Cloud Orchestration at the Level of Application

Project Acronym: **COLA**

Project Number: **731574**

Programme: **Information and Communication Technologies**
Advanced Computing and Cloud Computing

Topic: **ICT-06-2016 Cloud Computing**

Call Identifier: **H2020-ICT-2016-1**
Funding Scheme: **Innovation Action**

Start date of project: 01/01/2017 Duration: 30 months

Deliverable:

D1.2 Project progress monitoring and quality management

Due date of deliverable: 28/02/2017 Actual submission date: 28/02/2017

WPL: Gabor Terstyanszky

Dissemination Level: PU

Version: final

1 Table of Contents

2 List of Figures and Tables

Figures

No figures

Tables

3 Status, Change History and Glossary

Status:	Name:	Date:	Signature:
Draft:	Gabor Terstyanszky	20/02/17	Gabor Terstyanszky
Reviewed:	Simon Taylor	20/02/17	Simon Taylor
Approved:	Tamas Kiss	28/02/17	Tamas Kiss

Table 4 - Status Change History

Version	Date	Pages	Author	Modification
v1	10/02	5	G Terstyanszky	report template
v1.1	15/02	8	G Terstyanszky	introduction document standards
v1.2	17/07	16	G Terstyanszky	project communication infrastructure reporting procedures
V1.3	19/01	30	G Terstyanszky	annexes
v2.0	19/01	30	G Terstyanszky	adding missing sections
v2.1	20/01	30	G Terstyanszky	revision of v2.0
v3.0	20/02	30	S Taylor	report review
v3.1	26/02	30	G Terstyanszky	final review
final	28/02	30	T. Kiss	report approval

Table 5 - Deliverable Change History

Glossary

ATF	Application Task Force
EAC	Ethical Advisory Committee
IAB	Industrial Advisory Board
PMB	Project Management Board
TMB	Technical Management Board
PC	Project Coordinator
PM	Project Manager
PQM	Project Quality Manager
TMB	Technical Management Board
TTF	Technical Task Force

Table 6 – Glossary

4 Introduction

DoW specifies the D1.2 Project progress monitoring and quality management report as follows:
“It will outline how the project will monitor its progress and resources used to achieve the progress. It will also describe the internal quality/risk management strategy and how it will be implemented.”

This deliverable outlines how the COLA project will monitor progress and resources used to achieve progress. It will also describe the internal quality management strategy and how it will be implemented. The deliverable gives guidelines for development and document standards; templates are provided in the Annex. The deliverable also describes the communication infrastructure for the project, which is also described in D1.1 Project management structure and project management infrastructure, but is included here for completeness.

5 Document standards

5.1 Document naming

The Project Manager (PM) is responsible for issuing numbers and keeping a list of all documents of the project, which includes Number, Title, Author, Version, Date. The project management is also responsible for the maintenance of a master library of all documents including all versions of each document. The numbering scheme for deliverables will be as follows:

5.1.1 Formal Deliverable

Formal deliverables are numbered as *Dx.y*, where *x* is the WP number and *y* is deliverable number within the WP.

5.1.2 Informal Deliverable

Deliverables not foreseen in the Description of Work will be handled as informal deliverables and be numbered sequentially after the formal deliverables in the relevant WP/Task.

5.1.3 Version Numbering

Each document will be given a version number during development as follows:

version u.w

where *u*=1 and *w*=0 for the first version;
w changes in the case of minor corrections;
for substantive revisions, *u* > 1.

5.1.4 Deliverable name convention

According to the previous section the names of the deliverables will be constructed as:

COLA Dx.y.z.vu.w

example: *COLA D1.2.v1.0*

5.1.5 Optional conventions for draft, final and revised versions

For clarity, draft versions may be suffixed with *draft*.

example: *COLA D2.3.v3.1.draft*

The final approved version submitted to the commission should not include the *draft* suffix, and may be suffixed with *final*.

example: COLA D2.3.v3.2.*final*

If for any reason, the final version needs to be revised and resubmitted, the resubmitted/version may be suffixed *final.revised*.

example: *COLA D2.3.v4.1.final.revised*

5.2 Deliverable template

Microsoft Word format should be used for all working documents and formatted according to the template. The deliverable template can be found in the COLA Storage available at

https://cola.fst.westminster.ac.uk

5.2.1 Structure of Deliverables

All deliverables should have the following parts:

- Cover page
- Table of Contents
- List of Figures and Tables
- Status and Change History
- Glossary
- Introduction – executive summary

- Content – the substance of the deliverable
- Conclusion
- Annex

5.2.2 Front page of Deliverables

The cover page should contain the following:

Cloud Orchestration at the Level of Application

Project Acronym: **COLA**

Project Number: **731574**

Programme: **Information and Communication Technologies**
Advanced Computing and Cloud Computing

Topic: **ICT-06-2016 Cloud Computing**

Call Identifier: **H2020-ICT-2016-1**
Funding Scheme: **Innovation Action**

Start date of project: 01/01/2017 Duration: 30 months

Deliverable:

Du.w <deliverable title>

Due date of deliverable: dd/mm/yyyy Actual submission date: dd/mm/yyyy

WPL: <Work package Leader name>

Dissemination Level: <level>

Version: final

5.2.3 Other pages of Deliverables

- In the Header:

Du.w <deliverable title>

- In the Footer:

Work Package <work package number> **Page <actual number> of <total number>**

5.2.4 Deliverables Preparation and Submission Process

The submission deadline for the delivery to the EC of the final deliverables is before the end of the month specified in the DoW, re-produced in Table 4: COLA Reporting Periods.

The WPL of the relevant WP is responsible for the preparation of the final deliverable. The preparation schedule for deliverables is:

- WPL sends pre-final version to reviewer: 17th of month (copy to PM)
- Reviewer reports back to WPL: 20th of month (copy to PM)
- WPL sends final version to PC 25th of month
- PC approves final version 30th of month
- Submission by PM to EU: end of month

The WPL is responsible for proposing the deliverable reviewer; and is accepted subject to the approval of the PC. The WPL shall coordinate directly with reviewer throughout the preparation/review process, and the PM should be copied in to all correspondence between WPL, reviewer and PC.

The special case of periodic reports is slightly different and is described later in Section 7: Reporting procedures.

The detailed preparation, review and submission schedule is provided in Table 5.

5.2.5 Document storage and publication

Final versions of all project documents and deliverables shall be stored on the COLA Storage at https://cola.fst.westminster.ac.uk.

Public documents and public deliverables may in addition be published on the project webpage at www.project-cola.eu.

6 Project Communication Infrastructure

The following description of the communication infrastructure appears in deliverable D1.1, but is reproduced here in this deliverable since it constitutes the Project Handbook.

6.1 Web sites

The COLA project has created an internal web site at www.project-cola.eu and a public web site at www.project-cola.org. The former is for use by the partners throughout the course of the funded project. The latter site is a sustainable site that will remain as a legacy after the funded project has concluded. Both will be described in detail in the deliverable D2.1 Dissemination plan and project public website.

6.2 Document repository

A pydio based document repository as a storage facility will be used for storing all documents and deliverables produced by the project. The URL for the repository is

https://cola.fst.westminster.ac.uk

6.3 Project Calendar

Responsibility for maintaining a calendar is with WP2 (WPL: CloudSME UG). Information will kept on both the pydio storage and the website.

6.4 Event Management

Responsibility for event management is with WP2 (WPL: CloudSME UG). Information will kept on both the pydio storage and the website.

6.4.1 Doodle

Scheduling of COLA events will be done using the Doodle poll web tool. Doodle can be accessed at www.doodle.com.

6.5 Project Communication Infrastructure

The project has established emailing lists to provide a mechanism for internal project communication.

whole consortium mailing list:

cola-all@lists.cpc.wmin.ac.uk

board and committee mailing lists:

Project Management Board	cola-pmb@lists.cpc.wmin.ac.uk
Technology Management Board	cola-tmb@lists.cpc.wmin.ac.uk
Technology Task Force	cola-tmb@lists.cpc.wmin.ac.uk
Application Task Force	cola-ttf@lists.cpc.wmin.ac.uk

The project will create further mailing lists on consideration of requests by project partners and research communities to address specific application - or technology-oriented issues. These mailing lists will be tailored to forward the relevant messages to all interested parties.

6.6 Conferencing tools

For e-conferencing purposes in the project, Webex and Skype will be used.

7 Reporting procedures

In COLA there will be three types of reports: Interim, Periodic, and Final. Interim Reports are to the Coordinating Partner, and are required as part of Progress Monitoring procedures. Periodic and Final Reports will be submitted to the Commission and are contractual requirements. There will be two Periodic Reports and one Final Report that is due at the end of the project.

7.1 Reporting periods

Periodic Reports are due at M18 and M30; the Final Report at M30. Interim Reports are additionally required at M12 and M24.

7.2 Periodic and Final reports

Periodic reports should contain administrative, financial and technical details and should be submitted:

- according to the templates and reporting guidelines issued by EC
- by the Coordinator to the EC (see Annex I. Also, refer to the EC FP7 Reporting Guides in Appendices A and B to this deliverable)
- with contributions from beneficiaries submitted to the Coordinator

The reports comprise three parts

- Technical part:
  - reports of work packages, linked to financial part
- Management part:
  - description of costs and resources at task level, with justification
- Financial Statement:
  - Form C (on-line submission)

The technical part of the report should describe major project achievements and work progress for each WP, including any deviations and corrective actions taken. It should:

- contain a summary of progress towards objectives and details for each task;
- highlight clearly significant results and table of Deliverables (see Table 5 in Annex II);
- if applicable, explain the reasons for deviations from the **Description of Work** and their impact on other tasks as well as on available resources and planning;
- if applicable, explain the reasons for failing to achieve critical objectives and/or not being on schedule and explain the impact on other tasks as well as on available resources and planning (the explanations should be coherent with the declaration by the project coordinator);
- describe resource consumption, in particular highlighting and explaining deviations between actual and planned man-months per work package and per beneficiary in **Description of Work** (see Table 7 in Annex II);
- if applicable, propose corrective actions;
- describe the use and dissemination of project results (see table in Annex); monitoring of milestones (see Table 8 in Annex II)

7.3 Interim reports

Interim progress reports produced at M12 and M24 reporting points should contain basic administrative, financial and technical information. It should include

- Technical reports of work packages
- Description of costs and resources at task level

Interim reports are a progress monitoring tool for the project. They reflect the same information and structure as formal reports, with the exception of Form C, which is not required. They are also a mechanism for partners to rehearse their reporting skills, in anticipation of preparing formal reports.

The technical part of the report should *briefly* describe major project achievements and work progress for each WP, including any deviations and corrective actions taken. As with formal reports, the technical part should:

- contain a summary of progress towards objectives and details for each task;
- highlight clearly significant results and table of Deliverables (see Table 5 in Annex II);
- if applicable, explain the reasons for deviations from the **Description of Work** and their impact on other tasks as well as on available resources and planning;
- if applicable, explain the reasons for failing to achieve critical objectives and/or not being on schedule and explain the impact on other tasks as well as on available resources and planning (the explanations should be coherent with the declaration by the project coordinator);
- describe resource consumption, in particular highlighting and explaining deviations between actual and planned man-months per work package and per beneficiary in **Description of Work** (see Table 7 in Annex II);
- if applicable, propose corrective actions;
- describe the use and dissemination of project results (see table in Annex); monitoring of milestones (see Table 8 in Annex II)

7.4 Report Preparation

7.4.1 Report Structure

Formal reports are in three parts: a technical part, describing technical progress; a management part, describing effort and costs incurred; and a financial statement (Form C). The Technical part is largely descriptive, and should include references to effort and costs incurred. The Management part is largely tabular and should be consistent with the technical description. The Financial Statements, submitted online, should be consistent with the other parts.

7.4.2 Consistency and Compliance

All parts of a report contribution should be *consistent* with one another and the financial aspects should be validated by the Finance Office of the contributing partner. They should also be *compliant* with the project plan, as described in the **Description of Work** (or as subsequently modified by PMB).

Consistency must be ensured before submission. It is each beneficiary's responsibility to ensure consistency across all parts of their report contributions.

Non-compliant aspects of a report contribution may not be submitted to the EC, and should be discussed beforehand with the Project Coordinator. It is each beneficiary's responsibility to ensure compliance with the plan.

7.5 Report Preparation and Submission Process

The submission process in COLA follows that of other deliverables (described in Section 5), with some variations.

Firstly, submission to the EC (in the case of Periodic and Final Reports) and to the PC (in the case of Interim Reports) is due 1 month after the period being reported. Thus the following schedule for report submission applies:

- 1st Interim M13

- 1st Periodic M19
- 2nd Interim M25
- 2nd Periodic M31
- Final: M31

Unlike other deliverables, there are no formal Reviewers for these reports; instead, reports shall be consolidated and coordinated by WPLs and overseen by the PC. The preparation schedule for reports is as follows:

- Submission of Partner reports to PC and PM:
  - By 10th of month
  - Copy to WPL
  - Responsibility: Every Partner

- Submission of consolidated WPL reports to PC and PM:
  - By 17th of month
  - Consolidating contributory WP Partner reports
  - Copy to WP partners
  - Responsibility: Every WPL

- Submission of agreed final consolidated WPL reports to PC and PM:
  - By 25th of month
  - To be agreed with WP partners
  - Responsibility: Every WPL
  - Additional commentary by PC
  - By penultimate day of month
  - Responsibility: PC

- Submission by PM to EU:
  - By end of month
  - Responsibility: PM

A third variation is the direct and independent involvement of each beneficiary's Financial Statement Authorised Signatory (FSIGN). FSIGNs are required to complete financial statement Form C directly on-line, as an independent strand of the report. Note that Form C is *in addition* to the task level reconciliation of effort and costs included in the main part of the report. It therefore is vitally important that the Local Coordinators of each beneficiary take steps to ensure that Form C is consistent and compliant with the main (technical and management) part of the report. Helpful guidelines for FSIGNs are included in the Appendices C, D and E to this deliverable. These include a pro-forma Form C, indicating the level of financial information expected from FSIGNs. Local Coordinators are advised to pass this information directly to the FSIGNs appointed within their organisation well in advance of the submission dates.

The Technical part should be submitted in MS Word format. A template for the Technical part is provided in the file *COLA Technical Report Template available* in the COLA Storage, at https://cola.fst.westminster.ac.uk.

The Management part should be submitted as a spreadsheet attachment in MS Excel format only. Effort and associated costs should be described at the task and individual personnel levels. A template for the Management part deliverables is provided in the file *COLA Management Report Template* i in the COLA Storage, at https://cola.fst.westminster.ac.uk.

7.6 Report Schedule Summary

A summary of the reporting schedule is provided in Table 4.

Progress Report	Due Date	Submitted to	Parts included
Interim 1	M13	PC	Technical + Management Report
Periodic 1	M19	EC	Technical + Management Report + Form C
Interim 2	M25	PC	Technical + Management Report
Periodic 2	M31	EC	Technical + Management Report + Form C
Final	M31	EC	Technical + Management Report + Form C

Table 4: COLA Reporting Schedule

8 Quality Management

8.1 Deliverable delivery process

- Reviewers are assigned at the project kick-off meeting; reviewers are proposed by WPL and approved by PC
- Full deliverable schedule is sent to all partners at the start of the project
- Deadline for delivery is the last day of the designated delivery month, specified in the **Description of Work** (except for Reports – see below)
- Deliverable Schedule is included in the Project Handbook (Table 4 in this document)
- PM reminds the deliverable submitter, WPL and reviewer about their impending deliverable, 6 weeks before deadline
- Submitter sends outline (Table of Contents) to reviewer and ask members of WP for contributions, 5 weeks before deadline
- Members of WP send contributions to submitter, 4 weeks before deadline
- Submitter sends draft full version to reviewer by 17th of month (and sends a copy to PM)
- Reviewer sends report to submitter by 20th of month (and sends a copy to PM)
- Reviewer and submitter liaise by email and skype to address and resolve issues raised
- Submitter sends final full version to PM by 25th of month
- PM sends deliverable to EU by the end of the month
- Target dates of the reviews of the deliverable process and milestones are monitored according to the Deliverables list document.
- For December deliverables, all dates are brought forward a week

8.2 Report delivery process

The submission process in COLA follows that of other deliverables (see above), with the following variations: The preparation schedule for reports is as follows:

Reports to the EC are due one month after the designated delivery month

- Contributions to reports are required from every partner and they should report on all WPs at the Task level in which they are involved
- Partners submit their reports to the PC and to the WPLs of the WPs in which they participate by the 17th of delivery month
- Reports on WP progress are consolidated by the WPL, based on contributions from each partner in the WP
- WPL's are responsible for liaising with contributing partners for the preparation of the consolidated WP report
- WPL submits consolidated WP reports to the PC by 17th of delivery month
- PC and PM review all reports and liaise with partners and WPLs to ensure consistency and compliance
- Partners and WPLs submit final reports to PC by 25th of month
- PC consolidates all reports and submit complete report to EC by the end of the month
- Beside the deliverables, the reviews done by the Quality Management include Inspecting system design documents, and the outline or TOC of documents.
- Ensuring that the quality of the technical solutions of the COLA project meets the required level;
    - Inspecting system design documents, TOC
    - Managing the quality of the technical deliverables;

- Solving quality issues;
- Reporting progress and deviations to PMB

8.3 Deliverable review plan

At the kick-off meeting the Project Management Board discussed and accepted the deliverable review plan for period M01-M12. The review plan for period M13-M24 and M25-M30 will finalized at next project meetings at M10 and M22.

Del. no.	Deliverable title	Lead Partner	Diss. level	Mxx	Draft Submit Date	Reviewer	Review Submit Date	Final Submit Date	Submit to EU Date
D1.1	Project management structure and project management infrastructure	UoW	PU	M01	17/01/17	T Kiss	20/01/17	25/01/17	31/01/17
D1.2	Project progress monitoring and Quality Management	UoW	PU	M02	17/02/17	S Taylor	20/02/17	25/02/17	28/02/17
D1.3	Data Management Plan	UoW	PU	M06	17/06/17	M Rubio Redondo	20/06/17	25/06/17	31/06/17
D2.1	Dissemination plan and project public website	CloudSME UG	PU	M03	17/03/17	N Fantini	20/03/17	25/03/17	31/03/17
D2.2	First periodic dissemination report	CloudSME UG	PU	M12	17/12/17	P Gray	20/12/17	25/12/17	31/12/17
D3.1	First commercial exploitation and sustainability report	CB	CO	M12	17/12/17	J M Martin Rapun	20/12/17	25/12/17	31/12/17
D4.1	COLA development testbed infrastructure	CS	PU	M12	17/12/17	N Fantini	20/12/17	25/12/17	31/12/17

Del. no.	Deliverable title	Lead Partner	Diss. level	Mxx	Draft Submit Date	Reviewer	Review Submit Date	Final Submit Date	Submit to EU Date
D5.1	Analysis of existing application description approaches	UoW	PU	M03	17/03/17	S Taylor	20/03/17	25/03/17	31/03/17
D5.2	Specification of the application template concept	UoW	PU	M07	17/07/17	J M Martin Rapun	20/07/17	25/07/17	31/07/17
D5.3	Integration of the templates with the selected application description approach	UoW	PU	M10	17/10/17	A Worrad-Andrews	20/10/17	25/10/17	31/10/17
D5.4	First set of templates and services of use cases	UoW	PU	M12	17/12/17	A Anagnostou	20/12/17	25/12/17	31/12/17
D6.1	Prototype and documentation of the cloud deployment orchestrator service	SZTAKI	PU	M06	17/06/17	A Worrad-Andrews	20/06/17	25/06/17	31/06/17
D6.2	Prototype and documentation of the monitoring service	SZTAKI	PU	M09	17/09/17	A Michalis	20/09/17	25/09/17	31/09/17
D7.1	COLA security requirements	SICS	PU	M04	17/04/17	P Kacsuk	20/04/17	25/04/17	31/04/17
D7.2	MiCADO security architecture specification	SICS	PU	M10	17/10/17	P Kacsuk	20/10/17	25/10/17	31/10/17
D8.1	Business and technical requirements of COLA use-cases	UBRUN	CO	M04	17/04/17	Cs Krasznay	20/04/17	25/04/17	31/04/17
D9.1	POPD – Requirement No. 1	UoW	CO	M04	17/04/17	E Feuer	20/04/17	25/04/17	31/04/17
D9.1	POPD – Requirement No. 2	UoW	CO	M04	17/04/17	E Feuer	20/04/17	25/04/17	31/04/17

Table 5: Detailed Review Plan

8.4 Risk Analysis and Mitigation process

Description of Work identified prospective risks and the project consortium will address these risks presented in Table 6. Work Package Leaders will apply the described mitigation measures in each WP.

WP	P/s	Description of risk	Proposed risk-mitigation measures
WP1			
	L/H	The project objectives are not achieved according to the grant agreement on time and in quality, problems with resources may arise, beneficiaries could leave the consortium, and there is no common understanding to make decisions.	As part of the quality plan of the project, a risk plan will be developed, which will identify and eliminate the risks of the project in detail. This will be supported by regular communication within the project.
WP2			
	M/M	Low audience in activities and dissemination events WP2	The current economic situation can make this difficult for organizations to attend due to costs. We will try to minimize these costs by bringing events close to its targeted audience, and will use as much as possible on-line communication tools to avoid these situations (e.g. webinars).
	M/M	Too many different areas to be covered and supported. WP2	The COLA project will cover a wide range of application areas targeting both SMEs and public sector organisations in general. During dissemination planning in WP2, special care will be taken to assess key application areas based on substantial experience within the consortium. These will be analysed for cost/benefit and prioritised within the dissemination plan.
	M/M	Not enough website and social networks activity. WP2	The website and related social networks are important tools to interact with SMEs and public sector organisations. The dissemination plan will capture key methods to encourage interaction, especially through blogging and Twitter. The status and statistics of the website and related social networks will be thoroughly assessed at each PMB meeting and increased efforts will be decided whenever necessary.
WP3			
	M/M	Commercial project partners are not motivated adequately to exploit COLA results. WP3	UG, CloudBroker, CloudSigma) whose long term business plans are already in-line with the long term goals of COLA. These partners will play key role in WP3 and will drive the exploitation.
	L/H	Technology will not be ready for commercial exploitation	There are some project partners (e.g. CloudSME for commercial exploitation. WP3 WP3 will be in constant communication with the technical work packages and will monitor the progress of the readiness level of the COLA technology. If necessary, WP3 will alert the Project Management

			Board if commercial exploitation is in danger due to slow technical progress.
	L/M	SME Market is not responding to the products and services developed by the Cola project WP3	From the start of the project there is close collaboration with SME's to understand their requirements and challenges. The requirements and opportunities will be carefully assessed, passed on to the other work packages and taken into account for the shaping and development of the products and services
	L/M/	The integrated marketing campaign does not generate impact	The close collaboration with the use case representatives will ensure the focus on the market needs and the most adequate determination of the communication and channels used. The marketing components will be determined and aligned based experience out of the use cases and small market validations and tests.
WP4			
	M/M	Cloud software adaptations ask for features not implemented at the cloud middleware level provided by any of the beneficiaries.	Checks to verify whether new releases of the cloud middleware support the required functionality and subsequently deploy new versions of the middleware on the pre-production environment. Should it not be provided, check the possibility to implement it in another layer of the stack.
	M/M	Cloud middleware components are not mature in certain aspects.	By supplying a pre-production testbed, new versions of cloud middleware releases can be functional and performance tested, before being deployed in the production environment.
	L/L	Microservice benchmarking cannot take place due to insufficient tooling.	Existing open source service and infrastructure monitoring services will be evaluated and / or developed / adapted. These will be complimented by existing best practices and open source automation frameworks.
	M/M	The downtime of a given IaaS cloud provider is excessively long, resulting in service disruption and SLA violations.	All beneficiaries providing the IaaS cloud services have a long running experience of providing IaaS cloud services. The MiCADO framework will take into account and accommodate service HA requirements and will instantiate new instances on alternative IaaS.
WP5			
	L/L	WP5 cannot integrate the application, service and implementation template to the selected application description approach.	WP5 will analyse and select an application description approach that sufficiently supports the COLA template concept, i.e. application, service and implementation template.
	L/M	WP5 cannot create the application templates and the relevant service descriptions of the COLA use cases as scheduled in the project plan.	WP5 and WP8 will collaborate in producing the application templates and their service descriptions
WP6			
	L/H	The consortium cannot find an existing cloud deployment	The Occopus service developed by SZTAKI can be used if better service cannot be found. Occopus is

		orchestrator service that is close enough to the MiCADO requirements to be adaptable in the planned 6 months.	at TRL 6 and hence its adaptation to MiCADO must not require more than the planned 6 months.
	L/H	The consortium cannot find an existing monitoring microservice that is close enough to the MiCADO requirements to be adaptable in the planned 6 months.	We have already tested the existing JCatascopia monitoring services and even if we cannot find better service their adaptation to MiCADO must not require more than the planned 6 months.
	M/M	The consortium cannot find an existing scalability decision microservice that is close enough to the MiCADO requirements to be adaptable in the planned 9 months.	We are not aware of independent scalability decision making services, these kind of services are tightly integrated into cloud orchestrators and hence there is indeed a risk that we have to develop such microservice from scratch. However, this is exactly the reason why we allocated 9 months for creating this service. 9 months should be enough even if the required scalability decision making microservices should be developed from scratch. The additional work if needed will be provided as unfunded effort in this case.
	L/M	The development of the various optimization algorithms and the Optimization Decision Maker microservice requires too much cloud access and cloud usage cost that is not planned in the project budget.	CloudSigma as cloud resource provider partner guarantees to allocate the required amount of cloud resources for this task.
WP7			
	L/H	Wrong/not complete security requirements	The security requirements will be collected in close cooperation with the COLA use cases as well as the MiCADO architect stakeholders. This will ensure a solid set of relevant security requirements.
	M/M	Major technology barrier found making it impossible to design and develop the necessary security building blocks needed to support the defined architecture.	It might turn out that the defined security architecture will be too complex to support within the COLA project. Consequently, this might lead to that it will not be feasible to implement the needed supporting security modules. This risk will be mitigated by defining the security architecture with low complexity in focus. If some building blocks turns out to be infeasible to design and develop, alternative and less complex solutions will be used instead.
	M/H	Impossible to integrate the COLA developed security modules into the MiCADO framework.	This risk will be mitigated by doing the SW module design in close cooperation with the MiCADO architects and by doing the integration in iterative steps, starting with integration of a few modules and then later integrate the rest of the modules.
WP8			
	M/H	Development of COLA pilots and demonstrators delayed.	Ensure partners allocate enough developers and with appropriate skills. Ensure these developers receive appropriate support and training from cloud

			platform development WPs. Work in parallel with these WPs ensuring fluid collaboration during requirements analysis and implementation to avoid delays.
	L/H	Companies' expectations not fulfilled.	Every effort has been made during proposal preparation to understand the end user requirements and the benefits expected from COLA technologies. During the first months of the project further requirements analysis will be conducted to enhance the exploitation of the platform and applications by end users and developers. These requirements will be revisited during the development phase.
	L/M	The target of 20 proofs of concept is not met.	Different ways of acquiring the proofs of concept have been envisioned to reach this target. COLA project has a strong dissemination WP to look for new customers for the existing applications, or new software vendors interested in migrating their applications to the COLA platform. Proof of concept can also be brought by the ISVs in the project, both in terms of new customers or, more easily, moving existing customers to use the COLA version of their applications. Furthermore, these proof of concepts could also be developed by current partners in the project in the sense of new functionalities or data used by the applications.

Table 6: Risks and Their Mitigation

9 Progress Monitoring

The progress monitoring process regularly tracks the technical progress of the project, effort expended and costs incurred and compare them to the schedule and budget plan.

WP Leaders compare progress towards achievement of WP objectives and milestones and report this regularly as shown in the Table 6 and Table 7 in Annex II.

WP Leaders compare effort consumed and costs incurred against the predefined metrics every 6 months and report these as described in the interim reporting section. In the case of any deviation they explain the impact on other tasks as well as on available resources and planning and have to propose corrective actions.

The Project Coordinator globally checks the achievement of the objectives and milestones and integrates the usage of effort and costs. In case of deviation they determine effects and any corrective actions. Decisions are made on a PMB level, including necessary plan updates.

Effort consumed is also checked every 6 months, in an internal report from project partners to the PC.

10 Conflict resolution

The ethos of the project is to ensure a smooth, productive and harmonious work. However it is recognized that there are occasionally situations that may arise during a project lifetime that can lead to conflict. We differentiate the following clusters of potential issues:

1. Non-production of output by a partner
2. Redistribution of project funding between partners
3. Strategic direction of the project
4. Distribution of roles
5. Differing priorities of partners
6. Conflict in commercial interests of partners

Potential conflicts must be identified early and escalated to the Project Coordinator. If such conflicts cannot be amicably settled at the appropriate level, they should be escalated to the Project Management Board for resolution.

Wherever possible conflicts should be settled by consensus agreement of the parties involved, each recognizing the others basic interests. Situations where this is not possible should be brought to a vote for ultimate resolution.

Of the six types of potential conflicts identified above, the first two are the most difficult to deal with, especially if a partner does not fulfil its tasks, but still claims against budget. If required, the Project Coordinator should consider discussing unofficially the best course of action with the Project Officer due to the status of the partners.

Annex I. Templates for Deliverables and Reports

The following templates are on the COLA Storage at https://cola.fst.westminster.ac.uk:

- Deliverable template
- Report preparation template - Technical part
- Report preparation template - Management part

Annex II. Tables for Interim and Periodic Reports

TABLE 1. DELIVERABLES									
Del. no.	**Deliverable name**	**WP no.**	**Lead Partner**	**Nature**	**Dissemination level (*)**	**Due delivery date from Annex I**	**Delivered Yes/No**	**Actual / Forecast delivery date**	**Comment**

Table 7: List of Deliverables

(*) PU = Public
PP = Restricted to other programme participants (including the Commission Services).
RE = Restricted to a group specified by the consortium (including the Commission Services).
CO = Confidential, only for members of the consortium (including the Commission Services).
Make sure that you are using the correct following label when your project has classified deliverables.
EU restricted = Classified with the mention of the classification level restricted "EU Restricted"
EU confidential = Classified with the mention of the classification level confidential “EU Confidential"
EU secret = Classified with the mention of the classification level secret "EU Secret”

TABLE 2. MILESTONES					
Milestone no.	**Milestone name**	**Due achievement date from Annex I**	**Achieved Yes/No**	**Actual / Forecast achievement date**	**Comments**

Table 8: List of MIlestones

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 1 FOR THE PERIOD			
Work Package	**Item description**	**Amount**	**Explanations**
	Personnel costs		
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' ……..		
	Remaining costs		
TOTAL DIRECT COSTS AS CLAIMED ON FORM C			

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 2 FOR THE PERIOD			
Work Package	**Item description**	**Amount**	**Explanations**
	Personnel costs		
	Subcontracting		
	Major cost item 'X'		
	Major cost item 'Y' ……..		
	Remaining costs		
TOTAL DIRECT COSTS AS CLAIMED ON FORM C			

Table 9: Cost items per beneficiary

Planned/ Actual Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible / involved

Table 10: Foreground and Dissemination Activities

Annex III. Review report template

Number and title of the deliverable		
Name and organisation of the reviewer		
Date of review		
Review based on	Document Actual product Test report of product Other …..	
Achievement of the objectives of the deliverable stated in the DoW	Fully Adequately Partly So-so Not	
Objective1:	Comments:	
Objective2:	Comments:	
…	Comments:	
Measures:	Achieved Yes/No Comments	
....	Target number: Achieved Yes/No	
Formatting follows the template	Fully Adequately Partly So-so Not	
Comments on formatting		
Language	Excellent Good Bad	
Comments on language		
Accepted	Yes Yes with changes No	
Conclusions, recommendations for improvement		