Request for Proposals 1 – API Testing and Evaluation Annex 1 - Description

Contents

1 Introduction

This document contains the information about the first request for proposals (RfP) to select and award high quality actions to be performed within the PHOENIX project. The project will have a total of five requests for proposals, and the topic of each one of them has been defined depending on the most beneficial activities for the project at each given time, yet the applicants are encouraged to proposed others. The information for these requests is provided as a set of two annexes and a template. The present document is Annex 1 and the general information about the opening can be found on this document. The second document (Annex 2) provides the guides for applications.

Project PHOENIX will use this mechanism to (1) ensure that the developments done in the project are sound and robust, and (2) to verify that the developments have the sufficient versatility to be integrated and extended by third parties. This is particularly relevant to this specific request, in which the APIs and connectivity of the PHOENIX platform will be evaluated.

The request for proposal opens up the possibility of bringing into the team third parties that can observe the PHOENIX solution anew, and provide their perspective to enrich the developments. In this particular case, due to the topic of request stakeholders with an expertise on ICT will be considered. However, it will be of value that the methods and protocols they use for connection to the platform are different to those used within PHOENIX.

As mentioned before, the topic of this request is the evaluation of APIs and connections, but the request is open to the means used to perform this. Applicants are encouraged to design methodologies to achieve this goal of different types, including dummy services, connections to other existing solutions or automatised testing and performance evaluations.

1.1 About PHOENIX

Under the Energy Performance of Buildings Directive (EPBD) of 2010, the EU developed the first strategy to increase the energy efficiency of buildings, which consists in the creation of Energy Performance Certificates (EPCs) for buildings that are being constructed, sold, or rented. An EPC provides information to the customers about the energy performance rating of the building and recommendations for cost-effective improvements. One step further has been taken by the EU in the 2018 revision of the EPBD, which aims to further promote smart building technologies, in particular through the establishment of a Smart Readiness Indicator (SRI) for buildings. The SRI shall provide information on the technological readiness of buildings for interacting with their occupants and the energy grids, and their capabilities for more efficient operation and better performance through ICT technologies in the form of services. Therefore, the SRI should accelerate the transformation of the European Building Stock from standard and manually managed buildings to smart buildings. Smart buildings integrate cutting edge ICT-based solutions for energy efficiency and energy flexibility for their daily operation. Such smart capabilities can effectively assist in creating healthier and more comfortable buildings with lower energy consumption and lower carbon footprint.

The realisation of smart buildings depends mainly on the digital transformation with ICT technologies (i.e. Internet of Things - IoT, Artificial Intelligence – AI and Data Analytics) that is inundating all sectors (such as health care with the e-Health or industry with the Industry 4.0). In the case of buildings, this transformation is expected to have a large impact whose consequences will be highly beneficial for society when carried out in an adequate way.

The digital transformation of the existing European building stock requires an ICT-based solution, which covers from the technological improvements of equipment to the business

exploitation of the innovations born in this project. The architecture that PHOENIX will use to increase the smartness of existing buildings is compound by six layers: physical asset, seamless integration, building knowledge, security & privacy, smart services and business exploitation (i.e. building end-users and grid stakeholders).

In existing buildings, different equipment is already installed and need to be either upgraded or replaced to provide new services that will benefit both users and the grid. However, the number of existing systems and appliances is huge and without a proper classification, significant efforts would be made to increase the smartness of some equipment that could bring few benefits. Furthermore, multiple Plug-&-Play IoT gateways, sensors, actuators and communication systems need to be used to monitor and control the operation of these systems and appliances. All these devices will produce a large amount of data in different formats and also they might communicate using different communications protocols. An inappropriate homogenisation of the communications protocols and data formats will not allow a successful upgrade of the most important legacy systems and appliances. The aforementioned problems are addressed in the asset and integration layers.

Data by itself does not give intelligence to the building, but the data analytics and control strategies can do it. In the knowledge layer, all data gathered by different sources need to be properly analysed to support decision-making of individuals (occupants, managers, energy utilities agents) and/or artificial intelligence related to the operation of the systems and appliances in the building. The major threats that data and communication systems face are potential security and privacy risks to the end-users, which include unauthorised access and abuse of sensitive information. This may result in a significantly reduction of end-user's confidence in ICT technologies and therefore impede its full realisation. These security, privacy and trust issues will be properly addressed in the vertical (Protection) layer.

The final destination of these innovations in existing buildings is the creation of new services to occupants and the grid, which includes energy efficiency. Most of current automation technologies in existing buildings, if any of these exist in the building, focus on the improvement of the energy efficiency in the buildings. However, the energy-driven automated operation of systems and appliances have created human-related problems such as health issues, uncomfortable workplaces, overall dissatisfaction with automation, etc. Therefore, new user-centric services need to be created to meet the people's requirements. Services for grid flexibility (e.g. demand response) has been studied for many years, however, their application at distribution level has been limited. Thus, new services for the grid need to be created to successfully apply these flexibility requirements. All these services are covered in the function layer. Finally, the business layer will focus on the exploitation of all technological innovation and new services born in PHOENIX.

Vision: PHOENIX aims at changing the role of buildings from unorganised energy consumers to active agents orchestrating and optimising their energy consumption, production and storage, with the goal of increasing energy performance, maximising occupants' benefit, and facilitating grid operation.

PHOENIX's goals are well aligned with the challenges summarized earlier. The project will design a portfolio of ICT solutions covering all aspects from hardware and software upgrades needed in legacy equipment and optimal deployment of sensors, to data analytics and services for both building users and energy utilities. PHOENIX will take advantage of artificial intelligence technologies, as well as edge/cloud computing methods, to provide the highest level of smartness to existing buildings. The tools that will result from the different work packages will offer the possibility of establishing a new framework that will enable the optimisation of the energy use and infrastructure exploitation, while at the same time facilitate the creation of new

SMEs and Start-Up ideas to exploit new revenue streams and business opportunities. To achieve this ambitious goal, PHOENIX relies on a consortium which has the technological knowledge and expertise to understand the social and technical requirements and translate them into ICT innovations (i.e. IoT, AI and Data Analytics) for the integration and smartness upgrading of existing buildings with legacy equipment and systems. To demonstrate the real impact and replicability, the proposed solution with ICT innovations and cost-effective services will be validated in 4 different pilot countries at European level (i.e. Ireland, Greece, Sweden and Spain). Moreover, the consortia have high expertise and business capacities to disseminate and exploit the PHOENIX results.

Mission: PHOENIX will provide a portfolio of ICT solutions to increase the smartness of legacy systems and appliances in existing buildings which will increase the SRI of existing buildings. These improvements will translate in human-centric new services for users and an improvement on both execution of demand response actions and communication of data.

Key Objectives

1. Allow Adapt-&-Play seamless integration of domestic appliances, legacy equipment and building systems.
2. Create building knowledge with innovative techniques to upgrade the smartness of existing buildings.
3. Enable real-time communication with energy stakeholders to optimise the grid operation.
4. Provide cost-effective services for building end-users to maximize the energy efficiency and the overall performance.
5. Allow security and privacy of building data regarding the revised EPBD and the GDPR law.
6. Create suitable business models and exploitation strategies to target the broad market of smart buildings.
7. Develop human-centric approach and training/awareness activities to prepare citizens for smart buildings.

1.2 Concept

Energy efficiency in buildings (EEB) is a complex domain due to the high variety of legacy equipment (i.e. fridge, dryer, HVAC, lighting, etc.), smart devices (i.e. metering) and ICT-based systems employing many different technologies for communications, sensing, and data processing. To facilitate the digital transformation of traditional buildings towards smartness and energy-efficient environments, standardisation organizations have come forth to establish guidelines and standards. Among these organizations are the Industrial Internet Consortium (IIC) that has worked with multiple stakeholders and academicians to define new cross-domain reference architectures such as Industrial Internet Reference Architecture (IIRA). The IIRA architecture defines multiple layers (business, functional, information, communication, integration and asset - adopted from ISO/IEC/IEEE 42010:2011) with key system characteristics (i.e. security, privacy and resilience). Moreover, in compliance with IIRA, FIWARE and IDSA (Industrial Data Space Association) proposes a similar five-layers structure expressing various stakeholders' concerns and viewpoints at different levels of granularity that can be adapted to different sizes of buildings. FIWARE and IDS are creating a secure and trustworthy data exchange which addresses interoperability with many different equipment and devices used in EEB scenarios.

Based on previous reference architectures (i.e. IIRA, IDS and FIWARE), we propose a PHOENIX architecture divided into five horizontal layers and a security vertical layer in order to develop, integrate and deploy a secure interoperable ecosystem for heterogeneous EEB scenarios as

well as the interactions with non-technical end-users and stakeholders. The PHOENIX architecture is depicted in Figure 1 using a high-level conceptual design based on the flow of generating data, information and knowledge from the building assets to the services and business opportunities through the following layers:

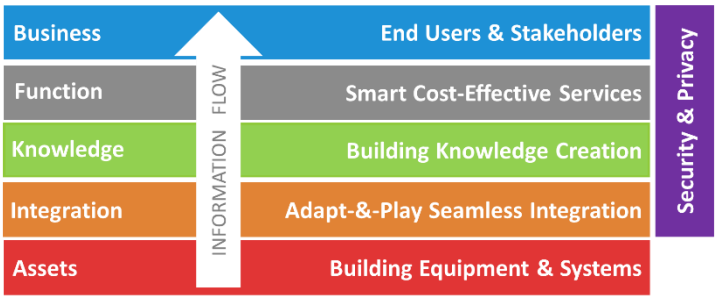

Figure 1: Conceptual Architecture of PHOENIX.

- Business layer represents the point of views and the interactions with the end-users (e.g. building owners) and stakeholders (e.g. ESCO, Aggregators, etc) based on an active democratic participation.
- Function layer includes multiple smart cost-effective services offered to the end users to optimize the energy saving, the occupants' satisfaction, the overall performance of the buildings and the grid operations.
- Knowledge layer enables modular tools for creating building knowledge, based on homogenized data through data processing and analytic to upgrade the smartness of the buildings.
- Integration layer provides the mechanisms for the remote control and data monitoring from different building equipment, systems and external data sources (i.e. weather predictions) with heterogeneous protocols and technologies.
- Asset layer consists of heterogeneous legacy equipment and systems already deployed in the buildings that must be integrated and managed intelligently.
- Protection layer provides the techniques and protocols to ensure the security, privacy and trust of the data exchange in all the horizontal layers.

The PHOENIX architecture will be developed with open & secure API interfaces to enable deep integration of existing building systems, the incorporation of new mechanisms or tools by third-parties as well as the development of new services and business opportunities between multiple actors. The PHOENIX architecture will be based on standardized protocols (e.g. HTTPS) for a secure data exchange made up of trusted partners. PHOENIX will build an interoperable architecture with advanced capacity to incorporate and process all kinds of building data and knowledge to improve the intelligence of services offered to end-users and stakeholders. PHOENIX will develop user-friendly services for inexpert users (i.e. building owners and occupants) to facilitate the easy use as well as to maximize the occupants comfort. Moreover, PHOENIX services will be implemented based on a cost-effective principle to minimise the costs of installation and maintenance as well as to maximise the energy savings. More details about the PHOENIX layers including their main components and their interactions are described below (see Figure 2).

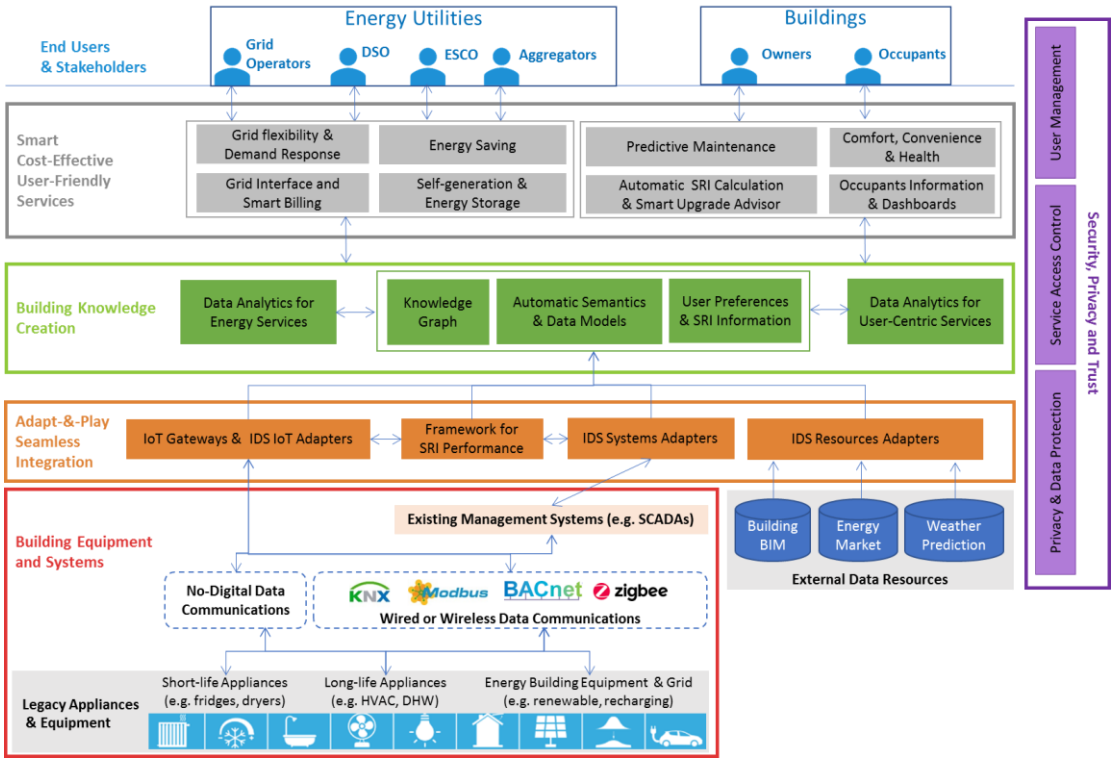

Figure 2. ICT architecture proposed in PHOENIX to form the Building Smartness Hub.

2 Request for Proposal Overview

The project will employ the request for proposals mechanism to expand the applicability of the PHOENIX platform while also allowing the consortium to learn about third-party advancements. The stakeholder who will obtain the funding of the request will open up fresh perspectives to the developments and will add functionalities and/or robustness to the solution.

PHOENIX will launch five requests for proposals to widen the use-cases addressed by the project, to robust the collection of planning engines, and to increase the number of technologies integrated. On each of the five requests, distinct proposals are expected. The following list, for example, suggests potential topics that are acceptable, yet the proposals shall not be limited to them:

1. **Evaluation and testing of APIs and connections**.
2. **Proposals request for the development of new services.**
3. **Evaluation of small-size external pilots.**
4. **One instance of business catapult.**

The first opening has been issued early in the project so stakeholders can have their inputs at the early stages of the development of the solution providing developments that will be of great use for subsequent requests. The diagram below illustrates how the proposals will be managed:

RfP Release: This is a fixed date RFP. All submittal items will be kept as received, as long as the objectives meet the requirements. The submission shall include the template filled with all the relevant information. Proposals that do not include the required information will be rejected.

Project Down-Select Notice: After the submission, projects that are selected for further consideration will be notified and supplied with details and specifications about the PHOENIX proposed non-binding offer.

Negotiations: Within 7 days of Project Down-Select Notice, Respondents shall provide (i) notification of their desire to enter negotiations and further consideration to the consortium, as well as (ii) a schedule for due diligence deliverables (which shall not be later than 30 days after PHOENIX notification).

Closing and Funding: PHOENIX and the Respondent will work as promptly as practicable to finalise definitive documents, approvals, and to establish the final closing and funding terms.

Within the project, the funding to third parties aims to upgrade and extend PHOENIX technology offer beyond consortium partners and to enlarge the outreach of the project deployments. For this purpose, the consortium has planned to devote a budget for the cascade funding across a total of up to five projects in total to select third-party developments.

Table 2: Requests for Proposal Briefing.

Proposal request rounds				
Rounds	**Desired topic (not limiting)**	**#projects**	**#months**	**Total**
1	Validation of APIs and connectivity	1	4	40,000
2	New services	2	4	80,000
3	Small size pilot(s)	1	4	40,000
4	Valorisation	1	4	40,000
		5	**16**	**200,000**

This request for proposal document is specifically dedicated to the first request for proposals and outlines the application for this request. The winners of the opening will be given the opportunity to contribute to the platform. Projects involving the evaluation of the APIs and the connectivity of the building blocks of the platform are particularly welcome, although participants are encouraged to submit alternative topics.

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The participants will have to consider that the project will follow **the principles of open innovation** and that this viewpoint will be of great importance for the projection of the request.

Applicants are encouraged to submit applications that involve different contexts and scenarios which go beyond the traditional ways of evaluating the APIs of the platform and the connectivity of it to third parties. Special attention should be given to the connection to grid communication and its interface with aggregators and other third parties. Also the connectivity of the platform with other potential services is of great importance for the request at hand.

3 Announcement at EC Portal

Announcement at EC Portal	
Request Title	Request for Proposals 1
Full name of the EU Funded Project	Adapt-&-Play Holistic cOst Effective and user-frieNdly Innovations with high replicability to upgrade smartness of eXisting buildings with legacy equipment
Project acronym	PHOENIX
Grant agreement number	893079
Call publication date	1st April 2022
Call deadline	15th April 2022 - **EXTENDED to 25th April 2022**
Expected duration of participation	4 months
Total EU funding available	€40,000
Task description	As a flexible suggestion it is considered that the task carried out on this request for proposals will consist on the evaluation of the APIs of the platform of PHOENIX as well as the evaluation of the connectivity of the different components within it. Special attention will be given on the connectivity to APIs for grid communication and grid flexibility, as well as the connection of the different modules of the platform with future services developed by third parties and using the components available on the PHOENIX solution
Submission & evaluation process:	Submission and selection process are available in the Guide for Applicants (Available at the project website)
Further information:	Details available at the project website

Table 3: Announcement Information

4 Support to Applicants & Kit for Application

4.1 Project Relevant Documentation

A number of documents contain information that is relevant for this Request for proposals. This subsection provides description of these documents and their links.

D1.4 'Data Management Plan' It defines the guidelines for data management in order to ensure a high level of data quality and accessibility for final users and stakeholders and to allow the application of data analytics techniques. Furthermore, a guideline to properly handle any ethic issue related to data will be provided in this deliverable.

D2.1 'Business, market and regulatory requirements' This deliverable includes a complete description of the diverse requirements for the business exploitation and market instantiation of PHOENIX innovations. Furthermore, all legal and ethical aspect regarding to the regulatory requirements will be presented in this deliverable.

D2.2 'Social barriers and enablers, building use cases definition and requirements' This deliverable describes the potential societal and individual behavioural factors that might leverage or block the deployment of PHOENIX innovations. Furthermore, different use cases will be presented for the diverse PHOENIX innovations

D3.1 'Technical upgrades and integration mechanism for legacy equipment - Initial Version' describes the first release of the PHOENIX technical innovations to upgrade the legacy systems and appliances.

D4.1 'PHOENIX Smartness Hub implementation - Initial Version' describes the first release of the Building Smartness Hub describing data analytics algorithms, security, privacy and trust mechanisms, knowledge graphs and semantics.

D5.1 'Services for building's occupants' describes the definition and implementation of services for the building's occupants.

D6.1 'Services for energy utilities and the grid' describes the definition and implementation of services for the building's occupants.

D7.1 'First feedback from the Proof-of-Concept deployment and Introduction to the other pilots'. In this deliverable we will provide the first lessons learned about the proof-of-concept pilot in UMU as well as introduce the other pilots.

D8.1 'Communication and training' provides a report of all the communication activities and trainings conducted and the results in terms of impact achieved. It includes also any action related to the interaction conducted with consortia of other H2020 project.

4.2 Support to Applicant

The PHOENIX consortium will provide information to the applicants only via email (request4proposal@eu-phoenix.eu). No binding information will be provided via any other means (e.g. telephone or other email).

- **More info at**: eu-phoenix.eu
- **Apply via:** request4proposal@eu-phoenix.eu

4.3 Kit for Applicants

The PHOENIX Request for Proposals' support material is the following:

- The PHOENIX Request for Proposals Text (This document).
- The PHOENIX Guide for Applicants.

This document provides helpful information on how to apply to the PHOENIX Request for Proposals 1, as well as an abstract of the PHOENIX project, a description of the request for proposals, the modalities for application, the selection process, the scheme of the funding support, and how to prepare and submit a proposal.