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NFFA

Nanoscience Foundries and Fine Analysis

D4.3

Design of NFFA-RI Scientific Management

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TABLE OF CONTENTS

1. INTRODUCTION	4
1.1. PURPOSE OF THE DOCUMENT	4
1.2. APPLICATION AREA	4
1.3. REFERENCES	4
1.3.1. OBJECTIVE OF WORK PACKAGE 4	4
1.3.2. DESCRIPTION OF WORK BROKEN DOWN INTO TASKS.....	4
2. EXECUTIVE SUMMARY	4
3. BACKGROUND.....	5
4. THE NFFA-CENTRE STRUCTURE: LOCAL MANAGEMENT.....	6
4.1. THE PROGRAMME DRIVEN SOLUTION	6
4.2. SUPPORTING OPERATIONS MANAGEMENT	7
4.3. SCIENTIFIC AND FACILITY OPERATIONS MANAGEMENT	8
4.4. THE LOCAL ADVISORY COMMITTEE (LAC)	9
4.5. LOCAL SHARING POLICIES	9
5. THE NFFA-RI (RESEARCH INFRASTRUCTURE) STRUCTURE: CENTRAL MANAGEMENT	9
5.1. COORDINATED ACTIVITIES	11
5.2. THE NFFA HEADQUARTERS	12
5.2.1. PERIODIC REVIEWS	13
5.2.2. REGULAR NFFA-RI STAFF MEETINGS.....	13
5.2.3. MEDIA AND PUBLIC AWARENESS.....	14
5.2.4. PROGRAMME ASSESSMENT AND REPORTING	14
6. NFFA COMMON POLICIES	14
6.1. INTELLECTUAL PROPERTY RIGHTS (IPR) ISSUES	14
6.2. A COMMON CODE OF CONDUCT FOR NANOTECHNOLOGY	15
6.3. PROCUREMENT	15
6.4. RESEARCH ACTIVITY PARTITION AND STAFF RECRUITMENT.....	15
ANNEX I. THE TECHNICAL LIAISON (TL).....	16
REFERENCES.....	17

Deliverable D4.3: Design of NFFA-RI Scientific Management

1. INTRODUCTION

1.1. Purpose of the document

The purpose of this document is to describe the design of the scientific management of the NFFA-RI which will formulate the general and specific science plans and direct those plans with flexibility in order to serve the users in a particularly fast-moving and diversifying field of multi-disciplinary research.

1.2. Application Area

The targets of this document are the members of the NFFA Project, the EC Project Officers, and the general public.

1.3. References

Description of Work (DoW). See at web site:

http://www.nffa.eu/UserFiles/file/Annex_I_DoW.pdf

1.3.1. Objective of Work Package 4

To define the mission and general structure of the future NFFA-RI, including general management of the central RI and of the local facilities, access criteria via quick international review of projects.

Develop schemes for implementing an NFFA-RI data and protocols repository and to make it available to general users. Develop schemes for remote use of NFFA-RI.

Set quality standards of production. Define efficient user access.

1.3.2. Description of work broken down into tasks

The following task was defined in WP4:

T4.3) The Scientific Management of NFFA-RI will formulate the general and specific science plans and will steer the action with much flexibility in order to serve the users in a particularly fast moving and diversifying field of multidisciplinary research.

2. EXECUTIVE SUMMARY

The scientific management needs to be able to follow the rapid evolution of nanoscience and nanotechnology as well as emerging techniques pointing to atomic scale control.

The structure of the scientific management of the NFFA distributed infrastructure will be tiered such that two levels are relevant: the NFFA interface to the European researchers as a recognizable element of the ERA and, equally importantly, the local (national) level representing the actual environment of operation of each NFFA Centre. The Centres will operate autonomously at the local level, within the framework of the NFFA distributed infrastructure legal entity, mission and science programme, therefore optimizing their activity through full integration of skills and techniques and internal (inter-Centre) mobility of personnel. Advisory committees invited from academia and industry as well as representatives from the local large scale facilities (LSFs) will interact with the management to ensure that research follows the correct direction and is updated as time progresses.

The **local management structure** of each NFFA-Centre, as depicted in Fig. 1, will be Programme driven, that is the main scientific responsibility will be channelled in Scientific Programmes, under the

responsibility of Programme Leaders. The Scientific Programmes will be better suited to address scientific challenges and better guarantee the proper level of interdisciplinary research. In parallel Facility Managers will operate the instruments and run work-plans for users.

The overall research time at the centres is initially proposed as being 70% user programme with the remaining 30% being in-house research.

NFFA personnel will be either hired directly by NFFA or seconded (full time or part-time) to NFFA by other institutions for a given number of years (possibly reiterated). The limited duration of the ERIC itself will set the maximum duration of the contracts. Visiting scientists in sabbatical leave from universities or other institutions may assume temporary responsibilities of science activities of NFFA.

The **scientific research staff**, will allocate 50% of their work-time to the user programmes and user assistance, and the other 50% to NFFA in-house research programmes. **Facility research staff** will be mainly dedicated to the user programmes but have an optional quota of work-time, up to 15%, for specific in-house research projects, coordinated and monitored by the scientific management. Overall research personnel coordination will be anyway referred to the Programme Leaders. All other supporting activities (e.g. administration, services, ILO and user office) will be managed by a Managing Director.

The NFFA-Centre Scientific Director, the Managing Director and the Programme Leaders will constitute the Local Executive Board (LEB). Finally, a Local Advisory Committee (LAC) will be formed from representatives of local (national) academic institutions, industries and LSFs to give a voice to their needs and opinions.

The **central management structure** of the NFFA-RI, as depicted in Fig. 2, will operate with reference to the governance structure of the ERIC (or similar international legal entity). Top level management will consist of a General Assembly (GA, decisional body) and the Board of Directors (BD, executive body). They will be advised and assisted by the Scientific Advisory Council (SAC, consultancy body) and the Evaluation Panels. Technical Advisory Committees can be optionally appointed by the SAC for specific technical consultancy during extraordinary interventions (instrumental up grades or new investments). A User Association Committee can be also optionally set up by the user community. Finally a Scientific Committee (SC, which may include a number of staff-elected representatives) will operate to have an internal inter-Centre consultancy. Therefore there will be a reporting structure able to take into account all the scientific activities running throughout the NFFA-RI. In addition, Financial, Operations and Technical Chief Officers will be appointed to coordinate responses on local demands and needs in such a way that common strategies, policies and technical platforms will be found across the distributed infrastructure.

One NFFA-Centre will act as **Headquarters**, that is legal seat, central Administration keeping the central accountancy and coordinating local administrations, secretariat supporting the Board of Directors (drafting budgets, reports, minutes of Body's meeting, etc.) and central User Office acting as the single portal accepting proposal and managing their evaluation. It will host items and activities which cover the whole NFFA-RI (e.g. Data Repository hardware and maintenance and ICT platform, as well as administration functions, organization of periodic reviews, media and public awareness, programme assessments and reporting).

Finally, some other common policies will be adopted:

- The code of conduct for the nanoscience, as adopted by EU on February 7th 2008.
- A user-request-based IPR policy where non-proprietary data will pass through three stages: (i) non disclosure agreement; (ii) opening of the metadata to the Data Repository, which will lead to the use of the data via permission of the parent user (this can stimulate collaborations or exploitation of marginal data); (iii) complete open access to data and metadata.

3. BACKGROUND

The NFFA Centres will be working at the leading edge of research in Nanoscience. This is a fast-moving, multidisciplinary and diversifying field and continues to grow day-by-day in directions unforeseen only a

few years ago. The users will therefore approach the Centres with a wide range of projects and their access will be performed in a number of ways, which will to be periodically refined over time. The NFFA-RI will deal with:

- non-proprietary and proprietary research, including a smaller number of urgent proposals,
- research carried out by academic and industrial communities,
- experiments which are part of the user programmes or the in-house programmes,
- a common metrology and standards platform, but allowing for different specialities across the network of NFFA centres
- interfacing with the associated LSFs
- effective use of the Data Repository, for onsite operations and remote consultation.

The main purpose of the scientific management will therefore be to (a) give leadership for the first three points, in a balanced and consistent way with the mission (D4.1³) and the scientific programme (D2.2¹) of the NFFA-RI and to (b) implement in the most effective way the last three points, so as to ensure that the technical targets for quality and standards (D4.8⁷) are achieved. This will include effective exploitation of the associated LSFs and the proper data management.

At the same time as the user projects, the in-house research programme will be underway (D2.2¹). This will underpin the user projects, maintain the skills of the permanent staff members, keep the NFFA Centres at the leading edge of research and therefore establish the Centres as national centres of excellence.

As already noted in this project (D2.2¹), not all NFFA Centres will be identical. They will all have quite similar common facilities, providing the unified platform that guarantees reproducibility of basic nanofabrication/characterization steps and therefore fully transportable protocols, but each Centre will also specialize in its chosen area, with each being complementary to the others, within the framework of the NFFA scientific mission and SPs. These differences will be reflected in the distributed aspects of the scientific management and allow some level of flexibility between Centres through dialogue between local and central advisory committees. As a matter of fact, if a standard scientific advisory council will be necessary for monitoring the overall scientific output and strategy of NFFA, in the case of a distributed infrastructure also a local consultancy will be useful as the communication and feedback instrument for all stakeholders, partner facilities and funding agencies at local/national level. Furthermore the ERIC committee of EC, or similar Council in case of other legal forms, will be the “external” monitor of the effectiveness of NFFA as a key element in the ERA and consequently its eligibility to support measures for access, operating costs, upgrades etc.

Finally, there is the need to ensure the integrity of users’ intellectual property (IP). Unlike more conventional infrastructures, there will be many occasions where the IP has to be divulged among the centres (for instance for the maintenance of the common standard platform), as well as outside the centres through external access to the NFFA Data Repository. Rigid systems of maintaining IP security often found in other institutes and organisations can cause administrative bottlenecks, and therefore a more flexible but robust systems will be required.

4. THE NFFA-CENTRE STRUCTURE: LOCAL MANAGEMENT

4.1. The programme driven solution

For the NFFA-RI to function effectively, the management structure must extend across the entire distributed infrastructure, whilst allowing the individual NFFA Centres to operate autonomously on the basis of their specialities and local scientific expertise. For clarity, the reporting structure is therefore broken down into two components; the intra-centre management structure and the inter-centre structure. Care should be taken to not make the management structure too bureaucratic, as this will cause response times to lengthen, when the Centres need to be fast-moving, flexible and open to change, when needed (e.g. adding new disciplines).

Several organizational solutions, running for instance at the DoE centres or at other European nano-foundries, have been analysed. In many cases the solutions were found to be “facility driven management” solutions, where each one of the facility sectors (similar to those outlined in WP3, i.e. metrology, lithography, nano-bio, material synthesis, etc.) determine the coordination blocks from both the technological and scientific point of view. This means that the general scientific activity of the NFFA centre results to be essentially divided in thematic areas. Such a distribution will expose the infrastructure to the risk of creating sterile compartments, which are not well suited for interdisciplinary research as well as a static building-block of the scientific programme.

It is now seen that organization in projects is becoming more established, not only in private companies, but also in research infrastructures. A suitable solution for the NFFA would therefore be a set of coordinated facilities, linked by scientific coordination of a set of main programme projects (user and in-house) which flow throughout the various technological competences.

At the same time, a dichotomy between technical and scientific proficiencies must be avoided; therefore scientific push should have precedence over the facility management.

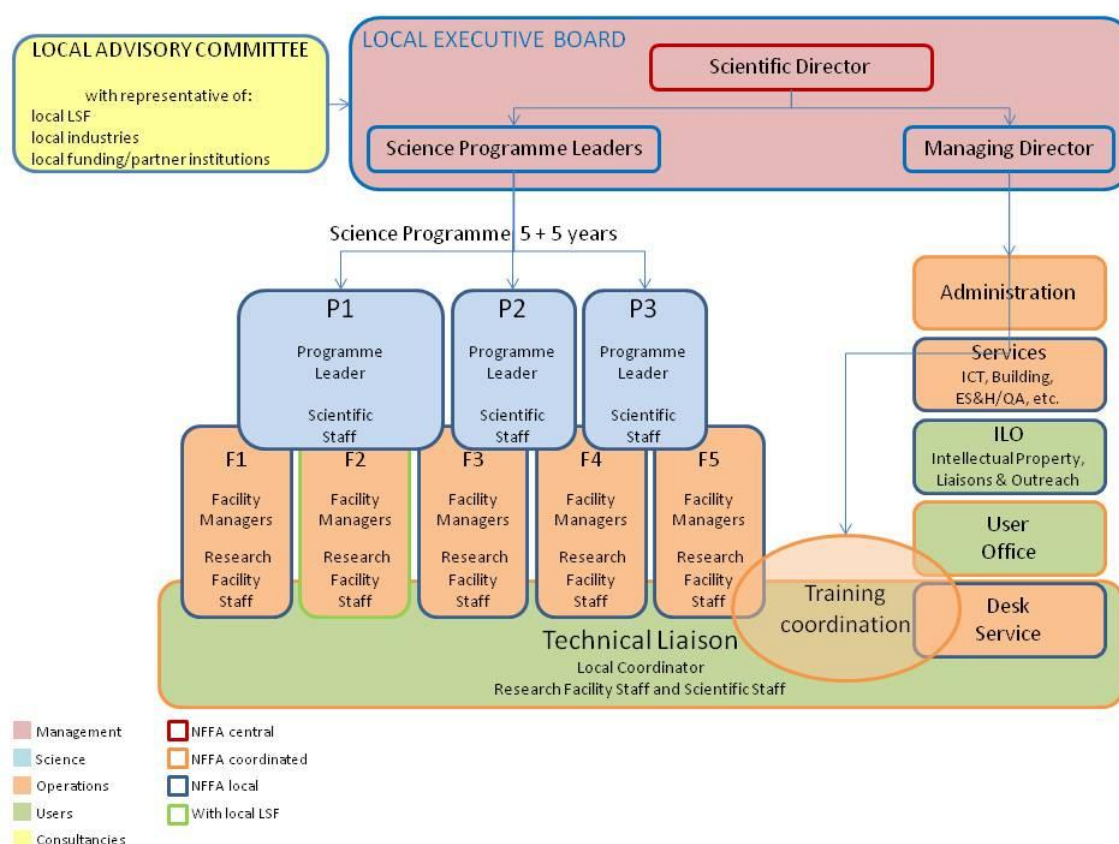


Fig. 1. The local management structure for a typical NFFA-Centre.

The scheme elaborated for the scientific management is shown in Fig. 1 and combines a traditional tree-like reporting structure with colour-coding by function. The **Local Executive Board** is made up of the **Scientific Director** of the NFFA-Centre, the **Managing Director** and the **Programme Leaders**.

4.2. Supporting operations management

Beneath the Scientific Director of the NFFA-Centre is the **Managing Director**, who leads the operations of all the supporting structures of the NFFA-Centre. His responsibilities also include all those which are not directly connected to the facilities and therefore are not related to the science and user programmes. Among these latter structures are:

- **Administration:** will operate at the Center level as a part of the central NFFA administration. It will provide the Centre with services (also to users), contracts & sales, financing, marketing and legal advice.
- **Services:** providing technical support for ICT, plant, power supply, buildings, etc. This includes Environmental Safety & Health (**ES&H**) and Quality Assurance (**QA**) issues, providing implementation and control of respective rules in line with national normative and eventual general rules set by the central NFFA Management. Agreements will be made with local institutions wherever advantageous for qualified services.
- **Technical services,** such as project design, mechanical workshops, electronic laboratories, software development, etc. must also be taken into account but it will be a matter for the individual NFFA-Centres whether to include them in their general services or to coordinate them in the Technical Liaison environment. The latter option is preferred as it is that a more effective connection between scientific and technical demands will be achieved – especially where a high level of in-house instrument development is carried out.
- **Industrial Liaison Office:** will act as the initial point of contact for industrial companies and provide help and assistance, as required. It will also have marketing and outreach functions for all users and just those from the industrial side. For more information see also D2.4. Technical-scientific support to industrial potential users will be provided mainly by the Technical Liaison, with the role of ILO being to accept the initial request and to deal with legal and economic issues for leading to the eventual contract, including intellectual property issues. ILO may also be appointed, when necessary, to set up quality standard for the management of customer commitments (ISO 9000-9001 standard – cfr. D4.8⁷).
- **User Office:** supports the users to go through the steps, as described in D 4.4. These include support during proposal writing from initial idea, proposal formalization and refinement of work-plans, user registration, arrival, security issues and training, logistic support, information of relevant events and deadlines, extension of IPR, dissemination and publication alerts.

The coordination of these supporting structures, will be the responsibility of the Managing Director. The Data Repository (D4.9⁸) will be of paramount help in connecting the several contributions from User Administration, ILO, Technical Liaison, as well as actions by the facility and scientific staff, because the DR will also track every action made by or for the user.

4.3. Scientific and facility operations management

The flow of the scientific programmes (user and in-house) will be managed by the **Programme Leaders** who are also part of the NFFA-Centre Executive Board. It is suggested that the appointed Director of the Centre is the Programme Leader who leads the prime specialisation of that particular Centre.

The scientific programmes will identify and pursue the scientific challenges associated with the main specialisation of the individual NFFA-Centres, as appointed by the Central NFFA-RI through its general scientific programme. These programmes are likely to be interdisciplinary and therefore will need the contributory activity of several competences available across several facilities. The Programme Leaders will then lead the scientific staff, carrying out the scientific programmes.

To optimize the operation of the facilities, the Local Executive Board will appoint **facility managers**. These managers will be responsible for coordinating facility staff which will be composed of technical staff and facility researchers (whose focus will be somewhat different to the science researchers – cfr. section 6.4). Finally, there will be a general coordination among the several facilities, implemented by the **Technical Liaison** (defined in the Annex I of the present document), dealing with the management of technical competences addressed to specific activities of the NFFA-Centre (common technological platform, instrument calibrations and round-robin tests, Desk-Service, technical support to inexperienced users in the proposal stage, instrumental development - in particular for technical solutions linking nano-foundry synthesis/patterning procedures with fine analysis techniques available at the associated LSF, Data Repository management).

The above can be summarised as:

- the scientific programme leadership will drive user and in-house scientific programmes by coordinating the scientific staff; the management structure itself, i.e. the list of the scientific projects, will be directly linked to the scientific programme, and therefore will be dynamic and progress down a long-term strategy path. Taking into account that a typical time to market for an emerging technology is about a decade, a 5+5 years project timescale would be appropriate.
- the facility management will oversee technical operations and will run work-plans in the facilities; it will be carried out in a larger portion by the facility staff whose management structure is competence based, resulting in a more static distribution with respect to the scientific needs; the Technical Liaison will connect several competences for specific missions.

The general rule is that scientific requests will be the guide for technical decisions.

4.4. The Local Advisory Committees (LACs)

The need for a local consultancy structure arises in order to inform and coordinate the action of the stakeholders of each Centre. The stakeholders include; representatives from the local LSF (who will help to optimise the link between NFFA Centre and LSF), local industries and local funding/partner institutions (including national and /or regional governments or agencies) and the representative entities (e.g. Research Institution) which may also be providing in-kind contributions such as buildings, services, seconded staff.

Local agreements and permanent collaborations with other public/private local research institutions will be crucial for the sustainability of the NFFA-Centre, in particular from the financial and societal impact points of view. It will be therefore duty of the Local Advisory Committees (LACs) to represent these needs and to propose strategies of outreach and to enhance the local scientific embedding of the NFFA-Centre.

4.5. Local sharing policies

The co-location of NFFA centers with LSFs and other existing research and service institutions will naturally provide opportunity to share infrastructure and services to be ruled by ad hoc agreements. For example this may include mechanical workshops, the ICT group or other technical-administrative services. Special agreements between NFFA and existing institutions may include integration of staff and infrastructure.

A key aspect is the sharing policy of **instrumentation and facilities**. For example NFFA will have to work-out agreements on the access to beamtime at the co-located LSF or to other nano-facilities. As it has been outlined in the Deliverable 4.56, a precise evaluation of the time which can be allocated to the NFFA user programme is needed. User access will be anyway more complex, because the time scheduling of the hosting institution must be considered and therefore a detailed quota and a properly anticipated scheduling is advisable in order to efficiently elaborate and simulate NFFA work plans.

Finally a sharing policy concerning laboratory space (**lab sharing**) will be considered. Lab-sharing consists of hosting in adequate available spaces top level instrumentation provided by an external institution. The interest of an external institution to implement a particular instrumentation in NFFA centres relies on the possibility of operating it in a well-supported nano-science foundry environment, with access to advanced complementary instrumentation and in close proximity to the fine analytical capabilities of the associated LSFs. NFFA users will have a certain quota of access to such unique instruments. The advantage for the NFFA centre is double: additional instrumentation and methods available at the NFFA centre and possibly an income obtained to rent the laboratory and to provide the services needed to operate it as well as any other nanoscience services needed to complement the main operations in the lab-sharing scheme.

5. THE NFFA-RI (RESEARCH INFRASTRUCTURE) STRUCTURE: CENTRAL MANAGEMENT

The governance structure of NFFA will consist mainly of three bodies. The **Board of Directors** of the ERIC, acting as the executive body, where the Scientific Directors of all the NFFA Centres are convened and complemented by three members, which are representative of the NFFA stakeholders but not directly involved in the NFFA management. The additional management structures will reinforce the distributed character of the infrastructure.

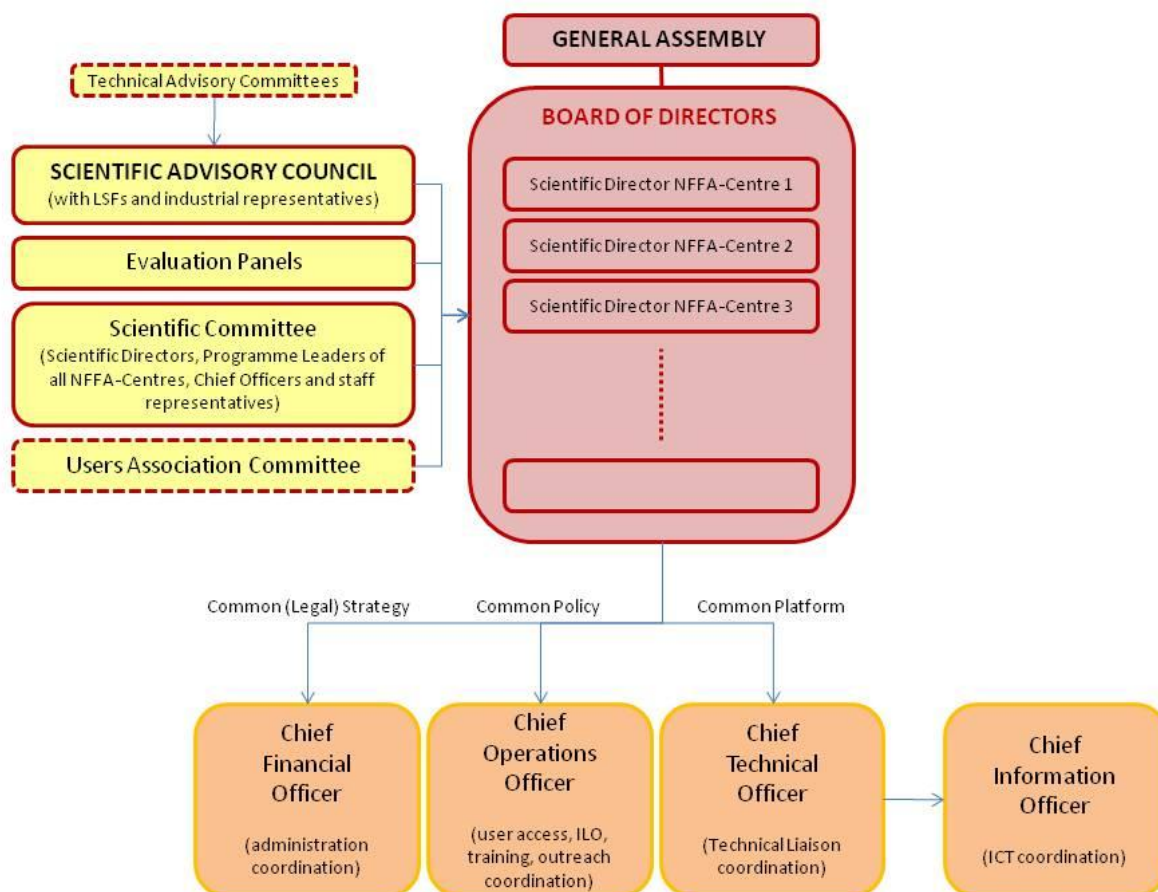


Fig. 2. The NFFA-RI central management structure. In bold characters the governance bodies are evidenced, while in dashed contour optional structures are specified.

Fig. 2 shows the central organization chart, where in bold characters the three formal bodies of the NFFA-ERIC are highlighted. The composition and regulation of the **General Assembly** and the Scientific Advisory Council (SAC) are given in document D4.2.

The **Scientific Advisory Council** will be composed of internationally recognised scientists and instrumentation experts, appointed for a term and chosen to cover as many as possible of the competences relevant to the research done in NFFA both by scientific staff and users. It will receive reports from the LACs, organize hearings of Centres or Facilities, and report to the NFFA-RI Board of Directors. The terms of reference of SAC would be:

- Receive reports from the Programme Leaders on the performance of the Centres, the user access and the in-house research programmes.
- Review and approve the projects for infrastructure and instrumentation developments
- Identify research priorities that will help shape the strategy of the NFFA-RI. This would include the best way to utilise the current suite of tools available across the network of Centres and to develop business cases for future investment.

- Inform and advise the Board of Directors of the NFFA-RI on opportunities to be pursued in research across the network, and the best methods for promoting these opportunities.
- Advise on best practise for industrial and academic engagement with the NFFA-RI, which is to include the nature of the research, in line with opportunities identified above.
- Carry out any other work as agreed with the Director of the NFFA-RI and his/her representatives.

It is important to note that the centrality of the SAC monitors the scientific strategy as well as the user policy of the whole NFFA distributed infrastructure. Technical Advisory Committees can be optionally appointed by the SAC for specific technical consultancy during extraordinary interventions (instrumental upgrades or new investments).

The **Evaluation Panels** are the appointed mechanism by which user proposals are evaluated. They are structured into different thematic areas, according to the articulation of the Scientific Programme and, if necessary, according to research tightly associated to specific scientific challenges, as well to time scheduling (normal or urgent access).

Other additional central structures or appointments are intended to make more effective use of the distributed character of the NFFA-RI.

The **Scientific Committee** (SC) which is composed, firstly, of all those with scientific responsibilities within the whole NFFA-RI; that is their Scientific Directors plus all the Programme Leaders. It has a scientific consultancy function charged with advising on all areas concerned with the scientific programmes at both network level and the individual centres. Other members of the SC includes: the three Chief Officers, and, optionally, elected representatives of the scientific staff, the facility staff and the technical and the administrative personnel.

A **User Association Committee** can be optionally set up by the user community in a self organised way. NFFA User Office will give all the possible support. In case, it will be in charge to organise the Users Meetings.

The Board of Directors will appoint the **Chief Financial Officer**, the **Chief Operation Officer** (appointed among the Managing Directors) and the **Chief Technical Officer** (appointed among the Technical Liaison Coordinators), They will be in charge of leading coordination activities (execution of common strategies and policies, elaboration of common rules, periodic meetings, etc.).

On top of the above structures, the best way to initiate inter-centre scientific interaction would be by running proposals whose execution moves through several centres with the aim of joining complementary aspects of synthesis and/or fine analysis available only at different sites. When combined with analytical facilities also only available at different LSFs this would constitute a rigorous test of the NFFA distributed infrastructure. Such a distributed proposal vision, must be steered by these central management structures and appointments.

5.1. Coordinated activities

The Centres must be able to communicate freely in all directions and exchange expertise and facility access to reflect the true, pan-European nature of NFFA. The overall NFFA central management structure, which would resemble that shown in Fig. 2, has to provide a coordinating role, to ensure users' needs are met in one NFFA centre, or another (or several) using the skills and information available from the Technical Liaison and Data Repository.

In detail, a high degree of coordination should be achieved in the following activities:

- Users access (common policy and coordinated inter-facility flow)
- Common platform (metrology and protocol standards)
- Data management
- Training
- Dissemination and public awareness
- Overall financing, legal issues and strategic support
- Programme assessment and reporting

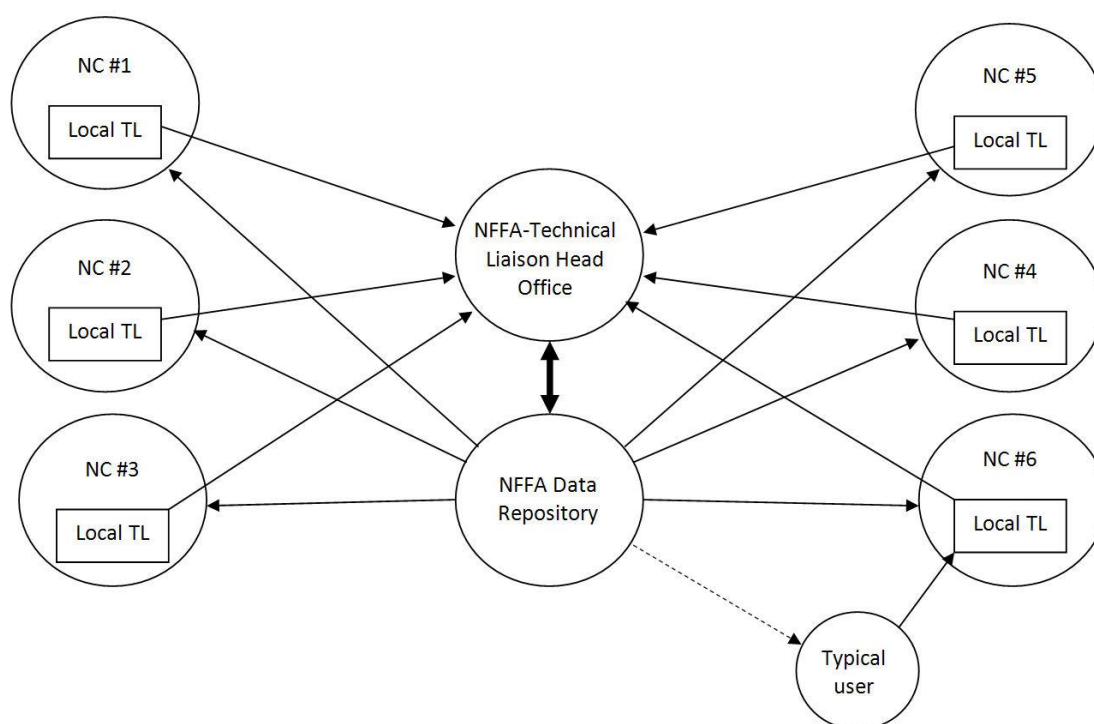


Fig. 3. Coordinated activity on the NFFA Data Repository. The dotted connection from the Repository to the “Typical User” indicates that the User may have limited access directly to the Repository depending upon status. The directions of the arrows indicate the direction of decisional/information flow.

As an example consider the action aiming to up-grade the metadata format, by means of introducing a new keyword in the Data Repository, in order to include new aspects (a physical parameter, a technique, a particular sample definition, etc.). Although the request originates from a specific user request or a local interaction between a user and the Technical Liaison, in order to ensure a common standard format and avoid unnecessary duplication and confusion, a corporate intervention is necessary and only the TL Chief Officer (appointed from the local coordinators of the TL) can acknowledge the change of the data format. A scheme is shown in Fig. 3, highlighting the information flow. To consult local experts in order to find the most appropriate solution and subsequently to disseminate the result of the intervention to the competent staff in all the NFFA Centres, will be a duty of the Chief Technical Officer.

It is clear that electronic communications will be a key function and the most effective hardware and software should be utilised from the start of the project. To ensure that this is the case, the individual Information Technology Groups should also be coordinated within the centres and across the infrastructure.

In a similar way, coordinated activities will be lead in other sectors (finance, operations) by the respective Chief Officers.

It is recommended that Chief Officers will organize regular cross-network meetings, mostly by videoconference, but there should also be face-to-face meetings on a regular, but on a less frequent basis. This could include, for example, an annual NFFA Workshop where experiences could be exchanged, successes celebrated and solutions to mutual problems which have arisen, discussed.

5.2. The NFFA Headquarters

One of the NFFA centres will be the NFFA Headquarters. It will mainly act as:

- Legal seat

- Central Administration keeping the central accountancy and coordinating local administrations
- Secretariat supporting the Board of Directors (drafting budgets, reports, minutes of Body's meeting, etc.)
- Central User Office acting as the single portal accepting proposal and managing their evaluation

NFFA Headquarters may host the hardware of the Data Repository. . The ICT group of the NFFA Headquarters may be responsible for the maintenance of the Data Repository and the ICT communication platform across the centres (web conferences and meetings, users accounts, etc.). Furthermore, as is usual in large research institutions, a common software platform could also be implemented for administrative jobs and this platform will be under the management of the ICT central unit. NFFA Headquarters supporting operations structures, as defined in section 4.2, will act as reference points for the other NFFA centres. It would be a logical consequence that the Managing Director of the NFFA-Centre hosting the Headquarters would be the Chief Operations Officer of the NFFA-RI.

A difference between coordinated activity and Headquarter actions has to be pointed out. While the former is a coordinated action where the NFFA-RI gives a response to a bottom up need, that is, started by a local need (even a user request) and where such a response has at least to satisfy to an internal standard, so as to be consistent with the distributed and common platform character, the latter is more likely a top down action, aimed at collecting information and initiating efforts at the local centre level whilst complying with top-level practices such that the NFFA infrastructure acts as a single entity (agreements with other institutions, participation to European initiatives, periodic reviews, etc.).

The NFFA headquarters will therefore be the natural premises for some common practices regarding the NFFA-RI as a whole and as a single ERIC. Among these practices, there will be the continuous improvement processes. It is important that the NFFA-RI moves forward over the course of its life and does not become entrenched in fixed ways of working. Therefore a policy of continuous improvement¹¹ is a key aspect to the continuing success of the network. This can be brought about in a number of ways, as briefly described among the activities listed hereafter.

5.2.1. Periodic reviews

They would look at, for example:

- The equipment usage levels, leading to a prioritisation list for new purchases, when additional capital funding is available.
- Equipment "up-time" statistics, showing reliability levels for maintenance contracts or equipment selection data for new purchases.
- Where additional staff or user training may be required.
- Block allocation usage (i.e. should the BAG be increased or reduced)
- New disciplines (i.e. what new technologies should be added, and where)

5.2.2. Regular NFFA-RI staff meetings

Intra-centre meetings: in order to keep the staff informed about local and network-wide issues good staff communications should be established. Best practise line-management techniques will deal with policy, safety issues, etc. but there should also be regular meetings where staff are able to discuss their particular projects and hence exchange skills and knowledge on a wide range of technologies in nanoscience and foster good team-working ethics.

Inter-centre meetings: regular meetings – many by video/telephone conferencing facilities, but periodically there should be face-to-face meetings (e.g. every 6 or 12 months) - these could be rotated around the partners' centres. As mentioned earlier an NFFA Workshop should be run on a regular basis, every 12 or 24 months to discuss all aspects of the NFFA-RI.

These will build upon the intra-centre meetings and allow good knowledge exchange across the NFFA-RI network, aid in the policy of continuous improvement and foster good working relationships between the staff of the various centres, all of which will ultimately improve customer satisfaction.

5.2.3. Media and public awareness

In order to address society-wide issues and concerns, media and public awareness must also be addressed. This could be largely carried out by the representative entities of the NFFA partnership, but there should also be contacts within the NFFA-RI. For example, a central public relations contact point could be set-up at the NFFA Headquarters and as it includes scientific staff and their work, is included here. Aspects covered would include:

- Media– radio, TV, press
- Web information– internal and external pages
- Special events– conferences, workshops
- Outreach– information to schools, colleges, general public
- Display area– posters, samples, guided tours

Scientific staff may be called upon to participate and therefore appropriate presentation skills would be a desirable part of the NFFA-RI training programme as described earlier.

5.2.4. Programme assessment and reporting

During the course of the project there will be regular review meetings which will examine how the various aspects of the project are progressing. There will be a policy of continuous improvement and this will be used to drive the project forward so that it maintains a high scientific reputation as national Centres of excellence.

At agreed times there will be reports and presentations to both the EU and national bodies. These presentations and reports will cover all aspects of the NFFA-RI impact on science, economy and society.

6. NFFA COMMON POLICIES

6.1. Intellectual Property Rights (IPR) issues

Users with access (or requesting access) to the NFFA-RI Centres may arrive with data or intellectual property, or may have to provide such information as part of a proposal for the peer review bodies at the Centres. In many cases this IP will be in the public domain (and protected as appropriate) but in other cases it will be confidential or commercially sensitive. Most organisations wishing to become a partner in the NFFA network will already have policies for the handling of sensitive information, but in all the above cases, the NFFA-RI has a responsibility to ensure that the information provided is held securely.

The EU has a number of documents covering this area, for example, “Commission Recommendation on the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organisations.”¹² and “The management of intellectual property by public research organisations”¹³.

We suggest that all information from all users (and those submitting proposals) should be stored in a secure data storage device and time/date-stamped to show when it was first received by the Centre. Also in order to satisfy adequate quality management, any subsequent access to this could also be logged and a data trail generated. If required at the NFFA Headquarters or other Centres, the data would then be securely transmitted and another (but linked) data trail generated by the recipient. Any queries regarding the use and viewing of the information could then be answered.

The proposed user-request-based option for non-proprietary data is that the IPR could be handled in several stages:

- Stage 1. For a time window of (say) three years data will be accessible only to users and collaborators and after which the data will be free to be published for open access into the data repository. If, within those three years a patent pending or patenting intent is addressed, additional Non Disclosure time windows will be provided, via ex-post evaluation on the previous window. The

evaluation will account for actions made by the users (patent filing, contracts with other institutions, etc.) and prior art reports. Therefore the main IPR criterion is based on a user request basis, thus avoiding stringent fixed rules which may act as bottleneck.

- Stage 2. The metadata will be open for a “read only” external access; eventual use of the data will be subject to permission by the parent user. This can stimulate collaborations and the exploitation of non-published or marginal data.
- Stage 3. After, for example, ten years the data will become completely free with a caveat that there is always a citation indicating the source of that original data. Therefore, from the meta-user point of view, whenever an access request to read or download data or protocols from the NFFA data repository occurs, the external meta-user will be asked to accept terms and conditions in order to properly refer to the source and its property rights, however that data is used.

Industrial property and in general IPR concerning private institutions, will be properly managed in order to avoid even non controlled internal leak among the NFFA staff, that can eventually translate in an external leak. Only NFFA employed staff will have access to sensitive information regarding proprietary research and industrial property.

6.2. A common code of conduct for nanotechnology

An important aspect of the safety issues related to nanoscience and nanotechnology is that of nanotoxicity. Indeed, a dedicated Working Group of the ISO Technical Committee is charged with delivering technical documentation on this topic. Due to the urgency of the situation, on February 7th 2008, the EU adopted a Code of Conduct¹⁴. Based on seven general principles covering issues such as sustainability, precaution, inclusiveness and accountability, the Code of Conduct invites Member States to take concrete actions, involving universities, research institutes and companies, for the safe development and use of nanotechnologies. As a first institutional step toward regulation and safe research and development activities, the NFFA-DS adopts the contents of this document.

6.3. Procurement

A facility accepted as an ERIC is granted a number of benefits, such as VAT exemption and not having to follow Official Journal of the European Union (OJEU) regulations as rigidly as would normally be expected. However, the procurement policy still has to reflect the principles of non-discrimination, transparency and competition¹⁵.

For important investments, like the initial setting-up of the centres, once the equipment requirements and specifications have been decided, the procurement has to take place preferably in the following phases; (a) identification of key suppliers; (b) tender action; (c) vendor visits to evaluate equipment; (d) identification of supplier; (e) purchase; (f) delivery; (g) installation.

For the key pieces of equipment, the knowledge of staff and user experts will be vital for identifying the best option (a balance between best performance and best value for money). Duration of procurements must be commensurate with its aims; for emergency interventions aiming to guarantee the user programme scheduling, the response must be adequate and redundant operations must be avoided, though ensuring the due transparency.

6.4. Research activity partition and staff recruitment

The overall research time at the centres is initially proposed as 70% user programme with the remaining 30% being in-house research. In a complex infrastructure, where proposals pass through several facilities which share time with other running proposals, it will be not easy to schedule access for achieving a precise partition of the research activity. The Data Repository will log all use of all tools and instruments and will thus enable monitoring of the time spent for both user proposals and in-house research and will help to manage access with the aim of maximising the useful time and minimising clashes between users

operating in the same facility. Simulation software which uses detailed information on access requests stored in the Data Repository can eventually help in elaborating work plans.

In order to satisfy such the aforementioned time allotment, the NFFA staff will have to share its manpower between the two programmes. For the **scientific research staff** a 50%-50% sharing between user research and in-house research is suggested and is well suited to maintaining a high profile in terms of scientific skill and motivation. On the other hand, to guarantee the strategic and technological achievements, **facility research staff** fully dedicated to operating and upgrading the facilities, have to be included. However, with appropriate approval an option allowance of up to 15% of their time for in-house research activity will be possible within the NFFA mission. The former typology of employment is preferential for the scientific staff in charge of advancing the in-house scientific programme, the latter typology is instead more suited, for instance, with the duties of the Technical Liaison; indeed such activities devoted to common platform, user consultancy and desk service should be more attractive for the involved personnel and more effective for the NFFA-RI, if carried out in an inter-facility and inter-centre coordination, with respect to isolated activities carried out facility by facility.

NFFA personnel will be either hired directly by NFFA or seconded (full time or part-time) to NFFA by other institutions for a given number of years (possibly reiterated). The NFFA employees will be hired according to the national legislation of the Country hosting the Center. The limited duration of the ERIC itself will set the maximum duration of the contracts.

Visiting scientists in sabbatical leave from universities or other institutions may assume temporary responsibilities of science activities of NFFA.

Finally, post doctoral positions will be offered to integrate the scientific staff and PhD students can be based at the NFFA center provided their research program is supervised or co-supervised by NFFA staff.

ANNEX I. THE TECHNICAL LIAISON (TL).

The concept of Technical Liaison is imported from the National Nanotechnology Infrastructure Network (NNIN) initiative in USA¹⁶. In that case *“**Technical Liaisons** are a subset of the NNIN staff, available to help users define their project and assist them in their execution. Their expertise is particularly important in cross disciplinary fields, or for new users to a field, as they can relate the knowledge of a specialized area (biology, for example) to the broader view of nanotechnology. As part of NNIN, their relationship with users, however, would not be one of collaboration but as staff adviser and technology expert.”* NFFA Technical Liaison is an extension of this concept, more appropriate for the peculiarities of the NFFA-DS.

The NFFA Technical Liaison (TL) will be made up of personnel across the NFFA Centres, operate under a defined set of rules and procedures and manage the technical competences in the following areas:

- Users consultancy (scientific and technological support to inexperienced users also including activities promoted by the ILO and addressed to industrial potential users)
- Common metrology and protocol standard development and maintenance
- Data Repository management
- Local Desk Services – set-up to provide support for quick characterisations by means of the well-established common metrology platform available at the NFFA Centres as well as rapid fabrication or synthesis by means of standardised protocols.
- Characterization of associated LSF methods and development of technical solutions to link nanoscience instrumentation at the NFFA centres with analytical methods at the associated LSFs.

The personnel involved will comprise both research and technical staff and will work, in a close collaboration across the Centres, to develop interdisciplinary skills with a good knowledge of all the facilities in the NFFA Centres which are useful to the above listed activities.

Clearly, such a widespread knowledge set-up will not substitute or overlap with high level scientific competences of personnel focused in specific areas or facilities. An editorial-like approach will provide the connection between the two: whenever a specific competences is requested to the TL, for instance in order

to provide a proper technical-scientific support to an idea by a potential user or when implementing a common protocol, the TL can call for a review, referring to the widest scientific community of the NFFA centres, i.e. the scientific staff and specially qualified users, acting as referees. In such a way a peer review-like method will account for the technical evaluation.

The following few examples will give a more clearly defined role of the TL.

1. Whenever an idea is submitted to the NFFA centres and needs technical competence for developing a properly complete proposal, the TL, after an initial rough filtering with regard to the real capabilities of the NFFA facilities, can process the technological support request. The high academic level experiences available in the NFFA Centres will be used to referee the request and to connect it with the proper NFFA staff. In doing this the TL staff will also improve its technical background.
2. Whenever a procedure is ready to become a common (internal) standard, a round robin activity may be necessary and, finally, an adequate data/metadata format must be taken into account to publish the standard in the Data Repository. This will be a duty of the TL staff, operating at the several NFFA centres. In this way they will enhance their technical background on the NFFA capabilities and they will exchange information on the Data Repository management.
3. They will approve a new “keyword” for the Data Repository, whenever a request will be made by a user or by the NFFA staff and verify the proper interoperability with the Data Repository assignments with respect to proposal forms, data format and technical liaisons.
4. They will be in charge for carrying out the Desk Service, meant as a short time (few hours) technological support, mainly in terms of well-established imaging (e.g. scanning microscopes) and characterization (e.g. EDAX or diffractometers) tools. This activity will allow the TL staff to acquire or improve technical competences on tools that will form the core of the common metrology standard system.
5. In order to maximize the action of linking nanoscience technology and analytical methods at the LSFs, a development activity will be initiated. This will involve the characterisation of radiation based techniques for subsequent calibrations as well as the implementation of technical solutions for a reliable connection with synthesis capabilities at the NFFA centres and is well suited for the TL staff. This will result not only in a more practical transfer into the “common” metrology and protocols system as well as into the Data Repository, but also in assigning to the TL staff a high profile in the NFFA mission and programme.

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