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N4U

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expansion of NeuGRID services and outreach to new user communities

Combination of Collaborative Project and Coordination and Support Action

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1. Introduction

1.1 Why this Document?

This is a new deliverable produced following the recommendations of the European Commission, received during the first project annual review. When evaluating the project results over the first reporting period, the reviewers stated that the vision of the N4U project was not clear in the deliverables, nor in the Description of Work (DoW). The European Commission agreed with their evaluation stating the following in the letter to the coordinator, accompanying the annual review report:

“The project should provide a vision statement, of what it is going to achieve by the end of the project in a tangible and measurable way, This vision statement should be coherent in its goals and – via a separate, more detailed roadmap document, see below – in the venues to be followed toward reaching the goals. These [documents] should assure work packages coordination, in particular, showing how each single WP contributes towards the achievement of the vision, without interfering in a risky way with, or doubling the tasks of other WPs.”

The Consortium acknowledges that, although the original DoW addressed more or less implicitly issues related to the project vision, this request is a good opportunity of describing them in a comprehensive and exhaustive way. Thus, a vision statement called “D1.2 N4U Vision” is included as an additional deliverable in the amended DoW. Another additional deliverable called “D1.3 N4U Roadmap” is also included in the amended DoW in order to concretely apply the vision to the project activities, which explains how these will allow N4U reach its final objectives.

1.2 Document Organization

This deliverable consists of three main chapters, i.e. (i) an introduction, where the background and structure of the N4U Vision are described; (ii) the “N4U Vision”, where the project’s vision and final goals are stated; and (iii) the conclusions. This document will be further expanded in deliverable D1.3 “Roadmap”, as mentioned above, by clarifying the contribution of each Work Package (WP) to the achievement of this vision, matching technical releases towards the project vision, and defining the Key Performance Indicators (KPI) allowing the Consortium to monitor the degree of fulfilment of N4U’s final goals.

2. The N4U Vision

The next ten years will be a decade of breakthrough discoveries in neuroscience and related translational medicine aiming to improve the health of people everywhere. This scenario offers exciting opportunities, but also great challenges, which N4U wants to address.

In this frame, the long-term objective of N4U is **to provide neuroscientists and clinicians in Europe and worldwide with the innovative online neuGRID for You functional environment, where they can securely upload, use, share brain feature extraction algorithms paired with computational power, large image datasets access, as well as specialized support & training.** Its objectives within the project lifetime are directed towards 4 communities: researchers, clinicians, algorithm developers, and pharmaceutical companies. In detail, the project will be considered successful if it meets the following results by its end (see table below):

- at least 5 research projects internal to the Consortium are run on neuGRID;
- at least 5 research projects external to the Consortium are run on neuGRID;
- at least 30 clinicians have used neuGRID's clinical applications once;
- at least 10 clinicians regularly use neuGRID clinical applications (regular use is to be intended as twice per month);
- N4U clinical partners regularly use neuGRID clinical applications;
- at least 3 algorithms developed by small algorithm developers are published in neuGRID;
- at least 2 clinical trials have their images analysed on neuGRID.

N4U SHORT TERM GOALS		
COMMUNITY	CONSORTIUM	GOAL
Researchers	N4U	5 projects successfully run on neuGRID
	External	5 projects successfully run on neuGRID
Clinicians	N4U	clinical partners regularly use neuGRID's clinical applications
	External	30 clinicians have used neuGRID's clinical applications once
		10 clinicians regularly use neuGRID's clinical applications
Algorithm developers	External	3 algorithms from small developers published on neuGRID
Pharmaceutical companies	External	2 clinical trials having their MR scans analysed on neuGRID

In order to achieve its short-term objectives, N4U will adopt a two-pronged approach. The **first action** consists of the set-up of a set of services, based on Grid infrastructure, made up of the combination and networking of digitally-based technology (hardware and software), resources (data, services, digital libraries) and communications protocols, access rights and networks. The **second action** consists of the setting up of an economically and financially sustainable legal entity that will deliver the services.

Each action will have **long-term expected impact** (i.e. that will be reached in a time span of 10 years).

The first action will have a **societal and scientific impact**: a) an increase of the base of researchers having access to research tools will lead to improved understanding of the nervous system, brain plasticity, and molecular alterations that cause diseases and finally contribute to the translation of discoveries into health benefits. b) the availability of online tools for computed aided diagnosis will promote the transition of clinical neurology and psychiatry towards a modern biomarker-based medicine.

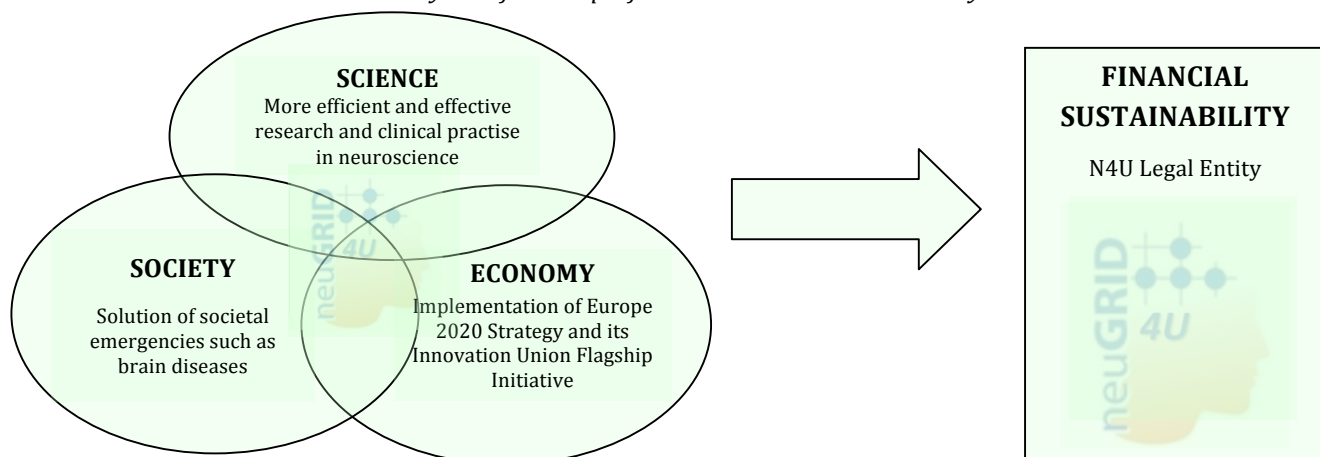
The second action will have a **financial and economic impact** in terms of increase of research productivity, through easy access and re-use of data, eliminating unnecessary duplication of work. The availability of an easily accessible wealth of data will potentially create new knowledge markets and job opportunities, increase mobility and knowledge exchange, thus providing a strong economic base for European prosperity.

In the long run these impacts may extend to other branches of medicine (e.g. cardiology, pneumology, etc.), being N4U an open environment with a modular structure, which can be extended without restrictions.

The achievement of these impacts is highly dependant on the **results** N4U will obtain in terms of

- Guiding scientists, engineers and clinicians towards a **shift in the practice of neuroscience research and diagnostics**, by facilitating knowledge and technology transfer and Innovation
- Being able to bring together researchers, national and international organisations and industry, to provide some **new insight on the financial sustainability** of innovative services for biomedical research that also can be implemented into clinical practice .

Figure 1. The figure shows the areas of impact of the transformational changes brought by N4U which are not only beneficial to professionals but also economically sustainable



The steps N4U will take during and after the project lifespan will be directed to

1. Encourage the rise of a new generation of computational neuroscientists,
2. Promote among clinicians the use of computer-aided diagnosis of chronic brain diseases, through imaging markers
3. Make these scientific and technological changes financially sustainable.

These three points are addressed and expanded in the following sections.

2.1 The rise of a new generation of computational neuroscientists

Improvements in technology often drive advances in neuroscience, e.g. sophisticated software, innovative visualization tools, powerful middleware and scientific applications created and used by the interdisciplinary teams which nowadays carry out different types of research, are critical in turning bits and bytes into scientific breakthroughs. The current state-of-the-art in brain and mental diseases has led to a novel requirement, i.e. that of uniformly accessing large image repositories, sophisticated algorithms, computational facilities, and expertise to overcome the hurdles that most scientists face when trying to setup advanced experiments in computational neuroimaging.

In such a context, N4U aims to address the issue of fewer and fewer research institutions being able to carry out their research with their own resources alone; and, at the same time, to avoid the danger represented by the lack of integration of underpinning data infrastructures with user-defined interfacing services, which, coupled with significant volumes of data growing beyond the human scale together with information heterogeneity, may stifle research and delay potential treatments for major diseases. To address these issues, N4U will follow a twofold strategy, catalyzing the development of a system where scientific digital data are easily accessible while suitably protected and reliably preserved; and supporting the development of new tools and services for data discovery, integration visualization and analysis.

Together with technological evolution, this requires a talented, diverse, and well-trained workforce, both from academia and private sector, able to handle a growing amount of resources and new tools. In N4U, this issue is being addressed by placing great emphasis on support and training activities.

To make N4U able to meet the requirements of the community of computational imaging scientists facing this quickly and radically changing scenario, the Consortium has identified a set of actions:

- to penetrate the following communities: neurodegenerative diseases (NDD), white matter disease (WMD), psychiatric disorders (PSY)
- to boost the involvement of young researchers (i.e. PhD Students),
- to network projects with a computational neuroimaging component,
- to penetrate the algorithm developer community.

2.1.1 To penetrate NDD, WMD, PSY communities

The N4U Consortium wants to respond to changes in neuroscience, starting from the needs of the research communities. In order to determine which services would have the greatest

impact, the project wants to involve, three communities: researchers working in the field of NDD, WMD, and PSY

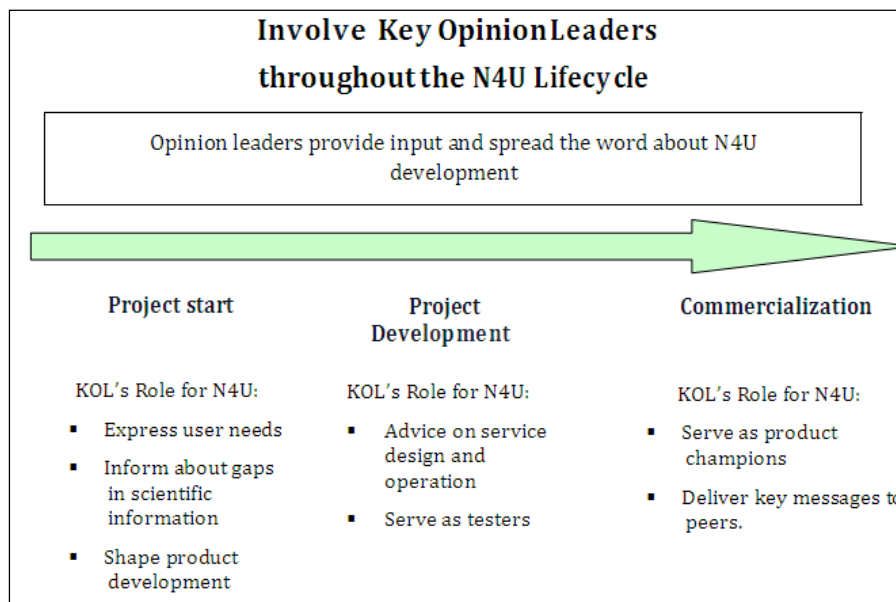
In these fields of research, modern imaging techniques are used to develop disease markers allowing early diagnosis and the development of disease-modifying drugs. Currently, imaging can detect the changes taking place in the brain of patients with brain and mental diseases at the molecular, cellular tissue and organ levels. Each imaging technique captures a specific feature of a disease, but the disease itself consists of all the changes together.

The approach towards scientific communities will be favoured by the research and academic organisations (i.e. FBF, VUA, KI, HUG) participating to the present N4U consortium that represent leading institutions in the neuroscience community, all with a dense network of scientific contacts and ongoing collaborations. These communities will be addressed with a customised approach aiming to promote the N4U infrastructure as the online environment where any scientist connecting from anywhere in the world (i) can access large image data repositories, sophisticated algorithms, computational facilities, and expertise to (ii) setup his/her own advanced experiments in the N4U Virtual Laboratory.

The involvement of these communities will be obtained through the continuous expansion of services and resources and through dissemination activities, which will be constantly carried out by all partners and will be directed to the most established opinion leaders in neuroscience. For example, N4U will contact professional associations of researchers and clinicians sharing the same interests. Through formal and informal collaborations with Scientific Societies, N4U will gain visibility and will have access to international organisms issuing guidelines, protocols, and practice parameters. Thus, thanks to CO1 FBF, N4U is already in contact with the Neuroimaging Professional Interest Area (NIPIA) of the Alzheimer's Association International Society to Advance Alzheimer's Research and Treatment (ISTAART), representing the Alzheimer's imaging community worldwide. The NIPIA gathers more than 400 neuroscientists from all over the world seeking to develop and advance research applications of brain imaging in Alzheimer's disease and related disorders. Thanks to P4 VUMC, N4U is already in touch with MAGNIMS (Magnetic Resonance Imaging in MS), a European network of academics that share a common interest in the study of multiple sclerosis through magnetic resonance imaging. For the PSY community, N4U has already been presented, to several leading institutions' representatives in the field, such as Steve Williams, founder, director and head of the Centre for Neuroimaging Sciences based at the Institute of Psychiatry and Maudsley Hospital, King's College London, and Paolo Brambilla of the Unit of Brain Imaging and Neuropsychology (RUBIN) of the University of Udine and University of Verona, WHO Collaborating Center for Research and training in Mental Health and Service Evaluation.

It is necessary to raise awareness about N4U among these groups of "Scientific Opinion Leaders", since they can give unique insight on the service through the eyes of users. Moreover they usually have a very strong power over current scientific debate, defying priorities and agendas, influencing not only their scientific field, but also industry investments and policy decisions. As represented in the figure below, the involvement of Scientific Opinion Leaders will be encouraged throughout the N4U Lifecycle for many reasons.

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2.1.2 To boost the involvement of young researchers (i.e. PhD Students)

N4U will expand its user base by engaging PhD students to better serve the needs of a larger segment of the neuroscientific community. As the field of neuroimaging continues to attract a growing number of trainees, the profession can benefit from greater coordinated engagement and support for the “stewards of the discipline”. Familiarizing young researchers to the use of N4U will give them the opportunity to take part to advanced experiments in computational neuroimaging and will allow N4U to stay tuned for the current trends in computational neuroscience that may create new requirements and to build longer-term relationships with users. This process will start by introducing N4U to PhD students belonging to different academic organisations (i.e. belonging to the N4U consortium and gradually expanding to new institutions and projects adopting N4U).

The envisaged action plan is the following:

- | |
|---|
| <ul style="list-style-type: none"> To provide young researchers with online resources and accompanying knowledge to get acquainted with N4U, |
| <ul style="list-style-type: none"> To organize dedicated user sessions, |
| <ul style="list-style-type: none"> To survey trainees' satisfaction. |

In addition, the development of a PhD curricula on “computational neuroscience” and largely leveraging on the use of N4U is currently under discussion in participating clinical and academic centres. Joint academia/private sector programs on the development of biomarkers involving PhD students are being developed too.

In the long-run, the involvement of young researchers will raise awareness about the potential of European research and contribute to counteract the brain drain and favour brain inflow, thus creating a new generation of researchers and potential entrepreneurs who are fully involved in a stimulating e-science environment.

2.1.3 To network projects with a computational neuroimaging component

In order to truly exploit the potential of the N4U environment, to maximise its effectiveness and to encourage the revolution in computational neuroscience, the N4U platform has to be made

widely accessible. From a technical point of view, this means that it needs to flexibly combine heterogeneous computing resources while providing a sufficient level of abstraction that shields the user from the complexities of the underlying ICT complexities. Additionally, this requires the coordination of N4U with other related national, European and international initiatives. This is a critical step for N4U to ensure the adherence to best practices, the compliance with current standards, and access to resources not being financed by the N4U project. Besides, this will support access to technical common developments for supporting tools and mechanisms to the N4U user communities. At the same time, these collaborations will be beneficial for the research field itself, allowing a faster knowledge exchange, promoting interoperable standards and avoiding duplication of efforts.

Last but not least, getting to know and working together with the most relevant national, European and international projects, will allow N4U to better understand its competitiveness, positioning, and highlight the unique characteristics that it provides. All these activities will be planned and described in appropriate deliverables (ie. D2.5 Concertation plan).

2.1.4 To penetrate the algorithm developer community

Current neuroimaging softwares offer users an incredible opportunity to analyze data using a variety of algorithms. However, this has resulted in a heterogeneous collection of specialized applications without transparent interoperability or an uniform operating interface.

N4U wants to become the harmonized environment where new complex, heterogeneous tools can be developed, tested and then widely distributed to the community(ies). This will be facilitated by the publication on the infrastructure of imaging labels, which are necessary to the functioning of such algorithms.

N4U partners will address academic software houses and ICT developing companies by highlighting how visibility can be boosted and how user access can be facilitated. In addition, N4U will give new algorithms the added value of being available with big computational resources, large datasets and user-friendly web interfaces. This will not only promote the software but also foster communities of users that promote technological advances.

2.2 The evolution in computer-aided diagnosis of chronic brain diseases through imaging markers

Successful treatment of diseases depends on early detection and appropriate therapy, but most diseases, (e.g. cancer, central nervous system disorders) begin before their clinical presentation. Advancements in research has lead scientists in many field to identify reliable predictors and indicators of a disease process, called “biomarkers” which proved to be very helpful in early diagnosis. As far as brain diseases are concerned, both structural and functional imaging help the clinician in the diagnosis and differential diagnosis by providing specific markers for the disease process.

However, such biomarkers must be "validated" — i.e. their value as predictors and indicators must be confirmed by multiple studies in large groups of subjects. **N4U can provide technological resources and profiling tools in order to get more accurate and sensitive biomarkers. This can help overcome existing obstacles to identify and validate biomarkers, making their discovery simpler.** At the same time, N4U wants to have an impact also on clinical practice by offering the possibility to make the extractions of imaging markers more and more automated, quick and reliable. Thanks to initiatives like N4U, in the long run physicians will have a universal biomarker based diagnostic test to identify brain diseases.

To facilitate the penetration of N4U into neurological clinical practices, N4U will target the most important groups of clinical experts in chronic brain diseases. Thanks to CO1 FBF and P5 KI, N4U has already contacts with EADC, i.e. a network of over 50 European centres of clinical and biomedical research excellence working in the field of Alzheimer's disease and related dementias. The centres involved in EADC are mainly interested in using N4U from a clinical perspective. Most of these centres are interested in computational neuroimaging, but lack appropriate ICT facilities.

2.3 Make these scientific and technological changes financially sustainable: towards a public-private model

Given the nature of the N4U e-infrastructure and the computing assets it relies on, two major exploitation models can be considered for developing its sustainability post project funding. The first consists in (i) making the N4U e-infrastructure available to academic institutions, public research centres and project Consortia over public resources such as the GEANT and NREN Internet network for research and education and EGI grid computing infrastructure; and/or (ii) making the N4U e-infrastructure available to all types of users, i.e. industry included, over private facilities, such as public/private clouds.

Whereas model (i) would enable N4U to leverage on GEANT and EGI respective sustainability and established networks, it would imply servicing N4U on a real-cost basis and limiting its quality of service to that of underlying infrastructural substrates. Model (ii), on the other hand, would allow selling access to the service and potentially streaming margin revenues, although implying that N4U sustains its own operational costs. Model (ii) would thus require a minimal number of users/sponsors and infrastructural base to get started with.

(i) In the public model, N4U services would be "hosted" onto computing resources from the EGI (e.g. that of the LSGC virtual research community) and made available over the GEANT network. N4U would thus solely need to collect funds corresponding to its real operational costs. For instance, access fees upon the number of users and training/knowledge transfer programs could be developed so to guaranty future system updates, accompanying training materials and meetings can be prepared. This model, although not restricted to, advocates the use of public grids and therefore requires approval from / discussion with initiatives such as GEANT and EGI (to cite the most relevant) as, even though not selling access to resources, may occupy networks bandwidths and compute resources for purposes not strictly related to research projects they are used to deal with.

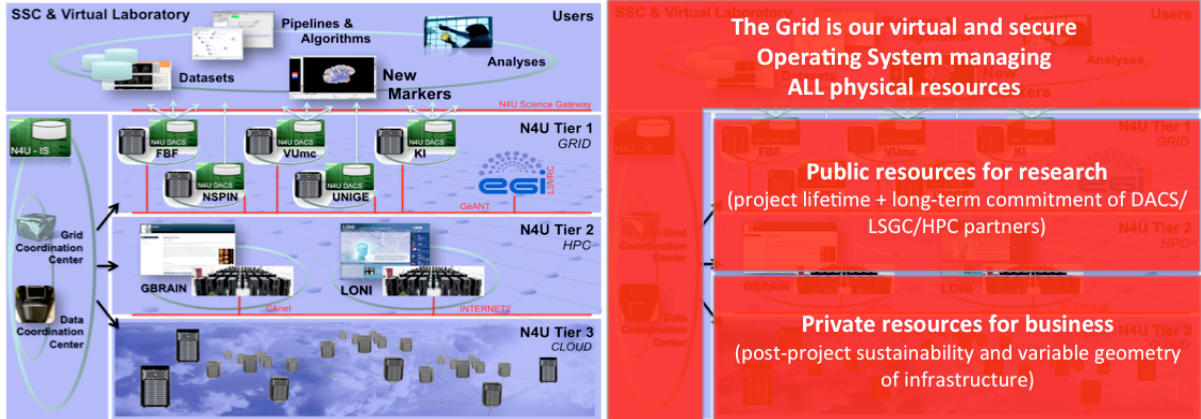
(ii) In the private model, N4U services would be hosted onto private computing resources exposed onto commercial networks, i.e. outside GEANT (though still available from within GEANT). In this private configuration, not only N4U could sell access to its services and offer accompanying training/transfer programs, but the actual utilization of computing resources could be metered and charged. Thus, compute power, storage capacity or even network bandwidth could be monitored and billed together with access to the added value service(s). Various business models could be proposed for and on top of the metering, thus giving an interesting flexibility to evolve over time and especially as the user base increases. This model advocates (and actually perfectly fits although not imposing) the use of private cloud resources.

Having introduced the two basic models, it is to be noted that nothing prevents from developing (iii) a hybrid exploitation approach, combining models (i) and (ii). The latter would consist in servicing N4U for research purposes to and onto public channels with a reasonable quality of service and on a real cost basis, while offering at the same time a commercial service to a

restricted private audience under higher quality of service and greater added value. Recalling formerly cited assets, NRNs and NGIs could also be consulted as to whether they would be interested in and actually could sell access to their respective resources. Such a public-private model could greatly help finding an interesting and evolvable equilibrium at the start with a solid public base already established, progressively enriched with a developing private network and user base.

It is to be noted that the N4U project and 3-Tier infrastructure, as illustrated in the following figure, were thought of with this public-private exploitation strategy in mind.

Figure 3. The N4U 3-Tier Infrastructure vs Exploitation Strategy



In the figure above, the 3-Tier infrastructure is illustrated on the left, where Users access applications, which seamlessly utilize different types of compute resources underneath such as Grid processing power and storage in Tier 1, HPC processing power in Tier 2, or even Cloud processing and storage in Tier 3.

With this interoperable architecture, N4U ambitions to service its portfolio of application, data and services to different types of user communities and potentially under different possible business models. The resulting public-private sustainability approach is illustrated in the figure above on the right with overlaid red blocks on top of the 3-Tier infrastructure, explaining what computing resources may be exploited, for what purpose.

2.3.1 Sustainability roadmap

In order to be an enforcing factor and a key enabler of the huge changes in neurological research and clinical practise described above, N4U must setup long-term support. All the activities described above require the attention of a permanent organisation, capable of ensuring continuity over actions that may last for decades. This requires the setting up of an economically and financially sustainable legal entity that will deliver N4U services.

Different legal frameworks are being evaluated as options, as described in the table below:

POSSIBLE OPTIONS FOR THE N4U LEGAL ENTITY

Table 1. The table shows the different legal entities suited for N4U and presents the advantages and disadvantages linked to their adoption.

Type	Description	Pros	Cons
<p>European Economic Interest Grouping (EEIG)</p> <p>Council Regulation (EEC) No 2137/85 of 25 July 1985 on the European Economic Interest Grouping (EEIG).</p>	<p>Designed to facilitate or develop the economic activities of its members by a pooling of resources, activities or skills. The natural purpose is not to make profits for itself. If it does make any profits, they will be apportioned among the members and taxed accordingly. Its activities must be related to the economic activities of its members, but cannot replace them.</p>	<p>Flexible and simple structure. The formalities for the setting up are quite simple.</p> <p>Uniform legal framework that is largely independent of the various national legal systems</p> <p>Full and autonomous legal capacity and independent organization (the members acting collectively and the manager(s)).</p> <p>Does not necessarily have to be formed with capital. Members are free to use alternative means of financing.</p>	<p>Unlimited liability/joint liability of members</p> <p>Difficulty for non European Union members countries to join</p> <p>EEIG may not invite investment by the public</p>
<p>European Research Infrastructure Consortium (ERIC).</p> <p>Council Regulation (EC) No 723/2009 of 25 June 2009 on the Community legal framework for a European Research Infrastructure Consortium (ERIC).</p>	<p>Only apply to infrastructures of pan-European interest.</p> <p>Legal entity with legal personality and full legal capacity recognized in all EU Member States. However, Member States remain solely responsible for the design of infrastructure projects and for defining the main aspects such as statutes, statutory seat, etc.</p> <p>The activities of the ERIC shall be non-profit-making. However, an ERIC can carry out some limited economic activities as long they do not impede the main aim of the research infrastructure</p> <p>Only Member States, third countries and intergovernmental organizations can be members of an ERIC. However, a state may decide to be represented by one or more public entities or private entities with a public-service mission, e.g. research organisations or</p>	<p>A legal entity recognized in all EU Member States</p> <p>Flexibility to adapt to the specific requirements of each infrastructure.</p> <p>Some privileges/exemptions allowed for intergovernmental organizations.</p> <p>Faster and more cost-efficient process than creating an international organization.</p>	<p>Economic activities should remain secondary and must not prevail.</p> <p>Since EU law is not applicable in third countries, provisions have to be made by third countries wanting to be a member of an ERIC in order to ensure that the ERIC will have legal personality and capacity in their legal order.</p> <p>Since it is a very new instrument there are some unclarities to be solved by national authorities.</p>

	research councils.		
<p>Company</p> <p>Many different legal types</p>	<p>To set up research infrastructures in Europe, limited liability companies are often used. The shareholders have a limited liability in proportion to their contribution to the capital. The companies are integrated into the legal framework of the country where the research infrastructures is located</p>	<p>Well adapted to public-private needs</p> <p>Successful examples exist (the <i>Diamond Light Source Limited (DLS)</i> in the UK, the <i>European Synchrotron Radiation Facility (ESRF)</i> in France and the <i>Delivery of Advanced Network Technology to Europe (DANTE)</i> in UK.</p> <p>The governance structure is found to be robust with a clear line of authority and responsibility covering scientific, technical and administrative aspects of the facility. The shareholders (other than government bodies) are represented either directly or through consortia with effective minority protection rules. The accounting rules and budget discipline are clearly defined.</p>	<p>Partners from other states reluctant to be under foreign legislation</p> <p>Confined to a given legal framework of one of the partner states, this solution does not reflect the spirit of a truly European endeavor</p>
<p>Non-profit organisation</p> <p>Many different legal types</p>	<p>Ruled under national law.</p> <p>It emphasizes the non-profit character of the research work and allows for a flexible governance structure with a board consisting of representatives from the stakeholders/financing parties and a management, reporting to the board, but having full authority for the daily management of the organization (entering into contracts, hiring and firing of personnel, etc.).</p> <p>The most suitable form for N4U could be the “Swiss Association” which is entity enjoying, unlike in other countries, independent personality.</p>	<p>Having independent personality, the members are not liable for the association debts or obligations.</p> <p>Swiss legislation offers an advantageous context concerning bureaucratic aspects.</p>	<p>Partners from other states reluctant to be under foreign legislation</p> <p>Confined to a given legal framework of one of the partner states, this solution does not reflect the spirit of a European endeavor</p> <p>There are successful examples (e.g. <i>German Dutch Wind Tunnel</i>) but it is not clear that this model can be generalized.</p>

The road to sustainability runs through the following aims, which should guide all N4U exploitation-related activities:

- Reliable services and long-term availability of infrastructure;
- Long-term added value on which new activities can be built;
- A growing body of knowledge shared throughout the community;
- Embedding the e-infrastructure in everyday research and clinical practice;
- Users' needs are met and the costs of uptake are affordable;
- An increasing number of users are engaging.

In view of achieving this long-term sustainability, the N4U Consortium has already defined an action plan, which can be summarized as follows:

1. Understanding the features which make N4U appealing to users/entities and exploring their willingness to pay in order to give an acceptable monetary value, without a market price or another useful proxy, to the benefits, which are not strictly monetary, that N4U can bring;
2. Establishing operating costs in terms of incremental hardware, human resources and user training. The costs may change as the size of the service varies, although this aspect could be more relevant for certain cost items (i.e., the user support or training, which is directly dependent from the number of users) than others (i.e., the hardware needed);
3. Identifying a sustainable business model, combining N4U value and costs;
4. Creating a novel legal entity that will govern the e-infrastructure and its services exploitation, post project funding;
5. Performing a market analysis in order to determine: (a) the approximate size of the potential users' pool, (b) the existence of potential competitors (e.g. similar services, software performing similar functions, algorithms embedded in vendors equipment etc) and (c) the project's positioning in relation to potential competitors.

The sustainability of N4U will be pursued along different funding paths:

- Public funding, through collaborations with other national or international, publicly funded, projects and initiatives, such as EGI and GEANT which can use N4U as a service portfolio of services to be embedded in their resources;
- Private funding, through engagement of users communities and collaboration with biomedical private sector.

The N4U Consortium has also identified a variety of approaches to ensure sustainability:

- Promotion of N4U results, through dissemination activities;
- Community building and empowering, through training and support;
- Influencing national and international policies on research e-infrastructures;
- Collaborating with other projects or subject-related initiatives, through concertation activities.

All the activities related to project exploitation and sustainability will be planned and described in appropriate deliverables (D2.4 Preliminary Exploitation Plan).

3 Conclusions

This document summarizes the N4U Vision Statement, analyzing the societal, scientific and economic impact of the innovative online N4U functional environment.

In order to transform this vision into a reality for European researchers clinician both from public and private sector (pharma companies and scanner manufacturers) and for the healthcare services N4U needs to:

- coherently strategise and periodically revise the concrete research and technological development goals that should make the vision come true;
- sustain the further development, maintenance and provision of resources tools and services,
- monitor the development, adoption, and impact of VPH technologies
- provide training and support in the use of N4U services.

All these actions will be detailed in Deliverable D1.3 “N4U Roadmap” in the next three months and related activities will be reflected in all pertinent deliverables (Dissemination and Training Plan, Exploitation Plan). The vision is the basis around which the whole project was, is, and will be developed and coordinated at each Work Package level.