Knowledge Management System

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Executive Summary

The Deliverable 5.3 "Knowledge Management System" defines the knowledge management activities, platforms, and strategy for Blockchain technologies and design Innovation for Social Good (BIG) develop a campus-wide initiative in the premier engineering school in Portugal. This document describes how BIG will consolidate knowledge management activities across the two main labs LARSyS and INESC-ID and within Técnico as a whole. It also describes the infrastructure used and how these will be used to general a portfolio of project and uses cases that ultimately will lead to a Living Lab for Blockchain Technologies and Design Innovation for Social Good.

1. Introduction

Blockchain and Distributed Ledger Technologies (DLT) are transformative and bring about a potential for improvement in European citizenship and economic growth - enabling decentralised, trusted, transparent, user-centric digital services, stimulating new and improved business models, and promoting decentralised social innovations. For this purpose, the EC is considering these technologies strategic for the next decades, promoting a holistic approach to their deployment in multiple application domains: from medical data to smart homes and grids, citizenship and democratic decision making, transport, creative industries and digital social media. While many of the challenges related to blockchain technologies may be perceived as exclusively technical, or deeply infrastructural, these technologies have the potential to profoundly impact business and human experience and values. Effective deployments of blockchain will require bringing together in a synergistic way the technical expertise and a design innovation perspective based on the principles of design thinking, which focus on a deep understanding of human needs to produce strong case studies in different domains through an iterative process of ideation and real-world testing.

The following general impacts in terms of innovation can be expected:

- **Improving existing blockchain products and services** in the key application domains of LARSyS and INESC-ID, most notably mobility and logistics, energy and climate action, urban systems and ocean exploration, and exploitation in close collaboration with existing and future industry partners;
- **Developing new business segments and applications** in ICT, emerging from ongoing research and not necessarily confined to the above domains. The project will develop components, systems, applications and also services that could be exploited by system integrators, application developers and other industry stakeholders to integrate new data-based technologies into their offerings thereby creating new valuable business opportunities;
- **Developing traditional (local) businesses**, in particular for the **Energy, Tourism and Creative Industries** sectors that can integrate new ICT technologies into their systems by becoming more flexible, responsive, innovative and competitive.

The potential of blockchain and distributed ledger technologies and design innovation to reshape the current interdisciplinary research landscape for the data economy lies in a novel relationship between science, technology and design used to support interdisciplinary work and foster dialogue with the population of

users. The location of BIG in Lisbon provides a unique setting for deploying a Living Lab, where the outcome of these DLT-based products, systems and services can be tested using open-innovation frameworks. These distributed knowledge management systems can leverage crowdsourcing technologies to extend the creative research capabilities of the individuals and organizations of the region, for the application areas identified in Lisbon S^3: mobility/logistics, tourism, creative and cultural industries and the blue economy. The BIGLab/DCentralLab could then become a framework to understand the mechanisms, both social and technical, enabling crowd-driven innovation to effectively address the technological opportunities but also the most pressing areas of human need. These positions BIG as a case study for the scientific understanding of how innovation can best be measured, implemented and supported. This will result in a potentially transformative reconceptualization of how innovation creates value and shapes economic growth at a regional level through the data economy and the S^3. It will change our current ways of learning and teaching innovation, and it will demonstrate how innovation systems can respond consistently and altruistically to the most relevant needs.

It is important to restate that Blockchain technologies and design Innovation for Social Good (BIG) main goal is to develope a campus-wide initiative in the premier engineering school in Portugal which includes more than 885 faculty members and 23 research units. BIG is not about blockchain technologies per se but rather about the many potential applications (including market disruptions) that could emerge from a campus wide initiative centered around blockchain technologies and its innovation potential. Therefore knowledge management activities should span the entire research end advanced training ecosystem of Técnico and contribute to consolidate research and pre-existing know-how and the definition of further strategic research lines.

2. Knowledge Management Activities

Knowledge Management activities address the description of pre-existing know-how, the identification of scientific results with high innovation potential, the definition of further research and/or training needs, the limitations for the use of the knowledge (ethics, costs, standards) as well as the description of a potential commercial exploitation (applications, products, markets, etc.). The results are evaluated and discussed in the regular meetings involving the industry partners and other stakeholders and will be reflected in the Communication, Dissemination and Exploitation Plan (D5.1. v1 and D5.2. v2) by BIG and Técnico - Lisbon during the project.

Knowledge generated in the project will be documented through the periodic reports, especially in the form of the project deliverables (in particular D4.1, D4.2 and D4.3). It will also be disseminated via the numerous meetings, workshops, interchange of faculty and other events either organized by or with the participation of LARSyS and INESC-ID units in BIG (in particular described D3.1 and D3.2). Groups from LARSyS and INESC-ID will consolidate an effective implementation of these measures and coordinate and monitor these activities. In addition, the Horizon Europe funded projects (e.g. DCitizens, LOGACulture, Bauhaus

of the Seas Sails, etc.) will generate knowledge which relates to the activities of BIG and hence contribute to a consolidate knowledge management strategy across Técnico.

The recent approval of the Bauhaus of the Seas Sails lighthouse New European Bauhaus (NEB) proposal is a good example of how BIG could leverage a widespread knowledge management activity throughout Técnico and also across Europe. The Bauhaus of the Seas defines a traceable, rigorous and innovative impact evaluation methodology based on blockchain technologies and DAOs to: i) provide replicate examples of distributed ledger technologies delivering automated ecosystem resilience frameworks; ii) instantiate DAOs overlaying coastal areas to manage them, generating technologically-augmented ecosystems that are more resilient and able to act according to a predetermined set of rules in the economic sphere. Other funded projects could leverage a similar strategy which takes advantages of the design innovation expertise of ITI/LARSyS and the cloud, computing blockchain expertise of INESC-ID and naturally consolidate that through the ERAChair team.
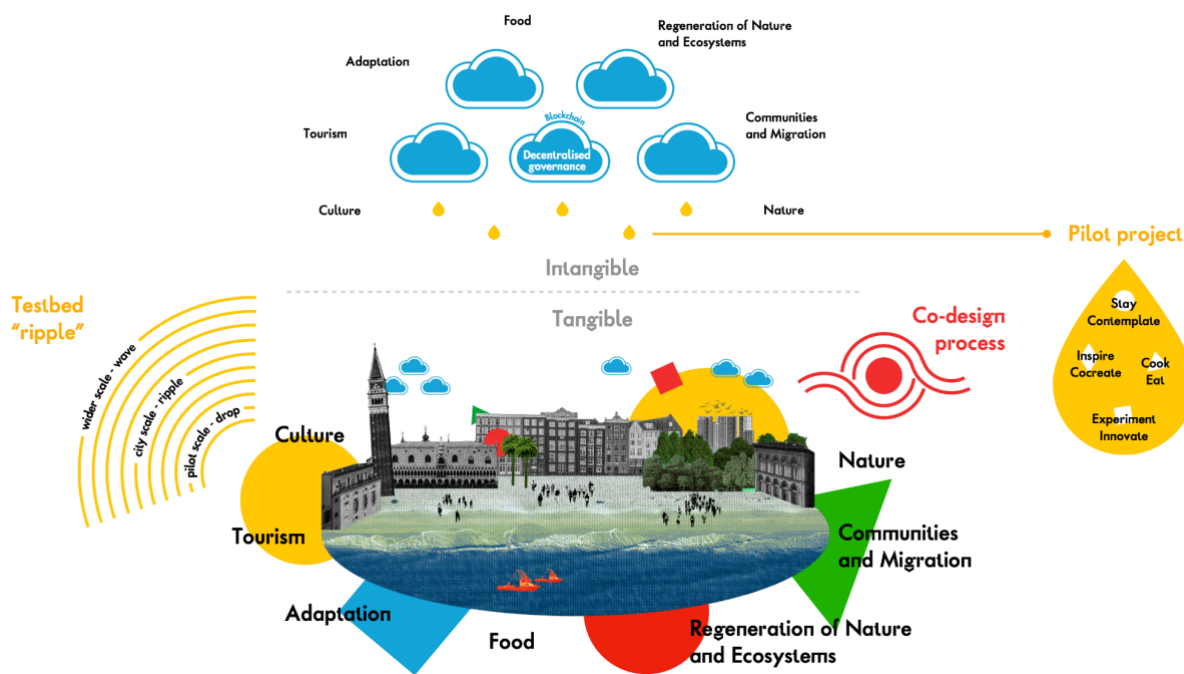
Figure 1 - The BoSS Concept and Approach

Figure 1 describes one approach for knowledge dissemination through pilots which in the Bauhaus of the Seas approach are summarised through co-design, pilot actions (called drops) and ripples (pilot demonstrators). In this approach which we use as one example, digital distributed ledger technologies, deliver a dedicated platform for sharing of experience and good practices on participatory governance and co-design at the local level:

- − **Co-Design** - the co-design process enables the co-development of the local BoS vision of what quality climate-neutral transformation might mean in their local and ecological context (critical community systems and enabling conditions), to start exploring how to match those needs with the existing possibilities from the pilots;

- **Pilot actions** (*drops*) generate concrete activities and experiments that engage communities on an environmentally sustainable, socially and ecologically fair and aesthetically appealing transition;
- **Pilot demonstrators** (*ripples*) - are the "lighthouse demonstrators" that will showcase how a co-design process, with architecture, design, sustainability, ecology, and culture at its core, can deliver highly innovative solutions to address environmental and societal challenges at the territorial level.

3. Knowledge Management System

In line with what was described below the knowledge management system should be a public-facing poartal which consolidates and showcases the capabilities and skills of Técnico around blockchain technologies and design innovation for social good.

The main components of the knowledge management infrastructure include the following:

- A section of the public static dissemination website (BIG and DCentral).
- A version control system (Subversion - SVN) for organizing files and documents with-in the project.
- Mailing list server (Mailman) as primary means of communication between participants.

The research management team of BIG, LARSyS and INESC-ID will be responsible for identifying projects that could be good candidates for showcasing and relevant use-cases within BIG.

The projects showcased in the BIG KMS will follow the identity of BIG and Técnico but also of the original projects in which these outputs are generated, as well as the funding agents and respective research units. The project management team established templates for different formats as MS-Word, MS-Excel, MS-Power Point, and Latex. The templates for documents and presentations are accessible to all project members. The templates are important to ensure a coherent theme and a consistent visual appearance of the project but also of the use cases and projects disseminated.

4. Towards a Living Lab for Blockchain Technologies and Design Innovation for Social Good

In line with what was described before, the innovation strategy of BIG is clearly connected with the activation of the Living Lab and the underlying testbeds. Living Labs are known for having an important role filling gaps by bridging ideation and development, market entry and fulfilment. In alignment with the best principles of human-centred technology the living labs concept provides a flexible ecosystem to promote demand-driven concurrent innovation and centring the iterative process in the user which are the foundations of the expertise of ITI/LARSyS.

The benefits for the different types of stakeholders to deploy user-driven open innovation are well-known[1]: i) empowering citizens and communities to influence the development of services and products that serve

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[1] Directorate-General for the Information Society and Media, Living Labs for user-driven open innovation, Jan. 2009.

real needs; ii) for large companies, providing a flexible and effective mechanism for innovation and enabling the partnering with local SMEs and startups and micro-entrepreneurs as providers with scalable development and validation framework; iii) integrating technological and social innovation for research actors, the economy and society, thus increasing returns on investments in ICT R&D and innovation. By activating the Living Labs and testbeds **BIG** will bridge the "pre-commercial gap" from technology prototypes for innovative and visionary users to evolving products for pragmatic and mainstream users. The following general impacts in terms of innovation can be expected:

- **Improving existing blockchain products and services** in the key application domains of LARSyS and INESC-ID, most notably mobility and logistics, energy and climate action, urban systems and ocean exploration, and exploitation in close collaboration with existing and future industry partners;

- **Developing new business segments and applications** in ICT, emerging from ongoing research and not necessarily confined to the above domains. The project will develop components, systems, applications and also services that could be exploited by system integrators, application developers and other industry stakeholders to integrate new data-based technologies into their offerings thereby creating new valuable business opportunities;

- **Developing traditional (local) businesses**, for the **Energy, Tourism and Creative Industries** sectors that can integrate new ICT technologies into their systems by becoming more flexible, responsive, innovative and competitive.

5. Conclusion

As BIG evolves and more projects are funded and connections with industry partners and student projects emerge from the teaching and supervision activities the KMS of BIG will start to generate information to consolidate a portfolio of competences, uses cases and real-world examples of activities that benefit and/or showcase how blockchain technologies could be used through design innovation to benefit social good. We have illustrated one example of a recently funded project which constitutes one of the first lighthouses of the New European Bauhaus and expect that many more could emerge from the activities of the project.