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Report

D5.5 Yearly Dissemination Report 2017

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1 INTRODUCTION

In the frame of the Electric Propulsion Innovation & Competitiveness (EPIC) project, (grant number 640199) and more specifically it's Work Package 5 "Dissemination Education and Outreach", this document has been produced with the aim to describe the activities performed in by the EPIC PSA regarding Dissemination, Education and Outreach (Task T5.1 and Task T5.2) during the third year of execution of the project. These activities are in line with the agreed Dissemination plan RD1 containing the dissemination objectives, target groups identified, and the structure, means and activities to ensure successful and wide dissemination of project results as well as maximising the project visibility.

The present document is the deliverable D5.5: *Yearly Dissemination Report 2017*.

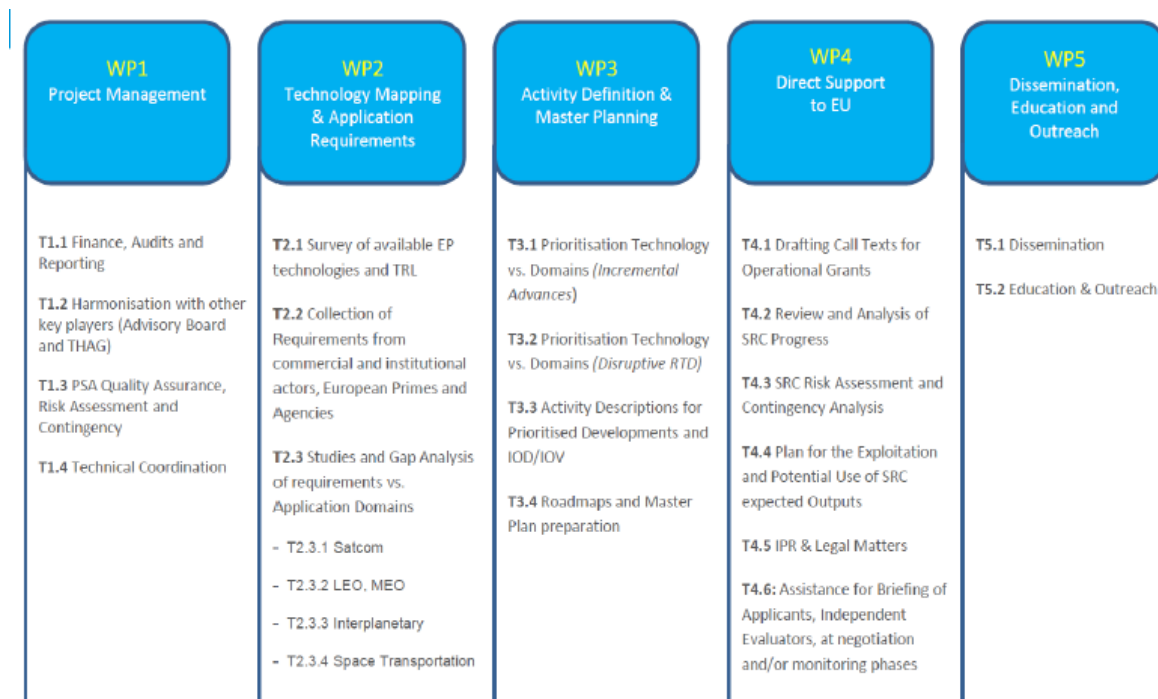


Figure 1.1: EPIC Work Package Structure



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2 REFERENCE DOCUMENTS

[RD1] EPIC-CDTI-5.1-RP-D5.1 Dissemination plan

[RD2] EPIC-CDTI-5.1-RP-D5.2 Web Portal for EPIC

[RD3] EPIC Grant Agreement: COMPET-03-2014 EPIC Grant Agreement for: Coordination & support action (Ref. Ares(2014)3706837)

[RD4] EPIC-CNES-2.2-RP-D2.3 Workshop 1 Report (Brussels 2014)

[RD5] EPIC-DLR-3.4-RP-D3.4 Workshop 2 Report (Stockholm 2015)

[RD6] EPIC- CDTI-5.1-RP-D5.3 Yearly Dissemination Report 2015

[RD7] D4.3 SRC Collaboration Agreement (CoA)

[RD8] EPIC- CDTI-5.1-RP-D5.4 Yearly Dissemination Report 2016

[RD9] EPIC- CDTI-5.1-RP-D5.8 Workshop 3 Report (Madrid 2017),

3 ACRONYMS & ABBREVIATIONS

ASI	Agenzia Spaziale Italiana
BELSPO	Belgian Science Policy Office
COSMOS	Continuation of Cooperation Of Space NCPs as a Means to Optimise Services
CDTI	Centro para el Desarrollo Tecnológico Industrial
CNES	Centre National d'Études Spatiales
DLR	Deutsches Zentrum für Luft- und Raumfahrt
EC	European Commission
EPIC	Electric Propulsion Innovation and Competitiveness
ESA	European Space Agency
EU	European Union
H2020	Horizon 2020
IEPC	International Electric Propulsion Conference
NCP	National Contact Points
OG	Operational Grant
PSA	Project Support Activity
SRC	Strategic Research Cluster
UKSA	UK Space Agency
WP	Work Package



4 DISSEMINATION EDUCATION AND OUTREACH OBJECTIVES AND STRUCTURE

In line with [RD1], the EPIC PSA dissemination and exploitation activities are aimed at:

- Promoting the EPIC PSA project, its progress and results.
- Improving access to useful inputs from the SRC Operational Grants.
- Contribute to ensuring that the EPIC and Electric Propulsion SRC achievements are known to the potential users and future potential bidders for SRC Operational Grants.
- Improving the knowledge and acceptance of the SRC and therefore contribute to the subsequent exploitation of the project results by end-users or by a potential next SRC phase beyond 2020.
- Guaranteeing that the EPIC project is exploited to its full potential.

The dissemination activities are the responsibility of and coordinated by CDTI (as leader of Task 5.1 “Dissemination” and of WP 5), but this task includes the participation of all PSA Partners.

EPIC Dissemination activities will be performed as far as possible in coordination with the COSMOS network which is the network of National Contact Points (NCP) for the Space theme under the EU’s Horizon 2020 (<http://ncp-space.net/>); and in collaboration with the PSA Partner organisation NCPs for Space.

The EPIC PSA will also encourage the dissemination of results by the SRC Operational Grants holders, in a united and coordinated way as much as possible, so that all possible channels are exploited, always under the coverage of the SRC Collaboration Agreement (CoA) [RD7].

In line with [RD3], the main education and outreach activities planned are:

- To reach grade-school and high-school students, in order to increase the interest in STEM (science, technology, engineering and math) and of female students in particular.
- Organisation of educational material, trainings or contests, making use of the ESA and National Agencies educational programmes and resources.
- Exchange and network with non-space sectors to identify opportunities outside the space field, presenting the PSA work at non-space events when possible.
- Preparation of education material related to space and EP especially aimed at promoting the interest in science, technology, engineering and mathematics in grade- and high-school students; and sharing it directly with entities performing outreach activities and through the EPIC website in an education and outreach section.
- 1 trainee will be invited to do his/her final thesis in the ESA Propulsion Laboratory at ESTEC in support of EPIC.

The education & outreach activities are the responsibility of and coordinated by ESA (as leader of Task 5.2 “Education & Outreach”), but this task includes the participation of all PSA Partners.

EPIC education & outreach activities will be performed as far as possible in coordination and collaboration with the education & outreach activities of the EPIC Partners and its means and channels. Mainly the National Agencies and ESA will make use of their expertise and resources in organising these types of communication, education & outreach activities.

The participation and support by PSA Partners in these two tasks (T5.1 and T5.2), will be described in detail in each activity of this document.



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5 TARGET GROUPS

In line with [RD1], the main target groups for dissemination had been grouped as follows:

- Main research institutions, and academia [DG1-Research/Academia]
- European space industry at all levels, especially manufactures of space subsystems: Large System Integrators, components manufacturers at subsystem, system or component level [DG2-Space Industry].
- European Commission, main Space Agencies, European Member States and Governmental Institutions [DG3-Governments].
- Space satellite operators and new space market and missions developers [DG4-Operators].
- Public media and general public interested in space technology and science, and its impact and benefits in their daily life [DG5-General Public].

These target groups for dissemination will be identified and mapped for each activity performed in each Yearly Dissemination Report.

In line with [RD3], the main target groups for education & outreach activities are:

- Grade-school and high-school students and its teachers [EG1-Schools]
- University students, and Master and students in science, technology, engineering and mathematics; and its teachers [EG2-University]
- Research Institutions; PhD students; young graduate trainees; and junior technical researchers in science, technology, engineering and mathematics, and its tutors [EG3-Research]
- General public [EG4-General public]

These target groups for education & outreach will be identified and mapped for each activity performed in each Yearly Dissemination Report



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6 DISEMINATION ACTIVITIES IN 2017

Various dissemination channels and media had been used during 2017 to obtain maximum impact from the promotion of EPIC results. The channels had been selected according to the intended audience.

6.1 EPIC website in 2017

The EPIC website is <http://epic-src.eu/>. It has already been set up in 2015 and evolved to its final shape to become the major EPIC dissemination tool. The website has evolved during 2016 and 2017 up to the mature form in terms of structure and content. This website should help increasing the public awareness and visibility of the project and it is used as the mayor channel to communicate with the main stakeholders, industry, research institutions and academia. In addition the site is a valuable tool for exchanging information produced in the EPIC PSA and in the SRC Operational Grants to be funded. The website is continuously maintained by CDTI and its content updated with the contributions of all PSA Partners, and the ongoing SRC Operational Grants.

The creation of a PSA web portal (media tool) provides a fast and on-line access of the relevant background, foreground and any other project related information (PSA events, links, public deliverables, news) that can be made public and disseminated.

The structure (Main Page/Child Pages/Sub-child Pages) of the web portal has been updated and it is the following:

- Main Page: Welcome page, including a News section (both with a dynamic window and with a fix list window)
- Child Pages (list of topics in the left had side of the Main Page), and Sub-child pages (second level) for the EPIC Programme Support Activity Child Page, and others.
 - Child Page: EPIC Workshop 2017
 - Sub-child page: EPIC Workshop 2017 Presentations
 - Child Page: EPIC Lecture Series 2017
 - Sub-child page: EPIC Lecture Series 2017 Presentations
 - Child Page: News
 - Child Page: What is Electric Propulsion?
 - Child Page: The Strategic Research Cluster: Programme Support Activity and Operational Grants
 - Child Page: The EPIC Programme Support Activity
 - Sub-child page: The EPIC Partners
 - Sub-child page: The EPIC work performed on its first years
 - Sub-child page: EPIC Events
 - Sub-child page: EPIC Public Documents
 - Sub-child Page: EPIC Education material
 - Child Page: High Level SRC Roadmap
 - Child Page: Space 2016 H2020 Call on Electric Propulsion
 - Child Page: Space 2019 & 2020 H2020 Calls on Electric Propulsion
 - Child Page: SRC Operational Grants
 - Sub-child page: CHEOPS
 - Sub-child page: HEMPT-NG
 - Sub-child page: GIESEPP
 - Sub-child page: GANOMIC
 - Sub-child page: HIPERLOC-EP
 - Sub-child page: MINOTOR
 - Child Page: Related links
 - Child Page: Questions & Answers
- Contact box (EPIC web content: Jorge.lopez@cdti.es, EPIC web master: DLR)
- Search box



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The content of the web portal contains among others the following:

- The EPIC PSA: what it is, its activities, objectives and PSA Partners,
- EPIC Workshop 2017 and EPIC Lecture Series 2017 webpage and repository of presentations and videos recording the Lecture Series.
- The H2020 Electric Propulsion SRC, its set up and the relationship between the PSA and the operational grants
- Background on Electric Propulsion (what it is, history, the EP system, its use, current European situation...)
- EPIC public documents,
- Agenda of events, EPIC participation and its presentations and calendar,
- Information on the EPIC Workshops and EPIC events participation already held (with links to their specific pages), and planned,
- Education material, presentations and papers presented by EPIC and the PSA partners,
- Questions & Answers page (public but not open),
- External links to be included (e.g. to Commission related documents, to SRC operational grants, etc.)
- Information/links on H2020 SRC Calls or relevant documents (as published by the Commission), including the Horizon 2020 Work Plans with the EP SRC Calls, and the corresponding Electric Propulsion SRC Guidelines documents (technical annexes),
- SRC Operational Grants detail information about all ongoing projects with all the public information of their activities, partners, publications and links to their websites (CHEOPS, HEMPT-NG, GIESEPP, GANOMIC, HIPERLOC-EP, MINOTOR).
- Web manager and web content points of contact,

During 2017 the main webpages updated have been the following ones: Welcome, News, EPIC Workshop 2017, EPIC Lecture Series 2017, EP SRC 2019 & 2020 Calls, including the Call texts and the corresponding Guidelines documents (technical annexes), EPIC work performed on its first three years, EPIC Events, EPIC Public Documents, EPIC Education material, SRC Operational Grants (including one webpage for each OG: CHEOPS, HEMPT-NG, GIESEPP, GANOMIC, HIPERLOC-EP, MINOTOR), and Related updated links (2016 Call, and 2019&2020 Calls).

The EPIC news Posts published during 2017 period are the following ones (<http://epic-src.eu/category/news/>)

- EPIC Lecture Series 2017 presentations and videos available! / 21.11.2017 / <http://epic-src.eu/epic-lecture-series-2017-presentations-and-videos-available/>
- Horizon 2020 Space Work Plan 2018-2020 published by the European Union / 20.11.2017 / <http://epic-src.eu/horizon-2020-space-work-plan-2018-2020-published-by-the-european-union/>
- EPIC Workshop 2017 presentations available! / 19.11.2017 / <http://epic-src.eu/epic-workshop-2017-presentations-available/>
- Electric Propulsion Strategic Research Cluster activities present in the IEPC 2017 / 18.11.2017 / <http://epic-src.eu/electric-propulsion-strategic-research-cluster-activities-present-in-the-iepc-2017/>
- Prof. Dr. Horst Löb – Pioneer of European Space Electric Propulsion, inventor of the RIT / 08.11.2017 / <http://epic-src.eu/prof-dr-horst-lob-pioneer-of-european-space-electric-propulsion-inventor-of-the-rit/>
- EPIC LECTURE SERIES 2017 FINAL PROGRAMME / 09.10.2017 / <http://epic-src.eu/epic-lecture-series-2017-final-programme/>
- EPIC WORKSHOP 2017 FINAL PROGRAMME / 04.10.2017 / <http://epic-src.eu/epic-workshop-2017-final-programme/>
- RIT 2X European space electric propulsion thrusters for Boeing / 25.09.2017 / <http://epic-src.eu/rit-2x-european-electric-propulsion-thrusters-for-boeing/>
- EPIC LECTURE SERIES 2017 REGISTRATION / 11.09.2017 / <http://epic-src.eu/the-epic-lecture-series-2017-registration-is-open/>
- EPIC WORKSHOP 2017 REGISTRATION / 04.09.2017 / <http://epic-src.eu/epic-workshop-2017-registration-is-open/>
- EPIC LECTURE SERIES PROGRAMME / 15.07.2017 / <http://epic-src.eu/epic-lecture-series-programme/>
- EPIC WORKSHOP 2017 PROGRAMME / 15.07.2017 / <http://epic-src.eu/epic-workshop-2017-programme/>
- European electric propulsion thrusters have been selected by Boeing for their commercial satellites / 14.07.2017 / <http://epic-src.eu/european-electric-propulsion-thrusters-have-been-selected-by-boeing-for-their-commercial-satellites/>
- EUTELSAT 172B, the first European all electric propulsion telecom satellite is on his way to GEO / 16.06.2017 / <http://epic-src.eu/eutelsat-172b-the-first-european-all-electric-propulsion-telecom-satellite-is-on-his-way-to-geo/>
- EPIC WORKSHOP 2017 ON SPACE ELECTRIC PROPULSION/ 24-25 OCTOBER 2017 / 09.05.2017 / <http://epic-src.eu/epic-workshop-2017-24-25-october-2017/>



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- EPIC LECTURE SERIES 2017 ON SPACE ELECTRIC PROPULSION/ 26 OCTOBER 2017 / 09.05.2017 / <http://epic-src.eu/epic-lecture-series-2017-26-october-2017/>
- IPAIA 2017 Workshop: Ion Propulsion and Accelerator Industrial Applications / Bari (Italy), March 1-3, 2017 / 25.01.2017 / <http://epic-src.eu/ipaia-2017-workshop/>

Information on the EPIC Workshops are already included in full detail in their respective websites as reported in the deliverables [RD4] D2.3 Workshop 1 report, [RD5] D3.4 Workshop 2 report, [RD9] D5.8 Workshop 3 Report (Madrid Workshop Report 2017), and the EPIC website is already linked those Workshop websites.

- The EPIC Workshop 2014 one; organised by EPIC in Brussels: 25-28/11/2014 (<http://www.epic2014.eu/>)
- The EPIC Workshop 2015 two; organised by EPIC in Stockholm: 11-12/02/2015 (<http://epic-src.eu/agenda/>)
- The EPIC Workshop 2017 three; organised by EPIC in Madrid: 24-25/10/2017 (<http://epic-src.eu/workshop2017/> and <http://epic-src.eu/workshop-2017-presentations/>)

Information on future EPIC Workshops (London/2018, ESTEC/2019) will be included in due time in the EPIC website with its own page links, and the relevant reports will be produced in dedicated deliverables (Workshop reports).

The EPIC website is one of the Deliverables of the project [RD2] and is updated and maintained continuously by CDTI, with all PSA Partners contributions. The full description of the EPIC web is detailed in [RD2], and its updates will be recorded if considered necessary in updates of this reference document.

Target Groups	EPIC Website dissemination in 2017	Type of channel	EPIC Partner	EPIC Partner preparing material
[DG1-Research/Academia] [DG2-Space Industry] [DG3-Governments] [DG4-Operators] [DG5-General Public]	EPIC Website / http://epic-src.eu/	PSA Website	CDTI	CDTI
	EPIC Workshop 1 Website Brussels: 25-28/11/2014 / http://www.epic2014.eu/	Workshop website, registration tool and presentation repository	CNES	CNES
	EPIC Workshop 2 Website Stockholm: 11-12/02/2015 / http://epic-src.eu/?page_id=12/	Workshop website, registration tool and presentation repository	DLR	DLR
	EPIC Workshop 3 Website Madrid: 24-25/10/2017 / (http://epic-src.eu/workshop2017/ and http://epic-src.eu/workshop-2017-presentations/)	Workshop website, registration tool and presentation repository	CDTI	CDTI

Table 6.1.1: List of EPIC websites for dissemination in 2017



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At the moment, the EPIC website looks as shown in the following Imaging Print (Only the Main Page is shown).



Figure 6.1.1: EPIC website Main Page

6.2 PSA's Partners own websites and OGs own websites in 2017

The publication of the EPIC work and results in PSA's Partners own websites; and the publication of the Operational Grants activities and results in its own OGs websites are a very important dissemination activity. The preparation of the PSA's Partners own website and text is the responsibility of the related PSA Partner, but the current content has been coordinated by CDTI drafting a baseline text proposed to all Partners.

The preparation of the OGs activities included in the EPIC PSA website has been coordinated with each Operational Grant in line with the SRC Collaboration Agreement, and the current content has been coordinated by CDTI drafting the text for each OG (<http://epic-src.eu/src-operational-grants/>)

Target Groups	EPIC Dissemination link in the PSA Partners	EPIC Partner
[DG1-Research/Academia] [DG2-Space Industry] [DG3-Governments] [DG4-Operators] [DG5-General Public]	EPIC reference in ESA website : http://www.esa.int/Our_Activities/Space_Engineering_Technology/EPIC_Electric_Propulsion_Innovation_and_Competitiveness	ESA
	EPIC reference in ASI website: http://www.asi.it/it/news/epic-in-space-electrical-propulsion-and-station-keeping	ASI
	EPIC reference in BELSPO website http://www.belspo.be/belspo/space/euPolicy_h2020_en.stm http://www.belspo.be/belspo/space/euPolicy_h2020_nl.stm http://www.belspo.be/belspo/space/euPolicy_h2020_fr.stm	BELSPO
	EPIC reference in French Research ministry and CNES websites	CNES



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	http://www.horizon2020.gouv.fr/cid73955/le-point-contact-national-espace.html https://horizon2020.cnes.fr/fr https://horizon2020.cnes.fr/fr/horizon-2020/epic	
	EPIC reference in CDTI ESH2020 website: http://eshorizonte2020.cdti.es/index.asp?MP=88&MS=711&MN=2&TR=C&IDR=2394	CDTI
	EPIC reference in DLR website: in English: http://www.dlr.de/rd/en/desktopdefault.aspx/tabid-2266/3398_read-44284/ and German: http://www.dlr.de/rd/desktopdefault.aspx/tabid-2266/3398_read-44284/	DLR
	TBD	UKSA
	EPIC reference in EUROSPACE website: http://euospace.win2.nucleus.be/news.aspx	ADS-EUROSPACE
	EPIC reference in SME4Space website: https://www.sme4space.org/epic-project	SME4Space

Table 6.2.1: List of links of each EPIC PSA Partner website dedicated to EPIC and SRC dissemination activities in 2017.

Target Groups	EPIC Dissemination link in the Operational Grants website	OG
[DG1-Research/Academia]	CHEOPS SRC Operational Grant website: http://www.cheops-h2020.eu/	CHEOPS
[DG2-Space Industry]	HEMPT-NG SRC Operational Grant website: http://www.hemtp-ng.eu/	HEMPT-NG
[DG3-Governments]	GIESEPP SRC Operational Grant website: https://www.giesepp.com/	GIESEPP
[DG4-Operators]	GANOMIC SRC Operational Grant website: http://www.ganomic.eu/	GANOMIC
[DG5-General Public]	HIPERLOC-EP SRC Operational Grant website: http://www.hiperloc.eu/	HIPERLOC-EP
	MINOTOR SRC Operational Grant website: http://www.minotor-project.eu/	MINOTOR

Table 6.2.2: List of links of each SRC Operational Grant website dedicated to SRC dissemination activities in 2017.

6.3 Social Media dissemination in 2017

The dissemination of PSA work and SRC Operational Grants results using social media-related channels is important for the dissemination of EPIC activities.

EPIC has selected Twitter and YouTube as the primary social media channels because they are the most popular general social media networks. They are easy to use and used by all target groups from general public to professionals and companies. The targeted audience would be the general public interested in space science and EU research activities, but also professionals and space research experts, and main stakeholders and decision makers.

EPIC had already implemented this Social media dissemination activity via Twitter (@EPICH2020) named: EPIC h2020 and YouTube Channel: (<https://www.youtube.com/channel/UC8a2JsVCDgmHu8mFWQmZlQ>) named: EPIC h2020. These social media dissemination channels are currently used for all EPIC Posts, news, activities, presentations and videos, and they will be used extensively during the following years in coordination with the website and the SRC OGs.

The maintenance and management is performed by CDTI.



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Figure 6.3.1: EPIC Twitter @EPICH2020

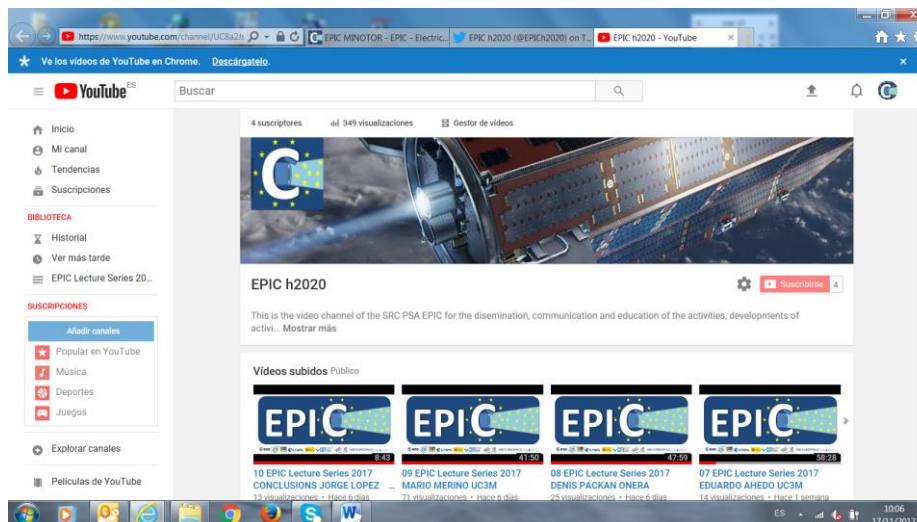


Figure 6.3.2: EPIC YouTube Channel

EPIC has selected LinkedIn as secondary social media channel because it is the largest professional network, it is structured by professionals, companies and technologies. The targeted audience would be professionals of the space sector or other sectors of interest in H2020 which could profit from the networking or knowledge on EPIC. It is currently used by the partner organisations and already contains multiple groups on Horizon 2020 which can also serve as vehicle of promotion and networking.

EPIC had already implemented this Social media dissemination activity by CDTI via a LinkedIn Dissemination Group (<https://www.linkedin.com/grp/home?gid=8303568>) named: H2020 SRC EPIC. This social media dissemination is currently at its early stages, and it will be further developed and exploited during the following years in coordination with the website.

The maintenance and management is performed by CDTI and will be further developed.



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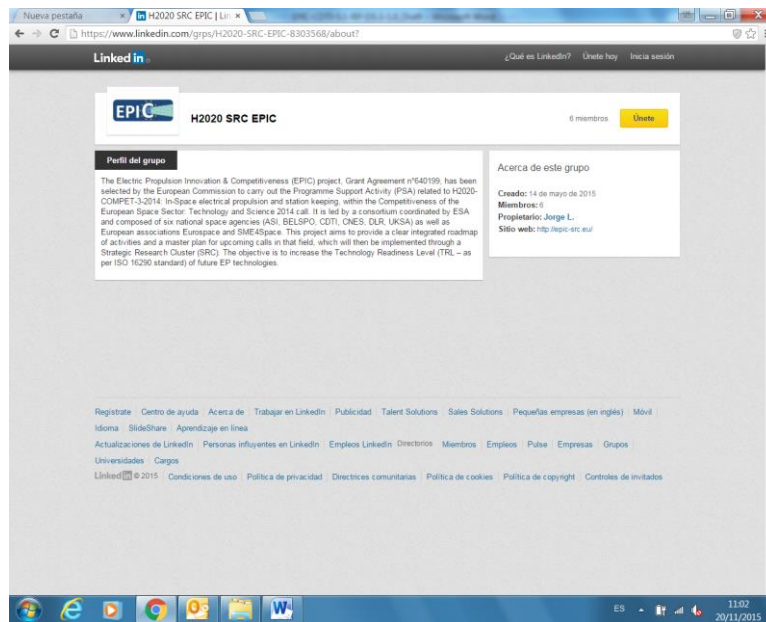


Figure 6.3.3: EPIC Group in LinkedIn

Target Groups	EPIC Dissemination Social Media	EPIC Partner
[DG1-Research/Academia] [DG2-Space Industry] [DG3-Governments] [DG4-Operators] [DG5-General Public]	Twitter EPIC h2020 (@EPICH2020): (35 tweets) Tweets and retweets on Electric Propulsion and @EPICH2020 from (@SME4SPACE): (20 Tweets)	CDTI, SME4SPACE
[DG1-Research/Academia] [DG2-Space Industry] [DG3-Governments] [DG4-Operators]	LinkedIn Group: (https://www.linkedin.com/grp/home?gid=8303568) named: H2020 SRC EPIC	CDTI
[DG1-Research/Academia] [DG2-Space Industry] [DG3-Governments] [DG4-Operators] [DG5-General Public]	YouTube Channel: (11 Videos, 1 Video EPIC Lecture Series 2017 list) (https://www.youtube.com/channel/UC8a2JsVCDgmHu8mFWQmZlQ/). Named: EPIC h2020.	CDTI

Table 6.3.1: List of EPIC Dissemination Social Media activities in 2017.



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6.4 EPIC Logo in 2017

The EPIC Logo has been produced in 2015 and selected by the PSA Partners. It is being used in the website and, from now on, on all PSA documentation, presentations and dissemination material along the project.



Figure 6.4.1 EPIC Logo

The EPIC banner to be used in all documents and presentations with the new EPIC PSA Partners Logos has been also produced in 2015 and updated to make it coherent with the PERASPERA banner.



Figure 6.4.2 EPIC PSA Partners Logos

No modification from RD8.

6.5 Organisation of EPIC Workshops events in 2017

The EPIC Workshops one and two were the ones organised by EPIC during the first year of execution of the PSA. The first one was in Brussels: 25-28/11/2014 (<http://www.epic2014.eu/>) organised by CNES and BELSPO; and the second one was in Stockholm: 11-12/02/2015 (http://epic-src.eu/?page_id=12) organised by DLR with the help of the THAG Swedish Delegation. Information on the EPIC Workshops performed during the first year of EPIC execution are already included in detail in their respective deliverables [RD4] Workshop 1 report and [RD5] Workshop 2 report.

6.5.1 EPIC Workshop 2017

The EPIC Workshop 2017 was organized by CDTI and held on 24-25 October 2017 in Madrid, at: CDTI (Madrid), Spain; with the active involvement of all PSA Partners: 24-25/10/2017 (<http://epic-src.eu/workshop-2017/>). Full information on the EPIC Workshop 2017 has been already included in detail in its respective deliverable [RD9] Workshop 3, but these are the main headlines of the most important dissemination event in 2017:



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The EPIC Workshop 2017 program covered the following topics:

- PSA and SRC progress and activities
- H2020 Work Programme EP SRC topics
- Stakeholders interaction with Satellite Operators and Satellite Large System Integrators
- Incremental SRC OGs: objectives, proposed approach, team, progress, and early results
- Disruptive SRC OGs: objectives, proposed approach, team, progress, and early results
- Trends in Power Processing Units
- New developments on EP Incremental and Disruptive Technologies (promising thrusters and transversal technologies)
- Dissemination and education SRC activities

EPIC PSA makes public the presentations of the EPIC Workshop 2017 in the EPIC web: <http://epic-src.eu/workshop-2017-presentations/>

These are the details of the invited speakers and their presentations:

Welcome (Chair: J. López Reig, CDTI)

- Jorge LÓPEZ REIG, CDTI: CDTI Welcome, Inauguration Workshop
- Jorge LÓPEZ REIG, CDTI: Introduction, and organization logistics
- José GONZÁLEZ DEL AMO, ESA: PSA Welcome, and EPIC Workshop Objectives

H2020, EP SRC and PSA (Chair: J. Gonzalez Del Amo, ESA)

- Tanja ZEGERS, European Commission: SRC & EPIC policy context, H2020 WP 2018-2020
- Florence BEROU, REA: Implementation of the SRCs
- José GONZÁLEZ DEL AMO, ESA: EPIC PSA and activities

Incremental SRC Operational Grants (Chair: L. Martin-Perez, DLR)

- Idris HABBASSI, Safran Aircraft Engines: CHEOPS Consortium for Hall Effect Orbital Propulsion System
- Farid INFED, ArianeGroup: GIESEPP: GRIDDED ION ENGINE STANDARDISED ELECTRIC PROPULSION PLATFORMS
- Ernst BOSCH, Thales Deutschland GmbH: HEMPT-NG – Development to provide European competitive EP solutions for future space missions

Satellite Large System Integrators (Chair: P. Lionnet, Eurospace)

- José GONZÁLEZ DEL AMO, ESA: Disruptive thruster technologies for telecom & constellations markets
- Vincent JACOD, Airbus Defence & Space: Electric Propulsion Market Trend
- Philippe LAMOTTE, Thales Alenia Space: TAS drivers towards electric propulsion versus satellites applications
- Birk WOLLENHAUPT, OHB Systems: OHB's reflections about the first study phase

Satellite Operators (Chair: R. Pavone, SME4Space)

- David MOSTAZA-PRIETO, Hispasat: Hispasat and Electric Propulsion
- Cosmo CASAREGOLA, Eutelsat: ELECTRIC PROPULSION: EUTELSAT STANDPOINT
- Eric KRUCH, SES: SES Perspective on Electric Propulsion



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Round table with LSI and Satellite Operators "Electric Propulsion in the telecom and constellations markets" (Chair: R. Pavone, SME4Space; Rapporteur: J. Gonzalez Del Amo, ESA) with: Vincent JACOD, Airbus Defence & Space; Philippe LAMOTTE, Thales Alenia Space; Markus PEUKERT, OHB Systems; Antonio ABAD, Hispasat; Cosmo CASAREGOLA, Eutelsat; Eric KRUCH, SES;

Disruptive SRC Operational Grants (Chair: N. Cox, UKSA)

- Louis / Eric GRIMAUD / BRIDOT, Safran Electronics & Defense: GANOMIC: Disruptive technologies for PPU cost & volume efficiency
- John STARK, Queen Mary Univ. of London: HIPERLOC-EP: Development of Electrospray Colloid Electric Propulsion as a low cost disruptive propulsion technology
- Denis PACKAN, ONERA: MINOTOR H2020 project for ECR thruster development

Incremental Technologies PPUs (Chair: J. López Reig, CDTI)

- Fernando PINTÓ, Airbus Defence & Space: PPU activities in Airbus DS Space Equipment
- Guillaume / Javier / Nicoletta GLORIEUX / PALENCIA / WAGNER, Airbus Defence & Space (FR / ES / DE): PPU developments for Incremental Technologies (HET / GIE / HEMPT) and common building blocks
- Frédéric VARASTET, Safran Electronics & Defense: Safran PPU roadmap
- Eric BOURGUIGNON, Thales Alenia Space Belgium: GEO Dual Mode PPU and LEO HEMPT PPU

Incremental Technologies (Chair: F.-X. Thibaut, BELSPO)

- Farid INFED, ArianeGroup: Shape Memory Alloy Valve – New Technology for Telecom Satellite Applications
- Michel POU CET, Bradford Engineering BV: Development of the Next-Generation Fluid Management Technologies for LEO, GEO & Navigation Satellites
- Kevin HALL, QinetiQ: Development of a Ring Cusp high power thruster
- Mariano ANDRENUCCI, SITAEL S.p.A.: DEVELOPMENT OF A 20 kW CLASS HALL THRUSTER FOR SPACE TRANSPORTATION AND EXPLORATION
- Daniele PAVARIN, University of Padua: Helicon research at University of Padua and T4i
- Pablo FAJARDO, Universidad Carlos III Madrid: An advanced simulation code for Hall effect thrusters
- Jochen SCHEIN, Universität der Bundeswehr/Transmit: RIT technology for space debris removal

Round table "Trends in Power Processing Units" (Chair: M. Gollor, ESA) with: Eric BOURGUIGNON, Thales Alenia Space Belgium; Luca BENETTI, SITAEL S.p.A.; Fernando PINTÓ, Airbus Defence & Space; Alain DEMAIRÉ, OHB Sweden; Matthias GOLLOR, ESA.

Disruptive Thruster Technologies I (Chair: F. Castanet & C. Boniface, CNES)

- Franz Georg HEY, Airbus Defence & Space: Electric Propulsion Opportunities for Future Scientific Explorations Missions
- Alberto GARBAYO, AVS Added Value Solutions: Disruptive EP technologies at AVS
- Georg HERDRICH, Baylor University/ Institut für Raumfahrtssysteme (IRS): Overview on IRS electric and advanced electric propulsion activities
- Luc HERRERO, COMAT: Vacuum arc thruster development
- Jean-Luc MARIA, EXOTRAIL: Exotrail miniature HET for CubeSats

Disruptive Thruster Technologies II (Chair: J. López Reig, CDTI)

- Christophe KOPPEL, KopooS Consulting Ind: Liquid PPT for attitude and orbit control of space vehicles
- Francesco GUARDUCCI, Mars Space Ltd: EP Technologies Development at Mars Space Ltd



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- Mercedes RUIZ HARO, SENER: Development and tests of HPT-05
- Ane AANESLAND, ThrustMe: Next generation ion thruster with imbedded neutralizaiton and propellant
- Luis CONDE, Universidad Politécnica de Madrid: Development and current status of the ALPHIE (Alternative Low Power Ion Engine) plasma thruster

Disruptive Transversal Technologies (Chair: V. Pulcino, ASI)

- Angel POST, Advanced Thermal Devices (ATD): C12A7:e- ELECTRIDE. A PROMISING MATERIAL FOR IONIC THUSTERS
- Fabrizio SCORTECCI, AEROSPAZIO Tecnologie s.r.l.: Standardisation and Improvement of EP Diagnostics
- Alexander REISSNER, ENPULSION: Industry 4.0 Meets Space - Establishing a production line for 100+ EP thruster per year
- Marcelo COLLADO, ARQUIMEA: Shape Memory Alloy Technologies for Electric Propulsion Valves
- Stephen GABRIEL, University of Southampton: Electric propulsion activities at the university of Southampton: Incremental and Disruptive

Workshop Conclusions

- Jorge LÓPEZ REIG, CDTI: EPIC Workshop facts and figures
- José GONZÁLEZ DEL AMO, ESA: EPIC Workshop conclusions

EPIC Workshop 2017 facts and figures:

The EPIC Workshop 2017 was performed in two full days of intensive work and interactions, with 45 presentations and 47 speakers. The Workshop had 123 participants, all from the European electric propulsion community, including the main space stakeholders in Europe. European participants came from: EC, REA, ESA, Space National Agencies, main Satellite Large System Integrators, main Satellite Operators, main Propulsion Subsystem Integrators, equipment industry, research institutions, universities, and industry associations.





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Figure 6.5.1: EPIC Workshop 2017 participation and networking



Figure 6.5.2: EPIC Workshop 2017 sessions and presentations



Figure 6.5.3: Round table with Satellite Large System Integrators (primes) and Satellite Operators during the EPIC Workshop 2017



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Figure 6.5.4: EC, REA and EPIC PSA Teams at the EPIC Workshop 2017

The future EPIC Workshops will be organized in 2018 and 2019 in London and ESTEC. The preparation had already started for the one to be held in London in October 2018 in full coordination with REA, EC, and all SRC OGs under the SRC Collaboration Agreement RD7. Further details on the EPIC Workshop 2018 will be published soon at: <http://epic-src.eu/workshop-2018/>

Oct. 2018/ London
EPIC Workshop

- progress of PSA
- **progress of 2016 OGs**
- Consultation on update of EPIC Roadmap
- SRC 2019 Call
- EP in other markets (LEO, EO,...)

Sept/Oct. 2019/
ESTEC EPIC Workshop

- Final presentation of PSA
- **results of 2016 OGs**
- Consolidated 2nd Issue EPIC Roadmap
- SRC 2020 Call

Figure 6.5.5: 2017 and future EPIC Workshops.



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Target Groups	EPIC Dissemination Workshops	EPIC Partner
[DG1-Research/Academia] [DG2-Space Industry] [DG3-Governments] [DG4-Operators]	EPIC Workshop 3 / Madrid: 24-25 October 2017	CDTI/ All Partners
	EPIC Workshop 4 / London: TBD October 2018	UKSA / All Partners
	EPIC Workshop 5 / ESTEC: 3Q 2019	ESA / All Partners

Table 6.5.1: List of 2017 and future EPIC Workshops.

6.6 External events: Conferences/Workshops/Symposia in 2017

The participation and presentation of the PSA work and the progress of the SRC activities with respect to the SRC roadmap at relevant European and international conferences/workshops/symposia is a very important EPIC dissemination activity.

The EPIC PSA had already participated during late 2015 and 2016 in several H2020 Info days presenting the PSA work and the 2016 SRC Call texts and its requirements and guidelines at relevant European and international conferences/workshops/symposia.

EPIC supported during late 2015 the European Commission in the H2020 Space Info Days to present the Electric Propulsion SRC calls and related documentation and presentations. Presentations were produced for each occasion after consultation with the EC. The agenda of the events and the EPIC presentations are available on the EPIC website.

CDTI has prepared standard slides on the EPIC project to be used at different events. EPIC Partners presenting at each event, refined them and adapted them to the event needs.

Target Groups	European and international space conferences/workshops/symposia in 2017	EPIC Partner participant	EPIC partner preparing material
[DG1-Research/Academia] [DG2-Space Industry] [DG3-Governments] [DG4-Operators]	35th International Electric Propulsion Conference (IEPC 2017) [8-12.10.2017] Atlanta, Georgia (USA). Papers and presentations (available on the EPIC web): <ul style="list-style-type: none"> IEPC 2017-47 “The Strategic Research Clusters on Space Electric Propulsion. A New Instrument of the European Commission” -Jorge Lopez Reig at al. IEPC 2017- 48 “Electric Propulsion Activities at ESA” -José González del Amo. https://iepc2017.org/	CDTI/ESA	CDTI/ESA
	Horizon 2020 Space Info Day [7- 9.11.2017] Tallinn (Estonia). Dedicated presentation (available on the EPIC web) on the Electric Propulsion SRC 2019 Call by EPIC PSA in the EU Workshop 1 Space Technologies, Science & Exploration session / http://www.eusw2017.eu/	CDTI	CDTI

Table 6.6.1: List of relevant European and international space conferences/workshops/symposia in 2017.

Target Groups	Local space conferences/workshops/symposia in 2017*	EPIC Partner participant	EPIC partner preparing
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		ant	material
[DG1-Research/Academia] [DG2-Space Industry] [DG3-Governments]	H2020 CDTI Infoday 2017 Call, Madrid, Spain [22.11.2016]/ Foro CDTI Horizonte 2020 Espacio, WorkProgramme 2018-2020. Dedicated presentation: Strategic Research Clusters: Propulsión Eléctrica y Robótica Espacial	CDTI	CDTI
	Horizon 2020 Space Information Day Calls 2018 Madrid, Spain [17.10.2017]/ Dedicated presentation Strategic Research Clusters: Robótica Espacial (y Propulsion Electrica Espacial), Call 2018 and future calls.	CDTI	CDTI

Table 6.6.2: List of relevant local space conferences/workshops/symposia in 2017.

*Some of them already included in RD8 but performed in late 2016

Target Groups	European and international space conferences/workshops/symposia attended by SRC Operational Grants in 2017	SRC OG participant
[DG1-Research/Academia] [DG2-Space Industry] [DG4-Operators]	35th International Electric Propulsion Conference (IEPC 2017) [8-12.10.2017] Atlanta, Georgia (USA). Papers and presentations: <ul style="list-style-type: none"> IEPC 2017-201. Development updates for a two-dimensional axisymmetric hybrid code for Plasma Thruster discharges. D. Pérez-Grande et al. IEPC 2017-209. 2D and 3D Hybrid PIC-Fluid Modelling of Electric Thruster Plumes. A. Dominguez et al. https://iepc2017.org/	CHEOPS
	35th International Electric Propulsion Conference (IEPC 2017) [8-12.10.2017] Atlanta, Georgia (USA). Papers and presentations: <ul style="list-style-type: none"> IEPC 2017-552. Gridded Ion Engine Standardised Electric Propulsion Platforms. Farid Infed IEPC 2017-266. AIRBUS DS Power Processing Units: New HET and GIT PPU Developments Qualification Status. Fernando Pintó, Javier Palencia, Nicoletta Wagner, Guillaume Glorieux. https://iepc2017.org/	GIESEPP
	35th International Electric Propulsion Conference (IEPC 2017) [8-12.10.2017] Atlanta, Georgia (USA). Paper and presentation: <ul style="list-style-type: none"> IEPC 2017-394. Modeling of Colloid Thrusters for Mission Analysis. Enric Grustan-Gutiérrez and John P. W. Stark https://iepc2017.org/	HIPERLOC-EP
	35th International Electric Propulsion Conference (IEPC 2017) [8-12.10.2017] Atlanta, Georgia (USA). Papers and presentations: <ul style="list-style-type: none"> IEPC 2017-547. The "MINOTOR" H2020 Project for ECR Thruster Development. Denis Packan IEPC 2017-437. Measurement of Anisotropic Plasma Properties along the Magnetic Nozzle Expansion of an Electron Cyclotron Resonance Thruster. Sara Correyero, Julien Jarrige, Denis Packan, Eduardo Ahedo. IEPC 2017-378. Direct Thrust Measurement of ECR plasma Thruster Performance and Comparison between Xenon and Krypton. Théo Vialis, Julien Jarrige, Denis Packan. IEPC 2017-382. Investigation on the Ion Velocity Distribution in the Magnetic Nozzle of an ECR Plasma Thruster using LIF Measurements. Julien Jarrige, Sara Correyero, Paul-Quentin Elias, Denis Packan IEPC 2017-105. 2D Plasma Wave Propagation and Absorption in Electromagnetic Plasma Thrusters. Mario Merino and Eduardo Ahedo. IEPC 2017-361. Advances in the Kinetic Simulation of Microwave Absorption in an ECR Thruster. Paul-Quentin Elias. IEPC 2017-106. One-dimensional Direct Vlasov Simulations of Non-stationary Plasma Expansion in Magnetic Nozzle. G. Sánchez-Arriaga 	MINOTOR



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	et al. https://iepc2017.org/	
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Table 6.6.3: List of relevant European and international space conferences/workshops/symposia attended by SRC Operational Grants in 2017.



Figure 6.6.1: Some EP SRC participants in the IEPC 2017

The Strategic Research Clusters on Space Electric Propulsion. A new instrument of the European Commission

IEPC-2017-47

*Presented at the 35th International Electric Propulsion Conference
Georgia Institute of Technology • Atlanta, Georgia • USA
October 8 - 12, 2017*

*Jorge Lopez Reig¹
Centre for the Development of Industrial Technology, Madrid, 28001, Spain*

*Jose Gonzalez del Amo²
European Space Agency, Noordwijk, 2200AG, The Netherlands*

Abstract: The Strategic Research Cluster (SRC) on Space Electric Propulsion (EP) is the new European Commission (EC) instrument into the European Union's Horizon 2020 research and innovation programme (H2020). The SRC objective is to target mid-term and long-term challenges in the space electric propulsion field, considered strategic for Europe. The SRC is implemented through a Programme Support Activity (PSA) coordinating individual and specific research and development Operational Grants. The Operational Grant activities aim at producing a significant demonstration and achievements of a specific technology in line with a defined roadmap. The Electric Propulsion SRC implementation and its roadmap are presented and the PSA and Operational Grants activities are described. Finally SRC next steps are detailed and future challenges are outlined.

Nomenclature

EP	= Electric Propulsion
GEO	= Geostationary Earth Orbit
GTO	= Geostationary Transfer Orbit
Isp	= Specific Impulse [s]
LEO	= Low Earth Orbit
MEO	= Medium Earth Orbit
P	= Power [W]
P/T	= Power/Thrust ratio [W/mN]
T	= Thrust [N]
TRL	= Technology Readiness Level

1. Introduction

WITH the Strategic Research Clusters (SRC) the European Commission (EC) introduced a new instrument into the European Union's Horizon 2020 research and innovation programme (H2020)¹. The idea of the SRCs is

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²Head of the Electric Propulsion Section, Mechanical Department, jose.gonzalez@esa.int.

Figure 6.6.2: EPIC PSA paper IEPC2017-47 presented at the IEPC 2017



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6.7 EPIC Partners use of own dissemination channels in 2017

SME4SPACE - EPIC workshop 2017 announcements and updated on SME4SPACE website
(<https://www.sme4space.org/epic-workshop-2017-on-space-electric-propulsion-24-25-october-2017>)

6.8 Dissemination outside of the usual space landscape channels in 2017

None in 2017



7 EDUCATION & OUTREACH ACTIVITIES IN 2017

During the third year, several initiatives on education and outreach have been performed or initiated by EPIC team, and mainly by CDTI and ESA as Task 5.2 responsible.

Target Groups	Education & Outreach activities in 2017	Type of activity	EPIC partner
[EG2-University] [EG3-Research]	Lecture at Dresden University on Electric Propulsion Activities, Dresden (DE) [23.05.2017]	Master Lecture at University	ESA
[EG2-University] [EG3-Research]	EPIC Lecture Series 2017, Madrid (Spain) [26.10.2017]. Presentations of 8 Master Lecture Series (available in the EPIC web). See programme.	Master Lecture at University / Research level	CDTI, ESA
[EG2-University] [EG3-Research]	EPIC Lecture Series 2017, Madrid (Spain) [26.10.2017]. Videos recording 8 Master Lecture Series in EPIC YouTube Channel .	Master Lecture at University / Research level	CDTI
[EG1-Schools] [EG2-University] [EG3-Research] [EG4-General public]	EPIC education webpage with updated Electric Propulsion education material from different sources / http://epic-src.eu/education/	Education material compendium webpage	CDTI

Table 7.1: List of Education & Outreach activities in 2017.

7.1 EPIC Lecture Series 2017

The EPIC Lecture Series 2017 was organized by CDTI, the EPIC PSA and the University Carlos III of Madrid (UC3M), and held on 26 October 2017 in Madrid, at: CDTI (Madrid), Spain; and took advantage of the presence of several prominent universities imparting engineering, and particularly aerospace engineering, in the Madrid region.

The EPIC Lecture Series is an educational activity of the EPIC PSA under the Horizon 2020 electric propulsion SRC funded by the European Union. EPIC PSA aims also to organize educational events, trainings and Lecture Series on the subject in coordination with ESA and national agencies educational programmes and resources. These educational events and material are envisaged as a suitable vehicle to promote the interest on electric propulsion and space science and technology, among science and engineering students.

The EPIC Lecture Series main objective is to provide to science and engineering university students (bachelor, master, PhD) with a selection of lectures on space electric propulsion, from the basic technology and concepts to the latest developments, with the aim to promote space EP talent and interest at university educational level, and therefore prepare the new generation of electric propulsion professionals.

The EPIC Lecture Series covers subjects ranging from electric propulsion principles and main technologies, present and future missions using electric propulsion, current technological challenges, relevant thruster subsystems, modelling and computational tools, experimental facilities and measurement techniques in the laboratory.

The EPIC Lecture Series 2017 program with full details of the invited speakers and the lecture titles are the following ones:

- José GONZÁLEZ DEL AMO, ESA: Electric propulsion in space missions.
- Vincent JACOD, AIRBUS DS: All-electric-propulsion satellites on GEO telecom market.
- Javier PALENCIA, CRISA: Electronics for electric propulsion.
- Luis CONDE, ETSIA – UPM: Multiprobe plasma flow diagnostics for space propulsion.
- Jaime PEREZ LUNA, QINETIQ Ltd.: Gridded Ion Engines.
- Eduardo AHEDO, UC3M: Hall Effect Thrusters.



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- Denis PACKAN, ONERA: RF thruster in electric propulsion: principle and diagnostics.
- Mario MERINO, UC3M: Magnetic nozzles for electric propulsion.

EPIC PSA makes public the presentations of the EPIC Lecture Series 2017 (<http://epic-src.eu/lecture-series-2017-presentations/>) and the videos (EPIC YouTube Channel: <https://www.youtube.com/channel/UC8a2JsVCDgmHu8mFWeQmZlQ>) recording the Lectures. The publication of the presentations and the videos is the key multiplication factor for the dissemination of the EPIC Lecture Series and the Electric Propulsion in general.

The EPIC PSA project will organize next EPIC Lecture Series in conjunction with future EPIC Workshops (in London on 2018 and in ESTEC on 2019). The target audience for the EPIC Lecture Series is the university students from Europe, although a higher participation is expected from local universities. Further details on the EPIC Lecture Series 2018 will be published soon at: <http://epic-src.eu/lecture-series-2018/>



Figure 7.1.1: EPIC Lecture Series 2017



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The leaflet is a black rectangular poster. At the top left is the European Union flag with the text 'Funded by the European Union'. At the top right is the EPIC logo, which features a blue rectangle with the word 'EPIC' in white and a stylized yellow starburst. Below the logos, the text reads: 'EPIC Lecture Series 2017', 'Space Electric Propulsion', 'Strategic Research Cluster H2020'. The date 'October 26 2017' is prominently displayed in blue. Below this is the logo for CDTI (Centro para el Desarrollo Tecnológico Industrial) and the text: 'Centro para el Desarrollo Tecnológico Industrial', 'CDTI', 'Madrid, Spain', 'Organized by: EPIC (PSA of the EP SRC H2020) and University Carlos III Madrid (UC3M)'. A glowing blue ring, resembling a propeller or a ring of light, is on the right side. Below this, the 'Calendar of Events' is listed: 'Preliminary programme publication' (15th July 2017), 'General registration opens' (11th September 2017), 'General registration closes' (7th October 2017), 'Final program publication' (15th October 2017), and 'Lecture Series date' (26th October 2017). At the bottom, it says 'Register on the EPIC website: epic-src.eu/lectureseries2017/'.

Figure 7.1.2: EPIC Lecture Series 2017 Leaflet

The screenshot shows a web browser window with the address bar displaying 'epic-src.eu/education/'. The page has a blue header with the EPIC logo and the text 'EPIC – Electric Propulsion Innovation & Competitiveness'. Below the header, there is a search bar and a navigation menu on the left. The main content area is titled 'Education and outreach of Space Electric Propulsion' and contains text about EPIC dissemination and outreach. It also lists 'Education material available from EPIC Partners:' with links to ESA's Education Ion Motors, ESA's Video Propulsion Laboratory, CNES's Video 'De Stentor à Nacat', and CNES's Video 'Sillage creé - la propulsion électrique'. The page is dated 12/11/2017.

Figure 7.1.3: EPIC education webpage with updated Electric Propulsion education material from different sources



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8 CONCLUSIONS

One of the main objectives of the EPIC PSA is to disseminate its progress and results, and to contribute to the dissemination of the SRC results'. The dissemination activities are been implemented following the EPIC PSA Dissemination plan [RD1] in close coordination with all Operational Grants under the SRC Collaboration Agreement (CoA) RD7.

This document aims at providing the list and detail description of the dissemination activities performed during EPIC PSA third year of execution, detailing: the dissemination activities performed, the role or the involved Partners, and the target groups addressed by each activity.

The dissemination activities presented are separated in different categories and detailed in this document, and they are mainly: EPIC website, PSA's Partners own websites, Social Media dissemination, Organisation of EPIC Workshops, EPIC Workshop 2017, External events: Conferences/Workshops/Symposia (international & local), EPIC Partners use of own dissemination channels, and Dissemination outside of usual space landscape channels.

Also among the main objectives of the EPIC PSA are the education and outreach activities in order to increase the interest in STEM (science, technology, engineering and math) and in the space Electric propulsion in particular on the different target groups (high-school students, University grade and PhD students, Research Institutions trainees and young researchers, and general public).

This document also aims at providing the list and detail description of the education & outreach activities performed during EPIC PSA third year of execution.

Dissemination, education and outreach future evolution and communication activities will be reported and updated in following Yearly Dissemination Report.