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Effective project management of 3rd party funding in European Union Horizon Industry4.0 projects: sharing experiences from two use cases

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Abstract

To reduce the risk and the required bureaucracy for accessing public funding, the EC has developed a mechanism to grant money to consortia to be used to fund to startups, SMEs and Midcaps to start, evolve or transition their offer to increase their competitivity in the market, in turn providing benefit for the entire European economy.

This paper presents the experience in managing what is actually 3rd party (or cascading) funding in two different European Innovation Action Projects in the manufacturing domain. The paper discusses the design and implementation phases and provides the detail on how to manage the processes to ensure fairness, efficiency, and effectiveness that is lacking from the EC's formal documentation.

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1. Introduction

For large scale European Union Innovation Action (IA) grants within the Horizon programmes, especially in the area of Industry4.0 (I4.0) and Industry5.0 (I5.0). It is standard practice for there to be a requirement to deploy a percentage of the funding made available by the Commission for conducting Financial Support to Third Parties (FSTP) (also known as cascade funding and/or Open Calls). Its aim is to provide a "mechanism to distribute public funding in order to assist beneficiaries, such as start-ups, scale-ups, SME and/or mid-caps, in the uptake or development of digital innovation" [1]. This was a feature of many Horizon2020 (H2020) calls and continues to be a feature of Horizon Europe calls. The Commission provides a set of requirements and a defined process for EC-funded IA projects to develop the FSTP Open Calls, whereby the Project Coordinator and the relevant Work Package Lead(s) develop the draft Call text and details and submit it for review and approval by the Project Officer. Once approved, the Project Officer then publishes the Call to the EC Funding & Tenders Portal (ibid.). There are also requirements for FSTP activities which will have been defined in the original H2020 IA Call text and agreed in the project Grant Agreement. These often include a specified amount of the total funding award being ring-fenced for FSTP funding (typically 20%), the eligibility criteria for the Call (in this context typically financially solvent and officially registered EU SME manufacturers, developers and/or research institutions), and a maximum amount that can be awarded to each successful third party. Additional rules are defined in Annex K of the H2020 Work Programme [2]. Further rules also govern how long the Call must remain open (typically a minimum of two months) (for a summary see [3]). However, beyond these rules and requirements, the EC documentation provides no guidance on how Open Call work package leads and project managers should deliver the specifics of the Calls. Hence, the purpose of this paper is to share the in-depth experiences of the authors in project managing the FSTP activities made in two H2020 IA use cases within the manufacturing and I4.0 domains in order to contribute to establishing FSTP best practice, especially as existing literature in this area is minimal at best.

The first use case was the Zero-defects Manufacturing Platform (ZDMP www.zdmp.eu EC Grant no.: 825631), the second use case was the European Connected Factory Platform for Agile Manufacturing (EFPF www.efpf.org EC Grant no.: 825075). For the purposes of this paper both projects will be presented jointly, as the strategies and actions were similar and both cascade funding calls were targeted at EU SME software developers and manufacturers. In addition, both projects involved outputs to provide advanced digital, AI and Machine Learning tools, services and solutions [4, 5, 6, 7, 8] to the I4.0 domain. In all cases, the analysis figures and data presented here will be the combined totals for both projects. In total, the two projects were responsible for awarding and managing 5.8million Euros of cascade funding, which was awarded to 48 consortia or single applicants for subprojects of between 60,000 and 150,000 Euros lasting either nine or twelve months. Throughout the paper, 'main project' refers to ZDMP and EFPF, while 'subproject' refers to the cascade funding recipients. In addition, based on our experiences, at various points we add our learning as 'Tips', that will be useful for others looking to manage cascade funding activities in the future.

2. Related Work

The 3rd-party funding requirements in EC funded projects is a widely used approach yet, the literature about the effective management of this specific kind of Open Calls for cascade funding it is extremely narrow. As noted, there are available EC documents related to the open call rules, requirements, and application and awarding procedures, but from a project management perspective there are only a very few publications that describe methodologies, experiences and best practices. In [9] the authors present the approach of DigiFed (EC funded project) and how they design and experiment with novel innovation support mechanisms for SMEs across Europe and the project's digital innovation hubs and research institutes. This work provides some brief details of the management of the Open Call application period and presents only the results of the awarding phase. The authors present the eligible types of consortia, the awarding process with pre-defined criteria and external evaluators, and information about application support webinars. However, there are no details about the Open Call promotion phase and initial planning, nor on the management of subprojects during the execution phase. Overall, the primary focus of this publication was to explain

how DIHs can effectively foster cross-border collaboration among each other and between private companies and not to provide a complete management guide for open calls in cascade funding projects. In [10] the authors describe the procedure, the phases and the results of the Open Call experiments in the EC-funded project ECHORD++. The article describes the complete experience related to this project's Open Calls. It starts from preparatory phase describing the creation of important documents such as the Guide for Applicants and the Evaluation Criteria. After that, the authors present the creation of the applicant 'pool' and the promotion of the call that was issued. Following the Call Issue phase, the authors document information about the selection process and its results. Information about monitoring and management of the experiments is also documented but there are no details regarding the payment scheme that was followed and relevant processes to authorize subproject payments. In the end, the authors present statistical results related to selected experiments.

To the best of our knowledge, only the abovementioned publications can be considered as related to the topic of the management of 3rd-party funding in EC funded projects. Both of them describe a lot of similar concepts and processes related to our approach. However, both of them just describe their experiences and processes of the calls that they launched. Moreover, they do not include a lot of detail related to actual management of the selected open call experiments, but focus more on the application and awarding periods. Besides this, in our approach we are trying to introduce a series of tips that future Open Calls Managers could take into consideration and we aim to present this article not just as an example of our experience but as a guide for managing similar calls.

3. Strategic Planning

The primary strategic aims for cascade funding tasks are to generate a high number of high-quality submissions, to evaluate them in a fair and transparent way, to award the 'best' subprojects, and to support and monitor those subprojects through their activities. Consequently, the first activity undertaken was to divide this end-to-end cascade funding process into individual phases and then identify and define the strategic plans and actions for each of those phases. These are summarized in table 1.

Table 1. Strategic Planning for cascade funding activities

Phase	Strategic Plans & Actions
Top-level Planning	Define timings
	Define open call parameters
	Develop strategic plans for each step
Call Promotion	Enact the promotions strategy
Call Management	Enact the call support strategy
Evaluation & Awarding	Recruit and train expert evaluators
	Enact the evaluation and awarding strategy
Subproject Management and Monitoring	Develop and finalize subproject workplans
	Sign contracts
	Identify subproject mentors
	Enact the subproject management and support strategy
	Enact the subproject monitoring strategy

3.1. Top-level Planning

Firstly, the timings for the cascade funding activities were defined. As it is necessary for the main project to have made sufficient technical progress in developing the platforms, tools and services that form the output of the project in order for the cascade funding subprojects to be able to meaningfully interact with them, subprojects should generally start during year three (of a four-year project), ideally around month 32 (M32). Working backwards, this means that

Workplan development and Contracting (sub-sections of subproject management) should ideally begin a minimum of three months before the formal subproject start (M29) and Evaluation & Awarding should ideally begin a minimum of three months before that (M26). Prior to that the call is required to be open for submissions for a minimum of two months, although three (or more) months is ideal, and, clearly, Call Management activities also begin at the time of the call launch (M23). Finally, Call Promotion activities should begin one to two months before the call launches (M21) and continue throughout the call duration. Before this step, at least twelve months of top-level planning and preparation should occur (M9).

TIP 1: *When defining the timings pay attention to the 'dead' periods of the year, such as August (when many businesses and individuals are on holiday) and December (when there is also a sizable break over Christmas and New Year), and do not launch or close open calls or schedule subproject starts at those times, as this is highly likely to impact the number and quality of submissions, or cause delays to subproject starts.*

TIP 2: *It is wise to build in more time than is absolutely required for each stage to allow for contingencies. This became relevant as both main projects were impacted by the COVID-19 outbreaks and the various national lockdowns of 2020 and 2021. As a result of these unexpected events, in one main project, the launch and close of the call, the evaluation and awarding of subprojects, and the workplan and contracting period had to be compressed into under six months, when it would ideally have been eight or nine months. This was successfully achieved, but it was extremely challenging and is not recommended.*

Beyond timings, another critical activity during the top-level planning phase is to clearly and consistently define the parameters of the call. From the management perspective, the first step of the top-level planning process was to define the KPIs by which to assess the performance of the call (and also of the subprojects), and to develop individual strategies for the remaining phases outlined in Table 1 above. The KPIs included stakeholder engagement targets (inc. promotional targets), call targets (inc. quantity and quality of submissions), and subproject output targets (inc. exploitation targets). Individual strategies for call promotion, call management, evaluation & awarding, and subproject management and monitoring were then defined (and will be discussed in the remainder of this paper).

Next, it was necessary to define the specifics of the Call, which include: the subproject activity areas; the target audience; all eligibility, restrictions, limitations and or requirements; the call value proposition(s); the funding model; and the evaluation and awarding process. All these inform the creation of the Guidance for Applicants, which is the central document provided to potential applicants during the Open Call period. To define specific activity areas it was valuable to work closely with the project technical teams so that they align with the main project aims and outcomes. To this end, an online survey completed by all main project partners was used to gather views and opinions in a co-design process. This resulted in the decision to offer a choice of one of three subproject activity types: i) Development – for subprojects proposing to use the main project outputs to develop something new; ii) Integration – for subprojects planning to incorporate main project outputs with their own products or services; iii) Testing & Validation – for subprojects wishing to deploy main project outputs in real-world scenarios or new domains not already covered by the main project.

TIP 3: *There is a fine balance to be found between making the call activities too specific and detailed (which might put off potential applicants) and making them too general (which can result in high numbers of unsuitable or out-of-scope submissions). The same applies to any restrictions, limitations or requirements you place on the call.*

Next, various factors had already been defined in the EC and main project documentation, such as the target audience (EU-based SME developers, manufacturers and other institutions), the eligibility criteria, and the maximum size of the cascade funding award (150,000 Euros in this case). Where main project management decisions were required involved the decision whether to allow consortium bids as they add a degree of complexity to all processes. It was decided that the opportunity for an SME developer to partner with a large manufacturer (e.g. from the aerospace or automotive sectors), or for an SME manufacturer to partner with a large developer, would help encourage higher numbers of higher quality applications. However, it was further decided that the consortium was to be restricted to a maximum of two partners with the SME partner always as the subproject lead and the primary recipient of the bulk of the funding and also responsible for the transfer of funds to the other partner. In this way the complexity of evaluating, managing and financing a consortium subproject from the main project perspective would be minimised.

Furthermore, as a result of additional close collaboration with the main project partners responsible for exploitation, sustainability and funding a further requirement was added - a commitment, where relevant, by the subprojects to make their outputs available on the main project Marketplaces for a minimum of one year after the end of the subproject. In some cases this would be an exclusive arrangement with subproject outputs unable to be available on other digital marketplaces during this period. This requirement was designed to ensure the post-project sustainability of the main projects.

After that, the subproject funding model was defined. There are various options for funding models, but in this case, a lumpsum funding model tied to the successful completion of a series of deliverables and milestones was developed – see table 2 below. A necessary accompanying task to this was to define the various deliverables required and to set the terms of the milestone reviews. These would, of course, be different for different main projects, but in this case the deliverables consisted of reports and/or demonstrations of activity and progress at set-up, mid-project and end-project stages, while the milestones consisted of a three-person panel presentation and live demos.

TIP 4: *A lump sum funding model is considerably more efficient to administer from the point of view of the main project, and on advice from the European Commission, front-loading the payments helps SMEs with cash-flow, potential recruitment and set-up costs, and supports on-going financial planning.*

Table 2: Lump sum payment schedule

Subproject Date	Dependency	Amount of funding awarded within 45 days
Month 0 (subproject start)	Completion of workplan Singing of contract	50%
Month 6	Completion of requisite deliver. Completion of milestone 1 review	15%
Month 9 or 12 (subproject end)	Completion of implementation deliver. Completion of milestone 2 review	20%
Main project completion	Receipt of final payment from EC	15%

Next, the value proposition was defined. This would, of course, vary depending on the nature and domain of the main project, but in this case, by collaborating with consortium partners and external Digital Innovation Hubs a suitably appealing value proposition was created for the call, written to stimulate significant numbers of high-quality submissions. Finally, the Evaluation Criteria were defined through a process of refinement involving work package leads and project managers. At this point all the necessary call parameters had been defined, and with those in place, the end of the top-level planning process was reached, allowing all the call documentation, materials and resources to be prepared.

3.2. Call Promotion

The Call Promotion activity in the main projects had a ring-fenced budget available to support promotional activities. The first decision taken was therefore to appoint an online submissions platform to manage the submission process. There are many such companies and services available for this purpose, and after a systematic review of services, usability, cost and reach, the F6S platform was selected from three potential platforms. Next, the call promotion strategy adopted a '4 Channel' approach designed to reach the largest number of appropriate EU SME developers, manufacturers and other institutions, as follows:

- Channel 1: Engaging EU Digital Innovation Hubs
- Channel 2: Leveraging main project consortium partner's networks and social media profiles
- Channel 3: F6S targeted mailshots and '5-Star' company introductions (paid-for services)
- Channel 4: Main project social media communications programme (inc. Youtube promo videos)

Promotional activity began in advance of the call launch, in order to trail the launch, and then continued consistently throughout the period in which the call was open. Analysis of this activity has shown that in total across all four channels in both projects, 20,241 separate stakeholders (either companies or individuals) received at least one communication concerning one or more of the calls. This included engagement with over 200 Digital Innovation Hubs (at least one in every EU nation state and associated country), who were provided with a Digital Promo Pack to deploy across their members networks as they chose. This included pdf documents presenting the main project, the Guidance for Applicants, a useful-links library, sample emails and social media posts for redistribution, and the first main project newsletter. The same Digital Promo Pack was provided to the main project partners for them to distribute across their customer and associate networks. In addition, in collaboration with F6S, call details were included in the F6S newsletter sent to F6S members (over 6,000 separate businesses), and over 30 highly relevant businesses were scouted and direct one-to-one engagement undertaken. Finally, a social media campaign was developed, with regular weekly or bi-weekly posts to the main project Twitter, Facebook and LinkedIn profiles, with posts increasing to every two days during the final ten days before the call closed. In total, this promotional activity resulted in 258 submissions (of which 244 were eligible for evaluation), which far exceeded the KPI targets for number of submissions.

TIP 5: *Quantitative analysis indicates that Channels 2 and 3 (partner networks (34%) and F6S (30%)) were the most effective in producing submissions, while Channel 4 (social media programme (6%)) was least effective. However, a considerable percentage of submissions (20%) resulted from other sources including the EFFRA website, the EC Funding Portal and general web searches. In addition, when assessing the quality of submissions, it was identified that although Channel 3 (F6S) resulted in a large number of submissions, they were often of low quality. The highest quality submissions resulted from Channel 2 (main project partners).*

3.3. Call Management

Alongside the call promotion activities, the call management strategy was enacted. This consisted of preparing and publishing a full range of application support documents, regular communication with consortia with submissions in progress on F6S, an email hotline, technical support resources, and an application support webinar series. The application support documentation included: (a) Guidance for Applicants (inc. the Eligibility Criteria and the Evaluation Criteria), (b) Proposal Template, (c) Declaration of Honour, and Ethics Statement, (d) Dataset for experimentation and (e) Promotional newsletter. These were available for download from the main project websites.

In addition, over 500 individual companies were contacted between 2 and 5 times via the F6S platform with reminders to complete in-progress submissions. Over 100 emails were received via the submission support email hotline and were responded to within 48 hours, and 86 FAQs and their answers were published on the main project websites in 6 separate topic threads covering: Administration, Using the Proposal Template, Business & IPR considerations, Using the F6S submissions platform, Funding, and Technical Questions. Additionally, extensive technical information relating to the main project's technical outputs were provided, including general descriptions of functionality and purpose, screenshots, IPR restrictions, architecture diagrams, benefits & features, and installation & use documentation.

Finally, the submission support webinar series provided 8 separate webinars of two hours each, where the main project co-ordinators, technical directors and open call managers presented on the main project aims, technical outcomes and open call goals and processes, before a question-and-answer session with potential applicants. Over 150 individuals attended these webinars. The call management activities resulted in a high number of high-quality submissions, with over 82% of all submissions exceeding the threshold score during evaluation.

3.4. Evaluation & Awarding

The evaluation & awarding strategy consisted of recruiting external independent experts, conducting eligibility checks, conducting evaluations and dealing with divergent scores, conducting technical viability checks, and ranking and selecting winners. Firstly, expert evaluators were recruited by leveraging main project partner contacts and networks. There was an aim to achieve a 50-50 gender balance distribution in accordance with equality and diversity directives. This was unfortunately not possible to meet in full however, with only 28% of external evaluators being

female. Over 30 external evaluators were recruited, trained and contracted for the work. An additional 40 internal evaluators (from within the main projects) were also identified. 7 separate training sessions for all evaluators were provided online covering: (a) Information about the ZDMP/EFPF project objectives, goals, and structures, (b) Detailed description of the role and responsibilities for an evaluator, (c) Detailed explanation of what constitutes a conflict of interest and what to do in the event of one, (d) In-depth information about the evaluation process (including how to access the proposals and what will happen in the event of divergent scores) and (e) How to use the weighted evaluation criteria.

Next, all submissions were checked against the published Eligibility Criteria with those failing being immediately rejected. Then, the submissions were randomly assigned to one internal and either one or two external evaluators, who completed the pre-prepared evaluation spreadsheet. Evaluation criteria were grouped into three main areas: Excellence / Impact / Implementation. The same evaluation criteria were used for all three activity types (Development / Integration / Validation), but the weighting for each criterion was slightly adjusted to reflect the importance of that criterion to the specific activity area, thereby ensuring that no proposal was disadvantaged by the scoring system.

The final overall evaluation scores from each evaluator were summed and averaged. Where there were divergent overalls scores of >3 points, the divergent score strategy was enacted, with the paper being sent for a further review and where necessary evaluator meetings being held. After resolution of scoring, all submissions were ranked from highest to lowest. The 25 top ranked submissions were then provided to main project technical leads for a final evaluation of the subproject, with scores and comments recorded for three main aspects: technical viability / fit with main project technical goals / correct identification of main project technical outputs to be used.

Two final considerations were necessary. Firstly, awarding was based on the distribution of submissions within each activity area (Development / Integration / Validation). For example, of the 244 eligible submissions 60% were for subprojects within activity area 1 (Development), hence 60% of awards were ring-fenced for subprojects in this area, with the highest-ranking activity area 1 subprojects being selected until the 60% limit was met. This process was similar for activity areas 2 and 3. In this way a representative spread of subprojects across the three activity areas were awarded and no subproject was unduly disadvantaged. The second consideration was the funding amount requested. Attention was paid to ensure that awards were not made that in total exceeded the 5.8million Euro cascade funding limit. Finally, those subprojects ranking just outside the awarding window were added to a reserve list to be called up in the case of a subproject dropping out or failing to meet milestone 0 (subproject start). In this way the highest quality, most technically viable subprojects across all three activity areas were fairly evaluated and awarded.

TIP 6: *Providing multiple activity areas significantly increases the complexity of the evaluation and awarding processes, but also provides applicants with the chance to develop high-quality proposals tailored to their particular business needs and the needs of the main project, so it is therefore worth the additional effort involved.*

TIP 7: *Adding a technical viability check also extends the time required for evaluation and awarding, but serves as a useful additional check on the work conducted by the evaluators, who may not always have the direct technical expertise in the specific domain of the proposal nor the in-depth knowledge of the main project technical outputs to evaluate the viability accurately.*

Before the final awards were announced, an additional, formal, non-deliverable document reporting on the promotion and call management activities and evaluation results was written and provided to the EC Project Officer for a final check and approval. Once received, the winning subprojects were informed and the announcement published on the main project website.

3.5. Subproject Management and Monitoring

Firstly, each winning subproject was assigned a mentor from within the main project for the duration of their subproject to provide advice and guidance, facilitate interactions with technical partners, review the required deliverables and milestone reports, monitor subproject progress, and report any issues and problems arising with the subproject to the open call management team.

The first task for the mentors and subprojects was to work together to identify all the main project technical outputs required for the successful completion of the subproject. These were formalized in a workplan, which was closely based on the original proposal, but with added detail on subproject activity broken down into separate work packages,

including for exploitation and dissemination. A workplan template document was provided to ensure consistency across subprojects. Weekly mentor meetings were held during this period, with technical partners attending if and when required. Early in this process an 'on-boarding webinar' was held, with all subprojects, mentors and senior main project managers present, where subprojects presented themselves and their subproject and main project managers presented the processes, requirements, and expectations for the subprojects. In this way all stakeholders were fully informed from the outset.

Next, once the workplans had been agreed, they formed the annex to the formal subproject contract where the commitments (inc. the lumpsum funding programme and exploitation actions), requirements (inc. deliverables and milestone reviews, dissemination activities and exploitation actions), and timings (based on the workplan work packages) for the subprojects were clearly defined. Contracts were then signed by the main project partner responsible for providing the funds and the subproject. At that point milestone 0 was considered complete and the subprojects were ready to start work (this also triggered the first lumpsum payment).

Once the subprojects had begun, pre-prepared systems were made available to assist subprojects with any questions or issues they encountered while undertaking their subproject activities and interacting with main project technical outputs. There are multiple ways to achieve this, but in these cases a ticketing system for questions (Tiki) was deployed in one instance, while a private Github instance was deployed in the other. Direct email interactions and/or technical meetings were also facilitated where necessary. Mentor meetings continued weekly for the first two months of the subproject, and then reduced to monthly thereafter. Subprojects could request additional meetings with 3 days' notice..

At various pre-determined points subprojects were required to provide mentors and the open call management team with a range of deliverables falling broadly within the categories of progress reports, demonstrations (live or recorded) of set up, implementation and execution, and milestone reports, as well as present at formal milestone review meetings. Successful completion of milestone reviews triggered the next round of lump sum payments (see table 2). In this way the main project was able to effectively monitor subproject progress throughout the subproject duration and identify underperforming subprojects and/or recurring issues with main project technical outputs at an early stage and initiate mitigation or resolution strategies. The subproject management and monitoring strategy is summarized in figure 1.
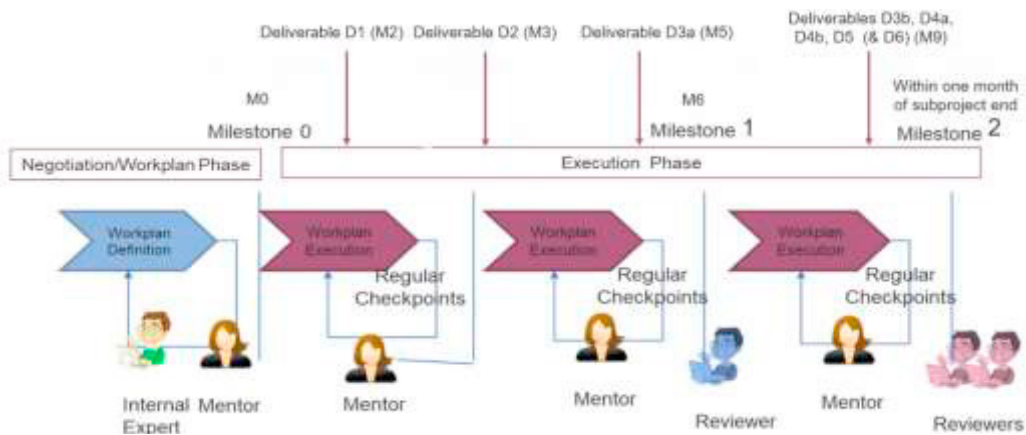

Fig. 1: Overview of the subproject management and monitoring strategy

TIP 8: *This level of monitoring is time consuming, but is extremely valuable – not just for the subprojects themselves, but for acting as a driver for useful main project technical development. The regular feedback from mentor meetings, deliverables, issues reporting systems, and milestone reviews serve to highlight technical weaknesses within the main project and galvanize rapid resolutions, as subprojects are dependent on those solutions for their progress. This helps the main project to target technical development in the most effective ways, which positively contributes to achieving main project outputs and post-project exploitation and sustainability plans.*

4. Conclusion

It is intended that the detailed presentation of the strategic approaches and activities undertaken in these use cases to project manage FSTP commitments within Horizon projects in the I4.0 domain can contribute to discussions designed at establishing best practice, as there is currently a lack of examples in the literature, and a lack of specific guidelines and advice within the EC documentation, to assist project managers and work package leads in ensuring that the often very large sums of money being distributed via FSTP activities within large EC innovation projects is done so in an effective, accountable and unbiased way. It is also hoped that the learning gained by the authors from their direct experience in these use cases, informally presented here as 'tips', may be of use to other project managers taking on the responsibility for FSTP cascade funding in the future.

Acknowledgements

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