IN-KIND CONTRIBUTIONS: A PROSPEROUS MODEL OF PROCUREMENT FOR LARGE-SCALE SCIENCE PROJECTS

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Abstract

The number of research infrastructures which are being built via significant amount of In-Kind Contributions (IKCs) from partners and stakeholders is on the increase [1]. One of the main advantages in the utilization of IKCs in big science projects is to enable numerous partners with technological and scientific know-how participate directly in such projects. Thus, IKCs promote capacity building in technology and knowledge transfer among these partners. However, management and execution of IKCs are particularly challenging.

This paper focuses on the analysis of the issues pertaining to how to best implement and execute IKCs from the initial phase of assignment until full delivery. The goal of this paper is to present the reader with a synopsis of the challenges and opportunities faced in procurement through IKCs. Where appropriate, examples from the FAIR accelerator facility [2, 3] are drawn to illustrate the point further.

COMPANY MODEL AND IN-KIND PROCUREMENT: THE FAIR EXAMPLE

Creation of any new research infrastructure with several international partners/shareholders involves long and complex negotiations, in particular with respect to the choice of its legal form. This choice has long-term implications to the establishment, management and operation of the facility. The legal basis on which a research infrastructure is set-up carries advantages and disadvantages right from its inception. Therefore, it is crucial to identify an appropriate legal form which executes the mission of the facility best. The choice of the legal form affects governance, organizational and managerial issues, resource planning (including manpower), procurement policies, financial commitments, budgetary compliance and, benefits and exemptions. There is no 'one-size-fits-all' solution for the establishment of a research infrastructure though.

During its preparatory phase, FAIR was chosen to be based on limited liability company model subject to German law, Gesellschaft mit beschränkter Haftung (GmbH), with partner countries as shareholders. The FAIR project and its Modularized Start Version (MSV) [2, 3] is a large scale interdisciplinary science facility (see Fig. 1) and is composed of international partnerships of ten countries: Finland, France, Germany (host), India, Poland, Romania, Russia, Slovenia, Sweden and the UK. Each country receives a certain number of shares in the FAIR company and nominates a 'shareholder' that oversees the status of its IKCs furnished mostly through various local suppliers or 'providers'. Such partnerships relieve the financial burden from the host country by pooling resources, including technical and intellectual skills, and can secure successful completion of the facility in a tight global economic environment. IKCs prove to be a prosperous and attractive model of procurement for the FAIR project by which its accelerator systems and experiments will be procured. However, conventional facilities and technical infrastructure will be realized through cash contribution from the host country (Germany) by and large and smaller in-cash contributions from the other shareholders. An effective organizational management and thorough planning is obligatory to effectively coordinate IKCs from their onset, i.e. allocation by the governing bodies – in the case of the FAIR project, the In-Kind Review Board (IKRB) and the FAIR Council – until full delivery and accreditation of the IKC value, i.e. allocated shares.

LIFE CYCLE OF IN-KIND CONTRIBUTIONS

Figure 2 is an illustration of typical life cycle of IKCs in a multi-party project:

- Allocation of the IKCs by the governing committees: This is the initial phase of the procurement of IKCs. At FAIR, the IKRB evaluates all IKC proposals or Expressions of Interest (EoI) and the Council approves them with the aim to ensure that partners can meet their IKC obligations within cost and schedule of the project. At this stage, it is imperative to define the deliverables clearly and the relative roles and responsibilities among the partners and with respect to the project baseline and technical scope as well as establishing an integrated project schedule and realistic cost estimates.
- Procurement phase: Procurement strategy, including technical, financial and legal frameworks, should be established early on. Usually, a common template is drafted to minimize contract handling. Such a template may include technical scope and detailed specifications including interface definition, project plans i.e. detailed schedule and specific deliverable milestones such as Site Acceptance Test (SAT) and Factory Acceptance Test (FAT), attributed financial value and financial control, appointment of coordinators for the contractual and technical follow-up, documentation and reporting, and quality management. Legal issues may include intellectual property and licenses, access rights such as non-disclosure agreements (NDA) and confidentiality

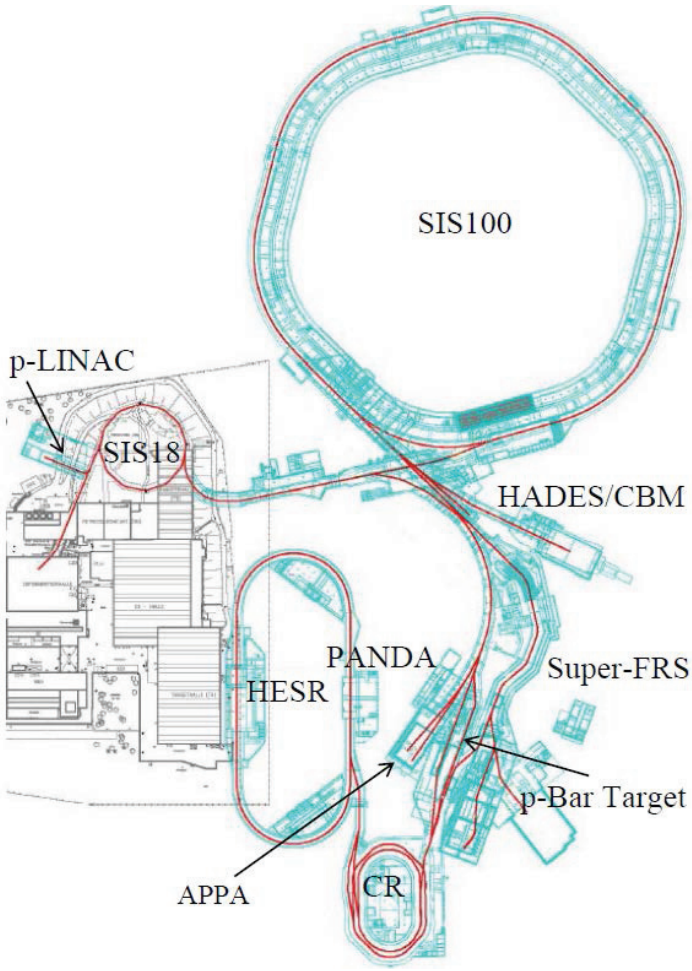

Figure 1: Overview of the FAIR accelerator complex and its planned experiments within the MSV [3].

agreements (CA), terms of delivery e.g. transport logistics and installation, customs duty and transfer of ownership.

- Monitoring the progress of the IKCs and follow-up: Once the contractual agreement with the delivering party has been concluded, a thorough follow-up plan should be implemented to track the progress of each IKC taking into consideration quality control, interface and technical integration management, and performance evaluation. Investment in managing partnerships by advocating a collegial and balanced view of a provider as a project partner and simultaneously as a delivering party should not be underestimated.
- Delivery of the IKCs: This is the concluding phase of the in-kind procurement life cycle. The supplier/representative of the project partner is responsible for the full delivery of an IKC – as outlined in the contractual agreement – before a partner or member country receives full accreditation of the value of the IKC. A continuous milestone validation fully incorporated and concurrent with the project schedule can facilitate the final assessment and accreditation.

In every step of the above life cycle, continuous project-centralized risk assessment and mitigation strategies should be implemented for the successful completion of each step.

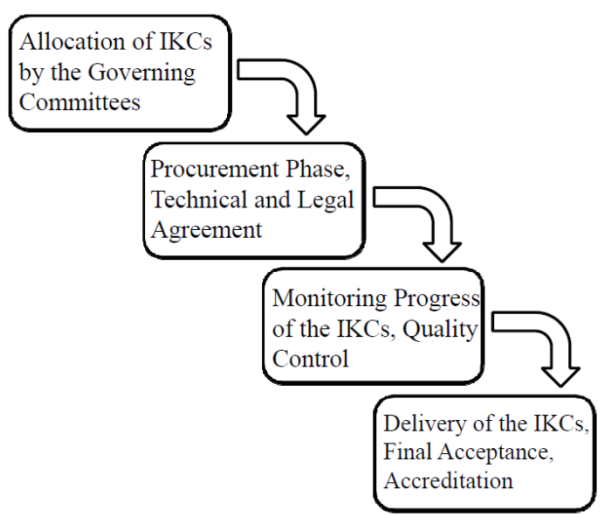

Figure 2: Life cycle of IKCs in general.

IN-KIND PROCUREMENT: OPPORTUNITIES AND CHALLENGES

Opportunities

Procurement via IKCs imposes both opportunities and challenges. It gives the opportunity for a contributing partner to bring in and implement a particular expertise and know-how to a project. Accordingly, it instigates pride for achieving a challenging technical task and being a contributing member of a multi-national science project. For example, FAIR's all-purpose Schwer Ionen Synchrotron (SIS100) and Super Fragment Separator (Super-FRS) (see Fig. 1) engage the expertise of the Polish shareholder in the field of cryogenics extensively. The contributing partner is solely responsible for the technical and financial management of an IKC until its delivery. Therefore, construction of different subsystems can proceed in parallel. SIS100 will be constructed via a parallel effort with IKCs from Germany, Russia, India, Poland, Slovenia and Romania. Through IKCs, contributing partners are not obliged to participate in a project through 'cash contributions'. This way, IKCs may be viewed as 'project currency' and hence, 'cash' is made available for other aspects of a project, such as conventional facilities.

Challenges

Special effort is needed to foster and manage partnerships particularly in multi-national environments where cross-cultural differences may influence the way management of a project is viewed. These cultural differences could be overcome by establishing a common governance structure and understanding among the partners. Close liaison and communication with the stakeholders and the in-kind providers/suppliers is of paramount importance as it maintains credibility with the stakeholders and cultivates trust. Generally, IKCs require a larger deal of administration and investment in order to proficiently handle managerial interfaces.

One major challenge faced with IKCs is the high risk which is embedded in this kind of procurement, namely, even with a legal contract at hand, a partner may not be able to deliver at all or within the schedule and/or quality. As mentioned in the previous section, continuous risk analysis and a thorough follow-up plan is needed to resolve issues which may finally delay the project as a whole.

Effective management of technical interfaces is mandatory where components from numerous partners contribute to the same system. For example, a major portion of FAIR's High Energy Beamline Transfer (HEBT) system will be procured via IKCs from Russia (room temperature magnets and the associated vacuum chambers), India (power supplies and related vacuum chambers for the beam diagnostics), Slovenia (beam diagnostics) and Germany (various components and instrument controls). 3D Digital Mock-Up (DMU) is used extensively to visualize and perform collision checks of this rather complex network of beamlines to rectify ambiguities due to technical interfaces as much as possible.

ROLE OF THE IKRB: IN-KIND PROCUREMENT AT FAIR

As one of the supervisory committees of the FAIR project, the IKRB assigns accelerator components among the FAIR shareholders based on their technical expertise and the number of shares they have requested. Therefore, its mandate spans both administration and technical aspects of the IKCs. At this stage, more than 85% of the FAIR accelerator components have been distributed among the FAIR shareholders. In addition, the IKRB devices and implements decision paths and procedures for the IKC procurement phase and subsequent follow-up (technical, financial and legal) of the procured IKCs. During progress monitoring, identifying roadblocks and conflict management, at the same time keeping an eye to cross-cultural diversity among the partners makes its role as a 'review' committee more compelling. IKRB takes note of the final delivery, and upon its recommendation, the FAIR Council accredits shares, i.e. value of the in-kind contribution.

CONCLUSIONS

In-kind (versus in-cash) contributions can be a prosperous model of procurement for large scale scientific projects taking into consideration both the opportunities and the challenges the in-kind model of procurement presents. The choice of the legal form of the company which administers a project has direct consequences on the procurement policies. In addition, effective decision making paths and organizational management is compulsory in order to guarantee success of procurement through in-kind deliveries. The role of supervisory committees to facilitate in-kind procurement should not be overlooked.

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