COMMUNICATION PLATFORM
FOR TENDERS OF NOVEL TRANSPORT NETWORKS

Procurement Requirements Analysis

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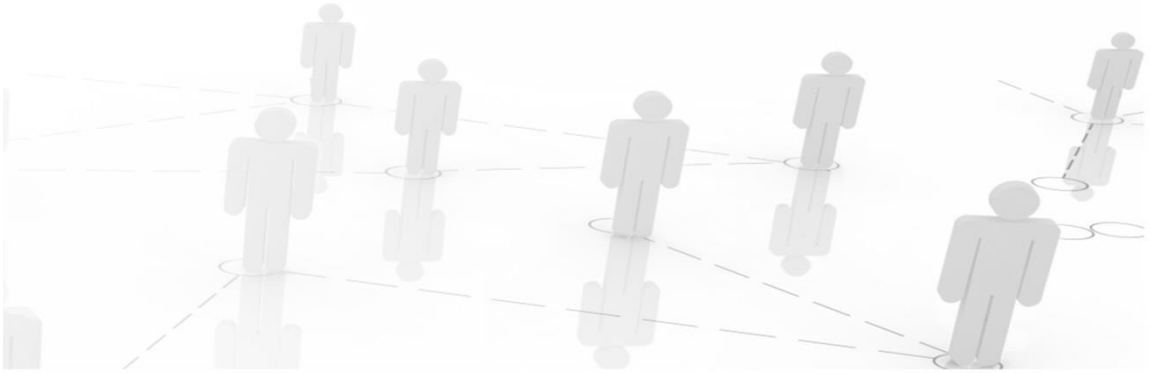

[1] The dissemination level of any deliverable falls into one of the following categories:

- PU = Public, fully open, e.g. web
- CO = Confidential, restricted under conditions set out in Model Grant Agreement
- CI = Classified, information as referred to in Commission Decision 2001/844/EC.

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1 Executive Summary

This deliverable broadly overviews NRENs (mainly technological) requirements needed to prepare procurement documents and to initiate procurement process. First part is devoted to the specification of the optical domain related technologies, which have been agreed among COMPLETE project consortium members during the initial meetings and regular VCs. Second part contains best practices and experience from the partners related to the public procurement process, which is specific in each country and is in most cases influenced by national public procurement laws and regulations. The last part of this document concludes with findings and foresees technological challenges in the academic and research networks for the next three years.

2 Introduction

Procurement requirements analysis represents the key element of the every procurement activity. It aims to precisely define needs, technologies and services related to the optical networking equipment. Services built on top of the network are driven by the needs of the NREN community, who usually influence strategic NREN decisions (e.g. selected academic representatives are members of CESNET's Board of Directors). As such, some of them were asked to provide feedback to the direction they want to go in the upcoming three years time-frame and if such plan complies with theirs needs. Results of this action will be briefly summarized in the last section of this Deliverable.

In conjecture with D2.4, where a first version of the database containing three optical equipment vendors exists, the key technologies have been addressed among these entities in order to determine their willingness. Such procedure requires mutual agreement on signing the NDA documents and establishing of close link between networking technologies and optical equipment vendors and the COMPLETE project members. The establishment of good relationship between vendors and particular NRENs, the COMPLETE project consortium members, specifically CESNET, GRNET and PSNC already exists. It is expected that this existing relationship will be extended and even intensified.

Figure 1 briefly shows necessary steps to accomplish PCP/PPI in COMPLETE. This figure covers only public procurement procedure and does not include any related (and necessary) dissemination activities.

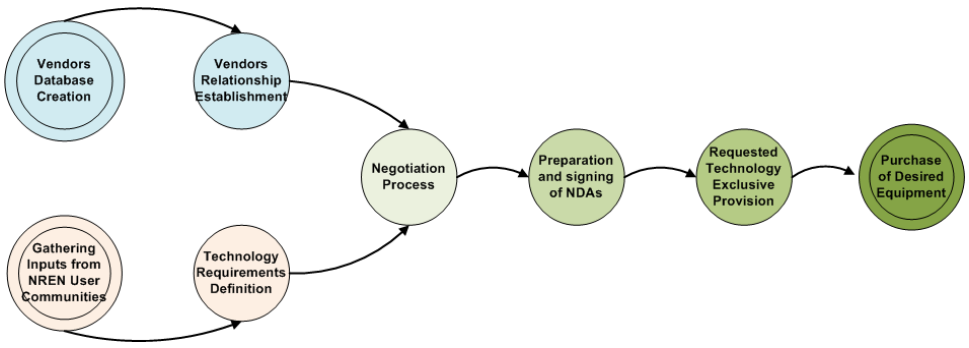

Figure 1 COMPLETE PPI Process

3 Requirement Analysis

As presented and discussed in the previous chapters, NREN user communities are those, who take control and provide the direction that NRENs should follow. The most active groups of users, who have direct or indirect requirements imposed on network resources, are:

1. Bioinformatics

    a. This, mainly research oriented multidisciplinary group of users combines raw biological outputs (mostly in the form of unstructured data, e.g. as an output from NGS – Next Generation Sequencing) together with an application of modern methods in informatics. Such data usually from tens of GBs to tens of TBs in size needs to be transferred from various sources (e.g. gene databanks) over long distances and then processed locally. Therefore the transfer speed is a crucial element, which also influences the speed of research itself, such as new drugs development.

2. Media related

    a. Educational and experimental users, who conduct applied research activities in audio and video, including remote collaborative tools. These services serve as important supportive utilities for other users. Media users, including (among others) doctors and medical assistants, who often require video transmission of surgeries and remote guidance and assistance. Such media related activities require not only dedicated high bandwidth lines (at the time of writing this document image processing high-resolution cameras are 4K minimum) but also low and fixed latency (stable jitter).

3. Physicists and Natural Sciences researchers

    a. The most demanding user group of scientists so far. Covers large scale trials for theoretical physics (simulations, molecule dynamics, high energy etc.), what requires dedicated circuits to CERN. To this user group we could also include geophysics, astronomy, meteorology, biology, material sciences or nuclear research. Remote instrument control, which means fixed latency together with extreme data transfers make Physicists one of the most challenging user group.

On the other hand, technology requirements, that could come up from the presented user groups must be compatible with already existing technologies in the particular NREN network topology. Therefore, compatibility with existing infrastructure state has to be specified in the public tender documentation. Additionally, new technology compatibility verification test must be performed.

4 Technological Challenges

Feedback from the NREN users lead to technological challenges, whose satisfy demands imposed on the networks of R&E operator. In the optical networks domain, these challenges are summarized in the following table:

Technology Challenge	Expected Timeframe	Description
400 Gbps transmission	2017+	Technology to speed-up backbones of NRENs with relatively low costs to the technology change (400G is 4x 100G).
Flexi-Grid	2016+	The flexible assignment of optical spectrum to channels. Maximizing flexibility in channel spacing of DWDM networks, improves spectrum utilization. Possibility to dynamically adapt the wavelength grid to the NREN needs.
1 Tbps transmission	2020+	According to actual needs of user communities' next backbone technological speed step-up to master high volume data transfers in short period of time.
Flexi-Rate	2016+	The ability to dynamically switch between modulation formats depending on the physical infrastructure, and thereby transmit higher bit rates, including superchannel bit rates, allow network operators to achieve the optimal balance between data throughput, transmission reach, and maximum spectral efficiency.
Software Defined Networking	now	SDN simplifies networks by implementing a centralized control layer with open application interfaces (APIs). Using open APIs, SDN architectures decouple the network control and forwarding functions enabling network control to be directly programmable and the underlying infrastructure to be abstracted for applications and network services.

Table 1 COMPLETE Optical Technology Challenges

Expected timeframe column should not be confused with timeframe found in Deliverable D2.4., where future optical technologies overview of three major vendors on the market can be found.

5 Procurement Experience and Best Practices

The public procurement procedure which should lead to the new technology implementation usually has several drawbacks, regardless of the country where it is announced. As it can be seen in the following sub-chapters, public tenders usually have very strict regulations, which in many cases lead to appeals of unsuccessful candidates and result in significant delays in new technology implementation.

In this chapter, Public procurement experiences and best practices will be shared from each COMPLETE Consortium partner including its own local specifics.

5.1 CESNET

In the Czech Republic all public tenders are governed by the Public Procurement Act (hereinafter referred to as Act), Act no. 137/2006 to be more specific. This also covers acquisitions of services and equipment, which are also subjected to the respective act in CESNET, Czech Republic,

This Act incorporates the relevant legal regulations for the European providers for

1. award procedures of public contracts,
2. contest design,
3. supervision over compliance with this Act,
4. conditions for the maintenance and function of the list of approved economic operators and of the system of certified economic operators.

Principles of Procedure by Contracting Entity

1) The contracting entity shall be obligated, while acting under this Act, to comply with the principles of transparency, equal treatment and non-discrimination.

2) The contracting entity shall not restrict the participation in an award procedure for the economic operators having their registered office or place of business in a Member State of the European Union and the other States, which have an international agreement concluded with the Czech Republic or, if applicable, the European Union, guaranteeing an access of the economic operators from these States to the public contract being awarded.

Under this Act CESNET uses three main kinds of procurement according to the estimated thresholds. The thresholds were adjusted by COMMISSION REGULATION (EU) No 1336/2013 of 13 December 2013 amending Directives 2004/17/EC, 2004/18/EC and 2009/81/EC of the European Parliament and of the Council in respect of the application thresholds for the procedures for the awards of contract.

Public contracts, according to their estimated value, shall be classified as above-the-threshold public contracts, below-the-threshold public contracts, and small-scale public contracts.

Small-scale public contracts are governed by an internal directive.

Above-the-threshold public contracts (ATPC) and below-the-threshold public contracts (BTPC) are governed by the Act.

Some notice and restrictions regarding ATPC and BTPC:

1. Relatively long period between tender announcement and contract signing (if you need the line or equipment soon). It is necessary do tender ASAP.
2. If exists only one valid offer for the tender, it is necessary to cancel tender and do it again. Implications can be not budget drawing in the actual year.
3. Choosing of evaluation criteria – must be carefully chosen.

Public Tenders Best Practice

- In pre-procurement stage it is suggested to clearly state subject of demand including dates and terms of delivery.
- As the next step it is useful to ask plurality of suppliers for preliminary quote.
- From preliminary quotes it is possible to verify following:
    - Whether we will have sufficient number of valid offers.
    - Prices will include service and/or maintenance fees.
    - Prices are final (with allowed exclusions), has requested tax structure.

In this phase suppliers can be informed and asked to improve quotes in simple way. It is difficult to do so when tender is already running or even shortly before tender end. Otherwise it might be necessary to cancel tender and open the new one. Final demand under small scale public contract will conclude:

- Basic Information
- Subject matter of the public contract
- Period of performance
- Form of price specification
- Payment terms
- Submission of Bid
- Bid evaluation
- Association´s rights and other conditions of the public contract (in CESNET case)

5.2 GRNET

GRNET supply tenders for optical equipment are governed by the Greek legal framework of public procurements. The phases of a typical open and international procurement can be highlighted as follows:

- Step 1: RFP tender preparation: this is the phase where the GRNET RFP team prepares a draft of the RFP document. At this phase, vendors can be unofficially approached via a Request for Information (RfI) process.

- Step 2: RFP consultation: the draft RFP document is released (posted at the GRNET web site) for comments. Potential tender participants study the draft RFP document and send comments to GRNET. Then the GRNET RFP team evaluates received comments and change the RFP text accordingly.

- Step 3: RFP evaluation and contract award. At this phase, the official offers are received; the GRNET RFP team follows the procedures already defined at the RFP document so as to technically rank the offers. The technical ranking is based on compliance tables that are defined at the RFP document. The GRNET RFP team publishes the technical ranking of the offers and if no objections exist, then opens the sealed financial envelopes. After this, a formula that is defined at the RFP document is used to nominate the best offer. The vendor with the best offer signs the respective contract with GRNET.

Based on GRNET's experience, this process has some disadvantages which are summarised below:

- The RFP document is typically very strict and specific regarding the requested technical solution, in an almost on-off fashion. This is deliberately done in order the technical ranking to be produced in an almost unambiguous way so that no participant raises any issues for preferential treatment. However from the other hand, it may happen that other alternative solutions that may be more effective compared to the one specified at the RFP document cannot be evaluated.

- According to the public procurements legal framework there can not be any forecast for supply of additional equipment. Hence, if after one year of network deployment some additional transponders are required, then a new RFP should be launched.

Public Tenders Best Practice

GRNET has conducted three major optical supply tenders over last ten years, the lessons learnt are shown below:

- It is useful to unofficially approach optical transmission vendors so as to obtain a solid understanding of what is available on the market. However, this process should be performed via an open RfI procedure which includes all the players so as not to raise issues such as preferential treatment.

- It is useful to promote the consultation of the draft RFP text; this can be achieved by providing adequate time for the vendors to respond. Note that the RFP text is always written in Greek, so quite some time is required for local vendor offices to perform translations and collaborate with EMEA headquarters which are usually responsible for working on the offer.

5.3 PSNC

PSNC prepares and conducts public tenders for the optical equipment according to Polish legal framework of public procurements, internal regulations and European regulations (connected with the European projects). From the formal point of view PSNC belongs to Polish Academy of Sciences and has to follow state and internal regulations regarding public tenders. Polish legal framework defines multiple ways and possibilities to prepare and conduct tender however many of them are not possible to approach by PSNC (form formal and organizational point of view) or are not useful for PSNC. In this document the most feasible and frequently followed procedure is presented:

Several phases for typical open and international procurement procedure can be defined:

- Step 1: Internal detailed definition of the tender requirements in terms of technical, financial and administrative aspects.

- Step 2: Draft tender preparation: at this stage PSNC team prepares draft of the tender document (technical aspects). Usually this is the time when if it is needed Request for Information (RfI) documents are published and vendors can be unofficially approached and further details can be discussed.

- Step 3: The final tender document is announced and published on the PSNC website. At this stage vendors and providers can officially contact with PSNC and ask questions or suggest changes to the text.

- Step 4: After the specified time frame the offers are submitted, opened and evaluated. The evaluation period usually takes time as all technical and formal aspects need to be checked. The offers are ranked according to specified in the tender algorithm and criteria. After successful evaluation and if there are no objections the final, best contract is awarded and agreement signed.

Based on PSNC experience, the following advantages and disadvantages for the presented above process can be defined:

- The tender document is very specific regarding the defined technical solution and functionality. It helps to: assure equal treatment of vendors and evaluate the tenders.

- The PSNC who defines the technical solution needs to have the best possible knowledge of the solutions existing on the market and not only. It guarantees that no other alternative solution is more effective that solution described in the tender document. The PSNC technical team need to find the best possible solution.

Following the public procurements legal framework there in some situations it can be possible to ask for supply of additional equipment. It allows to further develop the requested solution and the network infrastructure. However, in many cases the new tender procedure is required.

Public Tenders Best Practice

PSNC based on its multiple tender for the optical equipment and not only has prepared the following recommendations for the tender procedure in general:

- It is beneficial to approach optical transmission vendors to gather the best possible knowledge regarding the offered solutions and future roadmaps, upgrades etc. It should be conducted via and open RfI procedure and include all the vendors. The preliminary discussion with market vendors is very important. There must be common understanding between the Parties.

- The technical team that describes the desired solution need to be very specific and aware of all of the high and low level requirements and possible solutions on the market and not only.

- The technical and administrative (public tender office) need to establish a close cooperation and understand each other capabilities and limitation with regard to possible tender procedures etc.

- Parties need to understand that language translation of technical specification and offers needs time and must be very specific.

- It is very important to discuss the desired time frames with equipment vendors.

- Preliminary quotes from market vendors help to understand where we are and where there is room for improvements. Offers need to include maintenance and support fees.

6 Conclusion and Next Steps

Precise definition of future key technologies and directions in optical networks is the key activity in the whole PCP/PPI process. As it can be observed, COMPLETE consortium members have agreed on such technologies, which are vital and future-proof for their infrastructures and more importantly for their users. Careful selection of available technologies has to be done in compliance with technology already existing in the network infrastructure. Therefore, compatibility requirements (and compatibility test validation process) has to be addressed as well. PCP/PPI process is not excluded from the governance of local laws and regulations and it is obligatory to follow the official procedures valid for public tenders.

COMPLETE consortium members have already agreed on technologies they prefer (see Chapter 4) and will negotiate its early availability for NRENs involved with the vendors from the already existing database (available in Deliverable D2.4). Several NDAs at the time of writing this document have already been signed and the negotiation process in general has already begun. The following upcoming steps have been defined:

- To sign NDAs with the remaining vendors.
- To reveal the rest of internal technological roadmaps.
- To change the timeframe of the availability of the technology of interest.
- To prepare in cooperation with the vendors the particular technology available for purchase.

PARTNERS

CESNET, association of legal entities, was held in 1996 by all universities of the Czech Republic and the Czech Academy of Sciences. Its main goals are:

- operation and development of the Czech NREN
- research and development of advanced network technologies and applications
- broadening of the public knowledge about the advanced networking topics

GRNET S.A. provides Internet connectivity, high-quality e-Infrastructures and advanced services to the Greek Educational, Academic and Research community. The GRNET backbone interconnects all universities and technological institutions, and many research institutes, as well as the public Greek School Network. The GRNET network is present in global networking for research and education, representing Greece in the Pan-European GÉANT network. GRNET's vision is the development of Education and Research in Greece along with the equal involvement of the R&E communities in the Pan European society of Knowledge, with the provision of modern, advanced and reliable Internet services to all Educational and Research Institutions.

PSNC is the operator of the National Research and Education Network in Poland. The Polish NREN, PIONIER, a nationwide broadband optical network for e-science, represents a base for research and development in the area of information technology and telecommunications, computing sciences, applications and services for the Information Society. It connects 21 Academic Network Centres of Metropolitan Area Networks (MANs) and 5 of the HPC (High Performance Computing) Centres using their own fibre connections in all regions in Poland.