

ANNEX C

ANNUAL REPORT FROM THE GROUP OF RESPONSABLES
“FLIGHT MECHANICS, SYSTEMS AND INTEGRATION”**Remit**

The Group of Responsables for Flight Mechanics, Systems and Integration is active in the field of flight systems technology in general.

The GoR-FM is responsible for all research and development subjects concerning a chain starting from the air vehicles and their flight mechanics, concerning embedded sensors, actuators, systems and information technology, cockpits, ground control and human integration issues, with reference to automation for both inhabited and uninhabited aircraft, including, but not limited to:

- Aircraft multidisciplinary design aspects;
- Flight performance, stability, control and guidance;
- Aircraft navigation and mission management ;
- Air traffic management and control;
- Integration of remotely piloted systems in the air spaces;
- Safety critical avionics functions and embedded systems ;
- Scientific and technical expertise for air systems certification and regulatory aspects.

Noticeably, GoR-FM is not active in the rotary wing domain where the GARTEUR Helicopter GoR is.

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GoR-FM OVERVIEW

GOR ACTIVITIES

The FM GoR faced a few changes in membership in 2015. Several members are facing significant budget reductions, preventing new ideas to grow and Exploratory Groups to transition to Action Groups. GoR management has been active. Despite, existing EGs did not transition into AGs, and new ideas did not transition into EGs.

Two Exploratory Groups have been identified in 2015, but not active:

- FM/EG-28 “Non-linear flexible civil aircraft control methods evaluation benchmark”;
- FM/EG-29 “Trajectory V&V Methods: formal, automatic control and geometric methods”.

Within FM/EG-28, which was defined and started in 2013, there were difficulties on the technical direction, the changes in participation and limited budget at interested parties.

FM/EG-29 showed little progress in 2015. The development of a pilot paper was agreed but not completed in 2015.

Several discussions were held at FM GoR meetings to discuss new topics. FM GoR agreed to review FlightPath2050 reports and Horizon 2020 rejected proposals for topics to start in FM GoR as EGs. It was agreed to prepare a pilot paper on Pilot Wearable Avionics.

In 2015, there were no Action Groups active.

MANAGEMENT ISSUES

The GoR met on two occasions during 2015, with good attendance at each meeting. Existing EGs were discussed, as well as ideas for new EGs. Moreover, FM GoR identified and agreed to have a close look at Horizon 2020 and other funding opportunities for (new) activities as defined within FM GoR. Topics from unsuccessful bids are being considered for GARTEUR collaboration (since these are already considered a priority for nations).

Participation in the FM GoR by industry and research organizations was rather stable in 2015. One industry partner had difficulties participating to FM GoR meetings.

FUTURE PLANS

During 2016 the GoR will continue efforts to establish new EGs and transition EGs into AGs.

The FM GoR will continue to explore new ideas and funding mechanisms for the new ideas, within and outside GARTEUR context.

3-5 YEAR ROLLING PLAN

Time-Schedule

FM GoR Research Objectives	Subjects	CAT	2011	2012	2013	2014	2015	2016
B	Towards greater Autonomy in Multiple Unmanned Air Vehicles	FM/AG-18	█	█	█	█	AG Finished	
A	Flexible Aircraft Modelling Methodologies	FM/AG-19	█	█	█	AG Cancelled		
A	Fault Tolerant Integrated Aircraft Management System	PP	█	No EG, Cancelled				
A	Non-linear control benchmark	EG28			█	█	█	█
A	Trajectory V&V Methods	EG29				█	█	█
B	Relative Positioning for UAVs	PP	█		Cancelled			
B	Emergency Landing for UAVs	PP	█		Cancelled			
C	Small Airport Operations	PP		FP7 Network				
C	Air to air refueling		FP7 Project RECREATE					
C	Pilot Wearable Avionics	PP					█	█

AG	EG	Pilot Paper
█ Existing	█ Existing	█ Existing
█ Planned	█ Planned	█ Planned

FM GoR Research Objectives - Legend	
A	<i>Development and benefit assessment of advanced methods for analysis and synthesis of flight control systems for aircraft with both conventional and non conventional aero structural configurations.</i>
B	<i>Development of advanced methods for UAV mission automation</i>
C	<i>Development and benefit assessment of advanced aircraft capabilities into ATM/ATC related applications</i>

MANAGED AND FORESEEN GOR ACTIVITIES

The following meetings were held during 2015:

- 103rd GoR(FM) meeting at INTA, Madrid, Spain, 9+10 March 2015;
- 104th GoR(FM) meeting at FOI, Stockholm, Sweden, 13 October 2015.

Six national representatives and IPOCs attended each of the meetings during 2015 to monitor the activities of the EGs and to discuss new ideas and pilot papers. The estimated effort associated with these activities amounts to 1 man-month (20 man-days) in total and the associated travel and subsistence costs are roughly 10 k€.

The following meetings are planned for 2016:

- 105th GoR(FM) meeting at NLR, Amsterdam, The Netherlands, 5 April 2016;
- 106th GoR(FM) meeting TBD.

Rob Ruigrok
Chairman (March 2015 - March 2017)
Group of Responsables
Flight Mechanics, Systems and Integration



GOR MEMBERSHIP

2015 membership of the Group of Responsables Flight Mechanics, Systems and Integration

Chairman			
Mr. Rob Ruigrok	NLR	The Netherlands	ruigrok@nlr.nl

Vice-Chairman			
Mr. Martin Hagström	FOI	Sweden	martin.hagstrom@foi.es

Members			
Mr. Leopoldo Verde	CIRA	Italy	l.verde@cira.it
Mr. Emmanuel Cortet	Airbus	France	Emmanuel.CORTET@airbus.com
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Mr. Francisco Asensio	Airbus Military	Spain	Francisco.Asensio@military.airbus.com
Mr. Fredrik Karlsson (resigned during 2015)	SAAB	Sweden	Fredrik.Karlsson@saab.se
Mr. Martin Hanel	EADS	Germany	Martin.Hanel@cassidian.com

STATUS OF ACTION GROUPS AND EXPLORATORY GROUPS

Action Groups (AG)

None.

Exploratory Groups (EG)

Two Exploratory Groups have been under discussion in 2015:

- FM/EG-28 “Non-linear flexible civil aircraft control methods evaluation benchmark”;
- FM/EG-29 “Trajectory V&V Methods: formal, automatic control and geometric methods”.

Within FM/EG-28, which was defined and started in 2013, there were difficulties on the technical direction, the changes in participation and limited budget at interested parties.

FM/EG-29 showed no progress in 2015. The development of a pilot paper was not successful.

FUTURE TOPICS

One pilot paper was agreed on: Pilot Wearable Avionics.

TABLE OF ACTION GROUPS AND EXPLORATORY GROUPS

Subjects	ST	2010	2011	2012	2013	2014	2015	2016
FM/AG-15 IO–analys. and test techn. for prevention, II	AG							
FM/AG-16 Fault tolerant control	AG							
FM/AG-17 Nonlinear analysis and synthesis techniques	AG							
FM/AG-18 Towards greater Autonomy in Multiple Unmanned Air Vehicles	AG	Active	Active	Active	Active	Closed		
FM/AG-19 Flexible Aircraft Modelling Methodologies	AG	Active	Non-active	Non-active	Non-active	Closed		
FM/EG-28 Non-linear flexible aircraft benchmark for flight control methods assessment	EG				Active	Active	Non-active	?
FM/EG-29 Safety assessment of flight collision avoidance systems with formal V&V, simulation and proofs	EG					Active	Non-active	?

Active
Non-active
Closed

Status December 2015

ACTION GROUP REPORTS

No FM Action Groups were active in 2015.