



**slalom**  
LEGAL & OPEN MODEL TERMS  
FOR CLOUD SLA AND CONTRACTS

## Cloud Providers' Adoption Assessment

### D4.2

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<b>Author(s):</b>	Breda Beyer (CIF) David Bicket (CIF) Daniel Field (ATOS)
<b>Reviewer(s)</b>	Julia Wells (ATOS)



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## Foreword

This document presents the findings resulting from the Provider Track (WP4) led by the Cloud Industry Forum (CIF) in the SLALOM project.

The Cloud Industry Forum (CIF) is pleased to have been part of the SLALOM project, and considers that the project's deliverables provide significant value for all cloud stakeholders which will help drive the adoption of cloud computing. The two main deliverables for providers are (1) cloud service agreement model terms and conditions; and (2) service level metric definitions based on a technical model which is aligned to ISO and allows the unambiguous definition of metrics. Short overviews of these deliverables are attached as Annex A: Legal overview document and Annex B: Technical overview document. These were prepared particularly for circulation among providers.

The full legal and technical deliverables are available at [www.slalom-project.eu/downloads](http://www.slalom-project.eu/downloads).

These deliverables may be used by all stakeholders as fair and trustworthy baselines which can be modified to meet individual requirements. These deliverables go far beyond the often theoretical and exceedingly complex guidance materials found in the marketplace, and rather give concrete deliverables which are intrinsically more understandable and usable.

To the best of CIF's knowledge, no organization has previously developed such concrete and usable deliverables for the cloud industry, which furthermore are explicitly intended to be fair and balanced for all stakeholders. CIF are proud to be associated with this work. CIF also recognizes that this work would not have happened without EC funding, for which we are grateful.

The SLALOM project was a true team effort, and CIF was just one partner among many. The main legal input came from the legal firm Bird & Bird. The main technical input came from the National Technical University of Athens, which is highly involved in the cloud research sector in Europe. ATOS co-ordinated the project, with personnel well experienced in dealing with the requirements of EC-funded projects – skills which were needed. The University of Piraeus Research Centre and the Cloud Industry Forum were involved with particular responsibilities for adopter and provider liaison.

CIF contributed to the project from several perspectives:

- **Stakeholder contacts.** CIF has extensive cloud industry stakeholder contacts. While the majority of its institutional members are cloud service providers (including both very large and also SME providers), it also has extensive legal representation on its Cloud Industry Legal Panel, and includes cloud consulting professionals and organizations, and adopters in its membership, and contact lists.
- **Communication and dissemination capabilities.** By its nature as an industry association, CIF has extensive communication and dissemination capabilities, including:
  - o The ability to obtain booths, theatres, and/or speaking slots at major industry events, such as Cloud Expo Europe in London (both in March 2015 and in April 2016), and Cloud Expo Europe in Frankfurt (in November 2015)
  - o The ability to issue press releases and to obtain coverage from the IT and cloud computing press. For example, CIF has issued several press releases related to SLALOM during the project, and has been responsible for over a dozen articles from other press publications about SLALOM.
  - o A webinar platform. CIF provided the webinar platform for the four SLALOM presentations on the legal and technical models.
  - o Mailing list. The CIF mailing list has over 13,000 individuals.
- **Connections into the ISO standards world.** CIF was already strongly involved in the ISO standards world, and this became critical when ISO undertook standards development work

in the areas covered by the two main proposed SLALOM deliverables. Note that the ISO standards world, especially for cloud computing, has highly active involvement from almost all of the major cloud providers and stakeholders, including NIST, Amazon, Microsoft, IBM, Oracle, Adobe, and many others.

This was CIF's first experience participating in an EC-funded project. Consequently, some of the findings documented in this report reflect the perspectives of an organization which represents commercial members' interests, and does not have previous significant experience with the research or academic communities.

## 1 Introduction

### 1.1 Purpose

The purpose of this document, as stated in the SLALOM support action contract, is:

*This report will summarize the actions taken towards cloud providers with respect to the incorporated legal terms of the SLALOM SLA model and the SLA technical model, and the results of these. The provided information will be provided stating information with respect to the category the cloud provider (in terms of e.g., the jurisdiction in which he provides his services, the type of the services provided, etc.), will serve as a critical document for moving forward in the post-project phase, and will offer insight to the ECP and other policy group.*

Because of the holistic nature of the project, both concerning stakeholders and deliverables (see 1.2), it is not possible to limit actions just to providers, although that is CIF's primary focus. There is therefore another overlapping purpose of this document, which is to summarize all of the actions taken by CIF as part of the SLALOM project, and the results of these actions.

### 1.2 Project context

The context of the actions taken is defined in the SLALOM contract project summary abstract. This states:

*SLALOM is a support action tackling the complexity of cloud computing SLAs and contracts through standardization of the SLA and contract terms and a reference model for SLA management. In doing so it will support the adoption of cloud (SLA complexity is an identified barrier to adoption) and support the exploitation of results from the cloud and SLA research communities, effectively by factoring in advances from the research sector into the SLALOM legal and technical models which will be promoted as industry standards.*

*The project will involve interaction with policy makers, cloud providers, research projects and cloud adopters from various areas. There will be significant interaction with the policy groups set up under the European Cloud Partnership and the working groups of the research community. The project will run for 18 months, focusing on three phases – definition of the models; consensus building; and adoption.*

The SLALOM project was broken up into 7 tracks, with primary and secondary responsibilities assigned as follows:

<i>Track</i>	<i>Primary Responsibility</i>	<i>Secondary Responsibility</i>
Project Management & Communication	ATOS	CIF
Legal	B&B	UPRC
Technical	NTUA	ATOS, UPRC
Provider	CIF	ATOS
Cloud Adopter	UPRC	ATOS, NTUA
Sustainability	ATOS	NTUA, B&B, UPRC, CIF
Ethics Requirements (included by mandatory Commission amendment in March 2016)	ATOS	

While the focus of the work performed in the provider track was on cloud service providers, it is not possible to take actions or obtain results which are exclusive to providers and independent of the other tracks. This is because:

- There are more stakeholders than just providers and adopters, and their requirements must also be considered. Other stakeholders include the legal profession, policy makers (e.g. the EC), and consultants (many of whom are also members of CIF).
- The work done is holistic, i.e. it is for all stakeholders, and not exclusively for just one type of stakeholder. The communications channels are likewise largely holistic, reaching multiple types of stakeholders.

Furthermore, the project overall is holistic, i.e. the tracks naturally complement one another. For example, CIF has a Cloud Industry Legal Panel which includes representatives from a number of legal firms. Likewise, CIF is involved in the development of ISO standards for cloud computing, including standards which specifically overlap with both the legal and technical tracks. Indeed, this was the basis for SLALOM becoming a liaison organization with the ISO Cloud SLA working group. See 1.3 below.

### 1.3 ISO standards for cloud service agreements and service level agreements

A major factor which is 'context' for the work done, but so significant as to require separate explanation, is the fact that ISO started developing standards related to cloud service agreements and cloud service level agreements subsequent to the SLALOM proposal being prepared and submitted to the EC.

The SLALOM partners recognized that this development impacted significantly on the project. In particular:

- The SLALOM legal and technical models would not be credible in the marketplace if they were developed in a way which was incompatible with the work being done by ISO.
- Ensuring that the SLALOM models were aligned with the work being done by ISO would facilitate market uptake.
- SLALOM had an opportunity to ensure that the standards being developed were 'fit-for-purpose' for SLALOM's purposes by contributing to the ISO development work.

The four relevant standards currently being developed by ISO are:

- ISO/IEC 19086-1: Cloud computing – Service level agreement (SLA) framework — Part 1: Overview and concepts. This standard, although described as being for service level agreements, actually covers most topics related to cloud service agreements, but with more information given about topics relevant to service level agreements.

- ISO/IEC 19086-2: Cloud Computing – Service level agreement (SLA) Framework — Part 2: Metric model. This standard is closely related to the technical model. SLALOM has provided input into this model to ensure that it is ‘fit-for-purpose’ for specifying metrics with the level of precision (i.e., non-ambiguity) considered necessary by SLALOM. The SLALOM model which is built on it is therefore entirely conformant with the ISO model.
- ISO/IEC 19086-3: Cloud computing - Service level agreement (SLA) framework — Part 3: Core requirements. This standard highlights which of the framework provisions specified in Part 1 are considered ‘core’ and should be in any CSA or SLA.
- ISO/IEC 19086-4: Cloud computing – Service level agreement (SLA) framework — Part 4: Security and privacy. This standard addresses how specifications for security and privacy can be incorporated into contractual documentation.

SLALOM has had input into Part 1, and continues to have input into Part 2.

Participation in this work as a liaison effectively ensured that SLALOM had the opportunity to liaise with all of the provider organisations outlined in the Foreword to this report for the subject matter involved.

## **2 Principal outcomes of the project**

### **2.1 SLALOM legal deliverables**

There is one primary legal deliverable, which is the SLALOM legal model, and one related deliverable.

#### **2.1.1 SLALOM legal model**

The SLALOM legal model is effectively a complete contract for use between a cloud user (adopter) and their provider. (Placeholders are included for situation-specific content such as the description of services, and charges.) The SLALOM legal model is set out as a cloud service agreement (CSA) document, following a common industry approach, with more detailed content (e.g. specific service levels, privacy, and consideration) as annexes. The contract is ready to use, and can provide a starting point for creating new contracts, or it can be used as a benchmark for comparing with existing ones. It has been designed to be extendible or modifiable because it is recognized that in general variations will be needed.

The SLALOM legal model is the contractual deliverable D2.2. [1] See also Annex A: Legal overview document.

#### **2.1.2 Report on jurisprudence and case law**

This report discusses cloud computing contracts under Italian, German, UK, French and Greek laws.

The report on jurisprudence and case law is contractual deliverable D2.3. [2]

### **2.2 SLALOM technical deliverables**

There are two major SLALOM technical deliverables. There are also two related technical deliverables intended for the research community. The first major deliverable is the technical reference model, which is the conceptual basis for creating unambiguous and non-contestable (i.e. non-repudiable) metrics. The technical reference model is primarily expected to be used by researchers and specialists in developing metrics. The second major deliverable is a set of proposed

example metrics, developed using the technical reference model, but presented in a way which should be more immediately usable by providers and adopters alike.

### 2.2.1 SLALOM technical reference model

The SLALOM reference model was created with the aim of standardising the definition of SLAs in a manner that serves the whole lifecycle of SLAs for cloud services and overcomes the shortcomings of existing approaches, by eliminating ambiguities in the definition and calculation of metrics and facilitating the measurement, monitoring and enforcement of SLAs to achieve non-repudiability, so that these measurements cannot be contested. Another objective was to abstract the metric definitions as much as possible so as to facilitate the direct comparability of SLAs among providers.

The SLALOM reference model is ISO-compliant, utilising the classes and parameters of the draft ISO/IEC 19086-2 metric model, but further allows for the use of a ‘sampling’ class for concretely defining the sampling process of the metric. Furthermore, all metrics defined via the SLALOM model should be machine understandable.

In order to prove the applicability of the SLALOM model in a wide range of real world scenarios, a number of metrics directly stemming from commercial cloud providers were successfully mapped to the SLALOM model.

The SLALOM technical model is contained in the contractual deliverable D3.6. [4].

### 2.2.2 SLALOM example SLA metrics

Through a survey conducted by the SLALOM project [7], feedback was collected from various stakeholders, which was used in order to prioritize cloud related SLA metrics according to their importance. Based on this prioritization, we provided example definitions for the key SLA metrics, which were expressed via the SLALOM reference model.

The SLALOM example SLA metrics provide usable definitions for

- availability [accessibility and functionality]
- response time [transactional and incident]
- incident resolution time
- performance of virtual cores.

The SLALOM example SLA metrics are contained in the contractual deliverable D3.6. [4] They are also available as a free-standing document entitled “Cloud SLA Metrics Based on the SLALOM Specification and Reference Model” [6]. See also Annex B: Technical overview document.

### 2.2.3 Other SLALOM technical deliverables

There are two further public SLALOM technical deliverables primarily intended for the research community. These are:

- Guidance on including SLALOM in research. This is contractual deliverable D3.5.[3]
- “Dos and Don’ts of SLA Research” [7]. This is not a contractual deliverable, but is additional value delivered from the SLALOM project to the research community. It is an extract from D3.5. [3]

## 3 Actions carried out

This section is structured largely to correspond with the programme for work package 4 (provider track) in the SLALOM contract. It is not intended to cover all actions taken in the SLALOM project,



but rather just those related to the provider track (primarily undertaken by CIF, with some participation by ATOS), and also other actions undertaken by CIF.

### 3.1 Timeline

The first phase of SLALOM is divided into three sub-phases as shown in the figure below:

Note that the consensus phase, originally scheduled to finish at the end of month 13, was extended to the end of the project to help overcome difficulties related to the availability of deliverables, and in getting feedback.

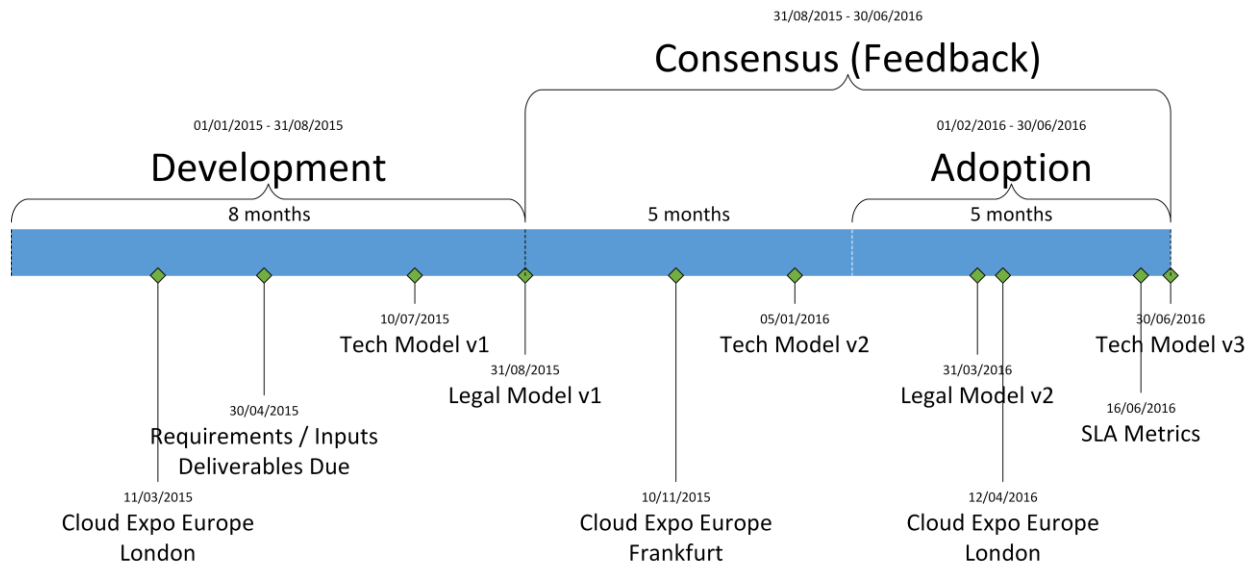


Figure 1: SLALOM Timeline

### 3.2 Actions carried out for determination of requirements

These actions according to the SLALOM contract cover the period from months 1 through 18. The actions described below relate to the initial determination of requirements during months 1 through 4. Requirements determined subsequently were the result of feedback received, which are covered in section 3.3 below.

#### 3.2.1 Preparation for Initial Determination of Requirements

Materials were prepared to support the initial determination of requirements. These included in particular:

- **Electronic handout [8].** To facilitate the process of obtaining direct feedback from the marketplace (both providers and adopters), it was essential to have a document which explained the SLALOM project, its objects, scope, and the essential issues about which we needed market guidance. CIF led the initial efforts to develop this material, which was instrumental in aligning the visions of different partners about what the project would deliver, and how.
- **Questionnaire [9].** A comprehensive questionnaire was created to obtain feedback from all types of respondents, using the electronic handout as the basis of many of the questions asked. This was a highly demanding questionnaire, typically requiring 45 minutes or more to

complete its 150 questions, in addition to having read the electronic handout. Once we had a number of responses to the full questionnaire, but not as many as we wanted, we produced a shorter version of the questionnaire which did not rely on having read the handout. Note that the longer version of the questionnaire gave us particularly useful feedback about SLALOM's proposed final deliverables. Both versions of the questionnaire gave us useful feedback about overall challenges and requirements of the marketplace, and also about the prioritization of metrics and other contractual provisions. Fifteen responses were received to the full questionnaire, and 21 to the shorter version, for a total of 36 responses. CIF led the efforts to develop the questionnaire; ATOS was responsible for its implementation.

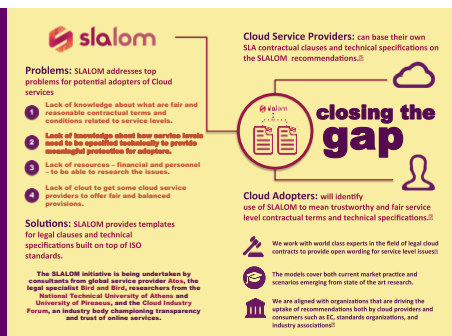
- **SLALOM Dissemination Kit.** ATOS had primary responsibility for developing the dissemination kit, which included posters, flyers and online materials to share with stakeholders. These were used in the initial phase of determining requirements, and have continued to be used and updated throughout the project. The SLALOM Dissemination Kit includes materials such as SLALOM in a Nutshell (<http://bit.ly/SLALOMinanutshell>).



Figure 1 SLALOM Poster



Figure 2 SLALOM Flyer



### 3.2.2 Obtaining stakeholder views about their requirements

Using the supporting materials described above, SLALOM obtained stakeholder views about their requirements. The CIF actions were intended to obtain information about provider requirements, but because of the holistic nature of many communication channels, the effect was to obtain information about all stakeholder requirements, and share that with the other partners.

The methods used to obtain feedback included the following:

- Promotion of the questionnaire via emails, including to:
  - o The CIF membership
  - o The CIF Legal panel
  - o The CIF provider contact list (over 4000 individuals)
  - o The full CIF contact list (over 13,000 individuals, including both cloud providers and cloud adopters)
  - o Members of the EC's Cloud Special Industry Group – Service Level Agreement Working Group
  - o Participants in the EC's SLA Expert Group (from 2013)
  - o Members of the ISO group working on SLA standards
- Press releases, in particular by CIF and ATOS. CIF published two press releases which generated over a dozen news articles in IT publications.

- A presentation at CIF's theatre at Cloud Expo Europe (CEE) in London in March 2015, plus the distribution of SLALOM leaflets at the CIF booth.
- Presentations at the CIF members' meeting. (CIF regularly presented updates on the SLALOM initiative at quarterly member meetings and invited members to get involved - 4 meetings in total)
- Direct 1 on 1 interviews with CIF provider members
- Informal discussions with others at CEE and other events such as the CIF Cloud Awards event.

### 3.2.3 Assessing and documenting provider and other stakeholder requirements

The information obtained from providers and other stakeholders was analysed and documented internally. A summarized version, consolidated with information concerning adopter requirements, and a literature survey conducted by ATOS, was included in the deliverable D4/5.1.[5] The main conclusions are given in section 5 (Initial determination of requirements). Further details are given in Annex C: Initial determination of requirements.

### 3.3 Actions carried out for obtaining feedback on deliverables ('consensus')

These actions according to the SLALOM contract cover the period from months 8 through 15, but they actually continued through 23 June (in month 18, the final month of the contract), and feedback is still being received as this report is produced. There were necessarily two separate sub-tracks for this activity, as the first draft of the legal deliverable was available sufficiently early for good stakeholder feedback (31 August 2015), and the updated version was also available sufficiently early to allow for further feedback (31 March 2016). The nature of the technical deliverable, however, meant that the initial deliverables were suited for the research community rather than the provider community. The deliverable which applied that work in a way which was directly usable by the provider community only became available on 16 June 2016, during the last two weeks of the project, meaning that there was no realistic opportunity for obtaining feedback on its contents.

Extensive actions were carried out to communicate the legal deliverables to stakeholders, and to providers in particular, requesting feedback. These actions included:

- Press releases
- News articles in the computer press covering CIF activities. (These included Comms Business Review, Channelnomics, Cloud Security International, and Microscope.)
- Emails including to the CIF mailing list of over 13,000 individuals
- CIF member meetings (CIF regularly presented updates on the SLALOM initiative at quarterly member meetings and invited members to get involved - 4 meetings in total)
- Circulation to members of the CIF Legal Panel
- Direct 1 on 1 discussions with CIF provider members
- Direct 1 on 1 discussions by ATOS with its own internal organization, and with other providers
- Presentations at conferences, etc. These included, in particular
  - o **Cloud Expo Frankfurt 10th November 2015.** The speaking slot was obtained by CIF. The presentation was made by Bird & Bird (Gian Marco Rinaldi)
  - o **CloudScape 8-9 March 2016.** The project attended this conference, attended by many stakeholders including providers and consultants, and had the opportunity to present the work and recommendations of SLALOM, both to the audience and through informal discussion.

- **Cloud Expo London 12-13 April 2016.** The project presented its results to the audience in one of the seminars, as well as distributing information via the CIF stand. The public was largely commercial in nature.
- **Webinars** CIF organised two live webinar sessions to outline the proposals for both the legal and technical tracks and invite feedback as part of the consultation phase. These were:
  - 11<sup>th</sup> Nov 2016: Public consultation on Cloud SLAs and Contracts – Have your say. A project introduction and legal results presentation for the consultation phase.
  - 26<sup>th</sup> Nov 2016: SLALOM helps you define metrics for cloud service agreements. An overview of the technical track for the consultation phase.



There was also a closed all-day workshop with key members of DG DIGIT and DG CNECT on 7 March 2016, organized by SLALOM and PICSE where an open and frank discussion regarding the experience from the EC on its recent cloud tender process was discussed. SLALOM was presented and the two sides explored how the project could enable the Commission to improve future tenders. In particular the technical track material was considered highly appropriate for use in future tenders.

### 3.4 Actions carried out for dissemination and publicity

The actions carried out for dissemination and publicity were all performed in conjunction with the actions for other purposes, as described in other parts of this section.

It should be noted that these activities are continuing even as the project officially approaches its end, and will continue into the sustainability phase. For example, we are still giving interviews to journalists who are interested in the work which has been done by SLALOM, and who have become aware of it through personal contacts or via press releases.

### 3.5 Actions carried out for obtaining adoption

The actions carried out for obtaining adoption were inherent in most of the feedback and dissemination activity undertaken. There were two further broad aspects of the actions carried out for obtaining adoption. One was via webinars, and the other was via a focused effort in the last two weeks of the project after both the legal and technical deliverables were finally available. Each of these is discussed further below.

#### 3.5.1 Webinars

SLALOM organized two live webinar sessions to present the final versions of the legal and technical models.

The first webinar called **"Using metrics to improve Cloud SLAs"** was held on April 26th. The second webinar, **"Ready to Use Cloud Master Agreement for SLAs"**, was held on May 27th. Both provided



examples showing how to practically apply SLALOM to improve current practice. They were also actively announced and promoted within EU Research and Scientific communities.

### 3.5.2 Final feedback follow-up

We attempted to obtain explicit feedback about the possibilities of adoption as part of the final feedback process after both the legal and technical deliverables were available, in the two final weeks of the project. To support this effort CIF prepared the following:

- 2-page overviews for each of the legal and technical deliverables, respectively. (Although CIF prepared these documents, they were reviewed and revised by the responsible partners.) These documents are included as Annex A: Legal overview document and Annex B: Technical overview document.
- An on-line questionnaire asking for feedback, including about adoption. [10]
- A 10-minute video to explain the project, and the request for feedback, to facilitate engagement with people who do not have the time to review everything on paper. [11]

We disseminated information about these materials via CIF emails, and also made these materials available for the other tracks to use.

Unfortunately, due to the late timing of this exercise, and other factors (such as explained in 4 - Challenges and how addressed) there were few responses to this action in time to reflect in this report.

We also followed up with a limited number of providers in 1:1 calls.

## 3.6 Actions carried out related to sustainability

As part of SLALOM's overall actions related to sustainability, we clarified that there was a continuing wish from the National Technical University of Athens, responsible for the technical stream, to remain involved in ISO. We are therefore taking appropriate steps to ensure that the liaison relationship between ISO (SC38 WG3) and SLALOM continues. CIF will continue to support the liaison relationship on the ISO side, because of our pre-existing role there.

## 3.7 Actions carried out related to ISO

As explained in 1.3, the fact that ISO (SC38 WG3) had started working on standards specifically addressing SLALOM's scope meant that SLALOM had to find some way of working together with ISO or else risk producing deliverables which would be incompatible with the way ISO was going and which the market would consider a requirement. The only realistic way of doing that was to establish a formal liaison relationship between SLALOM and SC38 WG3, which would then allow the complete sharing of documents (which would otherwise not be possible), plus for SLALOM members to actively participate in the development of the relevant ISO standards.

Note that the ISO standards world, especially for cloud computing, has highly active involvement from almost all of the major cloud providers and stakeholders. Organizations which are actively involved in the development of the two standards most strongly overlapping with SLALOM's scope include NIST, Microsoft, IBM, Oracle, Adobe, and the Cloud Security Alliance. There are also representatives from other organisations such as Amazon, HP, Salesforce, Cisco, VMWare, CA, Intel and Eurocloud. Participation in this work as a liaison effectively means liaising with all of these organizations for the subject matter involved.

Since CIF was already represented in ISO, CIF took the responsibility for driving and coordinating everything which was necessary for SLALOM to establish a formal liaison relationship with ISO. This was not trivial, but it was eventually successful.

Prior to SLALOM becoming an official liaison organization, the CIF representative in SC38 WG3 had the proposed SLALOM questionnaire reviewed by the editor of ISO/IEC 19086-2.

Subsequent to becoming an official liaison organization, SLALOM participated in ISO physical meetings in Dublin (5-9 October 2015) and in London (4-8 April 2016). SLALOM has also participated in a number of teleconferences related to the development of ISO/IEC 19086-2 on the metric model.

SLALOM has contributed most significantly to 19086-2 in the following ways:

- NTUA experts have demonstrated that the simplified model which ISO was proposing was not adequate to specify metrics with respect to how they should be measured. The working group accepted that it was necessary to provide for extensibility in the ISO model so that this requirement could be met. This was a particularly important SLALOM contribution.
- NTUA experts have walked through the detailed SLALOM metric specifications with ISO working group experts for a number of the major existing commercial metrics, to demonstrate the breadth of requirements, and how they can be captured in a metric model using the SLALOM extensions.
- CIF, leveraging experience with other standards for information structures (ISO/IEC 19770-2 and -3), proposed an approach to how the metrics standard can be structured, and how some of the detailed technical issues can be addressed; and this has been accepted
- CIF contributed text for the introduction to the standard.

CIF also prepared a mapping between the SLALOM legal deliverable and ISO/IEC 19086-1 (Overview and concepts), which has been submitted to SC38 WG3 as a liaison contribution.

### **3.8 Actions carried out related to the technical track**

Although CIF does not have any formal responsibilities with respect to the technical track, it was essential for there to be some involvement because of (a) the ISO liaison situation, and (b) the need to ensure that the technical deliverable was usable by the commercial provider community, and not just by the research community.

As a result, CIF took the following actions in particular, in addition to general discussions with technical track personnel:

- Reviewed the initial SLALOM technical deliverables, before the ISO liaison was established, to provide specific feedback and recommendations to NTUA concerning conflicts between the early versions of each.
- Drafted the initial version of the technical deliverable now called “Cloud SLA Metrics Based on the SLALOM Specification and Reference Model” [6]. This takes the work which had been done on the SLALOM technical model, and applied it to specific metrics which should be immediately usable by providers and adopters alike, using a structure similar to that used for the legal model.



### **3.9 Actions carried out related to other EC-funded projects**

#### **3.9.1 SLA-Ready**

Informal discussions were held with SLA-Ready experts at various times during the SLALOM project, to coordinate efforts. In particular, the Cloud Security Alliance, an SLA-Ready partner, provided CIF with examples of metric specifications which it had from other projects and sources, and these were passed on to NTUA.

#### **3.9.2 CloudWatch2**

CIF reviewed and provided feedback to CloudWatch2 on one of its major deliverables concerning how the IaaS marketplace could become more like a utility. CIF and NTUA personnel also met with CloudWatch2 personnel in London to discuss the two projects.

#### **3.9.3 DPSP**

The Data Protection, Security and Privacy (DPSP) in the Cloud Cluster is a group of an EU-funded projects with key objectives on data protection, security and privacy in the cloud. SLALOM established contact with this cluster and collaborated with the organization of the DPSP Workshop 2016 in Napoli (Italy), on 23rd February 2016. This workshop addressed some of the key issues of cloud security and privacy related with EU Digital Single Market strategy as well, and in particular: security level agreements, data sharing agreements, reactive cloud applications, data localization, security of cloud-based public services, secure communication and processing in cloud platforms.

In this regards, SLALOM had an excellent opportunity to present its outcomes in this context. SLALOM was represented by Gian Marco Rinaldi (Senior Legal Advisor on Cloud SLAs from Bird & Bird) who participated as panelist in the DPSP event discussing on the challenges for (multi-)cloud-based services in Digital Single Market. He emphasized the benefits that SLALOM's legal perspective provides. SLALOM was also represented by David Bicket (CIF). The project delegates established conversations with projects like SPECS, SERECA, MUSA, COCOCLOUD, and CLIPS. It is worth mentioning that contacts with MUSA project were initiated here that led to more concrete actions (see 3.9.5).

#### **3.9.4 PICSE**

The European Open Science Cloud envisages a trusted, open environment for storing, sharing and re-using scientific data and results and supporting Open Science practices. The PICSE (Procurement Innovation for Cloud Services in Europe) initiative is relevant for providers as it provides a framework in which they participate. PICSE and SLALOM (driven by ATOS) collaborated in the CloudScape workshop in Brussels, and also in organizing the meeting with DG DIGIT and DG CNCT on 7 March 2016. See also 3.3.

#### **3.9.5 MUSA-DCA-CSA-CIF Workshop 11 April 2016**

The MUSA Consortium organised a workshop at the premises of CA Technologies in Central London on 11th March 2016 between the Data Centre Alliance (DCA), Cloud Security Alliance (CSA) and the Cloud Industry Forum (CIF).

During this workshop SLALOM outcomes were presented to the MUSA consortium. This also provided an opportunity to communicate with an expert from the Cloud Security Alliance, who is also working in the SLA-Ready project.

## **4 Challenges and how addressed**

Comments are made from the CIF perspective. Some are not relevant for all partners of the SLALOM consortium.

### **4.1 ISO involvement in subject area of project**

As discussed in 1.3, ISO started developing standards specifically related to cloud service agreements and service level agreements subsequent to the SLALOM proposal being prepared and submitted to the EC.

This presented SLALOM with two types of challenges: (a) establishing a mechanism for working with SLALOM; and (b) working in the way required by ISO.

We successfully addressed the first of these challenges and established a formal liaison relationship with ISO (SC38 WG3), and actively participated so as to achieve the objectives stated in 1.3.

The second challenge, of working in the way required by ISO, was primarily a challenge for SLALOM members other than CIF, since CIF was already involved with ISO and used to its way of working. Other members found it bureaucratic yet with demanding deadlines which were largely immovable. CIF mentored the other SLALOM members through this process, and the general view now within SLALOM is that it was a successful effort, and will be continued beyond the end of the funded project.

### **4.2 Coordination with other projects**

We recognized that there were significant overlaps in interest between SLALOM and a number of other EC-funded projects. As a result, we took actions to liaise with many of these projects, to mutual benefit. See also 3.9.

### **4.3 Dealing with holistic issues across a team with different responsibilities**

SLALOM is a 'real-world' project which addresses issues which are holistic in nature. The responsibilities set by the different tracks in the SLALOM project were essential, but CIF as a first-time participant in an EC-funded project quickly recognized that execution could not be done in silos. As a result, CIF found that it had to take actions consistent with its own remit, but nonetheless not explicitly included. These actions included driving the establishment of a liaison relationship with ISO and actively participating in it (see 3.7), and also taking certain actions related to the technical track (see 3.8).

### **4.4 Bringing research expertise to the commercial world**

CIF also recognized a challenge in communicating the clear skills of SLALOM partners involved in EC research projects, but in a form easily taken up by commercial users, both provider and adopter.

The personnel involved in the technical track had obvious credibility within the ISO working group, so competence was clear and impressive. But communication and applicability within the commercial world were challenges. Both terminology and principles were issues, e.g. what



constituted ‘research’, and how practical and usable the deliverables of a project were *allowed* to be.

These issues were repeatedly discussed, and ultimately largely resolved. One specific action was that CIF itself drafted the first version of a technical deliverable to meet the desired commercial objectives, which was accepted by the technical track and further developed by them.

#### **4.5 Stakeholder feedback fatigue**

It proved to be a challenge to obtain good feedback from commercial stakeholders, for free, to such lengthy documents as were produced by the SLALOM project. The amount of effort required by reviewers, without obvious immediate commercial benefit, was itself a major barrier. The fact that there are many demands on these commercial players for participation in other surveys and reviews, including from commercial IT research organizations, mean that there is significant feedback fatigue amongst the commercial stakeholders, and in particular amongst the providers from whom we had requested feedback.

We tried to address this issue by making direct one-on-one requests to individuals with whom CIF personnel had personal relationships, and this was successful, but the number of individuals who will help in this way is limited, and our ability to repeatedly make use of such personal relationships is also limited.

It is CIF’s view that some alternative approaches may be more effective in the future, in similar situations. One possible alternative approach is to make use of small incremental deliverables. The SLALOM project had multiple versions of deliverables, but they were all of deliverables which were quite long, and inherently quite demanding on reviewers. Producing smaller, more ‘digestible’ deliverables more quickly could facilitate getting people to review those deliverables, and also get them involved in the project so that they would have a higher level of commitment to reviewing later possibly larger deliverables.

#### **4.6 Dryness of subject matter**

Another challenge of the SLALOM project was the fact that the subject matter was not very exciting. It is incredibly important, but it does not have the cachet of many other subjects, such as security breaches. In the vernacular, it is not ‘sexy’. The subject matter may also be commercially sensitive, especially for larger providers, and where they are willing in principle to contribute, their internal control processes for managing comments about such topics to external parties can be so onerous as to effectively prevent their helping.

There is little we can do which will make the subject matter more exciting. However, we can be vigilant to ensure that our deliverables communicate as clearly as possible.

### **5 Initial determination of requirements**

This section gives an overview of some of the main findings from the initial determination of provider (and other stakeholder) requirements. See also Annex C: Initial determination of requirements for supporting detail. The questionnaire used to determine these requirements can be referenced on-line [9].

## 5.1 Overall conclusions

The feedback from the questionnaire demonstrated that contractual and SLA-related issues are not seen as 'show-stoppers' by either providers or adopters. However, they are seen as inhibitors to cost-effective and faster uptake of cloud computing, in particular by SMEs (both provider and adopter) which do not have the legal staff or external legal support which larger organizations have. Significant value is seen in 'standardization', so long as it does not prove burdensome (i.e., 'keep it simple') and so long as it does not constitute a straightjacket (i.e. 'one size fits all' which does not).

## 5.2 Conclusions regarding alignment to ISO

It has been a fundamental premise of SLALOM that we need to align with, and leverage from, the ISO SLA standards currently under development (ISO/IEC 19086 family of standards). This premise remains, but since these standards are under development, they are moving targets. Furthermore, there is considerable content in these standards which is concerned with non-measurable requirements. These non-measurable requirements (or 'service commitments') are effectively contractual provisions rather than measurable service levels. The current situation is that the draft ISO SLA standards effectively cover much of the same scope as SLALOM, namely the overall cloud contract (at the Master Service Agreement level), and then more detail at the service level agreement level.

Based on the questionnaire responses, the proposed approach of using the ISO structure is considered good overall, but with a number of comments and recommendations for improvement.

- Even some of those commenting that it is 'good' consider that it is too detailed to be practical.

A number of detailed recommendations have been made for consideration for SLALOM's work, and potentially also by ISO.

## 5.3 Conclusions regarding master service agreements (MSAs)

Based on questionnaire feedback, the proposed approach for the MSA deliverable is considered good. Concerns primarily relate to the worries about a 'one-size-fits-all' approach. Assuming that sufficient flexibility can be built into the proposed model MSA terms and conditions, yet without throwing everything open to endless negotiation, it should help drive the speed of cloud contracting.

For presentation, the 'comparisons of good and bad terms are informative, but we also need a straight-forward list of recommended terms.'

A number of detailed suggestions have been made for consideration in the SLALOM deliverables, e.g. by analysis of the ISO structure (which contains many largely contractual issues), by reference to specific sources (e.g. from law societies), and as a result of specific questionnaire feedback.

## 5.4 Conclusions regarding service level agreements (SLAs)

Overall, feedback supports proceeding with the proposed metrics model approach. There are significant challenges because we do not yet have any practical worked examples; and ISO is still developing its proposals for how metrics should be specified, which is what we propose to follow. However, the goal of having something which can be automated is an important one.

Although there are potentially a large number of metrics which can be incorporated into SLAs:

- The number of measurable metrics (for use with service level objectives) is significantly less than the number of components which are identified in CD1 of the ISO SLA standard 19086-1. This issue about the distinction between SLOs and 'service commitments' (effectively contractual clauses with commitments which are not measurable in the sense of service levels) is not yet resolved within ISO (SC38 WG3).
- There is a clear prioritization amongst providers and adopters for specific metrics, or groups of metrics, as follows:
  - o Availability (e.g. uptime and downtime, planned and unplanned) – consistently the highest priority metric
  - o End-to-end responsiveness/throughput [particularly wanted by adopters, but seen as difficult by providers because of third-party providers beyond effective control, with geography a significant factor]
  - o Response time for one-off issues [e.g. time to provision; to respond/resolve to service interruptions or to support requests]
- There is repeated emphasis on the need to keep things simple; and that too many metrics are unrealistic and impractical

There is furthermore support for using a data exchange format (such as XML) for metric specifications

It is therefore proposed, for the purposes of SLALOM's final deliverables, that detailed specifications are developed for only a limited number of core metrics, principally in the three priority categories cited above.

## 5.5 Conclusions regarding research

Overall, feedback supports including coverage of the five listed research areas in the final deliverable. 'SLAs at different levels' was the most highly rated with providers and adopters. Automated SLA renegotiation was lowest rated for providers and others, whereas Multi-level SLA interaction was lowest rated for adopters. 'Others' consistently rated SLA research topics the highest, overall as 'highly important' for 3 of the 5 topics listed.

A number of additional topics for research have also been suggested by providers, adopters, and others.

## 6 Previous feedback

### 6.1 Previous feedback on legal model

As a result of the extensive feedback actions undertaken by CIF described in 3.3, a number of sets of comments were received from reviewers, including a number of providers, typically from individuals with legal backgrounds, working for legal firms or for the legal departments of providers, including one large provider which supplied extensive comments.

These comments were all passed to the legal track. We discussed with the legal track how we could demonstrate to the reviewers that their comments had been taken into account. As a result of this discussion, the format of the legal deliverable was modified to include a section, for each clause, entitled "Changes to the SLALOM proposed text after feedback". Because of this extensive audit trail which is contained in the final legal deliverable, and because it was not CIF's role to analyse the

feedback itself, no analysis of that feedback is provided here, but rather reference is made to the final legal deliverable D2.2 [1].

## **6.2 Previous feedback on technical model**

The majority of feedback on the technical model, because of its highly technical nature, came from CIF personnel directly, including in particular a review against the work being done in ISO to highlight areas where the two approaches were not initially compatible.

Because of the late date at which the user-focused technical deliverable was completed, there was no opportunity to have meaningful provider feedback on the technical model.

We did receive earlier confirmation, both in the meeting with DG DIGIT and DG CNECT, and in conversations with an individual closely involved with the UK's G-Cloud, that in principle the user-focused version of the technical deliverable would be highly useful on the adopter side, especially for large organizations such as governmental bodies. Near the end of the project, a copy of the user-focused technical deliverable has been sent to DG DIGIT for their review.

## **7 Final feedback on the major deliverables (legal and technical models)**

### **7.1 Subcontracting**

The most significant issue raised was subcontracting, and this was cited by multiple reviewers. There is clause 16 on subcontracting in the legal deliverable. However, the concerns raised relate to contractual issues overlapping with service level issues, and to the overall complexity of controlling subcontracting. In our view, this issue goes beyond what can be addressed just with model terms and conditions, and with the definition of metrics. Rather, what is likely needed is separate guidance on the issues involved in subcontracting, and how to address them.

The context for this issue is that it is likely that the majority of SME providers, and of SaaS providers in general, subcontract their services to IaaS providers. While this is the most obvious subcontracting situation, there are many others, and all providers are believed to subcontract some services, such as for communications. In general, there are typically many layers of subcontracting. One source compared it to a Russian wooden nesting doll, with additional layers repeatedly being found as you look inside each one.

Some specific examples were given of the types of issues which exist:

- The adopter's main provider may not accept responsibility and liability for the performance of its subcontractors and their service levels, especially if the main provider is a smaller provider with limited financial capacity, and the subcontractor is one of the larger providers of infrastructure services.
- There is a practice described as 'clause floating' in which a clause (e.g. for limitation of liability) from one subcontractor in the stack is 'floated' up through all intervening subcontractors until it gets to the adopter where it must be accepted.
- Responsibilities may be specified in a way which is highly challenging for the adopter, but designed to protect the providers. A concept called 'stop the clock' is an example. The main provider may have agreed a 24 hour maximum response time for incident resolution or response. However, if the incident was not under the control of the main provider, but rather the responsibility of the subcontractor (or possibly a subcontractor to that subcontractor etc.),

then the main provider reports the incident to the subcontractor. At this time the main provider's response time clock is stopped, and the subcontractor's response time clock starts – which may be for a different period of time than that of the main provider. A series of clocks may be started and stopped as the incident resolution request is bounced down and up the subcontractor chain. None of the providers suffers undue exposure as a result, but the adopter does.

- The situation is potentially much more complicated with respect to subcontracting when personal data is involved, because of the need to ensure compliance with data protection legislation in various countries. There may be a need for the adopter (the 'data controller' for data protection purposes) to be able to demonstrate adequate controls through the entire subcontracting stack.

The issue of subcontracting is also related to the next issue of market harmonization and commoditization.

## **7.2 Market harmonization and commoditization**

The issue of market harmonization and commoditization is being addressed in particular by the CloudWatch 2 project (see 3.9.2), which has discussed its issues with SLALOM personnel from CIF and ATOS. The issue has also been raised by one other organization.

The challenge is that cloud infrastructure services are now effectively commodity services, yet the market does not yet reflect that fact. For example, pricing information is not generally available; service levels and their metrics are generally defined differently; and contractual terms and conditions make it difficult for resellers to offer equivalent alternative infrastructure services.

SLALOM's approach of having model contractual terms and conditions, and agreed metric definitions, would greatly facilitate market harmonization, and the commoditization at least of the infrastructure layer.

It might be possible for the market overall to evolve in this direction, especially if large adopter organizations (such as governmental bodies) require common metrics and also common terms and conditions. However, it might also be necessary for there to be legislation and regulation, comparable to what exists in many utility industries, to achieve effective commoditization and interoperability.

## **7.3 Risks associated with SLALOM models**

Concerns have been expressed about possible risks associated with the SLALOM models. In particular, there is concern, as with any new text or deliverable, that there may be unintended or unexpected 'loopholes' which can be exploited. The example which was given is one which had already been raised in feedback to the first draft of the legal deliverable, and we consider it already to have been addressed in the final version. However, to give the example by way of explanation, the concern was that the original provision allowing an adopter to cancel a contract if the service was varied by the provider, would give the adopter an unfair opportunity to cancel if the provider had no choice but to make the variation, e.g. if it was required by legislation or regulation, or to fix a bug. As mentioned, this particular issue was already addressed in the final legal model. However, there may be more such cases which will only be identified over time, requiring amendments to the SLALOM models to remain clearly fair and balanced.

## 7.4 Concerns about overall SLALOM project

There has also been feedback expressing concerns about the overall SLALOM project. We cite it here for information and understanding.

**One size fits all.** We have heard the criticism on several occasions that the SLALOM approach is a ‘one-size-fits-all’ approach. Interestingly, to the best of our understanding, all such criticisms have been made by people who could be considered not to benefit from having the SLALOM models available in the marketplace, e.g. consultants and lawyers. The SLALOM position is that the SLALOM models are not ‘one-size-fits-all’ solutions, but are baselines which are intended to be used as templates which should be modified to meet each organization’s specific requirements.

**Uncoordinated with other projects by the EC.** We have heard a number of criticisms about the way highly similar projects such as SLALOM and SLA-Ready can be approved by the EC without coordination, and that it is left to the projects to find out about each other and do what they can to coordinate after their scopes and schedules have already been set. This is beyond SLALOM’s ability to control, and we have done what we could to coordinate with other projects, including SLA-Ready. Two of the significant challenges of such coordination are that (a) the projects typically have different completion dates, meaning that they are rarely at corresponding stages in their work; and that (b) the time when the major deliverables are available from one project may not work for the second project, meaning that cross-working between projects is often not realistic.

**EC overreach.** We have heard the comment on a number of occasions that the SLALOM project represents ‘scope creep’ and overreach on the part of the EC. This is mentioned in particular concerning the fact that the title of the project specifically mentions ‘service level agreement’ or SLA, whereas the scope as implemented includes the full cloud service agreement, or CSA, which is above the SLA. The SLA is seen as being more technical, whereas the CSA is primarily contractual.

The factual observation about the project including the CSA is correct. Unfortunately, however, the issue of how the term SLA is used is not limited to the SLALOM project. It is a common issue in the industry, and indeed the exact same issue exists in the ISO group working on the ISO/IEC 19086 family of standards which are all labelled as being for ‘service level agreement’, but the scope clearly includes the CSA, which is covered in the first part of that family, ISO/IEC 19086-1.

While it would be desirable to have better accuracy in the use of the terms SLA and CSA, we are reflecting industry practice. Indeed, we raised this issue ourselves in the ISO working group, but without success. Furthermore, the individual who initially developed the proposal for the 19086 family of standards clarified that this had been debated when the proposal was initially made, and the decision had been made to label it as it now is.

## 8 Analysis by provider type

One of the requirements of the SLALOM contract for this report (see 1.1) is:

*The provided information will be provided stating information with respect to the category the cloud provider (in terms of e.g., the jurisdiction in which he provides his services, the type of the services provided, etc.) ...*

We have identified the following areas where provider characteristics are significant in discussing the results of the work performed:

- **Likelihood of uptake of deliverables.** We determined that SME providers are more likely to adopt the legal model than large providers. On the other hand, the uptake of the technical

deliverables (metric specifications) is more likely to be driven by large adopters, such as governmental organizations, which will drive adoption by all providers. See also 9.2.

- **Types of services provided.** Infrastructure and platform services (IaaS and PaaS) are more likely to be provided by large providers, whereas SME providers are largely providing software as a service, using the infrastructure services supplied by large providers.
- **Relevance in subcontracting and market harmonization.** The way the market is largely split (see previous point on types of services provided) has significant implications for the issues of subcontracting (see 7.1) and market harmonization (see 7.2).

We did not identify any other significant issues which depend on provider characteristics, including the country or jurisdiction of the provider, with the exception of country-specific legislation affecting cloud computing contracts such as are addressed in the report on jurisprudence and case law which is contractual deliverable D2.3 [2]. It is also recognized that there may be special requirements by sector, such as for the financial and health care sectors, but that has been outside the scope of this present work, and is rather an area which might be addressed in future work. (See 9.4.)

## 9 Overall conclusions

This section presents overall conclusions from CIF concerning the SLALOM project, with particular emphasis on providers but also more general conclusions.

### 9.1 Useful and quality deliverables

Overall we have had positive feedback from reviewers and the marketplace to the SLALOM deliverables. We consider that the SLALOM project has produced deliverables which are useful for the cloud marketplace, and are of appropriate quality. They are immediately useable by all stakeholders, including providers, adopters, the legal profession, consultants, policy makers, and the research community. They also provide a good basis for incremental improvement.

### 9.2 Good opportunity for adoption

Based on the feedback we have had, we consider that it is likely there will be reasonable uptake and use of the SLALOM deliverables. There has been little time for the market to consider and start to use the SLALOM deliverables, but the signs are positive. In particular:

- **Legal model adoption.** It is considered that SME providers will be the earliest users of the legal model (i.e. the cloud service agreement model terms and conditions) because they have the most flexibility with respect to their legal contracting, and it may be seen as a competitive advantage for them to have contractual terms and conditions which are independently created with the intent of being fair and balanced. There is already at least one SME provider which has used the SLALOM legal model. (See <http://www.taxcalc.com/cloudServiceAgreement>). On the other hand, we have feedback that large organizations – both providers and adopters – will likely find it more difficult to adopt the legal model largely as it is because they have years, or decades, of contracting experience with resulting contractual terms and conditions which have evolved in response to that experience, and these will not quickly be replaced. Nonetheless, there could be a willingness to benchmark their own contractual terms and conditions to those of the SLALOM legal model.



- **Technical model adoption.** It is considered that large adopters will be the earliest users of the technical model, and in particular of metric definitions proposed by SLALOM based on that model. One large government procurement organization has already indicated that it is interested, in principle, in using the SLALOM metric definitions in its tendering processes, and we have had feedback that the same may apply to at least one other governmental procurement organization, and potentially more. While not all providers will respond to such requirements, enough will (and do), and such behaviour can move the market by making the use of these metrics generally available. On the other hand, it is unlikely that small adopters will have the commercial clout to require the use of the SLALOM metrics from providers which do not currently provide them. Likewise small SME providers, which are typically dependent on larger providers for underlying services, will not have the commercial clout to require their supplier providers to use the SLALOM metrics.
- **Use of SLALOM models as baselines.** Regardless of whether there is full adoption or not of the SLALOM legal and technical models, we have had feedback from several organizations including providers that they are considering using both SLALOM models for benchmarking against their current practices. This is likely to influence those practices, even if the SLALOM models are not adopted as such.
- **Publicity.** We have had good initial reactions and publicity concerning the release of the SLALOM legal and technical models, and there are further on-going developments. Indications are that there could be further commercial uptake as more people and organizations learn about the SLALOM legal and technical deliverables.
- **Research community uptake.** There has also been feedback that various research projects are considering making use of the SLALOM legal and technical deliverables. While this does not imply direct commercial uptake, it reflects the fact that all stakeholders see value in the SLALOM deliverables.

### 9.3 Importance of EC support

The SLALOM deliverables would not have happened without EC support. Although people have been talking about the need for such deliverables for some time, it does not appear to be in the short-term interest of large providers to develop or fund such deliverables, and SMEs do not have the ability to fund such work. It is only because of funding from the EC, which has a public-interest remit, that it has been possible to do this work. The same consideration may apply to sustainability activities. Sustainability activities could include further promoting the existing deliverables, driving test implementations/adoptions, maintaining the deliverables (e.g. to correct 'loopholes' which may be found as discussed in 7.3), and to allow further development. The SLALOM contract states that sustainability will be at the consortium's own expense, but the consortium has only a limited ability to promote and continue this work without funding. There is a risk that much of the potential of SLALOM may not be realized because of this.

### 9.4 Opportunities for further development of SLALOM deliverables

There are clearly recognized opportunities for further development of the SLALOM deliverables, if there were sufficient market demand and funding. In particular:



- **Legal model opportunities.** It would be possible to develop further model contractual terms and conditions for specific situations such as for specific jurisdictions/countries, and for specific sectors, e.g. for finance and health care.
- **Technical model opportunities.** There are significant opportunities for developing more model metrics for additional types of service levels, beyond the limited number which exist in the current deliverables.
- **Other guidance opportunities.** It would be possible to develop guidance on specific topics such as subcontracting which are highly complex and which often require solutions involving both contractual and technical considerations. (See 7.1.)

## References

- [1] SLALOM deliverable D2.2, “Final Legal Terms for adoption”, available at <http://bit.ly/28JOVO8> [last accessed: June 2016]
- [2] SLALOM deliverable D2.3, “Report on Jurisprudence and case law”, available at <http://bit.ly/28WlIjt> [last accessed: June 2016]
- [3] SLALOM deliverable D3.5, “Guidance on including SLALOM in research”, available at <http://bit.ly/28WiYIX> [last accessed: June 2016]
- [4] SLALOM deliverable D3.6, “SLA specification and reference model - c”, awaiting publication. To be available at [www.slalom-project-eu/downloads](http://www.slalom-project-eu/downloads).
- [5] SLALOM deliverable D4.1\_5.1, “Initial Position Paper Reflecting Cloud Service Provider and Cloud Adopter Requirements”, available at <http://bit.ly/SLALOMD4-1D5-1> [last accessed: June 2016]
- [6] SLALOM report, “Cloud SLA Metrics Based on the SLALOM Specification and Reference Model”, available at <http://bit.ly/28WewDN> [last accessed: June 2016]
- [7] SLALOM report, “Dos and Don’ts of SLA Research”, available at <http://www.slalom-project.eu/content/slalom-dos-donts-cloud-slas-project-researchers> [last accessed: June 2016]
- [8] SLALOM online handout: “SLA Model Terms and Specifications: SLALOM Project Overview and Request for Feedback”, available at [bit.ly/SLALOMeHandout](http://bit.ly/SLALOMeHandout) [last accessed June 2016]
- [9] SLALOM online questionnaire, “SLALOM: Ready to Use Cloud SLA”, available at <http://bit.ly/28JFmPh> [last accessed: June 2016]
- [10] SLALOM online questionnaire, “SLALOM: Project Deliverables Assessment”, available at <http://goo.gl/forms/Wl3wCRb3855dm2p42> [last accessed: June 2016]
- [11] Video to accompany project deliverables assessment, available at <https://1drv.ms/v/s!Ar6kp05WiUTVieJiBCEVhODpD97Taw> [last accessed: June 2016]

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## Annex A: Legal overview document

### Overview

#### SLALOM Cloud Service Agreement Model Terms & Conditions

The SLALOM project<sup>1</sup> ([www.slalom-project.eu](http://www.slalom-project.eu)) has two main deliverables, namely a cloud legal model, and a cloud technical model. This document provides a short overview of the structure of the SLALOM cloud legal model. The SLALOM cloud legal model is a set of model terms and conditions for cloud service agreements. The full legal model is available at [www.slalom-project.eu/downloads](http://www.slalom-project.eu/downloads).

The SLALOM cloud service agreement (CSA) model terms and conditions have been developed primarily by the SLALOM consortium member and legal firm Bird & Bird with assistance by the University of Piraeus Research Center (UPRC), and incorporating extensive feedback from cloud stakeholders. These model terms and conditions are intended to be:

- **A practical baseline.** The SLALOM legal model can be used by anyone to assess or develop their own CSA terms and conditions. It has been produced under a Creative Commons license which allows anyone to use it and modify it in any way they wish.
- **Fair and balanced.** The SLALOM legal model should give reasonable assurance that there is no bias towards either the cloud service provider or the cloud service adopter (i.e. customer).

The SLALOM legal model covers the following areas:

Section Title in SLALOM Legal Model	Comment
Introduction	
Cloud Service Agreement	
Section 1: Definitions - Interpretations	
Section 2: Provision of services	
Section 3: Service levels	There is limited coverage in the SLALOM legal model, with coverage rather expected in the SLALOM technical model.
Section 4: Variation of the services	
Section 5: Obligations of the Adopter	
Section 6: Charges	

<sup>1</sup> The SLALOM project is co-funded by the European Commission through the H2020 Programme under Grant Agreement 644720.

Section 7: Service credits	
Section 8: Intellectual property	
Section 9: Term and termination	
Section 10: Consequences of termination and expiration	
Section 11: Confidentiality obligations	
Section 12: Warranties and liability	
Section 13: Indemnification	
Section 14: Insurance obligations	
Section 15: Operational suspension of services	
Section 16: Subcontracting	
Section 17: Data protection	
Section 18: Force majeure	
Section 19: Notices – Parties’ team leaders	
Section 20: Governing law	
Section 21: Disputes - jurisdiction	
Section 22: Final provisions	
Section 23: Attachments	
Attachment 1 to the Agreement: Services Description [Ref'd from S2]	No detailed text is given by the SLALOM legal model, since this depends on the specific service being offered.
Attachment 2 to the Agreement: Service Level Agreement – Service Credits [Ref'd from S3]	There is limited coverage in the SLALOM legal model, with coverage rather expected in the SLALOM technical model.
Attachment 3 to the Agreement: Acceptable Use Policy (AUP) [Ref'd from S5]	A detailed proposal is given by SLALOM.
Attachment 4 to the Agreement: Charges [Ref'd from S6]	No detailed text is given by SLALOM, since this depends on the specific commercial terms which apply.
Attachment 5 to the Agreement: Data Protection Attachment [Ref'd from S17]	A detailed proposal is given by SLALOM.
Attachment 6 to the Agreement: Security Policy [Ref'd from S11]	No detailed example is given by SLALOM.

The areas addressed by the SLALOM legal model are organized as follows:

General description of the section	
Standard clauses used in the market	
Provider's perspective	Adopter's perspective
Position proposed by SLALOM	
Changes to the SLALOM proposed text after feedback	
SLALOM proposed text	

There may be future updates of the SLALOM legal model, based on further feedback received, and possibly also to address sector-specific or jurisdiction-specific issues. Further information when available will be found at [www.slalom-project.eu](http://www.slalom-project.eu).

## Annex B: Technical overview document

### Overview

#### Cloud SLA Metrics

#### Based on the SLALOM Specification and Reference Model

The SLALOM project<sup>2</sup> ([www.slalom-project.eu](http://www.slalom-project.eu)) has two main deliverables, namely a cloud legal model, and a cloud technical model. This document provides a short overview of the structure of the document entitled “Cloud SLA Metrics Based on the SLALOM Specification and Reference Model”, which includes examples that can be used “as is” by cloud providers and cloud adopters. The full document is available at [www.slalom-project.eu/downloads](http://www.slalom-project.eu/downloads). A more detailed document, SLALOM deliverable D3.6 “SLA specification and reference model - c”, will be released by the end of June 2016 through the SLALOM website and will include updates of the SLALOM technical model, including in particular for the suggested metrics, based on feedback received.

The SLALOM technical model has been developed by the SLALOM consortium member National Technical University of Athens (NTUA), incorporating revisions to reflect work which SLALOM has done with the ISO committee responsible for cloud standards. The SLALOM technical model is intended to be:

- **Unambiguous.** The SLALOM technical model allows for the unambiguous specification of cloud metrics, to avoid the common problem with many current metrics that they are unclear and can be contested (i.e. the results can be easily repudiated).
- **Fair and balanced.** The SLALOM technical model and its proposed metrics should give reasonable assurance that there is no bias towards either the cloud service provider or the cloud service adopter (i.e. customer). This is not only because of the way the metrics are specified, but also because of the metrics which are proposed.
- **Readily usable.** Although the proposed SLALOM metrics are technical in nature, they are described in ways which may be understood by individuals with limited technical expertise, and these descriptions may then be expressed in unambiguous ways (e.g. in XML or JSON) by individuals with those more specific expertise sets.

The suggested metrics based on the SLALOM technical model currently cover the following:

Section Title
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<sup>2</sup> The SLALOM project is co-funded by the European Commission through the H2020 Programme under Grant Agreement 644720.

Metrics: General
Availability (Accessibility) Metric
Availability (Functionality) Metric
Response Time (Transactional) Metric
Response Time (Incident) Metric
Incident Resolution Time Metric
Performance of Virtual Cores Metric

The different aspects describing the metrics based on the SLALOM technical model are organized as follows:

General description of the metric	
Standard metric provisions used in the market	
Provider's perspective	Adopter's perspective
Position proposed by SLALOM	
SLALOM proposed metric parameters	
Indicative SLO definition for the above metric based on the SLALOM reference model	

There may be future updates of the SLALOM technical model, and in particular for suggested metrics, based on further feedback received. Further information when available will be found at [www.slalom-project.eu](http://www.slalom-project.eu).



## Annex C: Initial determination of requirements

The information in this annex is from the initial determination of requirements conducted by CIF.

### 1. General observations

#### 1.1 Industry views of model terms and specifications

There are some strongly expressed views for and against having model terms and specifications. Views of principle include the following:

- Pro: they save time and resources, and provide better assurance of SLA appropriateness and adequacy, by providing a trusted verifiable starting point for providers and business users to negotiate. They are particularly helpful for SMEs who do not have the legal support to navigate and negotiate complex and varied contractual provisions from different potential vendors.
- Con: they create a 'one-size-fits-all' straightjacket which simply does not work.

There is also the issue of whether realistically they will be taken up by industry. There is a fairly poor track record of model terms being developed and adopted successfully. This issue is recognized, and must be dealt with if SLALOM is to be as successful as intended.

#### 1.2 Implications of counterparty size: SME to enterprise

The observation has been made – including in questionnaire feedback - that large organizations, whether providers or consumers – have no need or incentive to adopt model terms and specifications, because they have the legal resources to deal with anything they encounter, and indeed they can generally insist on terms advantageous to themselves if they are larger than their counterparties.

SMEs are the ones who benefit most from model terms and specifications being adopted, yet they do not have the muscle to make it happen widely. Notably, the majority of providers providing input for SLALOM were SMEs.

### 2. Industry views about the importance of the work being done

#### 2.1 Importance of the work - conclusions and proposals for final deliverable

- Two questions were asked in the questionnaire to assess the importance of the work being done
  - o "What are your organization's key constraints for its increased provision/use of cloud computing?" This was to determine the context within which this work is being done, to indicate the relative priority which providers and adopters have for inhibiting factors to increased provision/use of cloud computing.
  - o To what extent do you consider contract and SLA-related issues as inhibiting your organization's increased provision/use of cloud computing? This was to ask the question explicitly about contract and SLA-related issues.
- The feedback from these questions demonstrated that contractual and SLA-related issues are not seen as 'show-stoppers' by either providers or End-Users. However, they are seen as inhibitors to cost-effective uptake, in particular by SMEs (both provider and adopter) which do not have the legal staff or external legal support which larger organizations have. Significant value is seen in 'standardization', so long as it does not prove burdensome (i.e., 'keep it simple') and so long as it does not constitute a straightjacket (i.e. 'one size fits all' which does not).

## 2.2 Supporting questionnaire analysis

### Column 17 – Overall factors inhibiting cloud uptake

From perspective of providers:

- Only one mention relevant to SLALOM scope: 'legal issues'
- Minimal mention of 'traditional' cloud issues
  - o Data location
  - o Security
  - o Resilience
  - o Robustness
  - o Availability
- Most are marketing and education related
- Some relate to fast-changing technology and ability to keep up
- Some reflect financial and management concerns of potential customers
  - o Capex vs opex
  - o Need to utilize existing infrastructure investment
  - o Reluctance of IT management to lose control
- Some reflect particular concerns of small SMEs
  - o Funding
  - o One cites exposure to government policy changes (for provider serving government)
- Some reflect supply chain issues
  - o Licensing

From perspective of adopters:

- Limited mentions relevant to SLALOM scope
  - o 'difficulty of comparing providers'
  - o Availability (2 mentions)
- Main concern is regulatory compliance
  - o Personal data protection
  - o Data location
- Security is second-highest concern
- Variety of other single mentions
  - o Vendor lock-in
  - o Feasibility
  - o Performance
  - o Storage
  - o Redundancy
  - o Threat deterrents
  - o Accessibility
  - o Direct audit possibility

From perspective of others:

- Only 2 mentions
  - o Cost
  - o Need for technical cloud brokerage platforms/portals

## Column 18 – Legal terms and SLAs inhibiting cloud uptake

From perspective of providers:

- There were few comments about general contractual issues unrelated to SLAs, except as detailed below (e.g. data location)
- Overwhelming view is that SLAs do not inhibit cloud uptake
  - o 10 responses, 2 non-responses
- A limited number (4) say they want standardization, but do not say if they inhibit cloud uptake
  - o 3 SMEs
  - o 1 just above: 250 – 999 employees
- One says SLAs are important, but does not indicate if they inhibit cloud uptake
- Several mention issues related to SLAs
- Most important for
  - o Enterprise sector
  - o Public sector
  - o Local government
  - o Charities
- Other issues mentioned are
  - o Data location
  - o Availability (difficulty of achieving high levels)
  - o 'Off-shore or third party administrative roles in service assurance' [apparently = issue of subcontracting]
  - o Customer confusion
- View expressed that SLAs are not important for run-rate (= standardized, high-volume, low cost) services
- View expressed that there are no meaningful SLAs by public cloud providers

From perspective of adopters:

- Few considered this important
  - o 4 ignored the question
  - o 1 said it was not an inhibitor (if properly written); 1 said low; 1 said medium to low
- Several commented directly or indirectly about desirability of standardizing
  - o Variances of the same terms between vendors
- Only two strong comments
  - o "Very significant. Too much time reviewing contracts for potential privacy liability risk assessment with no ability to negotiate limitation clauses"
  - o "Lack of control about personally identifiable information outside of our doors"

From perspective of others:

- Only 2 limited responses
  - o "basically"
  - o "Significant"
- One extensive comment: " .. should be structured by strong, standard, simple and agile SLAs and contracts..."

### 3. Alignment to ISO

#### 3.1 ISO structure feedback - conclusions and proposals for final deliverable

- It has been a fundamental premise of SLALOM that we need to align with, and leverage from, the ISO SLA standards currently under development (ISO/IEC 19086 family of standards). This premise remains, but since these standards are under development, it is a moving target. Furthermore, there is considerable content in these standards which is concerned with non-measurable requirements. These non-measurable requirements (or 'service commitments') are effectively contractual provisions rather than measurable service levels. The current situation is that the draft ISO SLA standards effectively cover much of the same scope as SLALOM, namely the overall cloud contract (at the Master Service Agreement level), and then more detail at the service level agreement level.
- Based on the questionnaire responses, the proposed approach of using the ISO structure is considered good overall, but with a number of comments and recommendations for improvement.
  - o Even some of those commenting that it is 'good' consider that it is too detailed to be practical.
- Re structure, it is suggested that the data management component has too many sub-components. Consider further breakdowns.
- Re additional components, the following are suggested
  - o Warranty (compliance with law and agreement)
  - o 'Payment section (payment terms, indexation, consequence of non-payment)'
  - o 'Penalties'
  - o 'Service cancellation rights for both parties'
  - o 'Termination of service component: Deleting derived and customer data?'
  - o 'Mediation and arbitration'
  - o Subcontracting'
  - o Agility to integrate a service (or to stop a service). Associated: portability and reversibility'
  - o Scalability (to ramp up or ramp down) of a service
  - o 'Generic definitions. Availability is used for example, but there are many different definitions of it. Specific formula should be included'
  - o 'Cost reporting ! daily, weekly, monthly, wtd, mtd, ytd, forecasting...etc...'
- There are many further detailed suggestions contained in the supporting analysis below.

#### 3.2 Supporting questionnaire analysis

Column 127 – Quantitative Assessment of ISO Structure (Full Questionnaire Only)

Org Type	No of Responses	Average Rating
Provider	5	4.16 – Good
Adopter	4	4.2 – Good
Other	3	4 - Good

Column 128 – Qualitative Assessment of ISO Structure (Full Questionnaire Only)

From perspective of providers:

- Balance of views is positive.
- Qualifying comment from provider giving assessment of 'Good' is 'Probably excessively complex in operation. Few S&Ms [=SMEs] will pay the extra for the additional work and structures involved.'
- One negative comment from provider giving assessment of 'Poor' is 'Tries to shoe-horn the old world into the new.'
- One comment refers to missing components (should be in column 129): "There seems to be no warranty section. Cloud user must use the system in compliance with the law and the agreement. There seems to be no payment section, payment terms, indexation, and consequence of non-payment. Any commercial incentive of penalty for lack of service."

From perspective of adopters:

- Only question raised in comments is 'Process view should be included somehow?'

From perspective of others:

- Although balanced view is 'good', qualifying comment from provider giving assessment of 'Good' is 'It is too detailed in some points and probably overambitious, eg. in terms of MTTR, or all the information on data backup. Would probably make SLAs too complex for a user or provider to understand or upkeep'
- One negative comment from an 'Other' giving assessment of 'Poor' is 'The above SLA's should be industrialised, standardised and cloud service providers should be 'certified' to be capable (or not) to provide a high (or medium or low) level of traceability, visibility, monitoring reporting. An industry standard should emerge, like for any other industry...'

#### Columns 129-131 – Missing Components

From perspective of providers:

- Additional major components
  - o Warranty (compliance with law and agreement)
  - o 'Payment section (payment terms, indexation, consequence of non-payment)'
  - o 'Penalties'
  - o 'Service cancellation rights for both parties'
  - o 'Termination of service component: Deleting derived and customer data?'
  - o 'Mediation and arbitration'
- Specific provisions under existing components
  - o 'Have a quantifiable level of security'
  - o 'Security controls for cloud providers needs to be called out (denial of service protection - both volumetric and application layer).'
  - o 'DOS attack defense planning'
  - o 'Intrusion detection'
  - o 'Clarify exactly what type of access cloud provider has to customer data (e.g. purely for customer support, or also product management to improve product). Some cloud providers gather detailed metrics, even if in aggregate, that customers often are not aware of. I don't think it's a bad thing to collect this data, but customer should be informed.'
  - o 'Service desk response time, Change management response time (where applicable)'

- 'Network availability, latency'
  - 'Governance component: Audit results?'
- Further comments about proposed additional scope:
  - 'Expand performance by geographic location and tie with user experience due to high variability (e.g., Russia & China may have 10x worse performance than users in USA).'
  - 'Alignment with industry specific authorities such as Law Society or SRA requirements may be a consideration.'
- Main negative comment: 'A specific element on security standards, other than that there is far too much, and would push up the cost of cloud computing in Europe if providers were forced to build monitoring tools to cover the entirety. The components also fail to recognise that many elements would be service options driven by customer choice - e.g. frequency/method of back-up, asynchronous replication across data centres for DR, etc.'

From perspective of adopters:

- Additional major components
  - Managing subcontracting and ensuring standardisation of obligation in this context. Please see Cloud Security Alliance Control Matrix that addresses this topic.
- Specific provisions under existing components
  - a set of standard "minimum" security controls
  - Role and responsibility list (role list is missing)

From perspective of others:

- Additional major components
  - 'Agility to integrate a service (or to stop a service). Associated: portability and reversibility'
  - Scalability (to ramp up or ramp down) of a service
  - 'Generic definitions. Availability is used for example, but there are many different definitions of it. Specific formula should be included'
  - 'Penalties'
  - 'Cost reporting! daily, weekly, monthly, wtd, mtd, ytd, forecasting...etc...'

#### Columns 132-134 – Suggestions for Improvement

From perspective of providers:

- Philosophy of work
  - 'Simplify'
  - 'Simplify, simplify, simplify. The biggest adopters are not large organisations; these standards are aimed at enterprise customers'
  - 'Think about who the consumer is - a private consumer won't give two hoots other than "is my service available" and would resent paying for a service in order to have an SLA they won't understand, and won't care about.'
  - 'Speak to real cloud users and real cloud providers, rather than the old guard, and learn from them'
- Specific content recommended to include
  - 'Implement a quantifiable level of security'
  - 'How to measure availability of service as a whole'

- 'There should be a commercial liquidated damage calculation for loss of service e.g. that leads to a credit note rather than a termination of the agreement.'
  - 'Process of payment'
- Reiteration of existing content
  - Detailed security controls for cloud providers should definitely be called out, since denial of service, or web application vulnerabilities have the highest impact.
  - The roles and responsibilities of each party should be clear.
  - The importance of common language and expectation setting between provider, reseller and end user.

From perspective of adopters:

- Specific content recommended to include
  - Subcontracting
  - Process view should be included somehow?

From perspective of others:

- Structure
  - Data management component has too many sub-components. Consider further breakdowns.
- Specific content recommended to include
  - Costs monitoring/reporting
  - Cloud based orchestration Tools, services, monitoring, reporting... (Cloud Management Portal services)

## **4. Master service agreements (MSAs)**

### **4.1 MSA model approach - conclusions and proposals for final deliverable**

- Overall, the proposed approach is considered good. Concerns primarily relate to the worries about a 'one-size-fits-all' approach. Assuming that sufficient flexibility can be built into the proposed model MSA terms and conditions, yet without throwing everything open to endless negotiation, it should help drive the speed of cloud contracting.
- For presentation, the 'comparisons of good and bad terms are informative, but we also need a straight-forward list of recommended terms.'
- Potentially, there could be 'broader examples, organized for each kind of sector/industry'
- Re additional components, the following are suggested based on feedback to the proposed ISO structure (see 3.1 ISO structure feedback - conclusions and proposals for final deliverable.)
  - Warranty (compliance with law and agreement)
  - 'Payment section (payment terms, indexation, consequence of non-payment)'
  - 'Penalties'
  - 'Service cancellation rights for both parties'
  - 'Termination of service component: Deleting derived and customer data?'
  - 'Mediation and arbitration'
  - Subcontracting'
  - Agility to integrate a service (or to stop a service). Associated: portability and reversibility'
  - Scalability (to ramp up or ramp down) of a service

- 'Generic definitions. Availability is used for example, but there are many different definitions of it. Specific formula should be included'
- 'Cost reporting! daily, weekly, monthly, wtd, mtd, ytd, forecasting...etc...'
- Our provider interviewing process identified that the Council of Bars and Law Societies of Europe has issued the "CCBE Guidelines on the Use of Cloud Computing Services by Lawyers", including a section on contractual issues.  
([http://www.ccbe.eu/fileadmin/user\\_upload/NTCdocument/07092012\\_EN\\_CCBE\\_gui1\\_1347539443.pdf](http://www.ccbe.eu/fileadmin/user_upload/NTCdocument/07092012_EN_CCBE_gui1_1347539443.pdf)). There are a number of other references for legal practitioners relating to their own use of cloud computing at <http://www.lawcloud.co.uk/security/law-society-cloud-guidance>.
- There is considerable overlap in the proposed ISO SLA standard ISO/IEC 19084-1 between measurable metrics and overall contractual content (or 'service commitments'), and SLALOM should give consideration to what it lists as needing to be covered. See the supporting analysis below, plus 3.1(ISO structure feedback - conclusions and proposals for final deliverable).
- The EC DG Expert Group on Model Cloud Terms has considered many of the clauses considered important for cloud computing agreements. See the References at the end of this document.
- The proposed MSA detailed organization for contents to be produced for the final SLALOM deliverable is given in Annex 1.

## 4.2 Supporting questionnaire analysis

### Column 19 – Quantitative Assessment of MSA Approach (Full Questionnaire Only)

Org Type	No of Responses	Average Rating
Provider	5	4 – Good
Adopter	4	4.25 – Good
Other	3	3.33 - Poor

### Column 20 – Qualitative Assessment of MSA Approach (Full Questionnaire Only)

From perspective of providers:

- Overall assessments given ranging from good to poor
  - Good: 'excellent'; 'very useful examples'
  - Negative: 'I believe SLALOM is not addressing the problem from the correct perspective. Some cloud providers pitch service directly to consumers, and terms will need to be different from terms meant for enterprise, where there will tend to be greater scope for negotiation. In either case, SLALOM should be looking at the really key issues - controller, processor relationships, writing terms that serve the many available consumption models, DP compliance, etc. - what is proposed is too simplistic, and assumes all providers are like Facebook!'
- Concern/disagreement about specific terms proposed

From perspective of adopters:

- Overall assessments good: 'useful'; 'I will use them today'
- Suggestion for improvement: 'Maybe broader examples, organized for each kind of sector/industry'



From perspective of others:

- Overall assessments given ranging from good to very poor
  - o Negative: 'The "Model Terms" are either dictatorial (lengthy pages of terms and conditions that the Customer is required to accept to enable swiftly the cloud based services OR they are open to debate, with lengthy negotiations which reach agreements that are still highly in favour of the provider.'
- Suggestion for improvement: 'The comparisons of good and bad terms are informative, but we also need a straight-forward list of recommended terms.'

Columns 21 (all Questionnaires) & 22 (Full only) – MSA Pain Points

From perspective of providers:

- Security and personal data protection issues
  - o 'Data protection and location of data'
  - o 'Varied customer requirements for security, incident response, or privacy. Privacy is likely the biggest pain point due to variations in enforcement by different EU countries (e.g., German DPA registration requirements versus other countries).'
  - o 'Audit and security - in a multi-tenant environment we cannot change or concede for one customer, or we would breach our agreements with our other tenants. Its buyer education again. And trying to keep to standard'
  - o 'Many customers don't understand major areas of security vulnerabilities in SaaS applications - mostly in management consoles, by Customer Support, Product Management, etc. Since in many companies, SaaS have lots of access to customer data that the customer may not realize. Yet, the customer contracts try to require very specific security requirements that are archaic (e.g., intrusion prevention devices, instead of newer web application firewalls or privileged account management).'
  - o 'The length of time that potential customers take in looking at, and getting comfortable with, new areas of control within the contract - for example, controls on data access and location of data.'
  - o 'Cloud computing contracts are nothing different from managed services / outsourcing services contracts except that customers are very conscious about data privacy and data security related issues'
- Customer need for education / better understanding
  - o 'Client ignorance in the technology and their own responsibilities in managing risk.'
  - o 'Buyers assuming we can access and see their data. For IaaS, this simply isn't the case.'
  - o 'Lack of understanding of Cloud and how to interpret the contract in relation to the provision which leads to big questions that are difficult to answer in layman's terms as things are so new. The What If scenarios which can get a bit unrealistic especially when people hear "gossip" on the news about the latest security breaches. People's lack of understanding.'
- Problems for customers in comparing different cloud service offerings
  - o 'When prospects are comparing quotes it is very difficult to ensure they are comparing like for like. We find difficulty in helping the customer understand the differences between service offerings'
- Contracting and professional legal support
  - o 'One of the benefits of cloud computing is to avoid contracts. Negotiated SLAs bring this back.'
  - o 'Public sector type frameworks assist in definition and therefore avoid repeated queries and exceptions. Lack of legal support within SMB channel means that backing off

provider terms to End user contracts is not always clear and the provider ends up supporting that process.'

- 'They are usually almost worthless as caveats always dictate maximum forfeits based on actual user money spent.'
- 'Reluctance to commit to a contract at all'
- 'Consequence of default of SLA KPI.'
- 'Termination for Convenience.'
- 'Jurisdiction issues, caused by intentional confusion sown by [name omitted] etc. who try and sell as if they are not US corporations simply because they have a European office.'
- 'These can be long and difficult to understand or they can be short with not enough detail'
- Other
  - 'Complexity'
  - 'What's a good standard'
  - 'Exit and portability of data'
  - 'When asked about security practices, don't always have the certifications in place - not always practical for small business. Quality and responsiveness are key to them - e.g. took CIF Code of Practice to demonstrate trustworthiness'
  - 'Customers like the flexibility to grow with cloud computing. There are still lessons to be learnt to ensure the company communicates well between technical/account management and financials. We are addressing this issue with the implementation of a centralised management solution which will improve this issue massively.'

From perspective of adopters:

- Security and personal data protection issues
  - 'It does not protect against unknown breaches or security incidents as long as the cloud provider is not legally subject to notify them.'
  - 'The lack of a standard set of Security Controls (or just the "family" of the topic).'
  - 'Completeness of SLA : how far to go, what is acceptable by the provider, take it or leave it approach if the provider has a dominant position on its market.'
  - 'Where data is stored, who has access to the data? '
  - 'For Public Cloud, Compliance rules: Data Location & Direct audit possibility'
  - 'Changing nature of contract provisions with no ability to foresee / negotiate privacy & data protection provisions.'
- Contracting and professional legal support
  - 'The lack of a standard framework, in order to give a reply to the question: "How can I be sure that all the parts of a CCC [Cloud Computing Contract] are covered?"'
  - 'Limitation of liability... specifically the provider wanting to partner with skin in the game about ownership and dollars. Most want to tie this to their revenue as opposed to the potential losses.'
  - '99.99% uptime may be the guarantee, but if it's down, the only option is a credit (which oftentimes does not equal the employee/business impact)'
- Other
  - 'Customer's rights'
  - 'Service security, availability and quality'
  - 'Use of 3rd parties by main contractor who are they and where are they?'
  - 'Private cloud versus public cloud.'

From perspective of others:

- Security and personal data protection issues
  - o 'the opt out option and data privacy'
- Contracting and professional legal support
  - o 'It's the binary approach:
    - either you accept the terms and conditions AS IS and have quick access to the cloud services
    - either you do NOT accept the AS IS T's&C's, and not have access to the services
 Alternatively, you hope for a fair negotiation to protect the customers interests, as well as the cloud providers, and hope for the best...'
  - o 'The lack of transparency on the cloud provider infrastructures and how the customers' data are managed on those infrastructures. And here again, a big binary jump forwards:
    - either you accept that your data are somewhere secure on the providers infrastructures, or....
    - you accept the higher price of "on premise" services, with a CAPEX model that creeps in with this "traditional model"
  - o 'Length and legal complexity of the contracts.'
  - o 'Differences in definitions, obscure legal language, lack of auditing'
- Problems for customers in comparing different cloud service offerings
  - o 'Difficulty of comparing different providers.'
- Other
  - o 'user interaction respond time'

Columns 32-126: Prioritization of components

The following may be noted:

- The 'information security component' is top priority for both providers and adopters.
- The 'availability component' and 'personally identifiable information' component (i.e. personal data protection) are priorities 2 and 3 for providers; and in the top ten for adopters.
- Network redundancy ranks high for adopters (2) but lower for providers (24).
- The 'cloud service audits' component ranks high for adopters (9) but quite low for providers (58).
- The 'data location' components rank high for providers (9 & 11), but fairly low for adopters (55 & 64).
- 'Others' ranked a number of components highly which were not ranked highly by providers or adopters.

## 5. Service level agreements (SLAs)

### 5.1 Conclusions and proposals for final deliverable

- Overall, feedback supports proceeding with the proposed metrics model approach. There are significant challenges because we do not yet have any practical worked examples; and ISO is still developing its proposals for how metrics should be specified, which is what we propose to follow. However, the goal of having something which can be automated is an important one.
- Although there are potentially a large number of metrics which can be incorporated into SLAs
  - o The number of measurable metrics (for use with service level objectives) is significantly less than the number of components which are identified in CD1 of the ISO SLA standard 19086-1. This issue about the distinction between SLOs and 'service commitments'

- (effectively contractual clauses with commitments which are not measurable in the sense of service levels) is not yet resolved within ISO (SC38 WG3).
- There is a clear prioritization amongst providers and adopters for specific metrics, or groups of metrics, as follows:
    - Availability (e.g. uptime and downtime, planned and unplanned) – consistently the highest priority metric
    - End-to-end responsiveness/throughput [particularly wanted by adopters, but seen as difficult by providers because of third-party providers beyond effective control, with geography a significant factor]
    - Response time for service support issues [e.g. time to provision; to respond/resolve to service interruptions or to support requests]
  - There is repeated emphasis on the need to keep things simple; and that too many metrics are unrealistic and impractical
  - We noted that the CD1 draft of ISO/IEC 19770-1 has no measurable service level metrics defined for the service support component, although it does define a number of 'statements' which should be included in the SLA or other contractual documentation. It is suggested that more focus should be put on such metrics in future drafts, especially given their importance as demonstrated by the questionnaire responses.
  - There is furthermore support for using a data exchange format (such as XML) for metric specifications
  - It is therefore proposed, for the purposes of SLALOM's final deliverables, that detailed specifications are developed for only a limited number of core metrics, principally in the three priority categories cited above.

## 5.2 Supporting questionnaire analysis for metrics model approach

### Column 23 – Quantitative Assessment of Metrics Model Approach (Full Questionnaire Only)

Org Type	No of Responses	Average Rating
Provider	5	3.8 – Good
Adopter	4	4.25 – Good
Other	3	3 - Poor

### Column 24 – Qualitative Assessment of Metrics Model Approach (Full Questionnaire Only)

From perspective of providers:

- Overall assessments are highly variable, ranging from 'overall quite good' to 'meaningless and unusable'. Examples were (understandably) wanted. ['It is difficult to understand exactly how these would work...'] Given continuing significant evolution of ISO approach to specifying metrics, which we propose following, some negative comments are to be expected.

From perspective of adopters:

- Support for automation

From perspective of others:

- Recognition of issue of communication barrier between technical specifications and non-technical business users: 'Detailed metrics specifications using this template may be precise, but

still difficult to understand. For example, it is not clear how the rules will be shown/specified.'

#### Columns 25 (all Questionnaires) & 26 (Full only) – SLA Pain Points

From perspective of providers:

- Customer expectations
  - o 'Customers expecting the ability to bespoke - huge cost attached to this'
  - o 'Customer wants to measure end user experience, which is highly variable. So we have to set the bar low, yet only a small percentage of users really fall under this category of likely poor performance.'
  - o 'Managing client expectations. Many operate imperfect legacy systems and yet expect cloud technology and its purveyors, integrators and SaaS providers to provide 100% up time.'
  - o 'You can be asked to put something under SLA that you would never be asked in traditional process - over-expectation'
- Standardization issues
  - o 'The fact that no one set of SLAs will meet the needs of different customers/cloud options'
  - o 'Defining "availability"'
  - o 'To the most part lacking of common language and definitions.'
  - o 'how to measure SL's according to standard'
- Technical challenges
  - o 'That there is no contrast and compare mechanism available to gauge actual performance.'
  - o 'We had to make the Availability SLAs a quarterly measurement instead of monthly.' 'Customers don't often realize the difference in actual downtime. Performance SLAs are very difficult to meet due to many aspects of the network that are beyond the SaaS provider's control.'
  - o 'The reliability of third party service - such as connectivity.'
  - o 'Admin and tools to monitor internally that we are meeting our SLA's. IN saying that few people ask us to provide these measures.'
- Contractual issues
  - o 'That the quality part should be emphasised rather than the forfeit.'
  - o 'Consequence of default of SLA KPI.'
  - o 'Termination for Convenience.'
- Other
  - o 'Resource to meet them.'
  - o 'They can protect the provider rather than the customer'
  - o 'End to end penalties measurements and reporting.'

From perspective of adopters:

- Meeting adopter requirements
  - o 'I do not think the provider is able to provide all core metrics I have identified'
  - o 'managing subcontracting : the controls the provider has on its subcontractors and the leveling of controlling/reporting between all involved parties since the SLA are already in place when a new customer signs the agreement with the main provider'
  - o 'Mapping user needs and SLA'
  - o 'Ensuring the correct SLA's are in place to ensure they match the service we need, the contractor delivering the SLA we signed up for. The business area understanding we no

longer have the same control that we once had when we provided the service internally.'

- Other
  - o 'making them simple for all parties to agree to and review as a partnership.'
  - o 'Lack of accountability'
  - o 'Poor resolution of incidents and communication'
  - o 'Since we're mainly based in Europe, for Public Cloud, the European offer is not so developed and competitive as in the US. The possibility of using US facilities is constrained by the need of usage of sufficient bandwidth that often offset the economic benefit of the offer itself. '

From perspective of others:

- Technical challenges
  - o 'The difficulty to track the veracity of the SLA reports provided by the Cloud services provider.'
  - o 'The lack of 'end to end" SLAs'
- Contractual issues
  - o 'Complexity of contractual definitions, and all of the exceptions which undermine their usefulness.'
- Other
  - o 'Lack of comparability between different providers.'
  - o 'Lack of auditing'

Columns 27 & 28 (Full Only) – Suggestions for Improvement in Metric Model Approach

From perspective of providers:

- Need for simplicity
  - o 'Simplify'
  - o 'Make them less complex and perhaps targeted at types of provider. We operate a simple availability and responsiveness test which is as much as the majority of clients can track.'
  - o 'Keep contract text simple.'
  - o 'Clarity is key'
- Need for relevance
  - o 'Make relevant to the nature of cloud services'
  - o 'More details on performance - measured in networks that the SaaS provider controls, and by geography for areas that are not under the SaaS providers control (e.g., if hosted in Singapore - that's one metric. But access from China, Japan, Australia, Russia are all going to be very different).'
- Other
  - o 'Make metrics accessible via API.'
  - o 'Consistency with other model documents to ensure that they all work together'
  - o 'Make sure it is completely platform agnostic'

From perspective of adopters:

- Other

- 'Take into account the Cloud Security Alliance Control Matrix. It has some good ideas on disposition that could also be part of the model.'
- 'Alignment with future regulation/directive on data protection (security by design)'
- 'Support for automation'
- 'Support for designing (co-operative processes) processes between customer and supplier and third parties'
- 'A standardization accepted by EU level'

From perspective of others:

- Need for simplicity
  - KISS = Keep it Simple and Stupid... Seriously, just like TCP/IP is not perfect, but it works for everyone worldwide. Let's find the simple & standard approach to implement and deploy Cloud services.
- Other
  - Standard, transparent and traceable SLA contracts that are legally imposed and that balance the risk for both the Customer and the provider.
  - We need worked examples especially for some of the most important metrics.
  - Potentially standardized classes of contracts

#### Column 29 – Quantitative Assessment of Using Data Exchange Format (Full Questionnaire Only)

Org Type	No of Responses	Average Rating
Provider	6	4 – Good
Adopter	4	4 – Good
Other	3	4.33 - Good

#### Column 30 – Qualitative Assessment of Using Data Exchange Format (Full Questionnaire Only)

From perspective of providers:

- 'Highly recommended - this would make such metrics actually usable. Otherwise, customer has too many SaaS vendors to deal with to calculate things manually.'
- 'There may need to be some flexibility in the values i.e, dependent on usage or times of day or days of week, or exceptions.'
- 'Who is this aimed at? The majority of clients will be in the S & M [SME] bracket and won't require this level of detail'

From the perspective of adopters: No comments

From the perspective of others:

- 'Can be machine readable and processable, however an actual text should be there also. standardized fields should exist for generic processing tools to be created'

### 5.3 Supporting questionnaire analysis for prioritization of metrics

For the short questionnaire, a leading question was added which stated "Before commenting on the ISO proposals, please summarize which, in your view, what are the most important service level

metrics for you and for cloud computing overall?" Because this was answered with comments, the responses were not easily combinable. Nonetheless, it was clear that the most cited metrics fell into the following groupings:

- Availability (e.g. uptime and downtime, planned and unplanned) – consistently the highest priority metric
- Response time for service support issues [e.g. time to provision; to respond/resolve to service interruptions or to support requests]
- End-to-end responsiveness/throughput

We noted that the CD1 draft of ISO/IEC 19084-1 has no measurable metrics defined for the service support component, although it does define a number of 'statements' which should be included in the SLA or other contractual documentation. It is suggested that more focus should be put on such metrics in future drafts.

See also the separate spreadsheet 'Metric Priorities.xlsx'. This shows the ranked priorities of the different ISO metrics for providers, adopters, others, and overall, with the top priorities for each highlighted. The following may be noted:

- Availability metrics were high priority for both providers and adopters, with total downtime the highest priority availability metric.
- The top priority for adopters was cloud service throughput. However, this was no 24 for providers. Comments from providers elsewhere indicated their difficulty with this metric because of the fact that they rely on third parties for communications, and have little control over them. Geographic location is also an issue, e.g. Germany or China.
- Service reliability metrics were also high priority for both providers and adopters.
- Cloud service performance metrics were comparatively low priority for both providers and adopters.
- 'Others' ranked a number of metrics highly which were not ranked highly by providers or adopters.

## 6. Service level research

### 6.1 Conclusions and proposals for final deliverable

- Overall, feedback supports including coverage of the five listed research areas in the final deliverable. 'SLAs at different levels' was the most highly rated with providers and adopters. Automated SLA renegotiation was lowest rated for providers and others, whereas Multi-level SLA interaction was lowest rated for adopters. 'Others' consistently rated SLA research topics the highest, overall as 'highly important' for 3 of the 5 topics listed.
- A number of additional topics for research have also been suggested by providers, adopters, and others.

### 6.2 Supporting questionnaire analysis

Columns 135-139 – Quantitative Assessment of Research Topics

	Provide r	Adopte r	Other	Total



135 SLAs at different levels	4.32	4.2	5	4.34
136 Multi-level SLA interaction model	3.94	3.6	5	3.93
137 SLA negotiation across multiple layers	3.81	3.9	4.67	3.93
138 Automated SLA re-negotiation	3.69	3.8	4.33	3.79
139 Proactive SLA violation detection	4.22	3.7	5	4.13
Note: 5 = highly important; 4 = somewhat important; 3 = somewhat unimportant				

#### Columns 140-141 – Qualitative Assessment of Metrics Model Approach (Full Questionnaire Only)

From perspective of providers:

- Consumer education - the cloud service market is very diverse, evolving rapidly, with niche providers offering solutions to the commonly thought of cloud challenges. Customers need to understand how to identify the right cloud service, rather than homogenising cloud service, which will inhibit the market, and cloud take-up
- For enterprise consumers, how is availability defined?
- Expansion of SLA at different levels - should be split out by geographic location due to high variability in user experience based on country. For example, Russia & China users have up to 10x worse performance than US users. This is a much larger impact on performance than anything else in the cloud provider's infrastructure.
- Where the client's cloud service requirement is jurisdiction-critical (e.g. banking/ investment management; legal; health), regular audit reports for the Supplier to the Client to enable the Client to comply with its Quality Management/ Licencing audit requirements

From perspective of adopters:

- Combined effects of location of data centers, local laws and security.

From perspective of others:

- Cloud orchestration standards
- Technical Cloud Brokerage standards (interfacing, API's...)
- Cloud Management Portals standards
- Cloud Services Monitoring & Reporting Standards
- SLA auditing and monitoring process for public Clouds SLAs: 3alib SLA auditing component (<http://www.artist-project.eu/tools-of-toolbox/209>)
- Translating SLA terms to necessary resource management actions (<http://users.ntua.gr/gkousiou/publications/MOCS2011.pdf>)

Metric	CSP Avg Val	CSP Rank	End-User Avg Val	End-User Rank	Other Avg Val	Other Rank	All Avg Val	All Rank
043 Availability component [/ Total downtime]	4.79	1	4.8	2	4	21	4.72	1
044 Availability component [/ Availability]	4.74	2	4.6	12	4.67	3	4.69	2
046 Availability component [/ Uptime]	4.74	2	4.5	18	4.33	18	4.63	3
105 Service reliability component [/ Recovery time objective (TRO)]	4.53	5	4.78	3	5	1	4.63	3
091 Service reliability component [/ Maximum time to service recovery (MTTSR)]	4.47	7	4.78	3	4.5	7	4.57	5
106 Service reliability component [/ Recovery point objective (RPO)]	4.47	7	4.78	3	4.5	7	4.57	5
051 Cloud service performance component [/ response time observation]	4.44	10	4.7	7	4.5	7	4.53	7
089 Service reliability component [/ Time to service recovery (TTSR)]	4.42	11	4.78	3	4.5	7	4.53	7
048 Availability component [/ Allowable downtime]	4.58	4	4.6	12	3.67	30	4.5	9
092 Service reliability component [/ Number of service failures]	4.47	7	4.67	9	4	21	4.48	10
049 Availability component [/ Downtime]	4.42	11	4.7	7	4	21	4.47	11
045 Availability component [/ Availability percentage]	4.53	5	4.4	23	4	21	4.44	12
047 Availability component [/ Uptime percentage]	4.42	11	4.5	18	4.33	18	4.44	12
080 Cloud service support component [/ Service incident notification time]	4.32	14	4.56	14	4.5	7	4.4	14
081 Cloud service support component [/ Maximum incident resolution time]	4.21	17	4.56	14	4.5	7	4.33	15
061 Cloud service performance component [/ Cloud service bandwidth]	4.16	21	4.67	9	4.5	7	4.33	15
119 Data management component [/ Data deletion time]	4.21	17	4.63	11	4	21	4.31	17
055 Cloud service performance component [/ Cloud service response time over threshold]	4.17	19	4.56	14	4.5	7	4.31	17
090 Service reliability component [/ Mean time to service recovery]	4.26	16	4.44	20	4	21	4.29	19
056 Cloud service performance component [/ Delay duration time]	4.11	22	4.44	20	5	1	4.28	20
052 Cloud service performance component [/ response time mean]	4.17	19	4.33	24	4.67	3	4.27	21
060 Cloud service performance component [/ Cloud service throughput]	3.95	25	4.89	1	4.5	7	4.27	21
087 Governance component [/ Number of failed SLOs]	4.32	14	4.13	28	4	21	4.24	23
059 Cloud service performance component [/ Limitation of available cloud service resources]	3.95	25	4.56	14	4.5	7	4.17	24
063 Cloud service performance component [/ Elasticity]	4	23	4.33	24	4.67	3	4.14	25
065 Cloud service performance component [/ Precision]	3.95	25	4.33	24	4.67	3	4.11	26
064 Cloud service performance component [/ Speed]	4	23	4.2	27	4.33	18	4.07	27
053 Cloud service performance component [/ response time variance]	3.89	28	4.11	29	4.5	7	4	28
058 Cloud service performance component [/ Number of simultaneous cloud service connections]	3.72	29	4.44	20	4	21	3.97	29
054 Cloud service performance component [/ Nth percentile of response time]	3.47	30	4.11	29	4	21	3.71	30