


Tailored IoT & BigData Sandboxes and Testbeds for Smart,
Autonomous and Personalized Services in the European
Finance and Insurance Services Ecosystem



D9.7 – Contributions to Standards,
Associations and Clusters - II

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[2] Can be left void

Executive Summary

The purposes of Standardization have been expanded since the Industrial Revolution times as tools to support the mass production to become a wider source of innovation generation [1]. Furthermore, standardization plays a double role fostering the dissemination of pure research activities of the Horizon 2020 projects and encouraging innovations from a more industrial point of view.

Stakeholders engagement is a key objective for the consortium, activities such as standardization paves the way for the integration of relevant stakeholders into the INFINITECH way through different actions, as it is also stated in D9.15 [2]: “the INFINITECH Way, ...” involve stakeholders and real end users in the loop to refine the strategy and to provide the early feedback to tune the competitive advantage.” Through the standardization’s activities undertaken in the project, the consortium has been able of establishing valuable links with relevant actors in the standardization, technical and financial arena such us ISO, IEEE, BDVA, EBF. These activities have been reported in section 3 Reporting of Activities of this document under the title of “Activities M16-M27” where the activities undertaken in each INFINITECH’ stakeholder entity are detailed.

As it was stated in D9.6[3] the “INFINITECH standardization areas cover the standardisation landscape with regards to BigData, Internet of Things (hereinafter IoT) and artificial intelligence (hereinafter AI) technologies for the finance and insurance sectors.”

The main standardisation contributions during this period have been:

- Collaborate with the Big data value association (BDVA) through the INFINITECH Reference Architecture and leading TF7.SG1o “Big Data and AI for the Financial Sector”
- Dialogue with the European Banking Federation about AI and regulations.
- Formalize the affiliation with ISO/IEC SC27 and particularly to ISO/IEC WD 27559 (answer pending).
- Contributions to the FIWARE Foundation SmartDataModels from ETSI Standard NG ETSI NGSI-LD (V1.5.1 [4]).
- Participate in the European Banking Authority (EBA) Experts Discussion Forum
- Monitor and investigate the potential collaboration with the standard P2957 - Standard for a Reference Architecture for Big Data Governance and Metadata Management [5]
- Participate in AMF events to carry out regulatory monitoring activities and to identify potential collaboration with INFINITECH.
- Attends meetings in the AIOTI platform and introduce the project in the AIOTI working groups

Furthermore, the consortium also has devoted attention to be compliance with different standards and on providing open APIS, which will favour the INFINITECH adoption.

Standardization activities will continue until the end of the project when consolidated results will be shown, also the activities and outputs of these activities should continue beyond the INFINTIECH project.

Note: This deliverable is an update of D9.6[3], complete sections of D9.6 has been included in this deliverable to provide context with regard to the standardization plan and standardization objectives, so Section 2 has not been updated, in section 3 a sub-section “activities M16-M27” has been added per each subchapter. To finalize sections 4 5 have been created specifically for this deliverable.

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Abbreviations/Acronyms

Abbreviation Definition

ACPR	The Prudential Control and Resolution Authority
AI	Artificial intelligence
AIOTI	Alliance for Internet of Things Innovation
AMF	Financial Markets Authority
AML/CFT	Anti-money laundering and combating the financing of terrorism
AMLD	Anti-money Laundering Directives
AMLR	Anti-money Laundering Regulation
API	Application programming interface
BDVA	Big data value association
BDGMM	BigData Governance and Metadata Management
CEN	The European Committee for Standardization
CENELEC	The European Committee for Electrotechnical Standardization
DAIRO	Data AI and Robotics
DLT	Distributed Ledger Technology
DoA	Description of Action
EBA	European Banking Authority
EBF	European Banking Federation
EBP	European Blockchain Membership Partnership
EBSI	European Blockchain Services Infrastructure
EC	European Commission
ECB	European Central Bank
EDMC	Enterprise Data Management Council
EIPs	Ethereum Improvement Proposals
ETSI	European Telecommunications Standards Institute
FATF	Financial Action Task Force
FIBO	Financial Industry Business Ontology
FIC	FinTech, Innovation and Competitiveness
FIGI	Financial Instrument Global Identifier
fintech	financial technology
IAD	The Information Access Division within NIST
IEEE	Institute of Electrical and Electronics Engineers
IEEE SA	IEEE Standards Association
IoT	Internet of things
ISO	the International Organization for Standardization
LKIF	Legal Knowledge Interchange Format
MoU	Memorandum of Understanding
NGSI	Next Generation Service Interfaces
NGSI-LD	Next Generation Service Interfaces Linked Data
NIST	the National Institute of Standards and Technology
OECD	Organisation for Economic Co-operation and Development

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OMG	Object Management Group
OWL	Web Ontology Language
PAMLS	Platform for AML supervision
TREC	Text REtrieval Conference
URI	Uniform Resource Identifier
W3C	World Wide Web Consortium
WG	Working Group

1 Introduction

1.1 Objective of the Deliverable

This deliverable is the second iteration under the scope of T9.2: Standardization and Clustering. The current deliverable is an update of the deliverable “D9.6 Contributions to Standards, Associations and Clusters I” [6] in which the activities undertaken during the period M16-M27 have been included. D9.6 elaborated the initial plan for the project’s contribution to relevant standards and clusters, besides that a report of the activities conducted from M1 to M15 to implement the plan was included, so in this new version, D9.7, the activities undertaken from M16-M27 are detailed. There will be new updates of the plan and standardisation activities in the final deliverable: D9.8 (M39- December 2022).

1.2 Insights from other Tasks and Deliverables

Standardisation is a manner to maximise the project’s impact beyond the consortium, disseminating and facilitating further use of their results to the industry and society. “Effective ICT standards enable different services to work together while promoting differentiation that facilitates competition and innovation” [7]

The standardisation ecosystem is a wide network of experts, companies, research institutes and organizations that extends from the national to the European and international environment. The project’s involvement in these networks will provide a rapid and wide visibility to a qualified audience, allowing the sharing of information and knowledge. T9.2 is therefore very much related to T9.1: Dissemination and Communication Activities and T9.3: Community and Ecosystem Building, designed to create awareness on project results towards stakeholders. Besides, T9.2 is linked with T9.4: Business and Exploitation Planning, as the inclusion of the project’s results into new standards will facilitate that they can be accessed, accepted and used by all market and societal stakeholders, even beyond the project.

T9.2 is also related to the technical tasks of the project, since one of the main benefits of standardisation activities is to enable technological cooperation. Standards are a source of conceptual knowledge and permits the access to state-of-the-art in the different fields. In fact, the work in T9.2 is coordinated by project partner ATOS as task leader but driven by technical partners with active presence or knowledge in the respective standards development organizations and associations. Technical partners are considering existing standards to ensure compatibility and interoperability with current methods in their project’s activities and, at the same time, are identifying under development standards that can be supported by the different project’s tasks.

1.3 Significant changes since the previous deliverable D9.6

The current deliverable D9.7 is an update of D9.6[3]. Therefore, complete sections of D9.6 has been included in this deliverable to provide context with regard to the standardization plan and standardization objectives, so Section 2 has not been updated and remains unchanged, in the section 3 a sub-section “activities M16-M27” has been added per each subchapter with the main goal of reporting the standardization activities undertaken during the mentioned period. To finalize, section 4 and section 5 have been created specifically for this deliverable.

1.4 Structure

The deliverable has been organized in the following way, it should be highlighted that this deliverable is an update of the previous deliverable D9.6 [6] , so the previous sections are available.

- Chapter one is dedicated to the introduction, setting the context of the deliverable, and related task T9.2, into the general project overview. This chapter was delivered in D9.6.
- Chapter two introduces the standardisation plan that the project is following. This chapter was delivered in D9.6.
- Chapter three is devoted to report the activities conducted in the two periods: M15 (December 2020) and the reported period M16-27 (December 2021). Only the reported period M16-27 has incorporated in this deliverable.
- Chapter four explained how INFINITECH is compliant with well-known standards. This chapter has been created totally new for this deliverable.
- Finally, chapter five summarize the findings and activities conducted during the period. This chapter has been created for this deliverable.

2 Plan for contribution to Standards, Associations and Clusters

T9.2: Standardization and Clustering aims at engaging, to the extent possible, with standardisation bodies / groups of interest, and their respective working groups, with the goal of contributing to their standardisation efforts and activities. INFINITECH's input can be valuable for them as it is developing new technologies and solutions, both at research and commercial exploitation levels.

At the beginning of the project, ATOS, as Task leader, drafted a plan for monitoring relevant standardization bodies and groups of interest and contribute to ongoing specifications. The plan was communicated to the partners in January 2020 and referred to at every consortium meeting since then. INFINITECH Standardisation plan entails three different steps: (1) identification, (2) analysis and (3) action. It will be evaluated annually and updated if necessary. All actions conducted to follow the plan will be included in an annual reporting (D9.6, D9.7 and D9.8).

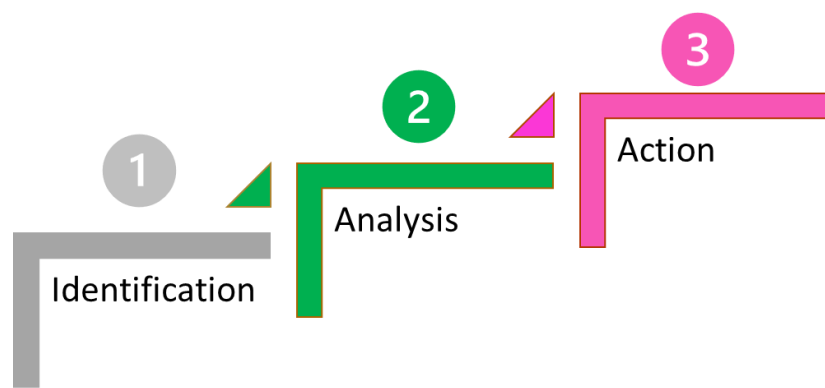


Figure 1 INFINITECH Standardisation Plan

2.1 Step 1: Identification

INFINITECH partners are adopting, where possible, standards that are relevant to the project to support previous innovation efforts and contribute to reinforcing existing standards. Partners are also aware that the use of standards ensures the comparability, compatibility and interoperability of products, services and systems and this, in turn, helps develop new markets and achieve economic growth. At the same time, adopting existing standards involves a critical revision that helps finding gaps and reveals where support for on-going standardisation activities would be useful. Moreover, partners are also willing to report on those research areas that INFINITECH is involved in where no relevant standardisation activity exists, so the initiation of a new standardisation effort would be necessary.

During proposal time and based on the expected innovations to be delivered along the project lifetime, INFINITECH consortium identified a preliminary list of standardization bodies of interest. Building on this list, that can be consulted in the DoA, partners were asked to review and update this information at the beginning of the project. For collection of this info a collaborative excel document was designed, with the following structure:

- INFINITECH Partner reporting.
- Specific research result. Why is the result relevant to standardisation? indicate also task/s related and approx. date for the result to be ready.
- Are there related national, European or international standards under development?
- Standardisation / industry fora at different levels:
 - National.

- European (CEN/CENELEC/ETSI).
- international (ISO/IEC/ITU).
- Other.
- Has a relevant technical committee (TC) been identified?
- What would be the best way to contribute? Partners involved?
- Action plan
- Follow up, indicating date
- Comments

This standardisation collaborative excel should be based on achievements observed along project execution, for this reason, it is a live document that can be updated anytime as new opportunities are identified. Regularly, T9.2 leader reminds the partners of the purpose of the excel sheet and the need to keep the information up to date and as accurate as possible, as it is the starting point for the task leader to engage with the relevant partners and discuss the way to proceed.

2.2 Step 2: Analysis

For the research areas where no relevant standards exist, this analysis phase aims to determine how realistic or feasible it is to expect standardisation activities initiated from INFINITECH project, as the standardisation process requires thorough discussions and broad consensus that usually take longer than the length of research projects.

For this reason, rather than launching or proposing new standards from INFINITECH, the consortium's aim is to join existing standardisation initiatives, providing input and participating in the discussions to assist in the elaboration of better standards. When a new opportunity for contribution is identified, the task leader, together with the involved partner/s, analyses it considering the relevance for the project, the complexity of process to follow and the partner's interest itself.

2.3 Step 3: Action - short list

The task leader identifies the most relevant opportunities and focuses on the most promising ones, agreeing with the partner the path to follow, the activities to perform and milestones that allow to evaluate efforts.

3 Reporting of Activities

INFINITECH partners have identified several initiatives where they see a possible connection with the project's activities, that are developing and validating BigData, IoT and AI technologies for the finance and insurance sectors. The pertinent existing standards and standardisation activities are being analysed to identify gaps, where support for on-going standardisation activities would be useful.

3.1 INFINITECH-related technologies

3.1.1 INFINITECH RA

INFINITECH project aims at boosting two de-facto standards for the use of BigData in the financial sector, namely the INFINITECH-RA and the notion of a standardized BigData & AI sandbox in digital finance. *The project designs and implements a range of pilots and use cases that aim at validating these technologies in real-life scenarios of the sectors* [8]. One of the main objectives of the project is *to define a reference architecture (INFINITECH-RA), which will serve as a blueprint for developing, deploying and operating BigData, AI and IoT* [9] in the mentioned sectors.

The reference architecture defines the structuring principles of general class of solutions, along with fundamental building blocks. Likewise, *the INFINITECH-RA will facilitate stakeholders' communications regarding BigData, AI and IoT systems for the finance and insurance sector, through providing a uniform set of terms and definitions that will be unambiguously understandable by stakeholders* [9].

INFINITECH RA is inspired and follows the BDVA Reference Model and aspires to become the counterpart in the financial/insurance sectors of the data-driven use cases. The project has the ambition to propose the RA as a de-facto standard in the sector. Efforts will be undertaken to promote the RA among relevant stakeholders (e.g.: banks, central banks, financial institutions, etc.)

INFINITECH consortium is participating actively in the BDVA workshops attending and presenting the RA concepts.

A white paper was prepared which quotes explicitly the project and the RA was submitted to BDVA/DAIRO association and is now under evaluation.

Objective: propose INFINITECH-RA as de-facto standard for the finance and insurance sectors

Initial plan: participate actively in BDVA workshops attending and presenting INFINITECH-RA concepts, whitepaper for BDVA describing INFINITECH-RA, dissemination activities related

Partner leading: GFT

3.1.1.1 Activities M16-27

GFT is the Leader of the Task Force TF7.SG10 "Big Data and AI for the Financial Sector" within BDVA/DAIRO. ABILAB is the Co-Leader. One of the main objectives of the task force is to deliver whitepapers highlighting challenges and opportunities in the verticals as a collaborative work with the BDVA community.

The Whitepaper "Big Data and AI for the Financial Sector: challenges and opportunities" edited by GFT. The paper contains relevant information related to INFINITECH. Specifically, Section 3.2 "Deployment of applications and real-life scenario recommendations" discusses INFINITECH and its Reference Architecture. The paper is currently (end of 2021) under review of BDVA and shall be delivered during Q1 2022, with some delays on the previously foreseen publication date.

- White Paper with RA sent to BDVA waiting for their feedback

3.1.2 Artificial intelligence

With specific reference to the notion of a standardized BigData & AI sandbox in digital finance, it should be important to consider the last steps of the initiative that the European Commission (hereinafter EC) put forward, in relation to the definition of a European approach to AI and robotics.

One important step is the appointment of a High-Level Expert Group on Artificial Intelligence [10] (AI HLEG): a group of 52 experts to advise for its implementation. The AI HLEG has developed two main deliverables:

- Ethics guidelines for trustworthy AI [11] (2019): a document where the lack of regulatory oversight is mentioned, concretely within the chapter “Implementation challenges”, and within the chapter “Possible further EU action” also standardization is foreseen. The document puts forward a set of key requirements that AI should meet to be considered trustworthy. In addition, a specific assessment list was built (Assessment List for Trustworthy AI – ALTAI) that aims to help verify each of the key requirements.
- Policy and Investment Recommendations for Trustworthy AI [12] (April 2019): analysing the international landscape regarding key markets and investments for AI, the document makes recommendations to maximise the extent to which Europe can benefit from the AI opportunities, while simultaneously ensuring that these benefits are felt throughout the entire European society, and that any risks are prevented or minimised.

At a subsequent stage, in February 2020, the EC published two important deliverables.

- White paper on Artificial Intelligence - A European approach to excellence and trust [13]: aims at discussing policy options to enable a trustworthy and secure development of AI in Europe, in full respect of the values and rights of EU citizens.
- Report on the safety and liability implications of Artificial Intelligence, the Internet of Things and robotics [14]: provides overall indications to ensure that all products and services, including those integrating emerging digital technologies, operate safely, reliably and consistently and that damage having occurred is remedied efficiently.

Also, in 2019-2020 there were several other initiatives to establish the AI policy framework (see deliverable D2.8: Security and Regulatory Compliance Specifications - II [15] for detailed information). To only mention some:

- OECD with the publication “The Impact of BigData and Artificial Intelligence (AI) in the Insurance Sector” [16] (2020).
- The European Banking Authority (EBA) with the report “Artificial Intelligence in the era of Open Banking” [17], explaining how to put into practice collaborative use cases for AI.

Besides, the standardization organizations are working on this topic, for example, the Institute of Electrical and Electronics Engineers (hereinafter IEEE), which in 2019 published the framework "Ethically aligned design. A vision for prioritizing human well-being with autonomous and intelligent systems" [18]. Another interesting publication worth mentioning is the “Companion to the Model AI Governance Framework - Implementation and Self-Assessment Guide for Organizations" [19], published from the World Economic Forum in 2020.

Furthermore, when the finance/insurance sector is deploying new technological solutions like AI, EBA pointed out in their “Report on BigData and Advanced Analytics: Steps for effective Advanced Analytics governance” [20] (2020), that financial institutions, which deploy AI solutions, are accountable for their results, even though those AI models were developed by a 3rd party.

Therefore, it is crucial that financial institutions have a comprehensive view of deployed AI solutions because in these days, we are facing more and more obstacles in legal and regulatory constraints regarding data gathering and data analytics and a balance between privacy, security and usability needs to be found.

Even though the regulatory environment concerning AI is still in an evolutionary stage, it is important to take as a reference the deliverables that the EC has developed so far, gradually acquiring consciousness about the capability of AI systems, their potential value, their risks and their peculiarities compared to other technological options. In INFINITECH, we believe that we can contribute to this regulatory environment. In addition, to take into consideration the position on which the European regulatory authorities are gradually converging, it will be important to develop a risk-based approach considering the specific context of application of AI, and the specific applications that may be developed. Of course, maintaining a human oversight on the overall process and keeping the liability framework clear.

INFINITECH partners ABI Lab and JSI, as experts in AI field, are monitoring the AI policy framework to identify collaboration opportunities for the project. In general, when a new consultation about AI comes out, INFINITECH partner ABI Lab works in synergy with the European Banking Federation (hereinafter EBF) to provide a response. In order to collect a more effective response, ABI Lab will inform the INFINITECH community if there will be new upcoming consultations from the EC about AI, so this community could contribute in providing comments that ABI Lab may transfer to the EBF. Additionally, in order to help financial institutions to implement trustworthy and auditable AI solutions, INFINITECH partner JSI could help with the preparation of guidelines for AI certification and concretize them with a template, building upon INFINITECH pilots (also mentioned in D2.8).

Objective: contribute to AI regulatory environment

Initial plan: Monitor EU consultations about AI in finance and collect input from the INFINITECH community to elaborate a response for the EBF. Preparation of guidelines for AI certification and implement them with the help of a template. Develop a risk-based approach considering the specific context of application of AI, and the specific applications that may be developed.

Partners involved: ABILAB, JSI

3.1.2.1 Activities M16-27

In order to monitor the Regulatory developments about AI, ABI Lab will continue its dialogue with the European Banking Federation focusing on the Proposal for a Regulation on Artificial Intelligence (the so-called AI Act) that the EC has recently published.

In order to identify a common understanding of the main issues that may characterize the future scenario, ABI Lab will formalize and transfer to EBF a list of key-points and suggested amendments, representing the position of the European Banks on the proposed Regulation.

3.1.3 Blockchain

Over a decade has passed since the emergence of Bitcoin first demonstrated how blockchain technology could be used to implement a crypto currency that operated in a decentralized and trustless way. A decade of blockchain research and development, mostly in the form of open works and source codes, led to the creation of several highly valued blockchain networks that now routinely store and transfer billions of euros worth of assets all over the world every day. Development of Ethereum blockchain, that supported Turing-complete programmability further, enabled programs called smart contracts to be deployed and to be operated in an autonomous manner by crowds. These in turn are creating opportunities for developing innovative decentralized applications (DApps) for educational institutions, governmental agencies and diverse industries such as finance, banking, energy, agriculture, healthcare and automotive.

Recognizing the disruptive potential of blockchain technologies, the EC has come up with a blockchain strategy [21] whose most significant elements are summarized in Table 1. The recent EC Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937 dated September 24, 2020 [22] also states that it *supports a holistic approach to blockchain and Distributed Ledger Technology (hereinafter DLT), which aims at positioning Europe at the forefront of blockchain innovation and uptake.*

Table 1 List of most significant elements of the EC blockchain strategy

1	Developing joint visions and initiatives
2	Building a pan-European government services blockchain
3	Promoting legal certainty
4	Increasing funding for blockchain innovation
5	Supporting interoperability and standards
6	Supporting blockchain skills development
7	Interacting with the community

The EC blockchain strategy elements numbered 2, 3, and 5 in Table 1 are relevant to the work carried out in INFINITECH project. With respect to strategy element 5, blockchain work carried out in WP4 and the pilots should strive to support interoperability and standards.

Interoperability problem is studied from a theoretical perspective in [23] which states that cross blockchain trustless interoperability in the general context remains an open problem but can be solved in some cases like atomic exchanges and hash-locking [24]. When a software tool is developed, interoperability can also be defined as a characteristic of the tool that enables it to work with other systems. Since software tools are developed in the INFINITECH project, these tools can be designed to work on multiple systems. In the case of tools that analyse blockchain transaction data, this means an ability to work on transaction data coming from multiple blockchains. This can be addressed, for example, by putting the raw transaction data coming from different chains into a common format and letting the tool operate on the common format. Such is the approach taken in Pilot #9 which aims at building a blockchain transaction graph analysis system.

When deciding on what blockchain infrastructures to deploy and operate within INFINITECH project, one can consider aligning with EC blockchain strategy element numbered 2 in Table 1 that proposes building of a pan-European government services blockchain and support the systems that are to be used on government services. Such an approach will have the advantage that whatever blockchain financial technology (hereinafter fintech) tools are developed, then they will be ready to be used on governmental blockchains. This is in particular very important for fintech tools since they need to do reporting to regulatory agencies in governments. At this point blockchain protocols used on the European Blockchain Services Infrastructure (hereinafter EBSI) [25] should be considered and deployed in INFINITECH project. For EBSI V1, (i) Ethereum Enterprise with the Hyperledger Besu Client and (ii) Hyperledger Fabric have been selected by a process governed by European Blockchain Membership Partnership (hereinafter EBP) [26].

Strategy Element 2 is also important, because with this strategy, the EC *“is proposing a comprehensive pro-innovation legal framework in the areas of digital assets and smart contracts”*. Considering that tokenization and smart contracts are covered in WP4 Task 4.4, existing token and smart contract standards can be augmented with additional functionality to satisfy the needs of regulated environments. New contract standards can also be defined and coded to address regulated environments.

Token smart contracts are mission critical software. If not carefully designed, developed, verified and audited, mission critical software, especially in finance, may lead to catastrophic financial losses if they fail or do not correctly function. The fact that smart contracts may operate autonomously on blockchain, may also mean that one cannot simply stop or interfere if there are problems. For this reason, it is important that:

1. Blockchain standards such as those published by the Ethereum community, and the IEEE and ISO organizations can be used. These are summarized in Table 2.
2. The source codes of token smart contracts are open sourced so that they can be reviewed by the wider public. The higher the publicity of a token smart contract is, the higher its value and impact can be. Storing value in a token smart contract whose code is only known by a few is very risky and should be avoided.
3. Automated tools, as well as auditing processes, are employed to verify smart contracts.

These practices should be employed within INFINITECH project and can also be standardized. INFINITECH partner BOUN is a member of IEEE Blockchain Community and is following the Ethereum Forum [27] to be able to propose Ethereum Improvement Proposals (hereinafter EIPs) based on INFINITECH results. For example, the work of Ethereum Trust Alliance [28] is quite relevant because they are looking into smart contract audit, verifiability, rating, correctness: in INFINITECH, if smart contracts are developed, they should go through correctness checks and auditability. Especially in the field of finance, since smart contracts (e.g. tokens) can store massive value (millions of euros), it is important that they are open and go through verification and audits.

Table 2 List of blockchain standards that are developed or are under development by various entities

Organization / Community	Standard No.	Title	Status
Ethereum [29]	ERC20	Token Standard	final
	ERC721	Non-Fungible Token Standard	final
	ERC777	Token Standard	final
	ERC1155	Multi Token Standard	final
	ERC1363	Payable Token	final
	Besides the above token contracts, there are several other standards on topics such as wallet, contract packaging, interface detection, ethereum domain name service, checksum address encoding, proxy contract, registry contract, consecutive transfer extension.		
IEEE [30]	P2140.1	Standard for General Requirements for Cryptocurrency Exchanges	2020-11-04 (published)
	2140.5-2020	IEEE Standard for a Custodian Framework of Cryptocurrency	2020-07-17 (published)
	2143.1-2020	IEEE Standard for General Process of Cryptocurrency Payment	2020-06-12 (published)
	2144.1-2020	Framework of Blockchain-based Internet of Things (IoT) Data Management	2020-12-03 (approved)
	2418.2-2020	Data Format for Blockchain Systems	2020-03-05 (approved)
	56 IEEE active standards projects on topics such as cryptocurrency, digital assets, identity, exchanges, interoperability, finance, cryptocurrency and token custodian, anti-money laundering, anti-corruption, electronic contracts, e-commerce, IoT, agriculture, connected and autonomous vehicles, government, governance, healthcare, payments, transforming enterprise information systems, life sciences, social sciences, risk, pandemic/epidemic surveillance, household appliance customer data assetization, energy, data management/trading/format, supply chain finance, testing specification, electronic evidence.		
ISO [31]	ISO 22739:2020	Blockchain and distributed ledger technologies – Vocabulary	2020-07 (published)

	ISO/TR 23244:2020	Blockchain and distributed ledger technologies — Privacy and personally identifiable information protection considerations	2020-05 (published)
	ISO/TR 23455:2019	Blockchain and distributed ledger technologies — Overview of and interactions between smart contracts in blockchain and distributed ledger technology systems	2019-09 (published)
	ISO/TR 23576:2020	Blockchain and distributed ledger technologies — Security management of digital asset custodians	2020-12 (published)
	ISO has 11 Blockchain and distributed ledger technologies series of standards under development. These are titled: (i) Use cases, (ii) Identifiers of subjects and objects for the design of blockchain systems, (iii) Data flow model for blockchain and DLT use cases, (iv) Vocabulary (revised), (v) Overview of existing DLT systems for identity management, (vi) Reference architecture, (vii) Taxonomy and Ontology, (viii) Legally binding smart contracts, (ix) Guidelines for governance, (x) Overview of smart contract security good practice and issues, (xi) Overview of trust anchors for DLT-based identity management (TADIM).		

Objective: align with EU blockchain strategy

Initial plan: carry out activities that confirm to blockchain standards available or standards that are being developed/planned. Monitor Ethereum Ecosystem and joining EU events on blockchain standardisation.

Partner leading: BOUN

INFINITECH has been invited to a series of Roundtables “ICT Verticals and Horizontals for Blockchain Standardisation” [32] to present the work done and explore more active involvement into activities of blockchain standardization bodies. A thematic discussion involving vertical and horizontal sectors has been done and will be done every two weeks. The topics discussed in the series of different workshops were as follows:

- Fintech, Digital Assets and Smart Grids (11 Nov 2020).
- Digital Society, Identity and Privacy (25 Nov 2020).
- Digital Economy, SME's, Industry and Supply chains (9 Dec 2020).
- Cybersecurity (13 Jan 2021).
- IoT (27 Jan 2021).
- eHealth (10 Feb 2021).
- Future Internet, Media and BigData (24 Feb 2021).

For Fintech, the “Digital Assets and Smart Grids” group is composed by INFINITECH partners GFT, IBM, GLA and UBI.

INFINITECH’s representatives had the opportunity to contribute and present the project during the roundtable discussion highlighting how the project is utilizing blockchain technologies and how they bring innovation and impact.

Objective: align with EU blockchain strategy

Initial plan: Participation in the roundtables “ICT Verticals and Horizontals for Blockchain Standardisation” to identify opportunities

Partners involved: GFT, IBM, GLA, UBI

3.1.3.1 Activities M16-27

No further updates during this period.

3.2 Ontologies and Data Models

Ontologies define the vocabulary to have a common understanding of a certain domain knowledge. They are used to specify common modelling representations of data from heterogeneous systems and databases, enabling database interoperability, cross-database search and knowledge management.

Through its pilots, INFINITECH project is analysing the related ontologies and data models to understand a possible path for contribution.

3.2.1 Financial sector ontologies and reference models

Targeted standards (What?):

The Financial Instrument Global Identifier (hereinafter FIGI [33]) is an established global standard issued under the guidelines of the Object Management Group (hereinafter OMG [34]). It is a 12 character, alphanumeric, randomly generated ID covering hundreds of millions of active and inactive financial instruments. In total, there are over 300 trillion potential identifiers available. The identifier itself acts as a Uniform Resource Identifier (hereinafter URI) to link to a set of metadata that uniquely and clearly describes the instrument. This method of constructing symbols was chosen to satisfy most of the client feedback, which demonstrated the need for a random sequence that produces a unique, non-changing symbol. The FIGI symbology refers to more than a code – it is a methodology and a system for defining financial instruments while specifying its fundamental structure in terms of related concepts and relationships.

FIGI closes the gap in existing symbology systems. Providing coverage across all global asset classes, real-time availability, and flexibility for use in multiple functions, firms can tie together disparate and fragmented symbology's, eliminate redundant mapping processes, streamline the trade workflow and reduce operational risk. FIGI also fills in the gap for asset classes that do not normally have a global identifier, including loans, futures and options.

Financial instruments are an essential part of the INFINITECH platform, however, due to the number of pilots, it is necessary to provide a unique and standardized way to consistently identify them. This is part of WP4 and specifically tasks 4.1 and 4.2. We need to understand which pilots align with this approach and give more detailed information in next versions of the deliverable.

The Financial Industry Business Ontology (hereinafter FIBO [35]) defines the sets of things and/or concepts that are of interest in the financial business domain and related applications together with the way those things/concepts can relate to one another. In this way, FIBO can give meaning to any data (e.g., spreadsheets, relational databases, XML documents) that describe the business of finance.

FIBO is hosted and sponsored by the Enterprise Data Management Council (hereinafter EDMC) and is published in several formats for operating use and business definitions. FIBO is a trademark of EDMC. It is also standardized by the Object Management Group (hereinafter OMG).

FIBO is developed as an ontology in the Web Ontology Language (hereinafter OWL). The language is codified by the World Wide Web Consortium (hereinafter W3C), and it is based on description logic. The use of logic ensures that each FIBO concept is framed in a way that is unambiguous and that is readable both by humans and machines. FIBO is implemented using a modular approach allowing the use of the very necessary set of things/concepts for the specific application.

The FIBO development process follows rigorous and well-defined rules and principles that can be accessed and retrieved [36]. Actually, the FIBO community group is interesting for INFINITECH since it is the endpoint and the ultimate decision maker for any changes and/or extension to FIBO. A GitHub repository is the main platform for them to discuss and prepare any update to FIBO. In this scenario, INFINITECH's pilots in general, and pilot's datasets, provide a fundamental test bed for FIBO ontology validation, i.e., to verify if the actual FIBO defined things/concepts properly describe the different INFINITECH's application scenarios in the financial sector.

The European project for Standardized Transparent Representations to Extend Legal Accessibility Estrella [37] aimed to develop and validate an open, standards-based platform allowing public administrations to develop and deploy comprehensive legal knowledge management solutions, without becoming dependent on proprietary products of particular vendors. Estrella supported, in a totally integrated way, both legal document management and legal knowledge-based systems, to provide a complete solution for improving the quality and efficiency of the determinative processes of public administration requiring the application of complex legislation and other legal sources. Estrella facilitates the definition of a market of interoperable components for legal knowledge-based systems, allowing public administrations and other users to freely choose among competing development environments, inference engines, and other tools. The main technical objectives of the Estrella project are to develop a Legal Knowledge Interchange Format (hereinafter LKIF [38]), building upon emerging XML-based standards of the Semantic Web, including RDF and OWL, and APIs for interacting with legal knowledge-based systems. To achieve and demonstrate vendor neutrality and independence, translators between the LKIF format and the existing proprietary formats of LKBS vendors participating in the project will be developed.

To demonstrate and validate the Estrella platform, European tax related legislation and national tax legislation of two European countries will be modelled and used in the pilot applications. The finance ministries or tax administrations of several other European countries will take part in an observatory board to ensure generality of the approach.

The results of the Estrella project and specifically the LKIF are fundamental for INFINITECH. As a matter of fact, INFINITECH's pilots and related use cases and applications comprise both financial and insurance domains. The latter will for sure have several legal things/concepts that can be easily mapped to LKIF things/concepts. As in the case of FIBO, also for LKIF the INFINITECH's pilots in general and pilot's datasets provide a fundamental test bed for LKIF ontology validation, i.e., to verify if the actual LKIF defined legal concepts properly describe the several INFINITECH's application scenarios in the insurance sector. The procedure for contributing should be the same as in FIBO (contribution by using the actual git repository).

Standards' Interoperability (Why?):

The three ontologies of reference –FIGI, FIBO and LKIF – provide complementary modelling capabilities required for digital finance applications but then also – as duly reported in deliverable D4.1: Semantic Models and Ontologies [39] – exhibit common and overlapping concepts between them. As an example, the *organization* concept is defined in all the three ontologies. The same can be said for the *document* concept, and others.

Therefore, to be able to take advantage of these standards for digital banking & insurance applications, it is required to make these standards interoperable, meaning to know how alike concepts are modelled in each standard and how to interexchange concepts from a given standard to another – i.e.: interoperate. In this respect, INFINITECH partner NUIG has created an INFINITECH-core that is built on top of these ontologies.

Ontologies' Alignment (How?)

Rather than thinking in extending the reference ontologies and/or identifying new things/concepts and relations it is a better approach to create an INFINITECH core ontology that grounds on top of the three reference ontologies. To do that, it is necessary to identify without any reasonable doubt all these commonalities while connecting them in one main model, the so-called INFINITECH core model. The Figure 2 shows this process.

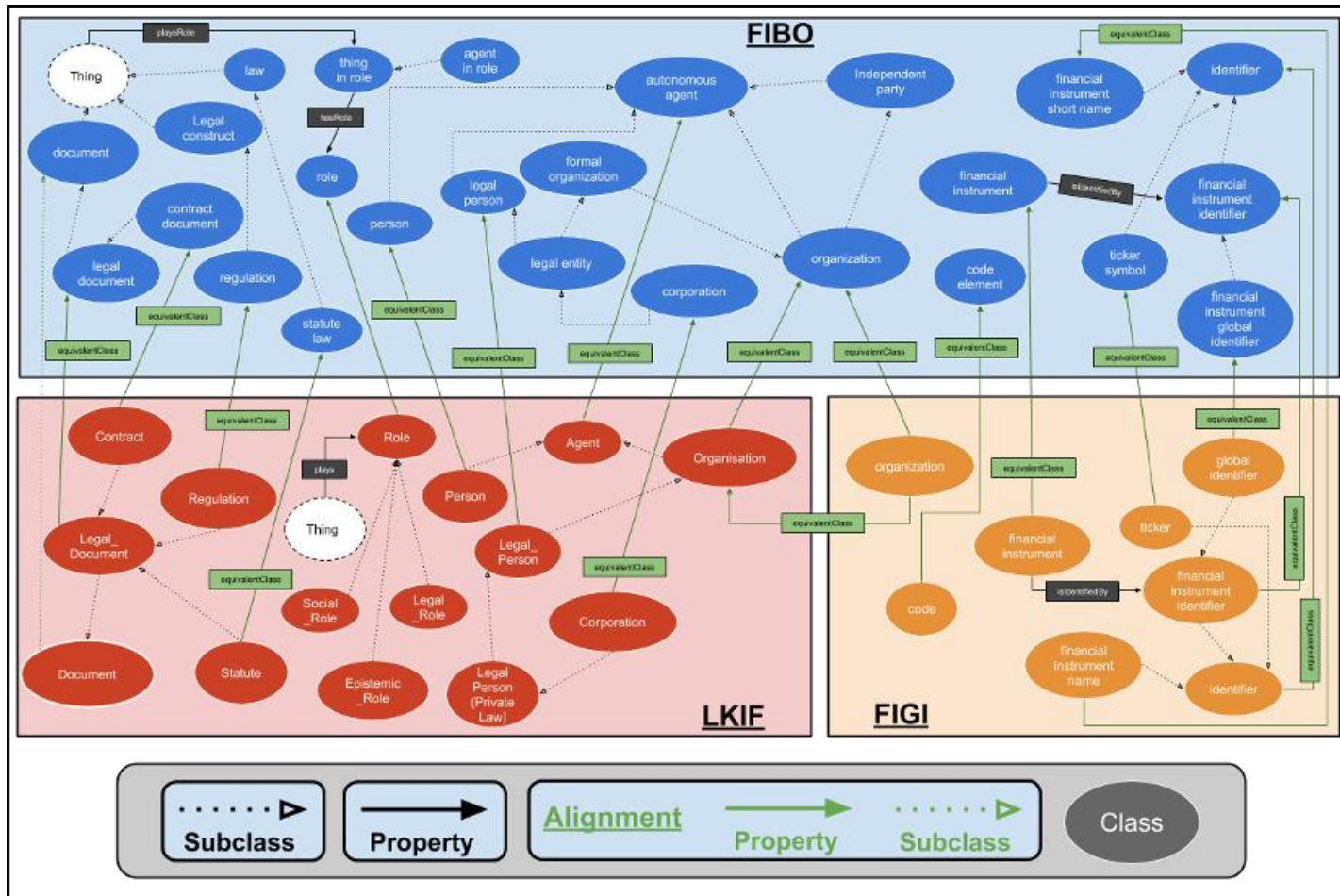


Figure 2 FIBO, LKIF and FIGI Alignment

Objective: make standards interoperable in finance and insurance sectors

Initial plan: watch FIGI, FIBO, LKIF and create INFINITECH core ontology that grounds on top of the three reference ontologies

Partner leading: NUIG

3.2.1.1 Activities M16-27

No further updates during the period.

3.2.2 FIWARE

Within Pilot #11, ATOS is evolving and deploying its Connected Car framework (see deliverable D2.5: Specifications of INFINITECH Technologies – I [40]) to gather, homogenize and store data produced by smart vehicles plus related context information, such as weather information or traffic incidents. This framework relies on FIWARE architecture and is powered by ETSI NGSI-LD standard to manage these datasets. In this line, FIWARE data models [41] are used to map the captured attributes from the different smart entities. These are live schemas that synthesizes devices and entities from real world into JSON-based documents which can be enhanced and improved with expertise from real use cases applications through a protocol defined by the FIWARE foundation [42]. During the first stage of Pilot #11 (first year of INFINITECH), ATOS is compiling the set of attributes for:

- Smart vehicles, using the FIWARE Vehicle data model
- Roads and lanes, using FIWARE Road and RoadSegment respective data models
- Weather information, through the FIWARE WeatherObserved data model
- Traffic incidents, adapting the FIWARE Alert data model

Once all raw data has been classified and mapped on entities' attributes, these data models will be upgraded to be used within the pilot's scope. In parallel, new attributes and modifications on top of the FIWARE baseline will be shared with the FIWARE foundation, according to the previously mentioned procedure, to be evaluated and revisited by the FIWARE experts.

Basically, the plan for these NGSI-LD extensions is to use FIWARE's GitHub and inform the community quality manager, ATOS is well experienced in this procedure. This work will be done during the second stage of the pilot's deployment (second year of INFINITECH project). All new outcomes, in terms of common data models' improvements, approved by the FIWARE foundation will contribute to the expansion of the FIWARE ecosystem, including the use of its core standard NGSI-LD.

Objective: contribute to FIWARE common data models' improvement

Initial plan: extensions of the existing FIWARE data models will be shared with the community, using FIWARE's GitHub and informing the community quality manager

Partner leading: ATOS

3.2.2.1 Activities M16-27

During 2021 the FIWARE Foundation has fostered the development of the ETSI NGSI-LD standard (key protocol within INFINITECH Pilot #11) and so the expansion of the FIWARE common data models. As a result of this, a new version of the ETSI NGSI-LD (V1.5.1 [43]) standard has been released in November (2021) and, directly related to INFINITECH contributions, the Smart Data Model [44] has been started, focused on the usage and standardization of the NGSI-based models. It defines an open and collaborative environment to provide multisector agile standardized free and open-licensed data models, based on actual use cases and open standards. As mentioned, this environment is directly supported by the FIWARE Foundation but other relevant entities in terms of communication and standardization are included, such as TMForum, the India Urban Data Exchange (IUDX), or the Open and Agile Smart Cities (OASC) network.

The Smart Data Models initiative has defined a common process for contributors to define new data models and extend existing ones, based on GitHub Pull-Requests mechanisms (Fig) that enhances the definition, refinement and adaptation of their schemas and nomenclature, improving the adoption of these data models in very different areas like Smart Cities, e-Health, Aeronautics, Robotics or Smart Manufacturing among others.

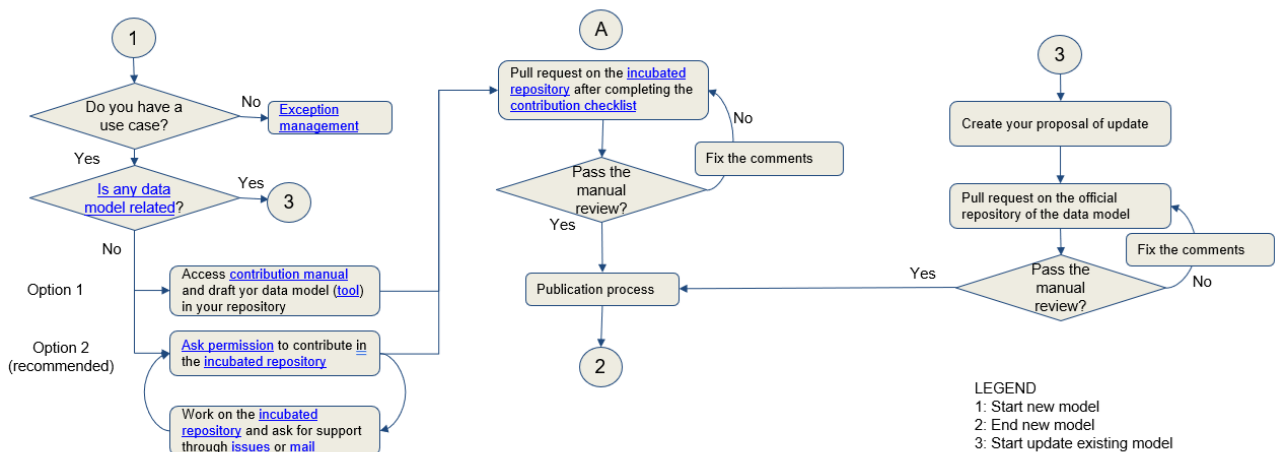


Figure 3 Smart Data Models publication process Source: FIWARE Foundation Smart Data Models

INFINITECH, through its Pilot #11 (Personalized insurance products based on IoT connected vehicles) contributed actively to the Smart Data Models’ transportation [45] branch by working on Vehicle [46] and WeatherObserved [47] data models, and reusing Road [48], RoadSegment [49] and Alert [50] ones for the current SmartFleet platform that supports Pilot #11. These models are used to capture and manage information from CTAG connected vehicles and SUMO (simulated) traffic, Spanish Meteorological Agency and the Directorate General of Traffic in Spain and support the use cases described in WP2.

In this sense, several attributes are under consideration within the Smart Data Models process. These have been provided by the pilot’s connected vehicles and will be added to the standard models:

- TimeInterval
- acceleration
 - lateral_acceleration
 - longitudinal_acceleration
- angle_value
- brake_pressure
- road
- status
 - righth_blinker
 - left_blinker
 - brake_activation
 - emergency_lights

For further expansion of pilot’s Smart Fleet platform, RoadAccident [51]and RestrictedTrafficArea [52] models are currently being analysed to provide a better mapping for traffic incidents.

3.3 Directives and Regulation

All financial institutions (including banks) are regulated based on the directives implied from either the European Union and parliament, or European Central Bank (hereinafter ECB), EBA, or the local central banks or financial compliance authorities in each country. All the general directives (like PSD2, 4AMLD or CTF) are adopted for each country legislation and are mandatory to be followed with some exceptions that are allowed or accepted from the central bank (that represents ECB in each EU country).

The financial regulatory framework has been extensively described in Deliverable D2.7: Security and Regulatory Compliance Specifications – I [53]. In this deliverable, the focus is set on how the project is analysing how to contribute, from the pilots’ results, to new directives or amendment to the existing ones.

3.3.1 AML/CFT and PSD2

The high-profile money laundering scandals in EU financial sector have shown that its anti-money laundering and combating the financing of terrorism (AML/CFT) directive must be strengthened. Moreover, in the communication entitled "Towards better implementation of the EU's anti-money laundering and countering the financing of terrorism framework" [54] EC issued on 24 July 2019, it was noted that as much as 0.7-1.28% of the annual GDP is 'detected as being involved in suspect financial activity'. Therefore, the fight against money laundering and terrorism financing is an important priority for the EU.

Currently EU AML/CFT regulatory framework is based on the Directive (EU) 2015/849 on preventing the use of the financial system for money laundering or terrorist financing [55], which extends and replaces the previous 2007 EU directive, and has been amended in 2018 with the 5th anti-money laundering Directive [56] considering also the recommendations of the Financial Action Task Force (FATF) from 2012. The aim of this directive is to make it harder for criminals to use the financial system through greater scrutiny and transparency of financial transactions and relationships.

To prevent the misuse of the financial system for the purpose of money laundering, the revised AML directive, amongst others, increases transparency of beneficial ownership information, defines new entities that are obliged, applies AML/CFT measures and enhances the cooperation between supervisors. Concretely, the scope of AML directive covers financial institutions ('obliged entities', previously known as 'designated persons') and their clients, including corporates, trusts and other beneficial owners, while areas of focus include risk-based due diligence, national registers of beneficial owners, record-keeping, politically exposed persons and sanctions.

Nevertheless, as was stated from the EC, the regulatory framework needs to keep pace with the increasing integration of financial flows in the internal market, the evolving trends, technological developments and the ingenuity of criminals to exploit any gaps or loopholes in the system.

Recently, on 7th May 2020, the EC adopted an action plan for a comprehensive EU policy on preventing money laundering and terrorism financing built on six pillars:

- **Effective application of EU rules:** EC will continue to monitor closely the implementation of EU rules by Member States to ensure that the national rules are in line with the highest possible standards.
- **A single EU rulebook:** the EC will propose a more harmonised set of rules in the first quarter of 2021.
- **EU-level supervision:** in the first quarter of 2021, the EC will propose to set up an EU-level supervisor.
- **A coordination and support mechanism for Member States' Financial Intelligence Units:** the EU mechanism to help further coordinate and support the work of these units.
- **Enforcing EU-level criminal law provisions and information exchange:** the EC will issue guidance on the role of public-private partnerships to clarify and enhance data sharing.
- **The EU's global role:** the EU is actively involved within the Financial Action Task Force (hereinafter FATF) and on the world stage in shaping international standards in the fight against money laundering and terrorist financing and is determined to step up in its efforts so that it acts as a single global actor in this area.

These six pillars will ensure that EU rules are more harmonised and therefore more effective. These actions on an EU level will also have a great impact on the work of the financial institutions who will have to apply effective and robust AML/CFT controls and on supervisory authorities who will have to strengthen their AML/CFT supervisory framework. Already on these days, supervisory authorities are obliged to comply with EU AML regulatory requirements and implement risk-based supervision that corresponds to extensive use of resources in the supervision department.

Directive (EU) 2015/2366PSD2, for its part, aims to better protect consumers when they pay online, promote the development and use of innovative online and mobile payments such as through open banking, and make cross-border European payment services safer. In November 2017, Commission delegated Regulation (EU) 2018/389 supplemented PSD2 with regard to regulatory technical standards for strong customer

authentication and common and secure open standards of communication. An important element of PSD2 is the requirement for strong customer authentication on the majority of electronic payments. Another important element of the directive is the demand for common and secure communication (CSC): eIDAS-defined qualified certificates are demanded for website authentication and electronic seals used for communication between financial services players. The technical specification ETSI TS 119 495 defines a standard for implementing these requirements.

AML/CFT and PSD2's process to discuss, agree and include an amendment for new versions of each directive is very restricted and lasts several months or years. In INFINITECH, the partner BOS (Bank of Slovenia) is a central bank and may be able to express or request some changes to AML or CTF, operating closer to ECB and EBA and being able to participate in the corresponding workgroups or lobbies where decisions about new directives or amendment to the existing directives are discussed.

Within INFINITECH pilot #8 ambition is to develop a platform that will improve the effectiveness of the existing supervisory activities in the area of AML/CTF. Platform for AML supervision (hereinafter PAMLS) will process and analyse BigData from a wide range of different sources and detect patterns of money laundering/terrorist financing risks using machine learning scenarios. Detected risks from BigData analysis will feed a risk assessment tool and enable supervisory authorities to focus their resources on financial institutions who present higher risk of money laundering and terrorist financing. Within the early phase of the development, the pilot is facing with data availability due to the regulatory restrictions (no direct access to the commercially sensitive raw data of the supervised financial institutions, data privacy laws). Therefore, supervisors need to ensure that they have the necessary legal permissions in place to use data for supervisory purposes.

In line with the above-mentioned challenges at the regulatory level, INFINITECH could contribute to the next versions of the AML/CFT regulation, directive and guidelines. Such contributions could include public consultations published by the EC or European supervisory authorities, cooperation on training events organised by EBA and ECB.

Objective: contribute amendments in PSD2, AMLD, CFT

Initial plan: at the moment, contributions for amendments to the related directives that apply in each pilot, are not foreseen, but it will be investigated and reported in the next version of the deliverable.

Partner leading: BOS

3.3.1.1 Activities M16-27

Following the action plan EC adopted for a comprehensive EU policy on preventing money laundering and terrorism financing, on 20 July 2021, the EC published an ambitious AML/CFT package consisting of four legislative proposals:

- A proposal for an AML/CFT Regulation – **AMLR** [57];
- A proposal for a Regulation establishing a new EU AML/CFT - **AMLA** [58];
- A proposal for a Transfer of Funds Regulation revision to trace transfer of crypto-assets – **FTR** [59]; and
- A proposal for an AML/CFT Directive – **AMLD** [60].

As explained by the EC, heart of the legislative package is the creation of a new EU Authority (AMLA) which will transform AML/CFT supervision in the EU and enhance cooperation among Financial Intelligence Units (FIUs). The Single EU Rulebook for AML/CFT (AMLR and AMLD) will harmonise AML/CFT rules across the EU, including, for example, more detailed rules on Customer Due Diligence, Beneficial Ownership and the powers

and task of supervisors and Financial Intelligence Units (FIUs). The proposed reform will extend these rules to the entire crypto sector, obliging all service providers to conduct due diligence on their customers. In addition, amendments to the FTR will enable better traceability of crypto-asset transfers. [61]

EC presented the AML/CFT package during the Slovenian Presidency of the Council of the European Union who as a co-legislator initiated a comprehensive negotiating procedure with the EC and the Member States. BOS cooperated during the negotiations on an expert level for the Slovene Presidency in the AML/CFT Council Working Parties.

Once the AML/CFT package is adopted, it will have a significant impact on the financial institutions. Therefore, the EBA set up an Experts Discussion Forum to discuss relevant aspects of the EC legislative AML/CFT proposals and its influence on the financial sector. Forum supports the EBA AML Standing Committee (AMLSC) with relevant topics for EBA formal opinion on the AML/CFT legislative package. BOS supervisory experts are members of the forum and AMLSC.

3.4 Standards Organisations

3.4.1 ISO

The International Standards Organization[62] (hereinafter ISO) is an independent, non-governmental international organization with a membership of 165 national standards bodies and 783 technical committees and subcommittees for standards development. Particularly relevant for INFINITECH is the technical committee ISO/IEC JTC 1[63], as it provides the standards approval environment for integrating diverse and complex ICT technologies. JTC 1 is comprised of 22 subcommittees which cover specific technologies. ISO/IEC JTC 1/SC 27[64]: information security, cybersecurity and privacy protection, is responsible for helping to mitigate against the growing problems of cyber risks and attacks, online fraud, information and identity theft, and the breach to personally identifiable information, having 83 ISO standards under development.

INFINITECH partner GRAD is monitoring certain standards related to information privacy aligned with their role in the project, that is the development of a data anonymisation tool, with the idea of reviewing these standards and evaluate the possibility of making technical contributions.

After the identification phase, GRAD concluded that the standard ISO/IEC WD 27559: Privacy enhancing data de-identification framework is the most aligned one. Although in a much more indirect way, they could also contribute to: ISO/IEC FDIS 20547-4: Information technology — BigData reference architecture — Part 4: Security and privacy and ISO/IEC CD 27555: Information security, cybersecurity and privacy protection – Guidelines on personally identifiable information deletion.

Partner ATOS evaluated the possibility to liaise with ISO/IEC JTC 1/SC 27, that is the Technical Committee with direct responsibility for the standard ISO/IEC WD 27559, under development. To this purpose, an email was sent to the Secretariat (held by DIN, German Standards Institute) explaining the potential contribution from INFINITECH. In parallel, as an EU project, INFINITECH could establish a Category C liaison, that is a special type of association reserved for ISO/IEC JTC 1, enabling external organisations to participate in the standardisation processes within an ISO working group. To facilitate the process, ATOS engaged with BDVA TF6.SG6 Standardisation[65], as one of the objectives of this subgroup in TF6 is to provide help to the projects and organisations when they plan to feed their results into the standardisation bodies. Ray Walshe, leading the subgroup, provided the template and some advice to fill in the liaison letter (note: see Appendix B

currently replaced by Appendix A). The consortium will follow SC 27 Secretariat advice and will send the letter to the Chair of the Standards Committee (Dr. Andreas M. Wolf).

Although this type of liaison will not grant INFINITECH the right to vote in the working group decisions, if the liaison is accepted, INFINITECH will be able to participate in the working group meetings, contribute to the ongoing discussions and submit comments to current draft standards as well as submit INFINITECH technical reports and recommendations for new standards, where appropriate.

Objective: contribute to ISO/IEC WD 27559: Privacy enhancing data de-identification framework

Initial plan: follow the guidelines of ISO/IEC JTC 1/SC 27 Secretariat. Prepare a liaison letter to ISO/IEC JTC 1/SC 27.

Partner leading: GRAD

3.4.1.1 Activities M16-27

GFT as coordinator formalized the collaboration with ISO, in November 2021 INFINITECH submitted a liaison to establish a Category C association with ISO/IEC JTC 1/SC 27 WD 27559 in collaboration with ATOS and GRAD. The objective of this liaison is to establish collaboration in the working group, participate in working group meetings, contribute to ongoing discussions and submit comments and review current draft standards. The final version of the letter has been included in Appendix A replacing the initial template.

3.4.2 NIST

The National Institute of Standards and Technology[66] (hereinafter NIST) is a non-regulatory agency of the United States Department of Commerce, primarily concerned with the development of sound methodologies for measuring physical and virtual systems. NIST is divided into divisions, focusing on different broad technology categories. The Information Access Division (hereinafter IAD) is one such division that specialises in complex information access problems from multimedia devices, such as digital video recording systems, iris scanners or document processing systems. Within the IAD, the Retrieval Group facilitates research involving information finding tasks in large, unstructured text collections, whilst also organizing the Text REtrieval Conference (hereinafter TREC) and its proceedings. TREC is a combined conference and evaluation campaign that aims to encourage research into information retrieval technologies from large test collections and has run annually for over 25 years. TREC provides a role in supporting standards creation by defining information access tasks and developing test collections and metrics/evaluation methodologies for those tasks. Researchers and practitioners can then participate in TREC by submitting the output of a system of their own design for one of these tasks. This is evaluated by the TREC organisers through human assessment paid for by NIST. The TREC organisers then analyse how effective the evaluation methodology was, and either refine it for a future year of TREC or if mature, publish their results as a white paper that can be used to inform standards creation.

Within the financial insurance domain that is covered by INFINITECH, one of the emerging challenges is how to more effectively incorporate text streams, such as world-wide news publications, live financial chats and social media discussion forums, to better inform decision making (e.g. buy/sell decisions for assets or recommendation of asset bundles for customers). This involves important challenges, such as mapping financial entities to text discussing them and providing effective real-time search capabilities on-demand for financial analysts. However, how to develop and measure the effectiveness of such systems is currently not well understood. Hence, there is a potential overlap in terms of the goals of NIST (and more precisely its Retrieval Group) and INFINITECH, where TREC might be used to better drive standardization in this area of financial analytics and tooling.

INFINITECH partner GLA is monitoring this Retrieval Group to identify routes to incubate financial evaluation standards via the TREC initiative.

On 19th November 2020, the future planning workshops were held as part of the TREC. One of the tracks that has been green-lit for running in the following year (2021) is the News Track [67]. This track is focused on developing test collections that support the search needs of news readers and news writers in the current fast-paced news environment. TREC News is run in partnership with the Washington Post as data provider, which contributes over 670,000 news articles published between 2012 and 2019.

During this planning workshop, the INFINITECH partner GLA presented a pitch for a new task within the TREC News track, focused on automated real-time construction of concise ‘infoboxes’ for named entities (e.g. companies), by identifying recent salient and diverse content from news streams. The idea here is two-fold. First, by having the TREC community work on this task, new techniques for ranking of news content snippets for entities (that can be finance related) will be developed, pushing forwards the state of the art in this area, while also informing the development of INFINITECH technologies. Second, through the normal TREC process, the development of test collections and evaluation methodologies for this task can be leveraged to inform standardization for finance-focused retrieval systems.

As an outcome from the planning workshops, there was some interest expressed by the TREC community in this task and the organisers of the TREC News track is currently evaluating how such a task might be integrated in TREC 2021.

Objective: explore the possibility for a route to incubate financial evaluation standards via the TREC initiative

Initial plan: make a pitch to the TREC community as part of the TREC News workshop and follow up

Partner leading: GLA

3.4.2.1 Activities M16-27

No further activities during the period.

3.4.3 IEEE

BigData paradigm aims to deal with data sets that are too large and complex. Metadata management regarding BigData is important due to its unique challenges. These challenges include findability, accessibility, interoperability, and reusability between heterogeneous datasets. It is important to have a standard reference architecture for BigData governance and metadata management that is scalable and can enable the findability, accessibility, interoperability, and reusability. In case of Pilot #9, management of datasets is critical because it is using millions of blockchain data.

The IEEE Standards Association (hereinafter IEEE SA) Industry Connections program is helping incubate new standards by facilitating collaboration among organizations and individuals on rapidly changing technologies. IEEE BigData Governance and Metadata Management (BDGMM) group was created jointly by the IEEE BigData Initiative and the IEEE SA [68] and is inviting researchers and practitioners to participate, review, discuss and comment, initiating IEEE standards activities (including recommended practices, guides) related to BigData governance and metadata management.

Objective: contribute to IEEE BigData governance and metadata management

Initial plan: participate in the workshops collocated at IEEE sponsored conferences to share relevant information coming from INFINITECH Pilot #9

Partner leading: AKTIF

3.4.3.1 Activities M16-27

An on-going standardisation activity is identified which can be relevant for Pilot #9. P2957 - Standard for a Reference Architecture for Big Data Governance and Metadata Management [69] aims to define a reference architecture that enables scalability, findability, accessibility, interoperability and reusability of datasets among heterogenous and cross-domain repositories. Pilot #9 is using large amounts of data from different blockchains. Therefore, an architecture that enables interoperability between different blockchains would be useful. Within the next year, it is planned to investigate this activity for potential collaboration. In addition, other events sponsored by IEEE will be continued to be monitored.

3.5 Other Clusters

3.5.1 The Financial Markets Authority (AMF)

The Financial Markets Authority (hereinafter AMF) is a financial institution and an independent French administrative authority created in 2003. Its missions are to oversee the protection of savings invested in financial instruments, investor information and the proper functioning of financial instrument markets. It contributes to the regulation of these markets at European and international levels.

In 2016, the AMF created the FinTech, Innovation and Competitiveness (hereinafter FIC) division with the objective to analyse the innovations underway in the investment services sector and identify the challenges in terms of competitiveness and regulation.

This new division analyses the opportunities and new forms of risk that the regulator and potentially investors must face. It is involved at European level by attending debates and must assess the need to adapt the regulations, or the AMF doctrine, while maintaining a high level of protection for investors. The FIC division is involved in market issues related to international competitiveness. It leads a fintech sector which brings together experts from different AMF departments for topics related to technological innovations. The FIC division has also the role of hosting and regulating innovative projects (in cooperation with the Prudential Control and Resolution Authority - ACPR).

INFINITECH partner FI has a collaborative relationship with the AMF when it comes to fintech (e.g.: specific questions from fintech are addressed to them, co organization of events, etc.), so it will monitor project's activities to identify potential opportunities for collaboration.

Objective: support the AMF in finding challenges in regulation

Initial plan: monitor project's activities to identify potential opportunities for collaboration

Partner leading: FI

3.5.1.1 Activities M16-27

The Financial Markets Authority (AMF) was informed about the project through communication (as recipients of newsletters, direct mailings, LinkedIn posts etc.) and discussion during virtual meetings, where they showed interest in the project. However, because of very long process, sanitary crisis and other priorities, we have not been asked yet for a specific contribution (demand could change rapidly in 2022).

Finance Innovation participated to AMF events to carry out regulatory monitoring activities and to identify potential collaboration with INFINITECH and other business opportunities (e.g.: the last one <https://acpr.banque-france.fr/webform/forum-fintech-acpr-amf-2021> in October 2021). This will be continued with the next results of the project.

3.5.2 AIOTI

The Alliance for Internet of Things Innovation (AIOTI [70]) was initiated in 2016 to contribute to the creation of a dynamic European IoT ecosystem and speed up the take-up of IoT technologies.

AIOTI is the multi-stakeholder platform for stimulating IoT Innovation in Europe, bringing together small and large companies, start-ups and scale-ups, academia, policy makers and end-users and representatives of society in an end-to-end approach. The AIOTIs work with partners in a global context, striving to leverage, sharing, and promoting best practices in the IoT ecosystems, being a one-stop point of information on all relevant aspects of IoT innovation to its members while proactively addressing key issues and roadblocks for economic growth, acceptance, and adoption of IoT innovation in society.

AIOTI's contribution goes beyond technology and addresses horizontal elements across application domains, such as matchmaking and stimulating cooperation in IoT ecosystems, creating joint research roadmaps, driving convergence of standards and interoperability, and defining policies. The AIOTI also puts them in practice in vertical application domains with societal and economic relevance.

AIOTI is a partner from the EC on IoT policies and stimulus programs, helping to identify and remove obstacles and fast learning, deployment, and replication of IoT innovation in real-scale experimentation in Europe from a global perspective.

The AIOTI leads the convergence of IoT/IIoT and other technologies providing vision for the future, provides support from nurturing raw experimentation to enabling market deployment at scale and providing input to funding programmes, and brings key players together – both online and offline – for providing policy input, organise events and workshops, share best practices.

AIOTI activities are carried out through Working Groups, Interest Groups and Task Forces which focus on well-defined areas of development. These include horizontal areas: research, innovation eco-systems, policy, standards, and distributed ledger technologies, as well as vertical, cross-disciplinary activities focused on key IoT issues.

Notably, the AIOTI does not include a focus group around IoT & digital finances. INFINITECH project includes several pilots that include the use of IoT technologies – e.g., Pilot#11 'Personalized insurance products based on IoT connected vehicles', Pilot#12 'Real World Data for Novel Health-Insurance products' or Pilot#14 'BigData and IoT for the Agricultural Insurance Industry'. Digital finances are an important add-on to the AIOTI vertical focus areas due to its economic relevance and possibility to take advantage of IoT as enabling technologies for novel digital insurances and banking use-cases.

The intention is to propose an interest group around digital finances. An interest group is a less formal structure than a working group that can start to develop and later evolve to a working group. An interest

group has full support with document access and online meeting tool, but limited support from the AIOTI secretariat.

Out of all INFINITECH partners, UNP and FUJITSU are already members of the AIOTI. These partners are coordinating actions to propose an interest group on IoT & digital finances to AIOTI.

Objective: connect INFINITECH results with AIOTI to be able to influence IoT ecosystem

Initial plan: propose an interest group around IoT & digital finances

Partner leading: UNP, FTS

3.5.2.1 Activities M16-27

FTS: Attending meetings in AIOTI on Testbeds and in other WGs and introducing INFINITECH in discussions as role model and suggestion of good operational practice.

The finance interest group was not created but INFINITECH continues promoting their presence.

3.5.3 Stand ICT.eu 2023

StandICT.eu 2023 is a Horizon 2020 CSA Project (topic: ICT-45-2020 - Reinforcing European presence in international ICT standardisation: Standardisation Observatory and Support Facility)

“StandICT.eu 2023’s principal goal is to create a European Standardisation Ecosystem, by:

- a) launching & managing a robust and efficient facility with € 3,000,000 funding earmarked over 36 months & 10 Open Calls, the StandICT.eu Fellowship Programme;
- b) empowering contributions from ICT standardisation experts letting their voices be heard, also in the Standardisation Observatory;
- c) pursuing the training of next generation of ICT standardisation experts, engaging with National Standards Associations & PPPs;
- d) ensuring hi-level steering of StandICT.eu 2023 by means of an authoritative Expert Group (the EAG) who tap directly into the WGs & TCs of SDOs, tackling EU priorities, challenges & gaps;
- e) Creating an engaging & influential Foresight Committee (the EUOS-FC) to keep momentum in policy discussions, in-synch with the MSP.” [71]

3.5.3.1 Activities M16-27

Due to the fact that StandICT main objective is to “foster the standardization activities in the European ICT arena”, INFINITECH contacted the StandICT project coordinator to start the conversations in order to find synergies and potential collaboration activities.

As result of these conversations a Memorandum of Understanding (MoU) has been drafted between the two projects.

The main activities foreseen under the MoU are:

- StandICT will provide visibility to all outreach activities that INFINITECH organises around efforts on the FinTech domain, and contributions to ICT Standards to its extensive network of stakeholder communities and through its main digital outlets.
- INFINITECH will promote the StandICT.eu Open Calls to its community of European organisations and specialists related to INFINITECH and FinTech community of members, as well as other relevant events/initiatives that are organised by StandICT.eu 2023.
- Participate at any webinars or (virtual) events of mutual interest.
- Study the creation of a dedicated Technical Working Group (TWG) within the StandICT.eu 2023's "EUOS – European Observatory for ICT Standardisation", by selecting specific and committed experts to work for the development of a "Landscape Analysis" tackling the current FinTech sector.

4 Used Standards

Apart from the aforementioned activities towards standardization that were described in the previous section, when needed, INFINITECH's building blocks and technologies are also compliant with well established standards or are implementing Open APIs. This facilitates their adoption by existing solutions that rely on these types of standards.

An example of such technologies is the overall INFINITECH data management platform. Hidden all complexity inside the platform, the latter exposes some well-known interfaces that allows the data users to establish database connections in a standardized manner, and thus, being easily integrated into their solutions. First, it provides a JDBC compliant driver. JDBC is a Java standard, under the JSR-221:*JDBC™ 4.0 Specification*, with its final version to be released in November the 7th of 2006. Apart from that, it also exposes the ODBC interface to enable data connectivity with non Java-based applications or frameworks. ODBC is under the ISO/IEC 9075-3:1995 specification. Finally, it implements the OData specification, which is an OASIS standard under the ISO/IEC 20802-2:2016 specification. The latter defines a REST API that can be used to access a data management system in a standardized manner.

Even if they are not official standards, the INFINITECH data management layer also implements Open APIs provided by popular analytical and streaming processing frameworks. As such, it implements specific connectors to Apache Spark [72], which is one of the most popular analytical processing frameworks used by the majority of AI tools and algorithms developed for machine and deep learning. An additional connector has been developed under the scope of the project for the integration of INFINISTORE, the project's data repository, with the Apache Kafka [73]. Moreover, in order to enable the integrated data access over streaming data and data *at-rest*, during the scope of the project, a connector for the Apache Flink [74] streaming processing framework has been developed. And last but not least, to enable the *Change Data Capture* paradigm, the INFINISTORE has been integrated with the Debezium [75], the dominant framework that implements this novel fashion.

Finally, the INFINITECH building blocks are compliant with the ICAO Document 9303 (endorsed by the International Organization for Standardization and the International Electrotechnical Commission as ISO/IEC 7501-1 for exchanging *Machine Readable Travel Documents*). These documents are being exchanged via microservices that are compliant with the the OpenAPI specification, as defined under the scope of task T5.5 ("OpenAPI for Analytics and Integrated BigData/AI WorkBench").

5 Conclusions

In the first report on INFINITECH standardisation contributions, the consortium drafted the plan to organize and provide contributions derived from the project's knowledge and outcomes.

In this second report, the activities undertaken during M16-M27 are detailed.

To summarise and bring together the main areas covered in the writing these have been the main activities undertaken during this period.

- Draft the Whitepaper “Big Data and AI for the Financial Sector: challenges and opportunities” sent to the Big data value association (BDVA) (currently under review by BDVA) in which INFINITECH and its Reference Architecture is discussed.
 - Monitor the Regulatory developments about AI, dialoguing with the European Banking Federation (EBF) focusing on the Proposal for a Regulation on Artificial Intelligence (the so-called AI Act) that the EC has recently published.
 - Transfer to EBF a list of key-points and suggested amendments, representing the position of the European Banks on the proposed Regulation.
 - Participate actively in the BDVA meetings leading the Task Force TF7.SG10 “Big Data and AI for the Financial Sector” thanks to GFT.
 - Initiated affiliation with ISO STD Request for Category C Liaison to ISO/IEC SC27 and particularly to ISO/IEC WD 27559 along with partners ATOS and GRAD.
 - Contributions to the FIWARE Foundation SmartDataModels from ETSI Standard NG ETSI NGSI-LD (V1.5.1 [76]).
 - Participation in the European Banking Authority (EBA) Experts Discussion Forum to discuss relevant aspects of the EC legislative AML/CFT proposals and its influence on the financial sector through BOS supervisory and in the EBA AML Standing Committee (AMLSC).
 - Monitor and investigate the potential collaboration with the standard P2957 - Standard for a Reference Architecture for Big Data Governance and Metadata Management [77] aims to define a reference architecture that enables scalability, findability, accessibility, interoperability and reusability of datasets among heterogenous and cross-domain repositories.
 - participate in AMF events to carry out regulatory monitoring activities and to identify potential collaboration with INFINITECH.
 - Attends meetings in the AIOTI platform and introduce the project in the AIOTI working groups.
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- On the other hand, the focus the focus should not be only on technological transfer, also the INFINITECH project takes care on being compliance with different standards and on providing open APIS, which will favour the INFINITECH adoption.

To conclude, the signing of the MoU with the StandICT project will pave the way to Standardization activities in the consortium providing more visibility and relevance to the INFINITECH achievements.

For the next period the INFINITECH project will continue with their activities in the different initiatives and in addition the consortium will explore new potential activities.

- **Appendix A: Application liaison form**

Application to establish a liaison
with an ISO Committee or Working Group



International Organization for Standardization
 Organisation Internationale de normalisation
 Международная организация по стандартизации

APPLICATION TO ESTABLISH A LIAISON WITH AN ISO COMMITTEE OR WORKING GROUP

To be completed by the committee secretariat

Committee (TC/SC number and name) ISO/IEC JTC 1 SC 27	Liaison category <input type="checkbox"/> A (at the TC/SC level) <input type="checkbox"/> B (at the TC/SC level – category reserved for inter-governmental organizations) <input checked="" type="checkbox"/> C (at the Working Group level)
Working Group (number and name) WG 5 NOTE: only relevant for Category C liaisons	
Committee Manager contact details ISO Member body DIN Name Sobhi Mahmoud Email Sobhi.Mahmoud@din.de	

Application process

An application to establish a liaison with an ISO Committee or Working Group shall be submitted by the applicant organization to the secretariat of that committee.

The committee secretariat shall submit a copy of the application to their Technical Programme Manager at ISO Central Secretariat (ISO/CS) for an eligibility check. ISO/CS will also consult with the National Body (NSB) in the country where the applicant organization is based.

If the application is validated by ISO/CS and there is no objection from the relevant NSB, the committee secretariat shall circulate the application in the committee (e.g. via committee internal ballot) to approve the liaison request.

In case of an objection from the NSB, the application will be referred to the ISO Technical Management Board for decision.

Detailed information concerning the general requirements applicable to liaisons, different categories of liaisons, eligibility criteria, rights and obligations of liaison organizations is contained in the [ISO/IEC Directives, Part 1 and Consolidated ISO Supplement, Clause 1.17](#).

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To be completed by the applicant organization

Details of the applicant organization

Full title of organization INFINITECH
Postal address GFT Italia SRL – Via Sile 18 20139 Milano (Italy)
Website https://www.infinitech-h2020.eu/
Organization's Point of Contact (e.g. Secretariat) carmen.perea@atos.net (Standardization Task Leader)
Nominated liaison representative (include email address) Inés Ortega Fernández iortega@gradient.org
Legal status (e.g. Ltd Co., S.A., Sarl, GmbH) Horizon 2020 Project – EC Grant Agreement No. 856632

Eligibility criteria

Please attach a copy of the organization's statutes to this application (or add a hyperlink, if available online) and refer to relevant clauses of the statutes below, where applicable Hyperlink: https://app.infinitech-h2020.eu/static/documents/GrantAgreement.pdf

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<p>The applicant confirms that the organization</p> <p><input checked="" type="checkbox"/> is not for profit</p> <p>Details / relevant clause in statutes Section 4.1.41 of the Grant Agreement.</p> <p>GRADIANT is a private non-profit Research and Technology Organization based in Vigo, Spain. GRADIANT's focus is on applied research and technology transfer of ICT to industry and society. GRADIANT began its activity in 2008. Since then, it has grown a client portfolio of over 100 industrial companies, a turnover of EUR 5.2 (2017), and a staff of ca. 100 engineers (Q4 2018). GRADIANT's track record in EU projects includes participation in 14 FP7 and H2020 projects since 2010, two of them as project coordinator, and another two as technical coordinators.</p> <p>GRADIANT is a founding member of ECSO (European Cyber Security Organisation), AIOTI (Alliance of Internet of Things Innovation), board member of RENIC (Spain's National Excellence Network for the Research on Cybersecurity), and member of the Digital Skills and Jobs Coalition. GRAD's ICT research and innovation activity spreads over three pillars: Connectivity, Security and Intelligence.</p> <p>GRADIANT's focus on industry and market has already produced a few success stories of security technology transfer with important market players (Telefonica, Samsung, and a few cases in the banking sector).</p> <p>In INFINITECH GRAD brings its technical experience in the following domains:</p> <ul style="list-style-type: none">- Anonymization techniques applied to end-to-end protection of large volumes of personal data in untrusted ICTbased environments in the banking sector, following the privacy-by-design methodology.- Privacy-by-Design and Security-by-Design methodologies that facilitate their adoption in engineering processes.- Definition of secure architectures and elicitation of security and privacy requirements.- Knowledge of GDPR and its implications on the use of personal data in business environments <p><input type="checkbox"/> is a legal entity (NOTE: this is a requirement only for Category A or B liaisons)</p> <p>Details / relevant clause in statutes Click here to enter text.</p> <p><input type="checkbox"/> is membership-based and open to members worldwide or over a broad region (NOTE: this is a requirement only for Category A or B liaisons)</p> <p>Details / relevant clause in statutes Click here to enter text.</p> <p><input checked="" type="checkbox"/> through its activities and membership demonstrates that it has the competence and expertise to contribute to the development of International Standards or the authority to promote their implementation</p> <p>Details / relevant clause in statutes</p>
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Application to establish a liaison with an ISO committee or working group
Page 4

<p>Section 4.1.41 – List of relevant publications and/or products/services</p> <p>Section 4.1.41 Participation in standardisation activities / bodies relevant to the project:</p> <p>GRADIANT contributed to the following ISO/IEC JTC 1 / SC 27 WG 5 (Identity management and privacy technologies) standards:</p> <ul style="list-style-type: none">- ISO/IEC AWI 20889 Privacy enhancing data de-identification techniques- ISO/IEC WD 27550 Privacy engineering- ISO/IEC WD 27552 Enhancement to ISO/IEC 27001 for privacy management- ISO/IEC WD 29184 Guidelines for online privacy notices and consent- ISO/IEC WD 24761 Authentication context for biometrics <p>The contribution to the previous standards was part of the work of the H2020 project WITDOM.</p> <p><input checked="" type="checkbox"/> has a process for stakeholder engagement and consensus decision-making to develop the input it provides (see Guidance for ISO liaison organizations – Engaging stakeholders and building consensus http://www.iso.org/iso/guidance_liaison-organizations.pdf)</p> <p>Details / relevant clause in statutes See Deliverable 9.12 Exploitation and Sustainability Plan – I for more details</p> <p>The INFINITECH strategy , also known as "The INFINITECH way" involves stakeholders and real end users in the loop to refine this strategy and to supply early feedback to tune their competitive advantage. Stakeholders participate in INFINITECH in several ways: participation in the project as pilots' sites, in workshops for validation, and trough dissemination activities with a task devoted to Community and Ecosystem Building.</p> <p>Moreover, GRADIANT, as a ICT R&D non-profit centre is devoted to serve our community and bringing technology to industry. Gradiant's mission comes down to "contribute innovative dynamism, growth and competitive improvement of Galician business network through technology development and innovation by using ICT".</p>

Justification for liaison request

<p>Reason for Liaison request</p> <p>INFINITECH is a joint effort of global leaders in ICT and finance towards lowering the barriers for BigData/IoT/AI driven innovation, boosting regulatory compliance and stimulating additional investments. Particularly, the project expects to provide novel BigData/IoT technologies for seamless management and querying of all types of data interoperable data analytics, blockchain-based data sharing, real-time analytics, as well as libraries of advanced AI algorithms. One important part of the project is the Security and Privacy and based on this, we are working in the development of a set of data governance mechanisms and the implementation of regulatory compliance tools. Based on this, we think that a liaison with ISO/IEC JTC 1/SC 27 will be of mutual benefit in helping to develop new ISO standards (ISO/IEC WD 27559) given the experience of part of the members of the consortium in this area and desire to collaborate to protect privacy.</p>


Application to establish a liaison with an ISO committee or working group
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<p>Expected benefits for applicant The consortium believes serving in a liaison capacity to ISO/IEC JTC 1/SC 27 and particularly to ISO/IEC WD 27559 (Privacy enhancing data de-identification framework) will help our INFINITECH project to achieve our mission to improve security and privacy through public standards and related programs that help minimize risks associated with re-identification, build trust with data subjects and meet compliance requirements.</p>
<p>Expected benefits for TC/SC/WG The scope of ISO/IEC WD 27559 is to provide a non-prescriptive framework for identifying and mitigating the privacy risks associated with re-identification and other risks associated with the lifecycle of de-identified data. The expertise of INFINITECH scientific staff with a long trajectory working in the framework of Privacy & Security, including members with contributions to other standards such as ISO/IEC 27550 by means of the WITDOM1 project (ID 644371), will be a valuable asset to the future activities of this ISO standard.</p>
<p>Short, medium and long-term goals of liaison INFINITECH will play a main role in the development of security and privacy technologies, focusing on protection of data and privacy. In the future, the consortium expects to maintain and enhance its position in the broader sphere of security and privacy, continuing with the design and development of different tools in this field. The development of a valuable working relationship with ISO/IEC WD 27559 for current and future ISO standards in areas of mutual interest (for example, security information, cybersecurity and privacy protection) will be a positive benefit for the whole organizations involved.</p>

Details of liaison representatives

<p>Contact details of liaison representative(s)</p> <p>Name: Inés Ortega Fernández Email: iortega@gradient.org</p> <p>Name: Lilian Adkinson Orellana Email: ladkinson@gradient.org</p> <p>Comments / additional representatives Click here to enter text.</p>

Signature of the applicant

<input checked="" type="checkbox"/> I am aware of the responsibilities and obligations of liaison organizations, as outlined in the ISO/IEC Directives, Part 1 and Consolidated ISO Supplement, Clause 1.17.	
<p>Name Ernesto Troiano – INFINITECH Project Manager on behalf of Project Coordinator GFT Italia Srl</p> 	<p>Date 2021-12-16</p>

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▪ Appendix B: References

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- [1] Shin, D. H., Kim, H., & Hwang, J. (2015). Standardization revisited: A critical literature review on standards and innovation. *Computer Standards & Interfaces*, 38, 152-157.
- [2] INFINITECH: Deliverable D9.15 - Business Models and Innovation Management - I
- [3] INFINITECH: Deliverable D9.6 Contributions to Standards, Associations and Clusters - I
- [4] ETSI GS CIM 009 V1.5.1 (2021-11) Context Information Management (CIM); NGSI-LD API https://www.etsi.org/deliver/etsi_gs/CIM/001_099/009/01.05.01_60/gs_CIM009v010501p.pdf
- [5] P2957 - Standard for a Reference Architecture for Big Data Governance and Metadata Management. (n.d.). Standards.ieee.org <https://standards.ieee.org/project/2957.html>
- [6] INFINITECH: Deliverable D9.6 Contributions to Standards, Associations and Clusters I. 12,2020
- [7] Dong-Hee Shin, Hongbum Kim, Junseok Hwang, Standardization revisited: A critical literature review on standards and innovation, *Computer Standards & Interfaces*, Volume 38,2015,Pages 152-157,ISSN 0920-5489,<https://doi.org/10.1016/j.csi.2014.09.002>.
- [8] INFINITECH: Deliverable D6.4 “Tools and Techniques for Tailored Sandboxes and Management of Datasets - I” – 7.2020
- [9] INFINITECH: Deliverable D2.13 “INFINITECH Reference Architecture - I” – 6.2020
- [10] High-Level Expert Group on Artificial Intelligence. (2018, June 14). European Commission. Retrieved January 2022, from <https://ec.europa.eu/digital-single-market/en/high-level-expert-group-artificial-intelligence>
- [11] Ethics guidelines for trustworthy AI. (2019, April 7). European Commission. Retrieved January 2022, from <https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai>
- [12] Policy and investment recommendations for trustworthy Artificial Intelligence. (2019, June 25). European Commission. Retrieved January 2022, from <https://ec.europa.eu/digital-single-market/en/news/policy-and-investment-recommendations-trustworthy-artificial-intelligence>
- [13] European Commission. (2020). White Paper on Artificial Intelligence: a European approach to excellence and trust (White Paper No. COM(2020) 65 final). European Commission. https://ec.europa.eu/info/publications/white-paper-artificial-intelligence-european-approach-excellence-and-trust_en
- [14] https://ec.europa.eu/info/publications/commission-report-safety-and-liability-implications-ai-internet-things-and-robotics-0_en
- [15] INFINITECH: Deliverable D2.8 “Security and Regulatory Compliance Specifications – II”, 12.2020
- [16] OECD, Gennaio 2020. “The Impact of Big Data and Artificial Intelligence (AI) in the Insurance Sector”. pag. 10-19. Retrieved January 2022, from: <https://www.oecd.org/finance/TheImpact-Big-Data-AI-Insurance-Sector.pdf>
- [17] <https://www.abe-eba.eu/thought-leadership-innovation/open-banking-working-group/management-summary-artificial-intelligence-in-the-era-of-open-banking/>
- [18] IEEE. (2019). ETHICALLY ALIGNED DESIGN A Vision for Prioritizing Human Well-being with Autonomous and Intelligent Systems First Edition. Retrieved January 2022, from <https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/ead1e.pdf>
- [19] World Economic Forum Companion to the Model AI Governance Framework—Implementation and Self-Assessment for Organizations (Infocomm Media Development Authority of Singapore, 2020) Retrieved January 2022 from, <https://www.pdpc.gov.sg/-/media/Files/PDPC/PDF-Files/Resource-for-Organisation/AI/SGIsago.pdf>
- [20] [EBA report identifies key challenges in the roll out of Big Data and Advanced Analytics | European Banking Authority \(europa.eu\)](https://www.eba.europa.eu/eba-report-identifies-key-challenges-roll-out-big-data-and-advanced-analytics) <https://www.eba.europa.eu/eba-report-identifies-key-challenges-roll-out-big-data-and-advanced-analytics> (Accessed: January 2022)

-
- [21] The EC blockchain strategy in a nutshell, <https://ec.europa.eu/digital-single-market/en/blockchain-technologies> (Accessed: January 2022)
- [22] Proposal for a Regulation of the European parliament and of the council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937 , 2020, <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM%3A2020%3A0593%3AFIN>
- [23] Lafourcade, P., & Lombard-Platet, M. (2020). About blockchain interoperability. Information Processing Letters, 161, 105976
- [24]] V. Buterin, Chain interoperability, https://www.r3.com/wp-content/uploads/2017/06/chain_interoperability_r3.pdf (Accessed: January 2022)
- [25] European Blockchain Services Infrastructure (EBSI) , <https://ec.europa.eu/digital-single-market/en/european-blockchain-services-infrastructure> (Accessed: January 2022)
- [26] EBSI Documentation, Ledger Protocols, <https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/EBSI> (Accessed: January 2022)
- [27] Ethereum Magicians forum <https://ethereum-magicians.org/> (Accessed: January 2022)
- [28] Ethereum Trust Alliance <https://Ethtrust.Org/> (Accessed: January 2022)
- [29] Ethereum Improvement Proposals, <https://eips.ethereum.org/> (Accessed: January 2022)
- [30] IEEE Blockchain Standards, <https://blockchain.ieee.org/standards> (Accessed: January 2022)
- [31] IEEE Blockchain Standards, <https://blockchain.ieee.org/standards> (Accessed: January 2022)
- [32]Joining forces for blockchain standardisation https://europa.eu/newsroom/events/joining-forces-blockchain-standardisation_en (Accessed: January 2022)
- [33] The Financial Instrument Global Identifier <https://www.openfigi.com/about/figi> (Accessed: January 2022)
- [34] The Object Management Group OMG.org, an international, non-profit standards organization, founded in 1989.
- [35]The Financial Industry Business Ontology <https://spec.edmcouncil.org/fibo/> (Accessed: January 2022)
- [36] The Financial Industry Business Ontology <https://spec.edmcouncil.org/fibo/> (Accessed: January 2022)
- [37] The European project for Standardized Transparent Representations in order to Extend Legal Accessibility (Estrella, IST-2004-027655) <http://www.estrellaproject.org>
- [38] The European project for Standardized Transparent Representations in order to Extend Legal Accessibility (Estrella, IST-2004-027655) <http://www.estrellaproject.org>
- [39] INFINITECH: Deliverable D4.1 “Semantic Models and Ontologies”, 8.2020
- [40] INFINITECH: Deliverable D2.5 “Specifications of INFINITECH Technologies – I”, 5.2020
- [41] FIWARE Foundation, “Smart Data Models,” <https://github.com/smart-data-models> (Accessed: January 2022)
- [42] Guidelines FIWARE data models <https://fiware-datamodels.readthedocs.io/en/latest/guidelines/index.html>
- [43] Context Information Management (CIM); NGSI-LD API Disclaimer. (n.d.). https://www.etsi.org/deliver/etsi_gs/CIM/001_099/009/01.05.01_60/gs_CIM009v010501p.pdf (Accessed: January 2022)
- [44] FIWARE Foundation, “Smart Data Models,” <https://smartdatamodels.org/> (Accessed: January 2022)
- [45] FIWARE Foundation, “Smart Data Models,” <https://github.com/smart-data-models/dataModel.Transportation> (Accessed: January 2022)
- [46] FIWARE Foundation, “Smart Data Models,” <https://github.com/smart-data-models/dataModel.Transportation/tree/master/Vehicle> (Accessed: January 2022)

-
- [47] FIWARE Foundation, “Smart Data Models,” <https://github.com/smart-data-models/dataModel.Weather/tree/master/WeatherObserved> (Accessed: January 2022)
- [48] FIWARE Foundation, “Smart Data Models,” <https://github.com/smart-data-models/dataModel.Transportation/tree/master/Road> (Accessed: January 2022)
- [49] FIWARE Foundation, “Smart Data Models,” <https://github.com/smart-data-models/dataModel.Transportation/tree/master/RoadSegment> (Accessed: January 2022)
- [50] FIWARE Foundation, “Smart Data Models,” <https://github.com/smart-data-models/dataModel.Alert/tree/master/Alert> (Accessed: January 2022)
- [51] FIWARE Foundation, “Smart Data Models,” <https://github.com/smart-data-models>, 2021. <https://github.com/smart-data-models/dataModel.Transportation/tree/master/RoadAccident> (Accessed: January 2022)
- [52] FIWARE Foundation, “Smart Data Models,” <https://github.com/smart-data-models/dataModel.Transportation/tree/master/RestrictedTrafficArea> (Accessed: January 2022)
- [53] INFINITECH: Deliverable D2.7 “Security and Regulatory Compliance Specifications – I”, 5.2020
- [54] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL Towards better implementation of the EU’s anti-money laundering and countering the financing of terrorism framework COM/2019/360 final <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52019DC0360> (Accessed: January 2022)
- [55] Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, amending Regulation (EU) No 648/2012 of the European Parliament and of the Council, and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC (Text with EEA relevance) 4th AML Directive-4AMLD <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32015L0849> (Accessed: January 2022)
- [56] Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, and amending Directives 2009/138/EC and 2013/36/EU (Text with EEA relevance) Directive (EU) 2018/843 (Accessed: January 2022)
- [57] Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing [COM/2021/420 final](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2021:420:FIN) (Accessed: January 2022)
- [58] Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing the Authority for Anti-Money Laundering and Countering the Financing of Terrorism and amending Regulations (EU) No 1093/2010, (EU) 1094/2010, (EU) 1095/2010 COM/2021/421 final <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0421> (Accessed: January 2022)
- [59] Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on information accompanying transfers of funds and certain crypto-assets (recast) COM/2021/422 final <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2021:422:FIN> (Accessed: January 2022)
- [60] Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the mechanisms to be put in place by the Member States for the prevention of the use of the financial system for the purposes of money laundering or terrorist financing and repealing Directive (EU) 2015/849 COM/2021/423 final. [EUR-Lex - 52021PC0423 - EN - EUR-Lex \(europa.eu\)](https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2021:423:FIN) (Accessed: January 2022)
- [61] Anti-money laundering and countering the financing of terrorism legislative package. (2021). European Commission. https://ec.europa.eu/info/publications/210720-anti-money-laundering-countering-financing-terrorism_en (Accessed: January 2022)
- [62] International Organization for Standardization. <https://www.iso.org/home.html> (Accessed: January 2022)

- [63] ISO - ISO/IEC JTC 1 — Information Technology. ISO. Retrieved January, 2022 from <https://www.iso.org/isoiec-jtc-1.html>
- [64] Information security, cybersecurity and privacy protection. JTC 1. Retrieved January, 2022 from <https://jtc1info.org/technology/subcommittees/information-security-cybersecurity-privacy-protection/>
- [65] BDVA Task Force 6: Technical. <https://www.bdva.eu/task-force-6> (Accessed: January 2022)
- [66] National Institute of Standards and technologies <https://www.nist.gov/> (Accessed: January 2022)
- [67] Text Retrieval conference <https://trec.nist.gov/> (Accessed: January 2022)
- [68] IEEE Big Data Governance and Metadata Management (BDGMM) <https://standards.ieee.org/industry-connections/BDGMM-index.html> Accessed: January 2022)
- [69] P2957 - Standard for a Reference Architecture for Big Data Governance and Metadata Management. Standards.ieee.org. Retrieved January, 2022 from <https://standards.ieee.org/project/2957.html>
- [70] AIOTI | The Alliance for the Internet of Things Innovation. Retrieved January, 2022 from <https://aioti.eu/>
- [71] <https://cordis.europa.eu/project/id/951972>
- [72] Apache Spark™ - Unified Analytics Engine for Big Data. (2019). Apache.org. <https://spark.apache.org/> (Accessed: January 2022)
- [73] Apache Kafka. <https://kafka.apache.org/> (Accessed: January 2022)
- [74] Apache Flink: Stateful Computations over Data Streams. (2014). Apache.org. <https://flink.apache.org/> (Accessed: January 2022)
- [75] Debezium <https://debezium.io/> (Accessed: January 2022)
- [76] ETSI GS CIM 009 V1.5.1 (2021-11) Context Information Management (CIM); NGSI-LD API https://www.etsi.org/deliver/etsi_gs/CIM/001_099/009/01.05.01_60/gs_CIM009v010501p.pdf
- [77] P2957 - Standard for a Reference Architecture for Big Data Governance and Metadata Management. (n.d.). Standards.ieee.org <https://standards.ieee.org/project/2957.html>