

Scientific Research Infrastructure for Maintenance and Networks (SRIMAN)

1.Preamble

1.1 It is now well established that one of the determinants of success in science and technology is the easy availability and access of high quality research infrastructure. Much of the success of the scientifically advanced countries can be explained by this. Research Infrastructure (RI) is a priority for funding agencies, policy makers and scientists. However, developing research infrastructure is very expensive and hence it becomes important for a developing country like India to carefully plan for it and develop mechanisms for its efficient use. RI has taken a centre stage among developing and developed countries with growing focus on enhancing social and economic value and promoting development based on science and technology. Therefore, development of scientific infrastructure is critical for advancement of nation with ease of access and greater emphasis for their optimal utilization.

1.2 India has made significant achievements in the scientific field since its Independence but much more is possible. Limited use of expensive RI leads to inefficient use of public expenditure which a country like India can ill afford. Since the issue is a serious one having country wide ramifications, an ecosystem approach to build quality RI and allowing easy access to scientists and academicians is perhaps necessary. Just focusing on procuring high quality expensive equipments for limited use may not be sufficient. We need to adopt a new approach and make such equipments available both across the grantee agency and to all scientists and other stakeholders in a region.

1.3 Hence, it is imperative that India adopts a Scientific Research Infrastructure Management and Networks (SRIMAN) Policy to address various issues for effective utilization of its research infrastructure. Since the requirements of the scientific research in the strategic sector are relatively different, for the present, it is being kept out of the ambit of SRIMAN.

1.4 SRIMAN entails the following components

- Procurement and maintenance of equipment and infrastructure for research
- Providing access and sharing of scientific equipment and infrastructure
- Disposal of scientific equipment and infrastructure
- Capacity Building of operators and technicians for efficient operations
- Monitoring of usage of expensive scientific research infrastructure
- Infrastructure Management for efficient operations

1.5 SRIMAN will promote creation of a regional ecosystem, by galvanizing relevant stakeholders of scientific research infrastructure that provides wider access to scientists, researchers and industry professionals across the country. This will also help in creating a pool of trained operators for operation and maintenance of the equipment.

2. Definitions

2.1 Research Infrastructure is a term used for facilities, resources and services used by the scientific community to conduct research. This includes major scientific equipment, resources such as archives of scientific data, e-infrastructures such as data and computing systems and communication networks and other such entities.

2.2 Sharing refers to providing access to equipment(s) in a laboratory/institute to scientists (inside and outside the organization) and other stakeholders, collaborators for the purpose of conducting an experiment/test for a fee or free

2.3 Regional Ecosystem refers to a set of organizations in close proximity of each other that collaborate with each other, share scientific resources, personnel to foster a sustainable network

2.4 Capacity Building refers to the process of providing training to improve the skill sets of a person esp. the operators and technicians of scientific equipments and infrastructure.

2.5 Infrastructure Management¹ refers to the management of various resources, people and equipment housed in a particular organization or institution to ensure optimal usage

2.6 Grantee Agency is an organization that receives funds from Govt. of India.

2.7 Granting Agency is an organization that allocates funds for scientific research (for both intramural and extramural research)

2.8 Total cost of ownership includes acquisition cost of the equipment (asset), its maintenance cost over its useful life, its operating cost over its useful life and all applicable taxes.

2.9 High denomination equipment has total cost of ownership greater than or equal to Rs. 10 Lakhs.

3. Need for the Policy

In recent years India has seen a growth in acquisition of research equipment (mostly imported). However, access to equipments needs attention. It is common to find in Indian laboratories, expensive equipments lying idle or underutilized. According to a recent study by NSTMIS, DST (2013), 94% of the research equipments used in India are imported while only 6% are being manufactured indigenously. Further, the study showed that large number of equipments are not shared and are marred with issues related to maintenance and want of spares. This adds to the burden of research infrastructure costs. A suitable ecosystem for sharing of scientific equipments is a solution to this problem. A culture of collaboration/sharing between institutions helps in optimum utilization of equipments resulting in better maintenance of the equipment. Simultaneously, it eliminates duplicate purchase of expensive

¹ The issue of infrastructure management is important because lot of high value research equipments malfunction due to lack of clean power, safe methods of disposal etc. Hence Infrastructure management group is important for grantee organizations.

scientific equipments. Greater awareness of available equipment can aid in cost reduction, attracting new minds to research and income generation from latent equipment through time sharing.

4. Objective

The objective of this policy is to facilitate the

- Simplified but smarter ways of procurement and maintenance of scientific equipments and infrastructure.
- Providing greater access to instruments funded by the Government of India and its agencies through a network all over the country.
- Providing a framework for smarter ways of disposal of dated equipments and infrastructure
- Providing a framework to improve and promote efficiency of operations of research infrastructure
- A broad template to monitor utilization of expensive research infrastructure.

5. Scope of the Policy

Applies to

- *All scientific departments and agencies of the Government of India and grantee agencies*
- *All Ministries and Departments of the Government of India and its agencies and organizations that support development of scientific research infrastructure.*

Other than

- *Scientific departments and agencies of the Government of India funding OR receiving funds for conducting scientific research in the strategic sector of Space or Defense or Atomic Energy.*

6. Benefits of SRIMAN

6.1 Maximizing use by providing equity of access: Ready access to government funded scientific research infrastructure will enable more extensive and optimal use of a valuable public resource for the benefit of the community.

6.2 Avoiding Duplication: By facilitating sharing of scientific research infrastructure and broadly monitoring utilization, duplicate purchasing of expensive scientific equipment will be avoided resulting in significant cost savings in research. This will also facilitate a mechanism to monitor the creation and maintenance of research infrastructure.

6.3 Efficient use of Public Expenditure: Sharing of expensive public funded scientific research infrastructure will improve the efficiency of the public expenditure and also help reduce brain drain. This will provide enhanced access to scientific research infrastructure to scientists, researchers and industry professionals.

7. Procurement

The Granting Agency will henceforth promote procurement, as a policy through **Government e-Marketplace (GeM)** for items which are available in GeM. Every grantee agency must establish a dedicated central procurement cell to oversee the procurement activities. For equipments not available in GeM platform, **procurement** will be promoted as far as possible through a central procurement cell in the grantee agency. While procuring, proper planning will be done to ensure that the equipment is procured and **maintained** for a reasonable time/productive life of the equipment. For high-value equipments (above Rs. 10 Lakhs), this life may be determined by a committee within the grantee agency (with representation from the granting agency) so that a “total cost of ownership” based decision can be taken instead of just asset acquisition cost. For lower denomination equipments (less than Rs. 10 Lakhs per equipment as total cost of ownership), every institution/organization must involve specialized people in procurement process for negotiations and management of procurement process to reduce the burden of the scientists in the procurement process.

Henceforth, the Government of India will also promote indigenous scientific equipments by encouraging domestic manufacturers. The granting agency will endeavor to put in place an advocacy mechanism to influence Indian researchers to use indigenous equipments. This mechanism will also help the equipment manufacturers in fine tuning equipment and making them world class. As far as possible, startups will be promoted in the indigenous manufacturing of equipments.

To promote an ecosystem and domestic manufacturing of equipment, it is important to foster trust within organizations. Domestic fly by night operators must be discouraged. To promote trust, a vendor rating mechanism will be developed centrally within the granting agency in which vendors can be clustered based on performance of their equipment and satisfaction of client organizations.

Granting agencies will ensure that when large number of research infrastructure grants is given to a cluster of grantee agencies within a radius of 25-30 Kms over a period of time then it will encourage the creation of a Central Instrumentation Facility within one of the prominent grantee agencies within the cluster with assurance of access to all stakeholders in the region. This would not only reduce redundancy in neighbouring colleges, institutions but also help in acquiring more variety of equipment with the funds received and thereby invite more expertise. Moreover, central facility guided by professionals can ensure the quality of equipment and vendor through active vendor evaluation, feedback archive and rate contracts. These professionals can be collectively termed as the Infrastructure Management Group.

8. Access and Sharing

For high denomination equipments, the Government of India henceforth will promote collaboration and sharing of equipment not just within the grantee agency but across other agencies too. In very expensive equipments, effort will be made to provide access to researchers across the country through a national portal. As far as possible the physical presence of the researcher in the premises of the grantee agency may be minimized so that the researcher may send the samples and the remaining activities may be carried out in the grantee agency's facility and the researcher be able to track the

progress of his sample testing through online tools like IP based cameras. Each grantee agency receiving such very high denomination equipments will have to sign a contractual obligation to ensure larger access to its equipment purchased through taxpayer money.

To promote ease of access, sharing and monitoring, the granting agencies will henceforth tabulate and put all equipments funded by it costing more than Rs.10 Lakhs on the World Wide Web to be accessed by all the researchers through a national portal. This portal will allow online booking of slots during idle time (after due preference to grantee agency). A reasonable fee to take care of maintenance and operator time may be levied on researchers. The industry researchers may also be given access but at an appropriate rate. The funding agencies will also endeavor to promote sharing of equipments by influencing other ministries and departments that support development of scientific research infrastructure as a culture change within scientific agencies.

Organizations like NAAC and others which promote excellence in academia may also take cue from this and give appropriate importance to this fact. A grantee agency rating system will be developed to rate Project Leaders and agencies on this aspect (sharing and collaboration of equipments) so that future decisions on project funding may be appropriately taken.

9. Capacity Building

Henceforth, while granting funds for scientific research, the granting agency will seek a plan (and be satisfied of its suitability) from Project Leaders on capacity building of operators along with any scientific project proposal put up for funding and special financial allocation will be made to ensure operators are up to date and are able to conduct tasks of managing the equipment to the best of their ability. As far as possible the funding agency would also like to urge grantee agencies to put all expensive equipments upward of Rs. 50 Lakhs under a **central instrumentation facility**²; the operation and maintenance of which will be vested with the grantee agency so that the ownership, both de facto and de jure, is vested with the grantee institution and not the Project Leader.

Henceforth the granting agency will also endeavor to strengthen instrumentation as a discipline in premier academic institutions and conduct events and programs to link the discipline to the practice and also with end users. The premier academic institutes where instrumentation is being pursued will also become nodal agencies for capacity building of operators with a mandate to build skills and develop skills not just for the existing demand but for the future too.

10. Disposal

It is acknowledged that scientific equipment has a finite life, which is determined by the relevance, physical wear and tear, and shift in research priorities. Hence it may not be worthwhile to quantify a fixed age for any equipment. However, to promote contemporary science, the grantee agencies are

² If such a central instrumentation facility, which carries out routine, preventive and breakdown maintenance, does not exist already, then it is desirable that such an organization be created within the grantee agency so that more people can get benefit of using expensive research equipment.

encouraged to dispose off equipments beyond their useful life in either of the following ways (keeping the granting agency informed and with their concurrence):

- a. Donate the equipment which is reaching a certain age nearing its useful life to colleges and other institutions as a way of Scientific Social Responsibility.
- b. Condemning the equipment and scrapping it. All audit requirements for scrapping and donating remain unchanged.
- c. Buy-back by supplier
- d. Existing manner of scrapping through Material Scrap Trading Corp etc.
- e. Using as an exhibit for creating awareness

11. Networking

To promote excellence in research and avoid duplication of equipment, the funding agency will also henceforth promote networking among grantee agencies to ensure that an ecosystem develops at a regional level and there is cross fertilization of ideas both on research as well as management of research infrastructure. This ecosystem will be based on the four pillars namely Research Infrastructure, Infrastructure Management Group, Maintenance and Training. The regional ecosystem will have a network of institutions and laboratories having common facilities of research infrastructure. Mutually beneficial consortium may be created with academic and research institutes that lie in close vicinity of each other or belonging to the same domain. A regional grid for commonly used consumables will aid in faster procurement of consumables for the laboratories and institutions in the region. A maintenance strategy should be created for the regional scientific research infrastructure which can adopt an in-house maintenance team or an outsourced model depending on the need and nature of the use of the instruments. Appropriate usage charges must be levied for use of the equipment depending on the nature of the users and the sample. A pool of trained operators must be created by the host institution with a provision for capacity building exercises to ensure minimal downtime. A professional infrastructure management group to ensure greater visibility and wider access of the scientific research infrastructure must be developed. This regional ecosystem will achieve the anticipated outcome of fostering sharing with the support from the initiatives and policies of the Government.

12. Legal Framework

Scientific equipments will remain the property of the granting agency however for operational reasons de facto ownership will be with grantee agency which houses the facility. Access to scientific infrastructure under this policy will not be in violation of any Acts and Rules of the Government of India. Legal framework of this policy will be aligned with various Acts and Rules covering the scientific research infrastructure.

13. Pricing

Usage charges of scientific research infrastructure, if any, would be decided by the Infrastructure owners and as per the Government policies. All Ministries/Departments/organizations will upload the pricing policy of the shared infrastructure and slots available for sharing under registered and restricted access within three months of notification of the policy. Broad set of parameters would be standardized and provided as guidelines for the use of scientific infrastructure owners.

14. Implementation

The following guidelines are being provided for the implementation of the policy.

The granting agency will develop a portal with updated information on all equipments over and above Rs. 10 lakhs. Grantee institutes will be required to provide details of the equipments and the idle time on their institutional websites in a standard prescribed format. This data would feed into the national portal where a union of all asset registers would also provide details of the idle time. This time can be divided into time slots and be made available to other researchers for a small fee. This portal would also allow granting agencies to monitor the availability and sharing of research infrastructure.

Procurement and Maintenance

- Every institution must set up professional procurement cell to take care of all procurement related activities of the institution. This agency would be equipped to handle procurement of all types of scientific equipment - high, medium and low end. Procurement of all equipment should be as per GFR 2017. Given the growing numbers of imported equipment, there should also be a push for the OEM to setup inventory of spares in India to reduce the cost of maintenance and spares procurement as well as reduce down time.
- As far as possible, procurement will be through e-procurement and Government e-Marketplace (GeM)³ to bring in transparency, efficiency and ease of access especially for low value equipment. However, if it is not possible to procure items via e-procurement through GeM, then procurement must comply with Rule 155 of GFR 2017.
- Given all conditions remaining the same, domestic manufacturers will be given preference
- A National Vendor Rating mechanism in which the grantee institutions can rate the performance of the equipment vendors based on credentials, manufacturing capability, quality control systems, past performance, after-sales service, financial background (Refer to Rule 150, GFR 2017) would be useful in weeding out fly by night operators.
- A holistic view of procurement will be taken based on the total cost of ownership in which not just asset acquisition cost but its operating expenditure will be taken into consideration but not limited to peripheral units that supplement the main unit like chillers, UPS, stabilizers, and Air dryers , provision for warranty, extended warranty, AMC and buy back of equipment and any other

³ When the implementation provisions of this policy is in direct conflict with Rule 149 of GFR 2017, provisions of GFR 2017 will prevail

component that makes the operation of the equipment smooth and hitch free for the entire life cycle of the equipment.

- For all new grants, an estimate of the utilization of the equipment would have to be provided and included in the Annual Report of the project so that the actual utilization and the estimated utilization can be recorded and measures taken to reduce variance
- All equipments should be listed in the institutional portal and national portal immediately after release of the first installment of the grant. The release of the second installment would be subject to the listing on the portal.

Sharing

- Tabulate and put all equipments funded by it on the World Wide Web to be accessed by all the researchers through a national portal. The same to be maintained as per the international standards equipment classification and interoperability for exchange of information. Each grantee organization would be required to provide details of the idle time of the equipments. The idle time would be made available in slots. The portal will provide online booking of slots, the contact information, fees and all other relevant information like instruction for sample preparation etc.
- A reasonable fee to take care of amortized maintenance and amortized operator time may be levied on researchers.
- The industry researchers may also be given access at a higher appropriate rate.
- Promote culture of sharing of equipment by encouraging all ministries and departments that support creation of scientific infrastructure to implement this policy in right earnest.
- Academic and research rankings of institutions, accreditation and certification should give due weightage to participation of grantee agency in such a scientific sharing regime.
- For equipment costing more than Rs. 20 Lakhs, the minimum time to be made available for sharing should be not less than 30%(except under special circumstances vetted by granting agency or its appropriate bodies under such agency).
- The sharing of equipment by the granting agency shall be counted towards their contribution to scientific social responsibility (SSR).

Capacity Building

- Whenever high-value equipment is granted a regional workshop must be conducted for capacity building.
- A standard procedure requiring user training by an application specialist as soon as systems are installed should be in place in all grantee agencies. Additionally, a user training programme may be provided to the interested users for the high value equipment by the instrumentation team on handling the equipment safely.

- Revamp and popularize Instrumentation as a discipline across all premier academic institutions like IITs.
- Manufacturer and suppliers who have more than five installations of equipment worth more than 20 lakhs must conduct atleast one workshop every year to discuss with stakeholders the intricacy of the working of the equipment, trouble shooting features best practices in proper scientific interpretation of results, routine maintenance and friendly disposal etc.
- The cost of equipment should include a component for capacity building and a maintenance plan.

Infrastructure

- Create regional scientific research infrastructure facilities in remote places through PPP model.
- Create common infrastructure facilities to provide access to high-end equipment for research. A model like Sophisticated Analytical Instrument Facility can be adopted for common research infrastructure.

Disposal

- Gifting of research equipment to Government funded colleges should be free of cost. However, while gifting the equipment to private colleges, the recipient organization should categorically acknowledge it on their portal and other relevant place with the undertaking to maintain for the benefit of all concerned. All such disposals must happen with the consent of the granting agency.

15. Conclusion

The policy aims to provide a framework for universal access to scientific research infrastructure to a wide range of researchers in the cities, towns and the hinterlands. Scientific Research Infrastructure being a capital intensive activity, wide scale replication may not be feasible for a developing country like India and hence the policy suggests measures to reduce the cost of ownership and increase the efficiency of public expenditure on research infrastructure. The policy also aims through its proper implementation to increase scientific output by wider access and reduce brain drain by providing access to wide section of researchers. The policy also seeks to address the need of grantee agencies to monitor the usage and ease of access of the funded equipment. The grantee agency will be responsible for the safe disposal of equipments and will ensure that environmentally hazardous pollution will be minimized in the process.

Schematic Model of SRIMAN

