



# Report

## D4.1 Yearly Dissemination Report 2020

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# APPROVAL



# EPIC

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# 1 INTRODUCTION

In the frame of the Electric Propulsion Innovation & Competitiveness (EPIC) project, (grant number 640199) and (EPIC2) project (grant number 872002), 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 & Outreach and Workshops (Task T4.1, Task T4.2 and Task T4.3) during the first year of execution of the extension project EPIC2. 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 D4.1: *Yearly Dissemination Report 2020*.

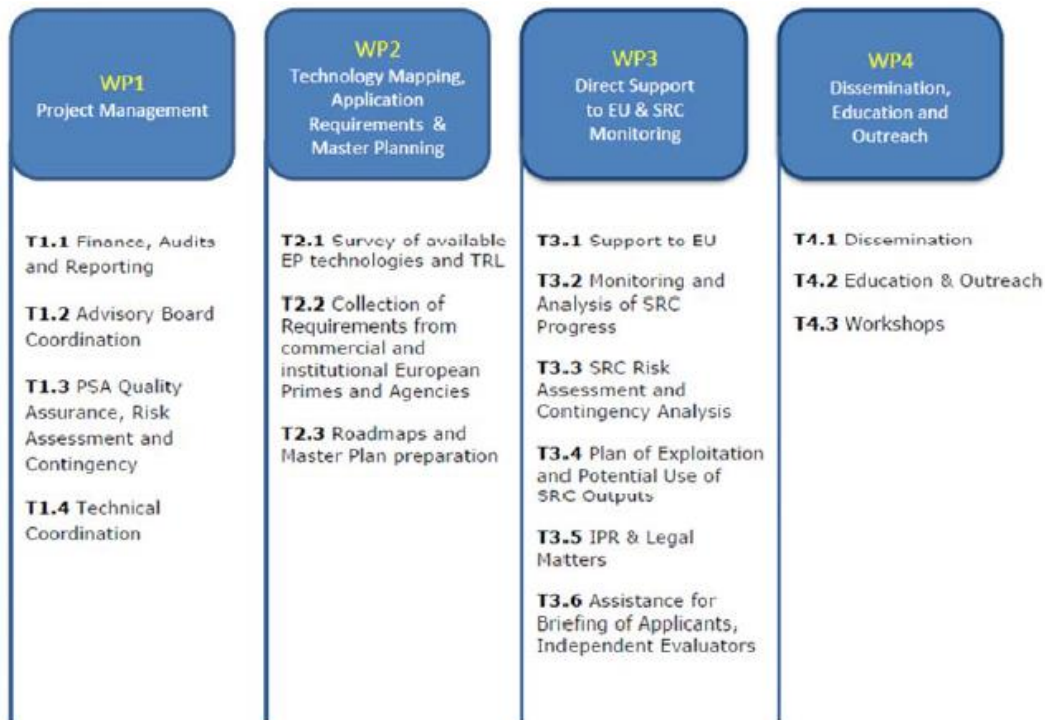


Figure 1.1: EPIC2 Work Package Structure



## 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)
- [RD10] EPIC- CDTI-5.1-RP-D5.5 Yearly Dissemination Report 2017
- [RD11] EPIC- CDTI-5.1-RP-D5.9 Workshop 4 Report (London 2018)
- [RD12] EPIC- CDTI-5.1-RP-D5.6 Yearly Dissemination Report 2018
- [RD13] EPIC- CDTI-5.1-RP-D5.10 Workshop 5 Report (ESTEC 2019)
- [RD14] EPIC- CDTI-5.1-RP-D5.7 Yearly Dissemination Report 2019.

## 3 ACRONYMS & ABBREVIATIONS

ASI	Agenzia Spaziale Italiana
BELSP0	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



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## 4 DISSEMINATION EDUCATION AND OUTREACH OBJECTIVES AND STRUCTURE

In line with [RD1], the EPIC and EPIC2 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 4.1 “Dissemination” and of WP 4), 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 and Horizon Europa (<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 4.2 “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 (T4.1 and T4.2), will be described in detail in each activity of this document.

Taking into account the relevance of the EPIC Workshop during the EPIC project, for the extension EPIC2 a new specific task has been created for the Workshops and Lecture series. The Workshop activities are the responsibility of all the partners of the consortium and coordinated by CDTI (Task 4.3 “Workshops”).



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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



## 6 DISEMINATION ACTIVITIES IN 2020

Various dissemination channels and media had been used during 2020 to obtain maximum impact from the promotion of EPIC results. The channels had been selected according to the intended audience. It is necessary to mention that due the strange situation that has happened around the World with COVID, the dissemination activities has been reduced compared the previous years. Also, the plans for the Workshops and lecture series have been delayed.

### 6.1 EPIC website in 2020

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. At the end of 2020 the hosting of the EPIC website has been moving from DLR to CDTI updating the Wordpress version and giving access to new tools that will improve the possibilities of the webpage. 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 during 2018 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 2018
    - Sub-child page: EPIC Workshop 2018 Presentations
  - Child Page: EPIC Workshop 2019
    - Sub-child page: EPIC Workshop 2019 Presentations
  - Child Page: EPIC Workshop 2022
  - Child Page: EPIC Lecture Series 2018
  - Child Page: EPIC Lecture Series 2019
  - 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 past years
    - Sub-child page: EPIC Dissemination & 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





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- Sub-child page: GIESEPP
- Sub-child page: GANOMIC
- Sub-child page: HIPERLOC-EP
- Sub-child page: MINOTOR
- Sub-child page:
- Child Page: Related links
- Child Page: Questions & Answers

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 2019 and EPIC Lecture Series 2019 webpage and repository of presentations.
- EPIC Workshop 2018 and EPIC Lecture Series 2018 webpage and repository of presentations.
- 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 2018 the main webpages updated have been the following ones: News, EPIC Workshop 2018, EPIC Lecture Series 2018, EP SRC 2019 & 2020 Calls, including the Call texts and the corresponding Guidelines documents (technical annexes), EPIC work performed on its first years, EPIC Events, EPIC Public Documents, EPIC Education material, and Related updated links (2019&2020 Calls).

The EPIC news Posts published during 2018 period are the following ones (<http://epic-src.eu/category/news/>)

- Download the presentations from the 2018 EPIC Workshop Now <http://epic-src.eu/download-presentations-2018-epic-workshop-now/>
- 22 proposals submitted for SPACE-13-TEC-2019 <http://epic-src.eu/22-proposals-submitted-for-space-13-tec-2019/>
- EPIC Workshop 2019 in ESTEC during 21-23 October 2019 <http://epic-src.eu/epic-workshop-2019-in-estec/>
- OneWeb launches pathfinder satellites <http://epic-src.eu/oneweb-launches-pathfinder-satellites/>
- SPACE-13-TEC-2019 Deadline is approaching for the Electric Propulsion Disruptive Call (2019) <http://epic-src.eu/space-13-tec-2019-deadline-12-march-2019/>
- IEPC 2019 in Vienna, Austria <http://epic-src.eu/iepc2019/>
- Download the presentations from the 2018 EPIC Lecture Series Now <http://epic-src.eu/download-the-presentations-from-the-2018-epic-lecture-series-now/>

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), [RD11] D5.9 Workshop 4 Report (London Workshop Report 2018) 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/>)



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- The EPIC Workshop 2018 four; organised by EPIC in London: 15-17/10/2018 (<http://epic-src.eu/workshop2018/> and <http://epic-src.eu/workshop-2018-presentations/>)
- The EPIC Workshop 2019 five; organised by EPIC in ESTEC: 21-23/10/2019

Information on future EPIC Workshops (Germany 2021 and Napoli 2022) 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 2018	Type of channel	EPIC Partner	EPIC Partner preparing material
[DG1-Research/Academia] [DG2-Space Industry] [DG3-Governments] [DG4-Operators] [DG5-General Public]	EPIC Website / <a href="http://epic-src.eu/">http://epic-src.eu/</a>	PSA Website	CDTI	CDTI
	EPIC Workshop 1 Website Brussels: 25-28/11/2014 / <a href="http://www.epic2014.eu/">http://www.epic2014.eu/</a>	Workshop website, registration tool and presentation repository	CNES	CNES
	EPIC Workshop 2 Website Stockholm: 11-12/02/2015 / <a href="http://epic-src.eu/?page_id=12/">http://epic-src.eu/?page_id=12/</a>	Workshop website, registration tool and presentation repository	DLR	DLR
	EPIC Workshop 3 Website Madrid: 24-25/10/2017 / ( <a href="http://epic-src.eu/workshop2017/">http://epic-src.eu/workshop2017/</a> and <a href="http://epic-src.eu/workshop-2017-presentations/">http://epic-src.eu/workshop-2017-presentations/</a> )	Workshop website, registration tool and presentation repository	CDTI	CDTI
	EPIC Workshop 4 Website London: 15-17/10/2018 / ( <a href="http://epic-src.eu/workshop2018/">http://epic-src.eu/workshop2018/</a> and <a href="http://epic-src.eu/workshop-2018-presentations/">http://epic-src.eu/workshop-2018-presentations/</a> )	Workshop website, registration tool and presentation repository	CDTI	CDTI
	EPIC Workshop 5 Website Madrid: 21-23/10/2019 / <a href="http://epic-src.eu/workshop2019/">http://epic-src.eu/workshop2019/</a> and the link to download the presentation are divided in three ZIP files included in the 2019 workshop link	Workshop website, registration tool and presentation repository	CDTI	CDTI

Table 6.1.1: List of EPIC websites for dissemination in 2019



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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 2019

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 : <a href="http://www.esa.int/Our_Activities/Space_Engineering_Technology/EPIC_Electric_Propulsion_Innovation_and_Competitiveness">http://www.esa.int/Our_Activities/Space_Engineering_Technology/EPIC_Electric_Propulsion_Innovation_and_Competitiveness</a>	ESA
	EPIC reference in ASI website: <a href="http://www.asi.it/it/news/epic-in-space-electrical-propulsion-and-station-keeping">http://www.asi.it/it/news/epic-in-space-electrical-propulsion-and-station-keeping</a>	ASI
	EPIC reference in BELSPO website <a href="http://www.belspo.be/belspo/space/euPolicy_h2020_en.stm">http://www.belspo.be/belspo/space/euPolicy_h2020_en.stm</a> <a href="http://www.belspo.be/belspo/space/euPolicy_h2020_nl.stm">http://www.belspo.be/belspo/space/euPolicy_h2020_nl.stm</a> <a href="http://www.belspo.be/belspo/space/euPolicy_h2020_fr.stm">http://www.belspo.be/belspo/space/euPolicy_h2020_fr.stm</a>	BELSPO
	EPIC reference in French Research ministry and CNES websites <a href="http://www.horizon2020.gouv.fr/cid73955/le-point-contact-national-espace.html">http://www.horizon2020.gouv.fr/cid73955/le-point-contact-national-espace.html</a>	CNES



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	<a href="https://horizon2020.cnes.fr/fr">https://horizon2020.cnes.fr/fr</a> <a href="https://horizon2020.cnes.fr/fr/horizon-2020/epic">https://horizon2020.cnes.fr/fr/horizon-2020/epic</a>	
	EPIC reference in CDTI ESH2020 website: <a href="http://eshorizonte2020.cdti.es/index.asp?MP=88&amp;MS=711&amp;MN=2&amp;TR=C&amp;IDR=2394">http://eshorizonte2020.cdti.es/index.asp?MP=88&amp;MS=711&amp;MN=2&amp;TR=C&amp;IDR=2394</a>	CDTI
	EPIC reference in DLR website: in English: <a href="http://www.dlr.de/rd/en/desktopdefault.aspx/tabid-2266/3398_read-44284/">http://www.dlr.de/rd/en/desktopdefault.aspx/tabid-2266/3398_read-44284/</a> and German: <a href="http://www.dlr.de/rd/desktopdefault.aspx/tabid-2266/3398_read-44284/">http://www.dlr.de/rd/desktopdefault.aspx/tabid-2266/3398_read-44284/</a>	DLR
	EPIC reference in UKSA website: To be updated	UKSA
	EPIC reference in EUROSPACE website: To be updated	ADS- EUROSPACE
	EPIC reference in SME4Space website: <a href="https://www.sme4space.org/epic-project">https://www.sme4space.org/epic-project</a>	SME4Space

Table 6.2.1: List of links of each EPIC PSA Partner website dedicated to EPIC and SRC dissemination activities in 2018.

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

Table 6.2.2: List of links of each SRC Operational Grant website dedicated to SRC dissemination activities in 2018.

## 6.3 Social Media dissemination

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/UC8a2JsVCDgmHu8mFWeQmZlQ>) 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

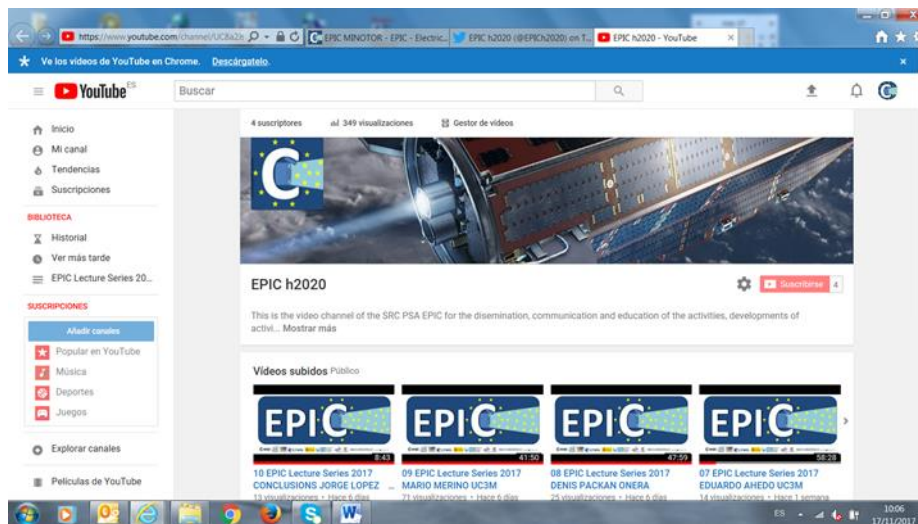


Figure 6.3.2: EPIC YouTube Channel

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): (tweets) Tweets and retweets on Electric Propulsion and @EPICH2020 from (@SME4SPACE): (Tweets)	CDTI, SME4SPACE
[DG1-Research/Academia] [DG2-Space Industry] [DG3-Governments] [DG4-Operators]	LinkedIn Group: ( <a href="https://www.linkedin.com/grp/home?gid=8303568">https://www.linkedin.com/grp/home?gid=8303568</a> ) 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) ( <a href="https://www.youtube.com/channel/UC8a2JsVCDgmHu8mFWeQmZlQ/">https://www.youtube.com/channel/UC8a2JsVCDgmHu8mFWeQmZlQ/</a> ). Named: EPIC h2020.	CDTI

Table 6.3.1: List of EPIC Dissemination Social Media activities in 2018.



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## 6.4 EPIC Logo in 2020

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

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](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 [RD3] Workshop 2 report. The third one, 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/>). The previous one was organised by UKSA in London 15-17 October 2018 (<http://epic-src.eu/workshop-2018/>). The 5<sup>th</sup> and last workshop of H2020 was organised by ESA in Noordwijk (ESTEC) 21-23 October 2019 (<http://epic-src.eu/workshop-2019/>). The 6<sup>th</sup> workshop and first one of the extension EPIC2 will be held in Cologne (DLR facilities) from 2 to 4 May 2022.

The main objective of the EPIC Workshops is to present the SRC Electric Propulsion activities to the electric propulsion community and stakeholders and to collect and assess the latest electric propulsion technology developments in Europe and the provide the information needed for the next Calls of Electric Propulsion that will open in Horizon Europe. EPIC Workshops are the fundamental element of the SRC dissemination of SRC activities, and the collection of information for the EPIC SRC Roadmap. They have two objectives: an extensive exposure of the EPIC team ideas to the external world



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(commercial, scientific, programmatic, etc.), and gathering of inputs, and to expand to the maximum the outputs produced during the EPIC project.

The two next workshops for the PSA extension EPIC-2 have been announced and will be held by DLR in Cologne in 2022 and ASI in 2023 in Napoli.

### **6.5.1 EPIC Workshop 2019**

The EPIC Workshop 2018 was organized by ESA with support from all the EPIC partners, and held on 21-23 October 2019 in Noordwijk (The Netherlands), at ESTEC/ESA Facilities; with the active involvement of all PSA Partners (<http://epic-src.eu/workshop-2019/>). Full information on the EPIC Workshop 2019 has been already included in detail in its respective deliverable [RD12] EPIC-CDTI-5.1-RP-D5.10-1.1 EPIC Workshop 5 Report, but these are the main headlines of the most important dissemination event in 2019:

#### **The EPIC Workshop 2019 program covered the following topics:**

- PSA and SRC progress and activities.
- H2020 Work Programme EP SRC topics, Horizon Europe & IOD/IOV activities.
- Incremental SRC OGS: objectives, proposed approach, team, progress, and early results
- Disruptive SRC OGS: objectives, proposed approach, team, progress, and early results
- Electric propulsion for Cubesats: technologies, actors and round table.
- Electric propulsion general and transversal technologies.
- Constellations: EP technologies, actors and round table.
- Power electronics for EP, analysis & simulation, and New developments.
- Dissemination and education SRC activities

EPIC PSA makes public the presentations in agreement with the authors of the EPIC Workshop 2019 in the EPIC web: <http://epic-src.eu/workshop-2019/>

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





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**AGENDA / FINAL PROGRAMME: 21<sup>TH</sup> OCTOBER 2019**

Day	Session	Time	Invited speaker			Presentation
			Last name	First name	Company	
Monday 21st/October 2019	Registration	13:00-14:10				
	Welcome (Chair: Javier Rodriguez)	14:10-14:20	Torben	HENRIKSEN	ESA	ESTEC Welcome, Inauguration Workshop
		14:20-14:40	José	GONZÁLEZ DEL AMO	ESA	PSA Welcome, EPIC Workshop Objectives & logistics, EPIC PSA
	H2020, EP SRC and PSA (Chair: José González del Amo, Rapporteur: Cheryl Collingwood)	14:40-14:55	Rémy	DENOS	European Commission	Horizon Europe and EP SRC activities
		14:55-15:10	Florence	BEROUD	REA	Status of Incremental and Disruptive activities
		15:10-15:30	Rémy	DENOS	European Commission	IOD/IOV Status of activities in H2020
	Coffee break	15:30-16:00				
	Incremental SRC Operational Grants (Chair: Lisa Martin Perez, Rapporteur: Fabien Castanet)	16:00-16:40	Idris	HABBASSI	Safran Aircraft Engines	CHEOPS
		16:40-17:20	Cyril	DIETZ	ArianeGroup	GIESEPP
17:20-18:00		Ernst	BOSCH	Thales Deutschland GmbH	HEMPT-NG	
EOM (EO Day)	18:00					



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AGENDA / FINAL PROGRAMME: 22<sup>ND</sup> OCTOBER 2019

Tuesday 22nd/October 2019	Registration	8:00-9:00				
	Welcome of the day	9:00-9:15	José	GONZÁLEZ DEL AMO	ESA/ EPIC PSA	PSA Wellcome of the day & logistics
	Disruptive SRC Operational Grants (Chair: Nick Cox, Raporteur: Vincenzo Pulcino)	9:15-10:00	Louis	GRIMAUD	Safran Electronics & Defense	GANOMIC
		10:00-10:45	John	STARK	Queen Mary Univ. of London	HIPERLOC-EP
		10:45-11:30	Denis	PACKAN	ONERA	MINOTOR
	Coffee break	11:30-12:00				
	Session 1: Electric Propulsion Technologies for Cubesats (Chair: Fabien Castanet; Raporteur: Rosario Pavone)	12:00-12:15	David	HENRI	Exotrail	Low power Hall thrusters and mission design and operation software for smallsats
		12:15-12:30	Nicolas	BELLOMO	T4i	REGULUS electric propulsion unit: current and future developments
		12:30-12:45	Luc	HERRERO	COMAT	Plasma Jet Pack (PJP) Technology Overview
		12:45-13:00	David	KREJCI	Enpulsion	Commercial Success of FEPP thrusters
	Lunch break	13:00-14:15				
	Invited Speakers to round table "Cubesats" (Chair: Davina di Cara, Fabio Nichele, Fabrizio Stesina, Roger Walker, Alexander Reissner, Tor-Arne Grondland, Raporteur: Fabien Castanet)	14:15-14:30	Roger	WALKER	ESA	
		14:30-14:45	Tor-Arne	GRONDLAND	GOMSpace	
		14:45-15:00	Fabio	NICHELE	Tyvak	
		15:00-15:15	Alexander	REISSNER	Enpulsion	
		15:15-15:30	Fabrizio	STESINA	Politecnico di Torino	
	Round table "Cubesats" (Chair: ESA, Raporteur: Fabien Castanet)	15:30-16:15				Round table "Cubesats & EP": Questions and Answers prepared by the Chair & PSA
	Coffee break	16:15-16:30				
	Session 2: Electric Propulsion Technologies (Chair: Nick Cox, Raporteur: Javier Rodriguez)	16:30-16:45	Hans	LEITER	Ariane Group	Smart RF-Ion Thruster Systems for Small Satellites
		16:45-17:00	Tommaso	MISURI	Sitael	Qualification of a Low Power Propulsion System Based on HT100 Hall Thruster
17:00-17:15		Francesco	GUARDUCCI	Mars Space Ltd.	Electric Propulsion Technologies Development at Mars Space Ltd	
17:15-17:30		Maria	SMIRNOVA	Transmit GmbH	RIT3.5 EM - classic technology for earth observation and science missions	
17:30-17:45		Alex	SCHWERTHEIM	Imperial College London	Electric Propulsion Research at Imperial College London	
17:45-18:00		Georg	HERDRICH	IRS Stuttgart	Assessment of Gaps for Dedicated Electric Propulsion Systems: The View of IRS	
EOM (EO Day)	18:00					
Workshop cocktail	18:00-19:30					
	Networking light cocktail					



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AGENDA / FINAL PROGRAMME: 23<sup>RD</sup> OCTOBER 2019

Wednesday 23rd/October 2019	Registration	8:30-9:15				
	Welcome of the day	9:15- 9:30	José	GONZÁLEZ DEL AMO	ESA/ EPIC PSA	PSA Wellcome of the day & logistics
	Session 3: Electric Propulsion Technologies for Constellations (Chair: Lisa Martin Perez, Raporteur: Vincenzo Pulcino)	9:30-9:45	Ralf	HEIDEMANN	Thales Deutschland GmbH	Development of the low power HEMP Thruster EVO
		9:45-10:00	Pascal	BARBIER	Air Liquide Advanced Technologies	Innovative Xenon/Krypton FMS (Feed Management System) for Electric Propulsion
		10:00-10:15	Massimo	PANAROTTO	Chalmers University Of Technology	Functionality-based value assessment of alternative architectures for satellite electric propulsion
	Coffee break	10:15-10:45				
	Invited Speakers to round table "Constellations & EP" (Chair: Alain Demaire, Philippe Temporelli, Philippe Lamot, Muriel Richard, Alexander Reissner, Morten Pahle, Raporteur: Javier Rodriguez)	10:45-11:00	Philippe	TEMPORELLI	OneWeb	
		11:00-11:15	Philippe	LAMOTE	Thales Alenia Space	
		11:15-11:30	Muriel	RICHARD	Clearspace	
		11:30-11:45	Alexander	REISSNER	Empulsion	
		11:45-12:00	Morten	PAHLE	Volante Global	
	Round table "Constelations & EP" (Chair: Alain Demaire, Raporteur: Javier Rodriguez)	12:00-12:45				Round table "Constellations & EP": Questions and Answers prepared by the Chair & PSA
	Lunch break	12:45-14:00				
	Session 4: Power Electronics for Electric Propulsion Technologies (Chair: Peter Van Geloven, Raporteur: Nick Cox)	14:00-14:15	Eric	BOURGUIGNON	Thales Alenia Space Belgium	Power Processing Unit Activities at Thales Alenia Space in Belgium
		14:15-14:30	Fernando	PINTO MARIN	CRISA, Airbus Defence & Space	Generic Gridded Ion PPU activities and future challenges for multiple applications
		14:30-14:45	Pierre	THEBAULT	DACTEM	Electrical propulsion thruster simulator: presentation of a solution to simulate the behavior of an electrical thruster in term of impedance characteristics ( operating points, transients, noise), beam events, ignition and failure cases.
	Session 5: Electric Propulsion Analysis (Chair: Vincenzo Pulcino, Raporteur: Peter Van Geloven)	14:45-15:00	Adam	OBRUSNIK	Plasmasolve s.r.o.	Leveraging open-source and cloud infrastructures for efficient 3D simulation of plasma and thermal balance.
		15:00-15:15	Eduardo	AHEDO	Universidad Carlos III De Madrid	Simulation of Hall thruster performances with HYPHEN
		15:15-15:30	Filippo	CICHOCKI	Universidad Carlos III De Madrid	Simulation of Hall thruster 3D plumes with EP2PLUS
		15:30-15:45	Filippo	CICHOCKI	Universidad Carlos III De Madrid	Modeling and simulation tools for Ion Thrusters
		15:45-16:00	Jaume	NAVARRO CAVALLE	Universidad Carlos III De Madrid	Experimental activities at the Electric Propulsion and Plasmas Team (EP2-UC3M): an example of an intense testing campaign on the Helicon Plasma Thruster (HPT05M)
		16:00-16:15	Joern	KRENZER	Universitaet der Bundeswehr Muenchen	Influencing grid erosion in RITs by fuel additives and desgining a better model for the underlying abrasive processes
	Coffee break	16:15-16:30				
Session 6: Electric Propulsion Technologies (Chair: Rosario Pavone, Raporteur: Lisa Martin Perez)	16:30-16:45	Stephan	GABRIEL	University of Southampton	Novel cathodes and alternative propellants for Electric Propulsion	
	16:45-17:00	Angel	POST	Advanced Thermal Devices S.L	NACES cathode: High performance cathode for electric propulsion devices based on C12A7:e- electride novel material	
	17:00-17:15	Charlie	RYAN	University of Southampton	The development of small Hall Effect Thrusters operating on alternative magnetic propellants	
	17:15-17:30	Manuel	LA ROSA BETANCOURT	PI Integral Solutions Ltd.	Superconductor-based Readiness Enhanced Magnetoplasmadynamic Electric Propulsion. SUPREME Consortium for High Power EP Space Missions).	
	17:30-17:45	Manuel	LA ROSA BETANCOURT	PI Integral Solutions Ltd.	Neutron Star Systems – closing the gap from laboratory to market for Superconducting-based Readiness Enhanced Magnetoplasmadynamic Electric propulsion technology (SUPREME).	
	17:45-18:00	Luis	CONDE LÓPEZ	Universidad Politecnica de Madrid	Thrust and supersonic ion beams of the Alternative Low Power Hybrid Ion Engine (ALPHIE)	
Workshop Conclusions	18:00-18:15	José	GONZÁLEZ DEL AMO	ESA	EPIC Workshop conclusions	
EOM (EO Workshop)	18:15					



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### **EPIC Workshop 2019 Conclusions:**

- Standardization of Electric Propulsion testing procedures for different tests such as lifetime test, acceptance test, etc. are very important. A specific round table in the next EPIC workshop at Cologne in Germany will be organized on this important subject.
- Thousands of cubsats will be manufactured in the next 10 years of which 40% may have electric propulsion. Therefore, it is important to put attention to the development of small electric propulsion systems for cubsats.
- New challenges for the integration of electric propulsion systems in cubsats are miniaturization of the power, thermal, structural systems, thus the propulsion designers should take these elements into account in the early development phase.
- Due to the great amount of satellites using electric propulsion in telecommunication and earth observation constellations, the use of Xenon as an expensive propellant is highlighted. Different propellants such as Krypton (Star link constellation make use of mini Hall Effect thrusters using Krypton), Iodine (a salt that does not need pressurize tanks), Argon and other propellants is being assessed by the community.
- Constellations are the biggest market for electric propulsion in the next 5 years and the development of the electric propulsion need to be accelerated to arrive at the market on time.
- In constellations the mass savings provided by electric propulsion are very appreciated but another important issue is the volume savings providing by electric propulsion.
- Constellations aim for electric propulsion with low cost but keeping a high reliability and quality. The car industry is the main example of what it is required by the different systems in constellations.
- The big numbers of satellites for constellations highlighted the need to assess the de-orbiting manoeuvres and the possible debris removal activities in the future. electric Propulsion is a main actor in these domains.
- Insurance of satellites requires from the electric propulsion systems the following point: heritage, electronics reliability and assessments of electric propulsion spacecraft interactions.
- The new market will require a high level of autonomy in the electric propulsion systems (failure detection, on-off procedures, etc.)

## **6.6 External events & Education in 2020**

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.

EPIC supported during 2020 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.

Also, during 2020, several initiatives on education and outreach have been performed or initiated by EPIC team, and mainly by ESA.



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- Electric Propulsion at the European Space Agency (ESA) (year 2020)
- Electric Propulsion at the European Space Agency (30 June 2020)

### **6.6.1 EPIC Lecture Series 2019**

The EPIC Lecture Series is an initiative that belongs to the Education Task 5.2. The last lecture series of the H2020 programme was organized by ESA, at ESTEC in collaboration with the University of Delft, just after the EPIC workshop 5 and held on 24-25 October 2019.

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 2019 program with full details of the invited speakers and the lecture titles are the following ones:



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Day	Session	Time	EPIC Lecture Series Speaker			Lecture title/ Presentation	
			First name	Last name	Company/University		
Thursday 24th October 2019	Registration	8:30-9:00					
	Welcome (Chair: ESA)	9:00-9:10	Jose	Gonzalez del Amo	ESA Education	Inauguration of EPIC Lecture Series	
		9:10-9:20	Jose	Gonzalez del Amo	ESA	EPIC Lecture Series and EPIC Education Objectives	
		9:20-9:30	José	Gonzalez del Amo	ESA/ EPIC PSA	PSA Wellcome of the day & logistics	
	EPIC Lecture Series Session 1	9:30-10:15	José	Gonzalez del Amo	ESA	EP in space missions	
		10:15-11:00	Davar	Feili	ESA	Electric Rocket science	
	Coffee break	11:00-11:30					
	EPIC Lecture Series Session 2	11:30-12:15	Neil	Wallace	ESA	EP on Scientific Missions (GOCE, BepiColombo)	
		12:15-13:00	Luca	Massotti	ESA	EP for Earth Observation missions: NGGM	
	Lunch break	13:00-14:00	Luch on your own				
	EPIC Lecture Series Session 3	14:00-14:45	Cheryl	Collingwood	ESA	EP micro-propulsion for scientific missions	
		14:45-15:30	Ben	Fallis	ESA	EP for Telecommunication and Constellations	
	Coffee break	15:30-16:00					
	EPIC Lecture Series Session 4	16:00-16:45	Roger	Walker	ESA	EP for Cubesats	
16:45-17:30		Orson	Sutherland	ESA	EP for Exploration: Mars Sample Return		
EOD	17:30						
Friday 25th October 2019	Registration	9:00-9:20					
		9:20-9:30	José	Gonzalez del Amo	ESA/ EPIC PSA	PSA Wellcome of the day & logistics	
	EPIC Lecture Series Session 5	9:30-10:15	Denis	Estublier	ESA	EP for Smart-1	
		10:15-11:00	Neil	Wallace	ESA	Testing of EP	
	Coffee break	11:00-11:30					
	EPIC Lecture Series Session 6	11:30-12:15	Kathe	Dannemayer	ESA	Plasma diagnostics for EP	
		12:15-13:00	Eduard	Bosch	ESA	ESA Propulsion Lab	
Lecture Series closure	13:00-13:15	Jose	Gonzalez del Amo	ESA	Lecture Series roadmap and conclusions		
EOM	13:15						

Figure 7.1: EPIC Lecture Series 2019 Programme

EPIC PSA makes public the presentations of the EPIC Lecture Series 2018 (<http://epic-src.eu/lecture-series-2018/>).

EPIC PSA makes public the presentations of the EPIC Lecture Series 2019 (<http://epic-src.eu/lecture-series-2019/>).



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## 7 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 have 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 2020 EPIC PSA execution, detailing: the dissemination activities performed, the role of 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 2019, 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 2019 EPIC PSA execution.

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