



# FP7 HELCATS

Heliospheric Cataloguing,  
Analysis and Techniques Service

WP1: Overview and  
Project Status  
Richard Harrison



# Overview & Status

“... a strategic programme that aims to empower the wider scientific community, in Europe and beyond, by providing access to advanced catalogues - validated and augmented through the use of techniques and models - for the analysis of solar wind transients, based on observations from European-led space instrumentation.”

Coordinating truly unique and comprehensive studies of *transients in the heliosphere!*





# Overview & Status

- Project runs from May 2014 to May 2017
- 2<sup>nd</sup> Annual Open Workshop & 4<sup>th</sup> Biannual Project meeting
- Status
  - The catalogues
  - Meetings and reviews
  - Deliverables
  - Actions
  - Publications
  - What next?



# Overview & Status

We are at the end of the second year - A huge amount of work has been done, with an impressive array of data-bases and studies in place and being refined.

In many ways, the third year is the time to consolidate, disseminate and exploit this unique facility!



# Catalogues: The CATS

**HICAT** (WP2 & 3)

STEREO/HI CME catalogues

(WP2 – basic manual catalogue)

(WP3 – kinematic properties)

(Almost 2000 entries)



The basic STEREO/HI catalogue developed at RAL, on which the project is built





# Catalogues: The CATS

**HICAT** (WP2 & 3)  
STEREO/HI CME catalogues  
(WP2 – basic manual catalogue)  
(WP3 – kinematic properties)  
(1510 & 1315 entries)

**DATACAT** (WP4)  
Catalogue of in-situ (plasma  
and field) events at various  
spacecraft

**ICMECAT** (WP4)  
Catalogue of interplanetary  
CMEs arriving at Earth. (267  
entries).

**LINKCAT** (WP4)  
Catalogue linking in-situ events  
(from DATACAT) to HICAT lists.  
(Delivery due month 24)

In situ catalogues at  
Earth and other  
spacecraft, linked to  
the HI interplanetary  
CME catalogue  
(HICAT)





# Catalogues: The CATS

**HICAT** (WP2 & 3)  
STEREO/HI CME catalogues  
(WP2 – basic manual catalogue)  
(WP3 – kinematic properties)  
(1510 & 1315 entries)

**CACTus/HI** (WP2)  
Catalogue of CACTus  
automatically detected  
CMEs in STEREO/HI data

**KINCAT** (WP3)  
COR2 CME catalogue in  
STEREO timeframe using  
GCS model for kinematic  
properties. (109 entries)

**CIRCAT** (WP5)  
Catalogue of CIRs

**LOWCAT** (WP3)  
Catalogue of solar source region  
events, from back-projected  
CME data. (109 entries)

Automated CME  
identification  
catalogue, linked to  
HICAT

Coronal and solar  
source catalogues,  
related to HICAT

Plus the CIR  
catalogue



# Catalogues: The CATS

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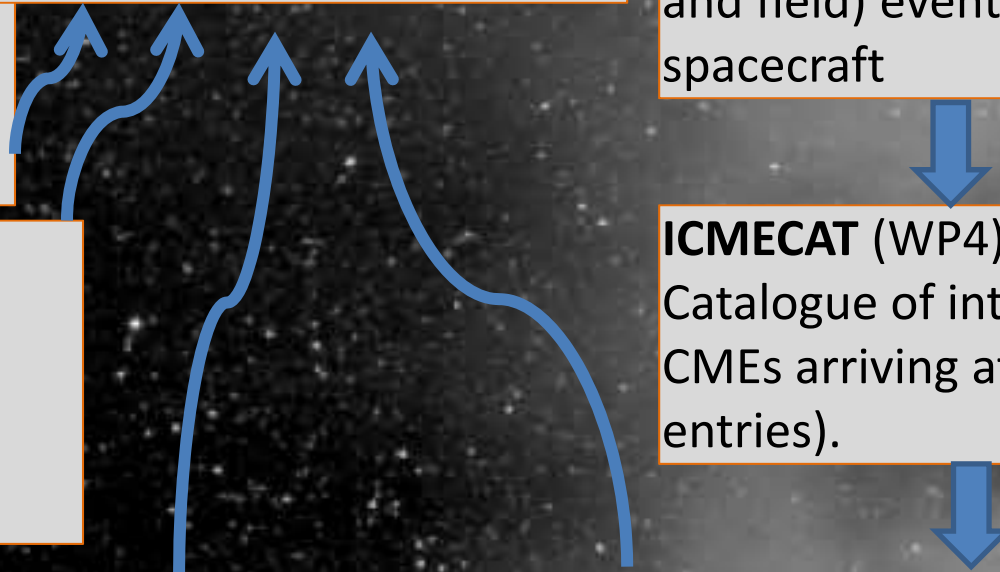
**CIRCAT (WP5)**  
Catalogue of CIRs

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Catalogue of solar source region  
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**DATA CAT (WP4)**  
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Catalogue of interplanetary  
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entries).

**LINKCAT (WP4)**  
Catalogue linking in-situ events  
(from DATA CAT) to HICAT lists.  
(Delivery due month 24)







# Meetings and Reviews

Month	Meeting/Review
1 ( <i>May 14</i> )	Kick-off meeting (STFC)
1+	Monthly telecons
6 ( <i>Nov 14</i> )	Bi-annual project meeting incl. technical review (ROB)
12 ( <i>May 15</i> )	Bi-annual project meeting/Annual Open Workshop (UGOE)
18 ( <i>Nov 15</i> )	Bi-annual project meeting incl. technical review (UH)
24 ( <i>Jun 16</i> )	Bi-annual project meeting/Annual Open Workshop (UPS)
30 ( <i>Oct 16</i> )	Bi-annual project meeting incl. technical review (TCD)
36 ( <i>May 17</i> )	Bi-annual project meeting/Annual Open Workshop (IMPERIAL)



# RESEARCH & INNOVATION

Help

## Participant Portal - Grant Management Services

Richard HARRISON

### MY PROJECT



Call: FP7-SPACE-2013-1  
Type of Action: CP  
Acronym: HELCATS  
Current Phase: Grant Management  
Number: 606692  
Duration: 36 months  
Start Date: 01 May 2014  
Estimated Project Cost: €3,168,901.60  
Requested EU Contribution: €2,499,833.15  
Contact: [Sabri MEKAOUJ](#)

[Final Report](#)

- [Latest Legal Data](#)
- [Process List](#)
- [Document Library](#)
- [Communication Center](#)

[H2020 ONLINE MANUAL](#)

[HOW TO](#)

Launch new interaction with the EU +

**Consortium Requested Amendment**  
AMD-606692-8  
07 Mar 2016

Launched Prepared Submitted Admissible Decision

- Process specific documents
- Process specific communications

**Periodic Reporting**  
REP-606692-1 - period 04/2014 > 10/2015  
01 Nov 2015

Draft Submitted Paid

- Process specific documents
- Process specific communications

**Deliverables**  
606692 - HELCATS  
01 May 2014

Started Completed

- Deliverables upload
- Process specific documents
- Process specific communications

**Proposal Management & Grant Preparation**  
606692 - HELCATS  
21 Nov 2012

Submitted Informed Invited Prepared Signed Paid

- Process specific documents
- Process specific communications



# Deliverables

Number	Title	WP	Lead	Date
D1.1	HELCATS Website launch	1	STFC	3
D1.2	Minutes Kick-off Meeting	1	STFC	2
D1.3	Progress report to Commission	1	STFC	7
D1.4	Annual Report	1	STFC	13
D1.5	18 Month Report plus cost statements	1	STFC	19
D1.6	Annual Report	1	STFC	25
D1.7	Progress report to the Commission	1	STFC	31
D1.8	Final HELCATS cost statements and Annual Report	1	STFC	36
D1.9	Final Public Report	1	STFC	36





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D1.3	Progress report t
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D1.6	Annual Report
D1.7	Progress report t
D1.8	Final HELCATS co Annual Report
D1.9	Final Public Repo



## Heliospheric Cataloguing, Analysis and Techniques Service

EU Project #: 606692  
FP7-SPACE-2013-1

### HELCATS 18 Month Report Nov. 2015

Version: 1.1

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<i>Title:</i>	HELCATS 18 Month Report Nov. 2015
<i>Document Number:</i>	HELCATS_STFC_D1_5_1
<i>Project Deliverable:</i>	D1.5
<i>Release/Date</i>	Version: 1.1 2015-12-21
<i>Editor:</i>	Richard Harrison, Jackie Davies, Jason Byrne
<i>Contributors:</i>	HELCATS Consortium
<i>Reviewed By:</i>	HELCATS Steering Committee
<i>Distribution:</i>	EU & PROJECT

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36



# Deliverables

Number	Title	WP	Lead	Date
D2.1	Catalogue of manually identified CMEs	2	STFC	36
D2.2	Report on feasibility of automated CME identification	2	ROB	12
D2.3	Report on inter-comparison of manual and automated CME catalogues	2	ROB	18
D2.4	Report on manual and automated CME catalogue comparisons to coronagraph CME catalogues	2	STFC	24
D2.5	Scientific management of HELCATS	2	STFC	36
D3.1	Provision of time-elongation maps and summaries for catalogued CMEs	3	STFC	12
D3.2	Incorporation of results of forward modelling into CME catalogue	3	UGOE	36
D3.3	Report on model results	3	STFC	36
D3.4	Report on prototype inverse model	3	UGOE	36



# Deliverables

Number	Title	WP	Lead	Date
D4.1	Establish on-line catalogue of potentially associated solar source and in-situ phenomena	4	UNIGRAZ	24
D4.2	Report on statistical analysis and comparison of HI results with coronal and in situ data	4	UNIGRAZ	30
D5.1	Establish online CIR catalogue	5	UPS	12
D5.2	Fitting leading edge of CIRs and determination of latitudinal extent	5	UPS	24
D5.3	Catalogue of CIRs/coronal holes	5	UPS	36
D5.4	Imagery/in-situ comparison	5	UPS	36
D5.5	Analysis of in-situ data	5	UH	36
D6.1	Assessment of how well Enlil predicts properties of CIRs using HI	6	UPS	24
D6.2	Catalogue of optimised Enlil simulations	6	UPS	24





# Deliverables

Number	Title	WP	Lead	Date
D6.3	Catalogue of shocks obtained using Enlil	6	UPS	36
D6.4	Assessment of the use of HI/Enlil for space weather forecasting	6	UPS	36
D7.1	Catalogues of EISCAT and LOFAR IPS data events and S/WAVES events	7	IMPERIAL	27
D7.2	Report of initial comparison between IPS events and HI events	7	STFC	30
D7.3	Report of initial comparison between solar radio burst events and HI events	7	IMPERIAL	30
D8.1	Publication in the professional literature	8	STFC	36
D8.2	Annual Open Meetings	8	STFC	36
D8.3	Attendance/presentation at major science meetings	8	STFC	36



# Deliverables

Number	Title	WP	Lead	Date
D8.4	Posting information on the website	8	STFC	36
D8.5	Integration with community facilities and websites	8	STFC	36
D8.6	Production of press releases, public talks	8	STFC	36
D8.7	Integrate J-map associated catalogues with propagation tool	8	UPS	36
D8.8	Integrate Carrington map associated catalogues in propagation tool	8	UPS	36



# Actions

Number	Action	Who	When
	<b><i>ACTIONS FROM 7 APRIL 2016 SC Telecon</i></b>		
115	Upload 18 month report to ECAS site	Richard	DONE
116	Upload D2.3 report to ECAS website	Richard	DONE
117	H2020 to be discussed at VarSITI meeting	Richard	DONE
118	Keep STFC up to date with publications. STFC to maintain publication list	All	On going





# Actions

Number	Action	Who	When
	<b><i>OPEN ACTIONS FROM PREVIOUS SC TELECONS</i></b>		
112	Seek approval for change of use of ROB funds	Richard	DONE
113	Identify follow-on for HELCATS (see 117)	All	DONE
114	First draft of statistical analysis to be distributed	Jackie	?
108	Inform Sabri that Jason has left and Chris P is Technical Manager	Richard	DONE
84	Complete deliverable D3.1 with a report	Chris P	
91	Install procedures for collecting data on website hits/use, downloads etc...	Chris P	
92	Provide material for HELCATS gallery to Chris P	All	On going
94	Press Release to coincide with stats paper release	STFC	
103	Consider meeting in Brussels at Commission bldg	Richard	
68	Draft definitive statement on standardization, format, naming, coordinate systems, metadata, version control, QA etc.	Chris P	



# Actions

Number	Action	Who	When
	<b><i>ACTIONS FROM 7 APRIL 2016 SC Telecon</i></b>		
119	Arrange TCD Biannual meeting for Oct/Nov	Peter	Aug 2016
120	Arrange Annual and Closed meetings for end of project (Year 3)	Jonathan	Sep 2016
121	Second Annual Report?	Richard	Jun 2016
122	Confirm 18 month payment and confirm amendments with EC	Jane	May 2016
123	Complete deliverable D3.1	Chris P	May 2016
124	Complete deliverable D2.4	STFC	May 2016
125	Complete deliverable D4.1	UNIGRAZ	May 2016
126	Complete deliverable D5.2	UPS	May 2016
127	Complete deliverable D6.1	UPS	May 2016
128	Complete deliverable D6.2	UPS	May 2016
129	Complete deliverable D7.1	IMPERIAL	Aug 2016



# Publications

- Publication list
- The HELCATS paper
- RAL catalogue papers - update
- Other issues
  - Presentations list
  - Other strategic papers
  - 'Getting HELCATS on the streets'





# What Next?

- Dublin bi-annual SC meeting – Oct/Nov 2016
- London (Imperial) final Annual Open Workshop and SC bi-annual meeting – May 2017
- Of course, monthly telecons will continue – as will the action list!
- Strategy
  - We have done and are doing the spadework – some superb results/facilities.
  - Step up a gear in publication and advertising, to maximise the exploitation and awareness of the huge benefits of the HELCATS ‘facility’



# What Next? H2020

- After HELCATS? Do we want to propose to the 2017 H2020 opportunity (space weather or data)
- Not necessarily the same consortium or lead beneficiary; just a good scientific case and the right team to take it on
- Never push too much the 'follow on to HELCATS' strategy. This must be a stand-alone project that is attractive in its own right, though we would want it to build on HELCATS, naturally!





# What Next? H2020

- If we are to be ready to submit in March, we need to have good, solid plans by the end of the Summer and some months to refine and draft the submission. We learnt last time that you cannot rush an H2020 submission.
- Some elements of the HELCATS project were not included in the final cut, and there were some additional ideas....





# What Next?

- Did not include SEPs. A logical next step? HESPERIA (led by Olga Malandraki) does focus on SEPs, but not CMEs - also probably looking for the next steps. Is there mileage in linking up the two for a new project?
- Did include more pioneering model work in early HELCATS drafts, notably a hybrid code. Following on from the HELCATS cataloguing work and the model comparisons, what about a real focus on novel modelling concepts?
- What about the application of HELCATS results for space weather services. Can the new project really apply the HELCATS results and techniques for space weather use and even mission definition?



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# Spare Slides





# Aims of HELCATS

- Catalogue transient (CMEs) and background (SIR/CIR) features imaged by STEREO/HI, including
- Kinematic properties estimated using a variety of established & prototype modelling approaches
  - geometrical modelling
  - forward and inverse modelling
  - automatic detection
- Verify these kinematic properties through comparison with solar source observations and in-situ
- Assess the potential for initialising MHD models with both the transient & background solar wind structures observed by HI
- Assess the complementarity of using radio obs (in particular Type II radio bursts and IPS) in combination with HI.

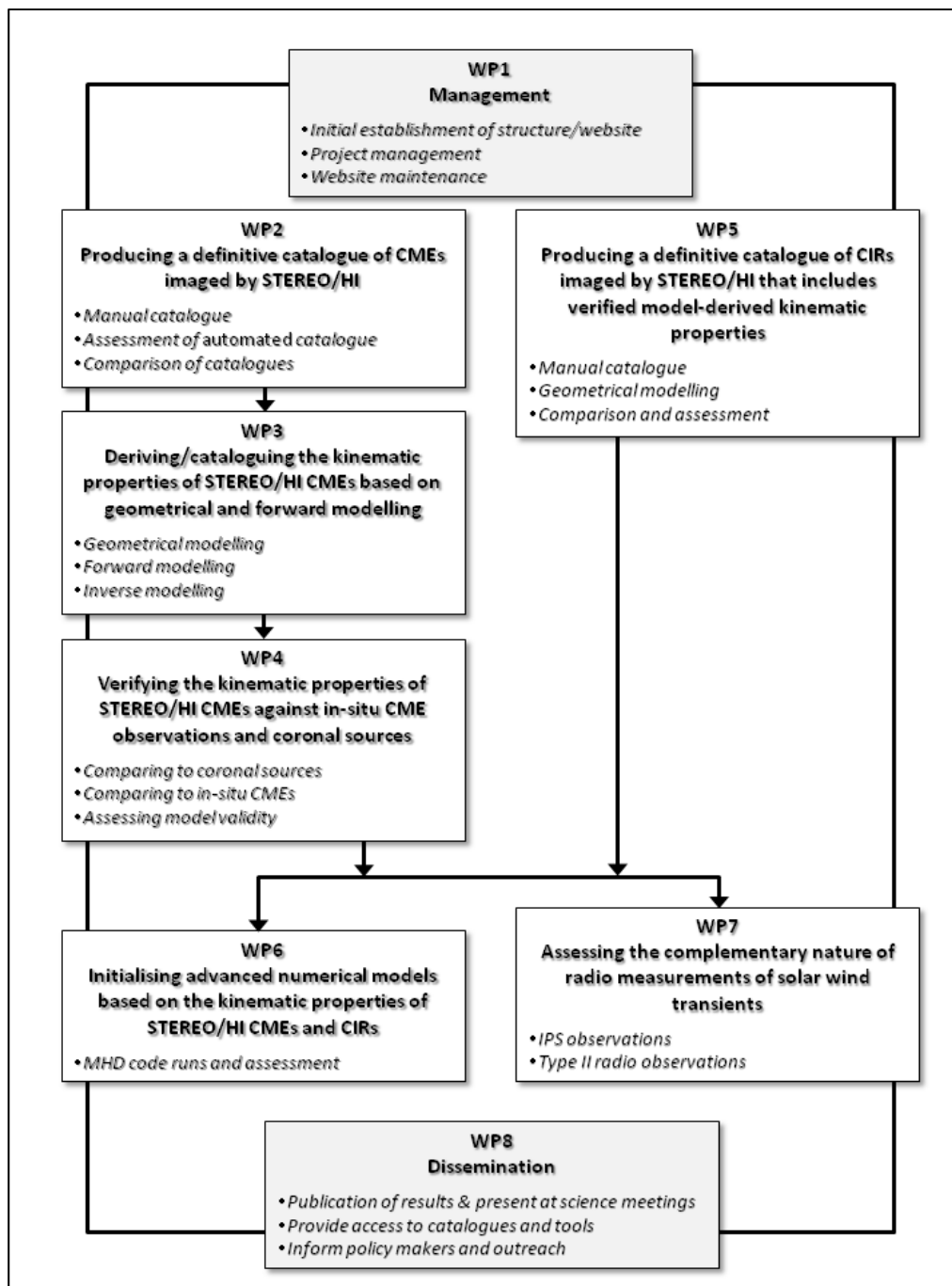


# The Team

- STFC-RAL Space, UK
  - University of Graz, Austria
  - University Paul Sabatier/CNRS, France
  - University of Göttingen, Germany
  - Royal Observatory Belgium, Belgium
  - Imperial College London, UK
  - University of Helsinki, Finland
  - Trinity College Dublin, Ireland
  - George Mason University, USA
- R. Harrison/J.A. Davies  
C. Möstl  
A.P. Rouillard  
V. Bothmer  
L. Rodriguez  
J.P. Eastwood  
E.K.J. Kilpua  
P. Gallagher  
D. Odstrčil



# The WP Structure







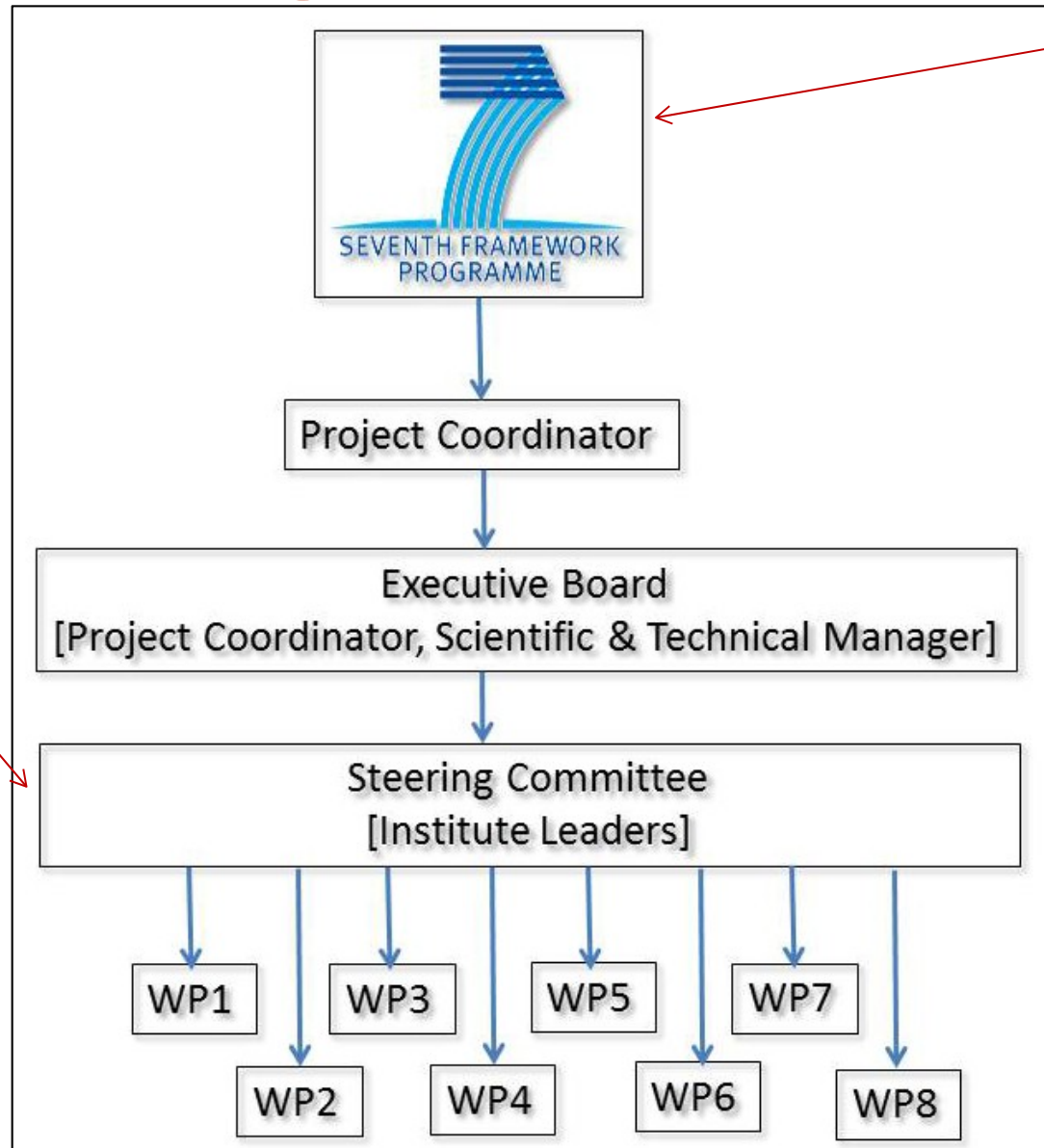
# WP Structure

Work package No.	Work package title	Type of activity	Lead beneficiary No.	Lead beneficiary short name	Person months	Start month	End month
WP1	Management	MGT	1	STFC	8.5	1	36
WP2	Producing a definitive catalogue of CMEs imaged by STEREO/HI	RTD	1	STFC	51.5	1	36
WP3	Deriving/cataloguing the kinematic properties of STEREO/HI CMEs based on geometrical and forward modelling	RTD	4	UGOE	51	7	36
WP4	Verifying the kinematic properties of STEREO/HI CMEs against in-situ CME observations and coronal sources	RTD	2	UNIGRAZ	68	10	36
WP5	Producing a definitive catalogue of CIRs imaged by STEREO/HI that includes verified model-derived kinematic properties	RTD	3	UPS	42	1	36
WP6	Initialising advanced numerical models based on the kinematic properties of STEREO/HI CMEs and CIRs	RTD	3	UPS	27	7	36
WP7	Assessing the complementary nature of radio measurements of solar wind transients	RTD	6	IMPERIAL	39.5	10	36
WP8	Dissemination	OTHER	1	STFC	21.5	1	36
TOTAL					308		



# Management

EU Project Officer – Sabri Mekaoui



Includes all institute leads and WP leads