

Cloud Services for SMEs: Contract Management's requirements specification

Mario A. Bochicchio, Antonella Longo

Dept. of Innovation Engineering
University of Salento
Lecce, Italy

{mario.bochicchio, antonella.longo}@unisalento.it

Caterina Mansueto

School of Economics
University of Salento
Lecce, Italy

caterina.mansueto@gmail.com

Abstract - Software tools for Contract Management (CM) are designed to support a wide range of contracts, but they can fall short in the case of cloud contracts. Cloud services, in fact, cross national boundaries and this entails complex problems (security, non disclosure, privacy, ...) about applicable laws, jurisdiction, accountability, third parties etc. Moreover, cloud services must be monitored and managed according to specific contract's elements (service level agreements, penalties, etc.) and this prefigures tighter integration among CM tools and other IT management tools. These aspects are even more relevant to Small and Medium IT Enterprises (SMEs) adopting open CM tools to manage their contracts about own cloud services, because they often lack skills, maturity and sophisticated tools already acquired by the larger companies. In this scenario we propose a requirement elicitation approach based on CM process modeling and information modeling to extend the current generation of open CM tools with the above mentioned features, for SMEs.

Keywords: *Management as a service, Managing cloud services, the Internet of services, Cloud Services, Contract Management*

I. INTRODUCTION

Software as a Service (SaaS) is software that is owned, delivered and managed remotely by one or more providers. The provider, or the chain of providers, delivers a service which is massively consumed in a one-to-many model by all contracted customers anytime and anywhere on a pay-for-use basis, or as a function of other metrics. According to a Gartner market report [1] released in November 2010, SaaS is forecast to have a 15.8% Compound Annual Growth Rate (CAGR) through 2014, i.e. three times the average application market CAGR. This makes SaaS and Clouds very interesting to services industry, but the viability of the business models depends on the legal compliance in contract definition, with particular attention to accountability. As defined in [2] and [6], accountability is clear disclosure of service obligations, faithfully honouring of disclosed obligations or otherwise assuming the liability for the non-performance of the obligations of either parties. Traditionally accountability is achieved through the enforcement of a legal, paper-based contract. In SaaS service providers generally publish a *terms and conditions* page for their offerings on their web-site. Upon clicking on the acceptance link, the consumer enters a binding contract with the service provider. Essentially, this is just a "web-enabled" version of

a predefined paper-based contract, in a plain-text form, but it can prefigure a new scenario able to better support the accountability challenge. In this new scenario, web-enabled contracts could be interpreted by software agents, and used as a basis for contract execution monitoring and state reasoning to automatically enable service obligation disclosure, to allow software agents deciding which party is responsible for what action and which party is liable for what result. To pave the way for this scenario we state that it is necessary to define a suitable information model underlying the contract and the related CM process model. The above mentioned models are also useful to face a second challenge, concerning deeper understanding of jurisdiction(s) where the provider operates and related details about client's data ownership and control. For instance, cloud providers can transport and store client's data in or through foreign countries, so the client becomes subject to laws and regulations she/he may not know anything about. Current contracts often lack of statements about data ownership or usage rights, leaving a grey area about what a provider can do or not do with the client's data, what happens to the client's data if the service provider is sold to another company and or in case the provider goes out of service. This means that enterprises involved in Cloud Services contracts must deal with complex international contracting about civil and commercial topics. If Cloud Computing must become the novel paradigm for delivering services it is necessary that contracts explicitly express all elements which guarantee both parties in the international frame and that obligations automatically disclose the proper actions. In other words the existing CM tools (e.g Ariba, SAP, Oracle, etc.) should better support the whole contract lifecycle (from formation to execution and conclusion) in the Cloud scenario and should better assist customers and providers in checking obligations, responsibilities and consequent actions. These issues are even trickier for Small and Medium Enterprises (SME), which usually don't own sophisticated and expensive tools and skills to face these CM and Service Level Management (SLM) challenges, even if they consume Cloud Services, like videoconferencing, email and virtual hosting. Our experience with a group of local SMEs delivering SaaS for e-learning or e-government shows that once the fascination for Cloud Services as new technology edge passes, the previous issues arise very quickly. In this scenario, the aim of our current research is to define a requirement elicitation approach based on CM process modeling and information modeling to

extend the current generation of open CM tools with the above mentioned features (accountability and cross national aspects). The approach includes the definition of the model of the CM process across the client and the provider organizations with specific attention to the involved resources, to service-level agreements as they arise in infrastructure and networking services, and to services viewed from the perspective of real-life engagements. Previous works on e-commerce architectures and on technical services (such as web and grid services) has focused on low-level aspects of computation. In contrast, the emerging trend toward contracts recognizes the importance of high level, flexible specifications of interactions. It is clear that contracts make sense only when the contracting parties are autonomous. Further, contracts help shield the organizational heterogeneity of the contracting parties from one another. In this manner, contracts provide a natural match for a variety of real-world problems that service scientists are beginning to recognize [18]. Following the method described in [3] and [4], a first step in approaching a more comprehensive tool support for CM in Cloud environment is to analyze and model information produced and consumed by the process. In our knowledge there is no reference process for Cloud Service's CM, so our approach proposes a process model and an information model. So starting from the organizational definition of the CM Process, we gather and model information objects. This process-oriented approach to model information domains is not new in literature [5], moreover comprehensive information models for Service Level Agreement (SLA) management in a cloud environment already exist ([3], [4]), but they are built starting from the analysis of ITIL's SLM process, and integrating requirements about international contracting ([3], [4]). This way the final information model doesn't match completely with information requirements coming from the process. The paper is structured as follows: Section 2 provides background information and overviews related works in this area. Section 3 describes the approach and section 4 illustrates the derived models, while section 5 validates the information model and section 6 depicts conclusions and future steps.

II. BACKGROUND

The market of Enterprise CM (ECM) tools is fragmented and various. Gartner states that [17] most organizations use Microsoft Excel, Access or SharePoint Portal, or a document management application, to store and manage contracts, often because they are not aware of additional, packaged functionality that is available in a purpose-built ECM solution. Organizations that have implemented ECM solutions have provided consistent feedback over the past five years that this class of solution adds a lot of value. According to Gartner, ECM vendors can be segmented into several classes, which, among others, include:

- **Strategic sourcing application suites** are software solutions that support spending analysis, strategic sourcing, supply base management and ECM. The most rated Gartner's strategic sourcing application suites

offer CM solutions. Gartner has observed that several vendors offering their ECM modules "for free" to clients that buy a broader suite. It can be a great advantage thanks to the native integration with other applications in the suite, but vendors are unlikely to have experience integrating their solutions with any solutions outside the normal set for procurement, such as an ERP, for contract compliance, or ITSM monitoring tools. Sample vendors include AECsoft, Ariba, BravoSolution, CGI, Curtis Fitch, Emptoris, Global eProcure, Iasta, Ivalua, Ketera, Selected Services (Pool4Tool), SAP CLM, SynerTrade and Zycus.

- **Content management applications add-ons:** Content Management applications and ECM systems share content management system. It is a good reason to avoid duplicating functionality (like security and versioning control) Content Management applications already own. Alas full-text search and complete document viewing may be available only by signing onto the content management application. Vendors in this category include Upside Software, CLM Matrix and Dolphin Software for Microsoft Office SharePoint Server (MOSS). Selectica and Imagitek's Prodiagio Software partner with EMC to provide solutions that extend Documentum. Hyland Software, IBM, Open Text, Perceptive Software and SpringCM offer their own ECM solution add-ons.
- **E-Signature-Based, Sell-Side Solutions:** An interesting use case for an ECM solution is supporting sell-side contracts that are presented online to prospects and are executed via electronic signature. Typical functionality for this type of solution includes "fill in the blank" or conditional, rule-based contract assembly, sales pipeline monitoring and, of course, electronic signature capability. An issue is that functionality is often too specific to the use case to leverage the solution for other types of contracts. For example, it's highly unlikely that a solution of this class would support document versioning, master agreement-subagreement links or complex approval workflows. Sample vendors include Adobe, ContractPal, DocuSign, eLynx, EchoSign and Sertifi.
- **IT Application Management (ITAM) tools:** Many ITAM tool vendors offer a CM module or CM functionality. The ITAM process entails capturing and integrating physical, financial and contractual data to manage the IT asset life cycle. Asset management encompasses the financial management, contract terms and conditions, asset costs, depreciation, life cycles, vendor service levels, asset maintenance, ownership and entitlements associated with IT inventory components such as software, PCs, network devices, servers, mainframe, storage, mobile devices and telecom assets (for example, voice over IP phones and PBXs). Alas, these solutions are not generally suitable

for a shared service or for organizations with multiple, heterogeneous ERPs, they do not offer support for document management or authoring, the focus on transactional data and a lightweight functionality, if any, in support of authoring, master agreement-subagreement interconnection and full-text search. Sample vendors include BMC Software, CA, HP, IBM and Symantec-Altiris.

- **General purpose solutions:** A group of niche vendors specializes in enterprise-class CM solutions, which are typically very robust and include extensive "bells and whistles" to meet a variety of requirements and to support multiple contract types within the same application. General purpose ECM systems are useful alternatives for a single contract type/departmental requirement when a suite is not in use or is not planned, but when implementing an enterprise contact management is a priority. Sample general purpose vendors include CobbleStone Systems, Ecteon, Emptoris, Mumboe, Nextance, Novatus, OpenWindows, Selectica, Symfact, and Upside Software.

On the side of open-source, a search about CM on Sourceforge.net shows 54 projects, based on php, Java or Microsoft technologies. The most interesting are

- Kwok Information Server, which is an IT management system, providing service CM integrated with IT asset tracking (hardware inventory and software license), issue tracking (helpdesk), vendor contact management, and knowledge base.
- FitNet Manager, which is a solution exclusively dedicated to consulting & services companies. It is Full-Web oriented and built upon JBoss Seam framework. FitNet Manager includes an activity management, contracts management and Reporting.
- extensible Life Cycle Management (xLCM), with its CM Component built on the core of this Management System. Other Components are Procurement- / Negotiation-Support, Accounting-Support and -Adaption.
- ContractFoundry, which aims to manage contracts made with customers, vendors, partners, or employees. It includes negotiating, ensuring compliance with the terms and conditions, documenting and agreeing during implementation or execution of contracts.

None of these tools support the integration between SLM management and CM and consequently it is able to manage contracts for Cloud Services.

The kind of approach we discuss in this paper (a reference process and information model) for eliciting requirements is not new in literature, but to our knowledge it has not been instantiated in the domain of contracting in Cloud environment. This scenario is specific because it concerns the agreement of technical service levels (SLA), international private law topics and contract lifecycle aspects. As already described in the previous section, some

attempts to define a reference information model based on SLM process is presented in [3]. Such an information model is derived from ITIL process ([9], [10]) with an approach based on the Shared Information/Data Model (SID) [8]. The information model derived from ITIL in [3] has been extended and adapted with international contracting aspects in [4]. The final information model is quite complex and structured and it is an interesting input to our approach. Alas, model in [4] starts from Service Level Agreement, which is a kind of IT service contract, it usually only records non-functional aspects of obligations and falls short on the functional aspect of service obligations. The topics of obligation disclosure, liability for misconduct, monitoring during the full-lifecycle of service consumption are the key concern for business [2], for maximizing financial and operational performance and minimizing risk. In order to define an information model supporting the whole contract lifecycle management, it is necessary to consider these functional aspects related to services obligations disclosure and monitoring and adequately position them in the CM Process. So far, the challenge is the definition of a reference process for Cloud Services' CM. For our purposes we define CM Process as the process of systematically and efficiently managing contract creation, execution, and analysis for the purpose of maximizing financial and operational performance and minimizing risk. It includes negotiating the terms and conditions in contracts and ensuring compliance with the terms and conditions, as well as documenting and agreeing on any changes that may arise during its implementation or execution. Although it is a fundamental procurement process, several organizations (like OGC, [7], the National CM Association – NCMA – or ASL Foundation [11], the International Association for Contract & Commercial Management - IACCM) are involved in discussion about this topic and a lot of platforms already support it in product and services procurement, in our knowledge neither ITIL nor other reference framework concentrate on CM. In order to set up the stage and define a shared background we propose our understanding of Cloud Services CM Process, starting from the references cited above and from some CM tools and ideas reported above.

III. THE APPROACH

The proposed approach aims to define a reference framework for Cloud services' CM. Starting from the research literature and from ITSM reference frameworks, we model a reference process and an information model which is validated with a group of users, before implementing the platform. The approach is divided into three phases: the CM Process modeling, the Information Modeling and the validation. Figure 1 illustrates the general sequence of steps with possible backtracking paths (where the final output of a step might necessitate the partial re-execution of a previous step). The CM Process modeling stage sketches the process structure, in a top-down way, splitting the process in aggregated or specialized phases.

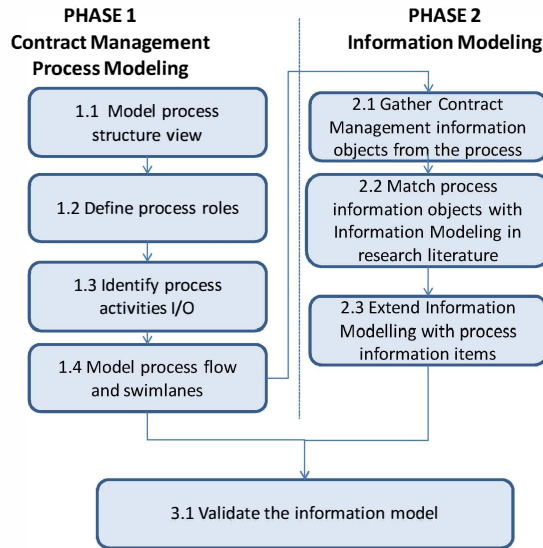


Figure 1: General approach

The first step is to model the process structure, usually with a tree-like hierarchical diagram. Then CM's actors and roles are defined, as well as input, triggers, output and (physical and informational) resources of each activity. At this point the process flow and swimlanes are modeled.

The process flow diagram shows the main flow between activities. It is basically a Unified Modeling Language (UML) activity diagram with a set of stereotypes that describe the activities performed within the processes and how they interact: the input and output objects; the supplying and controlling resources that participate. Swimlanes, usually represented using Business Process Management Notation (BPMN), group activities with respect to actors' responsibility and show the organizational view where activities are executed [15]. Process structure and swimlanes are the main output to be validated in the last phase of the approach. In order to gather information items relevant for CM we draw a π Diagram (Process-Information Bridge diagram). This diagram is effective to map information used in the process, since it represents the swimlane at the top and information resources, used or produced by the process, at the bottom. It shows also semantic relationships among information resources and between them and the related process activities. Each information resource is related to at least one CM activity because it can be an input of one or more activities, an output provided by one or more activities, can be owned by a process actor or by an activity (in the sense that it is created, managed and terminated). The connections between the swimlane and the information objects comprise the information flow to and from the information system and show the interface between the business process and the supporting systems. Due to lack of space in this paper we don't show any π Diagram. Further details are discussed in [5]. As discussed before, the research literature presents intensive and extensive studies about information models of ITSM processes and contract services. They are usually

represented with UML class diagrams or sometimes as ontologies [2]. Alas, these works lack of information objects related to CM's business process-oriented view. The novel contribution of this paper is to add this view and information necessary to manage functional aspects of contract obligations. In order to match CM's information model from literature and information objects gathered from the business process, it is necessary to analyze either information entities, adapt them, if needed, and add the unmatched ones to the model. Once the information model is derived, it is validated in the validation phase together with the process model.

IV. PROCESS AND INFORMATION MODELING

A. The Contract Management Process modeling

Within the procurement macro-process, Contract Management Process defines and describes the negotiation, formation, management and conclusion of a business contract between a service provider and a service client¹. Its aim is to deliver and manage a service contract, in order to achieve final value for both service provider and customer. The customer's final goal is to achieve a required service on time, on budget according to the suitable regulations and laws, or to receive help in case of service unavailability or incidents. The service provider's final goal is to deliver efficient and effective services to all customers and to be paid according to the agreements. Contract Management Process comprises three main phases: Definition, Execution and Conclusion. The **Definition phase** deals with negotiation and contract formation aspects: according to laws, regulations, best practices and policies, consumer's and provider's staff work together for defining the terms of the agreement. The aspects they discuss can be grouped in three main categories: financial (i.e. pricing and payment terms), technical (i.e. Service Level Indicators -SLI-, Service Level Objectives -SLO, metrics, duration, etc) and legal (i.e. jurisdiction, applicable laws). Each topic requires specific skills, so the formation of a contract requires cooperation among technical, accounting and legal staff of both parties. In the case of SaaS contracts, which are IT service agreements drawn in an international legal frame, a key aspect is the negotiation of preconditions, actions and post-conditions for each relevant obligation or event, which should be automatically monitored and controlled during the Execution Phase. Obligations can be technical or legal and are related to the issues discussed above. **Execution phase** refers to the contract running and to the management of service delivery, contract and communication among peers levels [7]. Activities include monitoring and reporting of the different aspects and relationship management between peers. The **Conclusion phase** is to manage the contract expiration (regular or withdrawal) or renewal. Activities in

¹ For the sake of clarity we are not considering multiple parties, underpinning contracts, agreements internal to consumer's or provider's scope, etc.

CM Process are carried out by peer actors and roles both in the customer and in the provider organization, who handle peer activities and communication, according to respective internal policies, regulations and national laws. The main roles are the **Contract Owner**, who signs the contract, the **Contract Manager**, who manages the contract according to what previously negotiated and signed, the **Enterprise Staff** (Administrative, Financial, Legal and Technical). In addition a **Sales Manager** (usually in provider organization) is in charge to receive the contract request from the customer's procurement manager at the beginning of the negotiation. Cloud Service contracts present specific issues in the CM process, because the definition phase is set out in international scenario and, due to the presence of the Cloud, provider's reputation and customer's confidence with the provider are both relaxed relationships requiring more formal checks on contracts. Service quality is based on Service Level Agreements, which must be defined in the definition phase in a shared shape, in order to allow their monitoring with automatic tools in the execution phase. In general the platform supporting Cloud Services contract management must support all the previous phases, each one with different requirements; for example the contract definition phase requires a warehouse of standard contracts, business terms and conditions and template contracts. The execution phase focuses on Service Level Management (SLM). The conclusion phase needs support to analyze process, clients and services performance.

Figure 2 represents the process structural view. The first phase, called Contract Definition, can be specialized in Contract Renewal and New Contract Definition. Renewal sets out because of the achievement or approximation of contract expiry date and of the receipt of a renewal request. The renewal procedure can be already stated in the contract or explicitly requested by the customer. The definition of a new contract can be further specialized according to the level of required customization. Currently Cloud Services are organized in a standard catalogue, with a few predefined potential customizations in service or contract. In case of specific requirements, not foreseen in the catalogue, a salesperson is contacted who provides ad-hoc offering. Contract Definition's activities also include the negotiation of Service Level Objectives (SLO), prices and financial conditions, legal conditions, obligations and responsibilities. Regardless of the activity specialization, the output of the initial Contract definition phase is represented by the Contract signature and Archiving. The process involves all the actors mentioned above, especially in the activities of authoring and creation, where the contribution of each actor is fundamental and prominent. According to [7], the Execution Phase can be split in Service Delivery Management, Relationship Management and Contract Management. The Service Delivery Management phase manages, checks and reports the technical aspects of the agreement. It is strictly related to SLM process. The Relationship Management includes communication

activities between peers inside the customer and provider organization. The Contract Administration is concerned with the mechanics of the relationship between the customer and the provider and the administrative procedures necessary to ensure that the parties understand who does what, when, and how. The input to these three phases is the signed contract, which is the output of the Definition phase. The actors mainly involved are the Contract Manager and Technical Staff, which is responsible for the execution of the service supply and for the monitoring and reporting activities. At the end of these phases there are two kinds of output, the first consists of the fulfilment of service obligations and the latter consists of written formal and informal communications between the parties and reports produced during the monitoring and reporting activities. The last phase of CM Process is the Conclusion Phase, the one in which there is the end of the agreement. This phase can be specialized in Renewal, Expiration and Withdrawal. Each of these activities is triggered by different events. The Renewal and the Expiration activity, for example, start with the achievement of the Expiration Date, which could lead to the Renewal of the agreement, according to the activities mentioned above in the Contract Definition, or to the conclusion of the provisioning relationship. In the third case, the trigger is represented by the Withdrawal Request coming from either the service customer or the service provider. Usually withdrawal conditions are explicitly defined in the contract. As in the Expiration scenario, in Withdrawal the output of the activity is the conclusion of the relationship between the parties involved. The actors involved in this phase are the Contract Owner, who is the final responsible of the service provisioning, the Contract Manager for the operational part, the Administrative, Financial, Legal Staff supporting the Contract Manager for the diverse aspects.

B. Information Model

Figure 3 represents an excerpt of the information model we defined to support the overall process of Cloud Services' Contract Management. Taking into account the documental aspects of a contract, the "Contract" class is modelled as an aggregation of "Contract items", which are classified as Technical, Legal, Financial, and General Items, represented in the upper right part. Each of these classes aims at defining and describing a particular aspect of the contract, for example, the financial items refer to the price and payment conditions; instead, the technical one refers to the service definition and service characteristics. In general, these classes are used by contract parties (customer and provider) for approval purposes, during the "Contract definition" phase, by assigning each contract item to the corresponding owner (i.e. financial items must be approved by the Chief Financial Officer, technical items must be approved by the Chief Information Officer etc.).

Contract items, according to their role in the contract, are also specialized in:

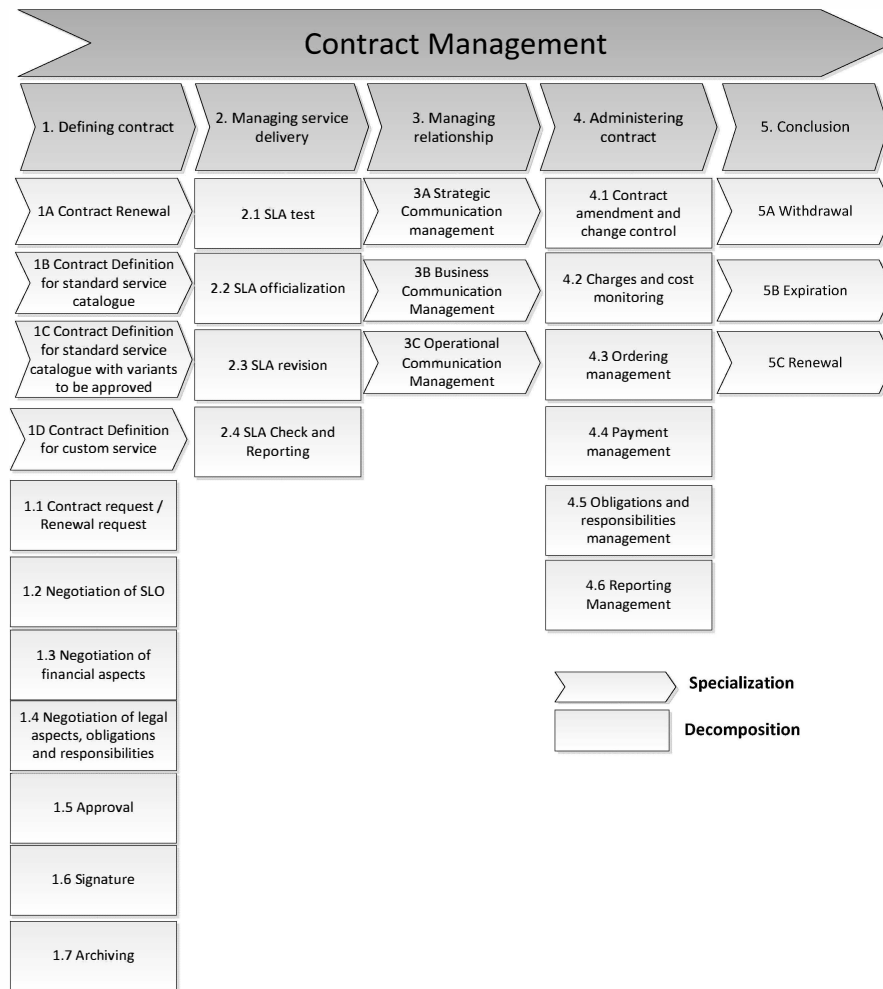


Figure 2: Contract Management Process structure (excerpt)

- **Definitions**, which fully specify name, type and contract structure, adopted naming conventions (if any) and other general aspects.
- **Parties**, i.e. the Customer, who purchases the IT service(s); the Provider, who supplies it; the User, who is the final “beneficiary” of the service and other involved parties (if any).
- All of the participants involved in the contract have **Obligation and Responsibilities** (another “Contract Item” specialization), that must be checked during the “execution” phase, and that trigger a set of related **Actions** in case of violation.
- **Services**, which represent and describe each service provided to the customer, with related **Service Level Specifications** and artifacts necessary to supply the service (e.g. requirements, supply modes, pricing etc.) and to support the associated Service Level Management process.
- **Payment Terms and Conditions**, which define the financial agreements between the customer and the provider.
- **Lifecycle elements**, which are furthermore specialized in **Monitoring and Reporting**, defining when and how service levels, obligations are checked and compensations (if any) are triggered during the contract execution phase; **Start** and **Conclusion** (specialized in Termination, Withdrawal and Renewal) which are the leading events in the contract lifecycle; **Variation & Relinquishment**, which specify how to manage the variations (if any) while the contract is running.
- For the sake of clarity, service level metrics, evaluation methods and other classes specific for the SLM process are not shown in Figure 3. Each contract item can be **Mandatory by Law** (i.e. the contract must contain these items to be legally valid -Party, Start, Conclusion, Service etc.), **Mandatory for Operational Effectiveness** (i.e. the contract must contain these elements to avoid any ambiguity in the execution phase - service supply specifications, obligation and responsibility etc.) or **Mandatory for Financial Effectiveness** (i.e. the contract items are critical to the correct execution of payment and penalties according to the agreed terms and conditions).

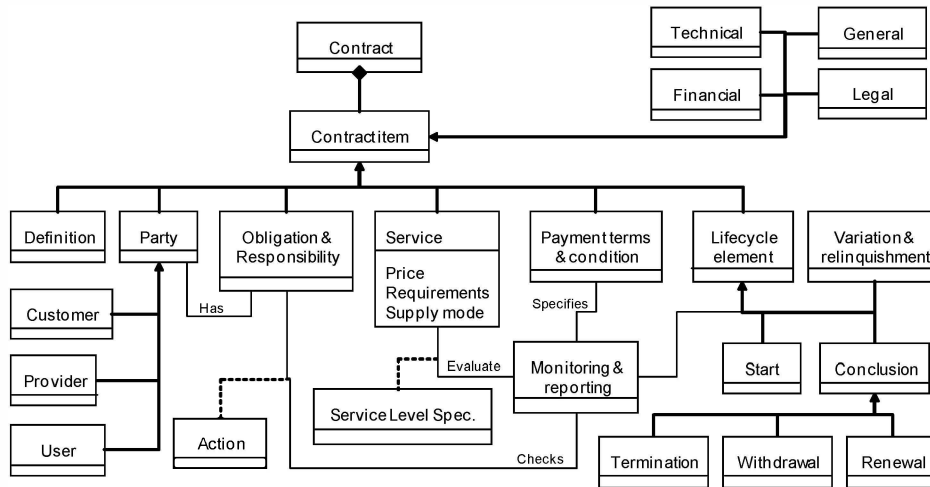


Figure 3: Information Model (excerpt)

V. RESULTS AND DISCUSSION

To validate the proposed approach we asked the contract owners of four small local IT enterprises working with our research group to assess the proposed information model against some actually adopted Software as a Service (SaaS) and IT services contracts.

For the purpose, five sample contracts have been chosen, namely Aruba Email Service Contract (AESC)², Google Email Service Contract (GESC)³, Microsoft Hosting Service Contract (MHSC)⁴, Libero Broadband Connectivity Service Contract⁵ (LBCSC), Tiscali Broadband Connectivity Service Contract⁶ (TBCSC) and we asked contract owners to map each contract element to the appropriate “Contract Item” class in the information model and to evaluate three parameters:

- **Coverage**, i.e. how much each contract covers the information model (a complete contract should “cover” all Information Classes and the related attributes).
- **Level of Detail (LOD)**: i.e. how much legal, financial and technical information is included in each contract item (each good item should be “detailed” or “very detailed” but not “poor” or “oversized”)
- **Accuracy**: i.e. how accurate is each item referring to the related internal policies, laws and norms or administrative and technical constraints. In this preliminary phase, only Italian law has been considered for the validation.

The assessment has been conducted with a preliminary personal evaluation, followed by a focus group for each contract and a final meeting to summarize the results.

We report the results of each single focus group and some general considerations about the approach.

AESC is a certified e-mail contract addressed to private citizens, professionals and small companies. It is the most complete one in terms of model coverage, number of items and items accuracy. Its only weak aspect is about service level specification, considered incomplete and ambiguous.

GESC refers to the well-known Google-mail service, for private citizens, professionals and small companies. The contract is in the form of a Service Level Agreement, so it is focused on the technical terms, on the conditions for the service provisioning, and on obligations and responsibilities in case of insolvency. A lot of non-technical aspects are missing.

MHSC is about web-applications hosting and related services. It is addressed both to private citizens and organizations with small to medium web traffic. Like GESC, MHSC is also focused on service’s technical aspects, lacking of other fundamental and mandatory contract items.

LBCSC is about broadband connectivity services to private and small business and, like the AESC, is almost complete in terms of model coverage, items number and items accuracy, but lacks of important technical aspects.

Finally, TBCSC is also about broadband connectivity services to private citizens and small businesses. TBCSC is complete and accurate. It is made up of two documents: the classical “contract” that holds the general, financial and legal aspects, and a technical addendum, specifying the technical aspects and the Service Level Agreement for each service and option described in the contract.

Some interesting considerations coming from the focus group deserve further comments:

- Since a contract is also a document, a platform supporting contract management lifecycle must also regard document management system features and, first of all, versioning management.

² http://contratti.aruba.it/sharecontratti/pec/hosting/download/Condizioni-GeneraliContrattoTitolare_PEC.pdf

³ <http://www.google.com/apps/intl/en/terms/sla.html>

⁴ http://myhosting.com/exchange/sla_exchangehosting.pdf

⁵ http://assistenza.libero.it/areaclienti/download/CCALLTINFO_LIBERO-CNS_dic05.pdf

⁶ <http://docenti.unime.it/docenti/tommaso-febbraro/2009/diritto-dei-consumatori-e-dei-risparmiatori-2009/approfondimenti-1/Contratto%20-Tiscali> and <http://business-old.tiscali.it/areaclienti/sla1.pdf>

- Managing international private contract law aspects requires specialized juridical skills and has been perceived as a critical potential risk source, difficult to be handled in the short term.
- Starting from the previous consideration, the focus group has asked to add risk aspects to the general approach
- The approach has been positively validated, even if it is considered little useful without the proper IT supports, especially in the contract definition and execution phase, because it is unfeasible to manually check all the aspects of Cloud Services contracts. So tools supporting accountability and SLM are fundamental and must be integrated together with contract repositories for knowledge sharing and reuse.
- Since Cloud service contracts are usually standard, SMEs ask for tools to share and comment terms and conditions. If a shared contract structure is defined contracts can be also compared and evaluated against each other. This request is also interesting for providers, for continuous improvement purposes.

In general the focus group appreciated:

- the effectiveness of the Information Model as a tool to classify, analyze and evaluate both the contract structure and the multiple aspects of contract items;
- the process and information modelling approach as a tool to share knowledge and to support the contract lifecycle, from the definition to contract's conclusion.

VI. CONCLUSION AND FURTHER WORKS

This paper presents a process model and an information model for Cloud Services Contract Management. The information model has been validated through a focus group of local SMEs. The assessment has been conducted matching real contracts against the information model, derived from the process model and adjusted with research references. The approach based on process modelling, information modelling and validation through stakeholders' focus group has been appreciated by stakeholders, it is less expensive than a classical requirement specification step in software development, based on interviews and focus groups, because it starts from reference models and specifies the differences. Moreover it produces a preliminary validation of information model as reference for further developments. Contract Management Process is fundamental and perceived as critical in large organizations, while SMEs still lack of the right sensitivity and maturity on the topic. With the rise of Cloud Services SMEs must be aware of the novel challenges they will face. Focus groups help knowledge and experience sharing and also help in the definition of a common shared process and information model. Further steps will include the validation of the

reference process. We are planning to extend the SMEs sample and ask them to instantiate the reference process against their actual working process and supporting tools. The validation will be conducted according to "task analysis" principles, usually adopted for usability assessment ([13], [14], [12]). Once these models are validated, we will proceed with the design of the platform architecture as SaaS, and its implementation.

REFERENCES

- [1] "Forecast Analysis: Software as a Service, Worldwide, 2009-2014, Update", Gartner Press, November 2010
- [2] J. Zou, Y. Wang, and K.-J. Lin, "A Formal Service Contract Model for Accountable SaaS and Cloud Services," *2010 IEEE International Conference on Services Computing*, IEEE, 2010, pp. 73-80.
- [3] M. Brenner, T. Schaaf, and A. Scherer, "Towards an information model for ITIL and ISO/IEC 20000 processes," *2009 IFIP/IEEE International Symposium on Integrated Network Management*, Jun. 2009, pp. 113-116.
- [4] M. Waldburger, M. Charalambides, T. Schaaf, and B. Stiller, "Automated Determination of Jurisdiction and Applicable Law for International Service Contracts : Modeling Method , Information Model , and Implementation," *18th Biennial and Silver Anniversary International Telecommunications Society Conference (ITS 2010)*, Tokio, Japan: ITS 2010 conference, 2010, pp. 1-31.
- [5] M. A. Bochicchio, A. Longo: Conceptual Modeling of Data Intensive and Information Intensive Web Applications. *MMM 2004*: 292-299
- [6] K.-J. Lin, J. Zou, and Y. Wang, "Accountability Computing for E-society," *2010 24th IEEE International Conference on Advanced Information Networking and Applications*, 2010, pp. 34-41
- [7] OGC, "Contract Management Guidelines", Crown Copyright 2002
- [8] TM Forum, SID Addendum 1A: Common Business Entity Definitions – Agreement, TM Forum, 2005, GB922-1A, version 6.3.
- [9] M. Taylor, M. Iqbal, M. Nieves. "ITIL v3. Service Strategy", Office of Government Commerce, 2007
- [10] G. Case, "ITIL v3. Continual Service Improvement"- Office of Government Commerce, 2007.
- [11] ASL Foundation, "Contract management process description", November 16, 2006
- [12] http://www.usability.gov/methods/analyze_current/analysis.html
- [13] Crandall, B., Klein, G., Hoffman, R. R. (2006). Working Minds: A Practitioner's Guide to Cognitive Task Analysis. MIT Press
- [14] D. Bolchini, F. Garzotto, "Quality of Web Usability Evaluation Methods: An Empirical Study on MiLE". *WISE Workshops 2007*:481-492
- [15] H. Eriksson, M. Penker, *Business Modeling with UML*, John Wiley, Indianapolis, 2000; H. Eriksson, M. Penker, B. Lyons B., D. Fado *UML 2 Toolkit*, Wiley Publishing, Indianapolis, 2004
- [16] I. Aib, M. Salle, C. Bartolini, A. Boulmakoul, R. Boutaba, G. Pujolle, "Business aware Policy-based Management," *Business-Driven IT Management*, 2006. BDIM '06. The First IEEE/IFIP International Workshop on , vol., no., pp. 55-62, 07-07 April 2006
- [17] D.R. Wilson, *Enterprise Contract Management Solutions Vendor Guide , 2010*, Gartner, 2010.
- [18] M. P. Singh, N. Desai: Multidisciplinary Views of Business Contracts. *Proceedings of ICSOC 2010*, pp 730, Decembre 2010, San Francisco - USA