

76. Rehabilitating from the local. Guide for a more sustainable architecture and urbanism in Seville

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Abstract This article explains the research developed to provide the Guide for a More Sustainable Architecture and Urban Planning in Seville. Initially a specific document search for the context of Seville in the different areas and scales develops. Based on the experience of researchers in the field this documentation is contrasted with experience at national and international level and methodological priorities are defined based on it. Simultaneously, the approach of communication adopted is essential because it is a priority to reach both professional architects and the general public, considering so many possibilities that can be adapted to a direct, clear and concise communication of content to divulge. Having defined the design on which the information will work it begins to develop specific contents for Seville. The proposal will depend of the selection of appropriate methodologies and strategies for addressing the problem, as well as the communication skills of the document. Finally it is explained the guide's scope and the current development situation

Keywords sustainable rehabilitation, sustainable construction, urban regeneration, sustainability Guide Seville

1 Introduction

Nowadays it exists a great documentary body of reference in sustainability and construction; currently many researchers develop many aspects within this framework about it must deepen and, academically, the approach is clear, concise and increasingly stricter. However, approach's transmission to the professional who must implement it and/or to society, it's verified insufficient yet (EDUCATE Project Partners, 2012).

This research focus on this necessary transmission of knowledge to society, starting from wide doctrinal existing corpus, and goal of synthesizing, not simplifying, and developing or building an approach to necessary knowledge in order to architectonic aspects from sustainability in the local scale of Seville. For that, it makes a wide analyse of art state in terms of procedures to raise the sustainability approach in several architecture scales, such as materials and construction systems, bioclimatic design, public space design and urban regeneration and/or rehabilitation.

1.1 How to approach to sustainability from architecture and urbanism

Environmental and sustainability issues relating to architecture and urbanism, are, even today, an unresolved task whose doctrinal corpus has been significantly rooted and strictly defined although whose professional practice and social perception still lack. Numerous authors (López de Asiain, Alberich, et al., 2004), (López de Asiain, Alberich, 2010), (EDUCATE Project Partners, 2012), have claimed for decades the need of include this knowledge to the architectural education and to the own profession, but we can't certify that it had been implemented.

Partly, it can be caused by the difficult relationship between sustainability conceptualization and the physical architecture. In this way, allegation of the academic Albert Cuchí (2005) can be enlightening, which affirm in the specific field of architecture, that sustainability involves the closing of materials cycles in construction.

This approach is directly related to field of energetic efficiency so developed nowadays and in transfer process from scientific to administrative (law, decrees etc.) and in second place, to real-world experience; but it goes far beyond that, because it involves rationalisation in materials use and building systems according to its entire life cycle, in other words, taking into account the energetic consumption

that it involves its use from its extraction process, production, transport and implementation, so as to its lifetime and reuse and/or recycled as new raw material.

On this basis, it is perfectly clear the approach from construction, we are talking about efficiency (understood as ability to having someone or something to get a particular effect (Spanish Royal Academy, 2015) and efficacy (ability to get the desired or expected effect (Spanish Royal Academy, 2015) in the construction of architecture.

When scale is expanded, we are talking about architectonic design, both building and urban levels. In this case, besides keeping requirement of implied sustainability through efficacy and efficiency in the handling of information. Social component is implied in it, as it relates material and energy with people. Information exchange allows verifying physical and psychological comfort degree achieved by a specific architecture respect from their users.

Again it's necessary to address efficacy and efficiency in data management. Bioclimatic knowledge permits it from environmental technical field and involvement of future users (in the building field) or citizen involvement (in the urban field), permit it from social field.

On the other hand, we have to know that sustainability from absolute terms for building, or even urban scale is an utopia, because it is impossible to meet the required requirement of close of all material cycles in a local level. In this way, it is important to highlight how this proposal is part of the objective of improving architecture in sustainability terms, without seeking to get the absolute sustainability which it just makes sense in broader scales than involve from Seville and province.

1.2 A matter of resilience

From the searching of improvement of sustainability premise in architecture of our environment, and Seville in particular, there is no question that we are getting into improvement of local resilience field. If we understand resilience as those ability of urban systems to support events of disturbance and to preserve and recover certain functional features afterwards, it is reasonable to indicate that ensuring sustainability conditions in time of the same system (or at least, to close to them), will improve the capacity of this system in order to find balance again for disruptions which will change the context such environment as socio-economic. More self-reliant (in terms of management of material, energetic and information resources) is a system and more complicate (ability and degree of adaptation to social needs), greater will be their resilience.

It is understood, in this way, that developing a tool for improve conditions of architecture in Seville in sustainability terms, becomes at the same time, a clear effort of improvement of local resilience.

2 Context of Seville

It is necessary to define the steps taken until this moment for Seville. For that, a detailed research of track has been done, first site, then bioclimatic, environment too and, nowadays, link to sustainability; of researching, teaching, management and local architecture production. Some facts can be highlighted below.

2.1 Previous history experiences

As previous experience developed in Seville, it is necessary to highlight bioclimatic conditioning made at the Universal Exhibition in Seville in 1992, of their open spaces. Both pilot experience made through bioclimatic roundabout spaces (López de Asiain, Martín, 2001), headquarters of Urbanism of Seville today, and subsequent designs based on this experiment represent a great progress in the improvement of public space of this town area. This experience, widely documented, has become an important reference for this research.

We have to highlight too in urban terms the development of the mobility in bicycle network (Calvo Salazar, 2013) developed in the city of Seville and it is a reference to many cities in a global level.

From building point of view we can highlight some examples of bioclimatic rehabilitation of buildings such as the old America's Pavilion of Expo 92 for the headquarters of Engineering School of Seville's University; or that rehabilitations carried out in framework of the South Integral Plan in terms of integral urban regeneration.

2.2 Specific local Tools

A comprehensive survey of potentially useable tools in a local level, from documents and research reports, decrees, manuals to projects and relevant experiences such as previously described.

Selection for this analysis has followed this criteria:

- Being a recognised, rigorous and scientifically referenced document.
- Being an administrative and legislative document, complied or not.
- Answering to sustainability abovementioned aspects from architectonic and urban approach, from environmental, economic or social field.

Between reviewed documents it can highlight such as: Ecological Footprint of Andalucía report and its implementation to conurbation of Seville (Calvo Salazar & Sancho Royo, 2001); Municipal Regulation for Energy Management, Climate

Change and Seville's Sustainability (Seville Council, 2016); 'White book – guide for selection criteria of energetic efficiency in urban planning and local public building, province of Seville' (Herrera Limones, *et al.*, 2011); or published handbooks for SODEAN, which is the precursor to andalucian Energy Agency about integration of solar collectors in buildings (SODEAN s.a. y SAMA s.c., 2000) or in urban environment (SODEAN s.a., 2001).

Finally, it is necessary to refer to the research work which develop the 'System of Indicators of Sustainability in Residential Building for Andalucía' (López de Asiain, 2010), which is precursor of this research and a main technical reference. This research, though is very interesting in a technical level, however is too complex for the citizen in general, for this reason, from research, it has allowed us revise the communication type which wanted to approach with this proposal.

3 Tools, methodologies and strategies

In addition to the experiences, tools and specific technical scientific documentation of Seville, we have been taken as reference other national or international cases that could complete the local references about strategies and methodologies. There are many systems of indicators (López de Asiain Alberich, 2014) (López de Asiain Alberich, 2012) both building and urban level, have proved being great interest like a reference. It has been objectively analyzing to establish the priority themes, scales and key references.

It also has been studied several educational strategies that allow to labor the issues of sustainability in architecture and have been experienced by many European universities (EDUCATE Project Partners, 2012). And finally, the same way, it takes as a starting point related publications: guidebooks about sustainability in other cities and autonomous communities (Guide to Sustainable Building and Rehabilitation of Housing in the Autonomous Community of the Basque Country (Regional Administration of the Autonomous Community of the Basque Country. Department of Housing, Public Works and Transport and IHOBE, Public Corporation of Environmental Management, 2011), thesis (Quantification of Resources Consumed and CO₂ Emissions in Building of Andalusia and its Implications in the Protocol of Kyoto (Mercader, P. (2010)), Proceedings of National and International Congresses on Sustainability (CICSE (Seville)), etc.).

Based on this commentary it has been made the proposal Guide for More Sustainable Architecture and Urbanism in Seville.

4 Communicate Instead of Indoctrinate

We are interested to be concise and to reach out to the local citizens with inquisitiveness and committed to the environment and climate change, to serve them like a reference and to avoid a document just intended for experts.

Also, we are interested to explain that this is possible because the small area which we work, Seville, whereby we can realize much as to possible solutions for specific strategies set up by the climate.

4.1. The choice of the Middle

The final way attempts to be a guidebook with query cards focused both to non-specialized user as an experienced technician. A support material that, at the same time, it can be consulted by the house owner to be reformed as well as the technician who is going to make this improvement, by the citizen who wants to invest in the construction of a new building or the non-expert in sustainability designer which wants to implement it, beyond the exclusive energy efficiency matter in its project.

This way we get, on the one hand, that the research reach out to the public in general, and, on the other hand, that citizens uplift whit their results and can use them to improve their quality of life and its impact on the environment easy and directly.

4.2 Design Criteria

The intention of the chosen design for this guidebook is the approach both to the technical an untrained user with specific, clear and structured graphic of easy and immediate understanding. It is intended that both the graphics and the language are handy though precise and rigorous; a clear and organized structure; and a chromatic, attractive and amazing design.

5 Guide for more sustainable architecture and urbanism in Seville

The Guide for More Sustainable Architecture and Urban Planning in Seville carries out in the realm of the Municipal Ordinance for Energy Management, Climate Change and Sustainability (2012), based on the need to accomplish with the agreements made by Seville in three specific areas: sustainable development, as a result of the signing of the Aalborg Letter (1994) and its attachment to the European Campaign for sustainable Cities and Towns; climate change, having been a signatory to the Covenant of Mayors against Climate Change; and continuous improvement in energy management at the local area, a task that has already been developing since 1997, but which requires a normative and regulation adaptation.

Aalborg Agreements expect increase the awareness-raising and highlight the need for local governments across Europe to act in an integrated way to confront

the challenges in sustainability. They were designed as a practical and flexible tool for action in local environments. They are designed based on ten themes: 1. Forms of government. 2. Municipal management towards sustainability. 3. Natural commons property. 4. Consumption and responsible lifestyles. 5. Planning and urban design. 6. Better mobility and reduced traffic. 7. Local action for health. 8. Local economy and sustainable living. 9. Equality and social justice. 10. From local to global.

Also, Seville is committed to Agenda 21 that is a global action program in all areas related to global sustainable development approved at the Conference of the United Nations Conference on Environment and Development held in Rio de Janeiro in June 1992. It requires changes in economic development activities, based on a new understanding of the impact of human behavior on the environment.

5.1 Aims

The aims proposed in this document Guide are:

- To promote the culture of sustainable construction, environmentally friendly and energy cycles of ecosystems
- Provide a common long-term vision of Seville as Sustainable City
- Involve and implicate governments, technicians (designers, architects and builders) and Citizens (energy consumers)
- To be a reference document for technicians, organizations and citizens, with scientific and technical guarantee, which should be under continuous review to be valid. Flee from a filling propagandistic document cursory information and hackneyed
- To be useful for both renovation and rehabilitation as new works, which want to be made according to the rule of sustainability
- To be configured as a protocol recommendations in all phases of the project (choice of materials, products and systems), the Construction (waste) and the subsequent maintenance of the building. It could become at a later regulation. The normative development should make possible the implementation of the measures.
- At the first, it would not be prescriptive or normative against other mandatory normative (CTE, RITE, urban planning, etc.), although it would be informative in times of important awareness-raising and commitment to the environment and climate change. However, it could have incentive character to the citizen that contributes to energy saving or improving the sustainability of Seville getting qualification and certification by the Seville City Council, through the Agency of Seville for Energy and Sustainable. These incentives, proposed by the ordinance itself would be:

- City of Seville Prize to Sustainable Development for remarkable ac-tuation
- Voluntary Certification of Sustainable Establishment for: contribution to the Urban Sustainability (energy improvement, reduce emissions, and / or Social, Economic and Environmental Development
- Tax bonus: in urban licenses, taxes such as IBI, etc.
- The guide must be unique in Seville, according to their morphology, historical and cultural background, geographical location and specific climatic parameters

5.2 Accomplishments

The Guide expect to have a broader range than purely constructive and open out to other areas and scales which are previous to the construction of the buildings that are decisive in key aspects of sustainability.

It will consist of several documents:

1. Guide for more Sustainable Construction in Seville (materials and construction systems scale). Analysis of the predominant building systems in Seville and Protocol for selection and design them from sustainability.
2. Guide for more Sustainable Architecture in Seville (scale buildings and immediate-around). Protocol for bioclimatic and energetically efficient architecture design include water cycle and materials management
3. Guide for more Sustainable Urban Design in Seville (scale space Urban). Protocol for urban spaces design at Seville climate to guarantee their habitability based on psychological aspects of using of them
4. Guide for more Sustainable Urban Planning in Seville (scale urban planning). Partial plans, improvement and rehabilitation of neighborhoods from sustainability
5. Guide to Guidelines for more Sustainable Territorial Planning in Seville and its environment (scale territory). Metropolitan area of Seville. Guidelines for future general plans and / or territorial

Nowadays, the part that is being developed is the “Guide to a Sustainable Construction in Seville”.

5.3 Essential Features and Structure

This double approach user-technician is directly reflected in the structure and design of each Card, where a first more visual part, with beginning concepts ade-

quately defined and the fundamental support of the use of representative iconography is complemented by a second part with a language more technical and specific where it completes the prescriptions.

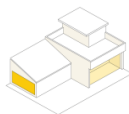
A clear division in key parts of the building envelope as well as usability issues and energy allows easy location of the Card that describes the performance improvement plan we are looking for.

The design guidelines are contemplated from the beginning and in parallel to the development of content, so that it accomplishes the objectives. Each Card is identified by an acronym and a colour of each part of index which it belongs to. The first visual element that helps us understand the described intervention is a simple 3D scheme that allows us to locate, on a housing, an element or system. This 3D model is made using the BIM methodology (Building Information Modelling) applied to existing relevant examples of sustainable architecture in Seville, running itself as a laboratory or a virtual model of the aspects studied and developed for this Guide.

The following approach to the content of each Intervention-Card is performed by the perception of own simple graphics highlighting its repercussion on sustainability, either in aspects of energy, materials, health...(Fig. 1)

FA07
Sustitución y nuevas carpinterías Vidrios

Actuaciones en Fachada - Ventanas II



repercusión de la medida en sostenibilidad

energía materiales recursos movilidad salud

objetivos

- Modificando las características del vidrio, podemos conseguir que el calor se acumule en el interior o que no entre en el edificio, según quiera favorecerse la captación solar o no. En climas cálidos, como es el caso de Sevilla, es conveniente reducir la ganancia de temperatura en verano para minimizar el consumo de refrigeración. En fachadas donde incide el sol directamente debería emplearse **doble acristalamiento** con control solar y una adecuada protección solar para el verano.
- Podemos reducir la transmisión del ruido exterior hacia el interior, para aumentar el confort de la vivienda. Una solución muy recomendable es el empleo de **vidrios laminados**.

actuaciones de mejora

+ Sustitución de vidrio
Si se tienen ventanas con vidrios simples, podemos cambiarlos por vidrios dobles con **cámara de aire** (para reducir la **transmisión térmica**) o por **vidrios laminados** (para reducir la **transmisión de ruido**). En el caso de marcos donde no se puedan colocar vidrios de mayor grosor, deberemos sustituir la ventana completa.

+ Láminas de control solar
Láminas adhesivas y transparentes aplicables a vidrios existentes, que mejoran las propiedades del vidrio sin necesidad de sustituirlo.

+ Doble carpintería
En ocasiones es conveniente duplicar carpinterías y colocar una nueva ventana hacia el exterior de la existente, conservándola y mejorando el **aislamiento acústico**.

tablas de datos

Características acústicas

VENTANA SEVILLA		VENTANA MADRID		VENTANA BARCELONA	
Distancia entre ventanillas: 12 cm		Distancia entre ventanillas: 12 cm		Distancia entre ventanillas: 12 cm	
Accristamiento	Sistema de apertura	Accristamiento	Sistema de apertura	Accristamiento	Sistema de apertura
Tip. Exterior simple	Tip. Exterior simple	Tip. Exterior simple	Tip. Exterior simple	Tip. Exterior simple	Tip. Exterior simple
Distancia entre vidrios: 12 cm	Distancia entre vidrios: 12 cm	Distancia entre vidrios: 12 cm	Distancia entre vidrios: 12 cm	Distancia entre vidrios: 12 cm	Distancia entre vidrios: 12 cm
Distancia entre marcos: 12 cm	Distancia entre marcos: 12 cm	Distancia entre marcos: 12 cm	Distancia entre marcos: 12 cm	Distancia entre marcos: 12 cm	Distancia entre marcos: 12 cm

Características térmicas

VENTANA SEVILLA		VENTANA MADRID		VENTANA BARCELONA	
Distancia entre ventanillas: 12 cm		Distancia entre ventanillas: 12 cm		Distancia entre ventanillas: 12 cm	
Accristamiento	Sistema de apertura	Accristamiento	Sistema de apertura	Accristamiento	Sistema de apertura
Tip. Exterior simple	Tip. Exterior simple	Tip. Exterior simple	Tip. Exterior simple	Tip. Exterior simple	Tip. Exterior simple
Distancia entre vidrios: 12 cm	Distancia entre vidrios: 12 cm	Distancia entre vidrios: 12 cm	Distancia entre vidrios: 12 cm	Distancia entre vidrios: 12 cm	Distancia entre vidrios: 12 cm
Distancia entre marcos: 12 cm	Distancia entre marcos: 12 cm	Distancia entre marcos: 12 cm	Distancia entre marcos: 12 cm	Distancia entre marcos: 12 cm	Distancia entre marcos: 12 cm

detalles constructivos

Vidrio monolítico con cámara de aire-laminado






Lámina adhesiva de control solar



Vidrio bajo emisivo



Vidrio de control solar

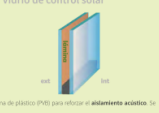


Fig. 1 Intervention-Card's example

5.4 Contents

The main content of the first part of each Intervention is its definition and objective, which directly introduce a series of Performance Improvement Plan where a brief written description is accompanied by a photograph to easily identify the item or system on which a constructive recommendation, design or usability is outlined.

6 Conclusions

Although this research is still in development, there already are some conclusions:

1. The need to work on defined and specific local area contexts in order to address a close and clear approach and propose solutions or concrete applicable strategies for all kind of professional and comprehensible to the citizens. The guide has been developed this ways so that it fits perfectly to Seville's context.
2. The importance of specific strategies and accurate methodologies to assist in making evidence-based decisions to professionals and/or citizens because of the breadth of the topic and concrete solutions do not always meet the expectations of each case study.
3. Specialized, professional and academic knowledge transmission to society needs an important, difficult and careful effort of simplification and explicitness on broadcasting means to be useful and recognizable.
4. Sustainability is a broad and generic concept, difficult to quantify from a specific technical point of view.

After the developed research the utility and relevance of the complete and precise development of the Guide for a More Sustainable Architecture and Urban Planning in Seville is confirmed.

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