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Purchasing and offering of cloud software services by a central procurement agency: a case study

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***Abstract*—The cooperative purchasing model has since long been used by government entities to obtain better purchase conditions through the power of aggregation. In particular, the "Piggypack" option which consists in bridging a contract from one entity to another in an ethical way has been almost globally generalized since 2005. Although cloud software services are natively designed for convergent needs, its apparent attractiveness has to be precisely qualified, especially in the cases where this "Piggyback" option is contractually defined.**

In this paper, we study the specific problems that can be experienced in the definition process of cloud software services when implementing cooperative procurement. In particular, we show the particular importance of the scalability of the contractually defined SLA themselves in this context. We propose some best practices. One is based on the use of meta-SLA and sub-SLA concepts. It is illustrated by an application on an innovative governmental cloud software services implementation program that was already described before. This leads to a better understanding of the role played by central procurement agencies in the definition of cloud software services.

Keywords: Services, Cloud computing, SLA, Negotiation, Cooperative purchasing, Central procurement agency

I. COOPERATIVE PROCUREMENT AND CLOUD SOFTWARE SERVICES DEFINITIONS

A. Cooperative procurement definition

The primary role of procurement is to obtain quality materials, supplies and services to support effective and efficient business. Expected added values are [3]:

- Providing efficient delivery of products and services,
- Obtaining best value through the competition,
- Offering fair and equitable competitive contracting opportunities for suppliers,
- Maintaining public confidence through ethical and transparent procurement practices.

Governmental procurement must particularly fits these requirements and we focus on it in this paper. We will refer to the term "structure" to denote a government entity. This paper could be read by replacing government by group and structure by branch, as any private group should also fit these requirements.

As contracting workloads increase, purchase requirements become more complex and cuts on expenses are generalized, procurement professionals are turning to various forms of cooperative contracts. More generally, cooperative purchasing are becoming increasingly popular because it can indeed save significant time and money in contract production as well as lower contracts prices through the power of aggregation[7].

Cooperative purchasing means procurement conducted by, or on behalf of, one or more procurement units representing one or more businesses. Cooperative purchasing may include shared procurement programs and resources, including advice and assistance. In this paper, we will focus on the contracting part of the process.

The following main cooperative purchasing schemes are the following:

Case A. True cooperatives: Two or more structures combine their requirements and solicit bids or offers for services,

Case B. Third party aggregators: A structure (allowed to do so) brings together multiple structures to represent their requirements and manage the resulting contract,

Case C. "Piggyback" option: In this scheme, one or more structures (allowed to do so) represent their requirements and include an option for other structures to conclude later a contract similar to the

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first awarded contract for their own use (*i.e.* to "bridge" the first contract). This way was first introduced in the USA (where the use of the Piggyback term originally comes from) in the 1970's before it was recently more globally adopted, for instance in France in 2005. In order to behave ethically, a structure can only "bridge" one contract at once for one service. As it is the more sophisticated one, this last scheme is of particular interest for us in this paper.

Minimum or maximum quantity and delivery can be definite or indefinite. In the second case, the risk is supported by the applicants. The challenges that are encountered in using or establishing a cooperative contract are legal compliance -Structures may have to comply different general or specific intern laws- and the participation of small businesses in bids as they may not be able to handle the total covering of the cooperative but only a part, which could exclude them from the competition.

A classical step-by-step method to describe how to create a cooperative procurement is the following:

Step 1. The cooperative is formed when one or more parties identify a common requirement suitable for cooperative purchase and sign a written agreement to cooperate,

Step 2. Lead party solicits proposal and awards contract,

Step 3. Contract is available for use,

Step 4. Participating structures sign an agreement in the specific contract.

Concerning the contracting part of the purchasing process, the following best practices are classically expressed [8]:

- Evaluating and negotiating offers:
  - Invite participating cooperative members to participate in evaluations,
  - Negotiate terms and conditions including SLA that conform to legal requirements of each participating structure,
  - Evaluate the proposals,
- Contracting, awarding and administrating the contract:
  - Establish a contractor performance reporting system, i.e. establish additional SLA related to contract administration performance by the contractor,
  - Require that contractor provide periodic contract sales reports,
  - Invite participating members to comment on proposed contract extensions,
  - Negotiate deeper discounts if actual purchases exceed estimates.

B. Cloud software services definition

It is straightforward to understand that materials and supplies are natural candidates for the use of the cooperative purchasing model. Although services are more complex by nature, their cooperative purchasing can be done by means of the use of the concept of Service Level Agreement (SLA) which is a part of a service contract where the level of service is formally defined. By this way, it can also be easily shared among cooperating structures.

Especially, the cooperative purchasing of software services has been widely realized in recent years (See [4] and [5]). This is mostly due to the emergence of the cloud computing techniques which makes even more natural to share the purchasing since the materials are on a neutral location, outside from all the perimeters of the cooperating members.

Cloud software service is a modality for providing software facilities via the internet by means of shared infrastructures. This modality combines both the cloud computing techniques and that of the Software as a Service (SaaS) paradigm which involves specific SLA for software. The cloud computing techniques represent a contextual shift in how computer resources are provisioned from the internet "somewhere in the cloud" and are accessed by users. The main benefit that comes with the cloud computing techniques lies in the economies of scale that it offers thanks to the power of sharing.

II. PARTICULARITIES OF COOPERATIVE PROCUREMENT OF CLOUD SOFTWARE SERVICES

We focus on the problem of the management of terms and conditions, especially SLA, for cloud software services in cooperative procurement schemes.

SLA negotiating with the cloud software provider is rather complex in the case of cooperative procurement than in classical ones. The following table shows how SLA management can be implemented throughout the cooperative purchasing process in the different cases of cooperation expressed in Part I.

In Case A, there is no specific problem to note in comparison with simple procurement. One has to put special efforts at Step 1 as convergent SLA may be difficult to obtain. During contract execution (Step 3), some SLA may be adjusted to fit more concrete needs.

In Case B, additionally, at Steps 2 and 4, the third party has to manage two negotiations concomitantly. Its situation is similar to that in which a dealer is through. It can use the concepts of meta-SLA (with the applicants) and sub-SLA (with the members) defined in [1] and used in [8] to do so efficiently.

Steps	Case A - True cooperatives	Case B - Third party aggregators	Case C - Piggyback option
1	SLA definition among members according benchmark results		
2	Negotiating SLA for a definite perimeter between members and applicants	Negotiating SLA for a definite perimeter between third party and concomitantly applicants and members	Negotiating SLA for a potentially indefinite perimeter between leading member or third party and concomitantly applicants and members
3 et 4	SLA adjustment if necessary		SLA adjustment if necessary + Comparing with other contracts + SLA adaptation if necessary and possible

Table 1. SLA management throughout the lifecycles of the three main cooperative procurement schemes

In Case C, if the initially negotiated SLA fit the needs of the new coming structure that asks the contract to be bridged to it, then it is straightforward.

Otherwise, the process is much more difficult to manage. To simplify it later, the purchasing structures have to take in account from the beginning a potential substantial adjustment of the SLA to fit additional needs – which can arise from the emergence of a new law for an example- which would imply an adaptation of the SLA. The best possible strategy consists in initially defining sufficiently abstract SLA to be able later to instantiate them to the potential new needs. It can be done by applying the method to define generic SLA provided in [1].

SLA adaptations are not always possible. They must comply with:

- Ethics: A competitor who had lost the initial competition could claim that it would have won the bid if the initial requirement had been the later adapted SLA and not the SLA presented at the time of the competition. However, in case of emergence of a new law, the purchaser can claim that it could not know that this was going to happen at time of competition and awarding,
- Commercial and offer strategies of the service provider: accepting adapted SLA could scramble the message delivered to prospects and other customers,
- Technical offer strategy of the service provider: In the case of cloud software services, the provider may have built and run the underlying platform following cloud computing principles and a very few adaptations of some SLA may have too strong implications on expected revenues.

III. EXAMPLES FROM THE STUDY OF THE HEALTHCARE CLOUD SOFTWARE SERVICES PROGRAM OF THE GREATER PARIS REGION

The “Filmless region” program is a program run by the “Groupement de coopération sanitaire pour le développement des systèmes d’information de santé d’Ile-de-France” (GCS D-SISIF) and led by the author.

First studied in [6], this program is a healthcare cloud software service implementation program that has been run in the greater Paris region since 2008. It is a real-life case. Its study follows the model of the study of the real-life case presented in [2].

For the purpose of this program, a third party (the GCS D-SISIF structure) was created in 2008 in order to lead a cooperative procurement based on the signature of a framework agreement, in this case the first awarded contract, including a piggyback option that allows any health structure within the greater Paris region to ask its bridge upon request during the 5 years of its performance.

So, this program uses the purchasing scheme of Case C defined in Part I and at time of writing, bridging had already been asked 11 times.

In the framework agreement, the following SLA were defined:

- 24x7 software service availability, maximum 6 hours interruption of service per year, i.e. availability rate of 99.9%,
- Archiving of any data on the central platform in less than 4 hours,
- First data (image in this case) on the screen of the user less than 2 seconds after the click of the button,
- No data may be lost or damaged,
- All call for assistance must be taken in account by the operator less than 30 seconds after they have been formulated,
- Extra setup and reversibility will be implemented upon request.

The following relevant situations occurred:

- A structure asked the first SLA to be adapted to its need with the consent of the service provider: It asked a SLA based on a 24 hours a day availability but only 6 days in the week as it closes on Sundays. We could answer its demand as the SLA was

calculated on the day duration basis. We would not have been able to do it if it had been defined on the basis of the week,

- It eventually appeared that the second SLA was concretely too low and that a limit of 1 hour should have better fitted the needs of all the members, so the third party asked the provider to adapt the SLA. However, the provider refused arguing that in the framework agreement model, prices cannot vary upwards in a follow-on contract. However, to protect the image of its offer, and as it was able to technically reach it, the service provider agreed to define a new service level objective at the 1 hour level. This could have been completely done if first this SLA was more theoretically designed, for instance by means od the use of an abstract integer n where n would have been the amount of minutes a user had to wait before the data is archived,
- A structure asked for the defined recovery time objective to be adapted. As this last one was not defined as an independent SLA but merged with other requirements, this did not allow us to answer positively to its demand. This could have been done if SLA had been sufficiently decomposed into atomic SLA.

IV. CONCLUSION AND PERSPECTIVE

All this illustrates that management of cooperative procurement, especially those involving contracts with piggyback option, would particularly benefit from popularization of the latest expressed principles of the theories of the services and cloud computing. The cooperative procurement including piggyback is certainly original, concrete and widespread enough in the real world to deserve the definition of a comprehensive set of generic and optimal SLA.

On the other hand, IT companies should put more efforts into the presentation of their cloud software offers as they have to manage them from strategic, marketing, commercial as well as technical points of view in a very communicating world, in which customers ask for readable offers and are ready to cooperate together.

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