PowerizeD

Digitalization of Power Electronic Applications within Key Technology Value Chains

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1.0			Final and reviewed Version

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1   Publishable summary

Project acronym	*PowerizeD*
Project Logo	
Project full title	Digitalisation of Power Electronic Applications within Key Technology Value Chains
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Coordinating Entity	Infineon Technologies AG

The Data Management Plan (DMP) for the PowerizeD project outlines the structured approach to handling and managing all data generated, shared and reused throughout the project. In line with the FAIR principles - Findable, Accessible, Interoperable and Reusable - the DMP ensures that all research data is managed to promote transparency, collaboration and innovation. It facilitates efficient data sharing between partners, supports secure storage practices and ensures compliance with data protection regulations, while maintaining high standards of data quality and integrity.

The DMP also encourages the re-use of external datasets and the creation of new, high quality datasets that will contribute to the advancement of power electronics and digitisation. By promoting a culture of open access and using advanced data sharing methods such as federated learning, the DMP not only enhances the outcomes of the PowerizeD project, but also ensures that the project's results and data can have a lasting impact on the wider scientific and industrial communities. This systematic approach supports the project's goal of driving the digital transformation of power electronics within key technology value chains.

2   Introduction & Scope

2.1   Purpose and target group

This Deliverable "D5.5 Updated Data Management Plan", with the Questionnaire to the project partners, is based on D5.4, "Data Management Plan". D5.4 set out the basic principles of the DMP for the project and was submitted after a project period of six months.

The purpose of the PowerizeD Data Management Plan (DMP) Questionnaire is to systematically gather detailed information about the current data management practices, tools and challenges faced by the project partners within the consortium. This information is essential to tailor the DMP to better support the collective efforts of the consortium. By understanding the specific needs and

existing practices of each partner, the DMP can be tailored to ensure that all partners are aligned with data management best practices.

In addition, the questionnaire aims to identify how data is currently managed, stored and shared to maintain the highest standards of data security, privacy and compliance throughout the project lifecycle. In addition, the data collected will help to promote transparency within the consortium by identifying potential areas for improvement, fostering collaboration and increasing overall efficiency in research data management.

The target group for this questionnaire includes all partners within the PowerizeD project consortium who are involved in data management, research dissemination and communication activities. This typically includes researchers involved in the generation, management and dissemination of research data within the project.

It also includes data managers who are responsible for handling and overseeing data management processes and ensuring compliance with the FAIR principles and other data management standards. Project coordinators and administrators who need to ensure that data management practices are in line with the overall project objectives and compliance requirements are also targeted.

In addition, IT and data security professionals who deal with the technical aspects of data storage, security and sharing within the project are key participants. By targeting these groups, the questionnaire aims to cover all aspects of data management, allowing for a comprehensive understanding of current practices and needs across the consortium.

2.2   Contributions of partners

Explain which partners were involved and their activities in their various sections:

TABLE 1: CONTRIBUTIONS

Chapter	Partner	Contribution
3	IFD	Version v0.3
3	FPG	Version v0.3
3	IFAG	Version v0.3
3	IPT, IRI, UNIOVI	Version v0.3
3	PLEX	Version v0.3
3	IFAG	Version v0.3
3	PTB	Version v0.3
3	Budatec	Version v0.3
3	EDI	Version v0.3 Updated the Publication of research findings table, project communication channels table and the re-use of existing data sets table.
3	OTH	Version v0.3
3	Aalto	Version v0.4
3	FAGOR	Version v0.4
3	TUDD	Version v0.4

3	VIF	Version v0.4
3	AQUA	Version v0.4
3	KTH	Version v0.4
3	RISE	Version v0.4
3	PRODRIVE	Version v0.4
3	XC	Version v0.4
3	PSC	Version v0.5
3	UNIBO	Version v0.5

2.3 Relation to other activities in the project

- **Inputs**: The Data Management Plan (DMP) is closely linked to inputs from other Work Packages (WPs), Use Cases (UCs), Cross Domain Technologies (CDTs) and Tasks within the PowerizeD project. Data collected from WP1 and WP3, which focus on technical research and development, will be fed into the DMP to ensure that all relevant datasets, models and research results are properly managed. In addition, the UCs provide real-world scenarios and data that need to be processed, stored and shared, while the CDTs provide tools and methodologies for data analysis and modelling. This collaboration ensures that the DMP is aligned with the technical and scientific goals of the project.

- **Outputs**: The results of the DMP will feed into various project components by enabling the secure sharing of research results, data sets and models across the consortium. Researchers and project partners will use the outputs of the DMP to access and reuse data for predictive maintenance, federated learning models and other advanced applications in power electronics. From here, the DMP outputs will help to ensure that data produced in one part of the project can be effectively used in relevant areas. In addition, the data and insights generated will benefit external stakeholders by providing accessible and reusable datasets that can support further research and industrial applications beyond the project lifecycle.

3 PowerizeD DMP Questionnaire

3.1 Introduction

As part of our commitment to effective data management and the collaborative success of the PowerizeD project, we are conducting a comprehensive survey to understand the current practices, needs and expectations around data management within our consortium. The responses of the project partners play a crucial role in ensuring that we maintain the highest standards of data security, privacy and compliance throughout the project lifecycle.

The purpose of this questionnaire is to gain detailed insight into how each partner manages data, the tools and methods they use, and the challenges they face. By gathering this information, we can tailor our Data Management Plan (DMP) to better support our collective efforts, promote transparency, and increase the overall efficiency of our project.

3.2 Data Summary - Collected Data Types

The "Data Summary - Types of Data Collected" section of the questionnaire aims to collect detailed information on the different types of data managed, used and disseminated within the PowerizeD project. This includes data related to project communication, research results, reuse and creation of datasets, and practices related to the FAIR data management principles.

3.2.1 Project Communication and Dissemination Data

A) Research findings: **What specific research channel do you use?** For example, academic journals, conference proceedings and project-related technical papers. These channels should typically follow rigorous peer review processes to ensure the quality and validity of the research being published.

TABLE 2: PUBLICATION OF RESEARCH FINDINGS

Name/Author Company Short Name	Research findings Channel	Link to Platform	Peer reviewed	Provided Access
Name, *e.g. IFAG*	*IEEE, ACM, Arxive*	*e.g. ieee.org*	*yes/no*	*Green, golden, closed access* *e.g. see https://open.ieee.org/about/faqs/*
IFD	N/A			

Name/Author Company Short Name	Research findings Channel	Link to Platform	Peer reviewed	Provided Access
FPG	DPMA, EPO	www.dpma.de, www.epo.org	Yes	Open access
FPG	IEEE	Ieee.org	yes	Limited access
IPT, IRI, UNIOVI	IEEE	https://ieeexplore.ieee.org/	yes	Golden Open access
IPT, IRI, UNIOVI	IEEE	https://digibuo.uniovi.es/dspace/	yes	Green open access (UNIOVI repository)
SIG	LINC (Lighting Information Center)	Elsevier, IEEE, Nature, OSA, SAGE, SPIE, Springer, Wiley	Yes/no	Subscriptions for access
SIG	Signify sources	PatBase, Portal2Research, S&R	Yes/no	Signify only
IFAG	Conferences	**PCIM** https://pcim.mesago.com/nuernberg/en/conference.htm **ECCE** https://www.ecce-europe.org/ **Electronica** https://electronica.de/en/trade-fair/		
IFAG	Academic journals	IEEE Journals		

Name/Author Company Short Name	Research findings Channel	Link to Platform	Peer reviewed	Provided Access
		- IEEE Transactions on Electron Devices (TED) - IEEE Transactions on Semiconductor Manufacturing (TSM) - IEEE Electron Device Letters (EDL) - IEEE Journal of Solid-State Circuits (JSSC) Elsevier Journals - Solid-State Electronics - Microelectronic Engineering - Materials Science in Semiconductor Processing American Institute of Physics (AIP) Journals - Journal of Applied Physics (JAP) - Applied Physics Letters (APL) Institute of Physics (IOP) Journals - Semiconductor Science and Technology - Nanotechnology		

Name/Author Company Short Name	Research findings Channel	Link to Platform	Peer reviewed	Provided Access
		Other notable journals • Journal of the Electrochemical Society (JES) • Journal of Vacuum Science and Technology (JVST) • Thin Solid Films		
IFAG	Industry publications	Print Magazines • EE Times • EDN Network • Electronic Design • Semiconductor Engineering • Solid State Technology Online Publications • Semiconductor Digest • Chip Design Magazine • Electronic Products • EETimes Europe • Electronics Weekly News and Analysis Websites • The Next Platform • Semiconductor Today • Electronics360 • EE Journal		

Name/Author Company Short Name	Research findings Channel	Link to Platform	Peer reviewed	Provided Access
		• SemiWiki		
IFAG	Market research Reports	Latest Market and Broker Reports via IFAG internal tool, like • S&P Global Market Intelligence, • SAR Insight, • Omdia Market Tracker, • FSTS Forecasts, • McKinsey Technology trends		
IFAG	Collaboration with academic institutions and industry partners	Engaging in joint research projects, workshops, and conferences, allowing for the exchange of ideas and knowledge between industry experts and academia.		
PTB	IEEE	Ieee.org	yes	Green, golden, closed access
Budatec GmbH	IEEE	https://www.ieee.org/	Yes, Journal of Advanced Packaging Paper for Power Electronics	

Name/Author Company Short Name	Research findings Channel	Link to Platform	Peer reviewed	Provided Access
Budatec GmbH	ECTC Conference	https://ectc.net/	Yes, Paper for Power Electronics	
Budatec GmbH	PCIM Intern. Exhibition	https://pcim.mesago.com/nuernberg/de.html	Yes, New offers in relation to Power Electronics	
Budatec GmbH	ESTC Berlin	https://www.estc-conference.net/	Yes, Paper and Poster	
EDI	IEEE, multiple open-access repositories (ArXiv, CiteSeerX, etc.)	ieee.org, arxiv.org, citeseerx.ist.psu.edu	yes	golden and close
EDI	ACM	https://www.acm.org/	yes	golden and close
EDI	MDPI	https://www.mdpi.com/	yes	golden
EDI	NPJ	https://www.nature.com/npjdigitalmed/	yes	golden
EDI	IJDSN	https://journals.sagepub.com/home/dsn	yes	golden
EDI	JPDC	https://www.sciencedirect.com/journal/journal-	yes	closed

Name/Author Company Short Name	Research findings Channel	Link to Platform	Peer reviewed	Provided Access
		of-parallel-and-distributed-computing		
EDI	DCN	https://www.sciencedirect.com/journal/digital-communications-and-networks	yes	closed
EDI	JSA	https://www.sciencedirect.com/journal/journal-of-systems-architecture	yes	closed
EDI	Computers & Security	https://www.sciencedirect.com/journal/computers-and-security	yes	closed
EDI	Nature SREP	https://www.nature.com/srep/	yes	golden
Shenyi Liu, Aalto	IEEE	https://ieeexplore.ieee.org/document/10643699	yes	Open Access via CC BY
FAGOR	IEEE	ieee.org	Yes	
FAGOR	Industry publications	Print magazines: • EE Times • EDN Network • Electronic Design • Bodo´s Power Systems Online Magazines:	Yes	

Name/Author Company Short Name	Research findings Channel	Link to Platform	Peer reviewed	Provided Access
		- How2Power - Power Systems Design - Infineon Technologies AG - Future Technology Magazine - eeNews Europe - eeNews Embedded		
VIF	Book chapter: "Friction and Wear in Journal Bearings: Accurate Testing and Simulation with an Outlook on Predictive Maintenance with Machine Learning" (not published yet)	IntechOpen editorial https://www.intechopen.com/	yes	Open access https://www.intechopen.com/page/about-open-access
VIF	Seminar: Bearing Lifetime prediction - from testing and simulation to machine learning (presented in January 2024)	"AI for Smart Predictive Maintenance seminar series" (RISE Research Institutes of Sweden)	no	
KTH	IEEE, Elsevier, Conferences	Ieee.org www.elsevier.com	Yes	Closed access, Open access

Name/Author Company Short Name	Research findings Channel	Link to Platform	Peer reviewed	Provided Access
Mattias P. Eng, RISE	IEEE, EuroSimE2024	https://ieeexplore.ieee.org/document/10491457	yes	closed access
XC	Conferences, IEEE, VDE	PCIM https://pcim.mesago.com/nuernberg/en.html VDE e.g. „Bauelemente der Leistungselektronik und ihre Anwendungen 2023" https://www.vde.com/en/events/event-detailpage?id=20637&type=vde%7Cvdb Publications of universities e.g. dissertations (only findings)		
UNIBO	IEEE	Ieee.org	yes	Journal papers will be golden or green Conference papers will be closed.

B) Project Communication and Dissemination Data: The PowerizeD project uses several online platforms for communication and dissemination, such as a dedicated website, video platforms and LinkedIn. **What specific dissemination channels do you use within PowerizeD?**

TABLE 3: PROJECT COMMUNICATION CHANNELS

Name/Author Company Short Name	Communication and Dissemination Channel	Link
…	*Organisations Website, LinkedIn, Mastodon, other*	
All, IFD	Intranet	https://intranet.infineon.com
All, IFD	PowerizeD Nextcloud	Powerized/WP1_WP3_UC (https://cloud.powerized.eu/f/17979)
FPG	Company website	www.finepower.com
FPG	LinkedIn	www.linkedin.com
IPT, IRI	WEBSITE	https://www.ingeteam.com/en-us/sectors/railways
IPT	LinkedIn	https://www.linkedin.com/showcase/ingeteam-traction
UNIOVI	WEBSITE	https://aecp.dieecs.com/

Name/Author Company Short Name	Communication and Dissemination Channel	Link
UNIOVI	LinkedIn	https://www.linkedin.com/company/aecp-group/
PLEXIM	LinkedIn	https://www.linkedin.com/company/plexim
SIGN	No dissemination so far.	
IFAG	LinkedIn	https://www.linkedin.com/company/infineon-technologies, respective employee specific profiles
IFAG	Company's Website	https://www.infineon.com/cms/de/about-infineon/press/press-releases/2023/INFXX202302-056.html
IFAG	YouTube	https://www.youtube.com/@InfineonTechnologiesAG
Budatec	Lab. for Sinter Techn. tasks and results for sintering	https://budatec.de/en/sintering/
Budatec	Website for illustration of technology	Platform at Budatec oriented interconnect equipment
EDI	EDI Website	www.edi.lv www.edi.lv/en/
EDI	EDI LinkedIn account	https://www.linkedin.com/company/institute-of-electronics-&-computer-science/
EDI	EDI Facebook account	https://www.facebook.com/edi.riga

Name/Author Company Short Name	Communication and Dissemination Channel	Link
OTH	OTH-AW	https://www.linkedin.com/school/oth-amberg-weiden/
OTH	Automotive-Team LinkedIn	https://de.linkedin.com/in/automotive-team-oth-amberg-weiden
OTH	Website	https://www.oth-aw.de/ https://www.oth-aw.de/team-automotive/
OTH	Instagram	https://www.instagram.com/othambergweiden/ https://www.instagram.com/automotive_othaw/
TUD	Website	https://www.tudelft.nl
FAGOR	Company website	https://www.fagorautomation.com
FAGOR	LinkedIn	Fagor Automation I CNC & Feedback Systems I Automation Solutions: Mi empresa | LinkedIn
FAGOR	YouTube	Fagor Automation - YouTube
TUDD	Website	https://tu-dresden.de/ing/elektrotechnik/eti/le/die-professur/news/professur-fuer-leistungselektronik-ist-teil-der-europaweiten-forschungsinitiative-powerized
VIF	LinkedIn	https://www.linkedin.com/company/virtual-vehicle-research-gmbh/
KTH	KTH Communication Platforms (optional), LinkedIn (Personal pages)	Kth.se https://www.linkedin.com/school/kth

Name/Author Company Short Name	Communication and Dissemination Channel	Link
Mattias Eng RISE	Website	Digitalization by Intelligence for Power Electronics Within Value Chains | RISE (https://www.ri.se/en/what-we-do/projects/digitalization-by-intelligence-for-powerelectronic-within-value-chains)
PRODRIVE	Internal company presentation	NA
PRODRIVE	Project general assembly	NA
XC	Nextcloud, Website	https://www.aixcontrol.de
PSC	LinkedIn	www.linkedin.com/company/power-smart-control/
PSC	Website	https://powersmartcontrol.com/

3.2.2 Research Data

Research datasets are essential for scientific discovery, providing critical data for analysis while often containing sensitive information. PowerizeD promotes the use of federated learning and the FAIR data principle to enable secure data sharing, ensuring privacy and integrity while facilitating the publication and re-use of research data.

C) Re-Use of existing datasets: Within PowerizeD we are collecting existing datasets for the project. These datasets will form the basis of our analysis and modelling efforts. **Do you collect and reuse data sets for your research?** If so, please provide a reference and complete the table below. Please add the purpose, e.g. federated learning, simulation, etc.

TABLE 4: RE-USE OF EXISTING DATA SETS

Name/Author Company / Dataset Short Name	Usage	Download	Access	Purpose within the project
NASA Battery Dataset	*Battery Lifetime Estimation (BLE)*	*https://www.nasa.gov/content/prognostics-center-of-excellence-data-set-repository*	*Public*	*Federated Learning*
CALCE Battery Dataset *CALCE Center for Advanced Life Cycle Engineering 1103 Engineering Lab Building University of Maryland*	*Battery Lifetime Estimation (BLE)*	*https://calce.umd.edu/battery-data*	*Public*	*Federated Learning*
RISE	*Lifetime Data of MOSFETs*		*Project Internal*	*Federated Learning*
IFD	N/A			
SIGN		No datasets used.		
TUD		No datasets used		

Name/Author Company / Dataset Short Name	Usage	Download	Access	Purpose within the project
PTB	Characteri-zation of sensors		Project Internal	METHO-DOLOGY
Budatec	Technology information to customer, Lab. For Sinter Techn.		Public and internal	Practical investigati ons
Budatec	Reliability Data to customer usage			Accelerate d Tests for Life Time Modelling
NASA (5. Batteries)	Experiments on Li-Ion batteries	https://www.nasa.gov/int elligent-systems-division/discovery-and-systems-health/pcoe/pcoe-data-set-repository/ https://phm-datasets.s3.amazonaws.co m/NASA/5.+Battery+Data+ Set.zip	Public	Federated Learning
CALCE (CS2)	LiCoO2 cathode, EDS results also showed trace elements of Manganese	https://calce.umd.edu/bat tery-data#CS2	Public	Federated Learning
CALCE (CX2)	LiCoO2 cathode (EDS showed trace	https://calce.umd.edu/bat tery-data#CS2	Public	Federated Learning

Name/Author Company / Dataset Short Name	Usage	Download	Access	Purpose within the project
	elements of Manganese)			
FastCharge	Data-driven prediction of battery cycle life before capacity degradation	https://data.matr.io/1/projects/5c48dd2bc625d700019f3204 https://data.matr.io/1/projects/5c48dd2bc625d700019f3204/batches/5c86c0b5fa2ede00015ddf67	Public	Federated Learning
FastCharge	Data-driven prediction of battery cycle life before capacity degradation	https://data.matr.io/1/projects/5c48dd2bc625d700019f3204 https://data.matr.io/1/projects/5c48dd2bc625d700019f3204/batches/5c86bf14fa2ede00015ddd83	Public	Federated Learning
FastCharge	Data-driven prediction of battery cycle life before capacity degradation	https://data.matr.io/1/projects/5c48dd2bc625d700019f3204 https://data.matr.io/1/projects/5c48dd2bc625d700019f3204/batches/5c86bd64fa2ede00015ddbb3	Public	Federated Learning
SiCWell	SiCWell Dataset contains data of battery electric vehicle lithium-ion batteries	https://ieee-dataport.org/open-access/sicwell-dataset	Public	Federated Learning

Name/Author Company / Dataset Short Name	Usage	Download	Access	Purpose within the project
HNEI	use of lithium batteries for power and energy-hungry applications	https://www.mdpi.com/1996-1073/11/5/1031 https://www.batteryarchive.org	Closed Access	Federated Learning
Oxford Battery Degradation Dataset 1	Long term battery ageing tests	https://ora.ox.ac.uk/objects/uuid:03ba4b01-cfed-46d3-9b1a-7d4a7bdf6fac	Public	Federated Learning
Zenodo NCM NCA (Dataset3_NCM_NCA_battery)	Data-driven capacity estimation of commercial lithium-ion batteries from voltage relaxation	https://zenodo.org/records/6405084	Public	Federated Learning
FAGOR	N/A			
VIF	Time series journal bearings operation dataset (simulation data)	Journal bearings lubrication conditions and remaining useful life (RUL) estimation	Project Internal	RUL prediction
RISE	Lifetime Data of MOSFETs from Power Cycling tests with constant load levels in each run / RISE-PEPC		Project Internal	Federated Learning/ Hybrid model development

Name/Author Company / Dataset Short Name	Usage	Download	Access	Purpose within the project
XC	Simulation data, semiconductor modelling		Project Internal	Electrical and thermal simulation of the system

D) Creating data set: **Are you creating datasets as part of the PowerizeD project?** e.g. The outputs include e.g. locally trained models…

TABLE 5: CREATING DATA SETS

Name/Author	Usage/Unique Name	Purpose within the project	Volume of the data set
… example	*e.g. E-Vehicle recorded data. (Give a unique name)*	*e.g. Create ML model for FL*	*2 TB*
IFAG	Power Electronics data during operation	Predictive maintenance, health supervision	2 GB
IFD	HVAC Motor control and sensor data	Prescriptive and predictive maintenance	1 MB
SIGN	No datasets created		
TUD	Power electronics data during reliability testing	Predictive maintenance, remaining useful life	2 MB

Name/Author	Usage/Unique Name	Purpose within the project	Volume of the data set
IFAG	CAD models	IFAG has supplied ABB and Alstom with CAD models for IFAG-modules for simulation purposes.	20MB
IFAG	Drawings and CAD data	With UNIBO, Serigroup, Electra, ABB, Aalto and BME IFAG has exchanged drawings and CAD data on chips and substrates, for material deliveries and analyses.	5MB
IFAG	Power Electronics data during operation	Predictive maintenance, health supervision	2 GB
IFD	HVAC Motor control and sensor data	Prescriptive and predictive maintenance	1 MB
FAGOR	Data collection on critical system power electronics components	Predictive maintenance.	750MB
Vladislav Dolgich (Diploma Theses TUDD), Dirk Rudolph and Matthias Meißner (TUDD)	Simulated simple transient thermal impedance curves of an aged IGBT module	Training of a neuronal network to detect anomalies in the IGBT structure	~ 200 MB
AQUA	Stack performance / recorded data	Create model for DC/DC development	ongoing
KTH	Power cycling of discrete SiC devices	Create ML model for FL, modelling of the reliability/condition monitoring technique	1-2 TB
RISE	Extending the Lifetime Data of MOSFETs from Power Cycling tests	Create rut to failure trajectories for power electronics in diverse operating	1 TB

Name/Author	Usage/Unique Name	Purpose within the project	Volume of the data set
	with more experiments using variable cycle loads within runs / RISE-PEPC	conditions for developing models and for FL	
XC	Drawings, CAD data and layout of PCB	construction and EMI prediction	<500MB
XC	Measurement and simulation results	Design and verification of the system	<50MB
UNIBO	Space charge measurements, conduction currents, PDIV tabular data, dielectric spectroscopy data	Dielectric and insulation system characterization	< 10 GB

E) Publishing data sets: **Have you already published these datasets externally or with project partners or do you intend to do so?**

TABLE 6: PUBLISHING DATA SETS, TABLE PART 1

Name/Author	Usage/Unique Name	Download	Access	Planned publication date
…	*Refer to the unique name in* Table 5: Creating data	*Link if available*	*Project internal, green or golden access, ...*	*e.g. Nov 2024*

Name/Author	Usage/Unique Name	Download	Access	Planned publication date
	sets			
IFD	N/A			
TUD	N/A			
FAGOR	Data collection on critical system power electronics components CSIC, project partner.	N/A	Internal	
AQUA	IV Performance testing Timestamps, measured parameters: Voltage. Current, pressure, flowrate, concentration, temperature, membrane thickness, perm selectivity, resistance, etc			
RISE	RISE-PEPC		Open source	Tbd. Likely Q2 2025

Name/Author	Usage/Unique Name	Download	Access	Planned publication date
UNIBO	Space charge measurements, conduction currents, PDIV tabular data, dielectric spectroscopy data.		Project internal	
OTH-AW	Ageing data set of battery cells	tbd	Open source	Q3 2025

Usage/Unique Name	Persistent Identifiers	Metadata	Keywords
Refer to the unique name in Table 5: Creating data sets	*DOI*	*Timestamps, Institution name, measurement hardware, measurement frequency, parameter name, etc.*	*Examples, please extend: Data Labelling, Deep Learning, Computer Vision, Autonomous Driving, Neural Network, Radar Sensor, Lidar Sensor, ...*
AQUA	tbd	Timestamps, measured parameters: Voltage. Current, pressure, flowrate, concentration, temperature, membrane thickness,	Performance testing

Usage/Unique Name	Persistent Identifiers	Metadata	Keywords
		perm selectivity, resistance, etc	
OTH-AW/Ageing data set of battery cells	tbd	rated capacity, test date, cycles simulated, termination reason, time duration simulated, initial energy wh, initial capacity ah, rpt remaining capacity ah, rpt remaining energy wh, last ...	Data Set, PyBaMM, Postgres, Battery Simulation, Cycle Data, Degradation, Capacity Loss

3.2.3 FAIR Data Management

FAIR data management refers to the principles and practices that ensure data are findable, accessible, interoperable and reusable. These principles aim to maximise the value and impact of research data by making it more discoverable, understandable and usable by both humans and machines.

Please consider linking your publication to our PowerizeD Zenodo Community:

https://zenodo.org/communities/powerized/

The input provided in the Data Management Plan (DMP) contributes to improving the FAIR data management principles - findable, accessible, interoperable and reusable - within the PowerizeD project. The points below show how the project benefits from each aspect of the FAIR framework:

3.2.3.1 Findability

Documenting research data and dissemination channels make it easier to find the data Publication of research results, see Table 2: Publication of Research findings . Listing specific research channels (IEEE, ArXiv, Elsevier, etc.) with peer review status and access types helps ensure that publications and research data can be easily found by others in the research community. Clear references to platforms such as IEEE or other open access repositories help to ensure that data and publications can be found. Similarly, the use of persistent identifiers in Table 7: Publishing data sets, Part 2 . The inclusion of fields for DOIs and persistent

identifiers for datasets, although some entries are missing, reflects the intention to improve the discoverability of datasets. The future inclusion of these fields in the DMP final report will ensure that datasets can be uniquely identified and made accessible.

3.2.3.2 Accessibility

The data described in the DMP will be made available through clearly defined channels and access mechanisms, as shown in the Table 3: Project Communication Channels . The list of websites, repositories (company websites, cloud services) and platforms such as LinkedIn shows how the project data and results will be shared within the consortium and with public audience. Ensuring that these channels are documented and kept up to date will allow stakeholders to access the data when needed. Also, the clear definition in Table 4: Re-use of existing data sets of where external datasets come from (NASA battery dataset, CALCE dataset, etc.), along with links and access conditions, will help ensure that others can find and potentially reuse these datasets as part of their research. In Table 6: Publishing data sets, Table Part 1 , specifying repositories, internal or external to the project, and the planned publication period will ensure that datasets produced as part of the project are made available to a wider audience and increase the availability of data beyond the consortium.

3.2.3.3 Interoperability

The input ensures that the data is formatted and structured in a way that enhances its interoperability across systems and platforms. Table 5: Creating data sets provides a clear description of data types and their purposes. This helps to ensure that datasets follow standardised formats. This enables other researchers and systems to integrate and use the data without significant reformatting or conversion. Descriptions in Table 7: Publishing data sets, Part 2 and parameter names help to ensure that datasets are properly annotated. By adhering to metadata standards, data can be better understood, interpreted and processed by other systems, thus promoting interoperability.

3.2.3.4 Reusability

By documenting the reuse of established datasets in Table 4: Re-use of existing data sets with appropriate citations and access links, the DMP encourages a culture of reusing valuable data rather than duplicating data collection efforts. Table 5: Creating data sets provides information on the datasets created by the project, including their name, purpose and volume. Describing the purpose of each dataset, such as for predictive maintenance, federated learning, or health monitoring, ensures that other researchers understand the context of the data and can reuse it appropriately in their research. Table 6: Publishing data sets, Table Part 1 helps to identify potential publication channels and access models (e.g. internal, green open access, project internal) to further support reusability. Open access publication will maximise the likelihood of data sets being re-used, and internal access arrangements will ensure that data will be available within the consortium.

4 Conclusion

4.1 Contribution to overall picture

The Data Management Plan (DMP) contributes to the PowerizeD project by ensuring that data is managed systematically and efficiently throughout its lifecycle, fostering collaboration and innovation. By applying the FAIR data principles of discoverability, accessibility, interoperability and reusability, the DMP facilitates the smooth sharing of data between project partners, enhancing collaborative research efforts and streamlining the integration of advanced technologies such as predictive maintenance and federated learning. This structured approach to data management ensures that all partners can easily access and build upon each other's work, ultimately accelerating the development and deployment of digitised power electronics solutions.

4.2 Other conclusions and lessons learned

The PowerizeD Data Management Plan highlights the critical importance of establishing clear and consistent data management practices across all partners, to ensure project success. A key lesson is that early alignment on data management principles - in particular adherence to the FAIR framework - greatly enhances collaboration by enabling partners to share, access and reuse data efficiently. Another important lesson is that ongoing communication and regular updates to the DMP are essential to meet the evolving needs of the project, especially as new datasets and technologies emerge.

In addition, the project has shown that incorporating robust data security and privacy measures from the outset can mitigate risk and ensure compliance, while still allowing for innovative data sharing strategies such as federated learning. Finally, the DMP has highlighted the value of fostering a culture of transparency and open access, which not only drives innovation, but also increases the visibility and impact of research results both within the consortium and the wider scientific community.

5   List of tables

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