Guidelines for Participatory and Concurrent design

Executive summary

Executive Summary: Proficient D1.2 – Guidelines for participatory and concurrent design [Confidential]

PROFICIENT; SME network business model for collective self-organised processes in the construction and retrofit of energy-efficient residential districts
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Colophon

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Publishable executive summary

The aim of Proficient project, funded under the FP7 programme 'Energy efficient Buildings (EeB)' is to facilitate Collective Self-Organised (CSO) housing for energy-efficient neighbourhoods. The target group consists of end users on the demand side of products and services and SMEs on the supply side.

The aim of the Guidelines for Participatory and Concurrent design is to identify the scope in which the PROFICIENT research acts. Therefore, the document reports findings and results based on the state of art of CSO housing in order to **define the direction** in which the PROFICIENT research can move forward, without giving prescriptive information. **It identifies and proposes strategies** to be applied in CSO Housing projects, as an emerging phenomenon that allows end-users to build their own tailor-made housing solutions. In fact, CSOs potentially represent a driver for new energy-efficient district development or district retrofitting. The *strategies* are going to be developed as suggested solutions, rules and procedures in future tasks (e.g. process models, business models). *Key concepts* to be further developed in the research are introduced here to define the perspective from which they must be applied. The concepts are analysed and defined to the extent in which they acquire a relevant significance in the research.

The Guidelines focus on the variables and fixed factors that operate in the definition of the Design process within the CSO Housing projects, at the same time entailing the description of other factors inherent to the whole CSO Housing system, as they contribute to the definition of certain Design issues. For these reasons, useful issues for the whole CSO Housing system are presented. **The issues presented are aimed to define boundaries of the research**. Collective Self Organized (CSO) housing is seen in the light of energy efficient housing projects in which a group of individuals organizes itself within a contractual agreement on a collective level for the realization of their settlement, in the case of new construction, or for the improvement of their building, in the case of retrofitting interventions.

A CSO Housing project differs from an ordinary housing process mainly because of the leading role the client, who is also the end-user, acquires in the development of the whole process. Therefore, the main characteristics of a CSO Housing process are the *self-organization*, the *participatory development process*. Moreover, the energy efficient aim is predominant in the Proficient scope. These inherent characteristics entail a high level of variability, which bring to assert that **a CSO Housing process could change from country to country or from region to region, according to the local housing policies and the social and cultural environment. At the same time, each case is a specific one depending on the level of participation of the end-users in the process and their objectives**. The advantages of building housing districts according to the CSO model lie in obtaining a high degree of customization of the settlement according to the end-user requirements, needs and objectives, and financial savings due to the absence of an ordinary project developer, a role which is undertaken by the end-user himself. Consequently, on a mere design level, these characteristics translate themselves into a tailor-made design process. The present report being a public deliverable, it also intends to provide a practical guide with suggestions, concepts, tools and principles to let stakeholders operate in any CSO design process or market.

The time issue has a considerable role in a CSO housings process, as it may determine the success or the failure of the process. Currently, CSO processes are characterized by a huge variability of duration, as the self-organization could lead to long lasting community building, development and design phases.

In exploring the scope and definition of Collective Self Organised housing, the importance of the participation of end-users and collaboration of all the actors in the different project phases of the process has been identified. Considering this, both **Participatory and Concurrent Design methods** appear to fulfil these upstream requirements coming from the definition of CSO housing.

On the one hand, **a participatory approach**, entailing the participation of the end-user in the design process, reflects the key role of the end-users, from the early beginning up to - and possibly including - the construction phase.

On the other hand, **the concurrent approach** establishes a parallel development of design activities instead of a traditional hierarchical, sequential order of steps and incorporates the knowhow of design and technical disciplines from the end of the design and building process (materials, details, management and maintenance). The concurrent approach provides a suitable basis for the integration of social, economic, and technical knowledge in the design process, as far as possible to the beginning.

The participatory design being an intrinsic factor of CSO Housing design, it should be merged with Concurrent Design for a full and optimal design method in order to achieve more effective and to provide more certain results responding to the end-users' requirements. The main difficulty in combining Participatory Design (PD) and Concurrent Design (CD) is hidden in the fact that CD essentially presupposes the definition of requirements as far upstream in the process, enabling professional parties to gain a whole knowledge of the project requirements in the early stage of the process and, thus, to deal in parallel with the different design tasks. However, the main characteristic of PD regarding non-professionals end-users is that these requirements cannot be decided and fixed far upstream in the process. One hand, CD operates as a problem-solving approach, based on the definition of downstream solutions to upstream requests. On the other hand, PD operates as an iterative design approach generating solutions throughout the whole design process. Thus, **PD and CD operate on two different levels of knowledge, the first one on a the functional side and the second one on the technical one; and they are applied by different actors, the first one by the non-professional end-users and the second one on by the professionals.** For these reasons, PD and CD generate the necessity of defining a common level of communication where the elements and actors of the PD and the CD integrate themselves in order to gain the sharing of collective knowledge and to meet the goals of the demand and supply sides.

A building system can be broken down into *technological subsystems* (e.g. structural framework, external envelope, etc.) and *functional parts* (homogeneous areas and single spaces/rooms); it can be assumed that the technological breakdown defines the items suitable for the CD approach whereas working on the functional parts is closer to the issues implemented by the PD group. Thus, the integration of PD and CD activities requires a "functional and spatial-relation entity", corresponding to a level of building system breakdown, which makes possible and compatible, the choices implemented from both the PD and CD working groups.

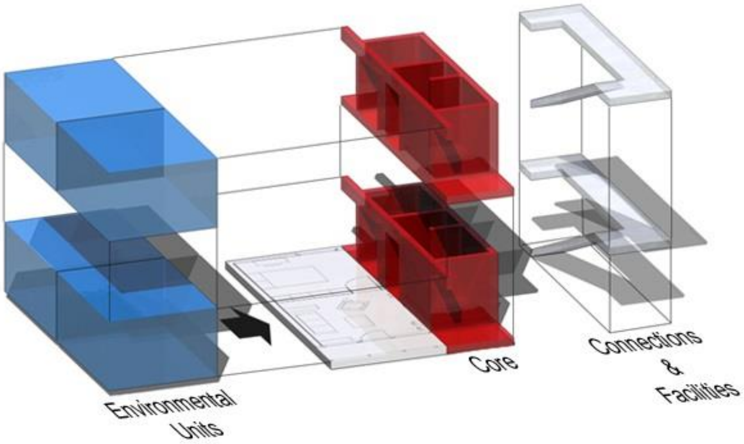

Figure 1. Conceptual representation of a system for a multistory apartment building including three types of macro-modules: Environmental units (rooms), Core (kitchen, toilet, storage, etc.) and Connection & Facilities (staircase and lift, common facilities, technical spaces, etc).

The **concept of "macro-module",** developed and applied in the IFD Project, has been adopted for this scope. The concept is based on the performance-based approach and **identifies the macro-modules as an assembly of elements originated by the breakdown of the spatial and technical systems, i.e. space units and building components.**

The **space units** are grouped into a macro-module depending on the homogeneity of functions, destinations and environmental requirement (i.e. living spaces, technical spaces, bed rooms, etc.). Environmental and functional performances of spaces grouped in a macro-module depend on the technical characteristics of materials and components used for building them. Thus the identification of a macro-module includes the definition of the technical requirements of the building components suitable to be used for every space unit.

The functional and spatial specifications defined by both the end-users and the professionals, do not identify a specific configuration of a macro-module (shape, dimension, lay-out, etc.); they define rules and standards for assembling the spaces units within configurations compatible with the system requirements and suitable for the development of design solutions. The compatible configurations of the macro-modules can be implemented during the design process or selected from an inventory of compatible solutions.

As well as for the functional and spatial configuration, the **technical specifications** identify the solutions (building components, construction procedures, interfaces, etc.) compatible with the system requirements. **Rules and standards define the performances of materials and components required to satisfy the functional and environmental requirements of the spaces of each macro-module** (including the energy-related features). Even in this case the technical solutions can be implemented during the design process or selected from an inventory of components and construction solutions compatible with the macro-module requirements.

In the scope of PROFICIENT the macro-module approach allows the design process to be flexible and adaptable to: the CSO process and business models, the typology of intervention (new construction or refurbishment/retrofitting of existing districts), the different profiles of the main actors involved in the design process (end-users, SMEs, designer). Besides, **macro-modules can represent the common base for the collective knowledge management;** inventories of spatial and technological solutions for the space units assembled into the macro-modules can be the basis for the development of a semantic web support system, that is being developed in another work package of the project.. **The result is the definition of strategic design approaches, supported by a set of operational tools, to enable the collaboration and communication between the actors of PD and CD, which could then be applied differently according to the specific development process.**

The CSO process is crucial as different expressions of self-organization and different expressions of project and end-users requirements in terms of law, constraints, objectives, etc,, entail different design process scenarios, and thus design approaches and tools to be applied. Considering this, each CSO development is *unique* and *different from another* due to the *different local contexts* (specific laws, prescriptions, such as geographical, social and cultural conditions) and the *specificity of each community* in terms of objectives, requirements (functional, legal, financial, etc.). However, each process always undergoes some precise phases, which represent the **constants of the system** (Community Building phase, Development phase, Design phase, Implementation phase, Operation/Maintenance phase). The **variables of the system** instead display themselves in the development of the content and chronological aspects of each phase, according to the start-up modality, the specific aim of the community, the country of operation, and the social, economic and environmental factors related. The CSO process is illustrated in fig 2 below.

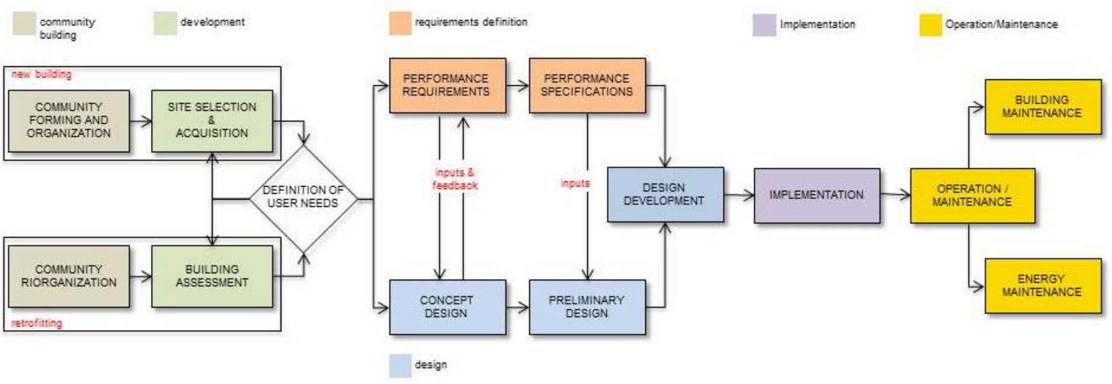

Figure 2. Illustration of the CSO process flowchart

Considering the existing examples of European CSO Housing project, the Design phase acquires importance as it begins at a very early stage of the process. The design phase relates to other phases as mostly each step of the whole process generates information, which directly affects the design phase on procedural, economic, or functional level.
At the same time, the design phase could inform the other phases according to a mechanism of *inputs* and *feedback*. A CSO Housing process does not necessarily follow a linear, sequential or chronological sequence of events but steps could be developed in parallel or could either be inverted. Therefore, the elaboration of the design stage in terms of *activities* could allow a more flexible system within which the

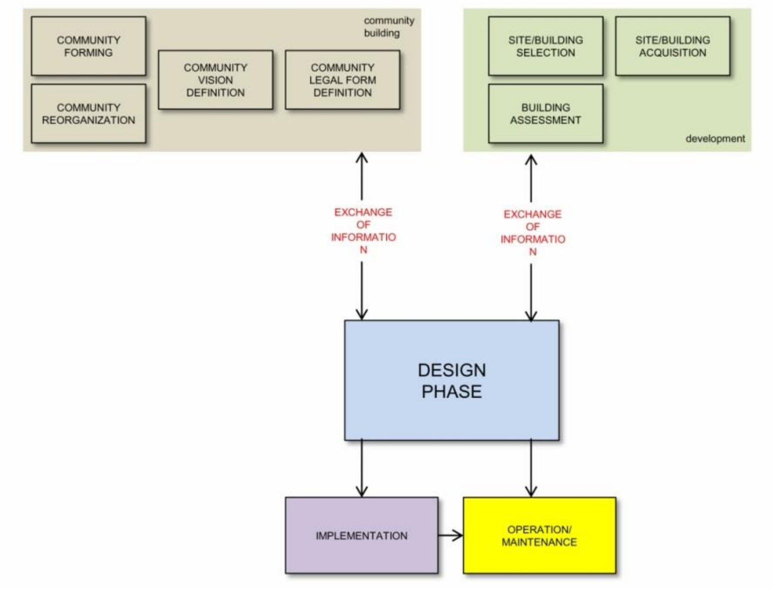

Figure 3. Diagram of the relationships between the Design phase and the other phases

necessity and requirements of the specific CSO Housing process is allowed to be developed (fig.3).
A CSO Housing project involves two possible kinds of design intervention: New Construction design intervention and Retrofit or Refurbishment design intervention. All of them require a series of activities to be done during the design phase. These design activities are developed starting from the procedures and elements of Participatory Design and Concurrent Design methods. From the **participation perspective**, it is crucial to define which are the activities the end-users participate in, the timing of participation and the tools necessary to apply to participation. From the **concurrency perspective** instead it is necessary to define the *information dependency among activities* in order to elaborate a proper team organization, defining time, roles and responsibility of each professional involved, and balancing the iterative characteristic of the process, keeping it to a fair degree . At the same time, it is essential to define the tools to allow communication and technical collaboration among professionals. These activities relate one to another according to a mechanism, which defines the dependency relationship among them in term of *information exchange required*. This is illustrated in fig 4.

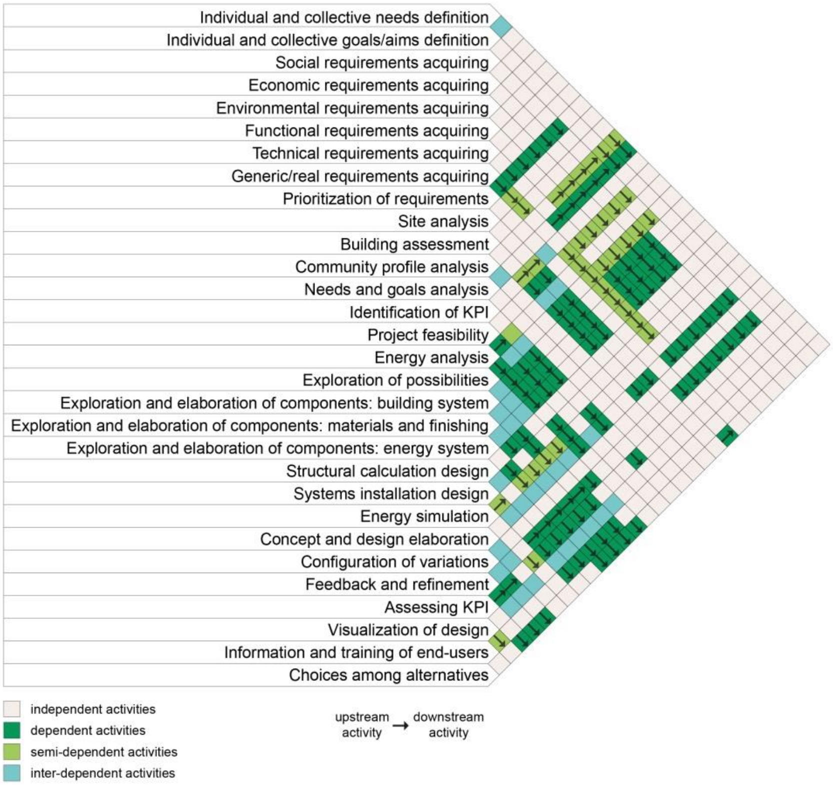

Figure 4: flow of information between different activities in a CSO housing process

The system of CSO housing design process defined is completed by the introduction of *outcomes* and *milestones*. The outcomes are the results of an activity. The milestones are the fixed points of the design process, and they display themselves on a "temporal" system to help in the definition of the sequential development of the activities. Both outcomes and milestones depend on the rules and procedures of each country of intervention. **The result is the generation of a flexible system in which different paths could be undertaken accordingly to the kind of intervention, the procedural and prescribing constraints of the country of operation, the specific necessity and requirements of each development process.**

Finally, it is worth to synthetize that whilst in a CSO Housing process energy efficiency is a preferred objective, it is mainly determined by the end-users' awareness and commitment to energy efficiency in the first place. In Proficient this aspect assumes a crucial role.