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ONTOCHAIN

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D4.2 ONTOCHAIN FOUNDATIONS TECHNICAL PROPOSAL

TECHNICAL RESULTS AND SUGGESTIONS

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ABSTRACT	This is a report which integrates a demonstrator, i.e. the GitHub repository in which ONTOCHAIN third parties deliver they code. This report facilitates the navigation on the repository GitHub. Moreover this report defines guidelines and requirements for third parties when contributing to the GitHub repository.
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CO Confidential to ONTOCHAIN project and Commission Services

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EXECUTIVE SUMMARY

This deliverable integrates the information included in the ONTOCHAIN repository GitHub in which ONTOCHAIN third parties deliver their results, and has also objective to facilitate the navigation in this repository.

This deliverable summarizes also the guidelines for third parties when contributing to ONTOCHAIN. These guidelines emerged from best practices experimented in the call 1 and 2 and include design, coding, testing and documentation of the solution developed.

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ABBREVIATIONS

ABI	Application Binary Interface
AI	Artificial Intelligence
API	Application Programming Interface
DAO	Decentralised Autonomous Organisation
DID	Decentralized Identifier
DLTs	Distributed Ledger Technologies
EVM	Ethereum Virtual Machine
GDPR	General Data Protection Regulation
IoT	Internet of Things
ML	Machine Learning
NFT	Non Fungible Token
NGI	Next Generation Internet
OC1	ONTOCHAIN Call 1
OC2	ONTOCHAIN Call 2
OC3	ONTOCHAIN Call 3
OWL	Web Ontology Language
RDF	Resource Description Framework
SGX	Software Guard Extensions
SSI	Self sovereign identity
W3C	World Wide Web Consortium

1 INTRODUCTION

The project ONTOCHAIN so far has concluded the first two calls, OC1 in the first year, and OC2 in the second year, whose objective was to deliver the code of third party projects. This code is now available on the ONTOCHAIN GitHub repository¹.

This deliverable complements the information delivered in GitHub by Call 1 and Call 2 participants, with the objective of facilitating the reuse of this code for those interested to integrate them in their applications. Moreover, this deliverable identifies some guidelines to be suggested to Open Call 3 participants. These guidelines emerged also from best practices used by third party projects in Call 1 and in Call 2.

Other complementary information about Open Call 1 and Open Call 2 projects and not in this deliverable are available in other ONTOCHAIN deliverables, as:

- The deliverable D3.5 [1] provides updated specification of the ONTOCHAIN framework and architecture including components developed by third parties during Open Call 1 and Open Call 2 and the specification of the ONTOCHAIN pilot deployment which will be used to evaluate the project results.
- The deliverable D4.4 [2] describes the demonstration outcomes of different projects developed by third parties in the Open Call 2.
- The deliverable D4.6 [3] presents the technical evaluation of software developed in the first two years of the project, in the Open Call 1 and in the Open Call 2, including deployment instructions, evaluation methodology, instructions for evaluation and evaluation results.
- The deliverable D4.8 [4] presents the impact of the 13 projects selected in the ONTOCHAIN Open Call 2 and summarizes keys results, the innovation, possibles evolution and most relevant KPIs achieved for each project.

A new updated deliverable of this document will be released at the end of the project.

2 THIRD PARTY PROJECTS OVERVIEW

The project ONTOCHAIN so far has concluded the first 2 calls, OC1 in the first year, and OC2 in the second year, whose objective was to deliver the software developed by the third parties.

The whole architecture of the project ONTOCHAIN[5] is summarized in Figure 1, which

¹<https://github.com/ONTOCHAIN/>

identifies the main components of the architecture as applications, ontologies, distributed ledger, core protocols, application protocols.

This block diagram summarizes also the specific Open Call in which a technology or an application has been developed. Typically the Call 3 will be devoted to applications, whilst the Call 1 and Call 2 were mostly related to technologies[6].

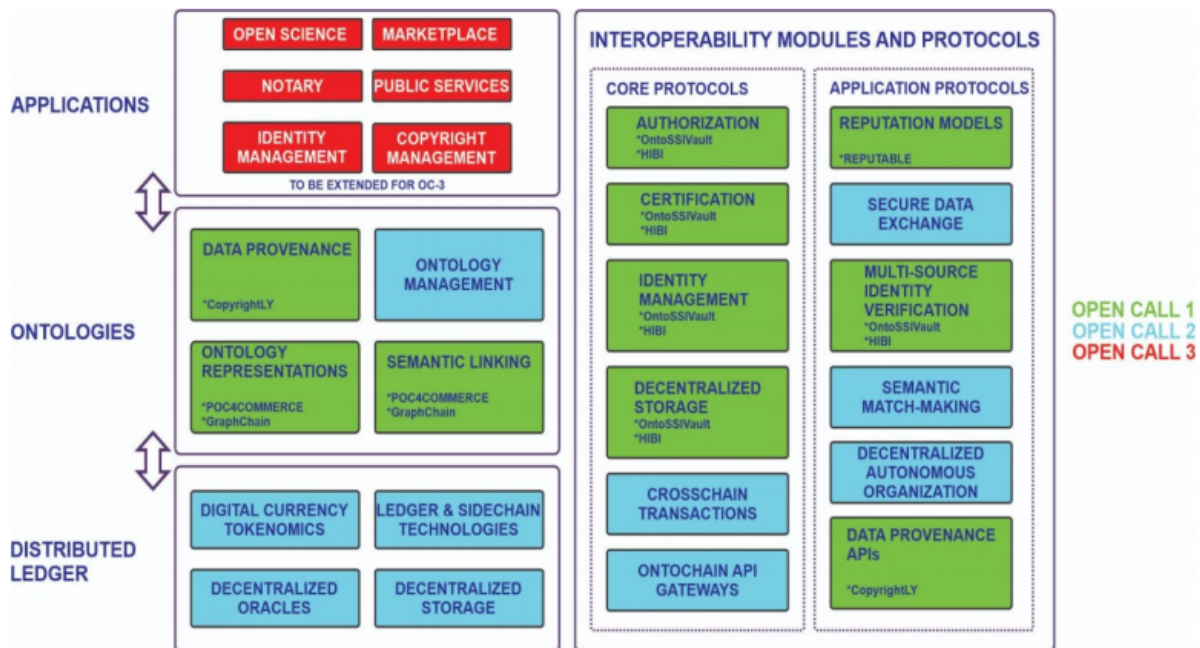


FIGURE 1: DIAGRAM OF ONTOCHAIN FUNCTIONAL ARCHITECTURE

Third party projects have delivered their code in the GitHub ONTOCHAIN private repository², which includes a directory from which codes of the different projects can be accessed.

OC1 and OC2 third party project can be further distinguished into long and short projects. OC1 short projects were asked to deliver only a feasibility study, not code.

The GitHub folder of the ONTOCHAIN project includes also the code of BELLECOUR, developed by the ONTOCHAIN consortium partner iExec. The BELLECOUR sidechain is part of the iExec blockchain infrastructure: it consists of a EVM-compatible private sidechain linked to Ethereum Mainnet with a bridge³. The BELLECOUR sidechain is composed from different kinds of nodes (full, validator). BELLECOUR hosts the iExec workerpools, which are able to execute the Dapps, included the Trusted-

²<https://github.com/ONTOCHAIN>

³iExec Glossary, <https://docs.iexec.help/glossary>, accessed: 22 Feb 2023

Execution-Environment applications⁴. BELLECOUR will act as pilot infrastructure of ONTOCHAIN⁵.

The following Table 1 summarizes the content of the ONTOCHAIN repository. This table is structured into the following columns; 1) project acronym 2) project year or partner (OC1 or OC2 or iExec) 3) kind of project(long or short) 4) direct link to the code in the ONTOCHAIN repository. In most cases the link to specific projects should be easy to identify by applying the rule <https://github.com/ONTOCHAIN/<project-name>>. In any case it has been preferred to remind the whole address in the 4th column of Table 1, as a) in some projects the name used in GitHub is different from the project name or b) some projects used more than a single directory as DESMO and PRINGO⁶.

The GitHub content of OC1 short projects is empty, since these projects were required only to deliver their status of the art and feasibility study, not to deliver code. However, the GitHub repository includes also OC3 projects, which in any case are not mentioned in this deliverable, as their code has not been delivered yet.

TABLE 1: OC1 and OC2 projects in summary

Acronym	Open Call 1 or Open Call 2	long or short	Address
ADOS	OC2	short	https://github.com/ONTOCHAIN/ADOS
BELLECOUR	partner iExec	N.a.	https://github.com/ONTOCHAIN/bellecour-node-deployer
BOWLER	OC2	short	https://github.com/ONTOCHAIN/BOWLER
CARECHAIN	OC2	short	https://github.com/ONTOCHAIN/CARECHAIN
Copyrightly	OC1	long	https://github.com/ONTOCHAIN/COPYRIGHTLY
DART	OC1	short	https://github.com/ONTOCHAIN/DART

⁴"V7 Bellecour - Sgx Production", iExec workerpools, https://pools.iexec.ec/pool/iexecblockchaincomputing/v7_bellecour_-_sgx_production, accessed: 22 Feb 2023

⁵"iExec to provide Pilot Infrastructure for ONTOCHAIN", Jun 15, 2022, <https://medium.com/iex-ec/iexec-to-provide-pilot-infrastructure-for-ontochain-1bd19bc0b981>, accessed: 22 Feb 2023

⁶more specifically the project DESMO uses a main directory with different subdirectories, whilst the project PRINGO uses 3 directory at the same level.

Acronym	OC1 or OC2	long or short	Address
DESMO-LD	OC2	long	https://github.com/ONTOCHAIN/desmo ⁷ .
DW MARKING	OC1	short	https://github.com/ONTOCHAIN/DW-MARKING
GEONTOLOGY	OC2	long	https://github.com/ONTOCHAIN/GEONTOLOGY
GIMLY	OC1	long	https://github.com/ONTOCHAIN/ONTOSSiVault_all
GRAPHCHAIN	OC1	long	https://github.com/ONTOCHAIN/GRAPHCHAIN
HIBI	OC1	long	https://github.com/ONTOCHAIN/DR-HIBI
ISLAND	OC1	short	https://github.com/ONTOCHAIN/ISLAND
KnowledgeX	OC1	long	https://github.com/ONTOCHAIN/KNOWLEDGEX
KUMO	OC1	short	https://github.com/ONTOCHAIN/KUMO
LCDP-ONT-APP	OC1	short	https://github.com/ONTOCHAIN/LCDP-ONT-APP
MFSSIA	OC2	short	https://github.com/ONTOCHAIN/MFSSIA
NFTWATCH	OC2	short	https://github.com/ONTOCHAIN/NFTWATCH
ONTOROPA	OC1	short	https://github.com/ONTOCHAIN/ONTOROPA
ONTOSPACE	OC2	short	https://github.com/ONTOCHAIN/ONTOSPACE
OriginTrail DKG	OC2	long	https://github.com/ONTOCHAIN/DKG
PERUNX	OC2	long	https://github.com/ONTOCHAIN/PXC
PiSwap	OC2	short	https://github.com/ONTOCHAIN/NFTSWAP
POC4COMMERCE	OC1	long	https://github.com/ONTOCHAIN/POC4COMMERCE
PRINGO	OC2	long	https://github.com/ONTOCHAIN/PRINGO-sdk https://github.com/ONTOCHAIN/PRINGO-backend https://github.com/ONTOCHAIN/PRINGO-frontend ⁸
PS-SDA	OC2	long	https://github.com/ONTOCHAIN/PS-SDA

⁷This directory refers to the following directories: desmo-sdk (<https://github.com/ONTOCHAIN/desmo-sdk>), desmo-front (<https://github.com/ONTOCHAIN/desmo-front>), desmo-dapp (<https://github.com/ONTOCHAIN/desmo-dapp>), desmo-contracts (<https://github.com/ONTOCHAIN/desmo-contracts>), zion (<https://github.com/ONTOCHAIN/zion>).

⁸In this project PRINGO, all directories are independent and at the same level

Acronym	OC1 or OC2	long or short	Address
REPUTABLE	OC1	long	https://github.com/ONTOCHAIN/REPUTABLE
SEIP	OC1	short	https://github.com/ONTOCHAIN/SEIP
SOLID-VERIF	OC1	short	https://github.com/ONTOCHAIN/SOLID-VERIF
TENACIOUS	OC1	short	https://github.com/ONTOCHAIN/TENACIOUS
UNIPRODAPI	OC1	short	https://github.com/ONTOCHAIN/UNIPRODAPI

3 BEST PRACTICES

These recommendations have been distilled from our coaching experience with the OC1 and OC2 teams and can now be proposed to OC3 participants.

3.1 TECHNICAL DOCUMENTATION

The GitHub directory of a third party project will include the following text files :

- the README.md file (mandatory), whose suggested format will be detailed in the following;
- the LICENSE file (mandatory)⁹¹⁰;
- the CHANGELOG file (suggested)¹¹.

The suggested format for the README.md file is the following:

- key info
 - acronym;
 - extended title;

⁹Without this file, the license does not appear in metadata

¹⁰As done for example in the project BELLECOUR node (<https://github.com/ONTOCHAIN/bellecour-node-deployer/blob/master/LICENSE>).

¹¹As done for example in the project DESMO (<https://github.com/ONTOCHAIN/zion/blob/main/CHANGELOG.md>).

- o logo (optional)¹²;
 - o maintenance: to specify if the repository is maintained or if updates are maintained in a different repository;
 - o link to the repository in which the current version is maintained, if this situation applies;
 - o functional overview, with few sentences; for more information add a link to the specific page which details the project on the ONTOCHAIN site;
 - o prerequisites of the execution of code, as the operating system and its version, languages and versions, libraries and versions.
- o implementation
 - o minimum system requirement;
 - o architecture;
 - o main innovation;
 - o APIs with a quick functional overview and a link to SWAGGER¹³ for more detailed information. Here is example of a REST API detailed description in SWAGGER¹⁴;
 - o ontologies;
 - o repository structure, with a description of the content of the repository, to facilitate the navigation.
 - o how to
 - o compile;
 - o run;
 - o test.
 - o contacts and acknowledgment
 - o contacts;
 - o developer team (optional, but suggested);
 - o funding, with reference to the ONTOCHAIN funding (this info is strictly

¹²As done for example in the project PiSwap (<https://github.com/ONTOCHAIN/NFTSWAP>).

¹³<https://swagger.io/>

¹⁴https://app.swaggerhub.com/apis/CTORRALBA/GEONTOLOGY_ORCHESTRATOR/1.0.0

mandatory).

It is suggested as a best practice to initialize the README file since the beginning of the project and to update it as the project evolves in order to document the progress of activities and to facilitate the final release of the documentation.

3.2 RECOMMENDED ACTIVITIES

To have a more reliable and more maintainable code it is recommended not to overlook these activities:

- project management documentation;
- automatic code documentation;
- static code analysis;
- coverage analysis and documentation;
- continuous deployment and test.

These activities can be carried out with different tools: it is up to third parties the final decision about specific tools to use, also on the basis of their background and experience.

In any case, a preferred best practice is to rely first on Github integrated features, as the **project management documentation**, as done by CopyrightLY¹⁵ and **continuous deployment**¹⁶.

The **static code analysis** can be typically tuned according to different level of accuracy suitable for the appropriate context. An example of such analyzer is the Swagger analyzer/validator for which parses the api code giving a first level check for static errors in such code¹⁷.

Moreover, as an example of **code documentation**, included APIs, we can mention the project ECOS, which used Docusaurus¹⁸, and Mkdocs¹⁹ and moreover Redocly²⁰) for API documentation.

¹⁵<https://github.com/rhizomik/copyrightly/projects/1>

¹⁶<https://docs.github.com/en/actions/deployment/about-deployments/about-continuous-deployment>

¹⁷<https://apitools.dev/swagger-parser/docs/>

¹⁸<https://docusaurus.io/>

¹⁹<https://www.mkdocs.org/>

²⁰<https://github.com/Redocly/redoc>

4 CONCLUSIONS

The project ONTOCHAIN in the first two calls so far concluded has selected and coached 30 technology projects, framed into the ONTOCHAIN architecture, whose results are presently available on the ONTOCHAIN GitHub repository, at <https://github.com/ONTOCHAIN>

The best practices emerging from the coaching activities so far, as in the project and software documentation and in continuous testing and deployment, have to be followed and even improved also in the present call and in eventual future extensions in order to have easier to reuse and maintain solutions.

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