New Tools for Terrain Gravimetry
NEWTON-g
Project number: 801221

Deliverable 5.3

Dissemination and Exploitation Plan

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1. EXECUTIVE SUMMARY

This is deliverable D5.3 – Dissemination and Exploitation Plan – of the H2020 FET-Open project NEWTON-g (GA No 801221). The work described here was carried out in the framework of WP5 (Dissemination and outreach).
As part of the EC Horizon 2020 research and innovation programme, the consortium of NEWTON-g has committed to ensure far-reaching dissemination and exploitation of the project's results and outcomes. These activities will be carried out throughout the project life and will continue after its end, to maximise the impact of the research.
The aim of this plan is to set the frame and scope for the dissemination and exploitation activities carried out under NEWTON-g, including their potential impact. We provide detailed insight into the characteristics of the target audience, as well as the dissemination and exploitation goals and tools.

2. INTRODUCTION

2.1. The NEWTON-g project

Gravimetry is a powerful geophysical tool, able to detect changes in subsurface mass, thus providing a window into processes that involve deep fluids. Nevertheless, high cost and operating features of current instrumentation seriously limits the practical field use of gravimetry. NEWTON-g proposes a radical change of paradigm for gravimetry to overcome such limitations. We aim at developing a field-compatible *gravity imager*, including an array of low-costs MEMS-based relative gravimeters, anchored on an absolute quantum gravimeter. This system will provide imaging of gravity changes with unparalleled spatio-temporal resolution.
We will field-test the new *gravity imager* at Etna volcano (Italy). Insights from the *gravity imager* will be used for volcanic hazards analysis, to demonstrate the importance of gravity to problems of societal relevance. A successful implementation of NEWTON-g will open new doors for geophysical exploration and will shift the locus of gravimeter manufacture from North America to Europe.

2.2. Scope and objectives of this deliverable

This document reports the Dissemination and Exploitation Plan of NEWTON-g, and aims at providing a comprehensive view of the consortium strategy for results dissemination, scientific visibility, and stakeholders' engagement, in order to ensure the best dissemination and exploitation of the project results.
We identify the stakeholders to whom the outcome of NEWTON-g might be of great relevance and define the tools and channels for reaching the target audience. The present document also includes measures to (i) adequately advertise to possible end-users the expected technological advancements in terrain gravimetry and their potential applicability to different fields and (ii) develop a platform allowing the end-user community to easily access the project data, including after the end of the project itself.

3. DISSEMINATION PLAN

3.1. Strategy key points

A robust and effective dissemination strategy must address the following key questions:

1. ***What is the goal?*** (objectives of the dissemination effort; type of impact to be assessed; object and purpose of the communication);
2. ***Who is the audience?*** (communities who might be interested in the progresses of the project and/or will be mostly affected by the project outcomes);

3. ***Which* media *and tools?*** (the most effective ways to reach the targeted audience);

3.2. Communication goals

The dissemination actions of NEWTON-g are aimed to:

- raise awareness of NEWTON-g amongst potentially interested communities;
- show how the project results are relevant for the geophysical community dealing with processes involving the dynamics of underground fluids;
- show how the development of new technology for gravity measurements represents a step forward in geophysics, volcano monitoring, hazard assessment and resource exploitation;
- show the results obtained through the fruitful collaboration between the scientific and the industrial community;
- spread the expertise and data generated in the frame of the project as comprehensively as possible, also adopting the open access paradigm.

3.3. Target audience of NEWTON-g

In order to communicate effectively, it is crucial to identify the audience that might be interested in the project outcomes. The results of NEWTON-g may be useful across a large number of actors in society. We can therefore define target groups as follows:

- ***Scientific community***
  the scientific audience includes academic and research communities. By supplying information on changes in the distribution of bulk mass over time, gravimetry can provide insight into the dynamics of underground fluids (water, magma, hydrocarbons…), thus being of interest to several sectors of the scientific community: universities, research institutions and monitoring agencies in charge of studying subsurface fluid characteristics. A detailed and technical language should be used, as well as references to concepts and methodologies, in order to reach this specific audience. Naturally, the level of detail of any communication will be adequate to the level of expertise of the target scientific group in the specific matter. Scientific communities are interested in new data and new technologies, as well as new frameworks for (i) collecting, processing and interpreting data, (ii) communicating results and (iii) training students and young researchers. Communication to this target group occurs mainly via open access scientific publications, but also through scientific conferences, events (seminars, schools, field trips, etc.) and the project website and social media.
- ***Industrial sector***
  The industrial sector will benefit from the outcome of NEWTON-g applied research. Industrial stakeholders from different market sectors have already shown great interest in the gravity imaging tools being developed under NEWTON-g. Indeed, in response to early papers on possible future developments of MEMS and quantum gravimeters, UNIGLA-IGR and MUQUANS have been contacted by several interested organizations representing applications from aerospace and defence to hydrology and petroleum geology. This target audience can be involved mainly through free access to the project deliverables, but also through the “News” section of the project website, scientific conferences and the newsletters.
- ***Decision-makers and risk managers***
  Communication to this target audience mainly involves project outcomes that can contribute to the policy-making process. Indeed, the new system for gravity measurements that will be developed under NEWTON-g will enhance our ability to monitor the dynamics of subsurface fluids, like water, hydrocarbons, and magma, and

this is critically important for both resource management and risk reduction. Stakeholders in this target group will be mostly reached via dedicated sessions during project workshops and other events.

- ***Other projects***
  NEWTON-g outcomes might be of interest to other either scientific or technological/industrial projects. Synergies will be sought with existing projects and initiatives that are relevant, to promote complementarity and to avoid overlap.
- ***General public***
  Communication to this target audience requires a clear and simple language, as well as simple but effective use of graphics. The project video is the key deliverable for which the general public is the main target audience. A professional film-maker – with experience of developing high-end science documentaries in the UK – has been employed to carry out the development of this film (which is now in the editing phase). The NEWTON-g team has taken great care to simplify the messages and communicate even complex issues in a way that the general public can understand. Furthermore, to maximise the number/diversity of viewers, several films will be produced, each targeted at a different social media platform. These videos will direct the viewer to the project website, where a longer film can be seen.

3.4. Communication tools

A range of media will be used to implement the dissemination strategy of NEWTON-g (social media, workshops, newsletter, etc.). The official project website (www.newton-g.eu) has been operational since August 2018, with links to NEWTON-g social media (facebook.com/NEWTONg.project; twitter.com/H2020_Newton_g). The official project short video (D5.4) is under development during the writing of the present document and will likely be released to the public before the summer of 2019. Factsheets, leaflets, newsletters and scientific publications are planned to be delivered after the end of the first project phase (*Design*; year 1).

4. DISSEMINATION ACTIVITIES

Dissemination activities are meant to promote transfer of knowledge, skills and competence from the consortium to the end users. The dissemination involves all the issues related to knowledge transfer, including: (i) where and when information should be disseminated, (ii) what should be communicated, (iii) to which audience, (iv) how it should be presented and (v) which communication tool should be utilized.
The dissemination of knowledge and results from research projects has been recognised by the EC as one of its priorities and, indeed, it is a contractual obligation of participation in research initiatives supported under the EC Horizon 2020 research and innovation programme. This provision is specifically aimed at promoting knowledge sharing, public awareness, transparency, and education.
A workpackage of NEWTON-g (WP5) is aimed at ensuring regular and effective dissemination of the project results, thus maximizing their impact. It involves three WP tasks:
Task 5.1: Project communication
Task 5.2: Project website
Task 5.3: Organization of project workshops

Deliverables expected from WP5 are reported in table 1:

Deliverable Number	Title	Lead beneficiary	Type	Dissemination level	Delivery date (month)
D5.1	Project website and logo	INGV	Website, patent filling, etc.	PU	2
D5.2	Kick-off workshop	GFZ	Website, patent filling, etc.	PU	5
D5.3	Dissemination and Exploitation Plan	INGV	Report	PU	12
D5.4	Project short video	INGV	Website, patent filling, etc.	PU	12
D5.5	2nd workshop	GFZ	Website, patent filling, etc.	PU	33
D5.6	Final workshop	GFZ	Website, patent filling, etc.	PU	48

Table 1: Deliverables expected from WP5 (Dissemination and outreach) of NEWTON-g.

4.1. Dissemination management

4.1.1. Distribution of responsibilities

In agreement with what reported in Annex 1 of the project GA, all the partners of NEWTON-g contribute to the dissemination activities. For this purpose, all partners participate to and give presentations at conferences, publish papers and contribute to the development of dissemination tools. Additionally, partners feed the project website and social media with information on new results, advancements, and upcoming events.

4.1.2. Dissemination policy and rules

Dissemination activities in NEWTON-g project will be carried out respecting the intellectual property rights (IPR), as clearly stated in Article 23a of the Grant Agreement, in Section 9 of the project Consortium Agreement, and in Deliverables 1.1, “Data Policy Guidelines”, and 1.2, “Data Management Plan”.

4.1.3. Dissemination monitoring, reporting, and evaluation

In order to track the dissemination activities throughout the project life, the consortium of NEWTON-g publishes a post on each activity in the “News” section of the website and on its social media platforms. These posts are also meant to inform dissemination monitoring, as well as the periodic and final reports of the project.

4.2. Project communication tools

4.2.1. Project branding (Logo)

Graphic design is one of the most powerful communication tools, as it can directly and effectively convey the identity of the object it is sponsoring. A project logo is unique to the project itself. As such, it should not be modified or adjusted in any way and has to appear on any communication material (either internal or external) and in each public occasion, thus creating a distinguishable and easily recognizable brand. A specific project logo (Fig. 1) was created for NEWTON-g by a professional designer (X-TERN architects, Italy).

Figure 1 – Left: the project logo. Right: the logo excerpt for particular applications (e.g., website favicon).

For the concept behind the logo of NEWTON-g, we refer to D5.1 (Project website and logo).

4.2.2. Project website

The NEWTON-g website (Fig. 2) went live on August 2018 and can be reached at the URL address http://www.newton-g.eu. It has been set up following the EU Project Websites – Best Practice Guidelines. The NEWTON-g website plays different roles:

- it promotes the project, its objectives, partnership and operational structure;
- it updates on progress, results and outcomes of NEWTON-g;
- it provides access to public deliverables and other relevant documents.

The website is constantly updated with information on NEWTON-g results and outcomes, as well as on upcoming events. It provides direct access to the social networks, through the clickable icons located in the footer of the website. NEWTON-g tweets are also embedded directly on the homepage of the website (Fig. 2). The consortium has access to website statistics, allowing to measure the impact of the website, while download statistics for shared deliverables is provided by the ZENODO repository.
Further details on the NEWTON-g website can be found in deliverable D5.1 - Project Website and logo.

4.2.3. Social media

Nowadays, social media represent the fastest and most accessible way of broad dissemination. Indeed, social networking is part of the NEWTON-g communication strategy. A Twitter page has been created (https://twitter.com/H2020_Newton_g) and is used to tweet the most relevant project information. Partners are invited to share, (re)tweet and forward relevant information. A Facebook page (facebook.com/NEWTONg.project) has also been created for complementing the Twitter page in sharing the information and short discussions on the project events. Additional social media platforms, such as LinkedIn, will be considered as the project progresses, if deemed appropriate.

4.2.4. Project short video

At the time of this writing (May 2019), a short video, presenting the project context and objectives and introducing the partners involved, is under development, in the framework of D5.4 (see Table 1). The production of this deliverable has been contracted to a professional filmmaker, Gordon Ballantyne (http://www.gordonballantyne.co.uk). Interviews with representatives of most of the project partners were shot during 7 to 10 April in Vienna, where many consortium members were attending the EGU 2019 General Assembly. This footage, along with laboratory and Etna footage will be edited to produce a series of videos. A 15 minute long video will give the fullest coverage of the project, and will be hosted on the project website. Shorter videos will be edited specifically for different social media platforms, and designed to direct viewers towards the website for further information. Videos of 3-4 minute length will be produced for facebook, and 30s-1m videos will be produced for twitter. These social media “taster videos” will be in square format, and will be closed captioned, making them easy to watch on a mobile phone screen. The consortium will engage with their host universities/institutions to promote these videos on their own social media platforms, and through their connections with the press.

Figure 2 – The homepage of the NEWTON-g website (www.newton-g.eu).

4.2.5. Participation to events

Participation in conferences and other events (i) provide the opportunity to present the project and its outcome to a broad audience and (ii) allow the consortium members to stay up-to-date with current and upcoming developments in the fields relevant to NEWTON-g.
During the first 10 months of project implementation, the rationale and objectives of NEWTON-g were presented in the framework of (i) the AGU Fall Meeting 2018 (Washington, USA, 10-14 December 2018), (ii) the Workshop on Observatory Synergies for Astroparticle Physics and Geoscience (IPGP, Paris, 11-12 February, 2019), organized

by APPEC, GEO-8 and Academia Europaea, and (iii) the EGU 2019 General Assembly (Vienna, Austria, 7-12 April 2019). The members of the NEWTON-g consortium will continue to regularly attend conferences and other relevant events, throughout the entire project lifetime.

4.2.6. Organization of workshops

Three workshops are scheduled at various stages, during the project lifecycle (Table 1). The kick-off workshop of NEWTON-g was held on October 9 and 10, 2018, in Potsdam (Germany; see D5.2 for details). The project partners met scientists and other stakeholders from different institutions and could exchange views on scientific and technical issues related to the implementation of NEWTON-g. End-user representatives and TV/Internet delivery networks will be invited to participate in the second project workshop (M33; D5.5), while the main achievements of the project will be presented to different stakeholders in the framework of the final workshop (M48; D5.6).

4.2.7. Scientific publications

When research outcomes become available, NEWTON-g partners will present them in papers that will be submitted to high-impact peer reviewed journals. The NEWTON-g consortium will comply with the rules on open access publications (Green or Gold). Publications in specialised magazines will be also encouraged, to attract more technology-oriented stakeholders (e.g., SMEs). All publications will be deposited into the ZENODO repository of NEWTON-g and will be reachable through the "Documents" section of the project website.

4.2.8. Informational factsheet

A NEWTON-g factsheet will be developed during year 2 of the project and will be continuously distributed afterwards. The factsheet will describe the project, its main objectives, methodology, partnership and expected impact, and will be used to raise general awareness of NEWTON-g. The factsheet will be made available for download from the project website and social media accounts. Partners will be encouraged to distribute the factsheet through their networks (including website and socials of their institutions) and at relevant events.

4.2.9. Newsletter

After the 1st project phase (*Design*; year 1), a dedicated project newsletter will be regularly issued; it will highlight project results and will present project news and other relevant information. The newsletter will be sent out to project partners, stakeholder and any other interested individuals. The newsletter archive will be publicly available through the "Documents" section of the project website.

4.2.10. Networking

Networking is a pillar of the EU framework, as it promotes collaboration, exchange, and sharing, thus increasing visibility. In this context, NEWTON-g aims at carrying out networking activities with other National and H2020 relevant projects.

4.2.11. PowerPoint and poster templates

NEWTON-g PowerPoint (Fig. 3) and poster templates have been developed to use at internal and external events, when presenting the project, its objectives and its results. These templates ensure that the project is represented with unique and standardised visual identity throughout its lifetime.

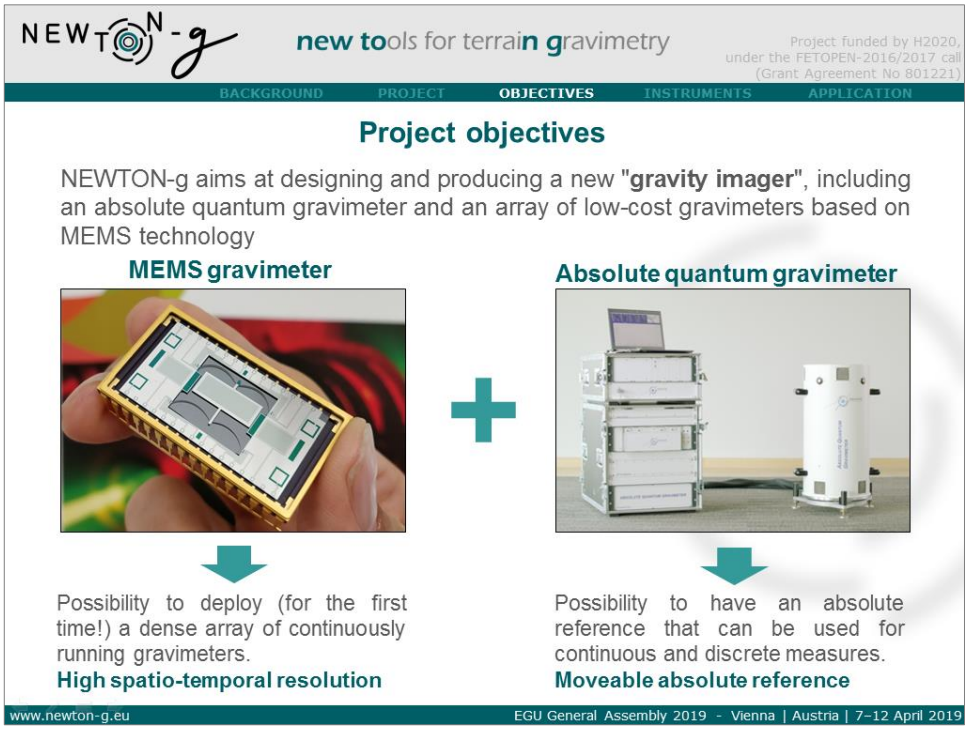

Figure 3 – The PowerPoint template for NEWTON-g presentations.

4.3. Impact of dissemination activities

The European Commission requires that the dissemination activities carried out under H2020-funded projects are adequately reported. Partners are thus required to keep track of all their dissemination activities during project implementation, through the reporting forms that will be periodically circulated among the consortium. In the reporting forms the partners are required to fill, among other, information on the type of activity, type and size of audience, etc. This information will be used to inform the project reports.
Every partner is also responsible for ensuring that the project-related scientific publications are uploaded onto the EC participant portal.

5. EXPLOITATION PLAN

The term *Exploitation* indicates the use of project results either (i) in further research activities, other than those covered by the action concerned, or (ii) in developing, creating and marketing a product or process, or (iii) in creating and providing a service, or (iv) in standardization activities (https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/support/glossary).
In the framework of the Horizon 2020 funding program, the EC has emphasized the need to strengthen the links between basic research and application, as well as between applied research and industry, SMEs and start-ups. Thus, it is pivotal for consortia to enhance the impact of their research and to plan activities that may foster the use of project results. Furthermore, sustainability principles dictate that the results and achievements of the project continue to be used in the long term after the end of EU funding.
In this frame, the Exploitation Plan of H2020 projects should provide measures to (1) enhance the impact of the project results, (2) allow transfer of projects outcomes to industry and market, so as to fully achieve the expected impact, and (3) ensure exploitation beyond the project itself.

As stated in Article 28 of the Grant Agreement, each beneficiary in the NEWTON-g consortium must— up to four years after the finalization of the project— take measures to ensure exploitation of the project results. To that regard, the following major aspects should be taken into account:

- **Confidentiality** [GA Article 36]: each Partner will treat information as confidential and not disclose it to third parties;
- **Ownership of results** [GA Article 26]: knowledge is owned by the Partners who carried out the work generating the knowledge;
- **Patents**: Partners who own key knowledge suitable for patent may, at their own expenses, make applications for patents and shall keep informed the Consortium;
- **Access rights** [GA Article 25, 31]: Access to know-how previously developed by members of the Consortium (background) and to new knowledge, methodologies, materials and technology developed in the project (foreground) is royalty-free for all Partners for implementing the project.

Project partners cooperate to identify the strongest project exploitation potential at the level of each partner and of the project partnership as a whole, in order to support the development of their current activities, and to possibly enable the launch of new ones.

5.1. Methodology

We expect that the exploitation plan and strategy of NEWTON-g will continuously evolve throughout the project life, following the steps listed below:

- Identification of the NEWTON-g exploitation target groups (from among the dissemination target groups; see section 3.3);
- analysis of the needs of each target sector;
- review of project outcomes / IP generated;
- possible gaps between project outcomes and needs of the target groups;
- validation and feedback by target groups;
- plan for the exploitation after NEWTON-g: funding schemes, other application areas, collaboration with other projects, commercialization through start-ups.

5.2. Objectives of the exploitation

Overall objectives of the exploitation strategy include (i) fostering links with stakeholders, (ii) collecting information about needs and requirements of possible end-users, (iii) identifying challenges for implementation, (iv) summarizing impact, (v) developing and upgrading the exploitation strategy.
In the framework of NEWTON-g, two main exploitable products will be delivered throughout the project life:

- innovative instrumentation for terrain gravimetry, going significantly beyond the state of the art;
- other exploitable foreground, mostly including data generated in the framework of the field-test of the new tools at Mt. Etna volcano, during the last phase of the project (*Field deployment and data utilization*; years 3 and 4).

Gravimetry is a powerful geophysical tool that, through sensing changes in subsurface mass, can supply unique information on the dynamics of underground fluids, like water, magma, hydrocarbons, etc. This is critically important for both resource management and

risk reduction. For example, measurement of subsurface water level is important for developing usage plans and monitoring resource health; the ability to detect mass changes induced by displacements of magma batches is of uttermost importance to recognize changes in the state of activity of a volcano, that may have implications for risk management. Hence, gravimetry is potentially of interest to several different stakeholders, from research institutions, to monitoring agencies in charge of studying subsurface fluid characteristics, to civil defense authorities.
In spite of this potential, gravimetry is currently underexploited. Indeed, continuous gravity measurements have been rarely performed, owing to the fact that the available instruments are not well suited for continuous measurements under severe field conditions. In addition, the high cost of available gravimeters limits deployment to, at most, a few sensors in a given area, implying that the achievable spatial resolution is always lower than needed.
In this framework, it is easy to understand the great exploitation potential of the instruments we are developing under NEWTON-g. In sections 5.2.1 and 5.2.2, these instruments will be presented, with special reference to the exploitation potential of each. Before going into those details, we introduce a framework in which the technologies under development can be assessed. The *technology readiness level* or n is a standard metric to assess the maturity of a new technology. Different TRL scales exist, but all share the basic structure: as devices get closer to their final form, their TRL level goes up. In the framework of H2020 projects, the TRL levels are defined as follows (M. Héder, From NASA to EU: the evolution of the TRL scale in Public Sector Innovation. *The Innovation Journal: The Public Sector Innovation Journal*, Volume 22(2), 2017):

- **TRL 1** - Basic principles observed
- **TRL 2** - Technology concept formulated
- **TRL 3** - Experimental proof of concept
- **TRL 4** - Technology validated in lab
- **TRL 5** - Technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)
- **TRL 6** - Technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)
- **TRL 7** - System prototype demonstration in operational environment
- **TRL 8** - System complete and qualified
- **TRL 9** - Actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)

5.2.1. MEMS relative gravimeters

The development of a MEMS (micro-electro-mechanical system) gravimeter has been ongoing for around 7 years at UNIGLA-IGR, and the currently available device sits at around TRL 5/6. It has been demonstrated to work in the laboratory and it has also been used for limited field tests (although not in a volcano setting, which is one of the most challenging). Work is ongoing on the components that make up the full system, with the aim of making the final device ready to work on Etna volcano, during the last phase of NEWTON-g (*Field deployment and data utilization*; year 3 and 4). The activities under NEWTON-g are pushing and will push the devices further along the TRL scale. By the summer of 2020, when tens of devices are scheduled to be deployed, an individual device will already have been used in harsh environmental conditions. The devices will also be packaged within a qualified packaging at this stage. NEWTON-g will therefore push the devices to TRL 7/8 by the time of deployment, rising to TRL 9, if the system is proven to work properly during the field-test phase of NEWTON-g, in years 3 and 4.

Although the research has been conducted within an academic environment so far, involvement of industrial stakeholders has been important. The MEMS gravimeter has a performance close to existing commercial gravimeters, but it is significantly smaller and has the potential to be much less expensive, since the fabrication process of mobile phone accelerometers can be exploited. The potential low cost of the devices has attracted the attention of many companies. Investment in the form of grant funding has already been sourced from five commercial partners in the defence, oil and gas and space sectors. In-kind support has been provided by several more. Over 50 companies have expressed interest in being end-users of these devices when they become commercially available. Indeed, the low-cost of the devices could democratise the gravimeter industry, currently dominated by large multi-national companies that can afford the necessary technology. Cheaper/smaller devices could increase vastly the number of potential users, as suggested from previous interactions with interested parties.
The prestige offered by utilisation within a H2020 project will be a great boon to the development of the device (and the success of any spin-off company formed to market the devices in the future). The deployment of the MEMS devices in the harsh volcanic environment will be a valuable validation of the technology, that will greatly increase the trust placed in it by potential commercial users.
In general, grant and commercial funding to take technologies from a laboratory demonstration to a working field prototype is limited. This stage in technology development is often referred to as the TRL "valley of death". H2020 funding will be of enormous impact in helping MEMS gravimeters to bridge this valley, thus making successful commercial development much more likely.

5.2.2. Quantum absolute gravimeters

Since about 15 years, academic research worldwide has provided major results in the field of high-precision measurements with laser-cooled atoms (including Nobel Prizes). Europe, and especially France, has nurtured fruitful collaborations and academic projects to transform a scientific domain into a technology. This led the Observatory of Paris and Institute of Optics (CNRS) to fill one key international patent in 2009, which led to the creation of the company Muquans, in 2011. During the first years after its creation, Muquans developed the first commercial version of the Absolute Quantum Gravimeter (AQG). This instrument can operate only under laboratory conditions. It is clear that the development of a field-version of the AQG, capable of withstanding harsh outdoor conditions, would be a game-changer for absolute gravimetry.
In the framework of NEWTON-g, we will develop a version of the AQG able to operate under the harsh field condition encountered in the summit zone of an active volcano. This project will thus offer the possibility to develop and validate the technology through a representative pilot test. Muquans will exploit the results obtained during the field-test phase of NEWTON-g to commercially promote the field version of the AQG. This new product will indeed be advertised to a wide range of academics and industrial end-users, involved in seismic studies, hydrology, geodesy, reservoir monitoring, etc. To conclude, NEWTON-g represents a remarkable frame to commercially promote a new instrument that is already attracting the attention of stakeholders from all over the world.

5.2.3. New imaging modality

While the potential of the two new technologies outlined above is significant (and NEWTON-g will foster their development) the combination of these two technologies into a symbiotic sensor network is also important. The high cost of currently available gravimeters has prevented, up to now, the deployment of large arrays of continuously recording devices. NEWTON-g will therefore offer the possibility to validate an entirely new

gravity imaging modality (with MEMS sensors making the *pixels* of the *gravity imager*, and the quantum gravimeter providing the absolute reference). The data produced by the network will therefore have the potential to spark a paradigm change in the way that gravity measurements are carried out. The benefactors of such a shift will not be isolated to the research community – multi-national companies/government agencies in defence, mineral exploitation, hydrology and civil engineering will watch the outcome of this project with interest. The consortium will ensure that news about the technological development under NEWTON-g reach as many potential users as possible. This will be achieved through regular communication from UNIGLA-IGR and Muquans to their existing commercial partners, attendance at trade shows, and publication (and public dissemination) of the project results.

5.2.4. Forthcoming exploitation actions

Taking into account the relatively low TRL of the new technologies during the first stage of the project, the exploitation strategy has, up to now, mainly focused on scientific results and implemented by the academic partners through contributions to conferences and the development of an outline for the first NEWTON-g peer-reviewed publication.
During forthcoming stages, in order to gather content for the NEWTON-g exploitation strategy and related tools, information will be collected from various stakeholder groups and via different methodological approaches, including:

- interviews with different stakeholder groups, in person or via phone/internet;
- organization of and participation in exploitation-related workshops (e.g., 2nd NEWTON-g workshop);
- attendance of conferences;
- identification of further research areas and promising industry sectors.

The partner institutions, as well as the members of the External Advisory Board of NEWTON-g (including academic and industrial members) will help to establish new contacts to experts and stakeholders.

6. INTELLECTUAL PROPERTY RIGHTS (IPR)

The management of IPR is defined in detail in the NEWTON-g Consortium Agreement (CA), where each partner of the project has reported the background knowledge included and the specific limitations and/or conditions for implementation and exploitation (see Attachment 1 of the CA). Indeed, the CA regulates the ownership of results (Section 8). Thus, the CA includes all provisions related to the management of IPR including ownership, protection and publication of knowledge, access rights to knowledge and pre-existing know-how, as well as questions of confidentiality, liability and dispute settlement. Every outcome of the project is owned by the partner that has generated it, and in this sense, the partner is entitled to use and to license such right without any financial compensation to the other contributors. In the case of joint ownership, the partners that have generated the product/s should agree that they may jointly apply to obtain and/or maintain the relevant rights and shall make effort to reach appropriate agreements in order to do so.
The CA also rules the transfer of results ownership (Section 8.3). Each partner may transfer ownership of its own outcome following the procedures of the Grant Agreement Article 30.
Each partner may identify specific third parties it intends to transfer the ownership of its outcome. The other Signatory Parties hereby waive their right to prior notice and their right to object a transfer to listed third parties according to the Grant Agreement Article 30.1.

The transferring partner shall, however, at the time of the transfer, inform the other partners of such transfer and shall ensure that the rights of the other partners will not be affected by such transfer. As for the Dissemination of results, it is ruled also by the CA (Section 8.4).

7. CONCLUDING REMARKS

As reported in the Annex 1, part B, of the GA, the implementation of NEWTON-g involves three main phases: (1) *Design* (year 1); (2) *Production* (year 2); (3) *Field deployment and data utilization* (year 3 and 4). The dissemination and exploitation actions that have been and will be carried out throughout the project life are in line with the above phases. At the date of preparation of the present document (M10), the project is still in the first phase and most dissemination and exploitation actions have been aimed at raising awareness among different end-users communities of the rationale, objectives and future perspectives of NEWTON-g, through the project website and social media, and through participation to conference and the organization of the kick-off workshop (see D5.2).

As the project progresses, (i) the new technologies under development will move on along the TRL scale and (ii) new experimental data will be generated through the experiments that will be carried out during the *Production* phase and through the final field-test in the summit zone of Etna volcano (*Field deployment and data utilization* phase), where the *gravity imager* will be evaluated against existing technologies (the permanent monitoring system of Etna, managed by INGV-CT), in terms of performance, resolution, ruggedness and utility. During those stages the dissemination actions will progressively broaden, to include, e.g., the production of scientific publications where the experimental results are presented and discussed in terms of both performance of the new instrumentation and possible use of the information provided by the *gravity imager* to gain new insight on how volcanoes work and mitigate volcanic risk. The new technologies will be also progressively elevated to higher TRLs and it will thus be possible to issue an updated and more detailed version of the exploitation plan, including indications on marketing possibilities and future deployments of the *gravity imager* beyond NEWTON-g – for example, interest has been manifested by research institutions operating in geophysics for deployment at Kilauea volcano (Hawaii) and Soufrière de Guadeloupe (Lesser Antilles).