Re-Engineering of Procurement Process and Re-Design for Implementation E-Procurement

Zahra Ghorbani Ravand
SIFCO Company - Iran, Managing Director
ravand@sifcompany.com,

Salman Salimi Sadr
SOICO Company - Iran, Chairman
s.salimi@sifcompany.com

Abstract:

This paper focuses on procurement process and new facilities and tools for doing procurement through Internet and the influence of Electronic tools on procurement process. In this paper, we first conceptualize procurement process from supplier-based perspective using interaction approach. Second, we introduce new electronic tools and facilities in order to perform procurement and new approach of development of business relationships, and re-design procurement process and design of Conceptual Model of E-procurement with using data base for storing data and information of suppliers, Decision Making System for selection of suppliers and purchasing process. Finally for assessment of Model, we define 3 Critical Success Factor (CSF) for implementation of model. The CSF's are performance, Trustable and Security. For quality CSF's such as Trustable and Security, at first we quantify them and then we measure model accordingly. A conceptual model incorporating process and CSF is examined with data collected in SIFCO[1], ISOICO[2] and GIPCO[3] which are 3 Procurement Companies with the experience of more than 20 years in oil and gas Industries. The results indicate that model can be defined as an e-procurement system for oil and gas industries.

Key Words:E-Procurement, Procurement process, Critical Success Factor, Re-engineering, Oil and Gas Industries.

INTRODUCTION

Standardization and automation of procurement processes are top priority on larger companies' e-business agenda. Establishing a common understanding of collaborative procurement processes showed the highest productivity gains. The paper looks at derived requirements and best practices from a set of hand on examples of procurement organization. E-procurement—the purchase and payment of goods and services—can assist the company to improve the way it does its business by reducing transaction cost, making better decisions and getting more value. The primary role of the

1 Separouk Iranian Farda Procurement Company, website: www.sifcompany.com
2 Iran Shipbuilding and Offshore Industries Complex Company, Website: www.isoico.co
3 Gostaresh Industrial Procurement Company affiliated by ISOICO.

private sector in driving the transition to e-commerce is well recognized. The company can also influence uptake of e-commerce for its own transactions with business and achieve flow through effects to influence the environment in which business-to-business (B2B) transactions take place.

Companies need to operate flexibly to take advantage of the efficiency gains likely to result from the evolution of new business models. More and more companies are adopting new technologies for the procurement in order to achieve benefits that have already been realized for the companies. The prerequisites for the integration of the new technologies at purchasing are the analysis and improvement of the existing business processes, the systems and the organization structures of the entity that execute procurement. In this paper, a case of a successful implementation of a methodology for the assessment of the functional specifications for the e-procurement system is described.

The definition of the appropriate functional specification determines, to a large extent, the success of the e-procurement system to be introduced. The paper presents the analysis of the SIFCO procurement process carried out by members of the SIFCO and Management and Operational Research of SIFCO. The analysis was followed by the identification of the problematic areas, the design of the improved business processes and the determination of the functional specifications of the SIFCO procurement solution.

After providing a short review of the e-procurement advancement, the paper presents the followed methodological approach with the tools used, an overview of the SIFCO Procurement System and the definition of the objectives of the new system which can be summarized as follows: more efficient process, higher quality of procured goods, shorter lead times and reduced cost without passing over the need for transparency.

The description of the analysis of the existing procurement process follows, concerning three important areas: the organizational structure, the procurement process and activities, and the information infrastructure. The identified problematic areas that could be improved and was based on the analysis results are described as the outcomes of a qualitative and a quantitative analysis. The new procurement process is provided in the form of three alternative scenarios based on different levels of organizational changes and technological solutions introduced. Finally, the functional specifications of the qualified scenario are defined covering both the specific needs of procurement at present and in the future (electronic marketplaces, electronic catalogues and reverse auctions).

LITERATURE SURVEY

Procurement is an integral part of B2B processes and an essential part of any organization's ability to function effectively but has only recently emerged as an important topic within the fast-growing B2B e-commerce market. An e-procurement B2B system is an open system that enables the organization to reach and transact with suppliers and customers in virtual markets (Bakos,1997).

With the introduction of cheaper web-based B2B e-commerce technologies, online procurement has become today commercially feasible (Datamonitor, 2000). The online procurement market is of great significance since it offers opportunities to a different range of companies from those which have implemented EDI. E-procurement is a user-friendly, Internet-based purchasing system that offers electronic purchase order processing and enhanced administrative functions to buyers and suppliers, resulting in operational efficiencies and potential cost savings. The e-procurement service features the most modern business and commercial practices offered by the Internet that will provide cost-saving opportunities to both suppliers and buyers(Erridge et al., 2001).

It is also essential to bear in mind that the procurement process covers a wide spectrum of activity from ordering routine indirect goods, where there is a good fit with automated e-procurement marketplace solutions at one end, through to more complex procurement of outsourced services, where e-procurement can support the integration of entire supply chains and collaboration with partners. A typical e-procurement system affects the whole requisition process (Dai and Kauffman, 2001).

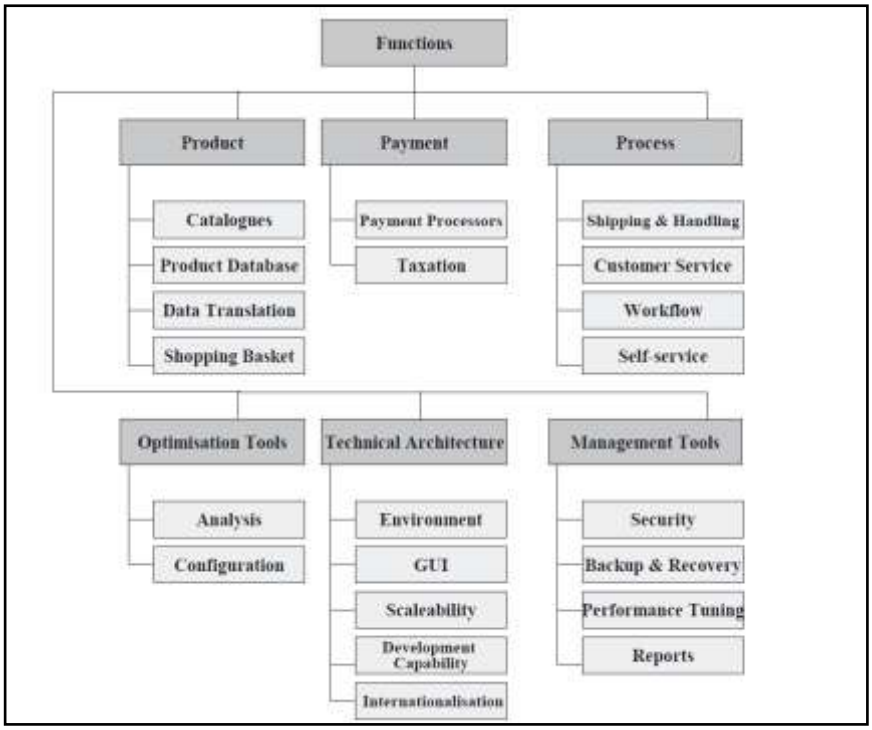
The success of an e-procurement system requires efficient processes both at the level of the supplier– purchaser relationship and the level of internal workflow. The transition from the traditional procurement to e-procurement requires the analysis and design of new processes in order to minimize the meaningless information circulation (due to bureaucratic documents exchange), the definition of clear and discernible job descriptions and the economical procurement of goods within defined deadlines. A successful transition is subject to a large number of constraints that have to be taken into account, mostly placed by laws, which try to guarantee the transparent administration of public wealth (Arrowsmith and Arwel, 1998).

"E-procurement can be further subdivided into e-ordering and e-sourcing in correspondence with its support to operational and strategic procurement" (Herfurth, Weiß, Rudolf, Kern, 2010). E-ordering aims at faster, easier and decentralized operational procurement processes at least possible cost striving for reduction of procurement process costs and in this way leveraging productivity gains.

E-Procurement offers high saving potentials by using automation technologies and ebusiness standards. State-of-the-art and ongoing developments and changes are addressed in various articles and reports, such as (Ponsignon, Smart, Maull, 2007), (Böhmann, Bremerich, Taurel, 2009), (Teboul, 2006), (KSRI, 2009), (Lindberg, Nordin, 2008), (van der Valk, 2008), (Johannson, Olhager, 2003), (Kagermann, Oesterle, Jordan, 2011). A strong influence can be seen by the use of new technologies in service delivery systems, mainly driven by IT and internet-driven channel, resulting in increased complexity (Ponsignon, Smart, Maull, 2007). IT can be seen as one major driver of change in service businesses (Kagermann, Oesterle, Jordan, 2011), (Zetzl, Käuper, 2006). The missing support of IT systems for service e-procurement systems lead to a lack of transparency. A recent study highlighted service procurement managers3 estimate that service costs could be reduced by 10 to 25 percent if “they had transparency similar to goods procurement” (KSRI, 2009).

This knowledge allows for effective negotiations with suppliers. Organizations should address key functional areas such as those presented in Fig. 1 (Gartnet Group RAS Services, 2000).

Figure 1: Taxonomy of functions in e-procurement applications.



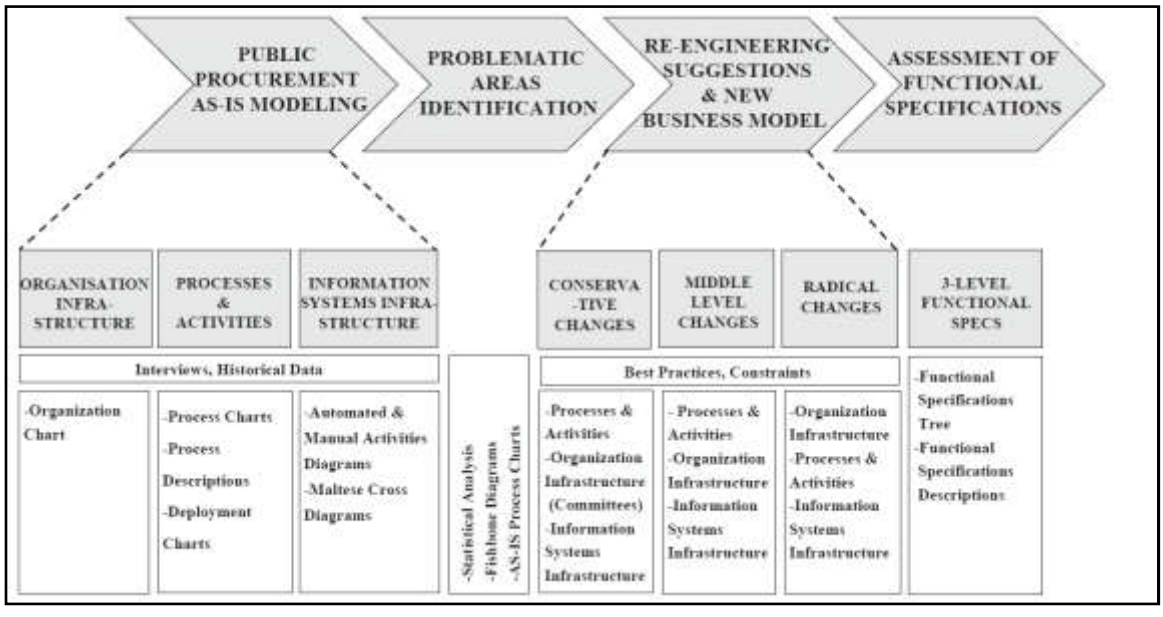
3- CASE STUDY

3.1. Methodological approach

The case study presented in this paper examines the analysis of the procurement process and definition of functional specifications of new e-procurement system, undertaken by the SIFCO Management. The objective of the analysis is the identification of potential problematic areas and the design of the new process in order to define the appropriate functional specifications and maximize the possibilities of a successful implementation of a new e-procurement system.

The methodology was supported by the use of specialized process modeling and workflow tools. Both qualitative and quantitative analyses were used in order to successfully identity the existing problematic areas. A set of performance indicators was defined including mean cycle times, transaction volumes (quantities, values, number of requests and tenders) and organisational units' capacities. The results of the analysis guided to the re-engineering suggestions in three levels of changes and to the design of the new process with the use of process charts. The functional specifications definition was based on the new system design and the overall findings of the analysis. The methodology followed is presented in Fig. 2.

Figure 2: The methodology for the assessment of the functional specifications.



The methodology followed in SIFCO's procurement system is not far from what Harrington (1991) describes as business process improvement (BPI), emphasizing on quality and productivity improvement, bureaucracy elimination, process simplification and processing time reduction.

3.2. Procurement system's overview

The procurement process was designed in 7 processes which are as per below:

- Preparation of Procurement Plan (PRP);
- Sourcing;
- Purchase Engineering;
- Contract Award and Payment;
- Expediting of the production process;
- Expediting of transportation and Delivery;
- Settlement.

Every supplier, which satisfies the qualifications defined by the laws, can participate in the RFQ procedure. The suppliers that usually participate in the restricted tendering process are qualified small-to-medium enterprises (SMEs). Specific activities of procurement process, the organisation chart of the General Direction of Public Procurement, the formulation of the various committees, the minimum lead times and several terms and rules are specified by the legal framework and changes in these areas are restricted by legislative constraints.

3.3. Objectives definition of the new system

The definition of the required functional specifications should be in line with a well-defined set of objectives. The Members of boards of SIFCO and Managing director should generate these objectives, after taking into account the critical success factors (CSFs) and the key performance indicators (KPIs) of e-procurement systems. Case studies concerning the introduction of similar systems in other companies helped in the definition of the following CSFs:

- Efficient processes without excessive idle times as performance key.
- Existence of monitoring and evaluation systems that permit the continuous improvement of the processes as Trustbility key.

- Adequate training of the employees in order to enable them takes advantage of the new system for more security and security Key.
- The above CSFs were coupled by a set of KPIs that should be monitored, the most important of which are the following:
- Tender lead times.
- Percentage of purchasing with accepted quality (in accordance with the predefined technical specifications).
- Productivity of resources (both human resources and information systems).
- Budget accuracy (deviation of the actual purchasing compared with the related budget).
- Cost (including all the relevant cost categories, together with the cost of the purchased goods or services).
- The combination of the recognized CSFs and KPIs, supported by the clear vision of the SIFCO's Managers, enabled the definition of the objectives of the procurement system:
- The procurement of quality goods and integrated services.
- The realization of short activity lead times of the procurement process.
- The minimisation of cost, such as restrictions in reducing the workforce, or changing the organization chart.

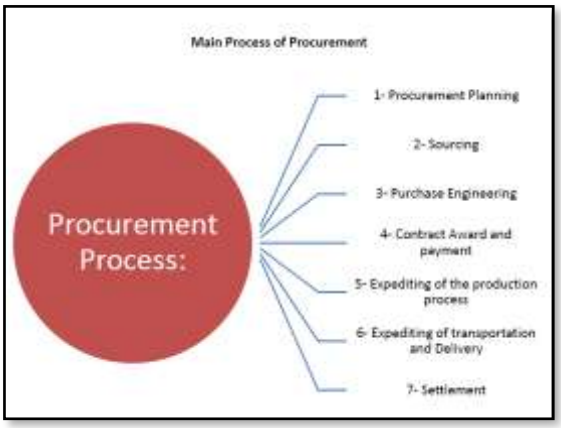
3.4. Analysis of the existing procurement process

The analysis of the existing procurement process was the first stage of the methodology followed. The analysis focused on three important areas:

- Existing organisational structure: The organisational chart was supported by the description of the main activities undertaken by each organisational unit, their staff levels and the committees held on a regular basis.
- Processes and activities: Based on information collected after the completion of interviews held with employees of all management levels, past reports generated by the procurement department (historical data) and previous analysis on the procurement system, seven main processes,

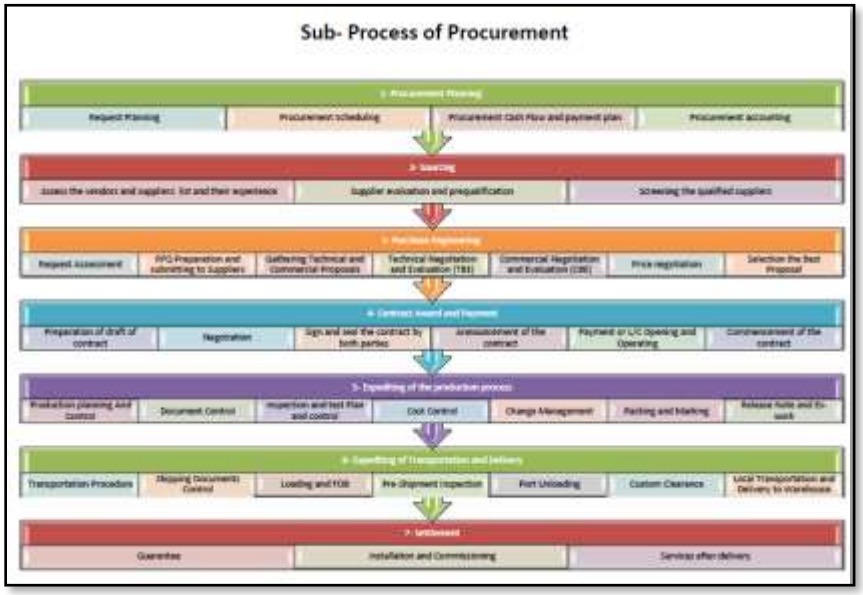
37 sub-process and a 160 activities (including the controls) were identified. The 7 main processes are depicted in Figure 3, which represents the first level analysis of the procurement process.

Figure 3: Main Process of Procurement



Each process was further analyzed and was graphically illustrated with the use of process charts, which in our case were sub-process charts (second level of process analysis). Figure 4 illustrates the process chart for the sub-process:

Figure 4: Sub-process Diagram of Procurement



- Moreover, a detailed sub-process description was created for each one of the sub-processes including their objectives, their application areas, inputs, outputs, the involved departments, the supporting information systems used for the completion of the sub-process and a detailed description of the tasks for each activity of the sub-process (third level of process analysis).

3.5. Problematic areas identification

The new process design was based on the analysis results and the identification of problematic areas that could be improved by the introduction of an electronic system. The basic steps of the analysis of the problematic areas were the following:

- Qualitative analysis based on the tools used in the process analysis.
- Visualization of problems' causes and effects with the use of fishbone diagrams. The most important findings of the qualitative analysis can be summarized as follows:
- Heavy work load at specific organisational units.
- Delays due to mistakes at the procurement requisitions.
- Iteration of the set of activities of ''delivery of recommendation'' and ''consolatory response'' of the Procurement Department.
- Delays on the technical evaluations of proposals.
- Process segmentation into various departments and committees.
- High ratio of checking and controls that causes delays.
- Variations, exceptions and special cases of the tendering sub-processes.
- Issue of multiple copies of the documents.
- Extremely large number of documents and transactions.
- Multiple filling (iteration and dissemination of the information).
- Difficulty in searching information from manually maintained and massive archives.
- Deficiency of document standardization.
- Same data entry to different applications (mainly for the PRP).

- Manual and iterated data entry to applications.
- Information technology supporting a very small percentage of activities. Most of the activities are carried out manually.
- The most important findings of the quantitative analysis can be summarized as follows:
- The tender lead times are long. A large percentage of the delay is due to idle time between the activities of the process. In particular,
- The lead time in the case of the open procedure procurement is 6–7 months (average value).
- The lead time in the case of the restricted procedure procurement is 11–12 months (average value).
- The maximum values of the procurement process (both of the open and the restricted procedure) extend to 2 years' time.
- The sub-processes acting as bottlenecks in the process are the following:
- The technical evaluation which accounts for 40% of the total tender time in the case of open procedure procurement.
- The pre-selection of suppliers who are invited for submitting proposals accounts for 54% of the total tender time in the case of restricted procedure procurement.
- The activities with the longest lead times are the following:
- The examination of suppliers' requests for participation to restricted tenders, which accounts for 24% of the total restricted tender time.
- The technical proposals evaluation from the technical committees, which accounts for 13% of the total time for open tenders and 8% for restricted tenders.
- A large number of activities has been identified (160 activities at the second level of analysis and 480 at the third level) due to the bureaucratic procedures. A high percentage of the activities involve non-value adding work.
- Ninety-eight different types of documents were traced in the whole procurement process. This number could be substantially smaller in the

case of documents' standardization. The document transactions appeared to be very high. The most striking findings in this area were the following:

- One hundred documents (average value) are used internally and externally in each tender process.
- Forty-six thousands documents (average value) are used for the tenders in 1 years' time.

3.6. New process design and expected benefits

The purpose of the new process design was to improve the identified problematic areas. Based on the findings presented above, new process charts and descriptions were developed for the e-procurement model. A summary of key points that were introduced by the new process is as follows:

- Single location filing.
- Electronic document flow and control. This includes a common database for all the organisational units and all the sub-process of the purchasing process, integrated document management system, automatic information transfer, authorisation and permissions with different access levels.
- Document standardisation and simplification.
- Rationalisation of the number of documents used.
- Elimination of non-value-added activities in the cases where there is no legal constraints.
- Information technology support for most of the activities, but not for all of them.
- Reduction of supply costs: The estimation of the study concerning the existing costs of supply (of purchased goods) is a 1% cost reduction.
- This will be realized through the participation of larger number of suppliers and the introduction of reverse auction business models.
- Reduction of cost per tender: It was calculated that the improvement of the internal workflow processes will permit a 20% improvement of the human resources utilization which will conclude in 20% reduction in the cost per tender. It should be stated that this is an opportunity improvement, as the total number of employees will stay stable.

- Lead-time savings: The lead-time savings will be substantial both in the cases of open tenders and the restricted tenders.

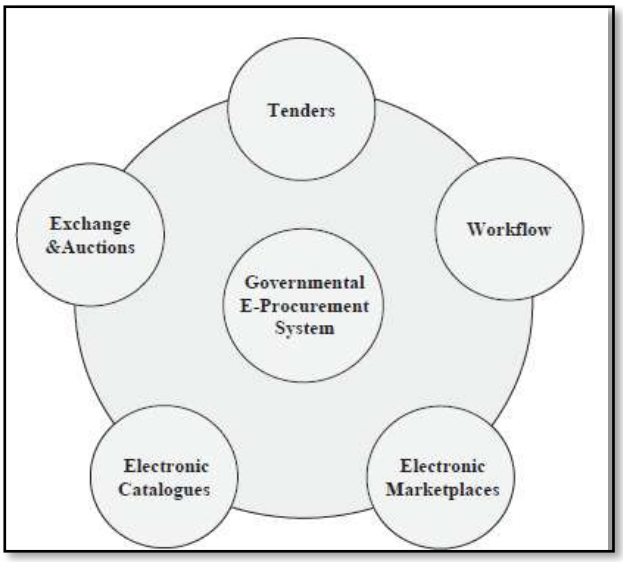
The estimated cost of the investment for the procurement and the implementation of the system based on the functional specifications of the selected scenario is h 300.000.

3.7. Functional specifications definition

The design of the new procurement process supported the definition of the functional specifications of the solution.. The most important features of the specified system are summarized as follows:

- Fully electronic activities of the governmental purchasing process, executed by the General Secretariat of Commerce using Intranets and web-enabled applications where applicable.
- Manual execution of activities where soft issues are involved (such as negotiations with the suppliers, qualitative evaluation and decision taking). In these activities, the e-procurement system will only play a supportive role.
- Interaction and communication with the external entities (governmental agencies, suppliers) through the Internet. The appropriate authorization definitions will determine the access of the external entities into the system.
- The tendering process could be carried out in a decentralized manner by the governmental agencies that hold the largest percentage of the authorized procured quantities, using sectional tendering sub-systems, integrated to the central tendering system.
- Interfaces with other existing governmental information systems. Figure 5 summarizes the solutions included in the e-procurement system.

Figure 5: E-procurement system overview



The different solutions of the system cover specific needs of governmental purchasing at present or in the future.

CONCLUSIONS

The structured approach of the study of the SIFCO procurement system, presented in this paper, enabled the identification of problematic areas and supported the design of the new procurement system, facilitating the definition of the necessary functional specifications for the selection of the appropriate solution. The methodology presented in this paper identified and analyzed three alternative scenarios, which were ranked according to the degree of the innovation they entail. The analysis of the prerequisite business processes was coupled with the design of new processes supported by new business models of e-procurement. The selected ‘‘conservative’’ scenario was enriched by functionalities offered by the two or more ‘‘innovative’’ scenarios.

The study revealed the difficulties in reengineering the SIFCO Company as sample and identified the most important barriers in the adoption of e-procurement business models. The thorough analysis of the existing legislative framework was identified to be one of the most important CSFs in the design of the new procurement processes. This explains the approach followed which placed a large amount of effort in the careful

analysis of the existing procurement process for the design of the new business processes and the adoption of selected e-business models. The designed functional specifications express the strategic view of the SIFCO for the procurement of the future, taking into account the supply chain developments and the existing practices in the suppliers all over the world. The expected benefits of cost reduction, improved efficiency, effectiveness and absolute transparency will result from the simplified processes, the electronic support of the activities, the continuous performance measurement and the definition of clear roles and responsibilities. The defined functional specifications intend to successfully express the specific needs both in services and change management that will support the new Procurement Process.

The coordinator of procurement system will be the SIFCO responsibilities, while the users (internal customers) will be the qualified. The suppliers (even SMEs sited outside the capital) will be encouraged to participate in tenders with simplified procedures and shorter lead times. Furthermore, taking into account that procurement is a key area of the Internal Market, both in terms of its economic importance and as an instrument of direct economic influence for Member States' administrations; the new public e-procurement system will help in SIFCO competition.

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