Project No. FP7 – 212348

NFFA

Nanoscience Foundries and Fine Analysis

D2.3

NFFA Roadmap

Work Package	**No.2**
Work Package Title	**Analysis of users and science programme, development of NFFA roadmap**
Activity Type	**RTD**
Lead Beneficiary	**No.2** **STFC**
Estimated P/Ms	**13**
Nature	**Report**
Dissemination level	**Restricted**
Delivery Date	**Contractual** **M29** **Actual** **1/11/2010**
Task Leader	**G. Arthur (STFC)**
Major Contributors	**G. Rossi, R. Ciancio (CNR-IOM)**
Other Contributors	**C. Africh, R. Gotter (CNR-IOM), L. Fonseca, E. Lora-Tamayo (CSIC-CNM), J. Gobrecht (PSI), H. Amenitsch (OEAW), J. Greenhalgh, E. Huq (STFC)**

Delivery Slip

	Partner/Activity	Date	Signature
From	STFC	01/11/10	Graham Arthur
Reviewed by	CNR-IOM	17/11/10	Rossi
Approved by	COORDINATION BOARD	19/01/11	All

Document Log

Issue	Date	Comment	Author
1-0	13/12/10	Partly approved version by CB, adjustments requested	Rossi, Ciancio
2-0	19/01/11	Approved version	Rossi, Arthur, Ciancio
2-1	31/01/11	Consistency check and submission	Rossi, Arthur, Ciancio, Africh, Orani

Document Change Record

Issue	Item	Reason Change

TABLE OF CONTENTS

Deliverable D2.3: NFFA Roadmap

1. INTRODUCTION

1.1. Purpose of the document

The purpose of this document is to describe the roadmap towards the setting-up of the NFFA-RI Distributed Facility.

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 2

- Survey and analysis of LSF Users
- Explore the range and size of the general nanoscience community benefiting from NFFA-RI
- Define the Science Programme of NFFA-RI and its implementation schedule

1.3.2. Description of work broken down into tasks

The following tasks are defined in WP2:

T2.1) The detailed analysis of nanoscience users needs in the perspective of the next 10 years will be carried out by the proponent participants. All participants will compare their medium term plans and those of other European institutions in the field in order to understand the patterns of investment in nanoscience and the way NFFA can intervene.

T2.1.1) A survey of established collaborating groups operating at LSFs will provide a complete map of the existing distribution of competences in nanoscience that already operate synergies with LSFs and the pattern of specialized centres that can emerge from it.

T2.1.2) A survey of nanoscience activities that are NOT involved with LSFs but would benefit from NFFA either becoming users of NFFA and LSFs, or becoming users of the NFFA repository of data and standards.

T2.2) Definition of a science program for NFFA-RI which will be composed of two synergic activities: the in-house research projects under the responsibility of NFFA-RI staff and associated scientists and the users' scientific projects.

T2.3) Definition of a roadmap for the construction of NFFA (localization of potential sites, definition of a time scale for construction phasing).

T2.4) Set-up an Industrial Liaison Office to manage economical and R&D relations with external companies. Public and private/public projects will be considered taking into account procedures for intellectual property protection.

2. EXECUTIVE SUMMARY

This document describes the roadmap for the setting-up of the NFFA-RI Distributed Facility. The key steps are discussed in detail from Section 4 onwards. The roadmap will follow the steps A to E outlined below:

A. 2010. A Memorandum of Understanding (MoU) will be proposed for signature by the NFFA partners, and possibly new partners, for the implementation phase of NFFA. The MoU includes both the agreement on the development of an European Research Infrastructure Consortium (ERIC) for the full implementation and operation of NFFA, and an agreement to proceed to short term implementation of the NFFA Demonstrator using existing facilities and to seek adequate funding.

B. 2011. Application to ERANET/ERANET+ in 2011 and to Integrated Infrastructures Initiative (I3) calls in WP2012 of FP7 will be made in order to assure funding for supporting the initial implementation of NFFA with an initial programme of users access based on existing facilities.

C. 2011-2014. A small-scale, "demonstrator phase" for the NFFA-RI network. It would have at least 3 Centres and use existing facilities and equipment. It would operate along the same principles as those intended for the full NFFA-RI and would demonstrate the proof-of-concept for the full size distributed facility. The NFFA Demonstrator will be based on substantial in-kind contribution from the participating partners (hosts) and on additional financial contributions (e.g. FP7) that will support the research activities and the open access by users.
   Option (a). One possibility is to access the integrating activities planned by FP7 in the Work-Plan 2012 for Research Infrastructures. To this end, a request has been made to the Programme Committee of FP7 for Capacities-Research Infrastructure with a view to adding a Topic suitable for NFFA. At the time of writing, explicit support has been received by the Commission from the Spanish, Swiss, Italian and UK delegates. The I3 contract could support open access operation, joint research (development of common metrology) and dissemination/training to NFFA users that could have a well defined access to the participating facilities.
   Option (b). Also to be explored is the possibility of an ERANET call in February 2011.

D. 2012. Full NFFA-ERIC proposal/business cases will then be submitted to National governmental bodies and EU. Within the ERIC status it is envisaged that capital costs will be borne by the national governments, VAT and other excises will be waived, and substantial contributions to the operating costs will be provided by EU under FP8.

E. 2013. Once the ERIC status (or other international agreement) has been obtained, the setting-up and operation of the distributed facility will begin. This will take place in two phases. Phase 1: Centres will be the first to begin construction and come on-stream. There will most likely be 2 or 3 such Centres. 2 to 4 Phase 2: Centres will follow-on from Phase 1, but will benefit from the feedback of solutions to the issues encountered in the Phase 1 build. The target number of Centres is 5 to 6.

A Gantt chart is presented in Appendix A covering both Options and show approximate timescales for the setting-up of a typical NFFA Centre and assume a completely new-build situation for one of the final Centres.

The steps for implementation of the NFFA Research Infrastructure are indicated in this roadmap and will make full reference to the relevant work package and deliverables of the NFFA Design Study.

3. ESFRI ACTIONS

The NFFA concept was included in the ESFRI-2006 Roadmap in the "emerging proposals" section under the name "nanoscience".

The following updates of the ESFRI roadmap classified NFFA in the landscape of the regional-relevant infrastructures (at the time of the ESFRI 2008 Roadmap, the NFFA DS was only just starting) or could not include the NFFA project due to the limitation to restricted themes for the ESFRI 2010 Roadmap (Energy, BioTechnology, Food, Agriculture, Fishery).

In 2010 ESFRI has set-up an independent working group to assess the perspective of the European analytical facilities (WG Analytical Research Infrastructures). In the WG ARI report NFFA has been mentioned twice as a relevant opportunity. The ESFRI-2010 update was limited to Energy, Biotech, Food and Fishery. No new projects in material science and analysis or nanoscience were admitted. Nevertheless NFFA was presented since material science and nanoscience research do have a very relevant impact on the efficient use of energy. The assessment of the ENERGY WG 2010 is as follows:

> *"The basic idea behind this proposal (NFFA) – namely to use highly advanced equipment at large scale facilities (LSFs) in the fields of nano-science and -technology and to further advance the beamlines/spectrometers is of importance, timely and indeed relevant. This is also the idea behind for instance the GENNESYS report referred to in the proposal.*
> *However, the proposal is not an energy research infrastructure but suggests the creation of an open access platform for all scientists within nano-science and -technology. Nano-science and -technology could potentially be relevant for energy research, but the approach within NFFA is extremely broad. In the field of the project even a single topic requires a very wide range of experimental tools and highly specialized experts to proceed."*

NFFA has also been analysed by the ESFRI European Physical Society Technical Working Group (EPS TWG) and defined as being, among the other existing initiatives in matter of Research Infrastructure, the closest in design to the Distributed Infrastructure concept defined by ESFRI.

Overall ESFRI has noted that the ESFRI Roadmap is weak in the field of nanoscience and nanotechnology. In particular, in the ESFRI Strategy Report 2010 and Roadmap Update the crucial need for the co-location of analytical facilities and nanoscience centres is clearly highlighted. As defined in the document, "a closer and enhanced co-operation of research infrastructures to form new European strategic partnerships should be encouraged. [...] ESFRI and the European Commission should continue their important role in incubating and catalysing decision processes for future large research infrastructures, and supporting their development through preparatory phase programmes, integrating activities and design studies."

NFFA could be therefore an excellent RI to be included when a future update (2012) includes such a theme.

There is a substantial endorsement of NFFA although it has not so far been included in the Roadmap. This implies that within FP7 NFFA will not be eligible for Preparatory Phase contracts.

It is to be noted that NFFA is mature for an implementation phase rather than for a preparatory phase and this NFFA-roadmap identifies the scenarios that may lead to implementation, also applying to FP7 instruments that are available and that appear suitable.

The NFFA Design Study will include a prototype of an ERIC statute for the NFFA Distributed Facility to be implemented. The ERIC statute will be further developed with the national authorities of the candidate participating Countries.

4. STEPS TOWARDS IMPLEMENTATION

4.1. Memorandum of Understanding

Approaching the end of the NFFA Design Study it has been understood that steps toward the implementation must be made involving the institutions that participated in the NFFA DS first.

A letter will be sent to all Partner Institutions, at top management level, to gain support for further action. The letter will mention the opportunity to proceed with a Memorandum of Understanding for the implementation of the NFFA research infrastructure, via the initial agreement on a Demonstrator Phase to be based on integration in the NFFA scheme of only already existing laboratories.

An important step in the NFFA Roadmap will be the establishment of a Memorandum of Understanding for the implementation of NFFA. The MoU step is a useful and common practice in international collaborations and in all European processes leading to new Research Infrastructure. The MoU will establish a collaboration towards the implementation of NFFA, it should describe the intention to support NFFA with in-kind and in-skill contributions by the partners, but NO specific financial contributions. It remains that NFFA must obtain NEW resources in order to exist and that the MoU is a step towards that goal, so no financial implication should be connected to the MoU. The MoU will indicate the intention of developing the ERIC concept for the full implementation of NFFA and, in that framework, to explore all possibilities for assuring the medium-long term sustainability of the Distributed RI.

The MoU shall be circulated for agreement and signature before the end of the NFFA Design Study.

4.2. CE instruments for starting the implementation

The implementation of NFFA, based on the MoU, will need specific resources. Applications to ERANET in 2011 and to I3 (if a suitable call in WP2012 will be included) may provide adequate support for an early phase that we define “NFFA Demonstrator” in which a limited, but relevant, users programme will start at those existing centres that do have capacity to assure it, by operating a substantial alignment to the NFFA technical and operational standards.

Application work for the ERANET should start in November 2010. Application to WP2012 I3 should start in spring 2011.

4.3. Demonstrator Phase

This possibility would enable a demonstrator-scale distributed facility to be set-up and operated. It would utilise existing facilities (co-located with LSFs) and their existing equipment and would run for up to 4 years. This phase would be assessed during the final year of operation and the experience gained will be fed into the business cases and proposals for the full NFFA-RI (ERIC). Construction of new facilities and/or substantial upgrade of those involved in the demonstrator will start.

Steps of the demonstrator phase include:

- Full assessment of the current capabilities of each proposed Centre. This is to a good extent done in the WP3, D3.7.
- Setting-up of the proposed management structure
- Creation of the appropriate advisory panels and committees.
- Harmonisation of IT facilities across the centres, including installation of secure servers for data/information from future users, adding of centre capabilities, staff, etc. into database/repository.
- Marketing for the Centres.

- On-going review of operations during the course of the project.
- Presentation of results to EU and National bodies at agreed times during the course of the project.
- Assessment of the project and final report.
- Writing and submission of business cases/proposals for full NFFA-RI (ERIC).

4.4. Writing of the Business Case for NFFA Centres

The cost analysis of NFFA is carried out in WP4 of the Design Study. This includes capital cost including civil engineering for new sites or adaptation of existing buildings which are very dependent on the final choice of the sites for the Centres, capital cost of equipment, and operational costs.

Of these the first two categories (capital costs) shall be mostly covered by national programmes of the host countries. The added financial value of the ERIC status would be the VAT and excise exemption of all expenditures and the CE contribution to the operating costs assuring the open access of the infrastructure. A detailed and robust business cases will be written by updating the NFFA Design Study results, particularly in view of the measures that will be adopted by FP8, at the time of submission of the construction plans at both National and EU level.

The business case will summarize the outcome of the Design Study and in particular will identify the items described later in this document and give solutions to the issues therein. It should address the following points, along with the legal status (ERIC or other) and the statute:

- Strategic Case for the NFFA Centres – i.e. technical and scientific reasons of the NFFA distributed infrastructure with centres co-located with Large Scale Facilities; location of centres; stakeholders; how the centres will transform the scientific and technical environments for nanotechnologists and how this will benefit the individual nations, EU and society; letters of support from national institutions, academia and industry.
- Operational Case – i.e. how the centres will be staffed, equipped, operated and marketed, both individually and as a distributed infrastructure.
- Financial Case – i.e. funding required for (i) capital costs (e.g. buildings and major equipment) and (ii) operating costs (maintenance, running cost, staff); who will supply the various funding phases; spending plan (with 5-10 year look forward); procurement strategy.
- Project Management – i.e. architectural design and drawings, seismic and EMI surveys; construction of buildings and associated infrastructure – or modifications to existing buildings, if used; fit-out; procurement and installation of equipment (scientific equipment, information technology, networks, etc.); staff recruitment and training; ramping-up to full operation.

4.5. Identification of locations for Centres

It is envisaged that the implementation will take place in two phases – firstly three centres will be required to set-up an ERIC and therefore will require funding and site decisions after which the remaining sites will be rolled-out.

a. Identification of initial 3 centres.
   Identification of the initial 3 centres will come in the negotiation stage with all partners and partner facilities that are willing to support the NFFA scheme.
   Selection of the Centre to house the NFFA headquarters.
b. Identification of remaining 2-3 centres (the total number of centres is envisaged as being 5-6.)
c. Adaptation of an existing centre or new centre?
   In some cases existing centres will be identified whilst others may be completely new-build facilities.
d. Specialization of each centre.
   All centres will have some very similar core activities as detailed in WP3 of the NFFA DS. However, the centres will differ in their particular specialization. These specialities are likely to

be driven by their existing activities (if they are an existing facility), or by an agenda set-out by national interest. These specializations will be clearly identified in order to ensure that the distributed infrastructure covers the optimum number of technologies and science programmes.

4.6. Design of the Centres

4.6.1. Identification of equipment

Scientific Equipment.

The scientific equipment will be divided into two types:

1. equipment common to all NFFA-RI Centres.
   As noted earlier, a proportion of the equipment in the Centres will be common to all (e.g. deposition, etch, optical/e-beam lithography, SEM). It may be financially beneficial to procure such equipment in bulk and distribute around the sites. This would also mean that users will be able to move from site-to-site and use the equipment with more ease.
2. specialized equipment for a particular NFFA-RI Centre.
   Highly specialized equipment (e.g. high resolution TEM, large area e-lithography) would constitute one-off purchases and be dedicated to a particular Centre. As noted earlier, the specializations of each Centre is yet to be decided.

Workpackage 3 has examined a number of the facilities which will be required:

T3.1. Design of overall infrastructure
T3.2. Design study of nanolithography station within facility
T3.3. Design study of user-oriented material growth facilities
T3.4. Design study of user-oriented metrology facilities
T3.5. Design study of molecular and nano-particle manipulation laboratory
T3.6. Design study of nano-bio laboratory
T3.7/T4.5. Assessment of the possible contribution of existing facilities that could be integrated into NFFA-RI.

Information Technology (IT).

The NFFA Data Management technology will be adopted and enable the realization of the integrated Data Repository with a unique entry point for external users.

4.6.2. Design of Buildings

General issues are addressed in WP3. Specific plans will be made according to the availability of existing buildings to adapt to NFFA and/or construction of all new buildings or extensions.

Among the very relevant aspects are the operational costs that bear implications on the building typology or technologies for the adaptation of existing buildings concerning, in particular, energy efficiency, vibrations, noise, landscape impact.

The evaluation of all the above aspects will be done site by site in order to meet the local rules and possibilities. Nevertheless all NFFA centres should be recognized as being “low carbon and energy efficient”, trying, wherever feasible, to introduce “green methods” in the nanotechnology world.

4.7. Staff

4.7.1. Recruitment of Staff

Staff will be identified and recruited according to the Management and Governance rules elaborated in the NFFA DS (see D4.3 and D4.2), as well as by meeting the national laws of a given centre.

The ERIC status is clear on the point that all employees of an ERIC will follow the general employment rules of the Country where a given site is located, given that the EU is fairly inhomogeneous with respect to employment rules, salary and pension levels. Rules about missions and rotation of personnel among the Centres will be defined.

Part of the staff, at all levels, may be seconded by scientific institutions as permanent or temporary in-kind support.

NFFA will have to address in the framework of its statutes the issue of long-term positions vs. fixed term (5 years) positions for staff scientists and other personnel.

The number of staff would be determined by the amount and diversity of the equipment installed as described in Work Package 3 as well as on the target users community size of each centre.

4.7.2. Training of Staff

Training of staff and users is vital to the smooth and efficient operation of the Centres. Some training is mandated (e.g. health and safety training) whereas other training programmes will be dependent upon the persons position (e.g. Lithography technician or SEM operator).

Training has been examined in detail in Work Package 5:

T5.1. Training Lessons/Courses for NFFA-RI staff.

T5.2. Training Lessons/Courses for potential users.

Other training specifically for dedicated equipment on particular sites will be devised and given as necessary.

4.7.3. Science Management of NFFA

The rules for the functioning and reporting of the NFFA personnel are described in the Scientific Management and Governance WP deliverables of the NFFA DS. (in particular, see D2.4 and D4.3).

4.7.4. User Projects and in-house research

After the staff have been recruited and trained, they will then be free to begin their in-house research alongside user projects.

The NFFA Science Programme has been examined in Work Package 2 and is described in Deliverable D2.2.

4.8. Procurement of Equipment

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 competition.

Once the equipment requirements and specifications have been decided, the procurement must take place. This will be in a number of 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 (see also Section 4.10).

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 the equipment procurement phase might be 6-12 months, but this may be longer depending upon tender actions, assessments and long lead-time items.

4.9. Construction of the Centres

There are several options for the procurement of the Centre. For example, since April 2000, in the UK, government policy has been that projects should be procured by one of three recommended

procurement routes. There are similar options available in other EU countries. The UK version with their various arguments is given, as an example, in the Appendix B.

As noted above in Section 4.8 a range of procurement advantages are available for ERICs and these will also benefit the building construction.

Construction time for a new building of the type suitable for an NFFA Centre would typically take 12-18 months from sign-off of the architect's drawings.

4.10. Installation of Equipment

Once the buildings are constructed, fitted-out and signed-off, the equipment described earlier will need to be installed, commissioned, calibrated and declared ready for business.

Installation of equipment might typically take 6 months from completion of the building construction

4.11. Pre-launch Activities

4.11.1. Scientific and Industrial Panels/Committees

Each Centre would have Industrial Nanoscience Committee (see D2.4) and people should be invited to be members as soon as is practicable. There will also be a Scientific Advisory Panel for the network and this should be set-up at the same time.

4.11.2. Marketing

This will include items such as Centre web sites, flyers and brochures. There are a number of options for the web site structure and each Centre will have web pages, which are a sub-section of the NFFA web site, with links to any relevant research institutions and in particular are cross-linked to the web sites of co-located LSFs.

The pages would give contact details (e.g. Industrial and Academic contact points), describe the facilities and their capabilities and have an FAQ section.

The depth of the marketing functions may require the recruitment of full-time staff (perhaps 1-2 people per Centre but also work together with their counterparts across the infrastructure). This will allow full and efficient marketing including literature, presentations, customer visits and maintenance of the Centre-specific web-pages.

4.11.3. Identifying launch customers

At the time of launch, operation of some of the equipment will be limited (apart from installation and commissioning tests and early in-house R&D). Therefore there will still be much to learn before each centre reaches the top of the learning curve. It would therefore be wise to have familiar customers in the initial stages to ensure close cooperation and good progress.

These customers should be identified well in advance and may be those who the staff already have good relations from previous work before transition to the NFFA Centre.

4.12. Launch of NFFA-RI Centres

4.12.1. Launch Event

At the time of the launch of the NFFA Centres, it is suggested that there is a "Launch Event." This will provide excellent publicity for this new distributed network of Centres and allow potential industrial and academic users and other invited guests to tour and see, at first-hand, a typical NFFA-RI Centre.

4.12.3. Ramp-up to Full Operation

After the launch of the NFFA Centres and successfully fulfilling the requirements of the initial users, experience with the equipment will increase, turnaround of projects will improve and more customers can be sought and introduced to the Centres. This ramp-up of operations may take 1-2 years.

4.13. Assessment of the Project

During the course of the project there will be regular review meetings which will examine how the various aspects of the project are progressing that will be detailed in the statutes (ERIC, for example), see Deliverable D4.3.

At agreed times there will be reports and presentations to both the EU and national bodies.

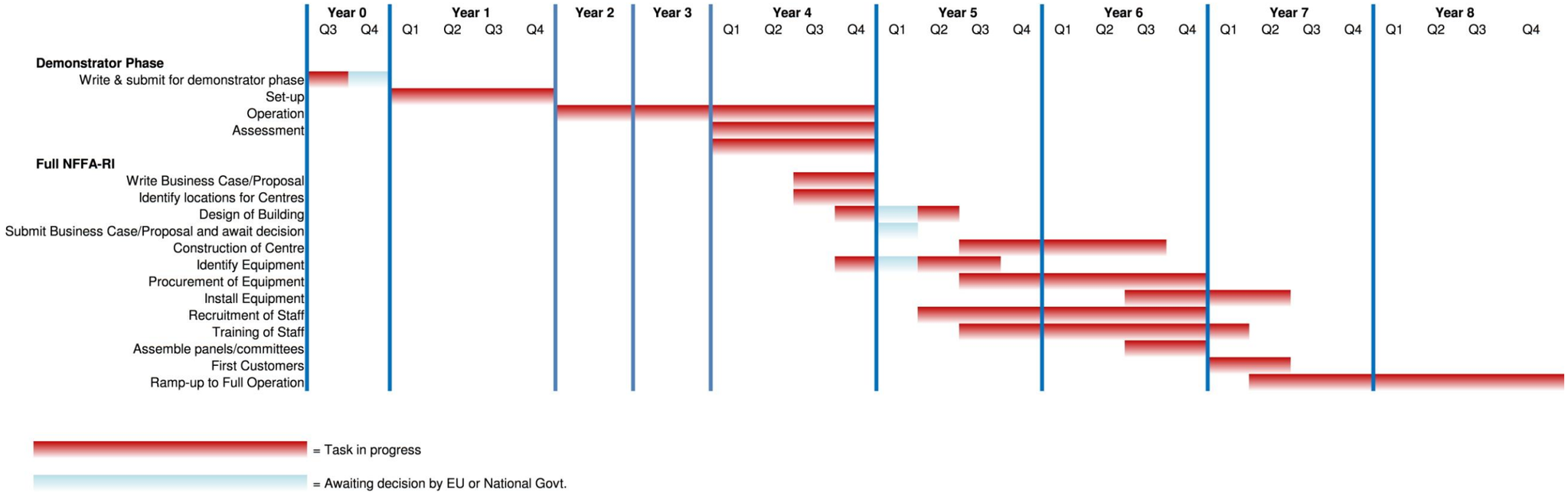
5. REFERENCES

- http://ec.europa.eu/research/infrastructures/index_en.cfm
- http://cordis.europa.eu/esfri/
- European Roadmap for Research Infrastructures, see: ftp://ftp.cordis.europa.eu/pub/esfri/docs/esfri_roadmap_2008_update_20090123.pdf
- Community legal framework for a European Research Infrastructure Consortium (ERIC), see: http://ec.europa.eu/research/infrastructures/pdf/council_regulation_eric.pdf
- Ground-coupled heat exchanger. See, for example: http://en.wikipedia.org/wiki/Ground-coupled_heat_exchanger
- http://ec.europa.eu/enterprise/policies/innovation/policy/lead-market-initiative/sustainable-construction/index_en.htm

6. APPENDICES

6.1. Appendix - A

Table 1. A Gantt chart showing the approximate timescales for the setting-up of an NFFA Centre, assuming a new-build situation.



6.2. Appendix - B

Procurement options in the UK.

1. **Private Finance Initiative (PFI)**
   In this route the employer contracts to purchase quality services, with defined outputs from the private sector on a long-term basis, including maintaining or constructing the necessary infrastructure so as to take advantage of private management skills, incentivised by having private finance at risk.
2. **Prime Contracting**
   Here a single contractor to act as the sole point of responsibility to the employer for the management and delivery of a construction project on time, within budget (defined over the lifetime of the project) and fit for the purpose for which it was intended, including demonstrating during the initial period of operation that operating cost and performance parameters can be met in accordance with a pre-agreed cost model.
3. **Design & Build Using a single contractor**
   In this case a single contractor acts as the sole point of responsibility to the employer for the design, management and delivery of a construction project on time, within budget (taking account of whole-life costs) and in accordance with a pre-defined output specification using reasonable skill and care.

PFI considerations

The HMT report on PFI - Meeting the Investment Challenge suggests that construction projects whose capital cost does not exceed £20m are not likely to achieve value for money under the PFI route. NFFA Centre-like buildings are therefore borderline with regard to this. There are however other reasons why PFI is not an appropriate route for this project. They are:

- It is a one-off project
- The activity in the building is complex and not able to be adequately defined early enough in the project process to specify the outputs
- With changing science needs it is likely that the brief will change during the design period
- Control over design would be lost with this route
- The complex operational requirements of the building lead to STFC (for a UK Centre) retaining control of buildings and services post completion.
- All other buildings on site are operated by STFC and PFI would introduce an inconsistency and unnecessary complication.
- STFC require to minimise calls on its operating budget and is averse to on-going PFI payments
- PFI requires a fixed period of on-going commitment to the provider
- Setting up of a PFI contract will extend the project programme and incur additional costs – e.g. legal fees
- STFC has its own in-house professional construction and maintenance teams which it has already invested in

Prime Contracting

Prime contracting was originally favoured where there was a need for a number of on-going projects over a significant period. Within the individual nations (which will separately fund the build of their Centre), the NFFA-RI Centres are one off projects.

Most of the reasons given above for PFI also apply to Prime Contracting. One benefit cited for using Prime Contracting is the involvement of the contractor throughout the design, construction and early part of operations. Although the functions going into the

building are complex the building, itself, will be relatively standard. STFC therefore do not consider that significant benefit would result from the early and on-going involvement of a contractor and that the premium paid for this would not give value for money.

Design and Build

Design and build enables STFC to meet its procurement objectives set out above.

It enables STFC to retain control of the design to a point which it chooses and provides a fixed tender cost at point of contract placement without excessive premiums due to design risk. Given STFC's previous experiences of Design and Build it would propose to develop the design in critical areas and to leave the more standard areas to the contractor. The specification given to the contractor would therefore have a level of prescription that would ensure quality of design in the areas that matter most to STFC.