5G key technology enablers for Emerging media Content production services

Deliverable D6.2
Data Management Plan

Version v1.0 Date: 2021/02/24

Document properties:

Grant Number:	957102
Document Number:	D6.2
Document Title:	Data Management Plan
Editor(s):	Paola Sunna (EBU)
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Contractual Date of Delivery:	2021/02/28
Dissemination level:	PU[1]
Status:	Final
Version:	1.0
File Name:	5G-RECORDS_D6.2_v1.0

Revision History

Revision	Date	Issued by	Description
1.0	2020/01/04	Paola Sunna (EBU)	EC Final version

Abstract

This deliverable describes the Data Management Plan (DMP) of the 5G-RECORDS project. A DMP describes the data management life cycle for the data to be collected, processed and/or generated by a Horizon 2020 project.
As part of making research data findable, accessible, interoperable and re-usable (FAIR), this DMP includes information on: the handling of research data during and after the end of the project; what data will be collected, processed and/or generated; which methodology and standards will be applied; whether data will be shared/made open access; and how data will be curated and preserved (including after the end of the project).
If it is needed, this deliverable will be updated as the project evolves.

Keywords

DMP, FAIR, data, security

Disclaimer

[1] CO = Confidential, only members of the consortium (including the Commission Services)

PU = Public

Table of Contents

List of Tables

List of Acronyms and Abbreviations

AMWA	Advanced Media and Workflow Association
BMSB	Broadband Multimedia Systems and Broadcasting
CEPT	European Conference of Postal and Telecommunications
D	Deliverable
DMP	Data Management Plan
DTT	Digital Terrestrial Television
DVB	Digital Video Broadcasting
EBU	European Bradcasting Union
EC	European Commission
ETN	European Training Networks
EuCNC	European Conference on Networks and Communications
EURASIP	European Association for Signal Processing
FAIR	Findable, Accessible, Interoperable and Re-usable
IBC	International Broadcasting Convention
ICC	International Conference on Communications
ICME	International Conference on Multimedia & Expo
ICT	International Conference on Thinking
IEEE	Institute of Electrical and Electronics Engineers
M	Month
MWC	Mobile World Congress
PDF	Portable Document Format
PM	Person Month
QMR	Quarterly Management Reports
QR	Quarterly Reports
SDO	Standard Developing Organization
SMPTE	Society of Motion Picture and Television Engineers
TR	Technical Report
TS	Technical Specification
VTC	Vehicular Technology Conference
WCNC	Wireless Communications and Networking Conference
WP	Work Package
3GPP	3rd Generation Partnership Project
5G-PPP	5G Public-Private Partnership

1 Data Summary

*The template is a **set of questions** that you should answer with a level of detail appropriate to the project.*

*It is not required to provide detailed answers to all the questions in the first version of the DMP that needs to be submitted by month 6 of the project. Rather, the DMP is intended to be a **living document** in which information can be made available on a finer level of granularity through updates as the implementation of the project progresses and when significant changes occur. Therefore, DMPs should have a clear version number and include a timetable for updates. As a minimum, the DMP should be updated in the context of the periodic evaluation/assessment of the project. If there are no other periodic reviews envisaged within the grant agreement, an update needs to be made in time for the final review at the latest.*

The Data Management Plan (DMP) describes the management life cycle for the data to be collected, processed and generated by the 5G-RECORDS project. This DMP represents a first version of the final document. It is intended to be updated, making it available on a finer level of granularity through updates as the implementation of the project progresses and when significant changes occur. The DMP will be updated in the context of the periodic evaluation of the project: minor updates (e.g., paragraphs rewriting, figures, editing, etc.) will be reported in Revision History table (see page 2) while substantial changes will be listed in Table 1

Table 1. Timetable for updates of the data management plan.

Version	Date
First version	M6

1.1 Purpose of data collection

What is the purpose of the data collection/generation and its relation to the objectives of the project?

Throughout the project, partners of the consortium will naturally generate data in the form of results and presentations related to the project objectives listed in the WPs and tasks. The collection and sharing of this information within the project is essential to keep all the partners up to date and aligned to enable an effective and fruitful collaboration. Data will be shared internally through an internal repository provided by the EBU, accessible only to project partners.

In addition, a dissemination and communication plan will ensure that the outcomes of 5G-RECORDS reach all the communities active in the technologies, systems, and services targeted by the project. This plan aims at:

- Establishing and maintaining a communication link with different parties using the public website [1] where the consortium is presented, project objectives explained, and public deliverables are accessible. Other means of promoting the project include the use of social media (YouTube Channel [2], LinkedIn [3], Twitter [4]) as well as printed communication as appropriate.
- Maximizing the scientific impact by publishing papers in major IEEE conferences and high impact journals. Visibility will also be guaranteed by providing open access to the published versions of the paper on the project webpage [1] and open repositories in compliance with the EC open policy.

- Publishing white papers to describe the project as a whole and to highlights the final results and use of partners' business networks to spread and discuss project progress and results.
- Organizing workshops and tutorials.

1.2 Types of data

What types and formats of data will the project generate/collect?

During the project, different types and formats of **open access** data will be generated and collected to be shared in the public website of the project [1]:

• **Deliverables**: during the project, a series of confidential and public open Deliverables (D) will be developed related to specific tasks. All documents will be shared with 5G-PPP projects for inter-project cooperation. Public deliverables will be released to the open public in the project website [1].

• **Outcomes:** all the project partners will publish their outcomes both in the project repository and on the public website [1], sharing their progress in terms of research (e.g. journal papers, conference papers, whitepapers, etc.).

• **Presentations**: presentations on the results achieved by the different work-packages will be published on the official website of the project [1] and proposed to relevant conferences. In order to have the maximum impact, the presentations made in these events will be also accessible to the open public.

• **Tutorials:** the tutorials prepared and presented by the partners will improve the transfer of knowledge within the consortium and to the general public.

• **Detailed results:** during the project, specific results (e.g., codecs and network performances, etc) are expected to be shared between the partners.

• **Standardization technical contributions** from project partners will be also published in the official webpage [1]. Examples of standardization forums are 3GPP and DVB.

• **Audiovisual resources:** the partners will produce multiple videos that will serve both as a presentation and as a demonstration of the results obtained throughout the entire Project. Likewise, these videos may be used as educational and support material for presentations at multiple events. All these videos will be available in the project YouTube Channel [2].

• **Additional information:** the project will also offer additional information published through the public web site and the social networks, such as, press releases, news, etc.

All types of data mentioned above will be also shared internally among the members of the consortium throughout the drafting phase. By making use of the EBU repository and email lists dedicated to this purpose, project partners can collaborate, jointly building the deliverables with shared access to all data. In addition, project partners will share **privately** (allowing access to project partners) other types of data, in order to ensure that the objectives of the project are fulfilled:

• **Software:** during the project, some tools and software will be shared among the partners. Different repositories will be used, depending on the nature of the tool. One of them will be Git. Git is a free and open source distributed version control system designed to handle very large projects with speed and efficiency.

• **Preliminary results** in the form of presentations, spreadsheets, figures, etc., will be shared among partners through the internal repository and teleconferences.

• **Preliminary research ideas** presented in teleconferences will be shared among partners through the internal repository as well.

• **Standardization technical documents:** partners submitting contributions to standards developing organisations (SDOs) will make the contribution public if the SDOs documents are public (for example 3GPP). For others SDOs that have documents restricted to members (for examples DVB) partners will check with the chairman and aim to make the documents public whenever possible.

1.3 Re-use of existing data

Will you re-use any existing data and how? What is the origin of the existing data?

5G-RECORDS will make use of existing data developed and validated by partners outside the framework of this project. Thus, public specifications coming from DVB (Digital Video Broadcasting), as well as 3GPP (3rd Generation Partnership Project) technical specifications (TS) and technical reports (TR), SMPTE (Society of Motion Picture and Television Engineers) and AMWA (Advanced Media and Workflow Association) standards will be used as starting point for the further development of required data.

5G-RECORDS will design and develop/integrate some components from scratch but for other components will build upon concepts already developed in 3GPP and 5G-PPP phase-1 and phase-2 projects or in partners' projects.

Baseline data, in particular performances of solutions currently used for production, will be considered as a benchmark for the 5G-RECORDS technology solutions developed within the project.

Likewise, scientific journal and conference publications, technical reports, white papers and workshops will also be considered for calibration and cross-checking of the technological data deployed.

1.4 Expected size

What is the expected size of the project data?

5G-RECORDS is expected to provide:

- 14 public deliverables
- 4 confidential deliverables (plus 14 on Ethics)

in addition to those listed in Table 2.

Table 2. Minimum project targets for the dissemination and communication activities

Category	Type	Target
Dissemination	Journal and conference papers	20
	Keynotes and panels	15
	Participations in events and forums	10
	Workshops	4
	Tutorials	2
Communication	Website	1
	Social networks	3
	Audiovisual resources	6
	Press releases	15
Others	Patents	5
	Open source repositories	2

It is expected that the size of the data will increase as the project progresses.

1.5 Data utility

To whom might it be useful ('data utility')?

All partners in the project will disseminate project results internally within their organisations and via established networks. Industrial project partners will disseminate through their strong links to industrial events and regulatory bodies where their products, prototypes, development platforms can be shown and ideas for 5G technologies, applications, and infrastructures can be presented. Research and academic project partners will disseminate the project visions and results to educational staff and students, so project ideas can be integrated in different training activities like student projects, incorporation into lectures, etc.

1.5.1 Industrial community

The dissemination plan seeks that the project will be present in major industrial events, for the industry in general and for the 5G and media industries:

- **5G Industry events**: Mobile World Congress (MWC).
- **European Administrations**: CEPT workshops.
- **5G-PPP**: EuCNC conference and ICT conference.
- **Media industry events**: IBC show, EBU Production Technology Seminar, EBU Network Technology Seminar, Forecast and BroadThinking.

All partners will have to show the advances achieved in the project and empathize what these new updates brings to the media industry and the project itself at major international exhibitions and tradeshows, as well as participating in 5G events and publicize those results among industrial research peers and the regulatory community.

The partners will organize demos that will be conducted at the most important EC events regularly organized by them in order to be visible in other sectors such as security or e-health.

1.5.2 Scientific community

The dissemination plan has as objective to promote the participation the academic and research partners in international scientific conferences, the organization of workshops, presentations, keynotes, Info days, training and tutorials:

- **High quality scientific publications**: EuCNC, BMSB, VTC, ICC, Globecom, WCNC and ICME. Targeted journals include the IEEE Transactions on Broadcasting, IEEE Transactions on Communications, EURASIP Journal on Wireless Communications and Networking and EBU's Technical Review.
- **Workshops, presentations and keynotes**: IEEE 5G summits, the IBC show, innovation seminars, relevant technical assemblies, telecom and EU policy making events or international scientific symposia.
- **Info days, training and tutorials**: Tutorials will be organized in conjunction with IEEE conferences and EC's Marie Curie European Training Networks (ETN). The project will also organize info days in parallel with major IEEE workshops and tutorials.

In order to disseminate the results and the partial scope of the project, as well as a better understanding of it, a publications plan of press releases related to the main activities or milestones of the project has been designed. Each project partner shall deliver, at least, a general press release per year concerning its work for the project, which shall be published on its own website and upload to the repository of the project.

1.5.3 Social Networks

As online media are very effective, its use will be adopted by the project. Thus, results and updates should appear on social networks, and, therefore, pages will be opened on Twitter [4] and LinkedIn [3] as well as an account on YouTube [2].

Social networks, mainly Twitter and LinkedIn, will be automatically fed as soon as some content is published on the website. Social networks require their own narratives and visual languages, as well as assiduity in publications, so the participation of all partners in this task is essential. In this sense, once the social networks of the project have been opened, the partners should inform the task leader of each of the news, providing texts and visual content and the community manager of the package will be in charge of publishing.

All the project's own publications on social networks will be accompanied by the following hashtag: @5G_Records, however, more hashtags may be added according to the content of the publication. Mentions to the project coordinators and funding agencies should also be added: @UPV, @5GPPP and @EU_H2020.

1.5.4 Audiovisual resources

5G-RECORDS considers that audiovisual content delivery is a must for the project outreach. Thus, a strategy for video content creation has been designed to be able to show in a friendly and compact way the objectives, the use cases and the outcomes of project.

2 Findable, accessible, interoperable and re-usable (FAIR) data

2.1 Making data findable, including provisioning of metadata

Are the data produced and/or used in the project discoverable with metadata, identifiable and locatable by means of a standard identification mechanism (e.g. persistent and unique identifiers such as Digital Object Identifiers)?

Internally, documents (presentations, figures, deliverables, etc.) will use a specific format for tracking all internal sharing per WP, within the project internal repository.

Externally, several metadata tracking methods will be used, depending on the type of data. Publications derived from the projects will follow the DOI (Digital Object Identifiers) mechanisms already established in the scientific research community. These publications will also include keyword metadata as well as descriptive titling. As such, these will become indexed and searchable by any academic or research search tool (including IEEEXplore, Research Gate, as well as most public search engines such as Google, Bing, etc.).

Patents follow a well-established form of description via metadata as well as possessing unique identifiers, which vary depending on country filed and patent type. Once again searchable via patent indexing services and most search engines.

What naming conventions do you follow? Do you provide clear version numbers?
Deliverables have unique IDs and always are presented with their full title. This will make them accessible via search engines and easily through the project website. Project partners will also use an internal versioning following naming convention. The nomenclature fixed throughout the 5G-RECORDS project as it was explained in D1.1 [5] is as follows:

1. Working documents in the repository will have names **5G-RECORDS_DZ.T_ Draft_vX.Y.docx** for the draft version. Once the document is reviewed and ready to be released, the document will be made available to the EC and in the project website and the naming will be changed.
2. Final versions Deliverables have name **5G-RECORDS_DZ.T_Title_vX.Y.docx**, where DZ.T denotes the deliverable number and vX.Y is the version number. • Version numbering shall only arrive at v1.0 once the document is ready to be sent to the EC.
    - Different versions may be differentiated by using v0.Y with Y being integer numbers between 0 and 9.
    - The version being transmitted to the EC will be labelled v1. If the EC requests modifications, the updated version will be labelled v2. The intermediate versions will be labelled v1.1, v1.2, etc.
3. Internal documents will be stored in the repository and might be used as a basis for public deliverables. Internal documents of WP will also have the following names: **5G-RECORDS_WPn_Title_VX.Y.ext** (the extension ext depends on the type of document)
4. For the case of the **Quarterly Reports (QR)**, the nomenclature will be:

    - Partner QR will be named ***5G-RECORDS_QRY_Partner.docx*** where *Partner* is the acronym of the project partner and Y is the quarter number (for example, *5G-RECORDS_QR1_UPV.docx*).

- A WP quarterly report will be prepared by the WP leader and should be named ***5G-RECORDS_WPX_QRY.docx***, where *X* is the WP number (*for example, 5G-RECORDS_WP1_QR3.docx*).
- Quarterly Management Reports (QMR) will be prepared by the project manager and should be named ***5G-RECORDS_QMRY.docx***.

5. For journals, articles, conference papers, standard contributions the naming standard is as follows: ***<Event>_<yyyy>_<Authors>_<Title>*** • <*Event*>: indicates the journal, conference, standardization body (e.g. VTC, IEEECommMag, 3GPP, etc.)
   - <*yyyy*>: Year of the publication
   - <*Authors*>: indicates the first three letters of the last name of the author(s). In case of several authors, only the first three letters of the last name of the main author will be indicated, appending '*etal*'.
   - <*Title*>: indicates the title of the document. Only two meaningful words indicating the contents of the document will be used. Titles will be kept shorter than 10 letters by using abbreviations.

Will search keywords be provided that optimize possibilities for re-use?
Keywords are also provided in all public deliverables to optimize possibilities for re-use.

2.2 Making data openly accessible

Which data produced and/or used in the project will be made openly available as the default? If certain datasets cannot be shared (or need to be shared under restrictions), explain why, clearly separating legal and contractual reasons from voluntary restrictions.

As a result of the 5G-RECORD project, many results will be generated and produced in order to fulfil the objectives and tasks planned. Some of the results produced will be shared (or shared under certain restrictions) to the open public.

The closed data due to legal and contractual reasons will not be shared. This specific type of data that may have a very sensitive commercial/technological value to some partners will be shared only to the level and the number of partners required for the execution of the specific project tasks, such as demonstrations and showcases.

How will the data be made accessible (e.g. by deposition in a repository)?

The collection and sharing of information within the project are essential to allow the effective coordination of research tasks among the task contributors. Data will be shared internally through a workspace provided by the European Broadcasting Union (EBU), current partner of the project consortium. Data will be only accessible to project partners.

The 5G-RECORDS project will also provide its main results, thoughts and ideas by making use of the official project website [1]. The website is open and accessible to the general public.

Twitter [4] and LinkedIn [3] will be automatically fed as soon as some content is published on the website. A YouTube channel [2] will be used as well to capture presentations from e.g. industry forum demonstrations, workshops, and test-bed trials.

What methods or software tools are needed to access the data?
Open deliverables and presentations (dissemination activities, workshops, WP summaries, etc.) will be uploaded using the Portable Document Format (PDF). Microsoft

Office or equivalents will also be required as a basic tool to open DOC, XLS and PPT documents. A web browser is needed to access the 5G-RECORDS website.

Is documentation about the software needed to access the data included? Is it possible to include the relevant software (e.g. in open source code)?
Currently, there is no information about software to be shared or published on the website. The same applies to documentation related to tests and field trials. In the future as field trials become more specific partners may wish to share some of the data. This will be updated in upcoming version.

Where will the data and associated metadata, documentation and code be deposited? Preference should be given to certified repositories which support open access where possible.
Open access data, associated metadata and documentation will be deposited in the File Download Area of the official project website (https://5g-records.eu/documents/). Internally, all data and associated metadata will be deposited in the repository folder created for the associated work package.

Have you explored appropriate arrangements with the identified repository?
All project partners and contributors fulfil the appropriate arrangements with the internal repository. Note that this repository is implemented within a workspace that belongs to a consortium member, i.e. the European Broadcasting Union. This repository is a customised implementation of the Atlassian Confluence software. For more information, please see [6].

If there are restrictions on use, how will access be provided? How will the identity of the person accessing the data be ascertained?

Individual member registration (EBU account) is required to access the internal repository and ascertain the identity of the person accessing the data. No registration is required to visit the different tags or access the data provided in the project webpage. Public deliverables are open and accessible to the general public without any restriction.

2.3 Making data interoperable

Are the data produced in the project interoperable, that is allowing data exchange and re-use between researchers, institutions, organisations, countries, etc. (i.e. adhering to standards for formats, as much as possible compliant with available (open) software applications, and in particular facilitating re-combinations with different datasets from different origins)?

Data produced in the project will be interoperable.

All reports, deliverables and public presentations will be presented (or where not able, translations provided) in English. Final versions of such documents will also be provided in PDF format, offering wide support and readability on a wide range of devices and platforms with many free and open source readers available. Where this is not possible, the project will endeavour to provide data in formats which are open, widely accepted and are accessible to the wider public through open-source utilities.

2.4 Increase data re-use

How will the data be licensed to permit the widest re-use possible?

Public project outputs such as public deliverables, papers, presentations and project results will be available on the project website [1] and can be reused by other projects.

Some of the contributions of the project will also be available in different standard developing organisations (SDOs). Some of these organisations allow open access to the general public (such 3GPP) while some other allow access only to members (such DVB, IEEE). An indirect access to some of project results will be possible via these standard and technical organisations. However, specific rules apply for each organisation (e.g. 3GPP allows access to results but they cannot be reproduced / used without permission)

Specific confidential material will require direct licensing from the originating company.

How long is it intended that the data remains re-usable?

Data produced within the 5G-RECORDS framework and openly published on the website will be useable by third parties, during and after the end of the project. On use, there is a requirement for appropriate attribution back to the 5G-RECORDS project. Any modifications to the original data or results must be indicated clearly. Data will remain accessible for as long as the project website is kept open. Data obtained will remain useable indefinitely.

When will the data be made available for re-use? If an embargo is sought to give time to publish or seek patents, specify why and how long this will apply, bearing in mind that research data should be made available as soon as possible.

Note that this DMP represents a first version of the document, released on M6 of the project. Therefore, information about embargos or when the data will be available for re-use is still unknown. This information will be specified in future versions of the deliverable.

Are data quality assurance processes described?

The data quality including all the review process and risk mitigation for all project outputs is described in the project Grant Agreement [7] and in D1.1 [5].

3 Allocation of resources

What are the costs for making data FAIR in your project?

The project has as entire Work Package, WP6, dedicated to dissemination, standardisation and exploitation of the data and research produced within the project. WP6 objectives are listed in the following and also include the implementation of the DMP and its update to ensuring making data FAIR in the project.

WP6 Objectives:

1. Maximize the innovation, social and economic impact of the project.
2. Build awareness of the integration of content production over 5G networks.
3. Maximize the exploitation of the project results by consortium members in terms of innovation, IPR and new products and servicesSharing knowledge through workshops, training events etc
4. Influence SDOs and regulation bodies such as 3GPP, SMPTE or ETSI to adopt the features developed.
5. Promote the project using public website and social media and disseminate its activities to maximize the impact in terms of awareness and adoption of results.6. Coordinate with other 5G-PPP European projects for maximum synergy.
6. Implement a data management and follow-up plan to ensure that the project data is accessible during and beyond the project lifetime.

WP6 has resources dedicated throughout the project, starting in month 1 and ending in month 24. In total this forms 64 Person Months of the total project budget and a minimum of 1 person months have been assigned to each project partner

Table 3. PM versus project partners

1 - UPV	2- NOK	3- EDD	4- TID	5 - CMC	6 - RED	7- IM	8 - RAI	9- ACC	10- LU	11- 5CMM	12- EUR	13- SEN	15 - EBU	16- BBC	17- UPM	18- TV2
4	2	1	5	4	4	3	5	2	3	2	6	4	6	6	6	1

Who will be responsible for data management in your project?

The person responsible for data management within the 5G-RECORDS project will be Jaime Ruiz [NOK] as the Innovation Manager of the project and Paola Sunna [EBU] as the WP6 leader.

Are the resources for long term preservation discussed (costs and potential value, who decides and how what data will be kept and for how long)?

Data is intended to be long-term preserved, after the end of the project. Internal and confidential reports, as well as results, presentations and all types of data are expected to be available in the EBU internal repository in a static copy for at least 5 years. UPM will keep hosting of the public website for a minimum of two years following the end date of the project. Note that this is an early version of the DMP, and no commitment has been made in this regard. More information will be given in future versions of this deliverable.

4 Data security

What provisions are in place for data security (including data recovery as well as secure storage and transfer of sensitive data)?

4.1 Shared project data

The sharing of all non-public data within the project is carried out through a team collaboration platform provided by the EBU. Access to the platform requires each individual to generate a personal username and password. Passwords are encrypted and only known to the individual herself/himself, i.e. neither the EBU nor the platform provider has access to passwords. Each individual must then be associated to the project space by the EBU administrators in agreement with the project management team. Only once this association has been made is access to the project space enabled to the user. The platform provided by the EBU is part of the company information infrastructure and is protected by the state-of-the-art security systems.

4.2 Data within each partner institution

The consortium is comprised of established and respected institutions, each of which is expected to have measures in place to protect and preserve data, as well as relevant policies to ensure compliance. Furthermore, each partner has agreed to comply with the Consortium Agreement [8], requiring observation of obligations under the EU data Protection Directive 95/46/EC. For the duration of the project, the data generated by each partner whilst carrying out their respective research activities is subject to their own internal measures of safety and security. Partners are required to provide updates and share the outcomes of this research on a regular basis through the project, at which point documentation will be uploaded to the EBU collaboration platform and be subject to the storage and security levels outlines above.

References

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