Nanoscale Systems for Optical Quantum Technologies

Grant Agreement No: 712721
Start Date: 1st October 2016 - Duration: 36 months

D4.11 Update of the Data Management Plan

Deliverable:	D4.11
Work package:	WP4 Management, dissemination and exploitation
Task:	4.2 Dissemination, communication and exploitation of knowledge
Lead beneficiary:	CNRS
Type:	ORDP
Dissemination level:	Public
Due date:	30 September 2019
Actual submission date:	27 September 2019
Author(s):	D. Serrano, P. Goldner (CNRS-CP)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 712721.

Version history

Version	Date	Author(s)	Description
V1	18/09/2019	D. Serrano, P. Goldner (CNRS-CP)	First draft
V2	27/09/2019	D. Serrano, P. Goldner (CNRS-CP)	Final version submitted to EU

Partners:
CNRS, Karlsruhe Institute of Technology, The Institute of Photonic Sciences (ICFO), Lund University, Aarhus University, Keysight Technologies.

Table of Contents

Deliverable Description

This deliverable is an update of the Data Management Plan (DMP) proposed for the NanOQTech project results in deliverable D4.3. The few modifications suggested here are based on the feedback of the partners on the actual implementation of the initially proposed plan. The main aim of the present update is the optimization of the FAIR data procedures engaged by the NanOQTech consortium.

Data summary update

Data generated during NanOQTech researches have been well aligned with the initial estimations in terms of origin, types, formats and sizes (refer to D4.3 for further details). As a minor update, we include in Table 1 some extra data/code formats to the ones given in D4.3. They can all be processed by free software ('.fig' files are commercial Matlab format codes but can be read by free software like Octave).

Table 1: Summary of data formats used in NanOQTech. Additions are highlighted in blue.

File type	Formats
Datasets	".dat", ".txt", ".xls", ".cvs", ".tsv", ".json", ".h5"
Images	Raster formats: ".png", ".tif/tiff", ".jpg/jpeg" Vector formats: ".eps", ".cgm" , ".amf", ".svg"
Code	".m" , ".vi" , ".nb", ".pyc", ".pyd", ".pyo", ".c", ".cpp", ".h", ".hpp", ".xml", ".i", ".t", ".dox", ".fig"
Other	".pdf", ".zip", ".rar", ".gz"

FAIR Data update

Making data openly accessible, findable, interoperable and reusable

The need for making data openly accessible was an important concern for NanOQTech consortium. It has been very regularly reminded to all partners by the coordinator during consortium meetings, as well as when a new paper was published.

Research data generated during NanOQTech have been made progressively available through the zenodo.org website following D4.3. Further details about the uploaded data are given in **Table 1**. We note that most shared datasets have been downloaded for further use. This is important, as it was one of the main goals of the original plan.

These datasets correspond mainly to images and data presented in the figures of the papers published within the framework of NanOQTech. Sharing raw data has appeared to be too time-consuming, since it would have involved creating files with proper labels and data descriptions in very large amounts. A future solution could be to develop pieces of software that automatically create the requested items when data are generated during experiments or analyses. Codes were also shared in several cases, in formats that are

readable by open source software like python files (.py) or readable by proprietary software like Mathematica files (.nb extension). In the last case, parts of the files can be read by open software too.

Fully respecting the original DMP has however been proven challenging due to the non-negligible workload experienced by the partners when fully following the DMP's instructions. This has implied longer delays in data uploads than initially expected. The mentioned workload cannot be easily mitigated as it mostly results from adapting the as-recorded research data to the FAIR data principles. This includes properly labelling of data sets and files or converting data formats from software specific to open ones for maximizing re-use by third parties. To take this into account, we have decided to increase the time period in which open data are due after publication:

- Former rule: Data associated to publications should be available in Zenodo within one month of the publication date.
- New rule: Data associated to publications should be available in Zenodo within six months of the publication date.

This longer delay is not expected to have a big impact on data re-use for most of the publications that have been uploaded to zenodo.org. Indeed, they are usually accompanied by an embargo time of 6 months. A possible caveat to this extension is that the formatting and uploading of data is most easily performed by the people who have contributed the most to their acquisition and analyses. In case they work under fixed-term contracts, longer delays may actually result in increasing the difficulty to make data openly accessible. Nevertheless, we still believe that this updated rule is better than the original one.

Metadata that were expected to complement the datasets have been successfully generated and completed, thanks to the simple mechanisms provided by the zenodo.org website. In particular, the grant identification procedure is very easy on this repository.

The chosen repository, zenodo.org, appeared very well adapted to NanOQTech DMP. We noticed very limited issues (e.g. temporary unavailable file upload) that were all resolved rapidly. The expected future of the repository, in terms of storage capability, duration and safety, as described on its website (https://help.zenodo.org), has not changed since the initial DMP. We estimate that it fulfills NanOQTech objectives for data management.

Table 1: Open access data currently available at zenodo.org for NanOQTech projet.

Data entry	Size	Data types	Views/Downloads
Data of the publication: "*Nuclear spin coherence properties of $^{151}Eu^{3+}$ and $^{153}Eu^{3+}$ in a Y_2O_3 transparent ceramic*"	848 kB	.dat / .txt	4/0
Data of publication: *"Controlled size reduction of rare earth doped nanoparticles for optical quantum technologies"*	31.2 MB	.tif / .txt	29/16
Data of the publication: *"Cavity-enhanced spectroscopy of a few-ion ensemble in Eu^{3+}: Y_2O_3"*	25.3 MB	.tsv / .png / .nb / .svg	24/11
Data of the publication: "*Recent Advances in rare earth doped inorganic crystalline materials for quantum information processing*"	24 kB	.dat / .txt	6/4
Data of publication: *"All-optical control of long-lived nuclear spins in rare-earth doped nanoparticles"*	1.2 MB	.txt	32/19
Data of the publication: *"Dispersive heterodyne probing method for laser frequency stabilization based on spectral hole burning in rare-earth doped crystals"*	64.3 kB	.py / .txt	9/5
Data of the publication: *"Ultrathin Eu- and Er-Doped Y2O3 films with optimized optical properties for quantum technologies"*	2.1 MB	.dat / .txt	5/19
Data of the publication: *"Optical linewidth broadening mechanisms at the 10 kHz level in Eu^{3+}:Y_2O_3 nanoparticles"*	4.5 MB	.fig / .txt / .tif	12/2

Conclusion

We propose here minor updates to the original Data Management Plan in which we include new data formats and increase time delays to make data openly accessible. For the remaining points, the original DMP remains valid and will continue to be applied to NanOQTech results after the project's end.