FSTD qualification standardisation (ICAO 9625)
  - Enable new regulatory framework to better facilitate advancements/innovation in simulation technology
  - Enable greater flexibility for training providers to provide more cost-effective training

# FSTD Tailored to Training Needs – Evolution Project

- Work commenced mainly with FSTD experts in 2017
- Call for more training experts during EASA event early 2018
- EASA-led training task force setup in 2018
- Latest stakeholder feedback shows overall support

# FSTD Tailored to Training Needs – Proposal

- Follow up from amendments (Opinion 05 and 06/2017) becoming applicable in December 2019
- Scope [FCL Type Rating Training and OPS Training]
- Follow up of other initial training requirements (MPL, CPL, IR) in regard of FSTD credits to be addressed with RMT.0194 “modernizing the pilot training system” commencing 2020

# FSTD Tailored to Training Needs – Proposal

- The FSTD capability signature (FCS) concept to be introduced ('DNA') by amendments to;
- CS-FSTD(A) for aeroplanes, incorporating ICAO Doc 9625 standards
- FSTD qualification certificate format at rule level
- AMC/GM to facilitate the above

**Page 1**

**A0106**

**POV 180degx40deg**

**Additional Capabilities:** none

**Restrictions or limitations:** 1. No training, testing, and checking of LPV approaches in Europe  
2. No UPRT training

**L. FSTD simulation features**

1. Flight deck (cockpit structure)	<input checked="" type="checkbox"/> S	<input checked="" type="checkbox"/> R	<input checked="" type="checkbox"/> G	<input checked="" type="checkbox"/> N
2. Flight deck (controls and engine)	<input checked="" type="checkbox"/> S	<input checked="" type="checkbox"/> R	<input checked="" type="checkbox"/> G	<input checked="" type="checkbox"/> N
3. Ground handling (taxi, take-off, landing)	<input checked="" type="checkbox"/> S	<input checked="" type="checkbox"/> R	<input checked="" type="checkbox"/> G	<input checked="" type="checkbox"/> N
4. Aeroplane	<input checked="" type="checkbox"/> S	<input checked="" type="checkbox"/> R	<input checked="" type="checkbox"/> G	<input checked="" type="checkbox"/> N
5. Flight control forces	<input checked="" type="checkbox"/> S	<input checked="" type="checkbox"/> R	<input checked="" type="checkbox"/> R1	<input checked="" type="checkbox"/> G
6. Sound cues	<input checked="" type="checkbox"/> S	<input checked="" type="checkbox"/> R	<input checked="" type="checkbox"/> G	<input checked="" type="checkbox"/> N
7. Visual cues	<input checked="" type="checkbox"/> S	<input checked="" type="checkbox"/> R	<input checked="" type="checkbox"/> G	<input checked="" type="checkbox"/> N
8. Motion cues	<input checked="" type="checkbox"/> S	<input checked="" type="checkbox"/> R	<input checked="" type="checkbox"/> R1	<input checked="" type="checkbox"/> G
9. Environment – ATC	<input checked="" type="checkbox"/> S	<input checked="" type="checkbox"/> R	<input checked="" type="checkbox"/> G	<input checked="" type="checkbox"/> N
10. Environment – navigation	<input checked="" type="checkbox"/> S	<input checked="" type="checkbox"/> R	<input checked="" type="checkbox"/> G	<input checked="" type="checkbox"/> N
11. Environment – atmosphere and weather	<input checked="" type="checkbox"/> S	<input checked="" type="checkbox"/> R	<input checked="" type="checkbox"/> G	<input checked="" type="checkbox"/> N
12. Environment – aerodromes and terrain	<input checked="" type="checkbox"/> S	<input checked="" type="checkbox"/> R	<input checked="" type="checkbox"/> G	<input checked="" type="checkbox"/> N

**Other:** None

**For the European Aviation Safety Agency,**  
Date of issue: 01.06.2018

**Flavio DE NARDIS**  
Flight Crew Training Oversight Section Manager

Note:  
The following numbers are listed on the certificate:  
EASA current Project Number: 0010039481 - 001  
FSTD QUALIFICATION CERTIFICATE - 10054824, REV. xx - FlightSafety International, Inc.  
EASA Form 143, Issue 1 - 08/04/2012

2/2

# FSTD Tailored to Training Needs – Proposal

- Training Provider -> Analysis of training tasks to determine FCS needed
- Matrix developed by EASA to support authorities and training providers with the analysis
- Additional process (methodology) developed to allow training providers to add tasks and determine FCS
- Training providers to match training FCS to available device FCS
- Training provider must demonstrate to authority how the specific devices used adequately achieve the training task

# FSTD Tailored to Training Needs - Proposal



2019



Regulatory  
training needs

Regulatory  
training needs

2022



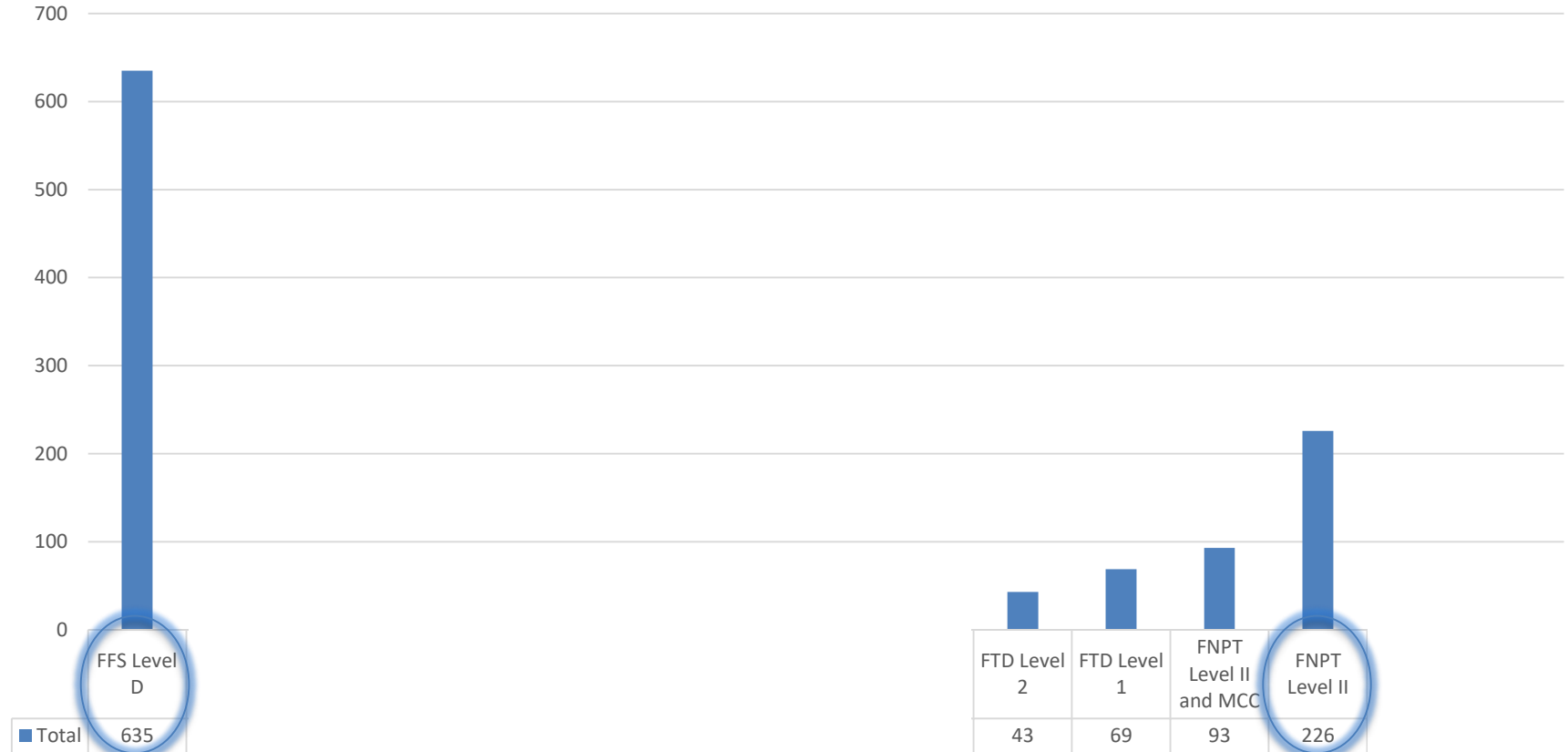
# FSTD Tailored to Training Needs – Project Planning

- Q1/2020 NPA to include drafts of:
  - CS-FSTD(A) issue 3;
  - Amendments to the FSTD qualification certificate;
  - Introduction of the Equipment and Specifications List (ESL);
  - AMC to appendix 9 for type rating training and ORO.FC.
- Q2/2020 Opinion – proposed changes to part ARA in regards of the FSTD qualification certificate
- All amendments to be in place by summer/autumn 2021, thereafter 6-12 months transition

# FSTD Tailored to Training Needs – Why?

Mismatch standards – utilisation in training  
FSTD and FCL/OPS training

# FSTDs with EU qualification certificate



# Why





## The FSTD from training perspective : the QC

EASA European Aviation Safety Agency	
<b>FLIGHT SIMULATION TRAINING DEVICE QUALIFICATION CERTIFICATE</b>	
Pursuant to Commission Regulation (EU) No 1178/2011 and subject to the conditions specified below, the European Aviation Safety Agency hereby certifies that	
<b>FSTD No EU-IT052/CU</b>	
S/N: FlightSafety / 8497	
<b>Cessna CJ1 (525)</b>	
<b>70210 SAINT ANTONIO, TX USA</b>	
has satisfied the qualification requirements prescribed in Part-ORA, subject to the conditions of the attached FSTD specifications.	
This qualification certificate shall remain valid subject to the FSTD and the holder of the qualification certificate remaining in compliance with the applicable requirements of Part-ORA, unless it has been surrendered, superseded, suspended or revoked.	
For the European Aviation Safety Agency,	
Date of issue: 24.03.2017	
 <b>Hans BIRKHOLM</b> ATO & AeMC Section Manager	
Note: The following numbers are listed on the certificate: EASA current Project Number: 0010016500- 001	
FSTD QUALIFICATION CERTIFICATE - 10039368, REV. 3 - FlightSafety International, Inc. EASA Form 145, Issue 1 - 06/04/2012	

EASA European Aviation Safety Agency	
<b>FSTD QUALIFICATION CERTIFICATE: EU-IT052/CU</b>	
<b>FSTD SPECIFICATIONS</b>	
1. Title, model and type: Cessna CJ1 (525)	
B. FSTD qualification level:	AEROPLANE FFS LEVEL C
2. Primary reference document: Part Two, Chapter 1.3)	
D. Visual system:	FSI FVS, Vital VIII, CRT projectors, FOV 180degx40deg
E. Motion system:	FSI SSD, 36 inch, hydraulic, 6 DOF
F. Engine fit:	Williams RA 73-44-1A
G. Instrument fit:	According to aircraft type equipped with Rockwell Collins Proline 21
H. ACAS fit:	TCAS I
I. Windshear:	Profiles available
J. Additional capabilities:	None
CAT III (lowest minimum)	RVR m DH ft n/a
LVTO	RVR 125 m yes
Recency	yes
IFR-training / check	yes / yes
Type rating	yes
Proficiency checks	yes
Autocoupled approach	yes
Autoland / roll out guidance	n/a / n/a
ACAS I/II	yes / n/a
Windshear warning system / predictive windshear	n/a / n/a
WX-radar	yes
HUD / HUGS	n/a / n/a
FANS	n/a
GPWS / EGPWS	n/a / yes
GPS	yes
ETOPS capability	n/a
Other: TV recording system, steep approach capability, RNP APCH limited to: [LNAV]	
For the European Aviation Safety Agency,	
Date of issue: 24.03.2017	
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# Why

## The FSTD from training perspective : the QC

 <p><b>FLIGHT SIMULATION TRAINING DEVICE QUALIFICATION CERTIFICATE</b></p> <p>Pursuant to Commission Regulation (EU) No 1178/2011 and subject to the conditions specified below, the European Aviation Safety Agency hereby certifies that</p> <p><b>FSTD No EU-IT052/CU</b> S/N: FlightSafety / 8497 <b>Cessna C31 (525)</b></p> <p>Located at <b>FlightSafety International, Inc.</b> 9027 Airport Blvd. 78216 San Antonio, TX USA</p> <p>has satisfied the qualification requirements prescribed in Part-ORA, subject to the conditions of the attached FSTD specifications.</p> <p>This qualification certificate shall remain valid subject to the FSTD and the holder of the qualification certificate remaining in compliance with the applicable requirements of Part-ORA, unless it has been surrendered, superseded, suspended or revoked.</p> <p>For the European Aviation Safety Agency, Date of issue: 24.03.2017</p> <p> <b>Hans BIRKHOLM</b> ATO &amp; AeMC Section Manager</p> <p><small>Note: The following numbers are listed on the certificate: EASA current Project Number: 0010016500- 001 FSTD QUALIFICATION CERTIFICATE – 10039368, REV. 3 – FlightSafety International, Inc. EASA Form 145, Issue 1 – 08/04/2012</small></p>	<p>testing and checking</p> <p>550 m</p> <p>300 m</p> <p>m</p> <p>125 m</p> <p>windshear</p> <p>approach capability, R</p>	 <p><b>FSTD QUALIFICATION CERTIFICATE: EU-IT052/CU FSTD SPECIFICATIONS</b></p> <table border="1"> <tr><td>A. Type or variant of aircraft:</td><td>Cessna C31 (525)</td></tr> <tr><td>B. FSTD qualification level:</td><td>AEROPLANE FFS LEVEL C</td></tr> <tr><td>C. Primary reference document:</td><td>FAA AC 120-40B and Catch-Up Special Conditions (JAA AGM Sect. Six, Part Two, Chapter 1.3)</td></tr> <tr><td>D. Visual system:</td><td>FSI FVS, Vital VIII, CRT projectors, FOV 180degx40deg</td></tr> <tr><td>E. Motion system:</td><td>FSI SSD, 36 inch, hydraulic, 6 DOF</td></tr> <tr><td>F. Engine fit:</td><td>Williams RA F3-44-1A</td></tr> <tr><td>G. Instrument fit:</td><td>According to aircraft type equipped with Rockwell Collins Proline 21</td></tr> <tr><td>H. ACAS fit:</td><td>TCAS I</td></tr> <tr><td>I. 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CAT II	RVR	300	m	DH	100	ft
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LVTO	RVR	125	m			
Recency						
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Type rating						
Proficiency checks						
Autocoupled approach						
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Windshear warning system / predictive windshear						
WX-radar						
HUD / HUGS						
FANS						
GPWS / EGPWS						
GPS						
ETOPS capability						
Other:	TV recording system, steep approach capability, RNP APCH limited to: [LNAV]					

- Guidance information only
- Limited list of training tasks
- No AMC or GM to support a standardized way to fill the table L.
- Not sufficient to support the requirements of ORA.ATO.135

# Why

## FSTD Qualification Certificate

B.	FSTD qualification level:	AEROPLANE FFS LEVEL C
----	---------------------------	-----------------------

L.	Guidance information for training, testing and checking considerations					
CAT I	RVR	550	m	DH	200 ft	yes
CAT II	RVR	300	m	DH	100 ft	n/a
CAT III (lowest minimum)	RVR		m	DH	ft	n/a
LVTO	RVR	125	m			yes
Recency						yes
IFR-training / check						yes / yes
Type rating						yes
Proficiency checks						yes
Autocoupled approach						yes
Autoland / roll out guidance						n/a / n/a
ACAS I / II						yes / n/a
Windshear warning system / predictive windshear						n/a / n/a
WX-radar						yes
HUD / HUGS						n/a / n/a
FANS						n/a
GPWS / EGPWS						n/a / yes
GPS						yes
ETOPS capability						n/a
Other:	TV recording system, steep approach capability, RNP APCH limited to: [LNAV]					



## Appendix 9 to Part-FCL

MULTI-PILOT AEROPLANES AND SINGLE-PILOT HIGH-PERFORMANCE COMPLEX AEROPLANES		PRACTICAL TRAINING			ATPL/MPL/TYPE RATING SKILL TEST OR PROF. CHECK	
Manoeuvres/Procedures		FSTD	A	Instructor initials when training completed	Tested or checked in FSTD or A	Examiner initials when test or check completed
<b>SECTION 3</b>						
3	Flight manoeuvres and procedures	P----	----			
3.1	Manual flight with and without flight directors (no autopilot, no autothrust/autothrottle, and at different control laws, where applicable)	P----	----			
3.1.1	At different speeds (including slow flight) and altitudes within the FSTD training envelope	P----	----			
3.1.2	Steep turns using 45° bank, 180° to 360° left and right	P----	----			
3.1.3	Turns with and without spoilers	P----	----			
3.1.4	Procedural instrument flying and manoeuvring including instrument departure and arrival, and visual approach	P----	----			

UNCLEAR



BENEFIT ONLY TO THE HIGHEST FSTD QUALIFICATION LEVEL

TYPE RATING TRAINING – 77% OF FFS LEVEL D

# What is the ICAO 9625 concept

Features

Fidelity levels

# What, ICAO 9625

## The FCS concept



→ 12 flight simulations features

- **Aircraft:** Flight Deck, Flight Model, Ground Handling, Systems, Flight Controls and Forces;
- **External cues:** Sound, Visual, Motion;
- **Environment:** ATC, Navigation, Atmosphere and Weather, Aerodromes and Terrain;

# What, ICAO 9625

## The FCS concept



→ 4 fidelity levels

- |                      |                                |
|----------------------|--------------------------------|
| → S (Specific)       | Highest level of fidelity      |
| → R (Representative) | Intermediate level of fidelity |
| → G (Generic)        | Lowest level of fidelity       |
| → N (None)           | Feature not required           |

# What, ICAO 9625

## The FCS concept



→ An FSTD is described as follow

Feature	1	2	3	4	5	6	7	8	9	10	11	12
Fidelity	S	S	S	S	S	R	S	R	S	S	R	R

Highest level of qualification

# FSTD Tailored to Training Needs - How? The changes needed

CS-FSTD(A) issue 3

Part ARA

Part ORA

Part FCL

# How? Update to Part ARA

## Lower part of the qualification certificate page 2

H.	FSTD capability signature (FCS)				
1.	Flight deck layout and structure	<input checked="" type="checkbox"/> S	<input type="checkbox"/> R	<input type="checkbox"/> G	<input type="checkbox"/> N
2.	Flight model (aerodynamics and engine)	<input checked="" type="checkbox"/> S	<input type="checkbox"/> R	<input type="checkbox"/> G	<input type="checkbox"/> N
3.	Ground handling	<input checked="" type="checkbox"/> S	<input type="checkbox"/> R	<input type="checkbox"/> G	<input type="checkbox"/> N
4.	Aeroplane/Helicopter systems (ATA)	<input checked="" type="checkbox"/> S	<input type="checkbox"/> R		<input type="checkbox"/> N
5.	Flight controls and forces	<input checked="" type="checkbox"/> S	<input type="checkbox"/> R	<input type="checkbox"/> R1	<input type="checkbox"/> G <input type="checkbox"/> N
6.	Sound cues		<input checked="" type="checkbox"/> R	<input type="checkbox"/> G	<input type="checkbox"/> N
7.	Visual cues	<input checked="" type="checkbox"/> S	<input type="checkbox"/> R	<input type="checkbox"/> G	<input type="checkbox"/> N
8.	Motion cues		<input checked="" type="checkbox"/> R	<input type="checkbox"/> R1	<input type="checkbox"/> N
9.	Vibration cues ( <i>for helicopter only</i> )	<input type="checkbox"/> S	<input type="checkbox"/> R	<input type="checkbox"/> R1	<input type="checkbox"/> N
10.	Environment — ATC	<input checked="" type="checkbox"/> S		<input type="checkbox"/> G	<input type="checkbox"/> N
11.	Environment — navigation	<input checked="" type="checkbox"/> S			<input type="checkbox"/> N
12.	Environment — atmosphere and weather		<input checked="" type="checkbox"/> R	<input type="checkbox"/> G	<input type="checkbox"/> N
13.	Environment — aerodromes, heliports and terrain	<input type="checkbox"/> S	<input checked="" type="checkbox"/> R	<input type="checkbox"/> G	<input type="checkbox"/> N

GPS	yes
ETOPS capability	yes
Other:	Smoke, RNP APCH limited to: [LNAV, LNAV/VNAV, AR]



## AMC to appendix 9 to Part FCL



	MULTI-PILOT AEROPLANES AND SINGLE-PILOT HIGH-PERFORMANCE COMPLEX AEROPLANES	Testing and checking (T&C) Training (T)	Flight deck/cockpit layout and structure	Flight model (aerodynamics and engine)	Ground handling	Aircraft systems	Flight controls and forces	Sound cues	Visual cues	Motion cues	Environment - ATC	Environment – navigation	Environment – Atmosphere and weather	Environment – aerodromes and terrain
2	Section 2 Take-offs	T&C	S	S	S	S	S	R	S	R	S	S	R	R
2.1	Normal take-offs with different flap settings, including expedited take-off	T	S	S	S	S	S	R	R	N	G	S	S	R
2.2	Instrument take-off, transition to instrument flight is required during rotation or immediately after becoming airborne	T&C	S	S	S	S	S	R	S	R	S	S	R	R
		T	S	S	S	S	S	R	R	N	G	S	R	R
2.3	Crosswind take-off	T&C	S	S	S	S	S	R	S	R	S	S	R	R
		T	S	S	S	S	S	R	R	N	G	S	R	R
2.4	Take-off at maximum take-off mass (actual or simulated maximum take-off mass)	T&C	S	S	S	S	S	R	R	S	S	S	R	R
		T	S	S	S	S	S	R	R	N	G	S	R	R
2.5	Take-offs with simulated engine failure:	T&C	S	S	S	S	S	R	S	R	S	S	R	R
		T	S	S	S	S	S	R	R	N	G	S	R	R
2.5.1	shortly after reaching V2	T&C	S	S	S	S	S	R	S	R	S	S	R	R
		T	S	S	S	S	S	R	R	N	G	S	R	R

## Additional information

Name, date and signature of the person of the FSTD qualification certificate holder who has the organisational responsibility to submit this declaration:



+ evaluation of the FSTD adequacy  
by the ATO

# ORA.ATO.135

## Adequacy of the FSTD

# NOTE

- Making use of the new concept in training is not mandatory
- However it will be mandatory to update the qualification certificate all FSTDs holding an EU qualification certificate (either initial or during recurrent evaluation)
- Applying the new concept will provide opportunities to use more type of FSTD to achieve the regulatory training objectives

# Further future developments

- RMT 196, Work Package 3
  - CS-FSTD(Rotorcraft) initial issue compliant with FCS concept
  - Covers helicopters and VTOL
  - Enabling requirements for introducing new innovative simulation technologies
- Enable one off qualification for FNPT (and similar) associated with lighter requirements for their operation

# Take away....

- EASA, NAAs and industry working towards enabling the ICAO 9625 FCS concept
- EASA Project to;
  - Strengthen link between training task and training tool
  - Cater for new innovative training tools
  - Enable better standardization of training tools used
- Go live for aeroplanes from 2021/22 with those training providers wishing to do so

# Embracing FSTD Innovations: FSTD Capability Signature (FCS)

Session on Training and Simulation

**Questions**

**Rotorcraft and VTOL Symposium**

Daan Dousi

Aircrew and Medical Standards & Implementation Section Manager

**Your safety is our mission.**

An Agency of the European Union 