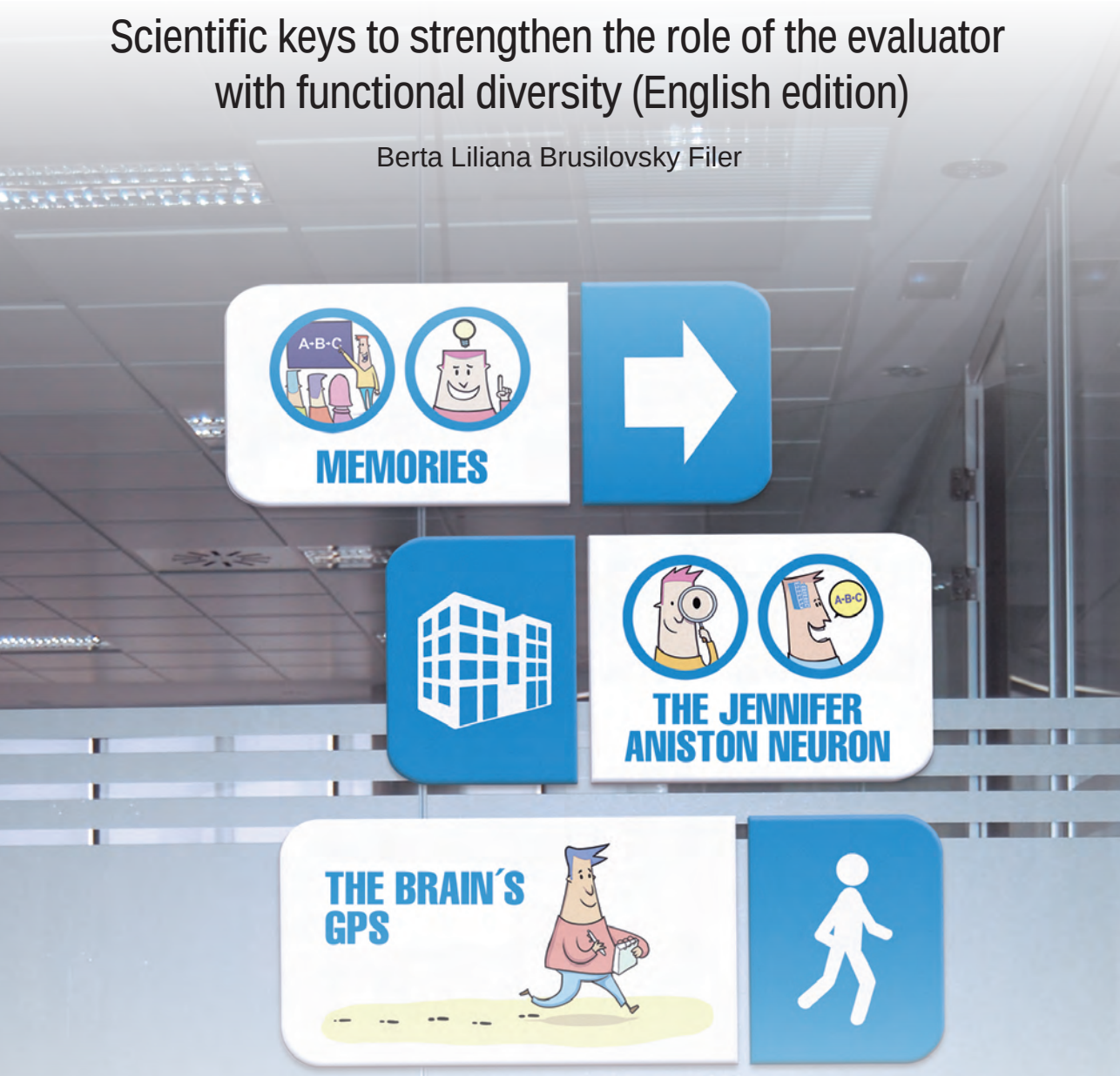
COLLECTION ON DEMOCRATIZING ACCESSIBILITY. Vol 18

EVALUATING COGNITIVE ACCESSIBILITY

Scientific keys to strengthen the role of the evaluator with functional diversity (English edition)

Berta Liliana Brusilovsky Filer



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La **Ciudad** Accesible
Accesibilidad Universal, Usabilidad y Diseño para Todos

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Prologue

This is the third book written by architect Berta Liliana Brusilovsky Filer, an Argentine-born author of Spanish nationality who has worked and conducted research in different countries around the world throughout her long professional career. Without a doubt, the career of this woman, determined to fight for and attain recognition of architectural design from a cognitive design perspective, has led to these publications that place a greater emphasis on design, taking into account cognitive accessibility.

These publications chronicle the extensive and interesting work carried out on the guidelines and methodologies to be implemented when designing accessible environments for people with intellectual or developmental (cognitive spectrum) disabilities. In addition, they discuss strategies to fully include these people in environmental design processes, a novel and innovative aspect of the methodology proposed in this book and based on the author's own experiences in recent months.

I have known Berta for several years now and from the time we met, with her optimism and more than 20 years of work and research experience, she has never given up on her dream to improve established classic methodologies, thus creating an efficient work model that can be applied to pre-existing environments and new designs that we propose.

Certainly, within the study of universal accessibility, the specific topic of cognitive accessibility has been one of the least researched

until now. These types of publications are important and necessary since they add value and bring issues to light that until now were considered secondary or were not even considered at all.

It is also strategic that this discipline of specialization is beginning to appear in universities and schools of design and it takes into account topics such as easy reading, spatial orientation, signage, etc. We should always ensure that communication between the environment and the person exists and that it is accessible so as to not exclude anyone from the processes of interaction. Once again, professional training is the key to being able to efficiently and consistently implement accessibility.

As an architect specializing in accessibility, I believe that cognitive accessibility is a fundamental aspect in the design of public spaces and, of course, in the urban environment, since the application of these criteria not only benefits individuals with cognitive disabilities, but also directly benefits children, people with the onset of dementia or Alzheimer's Disease and of course, all those who are new to an environment or city. This is due to the fact that the criteria applied is directly related to cognitive abilities and information processing, attention, perception, memory, problem solving, comprehension, analogies, etc. For this reason, its application in the design of comprehensive environments for everyone is so interesting.

Since its beginning in 2011, La Ciudad Accesible has maintained that accessibility should be understood as a matter that benefits everyone in their diversity. Applying basic principles of accessibility in design process helps us find solutions that provide safe and comfortable environments that everyone can use.

As for cognitive accessibility, which we define as the set of requirements that environments, products and services should meet during their process of communicating and interacting with the user so that information is accessible, it is important to remember that depending on memorization as a tool to remember information should be reduced, the largest possible number of complementary formats, whether they are visual, audio or with several pictures, should be used, the recipient should reduce their need to use complex organizational skills, and there should be vocabulary or a reading level that matches the comprehension level of the receivers, etc. In short, it creates environments that make

people more independent on all levels of interaction. With regard to previously discussed concepts, this book provides developments based on key research in neuroscience.

Given the implementation of accessibility criteria and scientific research in this field, which I consider to be fundamental and necessary to make progress towards establishing this topic as a basic element of academic training, universal accessibility, as it has been understood since I started working in this field, is closely related to obtaining equal opportunities. This basic relationship must exist and be understood so that it can be applied correctly, since it involves working from a point of view that takes into account human diversity when designing spaces, products, goods and services.

We are often influenced by very limited, standardized design patterns and we must make an effort to broaden these criteria and basic patterns by keeping human reality in mind. For that reason, accessibility should be considered a discipline in and of itself that takes into account human, evolutionary and design criteria. It is a discipline that aims to recognize that diversity-based designs provide opportunities for everyone in our cities without factors of exclusion and with equal opportunities, a fundamental key to moving forward as a society.

In this prologue I should also thank the editorial work of La Ciudad Accesible which brings us high quality publications every day at no cost to both authors and readers, emphasizing its efforts to spread the word and philosophy of 'open code accessibility', thus giving a voice to authors and research work that would otherwise be forgotten since they are considered to be of limited interest to the general public, despite the fact that download data and views of this publishing house's books clearly tell us that interest in accessibility growing.

As stated in CEAPAT's publication from November 2015 titled 'Cognitive Accessibility' by Cristina Larraz Istúriz, Head of the Architecture Department of this organization and where Berta collaborates with her expert opinion, cognitive accessibility is understood "*as the right to understand information given to us by that the environment, to control our communication with it and to easily carry out activities in it without discrimination based on age,*

language, emotional state or cognitive skills. When we speak of environment, we refer to spaces, objects, tools, belongings, services and activities."

Sharing accessibility, good practices and criteria with respect to diversity and inclusion in design processes will make it easier to have cities that are more accessible, sociable, friendly and, above all, comfortable on a daily basis.

Granada, March 23, 2016.

Mariela Fernández-Bermejo

Architect specializing in urbanism and accessibility. Mentor in urban comfort, accessible smart cities and human diversity. Master's degree in Urbanism (University of Granada), Master's degree in Accessibility and Design for All (University of Jaén), Master's degree in Urbanism, Planning and Urban Management (Official School of Architects in Granada) and Expert in Universal Accessibility and Physical Environment (University of Granada). She is a researcher of public space as a social promoter with the variable of accessibility and participation, and is now in the process of earning her PhD. She is committed to the urban environment and her work in recent years has focused on the humanization of cities and the democratization of universal accessibility so that it can be guaranteed to everyone, without any type of exclusion. She was president of the Spanish Association for Professionals of Universal Accessibility (ASEPAU) and Technical Director of La Ciudad Accesible. She is currently Territorial Delegate of Promotion and Housing for the Government of Andalusia.

Biography of the author

Berta Brusilovsky Filer. Architect and Urban Technician, with a Master's degree in Accessibility and Design for All. University professor on topics relating to urbanism, historical centers and cognitive accessibility. She has published several articles on urban planning, historical centers and accessibility.

She speaks at national and international conferences, and thanks to this publication she has participated in the World Mental Health Congress of AASM in Buenos Aires, Argentina (2013) and in the 7th Argentine Down Syndrome Congress, Fundación Tigre for Inclusion, Argentina (2015).

Over the last few years, she has been researching, creating and spreading awareness about the model for designing accessible spaces (cognitive spectrum) with which she works, including people with intellectual or developmental disabilities when diagnosing and evaluating environments and buildings with the participatory methodology. The model and methodology received the '2015 Good Practice' Award given by the Design for All Foundation.

In 2015, the Association for the Easy Understanding of Environments and Buildings was created and an agreement with Afanias was signed to work with occupational centers under evaluation.

She is also a teacher at the International School of Universal Accessibility, Usability, Design for All and Attention to User Diversity (EIA) of La Ciudad Accesible.

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To those who research, publish and spread awareness about knowledge so that professionals can have a positive influence on the quality of life of many people:

- John O'Keefe, May Britt Moser and Edvard I. Moser. 2014 Nobel Prize in Medicine.
- Rodrigo Quian Quiroga, for his interesting discovery on concept neurons: the "Jennifer Aniston" neuron.
- Ignacio Morgado Bernal, for his great help and understandable texts on memories.

For sharing experiences:

- Antonio Tejada. La Ciudad Accesible, Publishing Company and La Ciudad Accesible EIA.
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- Afanias. Marisa Cazorla, Technical Director.
- Afanias Plegart-3 Occupational Center. Assistant Director, David López Blanco.
- Nieves Navarro Cano, Head University Professor, head of the university course "Universal accessibility applied to buildings." Tenured Business Director. ETSEM-UPM.

• Students in the course “Universal accessibility applied to buildings”. ETSEM-UPM.

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• EspacioCaixa Madrid. Director, Mar Barón Catalinas and elderly volunteers. CaixaForum Madrid, coordinators of the exhibition center.

• Course “Universal accessibility in urban environments”. School of Architecture and Geodesy. University of Alcalá de Henares. Staff, teachers and students of the Pablo Picasso Special Education Public School (C.P.E.E) in Alcalá de Henares.

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Antonio Tejada, Iván Fernández, Berta Brusilovsky and Mariela Fernández-Bermejo.

Opening remarks

This book allows for reflection on systematic collaboration between research, experimental work and debate groups.

- It promotes the link between social sciences and sciences that have become successful in recent years. These sciences began to show results in the mid-20th century and had surprising discoveries in the 21st century in the fields of psychobiology, neuroscience and neuroengineering, the latter being an indispensable technological support. In addition, cognitive neuropsychology is a branch of psychology that focuses on the relationships between different brain structures and functions with specific psychological processes.

- It includes developments provided by the environment and architecture, since the theoretical and experimental component of the book is a model for designing environments and buildings. It is based on the need to promote the adaptation of human activities, ways (their meaning), and their relationships to improve the behavior of people, facilitating their positioning and spatial orientation.

Achieving this is made possible by the scientists who work to help people, their quality of life and encourage inclusion. This work mentions people who have not always actively and consciously participated in activities that promote a developed society in which everyone deserves to participate in their own right[1].

[1] United Nations. 2006. Convention on the Rights of Disabled People.

The key factors for increasing knowledge and having its results affect everyone are the permeability of all institutions and an increased awareness of their achievement.

This is based on the series of documents published as the "Model for designing accessible spaces, cognitive spectrum" (La Ciudad Accesible publishing house, 2014 and 2015), and it focuses on the participative methodology (Record entry 16/2105/3448) to work with users, people with intellectual or development disabilities, in an inclusive way. It was made with the intention of improving the performance of evaluators in cognitive accessibility, and thus provide incentives for their participation in environment and building diagnostics, supporting technicians and specialists in universal accessibility.

The creation of a new and different labor profile with social influence, in which skilled people who support the technicians give their opinion and collaborate on the design, has two important elements that validate the method and research on matters relating to inclusion that continue to be developed.

It is known that there are socially valued roles, and this is one of them. However, it does not simply entail putting a role on the list of employment alternatives. This activity, when carried out by people with different abilities or cognitive or intellectual skills, provides theoretical and practical concepts to the practice of universal accessibility which are not yet included in the current legislation on universal accessibility. Finally, it provides environments and buildings with a set of design, comprehension and reference qualities that without the participation of the people involved in the process is nearly impossible to attain.

The people define their work as "committed". This commitment is supported by the development of the methodology, since the best guides and instrumental tools are sought after so that these people, and not only people with absolute autonomy, can participate. Dependent people whose opinion is of interest participate in these processes, broadening the criteria so that the selection of profiles is broader and the results are more substantial, as seen here through the documents.

This space is open to other contributions but it is not considered to be under construction since it has been the object of reflection

and is supported with research and multiple experiences. However, new material can be admitted if they are of interest for the model and the method. It is expected that the readers, as well as the organizations involved, are those that continue to work and introduce new knowledge.

Image 1. Afanias Plegart-3 Occupational Center with ETSEM-UPM students. March 2016.

The Convention on the Rights of Disabled People announces:

> *"Why hold a Convention? Why do we need a special convention for disabled people? Don't they have the same rights as everyone else?*
>
> *In a perfect world, the rights listed in the Universal Declaration of Human Rights would be enough to protect everyone. But in practice, certain groups, such as women, children and refugees, have fared much worse than others and international conventions aim to protect and promote the human rights of said groups. Likewise, the 650 million people who have a disability, approximately 10% of the world's population, lack opportunities that the general population has."*

Structure of the book

The book is structured according to research conducted for more than 18 years, the results of which have been the publications and inclusive participatory processes that make up the experimental material of the text.

An introduction and grounds for the proposal is provided, where the reasons of interest are clarified and the theoretical and experimental objectives, results obtained and recommendations for professionals and organizations that wish to work (i.e. design and evaluate) with an inclusive and systematic perspective of urban environments, architecture and design are developed.

The sequential structure of the book is as follows:

Introduction.

- Objectives.
- Work method.
- Systemic focus.

These sections justify the work carried out which involves people and currently focuses on including them in society and in universities that open their doors to them. These people would carry out a valued work role that would correspond to that of evaluators of environment and buildings who support technicians specialized in the field.

Background.

The "Model for designing accessible spaces, cognitive spectrum" and the "Participative methodology for evaluation" (Intellectual Property Registry 16/2015/3448) are the background material expressly created to train attendees with different cognitive profiles who can participate in courses on cognitive accessibility, aiming to form a team with technicians and specialists in universal accessibility.

This section of the book intends to inform readers who are unaware of the model and participative methodology about the interactive dynamics of cognitive accessibility, so that they feel the need to read the text that is the source of subsequent texts.

Scientific research to improve the model and methodology.

Research is key to growth and improvements in the model and participative methodology, facilitated by laboratory studies and studies on patients which, since the mid-19th century, have allowed a set of theories related to cerebral function and memory to develop.

- Memories.
- Rodrigo Quian Quiroga and the "Jennifer Aniston" neuron concept.
- 2014 Nobel Prize. The brain's GPS.

Experiences and results. Conclusions.

Recommendations based on experience and conclusions needed for continuing to innovate in scientific and methodological matters.

Bibliography.

The experimental bibliography and theory gather experiences and the best texts which, without their consultation, would not have allowed us to arrive at the results and recommendations.

Table of contents

1. Introduction

A long list of publications and research and nearly 20 years dedicated to an ongoing process have been necessary for cognitive accessibility to appear in texts and regulations on universal accessibility.

During this time, significant progress has been made, further engaging in research that has defined and structured a work method and a model for designing and evaluating environments and buildings, enriching it with information based on theories, experiences and continued practice. In 2014, the first edition of the book "Model for designing accessible spaces, cognitive spectrum" was published and in 2015, its second edition "Cognitive Accessibility. Model for designing accessible spaces" was published.

Three years ago, a participative methodology based on texts previously written by professionals to evaluate how non-specialists understand the spaces included in this methodology was published and registered. This methodology sought to integrate the work of technicians in universal accessibility with users that form part of

this broad group of people with intellectual, developmental (i.e. cognitive spectrum) or other disabilities, who due to some reason, age, accident or state, have lost some intellectual abilities or skills, especially those related to memory and orientation.

As progress has been made in understanding the method, it was concluded that implementation of the model promotes the construction of spaces that are accessible to all. When applying the design concepts and components, these spaces must be meaningful, recognizable and easy to use.

The objectives of the model and method require user participation, which has been possible thanks to the agreement with Afanias and networking with ETSEM-UPM, the University of Cartagena, La Ciudad Accesible, Madrid Art School 10, and the University of Alcalá de Henares, as well as other local organizations interested in participating.

Work has been carried out with users and Afanias centers for two years, and a large group of centers in Spain are using the model through La Ciudad Accesible EIA online courses to make their spaces more welcoming. Work has also been carried out in Buenos Aires with technicians from CONADIS Argentina.

This type of work has increased in occupational centers and organizations. However, the most significant event with regard to the inclusion project for disabled people is the participation of the Polytechnic University of Madrid. This was possible thanks to the opportunity given to the team in which highly sensitive professionals of universal accessibility showed interest in this proposal. Tenured University Professor Nieves Navarro Cano, head of the university course “Universal accessibility applied to buildings” at the Polytechnic University of Madrid Technical School of Buildings, accepted, along with others, the challenge by signing a collaboration agreement between ETSEM-UPM and Afanias. For two years, the training of more than one hundred students in cognitive accessibility in this elective course has demonstrated that applying an inclusive work model and method is the way to change and create awareness in society with regard to the fact that the technicians responsible for the environment and buildings cannot be replaced in the process of design, diagnostics and spreading awareness.

1.1. Awards and Presentations

• Recognition of the "Good Practice 2015 - International Design For all Foundation Award. 2016".

• Workshop on accessibility and automation, ASISPA-IMSERSO. 2015.

• Congress on Down Syndrome. Tiger Foundation for Inclusion. (Argentina) 2015.

• Congress on Innovations in Accessibility, University of Huelva. 2014.

• Symposium on disabilities. City of Mercedes (Argentina) 2014.

• World Mental Health Congress in Buenos Aires (Argentina), World Federation for Mental Health. 2013.

Image 2. Author of the book at the UPCT Summer Courses. 2015. Image 3. World Mental Health Congress. 2013.

2. Objectives

2.1. General

Full inclusion of people with intellectual or developmental (cognitive spectrum) disabilities through their participation as support, along with technicians specializing in universal accessibility, in order to evaluate and design environments and buildings.

Groundbreaking research on neuronal function, memories and the brain's GPS helps the model and methodology as key elements of the general objective.

2.2. Specific

Improve how people with intellectual or developmental (cognitive spectrum) disabilities work in their role as evaluators of environments and buildings, as they support technicians in accessibility and based on the integration of the following systems:

- Concepts of the model for design.

- The participative work method with users.
- Implemented improvements that take into account concepts and experiences of the work carried out by researchers in psychobiology and neuroscience.

Improved functioning achieves the following:

- First, the participative work method with users and implemented innovations that take into account the discoveries made by well-known researchers, all of which are based on working with the concepts of the model for design,
- Second, the role of diverse evaluators is included in the teams that collaborate with technicians in universal accessibility.

This participation contributes to improving actions and behaviors, since it involves a participative and inclusive method. By using complex concepts for professionals, content is then adapted to abilities, identifying and incorporating their personal, regular and group vocabulary, which they themselves created through the original model. In short, the following is sought:

- To strengthen the role of the evaluator.
- To foster their participation in multidisciplinary teams.
- To perfect training methods.
- And finally, from the perspective of their qualified intervention, to use their abilities as evaluators to improve the quality of the environments, buildings and services that can be enjoyed by all.

System interaction leads to the following interesting results: it can be demonstrated that during a period of time, the time that passes from when a subject (position or place) moves from one place to another (sequence), the reality that surrounds it (the outside) does not negatively affect the processing of the person-space-time experience if continuity is not broken. A sequence or succession uninterrupted by external circumstances makes it possible to construct spatial cognitive maps, even in subjects that have severe brain disorders[2].

[2] Cases such as that of Henry Gustav Molaison that have been studied in depth since the mid-20th century. His brain is currently preserved at the University of San Diego, available to scientists interested in studying his case.

With the positive results from research and the scientific texts that are included, the aim is to overcome constraints and treatment (i.e. marginalizing vocabulary) that act as obstacles and barriers to the development of people and their participation as rightful members in their community and in society in general[3].

[3] Convention on the Rights of People with Disabilities. United Nations. 2006.

3. The work method

3.1. Systemic approach

3.1.1. Background

The systemic multidisciplinary approach refers to the origin of the author's research work. All theoretical texts, experiences and analyses involve people as protagonists and space as a medium (location-direction-orientation-destination).

Practice, however, is what has led to the "urgent need" to implement a specific, participative and multidisciplinary methodology, which is a requirement of the work model itself, which has a life of its own, and which includes people who, through their interactions, evaluate and design with and from their qualities and abilities.

Integration of the model and the participative method (theory and practice) has created the need to incorporate other theoretical and behavioral characteristics of users to clarify the circumstances and use them to improve the quality of the evaluation activities. This theoretical and practical exchange of conclusions made

from material coming from current research (i.e. on memory and neuronal function), and which was put into practice to organize the development of the work of the evaluators, enhanced the processes and results without making those who carried out the work feel "observed or assessed".

3.1.2. Training of professionals

The experiences offered through the inclusive course on Experts in Cognitive Accessibility (La Ciudad Accesible EIA), in which professionals of different specialties are trained in this subject matter, led to very interesting conclusions that would not have been possible with the sole participation of technicians in buildings or technical legislation. The comprehensive perspective they provided when carrying out their practical work demonstrates that the lack of a systemic approach would lead to inconsistent results focusing on the need to delimit spaces. Since this condition is necessary, the model and experiences led to conclusions relating to organization and spatial dimensions, which is known as the "regulations for cognitive accessibility" (although it still has not been included in the official documents that explain the current legislation on universal accessibility).

3.1.3. Developing the systemic approach

This approach, also known as the system approach, means that objects and phenomena should not be regarded as individual elements, but rather as part of a whole, for example, the human being is a system within a system.

This approach originates from the development of science and technology in the 20th century. As a result of these times, the ideas of systemic approach were perfected in the second half of that century and applied to various areas of production and services, scientific research and technological processes. Furthermore, this had an influence on how social, psychological and pedagogical processes were envisaged. In the process that is being developed, systemic approach favors its improvement, as well as its planning and its objective, in this case, the full inclusion of people.

It addresses the problem of complexity through a way of thinking based on the whole and its properties that complements scientific reductionism. It is not the sum of elements, but rather a set that

interacts in a comprehensive way in order to produce new qualities with different features, the result of which is greater than that of the components that form it and which leads to a jump in quality.

This jump is evident given the high production of training materials that have become necessary, as well as the many ways of carrying them out, whether they are textual, graphic, video or with or without sound. In addition, they can be viewed with any current technological device used by technicians as well as users themselves, for example, tablets, telephones, etc.

3.1.3.1. Structure and function

"A system can be divided structurally but not functionally, since the organization and interaction of its elements do not allow it due to the fact that some of its essential properties would be lost with the division. The features or behavior of each element influences the properties or behavior of the set as a whole. New properties that are not the simple sum of the properties of each element arise from the interaction among elements[4]". This definition of the system, similar to interlocking gears, is important when keeping in mind that the absence of one of its components would lead to a loss of energy that, without breaking it, would alter objectives and thus minimize results.

3.1.3.2. Interaction

The systems used for research on neuronal function and on the brain's GPS are combined, and they confirm the model's hypothesis (organization, observation, perception, orientation) and increase the performance of people in their experimental work when evaluating environments and buildings in cognitive accessibility.

3.1.3.3. Integration

Integration corresponds to the mechanisms that ensure system stability. This is confirmed through their evaluation and growth which allows for feedback. In order to ensure that a systemic structure has been made, the three following processes, which are

[4] Gay, Aquiles and Ferreras, Miguel Ángel. 2014. Technological education. Notes for implementation. Prociencia. MC and EN. Available at: http://es.slideshare.net/JuanGarciadecossio1/libro-aquiles-gay-tecnologia.

very clear in this case, should be checked:

- An element that breaks down the system is removed.
- The set reinforces the function of the isolated elements.
- Performance is truly higher in all cases carried out.

A result of this approach, which can establish several purposes as well as participants (interests), develops the project or study. For some, it will be related to the main objective and specific objectives, i.e. inclusion, design or evaluation of environments and buildings, drafting of legislation, etc. While for others, it will entail understanding the functioning of people who with the surrounding space interact in a systematized way via a work method that provides them with guidelines for the evaluation. It is also possible, however, that there is an interest in identifying how people react to different space stimuli and stimuli with formal and sensory aspects.

It is also possible that through the aforementioned practices, those who participate can reach conclusions based on actions related to the study and future interventions. The figure below defines the system which involves the participation of the following elements:

- A design method that defines the space as a set of supports. Legislation is used as the origin and that which should be developed is added to it (+). The method includes a set of background information focused on people, spatial orientation systems and perception.
- Professionals trained in accessibility (technicians) and technicians trained in the participative method.
- Inclusive formulas to work on designs with diverse participants and individuals who support others to assist them when necessary.

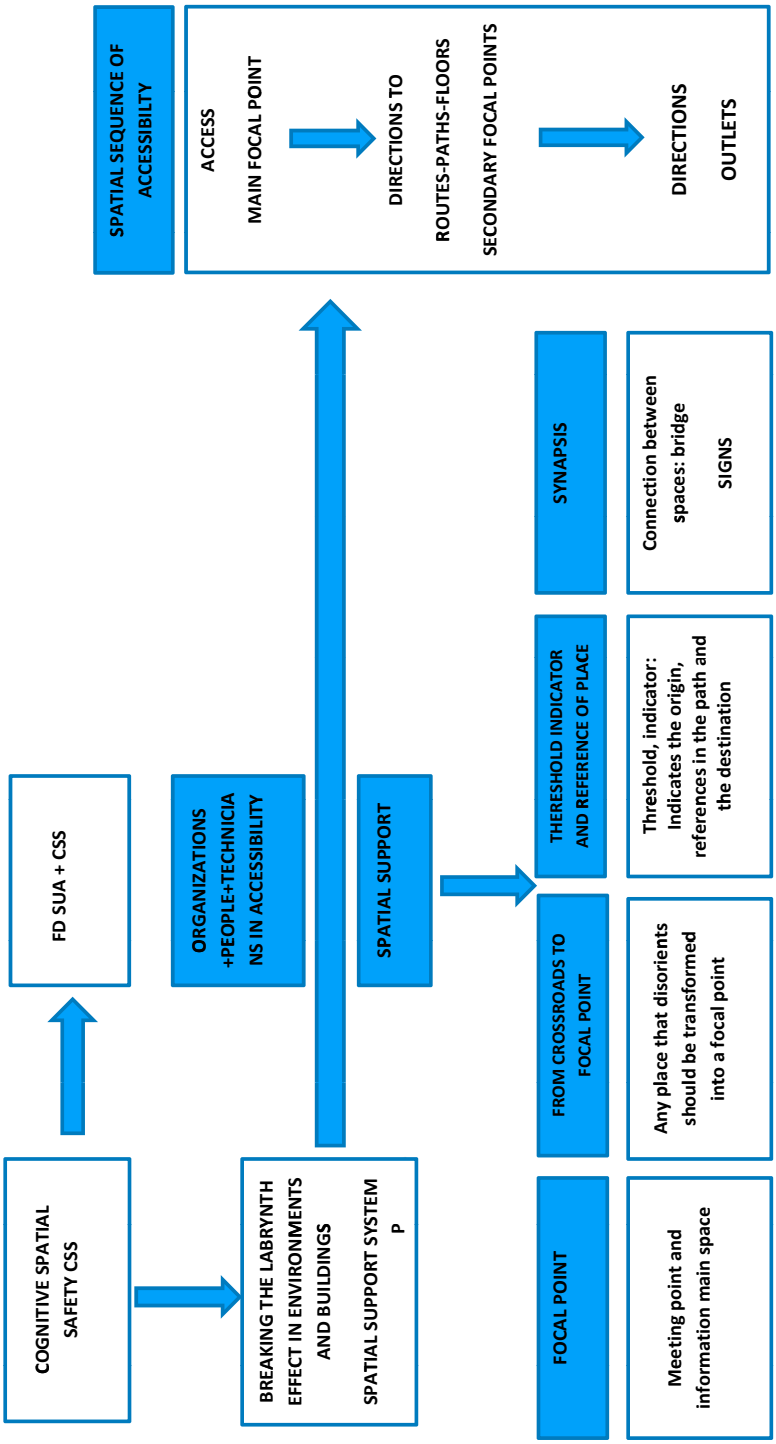


Figure 1. The system of internal and external relations, model for designing accessible spaces. Berta Brusilovsky Filer and Francisco Javier Márquez (EIA Experts).

3.2. Experiences

The cited examples form part of the work carried out and only partial examples are included since a large amount of material is generated in courses and projects on the model and method. The examples are available for reference with prior notice given to those responsible for drawing up the information within their organizations. The examples that correspond to the author's works are available for reference. In addition, the examples are evidence of how researched theoretical aspects facilitate the model and the method.

It is demonstrated that an open process in neither still nor closed-off spaces benefit people and improve the results of the experiences carried out.

Inclusion reinforces the conclusions of this book in terms of research and the discussion of topics, since they are based on meetings between technicians in accessibility and specialists in education and employment who help people with intellectual or developmental disabilities. All these conclusions were reached in the following ways:

- During inclusive training sessions for people with intellectual or developmental disabilities, coordinators and technicians.
- During inclusive training sessions for people with intellectual or developmental disabilities and university students.
- During evaluations of environments and buildings with technicians and users in inclusive design and evaluation projects (i.e. projects carried out and those being developed).

The names of users are discreetly hidden and only their first initial is used. The names mentioned are the most representative of those that are developed.

3.2.1. Selecting evaluators

It is important to be very familiar with those who collaborate on diagnostics, since attention focused on one concept or topic should not be confused with a limited ability to pay attention to the whole. They may also tend to focus on one of the more specific components but without ignoring all others. There are individuals

who wish to show that they participate but they are not always as effective. On the other hand, there are those who are discreet but detailed in the search.

People who make spatial diagnostics in community and social contexts that give them fewer problems, i.e. their work as evaluators is a big commitment, are open and communicative and they focus their attention on the space in which they permanently move. This is one of the conditions to be selected, since as evaluators, specific conditions are required for communication and subsequent group reflection.

In some cases, users with different characteristics but very skilled in terms of detecting details, especially those that are spatial, have participated. In any case, it is interesting to have different profiles and group and personal qualities.

Above all, it is very important that these users have skills in:

- Creating their own glossary from the model's concepts.
- Being able to be trained in the model's concepts through presentations with easy-to-understand text and images.
- Knowing where the objective is (guides) because they are able to search for information or they already know it due to some other reason (prior visits).

However, the examples found in this document have been carried out by people selected as permanent evaluators and those who form part of learning experiences with students of the Course on Experts in Cognitive Accessibility with their organizations.

In other words, this involves all types of users, provided that they can show a certain level of autonomy and can verbally communicate, regardless of whether they are able to read text.

3.2.2. Glossary

The glossary is 90% unique to the model for design. The glossary of the easy-to-read texts was created when the training materials and sessions were prepared.

Other concepts belong to the forum sessions of La Ciudad

Accesible's Course on Experts in Cognitive Accessibility. "Indicator", for example, is the concept provided by Tamara García Garrofé (Fundación Magdalena) and Entrepreneur of Leisure Projects and Accessibility.

The concept of "recall" defined in the texts on memories is developed with students during the spatial evaluation sessions and they often use it to reflect on "why they become oriented or disoriented". In fact, it corresponds to the concept of "recognition" (analyzed later), which they understand to be "recall ... or non-recall".

3.2.2.1. Examples

The definitions listed below have been established by the first Afanias Plegart-3 OC evaluation groups during the group training sessions. They have been kept up-to-date and subsequently incorporated into training guides, i.e. PowerPoint presentations, texts, etc., as an example and to encourage users in work sessions. The guides are fundamental, help to recall concepts and, most importantly, identify obstacles and barriers that impede orientation and spatial understanding in an organized way.

Thanks to the frequency of practices, words become a habit for many of them. Words are more than just vocabulary that should be used in practical cases with the technicians. They are part of the habit of checking spatial difficulties that are present in the daily environments that they take part in and are then able to address. This is an important step towards their autonomy since it represents the possibility of arriving at unfamiliar areas of the city via public transportation in order to participate in the recreational or cultural services offered. Even in cases where that is not possible, they develop a sixth sense for orientating themselves that improves their personal mobility.

- **Labyrinth**: a complicated space in which we may become lost: we must unravel what is tangled.
- **Obstacles**: barriers that we find in our path.
- **References**: elements that help us recognize and remember the path.

• **Objects and shapes**: buildings or monuments that we know and orient us.

• **Crossroads**: a point where several paths cross.

• **Center**: a meeting point. It is in the medium and orients us to know where we are.

4. Background

4.1. Definitions of cognitive accessibility

4.1.1. Cognitive abilities

"Cognitive abilities are those that refer to thought processes related to information processing: attention, perception, memory, problem resolution, comprehension, establishing analogies with others". "The Arc", the United States organization of and for people with intellectual disabilities, defines cognitive accessibility in terms of a series of requirements that must be filled by the communication process in order for that information to be accessible:

- Reduce dependence on memorization as a tool to remember information.
- Use the largest number of complementary formats possible (visual, audio, multi-graphic).
- Reduce the need of the recipient to use complex organizational skills.

- Have vocabulary or a reading level that matches the comprehension level of the receivers.

These requirements appear in the document "Accessibility and cognitive abilities. Orientation in public spaces for everyone[5]" created by Fundación Once in Madrid, 2008.

Although there is agreement on the general aspects of these requirements, memory as one's ability to remember and organize is essential in order to be able to react and adapt to the many aspects offered by the environment. Since this is not always going to be possible when taking into account people's intellectual abilities, cognitive accessibility is used as a process that should no longer be related to memorization when possible.

However, if further research is conducted on how mental processes function, given the extensive number of ways they manifest themselves (i.e. memory types and strategies), more comprehensive and systematic conclusions will be made. This text aims to achieve this by including the wide range of classifications with which memory is presented in current research on the brain and education.

These pages will focus on memory and memories as one of the key aspects in the wide range of forms, manifestations and definitions related to spatial and temporal orientation.

4.2. Model for designing accessible spaces

The cover designs are very important. In the first edition published in 2014, a support system specifically created for people was chosen with the aim of helping them in their work at a Plegart-3 Occupational Center, where they are supported by people and other means.

In the second edition published in 2015, one of the designs made was for spatial support systems, which were created among professionals and disabled people and their coordinators or supporters.

[5] Published in: http://accesibilidadcognitivaurbana.fundacionONCE.es/capacidadesCognitivas.aspx.

- First edition: http://goo.gl/G2C5nI.
- Second edition: http://goo.gl/bgrL5M.

Collection on Democratizing Accessibility. Vol 1. Model for designing Accessible Spaces. Cognitive spectrum.

Collection on Democratizing Accessibility. Vol 6. Cognitive Accessibility. Model for Designing Accessible Spaces 2nd Edition.

Images 4 and 5. Covers of the 2014 and 2015 book editions.

Figure 2. 2015 Good Practice Award, International Design for All Foundation.

Next, a synthesis of the most original aspects of these publications is made, creating a model for design that takes into account the abilities of people and the need to establish a spatial support system based on orientation and, among others, important phenomena of sensorial perception.

4.2.1. Principles or tenets

Principles or tenets are the basic requirements that provide the design of accessible spaces with a foundation. These principles ensure cognitive accessibility because by reducing difficulties, it increases one's capacity to use personal abilities and qualities.

The principles can be expressed in three ways: universal and design principles, which should always be present given their important influence on the state and behavior of people with regard to space; principles that strictly correspond to spatial design and carry out specific functions as formal and visual organizers; and thirdly, technological principles, which should complement and support, not replace, the previous types.

In accordance with the theoretical framework, conditions facilitating the start are established and contribute to the design of good practices.

Universal and design principles:

- Neutralize the labyrinth effect or inner confusion of the design, the main obstacle to orientation in space.
- Perfectly bring together, or simplify, meetings in spatial connections and crossroads (similar to topological cleaning or map layout design) in order to avoid duplicates, segmentation, confusion and disorientation. Eliminate design and perception obstacles.
- Create references-inferences (with easy-to-read or understandable texts with graphic content) and with their spatial localization[6]. Spatial relationships of the references or inferences are determinant of accessibility, as well as their content.

[6] This principle is related to the sequence of accessibility and the brain's GPS.

Principles of design or visual organizers:

- Threshold effect in longitudinal spaces, with markers through sequences or indicators, to avoid visual or emotional alterations.
- Orientating visual effects through grouping-segregation, an important phenomenon of perception.
- References-inferences with shape semantics.

Principles of technology:

- Support autonomy, without taking away capacities, in order to increase abilities, not replace them.

4.2.2. Components or dimensions

They are specific elements for design that take into account human qualities and topological relationships.

The model is the morphological decomposition of the set of components or dimensions, basic elements of accessible design, adapted to human functioning. They are distinguished by their qualities and represent a strategy to understand and design real scenarios: urban, rural or residential spaces, services, transportation, etc. There is no optimal a priori configuration; instead it will depend on the context, originality and understanding of the designers, the available elements and the specific needs of each case. Each element, and its related qualities, provide the set or the "whole" with the capacity to organize the space, as well as the events that occur inside and outside of it. It can be confirmed that this is the closest or best adjusted model to the human, sensorial, physical and cognitive abilities of a very broad group of people.

> *As in the world of ideas where thought is possible if there are connections, in space everything is possible if relationships are understandable. The model contains elements so that the greatest number of people can orient themselves, relax and feel comfortable because they understand the connections and signs.*

Each component or dimension has the following functions:

- Global Function: spatial structure, organization or grouping (ability to order/organize).

- Focusing Activities Function: places or premises (ability to be able to experiment in succession or in a scenario).
- Referential Function: center (ability to make references).
- Relate Function: drivers or connectors (ability to move from one point to another). Synapsis or synaptic space (ability to link, act as a bridge, connect).
- Direct Function: axes (ability to direct)
- Complementary Function: Attributes.

Component (topological) qualities: each component or dimension has qualities that if unfulfilled, will leave isolated images, limits, barriers, difficulties (traps). If they are all verified, environments, spaces and services will be accessible.

Topological relationships are linked to perception and spatial orientation and are necessary to partially understand the succession of elements in space.

On the other hand, there are more complex relationships such as projective relationships (the need to place objects or elements of the same object in relation to others). There are also Euclid or metric relationships that require a complex spatial reference system (measurements and distances).

- Order: relationship that a group has with a reference system (a row):
- Contiguity or vicinity: relationship of closeness between elements.
- Separation: relationship between disperse elements.
- Circumscription: relationship in which one object or subject surrounds another.
- Continuity: relationship in which a constant succession of elements appears (the same series).
- Interiority: relationship of an object that is found inside another (for example: furniture). This concept is very common in museums since screening rooms are used inside the main spaces.

General principles	Functions fulfilled	Principles supported
Breaking the labyrinth effect	Facilitate/maintain continuity	
Topological cleaning (or the frame size of the Search Paradigm)	Remove obstacles, facilitating mobility	
References and inferences	Facilitate-guide	
Threshold effect	Prevent alterations caused by distance, ideal distance: 6 meters	
Grouping-segregation effect	Facilitate	
Semantics	Orient, disorient	
Technology	Support, never substitute	
Model dimensions		
Structuring-spatial organization	Order/organize	Breaking the labyrinth effect
Spaces (open)	Experience/spatial succession	
Premises (buildings)	Experiment/scene	
Center	Reference	Breaking the labyrinth effect
Drivers or links	Drive/relate/annex	Grouping effect and threshold effect
Axes	Direct	Breaking the labyrinth effect
Synapses	Link (bridges)	Breaking the labyrinth effect Topological or design cleaning
Attributes for the set of dimensions	Establish, support the above (shapes, colors and textures, haptic textures, sounds, smells, lighting, furniture)	They should consolidate the principles

In the section on "Model and participative methodology" these components are developed to be shared with the users. Their structure relates to the group and organizational style developed by a project, since it should be adapted to the qualities of the evaluators, the type of environment and the building.

By applying the aforementioned concepts and relationships, cognitive spatial safety (CSS) can be defined.

4.2.3. Cognitive spatial safety CSS

As a result of the integration of the principles and components of the model, a complex concept was reached based on the relationships of the system itself. This concept is original and is not included in the current regulations on universal accessibility, the Technical Code or the DALCO Requirements. Its references are internal and created from the system and its level of demand that, after a trial period involving experiences with the participative methodology, called for greater projection towards the exterior. The results from applying the spatial model through an inclusive definition involving environmental aspects (environments and buildings) and qualities for the functioning of people, "Cognitive Spatial Safety (CSS)", were presented.

This section describes their significance, functions and the reason why these concepts must form part of the current regulations or documents that are expressly drawn up for creating awareness about and referring to cognitive accessibility.

- Work is started on the opposite concept: What is Cognitive Spatial Unsafety?

- To answer that question, the following must be defined: What is Cognitive Spatial Safety?

Cognitive spatial unsafety is a feeling, a mental perception of oneself, that without immediately being physical can later become so as a result of the stress and anguish it may cause. This feeling or experience can be eliminated, or reduced, as a series of responses related to design, in environments and buildings, accompanied by support solutions of a verbal, written and graphic nature, are sequentially generated through the organization and topological relationships (continuous succession).

In consideration of the aforementioned definition, Cognitive Spatial Safety (CSS) should be: "the condition of the design of environments and buildings that, by breaking the labyrinth effect and creating a spatial support system, fulfills the DALCO requirements[7] (Ambulation, Apprehension, Location and Communication)".

CSS does not perpetuate personal qualities, instead it specifically refers to spatial conditions. The design of the spatial system allows or facilitates the comprehension of environments and buildings through the components and their relationships.

- CSS does not refer to the conditions of people or their way of being.
- It entails the conditioning of spaces and their relationships by making adjustments.

4.2.3.1. CSS conditions

The model previously defined the principles and components of cognitive accessibility. The definition of CSS expressly focuses on the following features or ways to represent it, without underestimating the value of the whole, for an accessible design and good design practices.

4.2.3.1.1. The accessibility sequence or continuous succession

Cognitive accessibility sequence refers to the organization or continuous and progressive development of the keys to easily understand space, taking into account the relationships that are created in it. It is confirmed when there is spatial continuous succession.

The *black points of darkness* or lack of accessibility are points where continuity and spatial succession are broken, i.e. crossroads leading to *cognitive spatial unsafety*. Users have dramatically called them "traps" because they feel trapped in confusion.

[7] DALCO requirements. UNE 170001-1.

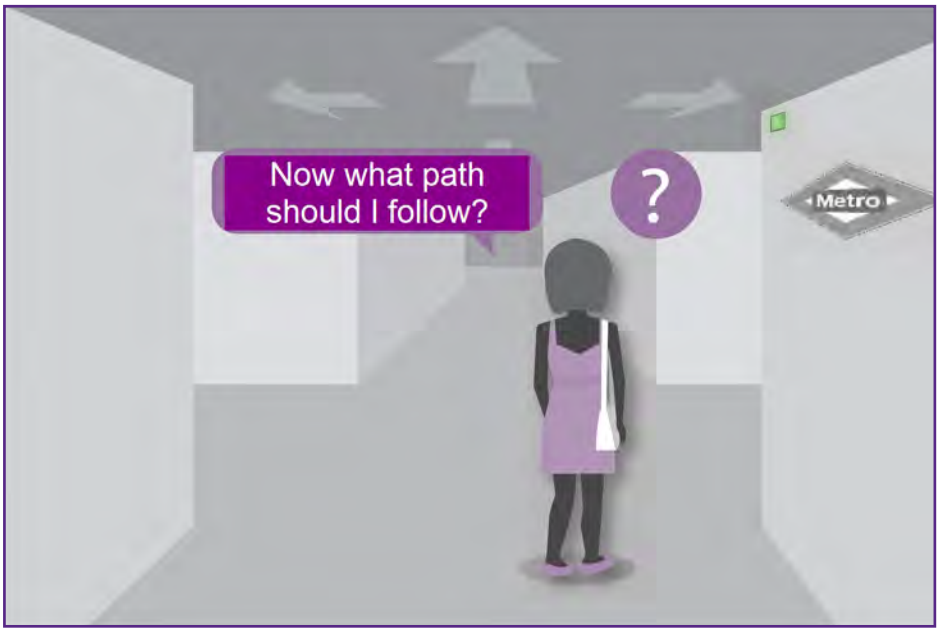
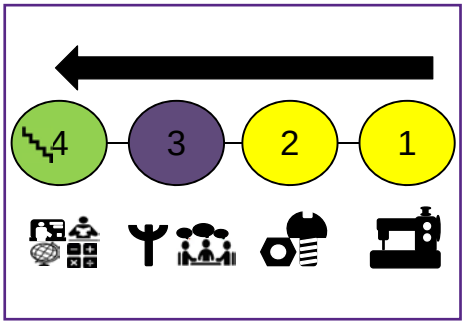
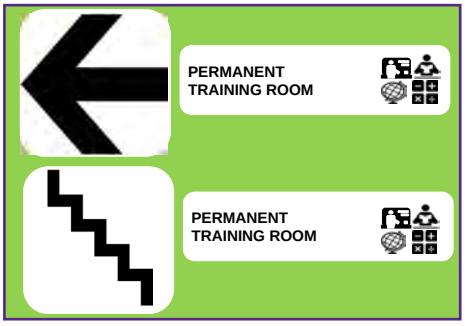


Figure 3. Black points or crossroads.

When the sequence is broken, the functioning of people is no longer supported or safe, which immediately leads to an unsafe state that forces people to change their attitude due to the lack of spatial and emotional support.





Figures 4 and 5. Accessibility sequence and zone 4 of the sequence (Afanias Las Victorias OC).

The accessibility sequence or continuous succession is shown in the figure above where continuity and succession become the same term. The sequence was identified and developed between the

author and specialists at the Afanias Las Victorias Occupational Center in Madrid. This is an example of the criteria that solved the inner confusion caused by the building's current structure.

The activities, initially developed in spaces without a beginning or end and without messages indicating "place or position", promoted the permanent "crossroads" experience. Confusion and disorientation came to an end without changing the activity and through the sequence's indicator messages. The importance of the message is communicated by the "agreement" between a direction that marks the succession or sequence and the details (1 to 4) that "uncover" what will occur beyond the place (position) where the protagonist is located. The direction indicates the relation (succession) of the four messages, i.e. the static and safe messages, which includes clearly delimited spaces with their events that will occur along the path.

The aforementioned concepts are key to being able to start developing the text: how research on neurons and memories are part of the set of supports that science, in this case, provides to understand the functioning of people, and especially so that can intend to have greater safety in their daily lives. The model, sequence and succession, references and the way in which people react all correspond to the *scientific keys* that have been identified by researchers who had a fundamental role in providing knowledge about the brain and its connections and responses. The scientific keys are the following:

- How strategies of memories are formed and developed.
- Concept neurons: the Jennifer Aniston neuron.
- The brain's GPS: grid or network cells.

4.3. The model and participative methodology

4.3.1. Training and evaluation experiences

This training, which is repeated in various sessions (i.e. the process) and is carried out with different materials: text, images, PowerPoint presentations, notebooks, etc., has been defined by Afanias users as "cognitive stimulation".

Every time a training session is carried out jointly with technicians or only with users, conclusions relating to the functioning of people are made in order to improve their work, thus ensuring training and commitment. Comments on the accessibility conditions of the space and its support needs are converted into data to process the information and spaces.

Easy-to-read summary table of the model.

This table is a tool that organizations use to work with users before conducting spatial evaluations. It is supplemented with images (the following figures).

Concepts of the model	Vocabulary for pre-consultation meetings with the users	Verbal and visual vocabulary created from the work between technicians and users
Labyrinths	Why do you get lost? What confuses you? Do you get confused while searching for something?	"UNRAVEL WHAT IS TANGLED" (Expression from "Labyrinth" by Óscar Berzal, Plegart-3 user).
Topological or design cleaning	What gets in your way or prevents you from finding what you are looking for?	Obstacles (of any type) that are confusing What a mess! (Definition of confusion by several Afanias Plegart-3 users).
References-inferences	Do you want several indications? Or not?	They should be placed along a path. How many should there be? It depends on the length of the path. • **References of place**. They indicate the direction in which one should go: put several that are related. • **Panels and color references**. They should be placed at the entryways and on different floors.

Easy reading	Are there posters that help you? Can you read them? Can you understand them?	Readers understand.
Signs (floors and ceilings or walls)	What do signs tell you? Do you understand the ones that are there?	Non-readers need symbols: Arrows are always easy to follow, although sometimes they are confusing if they have different colors.
Pictograms	Are the drawings that orient understandable?	Clear or confusing drawings? There are some that will never be confusing, such as a cup of coffee. (The most complex need validation).
Thresholds and markers or beacons (along the path)	Is there a marker in the path that orients you? What would you place?	Guides on the wall and floor, one after another so that we don't get lost.
Elements of perception	What are the colors/shapes that orient you? Why do they stand out to you or why do they attract you? Where would they have to be placed?	Guides with colors. It is the easiest to recognize.
Semantics	Shapes, elements or buildings that guide or confuse you.	Any element that we trust. Books: library.
Crossroads and focal points	What prevents you from continuing? Is there a marker in the path that can orient you? What would you place?	Guides on the wall and floor.
Synaptic spaces and placement of signs on the upper threshold or on the floor	Where would you place the information when there are several paths? Above, or below on the floor?	Between important places in order to recognize them before entering.

Ariadne's thread	If you enter and don't want to get lost, what do you suggest?	Guides on the floor, walls, handrails, lights, etc. **The "route" is recognized from:** Arrows; letters; design or furniture elements that guide in key places or focal centers (related to each other). Note on Ariadne's thread: in the second Plegart-3 evaluation at ETSEM-UPM (Afanias-UPM Agreement, course on Universal Accessibility Applied to Buildings), the users used University department mailboxes as a reference. These furniture elements located in various positions along the paths were the key to relating spaces and finding the objective: the School library.

A logbook or a notebook with comments, expressions, words, and particular images captured from the qualities of protagonists is kept with the conclusions based on the signs or the lack of accessibility.

With these expressions based on training and experiences, the results, which are ordered according to the theoretical aspects researched to improve the model and the method, can then be viewed.

The material shown below in different qualities and quantities is an example of the extended set of written and graphic texts that are drawn up from the model so that organizations may work with users on tasks before, during and after the evaluations.

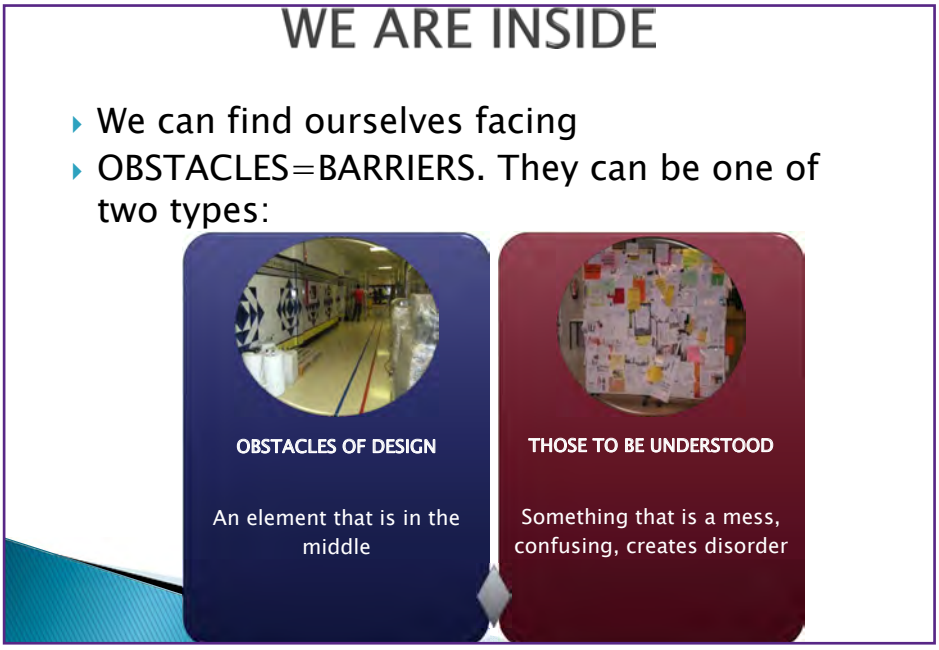


Figure 6. An example for working with obstacles.

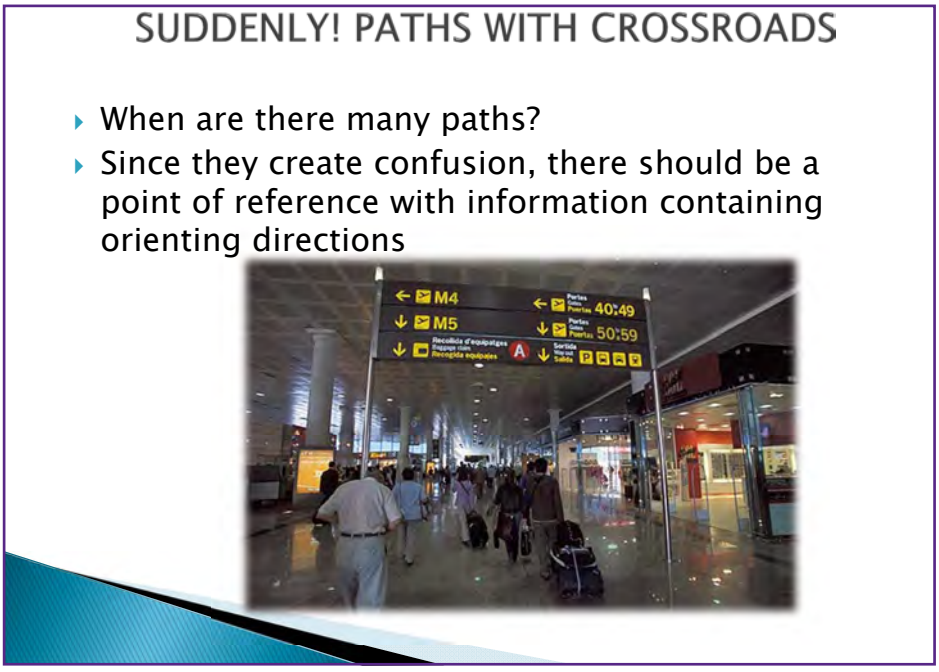


Figure 7. An example for working with the crossroads.

INSIDE: REFERENCES

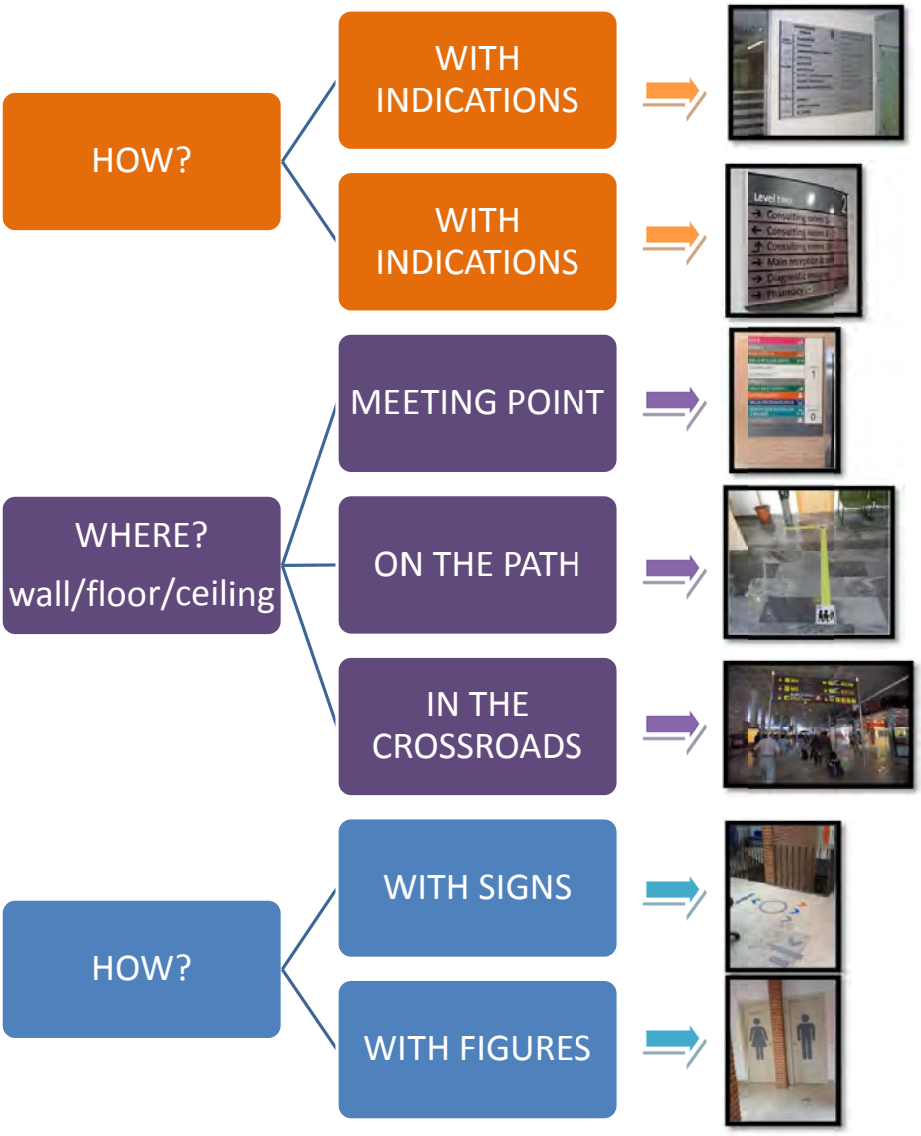


Figure 8. An example of a template for supporting the fieldwork.

4.3.2. Evaluation phases

The first phase is to elaborate the personal vocabulary or glossary (systematization of the model), then provide a PowerPoint presentation and hand in a notebook for review and recall. Some evaluators then return to "check" the path followed in order to confirm the concepts identified.

Figure 9. Training materials for Afanias-the Association for the Easy Understanding of Environments and Buildings.

In figures 9 and 10, "localization" is used as an initial position to simplify concepts. It is of interest to differentiate the place where the path that represents the safety of the known begins, which is Moncloa in this case, and the following localization (or localizations) as expressed in the DALCO requirements in the Standard[8]. In the case of getting lost, one can return to the known place. The sequence or continuous succession of places is the path to a destination which is perhaps unknown.

[8] DALCO: Localization: to know where one is at all times and where to look for information to identify someone or something. Completely explained in AENOR UNE STANDARD 170001-1:2007.

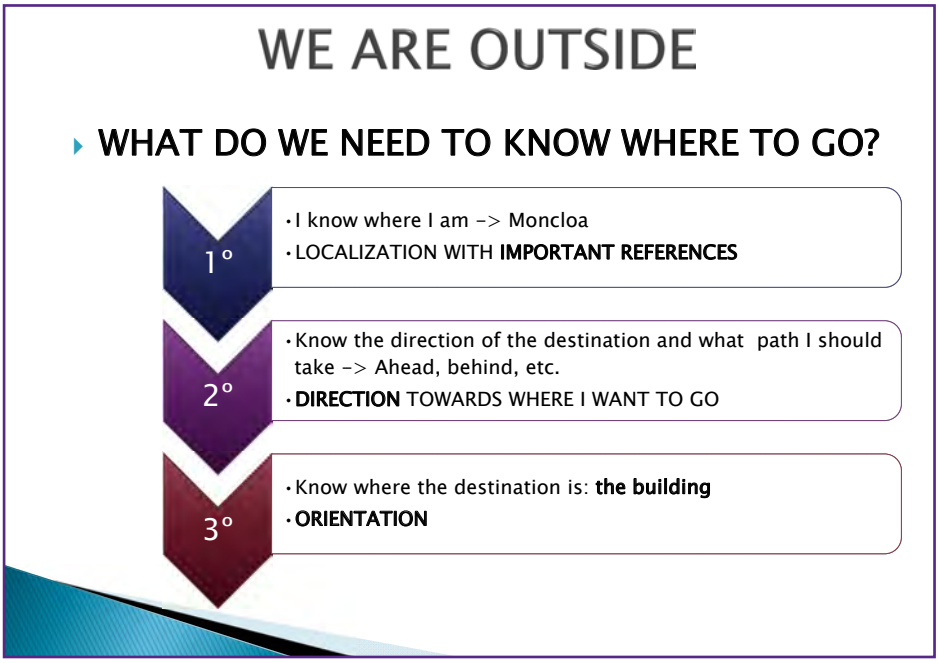
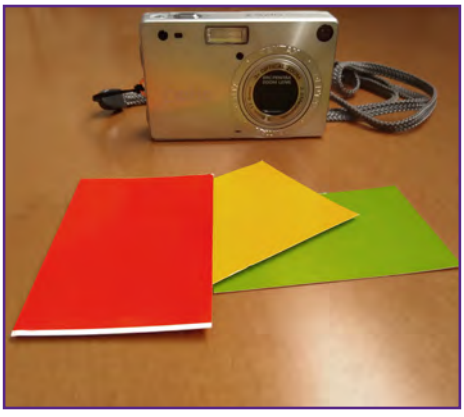


Figure 10. Training materials for Afanias-the Association for the Easy Understanding of Environments and Buildings.

The examples in this chapter are some materials used in the different work phases with users. These aspects will be developed later given their theoretical content: sequence and places and distances, as the model's reference-inference of place.



Images 6 and 7. Materials to develop practices: maps and cards. Aitor Álvarez Ballesteros (EIA Experts).

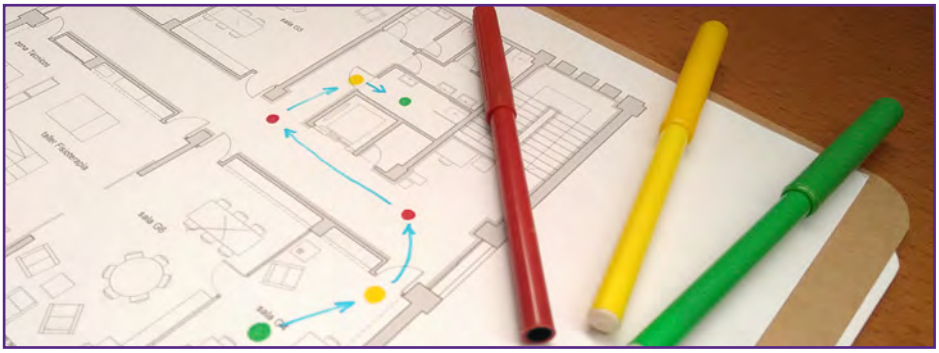


Image 8. Materials to develop practices: maps and cards. Aitor Álvarez Ballesteros (EIA Experts).

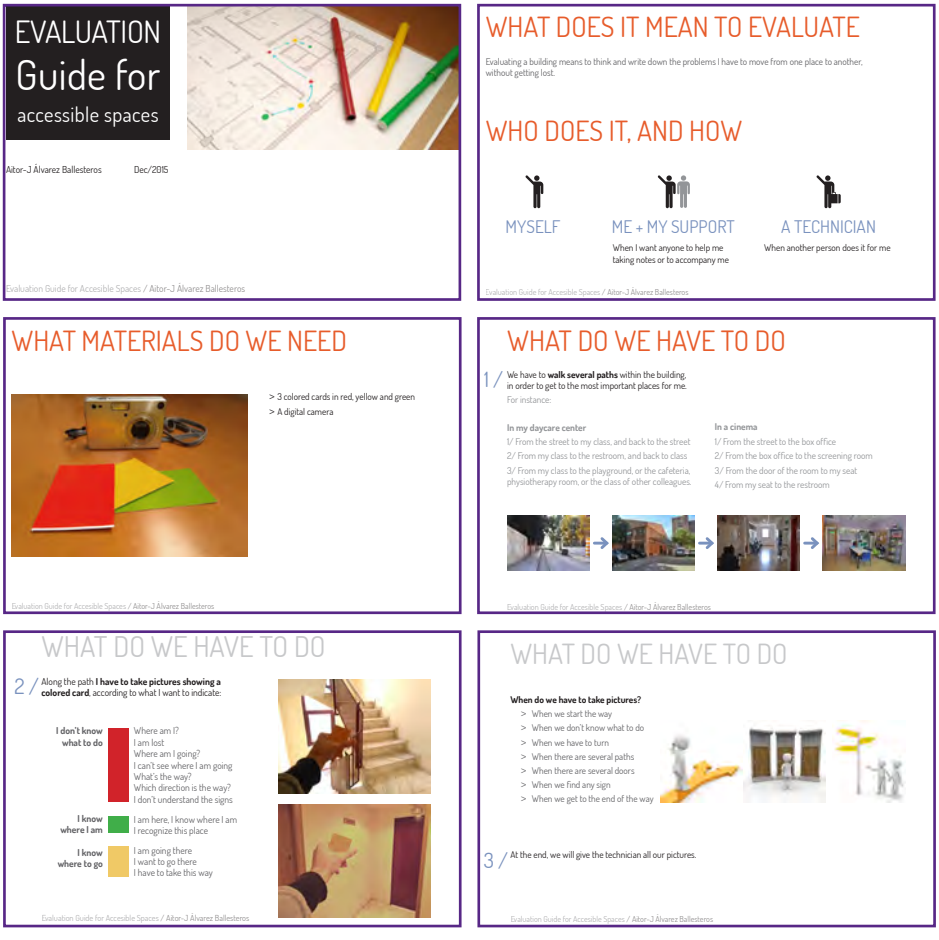


Figure 11. Guide to evaluate. Aitor Álvarez Ballesteros (EIA Experts).

Figure 12. Guide to evaluate. Afanias-the Association for the Easy Understanding of Environments and Buildings. Designer, Pablo Matera.

4.3.3. Systemic fieldwork

The results from "Experiences and results" are extracted from the work carried out in 2014, 2015 and 2016. The following list is important since it has been drawn up with many organizations and people, always demonstrating the validity of the diagnostics and participative spatial design.

- Afanias: Afanias Plegart-3 OC, Afanias La Encina OC, Móstoles. Las Victorias OC, Administrative Center and Day Center on Calle Hervás 12. Other Afanias training sessions on the model and participative methodology have been carried out with Afanias partners.

- ETSEM-UPM. In 2014 and 2015-2016, training sessions based on cognitive accessibility were developed with and for people with intellectual or developmental disabilities, supporting students of

the ETSEM-UPM course on "Universal accessibility in buildings". This work continues to be developed actively.

• UPCT during the 2015 summer course. Training sessions on cognitive accessibility for people with intellectual or developmental disabilities, along with students, coordinators of local centers and professors of "Universal accessibility" at UPCT in Murcia.

• Art School 10 of Madrid. Presentation of the first phase in 2015. In January 2016, two workshops were carried out with students from the School and young individuals from Afanias Plegart-3.

• University of Alcalá de Henares. In February 2016, the first training sessions on cognitive accessibility were carried out with the participation of students from the School of Architecture and Geodesy who were enrolled in the elective course "Universal accessibility in urban environments". People with intellectual or developmental disabilities from the CPEE Picasso School of Alcalá de Henares also participated. In this case, the preparation of the evaluators was very intense and productive. It was carried out at the school and the teachers spent several weeks in different sessions working on the definitions created by the group as well as those that came from the model as a guide.

• Projects carried out that are explained in detail in the digital book titled "Cognitive accessibility. Model for designing accessible spaces".

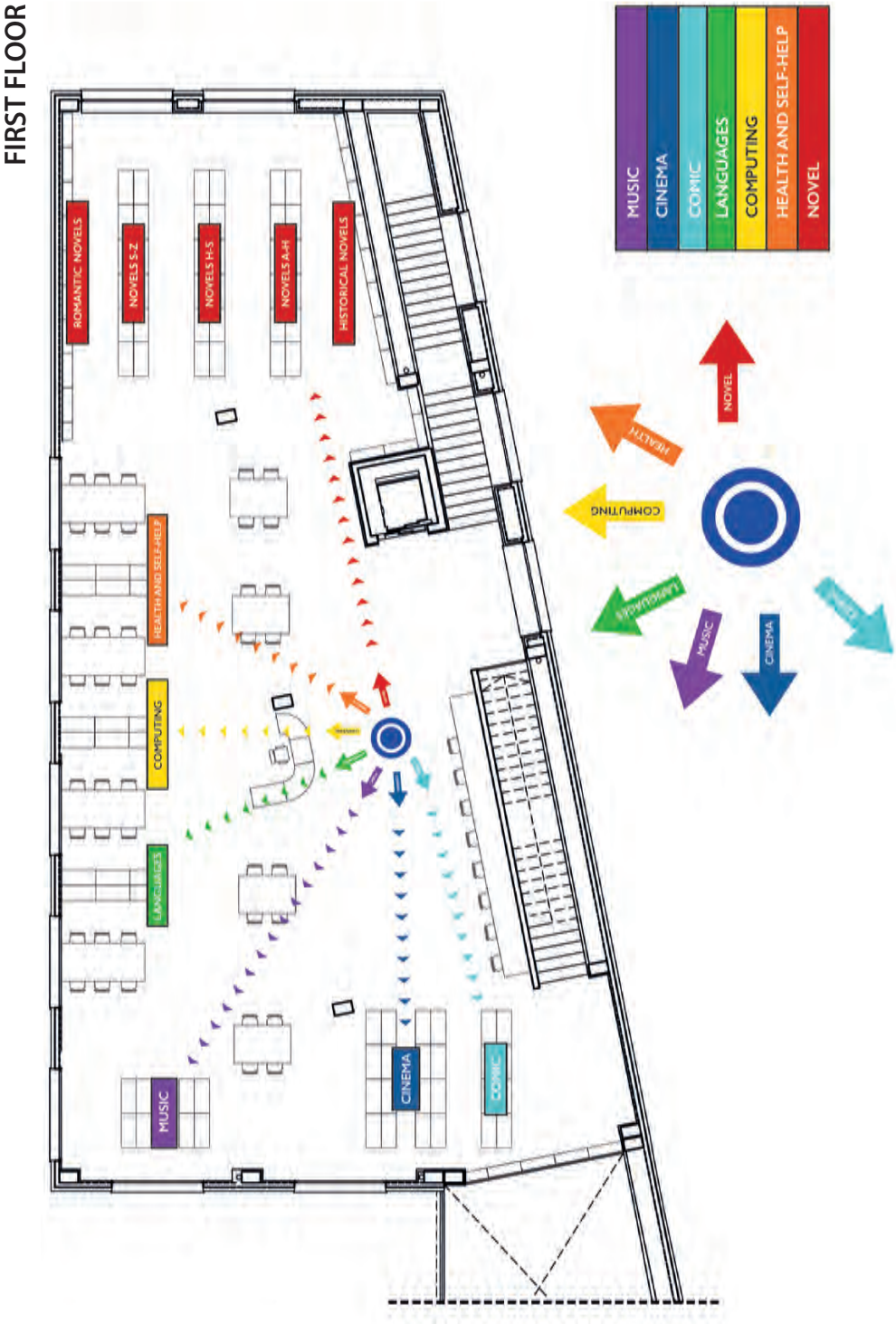
• Projects by students of the 2015-2016 "Experts in Cognitive Accessibility" Course (La Ciudad Accesible EIA). Granada. The proposals were made in Madrid, Motril, Salamanca, Santander, Seville, Tenerife, Valladolid and Valencia.

Some examples of projects presented by technicians participating in the course express the aspects of the model that are interpreted and adapted to the needs of their organizations, with personalized vocabulary or that of the users, such as graphic or textual expressions, colors and shapes to maintain the relationships, sequences and continuous succession.

GROUND FLOOR

Rafael Gutiérrez Ramos

FIRST FLOOR


MUSIC
CINEMA
COMIC
LANGUAGES
COMPUTING
HEALTH AND SELF-HELP
NOVEL
ROMANTIC NOVELS
NOVELS S-Z
NOVELS H-S
NOVELS A-H
HISTORICAL NOVELS
HEALTH AND SELF-HELP
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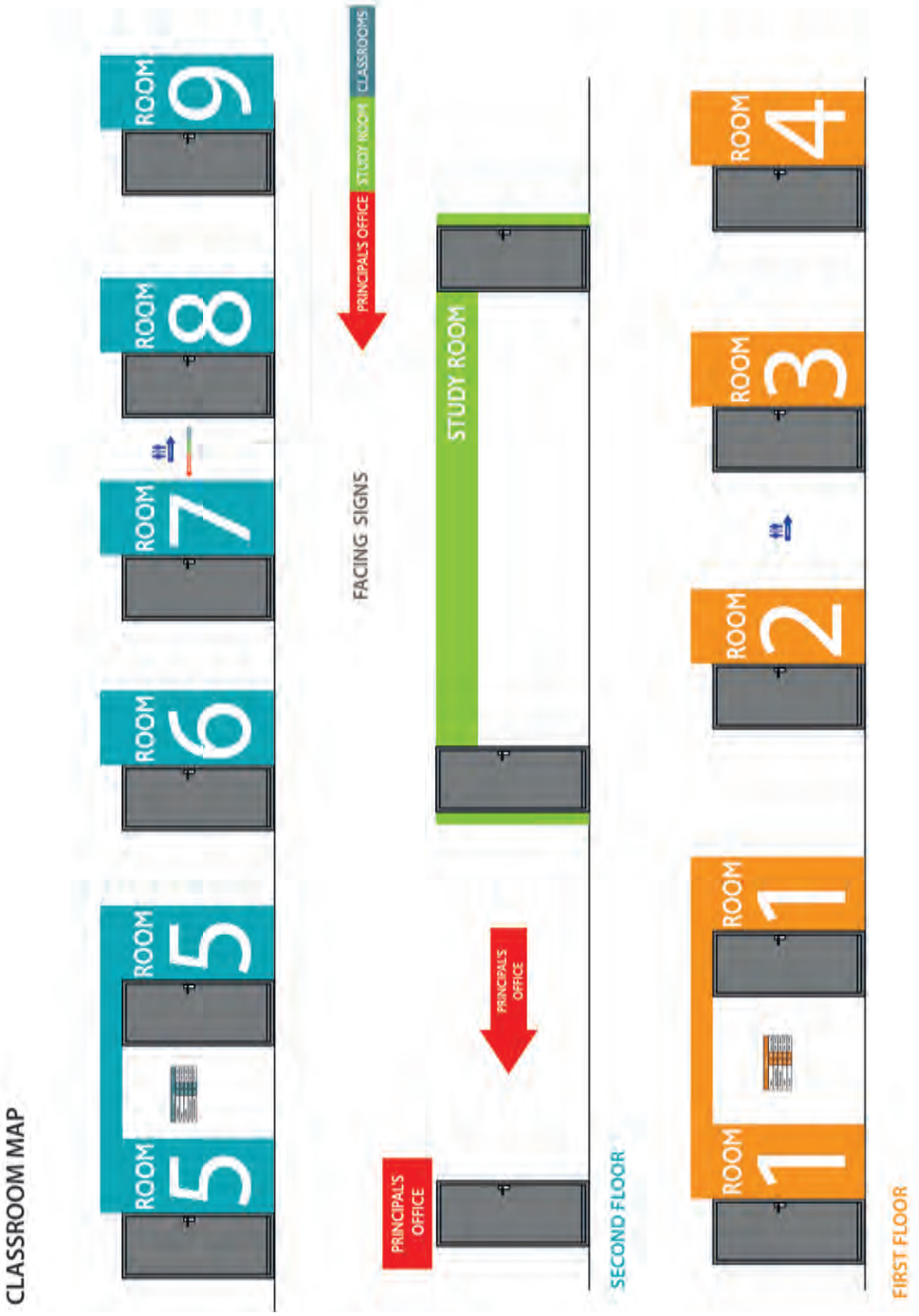
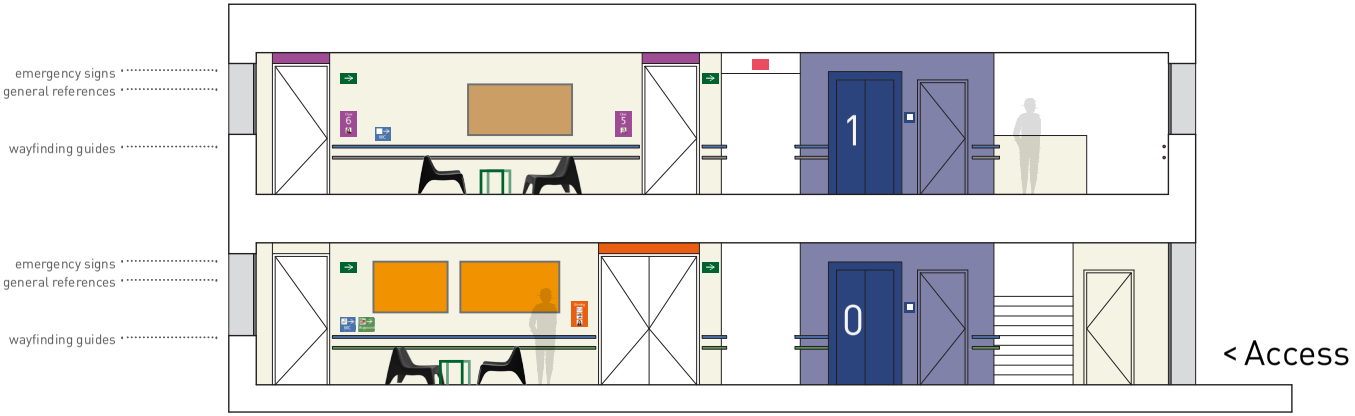
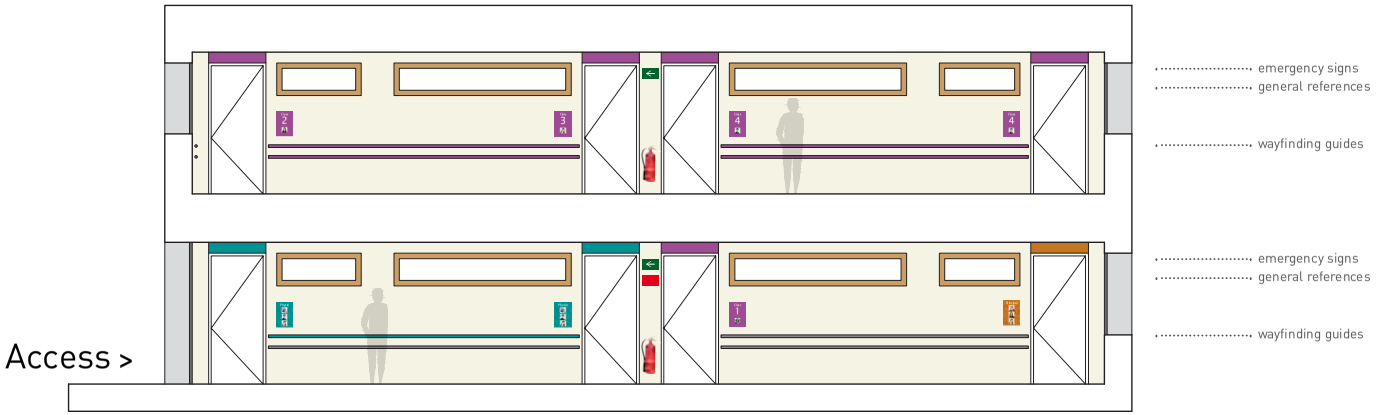


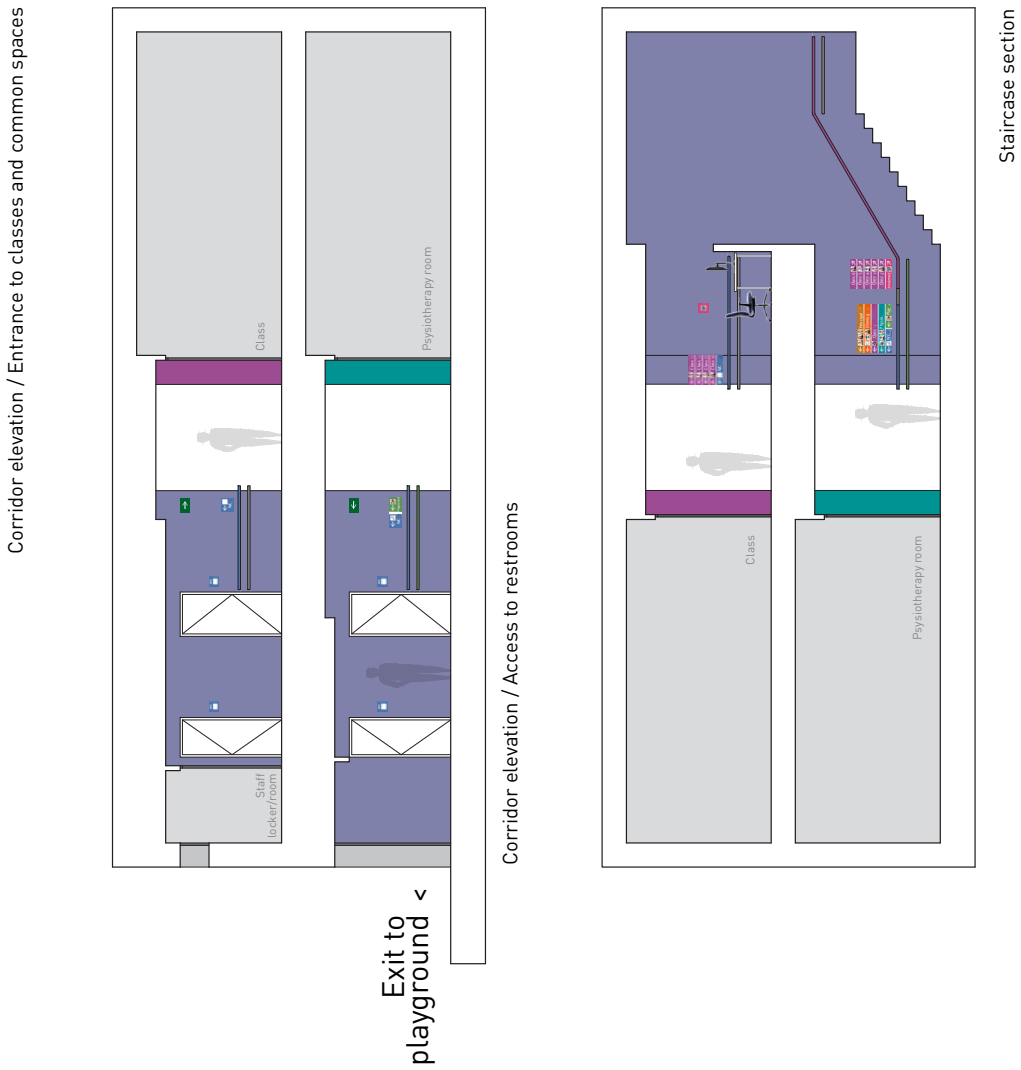
Figures 13, 14, and 15. Accessibility sequence. Rafael Gutiérrez Ramos (EIA Experts).



Corridor elevation / Elevator front



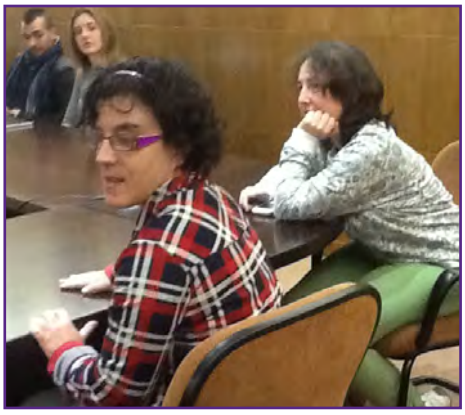
Corridor elevation / Entrance to classes and common spaces



Figures 16, 17 and 18. Accessibility sequence Aitor Álvarez Ballesteros (EIA Experts).

4.4. Experiences in images


Images 9 and 10. Final quarter 2014. ETSEM-UPM and Afanias Plegart-3 Occupational Center inclusion.

Images 11 and 12. ETSEM-UPM and Afanias Plegart-3 Occupational Center inclusion.

Image 13. ETSEM-UPM and Afanias Plegart-3 Occupational Center inclusion.


Images 14 and 15. May 2015, Afanias-ETSEM-UPM course for evaluators.


Images 16 and 17. December 2015. Afanias-ETSEM-UPM course for evaluators.


Images 18 and 19. December 2015. Afanias-ETSEM-UPM course for evaluators.


Images 20 and 21. Art School 10. Afanias Plegart-3 Occupational Center. 2015.


Images 22 and 23. July 2015, summer course. SOI Cartgena-UPCT, Murcia.


Images 24 and 25. July 2015, summer course. SOI Cartgena-UPCT, Murcia.


Images 26 and 27. Afanias training sessions for support and evaluators.


Images 28 and 29. Afanias training sessions for support and evaluators.

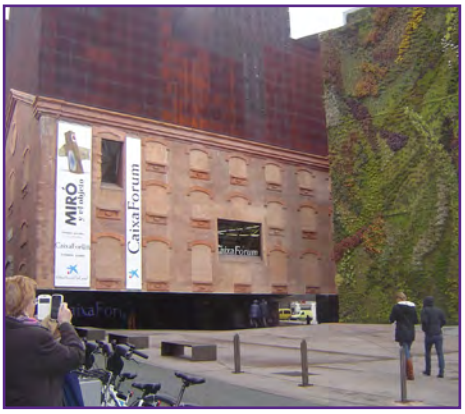
The following images form part of the path (Moncloa Polytechnic University) with the model's concepts, methodology, and participation of people with ETSEM-UPM students. Sequential conditions (i.e. the adapted model) are established which make it possible to identify enough elements to maintain continuity, thus preventing disorientation on a long path full of obstacles (i.e., incomplete, insufficient and poorly placed signs). All of these barriers can be overcome because references within the sequence have been identified. They can later go along the sequence without human support. The case of **Ca** who returns to travel along the same path as a demonstration of her interest and commitment will be discussed later.


Images 30 and 31. Afanias, Moncloa-ETSEM-UPM circuit-sequence.

Images 32 and 33. Afanias, Moncloa-ETSEM-UPM circuit-sequence.

Images 34 and 35. Evaluation of the Youth Center in Villa de la Orotava, Tenerife. PROBOSCO and María Elena Escobar Martín. (EIA Experts).


Images 36 and 37. Accessibility in Urban Environments. School of Architecture. Alcalá de Henares. Evaluators: young people at CPEE Picasso.

Images 38 and 39. Afanias, Ministry of Agriculture-CaixaForum Madrid circuit-sequence.

In the first image above, the person in the foreground is the "guide" since the sequence is not determined by any type of reference to the location of the building and destination of the evaluation: the CaixaForum Madrid[9]. The report will be presented by the group of users who participated in the experience with the coordinators of the occupational center.

[9] One reference that can often create confusion is the numbering of roads and streets. The origin (number 0) is not always recognized if the city has a complex or maze-like structure.

Image 40. Evaluators of the Canillejas Occupational Center. Image 41. "Indication". CaixaForum Madrid.

Images 42 and 43. Evaluators at ANIDI. Rafael Gutiérrez Ramos (EIA Experts).

Image 44. Evaluators at ANIDI. Rafael Gutiérrez Ramos (EIA Experts).

5. Key research to increase system efficiency

The previous pages reflect the importance of working with a process that is presented as a model to design as well as evaluate environments and buildings, with the ability to influence the autonomy and mobility of people. It defines a support system that scientific research based on processes, behaviors and functioning corroborates, improves and facilitates. From this point forward, all texts, concepts and research have been chosen for their effectiveness in advancing the model and inclusive method adapted to people in their role in supporting technicians when evaluating environments and buildings.

5.1. Improvements to the model and the methodology

Accessible design has an effect on the health state of people and their spatial behavior, which can be influenced by unusual environmental conditions, for example, contact between the house and a road, problems coming from traffic (i.e. noise and pollution),

etc. They are so important that the ICF[10] has designed a system of relationships to point out the aspects that determine the health of people, regardless of their condition.

Environmental factors have an influence on people and their spatial behavior, and along with personal factors, they favor the health state when the environment does not disturb them and facilitates autonomy. Social and community participation involves adaptation to environments and buildings in order to carry out activities.

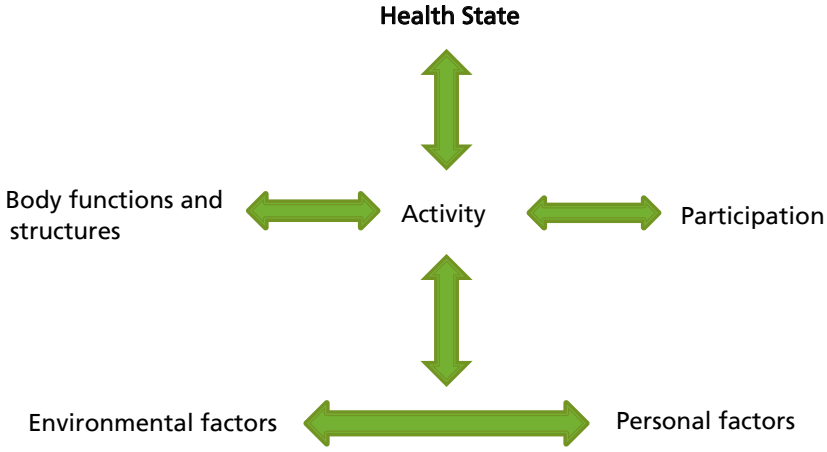


Figure 19. Synthesis of the aspects of ICF.

5.1.1. Functions of orientation

The ICF defines the functions of orientation as:

- General mental functions related to knowledge and which allow us to establish the relationship that we find ourselves in with respect to ourselves, other people, time and our surroundings.
- It includes: functions of orientation with respect to time, place and person; orientation with respect to oneself and others; disorientation with respect to time, place and person.

It does not refer to "positioning" as a specific concept, but with "oneself and others" it refers to the known place (MYSELF) which establishes spatial and time relationships with the environment, people and objects.

[10] International Classification of Functioning. IMSERSO. WHO.

These aspects defined by the ICF and relating to organic and environmental factors are supplemented by the research involved in the 2014 Nobel Prize in Medicine with regard to how and why human beings orient themselves in space.

5.2. The human brain

In recent years several discoveries have come to light following in-depth studies and research. They favored the work carried out in cognitive accessibility, which led to the 2014 Nobel Prize in Medicine on the brain's GPS and the research of scientists who discovered neurons that encode concepts, which in this case are called the "Jennifer Aniston neuron". Both discoveries are related to the model and especially enrich theoretical and practical aspects, since the method uses both bodies of research which are theories that validate the model's concepts and clarify important methodological and behavioral aspects of the evaluators.

With regard to the participative methodology, both discoveries provided a path that was not previously defined, especially due to the fact that the discoveries on the functioning of the human brain are fundamental for explaining why people function in a specific way, and how introducing changes can make it much better.

These and other important findings about the human brain have created a theoretical framework that did not exist at the end of the 20th century, although some discoveries from the 21st century are based on other made previously discoveries, as shown, on one hand, by the research of the scientist John O'Keefe, one of three winners of the 2014 Nobel Prize in Medicine, and on the other hand, by other research on memory by working with patients affected by brain injuries, specifically in the hippocampus.

This research also helps to evaluate and highlight the work on memories carried out by Professor Ignacio Morgado Bernal. This senior professor of psychobiology and researcher at the Institute of Neuroscience of the Autonomous University of Barcelona published a fundamental document that takes an in-depth look at how people think, remember and orient themselves in space and in time: Learn, remember, forget (Ariel. 2014) is a truly exciting book. This researcher had contacts related to his search for references for the theoretical works and practical developments that are discussed here.

5.2.1. Brain function[11]

Neuroscientists, along with researchers from similar disciplines, study how the human brain functions. These advances have progressed considerably over the last few decades and it is considered that the "Decade of the Brain", an initiative of the United States Government from 1980 to 1990, had a significant effect on the increase in research carried out.

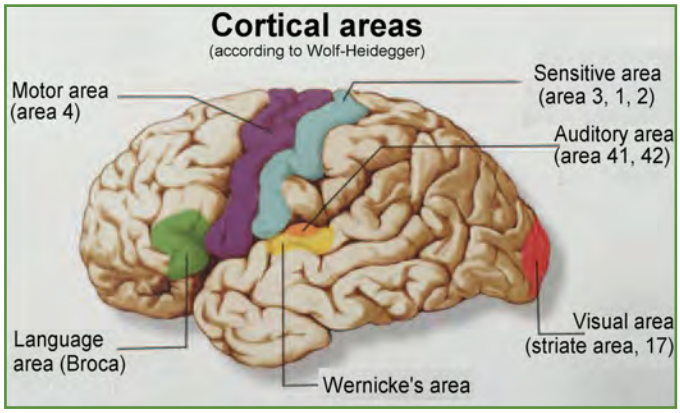


Figure 20. The human brain, according to 3B Scientific GmbH.

Furthermore, improvements in the tool used, i.e. technology, are also important so that the brain reactions "say" what is happening and how the neurons react to external stimuli. Although technological progress has facilitated research, there are scientists who are also committed to creating their own tools, such as censors which are placed on specific areas of the brain to know how the neurons of laboratory rats are activated and react[12].

The brain, the central part of the nervous system, is protected by the skull and is found very close to the main organs for the senses, such as vision, hearing, balance, taste and smell. The mind receives content from the senses but this process is not related to "reality". The brain reads what enters through the senses "in its own way" and that which it presents is the final state of the process. Colors and smells do not exist, but rather particles that the senses capture,

[11] According to 3B Scientific GmbH.
[12] John O'Keefe created his own tools to measure neuronal reactions. Professor Ignacio Morgado Bernal discusses this in his published documents and articles.

and the brain creates what we call smell, color and light.

Most of this mass is made up by the cerebral cortex, a layer of folded neuronal tissue that covers the surface of the prosencephalon. The frontal lobes are especially wide and are associated with executive functions, such as self-control, planning, reasoning and abstract thought.

The hippocampus is one of the main structures of the human brain and the brain of other mammals. The name was coined by 16th century anatomist Giulio Cesare Aranzio, who noticed its similarity to the shape of a seahorse. The hippocampus is one of the main regions of the brain and is directly related to the functioning of memory and emotions. It forms part of the limbic system, a group of brain structures that manage basic physiological responses.

There are few studies on its function in humans, but extensive research has been carried out on it in rodents as part of the brain system responsible for spatial memory and navigation. Many neurons in the hippocampus of rats and mice respond by firing action potentials when the individual crosses a specific area in their environment, such as "place cells" or position cells. The "place cells" of the hippocampus largely interact with the "orientation cells" of the brain, which act as an inertial compass, and also with the "grid cells" around the entorhinal cortex.

Problems of memory and disorientation are among the first symptoms of illnesses linked to the hippocampus. Damage may also come from the lack of oxygen (hypoxia), inflammation of the brain (encephalitis) or temporal lobe epilepsy. People who have suffered extensive damage in the hippocampus may experience the inability to acquire or retain new memories.

5.3. Memories and spatial learning

Memory represents the key piece (i.e. the transverse axis) that connects research, the model for designing accessible spaces and the participative method, since it leads one from one place to another and makes it possible to reformulate spatial relationships in the network key or "system of networks".

To sustain this, memories need experiences and training (i.e. theory and practice). In any case, spatial design can facilitate or impede

its consolidation. The memory is capable of filtering each person's experiences with regard to their skills, interests and the context of which they are a user.

"Of the two things that have been learned simultaneously, if one occurs, it usually means the other will then be represented[13]". "This simple phrase summarizes something as important as the relational code that links and governs all memories or changes that are produced in the brain to retain or store what we learn".

Ignacio Morgado Bernal points out that "psychobiology is the scientific discipline that can explain to us how education changes the brain and how these changes modify the behavior of people". This is regardless of their greater or lesser skills for learning.

What happens to the brain when we learn? Memories are formed, stabilized and persist. Or they are lost. This allows humans to adapt to a changing and unpredictable environment. Learning without memory cannot occur because when we learn, neuronal connections are formed with others that exist in the brain, they are strengthened, stabilized and some even disappear (structural and functional plasticity of the brain according to Ignacio Morgado Bernal).

These processes allow the representation of neurons to remain linked to a concept that is important and that represents "what is remembered" from a situation, an event or an author (such as Don Quixote by Cervantes or a sign in a sequence).

Why is this so important when working with people with intellectual or developmental disabilities? Its importance comes from the fact that each person has a "quality" that allows them to learn, recognize and remember as a support for their learning. The intellectual abilities of each person should help reinforce their performance and their memories, since they will allow them to maintain what they have acquired and continue learning in the best cases.

From this point forward, important theoretical and practical

[13] In the prologue of "Learn, remember, forget" by Ignacio Morgado Bernal. The words of Joaquín Fuster that begin the prologue, referring to Juan Luis Vives of Valencia, the tutor of Catherine of Aragon, in "De Anima et Vita" from 1538.

scientific concepts frame the methodological aspects of the evaluation that is focused on spatial orientation. The terms that appear the most often are: recognition and recall, explicit and implicit memory and allocentric and egocentric strategies. Working memory is extremely important since it is constituted in the "form that must be completed" so that people in their role as evaluators can carry out their tasks.

Emotional memory is the sentimental support for the aforementioned memories and it can even alter conclusions made from the experiences, as explained later in the results of some experiences carried out.

5.3.1. Recognition and recall

Strengthening memories means going beyond recognition memory which results in identification that is less developed than recall. "Recognition is a concept that is less developed than recall" (Ignacio Morgado Bernal). Recognition implies familiarity; recall is having an idea of context, place and prior experience.

It is important to start discussing this concept, which represents the ability to store, bring to the surface, remember, and store again, with certainty and with different content. Each time something is recalled, the consolidated memories are strengthened: therefore, the "practice of recall as a method for enhancing memory" is extremely important.

This is a continued practice of the participative methodology. Precisely due to its importance, it is systematically worked on with people before, during and after the evaluations, so that the concepts that should be used (i.e. practice and the subsequent report) are properly established with a specific name or one that has been assigned to it (labyrinth=unravel what is tangled, for the user that defined it as such in their glossary).

Experiences carried out in the laboratory demonstrate that when the rat tries to remember which corridor takes it to the food, place cells are activated in the same sequences as when it moved along the corridor, as if it were recalling that path. The greater the production of these activations, "the more it thinks before deciding and the less it makes a mistake" (neuronal mechanism of recall in Morgado Bernal).

5.3.2. Other classifications to group

Without going into further detail on these concepts which are sufficiently developed in the corresponding bibliography[14], the following classifications related to the methodology are cited:

- Implicit or procedural memories (habits, customs)
- Explicit memories (analyze, relate, compare) as organizers.
- Emotional memory as an absolute determinant of recall, as well as other elements such as sounds and smells that open up an immense field to the study of memories related to perception, space and recall for orientation.

Explicit and spatial memories located in the hippocampus make up the spatial GPS that will be discussed later. It is necessary to emphasize two fundamental aspects for this work: how movements in space are made through different individual strategies and personal strategies:

- Allocentric strategy: the representation of where we are with regard to the context (orientation by signs in the context).
- Egocentric strategy: automatic reproduction of movements according to prior learning.
- Combined strategies.

Other definitions such as semantic and episodic memory help unravel these complex processes:

- Episodic memory: similar to egocentric navigation that the establishment requires for a type of temporal space sequence in the brain. It contains information about our personal experiences that have taken place in a specific place and temporal moment.
- Semantic memory: people and animals, things and facts about the world; similar to the allocentric strategy that is also independent of time. It contains knowledge about different information, facts and events from our own experiences.

[14] Especially Ignacio Morgado Bernal.

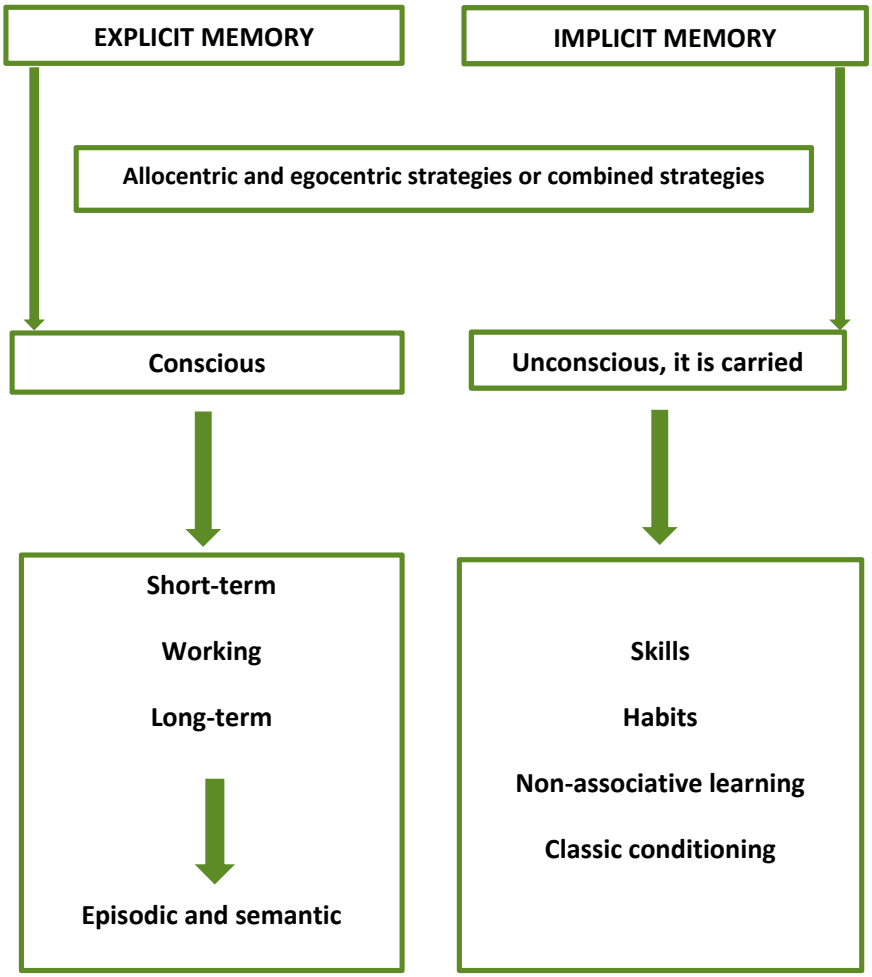


Figure 21. Memories and their relationships.

After analyzing the relationships or associations of semantic memory, and the set of neurons that become "a suitable place for computing the metrics of the surroundings", the researchers arrived at the following conclusion: "This possible parallelism makes us suspect that the neuronal mechanisms that we use to learn to physically orient ourselves in a specific place may be the same as those we use mentally, that is, imaginatively and consciously, without needing to move from where we are[15]".

[15] Ignacio Morgado Bernal.

To draw attention to the validity of this interpretation, materials that simulate the space are always used so that users may complete their ideas before and after the fieldwork.

Those who demonstrate greater spatial imagination are the best collaborators with regard to the evaluation and management of cognitive accessibility.

5.3.3. Memories in the evaluation

The users who form part of the work use memories and combined strategies based on their qualities and intellectual skills. It is possible for some to alternate them, but not for others, as seen later in the users' own words. However, the above implies that those people who "can imagine spaces" have greater abilities to adapt to complex environments and move within them as long as there is an order of relationships and a clear structure of spatial functions.

> *Important conclusion: a reductionist interpretation of the qualities of people that does not incorporate the functioning of memories, with their types and strategies, limits their participation in complex processes for which they can be prepared and actively participate in. It also reduces their true chances to act with autonomy in their community and in society in general.*

This participation carried out along with professionals in analyzing spaces, with the participative method and their inclusion as evaluators, generates skills and then leads them to be users of all spaces, recognizing possible difficulties or interferences and strengthening them, to therefore leave them easily, thus solving the problems that they may present.

5.3.3.1. Working memory

The previous description of the evaluators' work becomes a "working memory" for them, such as information that is retained for some time in order to be used in a near future. Morgado Bernal describes this memory as "a mental slate where we continuously take notes and erase the information that is not accessible in the environment in order to guide immediate behavior".

This description of the memory as a slate is very important since the vocabulary learned during the model's learning sessions or the guides that go along with them during the evaluations will allow them to imagine, predict or mentally anticipate what may arise, unlike short-term memory that is more retentive than analytical.

A second conclusion that supports the need for people to practice their memory, in this work case, is that the executive tasks carried out as part of the developed process improve their performance thanks to practice. Even if these tasks are simple activities, they move more content and involve much more than just their short-term memory.

Laboratory experiments with tasks requiring reasoning demonstrated that they improve emotional control. "These types of experiments ... show us that another significant benefit of training and enhancing working memory, in addition to general intelligence, is emotional intelligence[16]".

Emotion can increase memory, especially for relevant details. For evaluators, these details can represent words or how to carry out their work in an organized way. The emotional concept is so important that in exchanges with students, the people who participate, once they overcome shyness at the beginning, they very skillfully carry out their work in accompanying and supporting the future technicians.

When the training sessions are carried out, "commitment" is worked on in one of the blocks. This agreement is very important and has benefits not only for carrying out the task. An individual's personal and group identity improves through a new activity that they develop with a large number of partners and spaces. This is also reflected in the ways it benefits their emotional intelligence, change in attitude, openness to colleagues, and increase in vocabulary retention (glossary) for the evaluation.

One of the people with Down Syndrome who was trained in Afanias Plegat-3 and who was also part of the group creating the glossary stated that it was a great work and above all, "my values and skills were recognized".

[16] Ignacio Morgado Bernal.

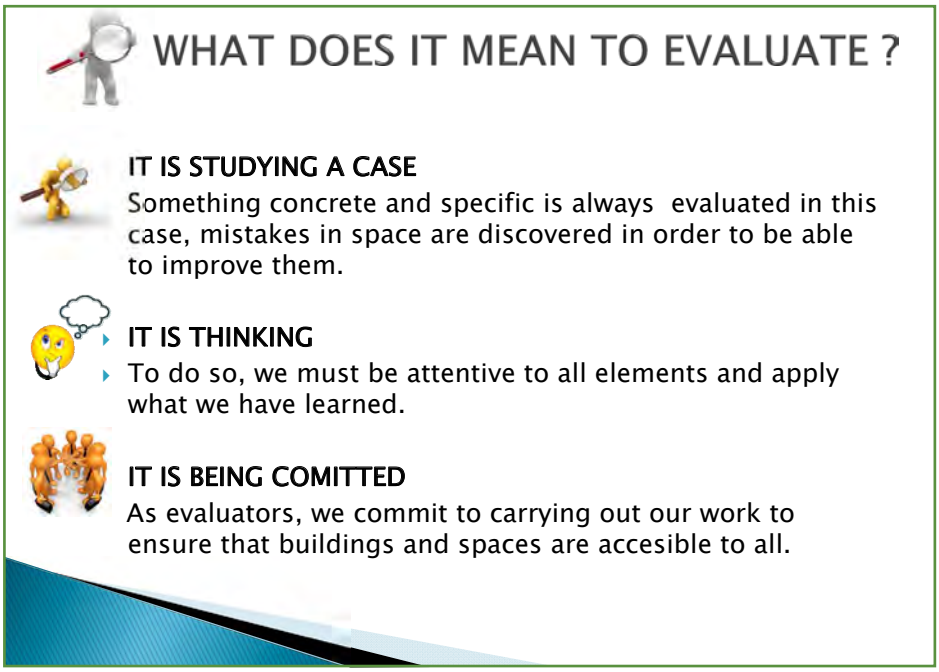


Figure 22. The commitment of users to the evaluation.

5.4. Focusing on the task: the Jennifer Aniston neuron

Approaching the mystery of the human brain and memory through neuronal functioning, i.e. researching what happens inside the mind, was introduced by Rodrigo Quian Quiroga, director of the University of Leicester Centre for Systems Neuroscience in Great Britain, and Hernán Rey, both from Argentina.

They published and discussed their discovery, the "concept neuron" (a neuron that responds to concepts, faces and objects), in the Current Biology magazine. This type of neuron is responsible for relating images in the human brain, thus creating immediate memories.

In a research paper recently published by Neuron, one of the leading magazines in neuroscience, Rodrigo Quian Quiroga and Matías Ison, in collaboration with Itzhak Fried from the Ronald Reagan Medical Center at the University of California-Los Angeles, reveal how a neuron immediately changes its activation pattern when a new memory is formed.

"This discovery is important to understand the functioning of memories. If we do not have that area (the hippocampus), we cannot generate new memories. This is supported by significant evidence in neuroscience, however, we primarily know this because of a patient who did not have a hippocampus and could not have new memories", added the scientist. Memory is distributed throughout different parts of the brain and there is no a specific place that functions as the "memory chest". There is, nevertheless, a specific area involved in its creation[17]".

From this preliminary research on recall and memories, Quian Quiroga, who worked with people with epilepsy, in particular a patient (to whom pictures were shown), identified whether a neuron responded to one of the pictures. It was something very simple: "it turned out that the neuron responded frenetically with the photograph of Jennifer Aniston (in different poses, hairstyles, clothing and places). Even when the patient was asked to only think of this actress, the response was impressive; however, the neuron did not react in the same way with any other image", noted the scientist in his conclusions.

"If I find a neuron that is activated with Jennifer Aniston, surely there are more, because if that were the only one, the probability of me finding it among thousands of other neurons in the area would be practically zero. There should be a network of neurons that encode a concept. These concept cells can rapidly generate associations, meaning that there are neurons that respond to two concepts but are always related[18]. This is a key mechanism for generating memories. I believe that they are the construction blocks of memory and the link between memory and perception. This representation is radically different from what was believed up until now, in which memory was based on distributed networks of millions of neurons".

"This can be studied in these neurons by generating associations between two concepts, and once we have created this association, we can see if the neuron also responds to this association and

[17] Articles published on Rodrigo Quian Quiroga and other sources: El•lipse. Barcelona Biomedical Research. All are included in the biography.
[18] A quote very similar to this one made at the bottom of page 13, referring to Juan Luis Vives of Valencia, tutor of Catherine of Aragon, in "De Anima et Vita" from 1538.

encodes it. In a few trials, we have seen that these concept cells begin to respond to the association that we created" (according to Rodrigo Quan Quiroga in an interview for SINC)[19].

The idea that concept associations as a base for "episodic" memory lacked objective evidence has now been significantly modified. "We now know that they learn associations very quickly, providing important support to the hypothesis that episodic memory could be stored in the medial temporal lobe in neurons that are able to associate different parts of the same experience".

5.4.1. The importance of Rodrigo Quian Quiroga's discovery

Why has the participative methodology focused on this discovery? Perhaps, even if general aspects of memory were taken into account, the same results would not have been reached when paying attention like that given to Rodrigo Quian Quiroga's conclusions.

During the first evaluation experiences, two people who worked on the project drew interest. Their responses were always the same: you have to put up posters, you have to put up "arrows, arrows". It was difficult to take them out of those elements, which also responded to their need with regard to the situation, size and needs. However, on the other hand, they limited their colleagues who worked with the method and other concepts that were also important.

After reading about this scientific discovery, it was decided that focusing on certain people who have an interest in a single aspect of the method, for example, posters-panels (two concepts) and arrows (or route indicating signs), could be interesting. It must be clarified that this "specialization" does not correspond to people who are isolated from other concepts, but rather the contrary. One of these users is the one who created the complex definition of "unraveling what is tangled" for the model's "labyrinth effect". The user is a very active participant when pictograms and text have to be evaluated, since he is a reader and reads and understands with much ease. Nevertheless, given the spatial problem, the user

[19] Articles published on Rodrigo Quian Quiroga and other sources: El•lipse. Barcelona Biomedical Research.

"dictates" where and how the signs should be by means of posters and panels. Perhaps his strength is his quality as a reader which not all of his colleagues have.

This specialization characterizes users and makes them "predictors" of one or another type of sign, but it can limit them when the use of a glossary containing more elements is required. With regard to the young individual who prefers arrows to orient himself, it is worth noting that he is autonomous and not very communicative, but sees spatial details that many of his colleagues cannot see. This is especially true for routes with these types of elements that are better resolved than with other types of measures.

In this way and with any other related concept or concepts, performance would be significantly higher than that expected since the users would not become stressed when focusing on that which does not interest them or is up to them to find.

To know if they are "specialists in a concept", they are asked with whom they would like to work. Based on these shared decisions, the evaluations are worked on with one or more concepts every time.

All are related to the model and the method in their initial group work and in the evaluations.

5.4.2. Concept neurons in safety and emergency

During the work that the evaluators carry out, imbalances linked to changes in the signs they receive from the environment may occur. One important, unconscious reaction of concept neurons is related to the identification of safety factors (i.e. objects and colors). When one that is already learned, remembered, and. above all, symbolic, is modified, a message is broken which must be rebuilt.

If, during the training session, it is indicated to the evaluators that a specific color[20], the concept, is related to a specific situation, for example safety or an emergency exit, that sign is internalized and each time the participant sees it placed in the sequence, they identify it, whether or not it corresponds to the concept that it is representing. Therefore, its use on surfaces or signs that do

[20] The meaning of the color red is learned in elementary school but is consolidated as users are informed and trained in emergency signs.

not apply to these concepts can disrupt understanding since it is different from the meaning that was learned.

The most significant example of this is red, a very striking and contrasting color that is frequently used as the background of signs or indications that are not related to safety or emergency. In these conditions, people interpret color as an attribute assigned to the concept unconsciously and without thinking.

Examples of these breaks will be shown later, although they are probably less dangerous than in other cases where the sign and the color are fundamental for indicating a safe-unsafe position (for example, red on emergency doors). But in being careful, and given that these cases might create confusion in the message, i.e. what they intend to transmit, it is preferred that specific ranges very close to functions that refer to emergencies and safety conditions are not used.

This break is repeated if the color red is substituted by another color, without there being prior knowledge or conditioning for the change. Evaluators who have internalized the color red will have to re-identify the new warning call for as much time as necessary so that their memory-recall can modify it, especially given its importance.

5.5. The brain's GPS, positioning and orientation

How can our brain orient itself in space and create a map of the complex environment that surrounds us and in which we find ourselves? The aspects of memory tested in the previous section, but in this case correlated in space, are found in this research, which given their excellence, were awarded the 2014 Nobel Prize in Medicine.

Three scientists from different times revealed the brain's "inner GPS", cells that form the positioning system that makes orientation in space, i.e. spatial representation in the brain, possible. The Karolinska Institute of Sweden, a university medical institute located in Solna, near Stockholm, and one of the most prestigious medical centers in Europe, points out that the discoveries of British-American John O'Keefe and the Norwegian couple May-Britt and Edvard I. Moser represent a change in the paradigm for understanding superior cognitive functions and have led to new

ways of understanding the functioning of memory, thoughts and how to make plans.

"In 1971, John O'Keefe discovered the first component of this positioning system. This scientist found that one type of nerve cell in an area of the brain called the hippocampus was always activated when a rat was in a specific area of a room. Other nerve cells were activated when the rat was in other areas."

O'Keefe concluded that these "place cells" (i.e. position cells) formed a map of the room.

His studies in animal models determined that there was a type of neuron that was activated depending on the rat's position in the cage. The varying activation of the nerve cells made it possible for this animal's brain to be able create a map of its location in space. This type of pyramidal cell helps create a cognitive map so that the brain can register and process the spatial information it receives.

More than three decades later, in 2005, May-Britt and Edvard Moser discovered another key component of the brain's positioning system. They identified another type of nerve cell, called a "grid cell" (grid-distances), which generates a system of coordinates and allows for precise positioning and the search for paths. Their subsequent research showed how place cells and grid cells make it possible to determine positioning and navigation.

In this case, these neurons are collectively activated when the rat changes position in its cage.

The discoveries of John O'Keefe, May-Britt Moser and Edvard Moser solved a problem that concerned philosophers and scientists for centuries: how does the brain create a map of the space surrounding us and how can we navigate our path through a complex environment?"

"Place cells are neurons that are activated, that is, they emit small electrical shocks when the animal is in a specific place in its environment, as if each one or a set of these neurons had learned to represent that place" ... (their bus or metro stop in experimental cases). "With practice and learning, these neurons can change their representation, ceasing to indicate one place in order to represent another, different one. Furthermore, place cells can be associated

and combined on a planned path or route (Ignacio Morgado Bernal). These combinations indicate the place and route to be followed to find an objective.

These conclusions are reflected in the results of the evaluations carried out by the young participants.

"In 2005, after years of study, the couple formed by the researchers May-Britt and Edvard Moser discovered another key component of the positioning system known as network cells, also known as grid cells". "The precision of this neuronal activation is similar to that of the place cells discovered by O'Keefe, in this case showing periodic activation fields after integrating the data that the animal's brain receives through different ways. After storing this information and analyzing it as a whole, the rat is able to create a self-locating neuronal map, fundamental for being able to orient itself and know where it is heading" (Think Big).

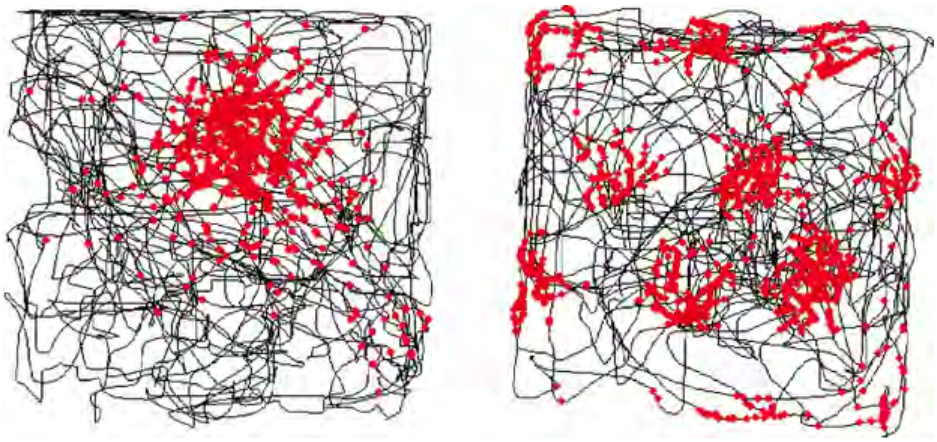


Figure 23. Example cited in the document mentioned in the footnote[21].

These discoveries have enriched the theoretical aspects of the method and have given it a greater degree of accuracy, taking into account the fact that the model for design is based on topological qualities, the most important of which is the organization and internal order of the design elements.

[21] CITYLAB. The 30-Year Quest to Find the Brain's Transit Center. Science has solved a centuries-old question: How does the mind process space? By Kriston Capps. 6/10/2014.

To complete the concepts related to the brain's GPS, texts relating to the research of University of Barcelona Professor Ignacio Morgado Bernal were used.

5.5.1. The brain's GPS and the model

Among the model's principles, the universal principle of "reference-interference", treated in an original way and not with the traditional components that it gives to signs, is fundamental.

Working with Afanias Plegart-3 to evaluate spaces in the Higher Technical School of Buildings of Madrid (UPM) has led to the conclusion that the users refer to furniture or lighting elements when the space is confusing. These elements are striking or have special dimensions that distinguish them from the norm, and they represent a "marker" in the space for the users, a sign that they are on the right or wrong path. They are elements placed in key locations and refer to the paths and routes to be followed.

Other identified and repeated elements include the mailboxes of professors in the hallways of the University which served as a "handle" to find the objectives of the searches. These references should be objects of interest and be envisaged in the projects, so that once placed and recognized, they are identified in the safety and emergency plans as specific elements for orientation. The elements can be standardized to say: "follow the route to the ... mailboxes".

5.5.1.1. Components of the model

If we take the model's basic components into account: organization (i.e. boundaries), places, drivers and synapses (i.e. place and network references), it can be said that they are fundamental elements for shaping the "brain's network for orientation". Furthermore, if other principles and components such as thresholds (markers-indications) and semantics are considered to improve the system, there is no doubt that spatial mobility without the need for signs and graphic elements would recover its natural condition, only being supported by the brain's orientation system or the brain's GPS of place and network neurons.

Most importantly, stimulating spatial orientation/memory cells would ensure that the people included in mobility and spatiality

practices would permanently validate their brain's skills in orientation and navigation.

5.5.1.2. Accessibility sequence

From this scientific perspective, the concepts developed by the method and based on empirical experiences related to the phenomena of perception and paths based on topological relationships lead to a firmer expression, if taking into account that the solutions proposed by the method are based on elements that are associated in the form of planned routes or paths: the sequence of accessibility. This sequence is equivalent to the "brain's GPS" which uses the model to regulate the orientation system in environments and buildings.

Once established, it facilitates spatial relationships based on all types of references (according to the needs of the design: the situation, what it intends to solve, the demands of users, the dimensions of the spaces, the types of relationships established, etc.). This is mainly due to the fact that it is based on maintaining spatial continuity without interruptions or shocks due to breaks.

The following diagram relating to the model's principle of reference-interference (footnote on page 6) establishes the minimum conditions for alterations in the sequences to be resolved with minimum failures. It takes into account the position or location of people, distances between places (sequence) and the need to place messages in continuous succession.

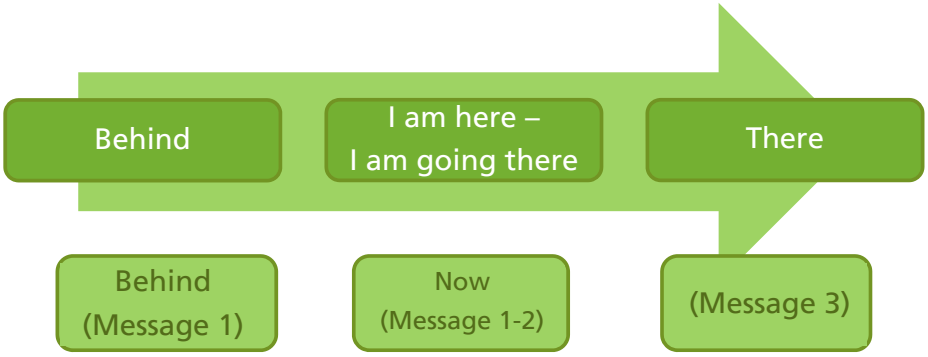


Figure 24. Principle of reference/interference of place.

In the following figure, the places (positions) already appear with their relationships and exchanges and how they correspond to that defined as distance in the "brain's GPS".

Figure 25. Principle of reference of place: positions, distances (brain's GPS).

When there are no successive references or any references to the origin, the possibilities of becoming disoriented and lost can be stressful, especially for people who consider the identification of a daily path as a reason for peace and dependability.

5.5.1.3. Modifications in the sequence

When the experience is permanent and established as a system or network in the memory, people have a high degree of autonomy. However, alterations may be a very significant cause of confusion.

This happens when directions or paths are changed due to organization or management needs of space or transportation.

In these situations, the previous situation must be recreated, which allows them to:

1) Return to the origin if there are references of place (origin and destination).

2) Rebuild a path that has been modified.

The first case is relatively easy if there is information about the origin, whereas the second case is more complex since the elements have to be situation in relation to what has been modified, in other

words, the path must be recreated. In this case, memory ceases to be the facilitator. The examples provided later reflect various experiences related to this aspect when, in the absence of clear sequences, abstraction cannot be used to reconstruct the new condition or the spatial path.

The following diagram makes it possible to reflect on the importance of changes and modifications to planned routes. It especially reflects the need for interferences in the sequence to contain enough messages to restore safety conditions in order to reach the destination.

It is not easy to address these problems when a metro line is reorganized with an alternative service to cover the closed section because of construction. People and especially those with long-established habits are unable to turn to alternative routes without specifying which means, human or spatial support, they are going to have.

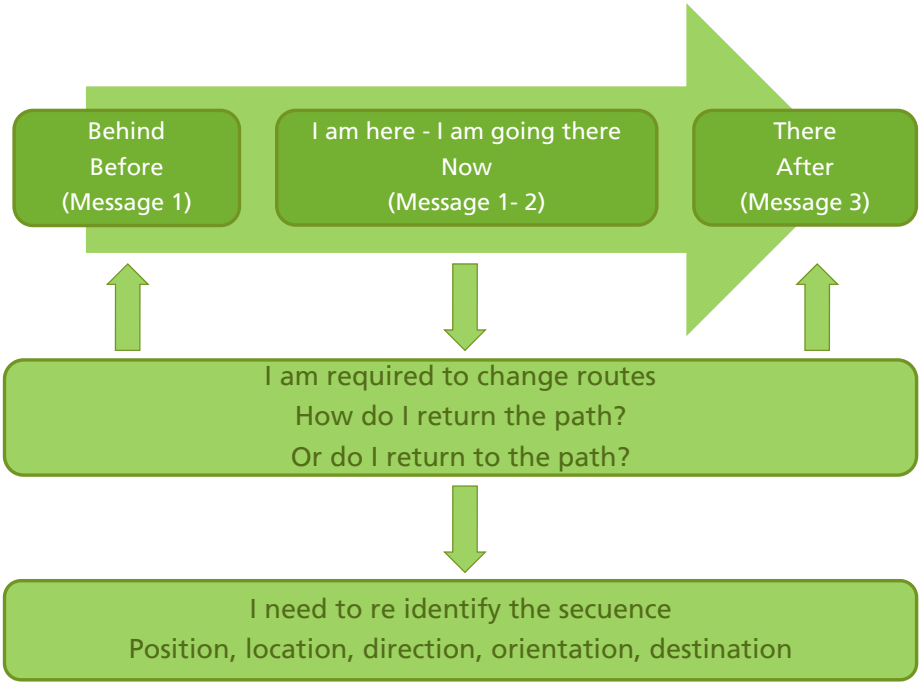


Figure 26. Alterations to the reference of place or sequence.

5.5.1.4. Receiving signals through “indicators”

This name (introduced by Tamara García Garrofé[22] to name the model’s thresholds and markers) is a preferably urban element (for example, a building on long paths or complex circuits) that emits an alert along the path (by means of writing or an image, illumination or sound) that situates users in their surroundings with regard to themselves, their origin and a destination. This destination may be fixed when involving important or emblematic buildings and environments. When they are not fixed, they will respond to the distribution of important destinations in that particular environment.

The destination may also be technological, indicating that which exists on that particular route, identified by its name or any other type of access, for example, QR.

Images 45, 46 and 47. Markers or indications: on the pavement and occupying space (Alcalá de Henares and UPCT. CaixaForum Madrid).

Unlike images 45 and 46 that are placed along an urban sequence, image 47, the building’s identifying marker or indicator, located at the entrance of the CaixaForum Madrid square, is an element that does not exist along any path. There is nothing that indicates to the pedestrian that they are arriving at their destination. It is a final identifier but its placement is interesting because it is already

[22] Professional at the Magdalena de Pozuelo Foundation, Expert in Cognitive Accessibility at the International School of Accessibility (EIA) of La Ciudad Accesible.

designed, has an acquired personality and is repeated. It would mark the path or route to follow from nearby focal points: Renfe, metro, bus stops.

It would even have a referential function such that if it is graphic, it can be reproduced on sign panels to orient pedestrians (which are currently non-existent). The route or path markers or indicators would make up a network of positions marking the distances that remain to reach the final objective, which are different in each case.

These graphic elements or route or path markers would cover information or guide spaces for the pedestrian, which the city does not offer because the informative space is specialized for road traffic. Even the signs that are oriented towards vehicles do not use their rear side to inform pedestrians. These spaces could be occupied by graphic markers or indicators.

Image 48. Rear side of signs for vehicles on the Paseo del Prado road. Madrid.
Image 49. Trail of footprints in a small museum in Lanzarote. María Elena Escobar Martín. (EIA Expert).

There is a significant difference between the empty panels of the Paseo del Prado road and the pleasant image of the museum in Lanzarote.

This does not require any excessive spending, but clearly carries out the functions of orientation and even establishes distances through the succession of footprints on the pavement (the brain's GPS).

Image 50. Focal centers. Lotte World Tower, Comercial Center. Seoul, South Korea.

6. Presentation of experiences and results

Once the research is integrated into the model and the method, the set of concepts is reinforced on one hand, and the performance of the users in their evaluations is reinforced on the other hand, i.e. orientation through recall and recognizing routes or places by identifying references. The model and method are conducted in parallel, but they are not separate operations since their approaches come together so that both views share their experiences. They are combined during fieldwork and afterwards, during synthesis.

Although the model was created based on diverse research and many hours spent with people during the first phases of content writing, the subsequent validations were already made with material coming from the participative method with users and by sharing the glossary in training sessions and experiences.

With the new integrated knowledge, safety in handling the model

and methodology is achieved so that evaluators who support technicians in accessibility are recognized and valued. All of the cases discussed can initially be part of one key or another, although the title under which they are included is dominant.

Nevertheless, some experiences (i.e. responses) only belong to one of the keys, since the features of the subject in the action is always the same and is sometimes consciously or unconsciously repeated.

This chapter includes some experiences from people who have not worked with the author directly given their importance. They formed part of the group of users in the project led by María Elena Escobar Martín (Course on Experts in Cognitive Accessibility, La Ciudad Accesible EIA).

6.1. Work techniques based on memories

6.1.1. Training

Training sessions are carried out to improve performance in a proven way and to provide an opinion, instead of repeating knowledge on similar topics, except for when they are compatible with the main topics given the context. The sessions are based on repeating spatial experiences that are carried out during training.

They allow users to retain learned concepts and refresh those from their acquired memory (including memory modified with practice) without needing to go back and review some of the known theoretical and practical topics. This involves detecting difficulties and potential solutions to solve them.

The purpose is to subsequently introduce qualities shared among users that give spaces the ability to orient beyond the users' personal skills to recognize and remember (i.e. orient themselves).

The experiences were responded as such in the first or third person.

6.1.2. Emotional memory

Recalling that which was stated previously: "Laboratory experiments with tasks that require reasoning demonstrated that they improve emotional control.

These types of experiments ... show us that another significant

benefit of training and promoting working memory, in addition to general intelligence, is emotional intelligence[23]".

6.1.2.1. Cases

Ce: This young, autonomous individual is very attentive to his surroundings; however, he is very sensitive to change. Habits and a routine influence his behavior and sense of safety. New and different situations change him. However, tranquility assures the team of his collaboration and participation. The experiences have improved his attitude and built his identity; he has opened up during training sessions and fieldwork.

Group 1: This group to which the young individual Ce belongs is highly affected by the expectation of being successful and "not making mistakes". During the evaluations, they had to be convinced that success in this case was paying attention to the problems on the path and making mistakes, in other words, failing to reach the destination. This would lead to greater achievements: solving the problems of accessibility.

6.1.3. Memories: implicit and explicit, strategies

6.1.3.1. Cases, allocentric strategy

AB: This is the most obvious case because the individual first makes a conceptual synthesis of complex paths based on the location of furniture (for example), which is reproduced in the same way on all floors of the building. Once the individual has identified them, they know what to search for to orient themselves and reach the destination (which is clarified later).

6.1.3.2. Cases, egocentric strategy

Group 2: They developed a diagram (in a network?) that lets them arrive, but they would not know how to do so if they had to change direction (i.e. modification of the sequence).

T: Redirecting her words leads to an interesting concept of "memory" (she expresses it by saying "because I remember"). Coordinator's comments about T: we had the opportunity to ask her what would happen if she does not remember or if she was not there before.

[23] Ignacio Morgado Bernal.

N: Coordinator's comments about N: I take advantage of the fact that she has only been at the center for a few months to ask her if, when she arrived, she knew the location of every area of the center that she now recognizes. She tells me no. We reached the conclusion that markers, such as colored steps marking an easier path, would have helped her.

Group 2: They say they know how to take the path to Kiosco (the name of a cafeteria that they go to almost every day) alone but they are not able to explain (i.e. conceptualize) the path. They developed a system that allows them to arrive, but they would not know how to do so if they had to change direction.

Coordinator's comment about Group 2: the need for help and company seems to be more obvious on the streets near the center that we don't take often.

Group 2: This case is clearly of the combined type with the following key, since the habit and the concept corresponding to "the boy" appears. (These responses can be read in the context of point 6.2.1).

*Question on the aspect to be identified: d*irections from a crossroads.

"Nominal" response: We name the boy that is in front of one of the two possible paths. When they see "the boy", they move towards the path where he is located (i.e. recognizing a person or object, i.e. the concept, which is repeated in the same place), which indicates the path. Would they find the path if this person were no longer in his usual place? Or would it be enough for there to be a boy?

Technician in accessibility: In a known environment, for example, the day center that is going to be evaluated, the acquired experience provides other references or guides that are perhaps more difficult to interpret or assess in an evaluation of unknown environments.

6.1.4. Work techniques based on "NON-recall strategies"

Estas técnicas resuelven situaciones complejas en el espacio y pueden apoyan a personas cuyas cualidades les impiden el reconocimiento de espacios y la búsqueda de secuencias.

6.1.4.1. Cases

Group 2: (day center) there are users that have difficulties in not only memorizing black points on the route, but also forget where they are going. In this case, they use a "portable" reference, similar to a pictogram or picture, according to their communication abilities which they take with them. In this way, they can remember where there are going, or if someone finds them lost or disoriented, that person can know where they are going and accompany or redirect them.

6.1.4.2. Usefulness of the techniques

In other contexts, this final experience can be very useful for supporting the autonomy of people with Alzheimer's disease. It is also very useful for people with a visual sensory disability in order to get their attention in urban environments (getting help, taxis, etc.).

6.2. The Jennifer Aniston neuron

Research evolves and enriches knowledge, which in this case uses its content to improve the quality of life of people through cognitive accessibility in environments and buildings. A working guide is created, which is adapted to each person or group of people who in practice recognize problems and provides solutions as they walk and comment. If people become stuck or do not remember a large number of concepts, it is a good idea for each individual, or small group, to be responsible for a few concepts.

This will decrease the need to remember an extensive memory set and the individuals will also create their corresponding "memory-concept" that they are each responsible for. Small groups are made based on the glossary they will retain and use when working. It is "their memory" and their responsibility, along with that of their colleague in the evaluation.

6.2.1. Concepts that specialize the evaluators

The cases presented are supported by the content of the model and form part of the participants' specialty. Focus is placed on these cases, which are most likely to be remembered every time the individuals are called to evaluate. Furthermore, this will be

their strongest aspect beyond the fieldwork, in other words, in the reports.

6.2.1.1. Cases

O: This experimental case is very important and has already been discussed given the reading ability of this young individual. The function of "unraveling what is tangled" has been assigned to the principle of "neutralizing the labyrinth effect". However, the individual's semantic understanding of orientation relates to information panels or posters, since he is not capable (even if he so desired) of finding or justifying the need for more elements. Orientation through panels becomes the key element for knowing where and why they have to be placed.

O finds safety in his reading identity.

J: He is a very shy person and communicates very little but does so in a very expressive way. He understands that orientation through arrows and routes is the easiest, most comprehensible and most useful method for him. J helps in each case by saying whether it is useful to place guide arrows on the floor to reach the desired objective.

L: J's earlier conclusions are important because they often reflect the demands (design) of people such as **L**, who, despite having little autonomy in an unknown environment, move freely inside a building if there are references that guide them (arrows). **L** is not a reader, but is autonomous and uses the public transportation system.

ER: In the courtyard I find it easy to know where I have to go to enter the building because the path (J's arrows) takes me to the entrance almost unintentionally. In addition, the handrails are on both sides of the ramp to support me and I see the door if I look to where they end. Afterwards, the path is easy, it continues straight ahead.

AB: She is the young individual that has a high capacity for relating spatial concepts. However, there is one that especially she especially focuses on when she reaches a large space: where are the restrooms? And this is something she repeats. Individuals generally need to locate this place and ensure that they will be able to

"arrive on time" when they go to work to making the evaluations. There is a general comment among them and it is that "they are always hidden". This is something that concerns them and they spend a significant amount of time on the paths on searching for restrooms. (This isolation corresponds to "separation" in topological relationships, a quality that the model uses to identify problems of accessibility).

A: This individual has internalized the concept of crossroads. She enjoys all problems related to these types of conflictive spaces. She even created a type of response: "this is a crossroads". When drinking coffee during one of the workshops, she had to choose a cookie. She reached the conclusion that choosing "is a crossroads".

Group 3: referring to the previous topic on restrooms, the group also spent a long time focused on this space, requesting information about why there was spatial separation and concealment of the internal paths and routes.

Group 1: the crossroads is a concept developed by other collaborators not because of the difficulty of identifying it spatially, but rather in order to express it verbally. The group decided that it was an important concept that had to be remembered. In order to do so, they spent time in various workshops repeating the word that now is not only established, but also "jumps out" quickly when it is identified spatially.

6.3. The brain's GPS

As previously mentioned, "place cells can be associated and combined in a planned path or route" (Ignacio Morgado Bernal), and various cases related to the model's concepts and the network structure of the brain's GPS are described.

6.3.1. Spatiality

These cases are very clear to identify. They involve people who, prior to the experiences, have already considered identifying not only elements, but also paths that serve as a reference.

Although they were helped during the evaluations with known signs while searching for the shortest routes, it is clear that spatiality is part of their qualities and skills. They function with

complete autonomy and facilitate the life of the groups with which they share their activities.

They are people who collaborate because, in addition to their spatial qualities, they have other qualities related to group communication.

6.3.1.1. Cases

F: Recognition of a route through their prior travel experiences in a bus. Although our path did not exactly correspond to his, he could indicate to us the reverse direction of the one he took in public transportation. Capacity of abstraction and interaction: move forward and backward from his initial position.

S: He is a young individual with high autonomy and the ability to analyze each situation. During the evaluation, he proceeded to carry out a prior study on the possible routes along urban paths to reach the building (destination). He decided to take the longest and safest route. With 150 meters left, he changed the route because he had incorrectly calculated the sequence and he continued along the quickest route from the previous point. This corresponds to the previous texts that refer to how ways of being are combined within a planned path or route in order to find an objective.

AB: Search for references and memories in placed objects and furniture. His spatial orientation depends largely on places and their ordered and organized relationships. He first seeks elements and shapes (concepts), and then relates them (the network) to each other to reach the objective (combination of concepts and the network).

P: She notes: "you should be well placed" so you don't get lost. The way in which **P** describes HERSELF with regard to the surrounding space describes her way of conceptualizing and her movements. **P** is a young, autonomous individual who has an internship at a company in the city where she lives. She travels alone and does not have any problems as long as the route for the round trip is explained to her. If this is modified, she is able to situate herself once again, provided that she is given new navigational charts of her new position in the sequence.

Group 1: This group decided that all concepts are useful for helping "people find their position and not become disoriented". The way that one of the young participants expresses herself is very important to know what positioning and orientation means to them. All of the concepts are understood as a set, not isolated elements.

6.3.2. GPS and learning

6.3.2.1. Cases

Ca: She cannot reverse the direction of the routes as in **F**'s case, for which reason she is always disoriented since her reference is the place where she is at (her origin), not the one where she should be headed. But once recognized, she remembers it, takes decisions and shows the path to her friends, returning with them without becoming disoriented (she reproduces the path). This case can be combined with emotional memory since **Ca** needs it to be evaluated and to evaluate herself (very strong identity). That is why she shows her friends the path, showing that "it can be done" and she should be the one that guides them.

6.3.3. Work techniques based on references to the origin

When the evaluators are trained in the method, they become aware that if they become disoriented on a route, whether or not it is defined as a sequence, it is a good idea to return to the origin to find the correct path again.

6.3.3.1. Cases

Al: Making a synthesis of the work, he commented that the signs "to the origin" (which did not exist in the search for his destination) would have made it possible to relocate himself at a moment of confusion that his colleagues in **Group 1** had to clear up.

7. Recommendations based on the experience

Starting with the first pages of the book, a series of experiences based on theory and practice, research and experiences have been provided to the reader. This chapter is not considered a synthesis because each chapter went on to elaborate successive analyses and syntheses from the systemic and dialectical approach. These recommendations are expressly focused on two topics that are extremely complex since they relate to the autonomy and safety of people, both in environments and in buildings, as well as service containers.

The recommendations are related not only to the evaluator profile of the users, but also to the comments and conclusions that were constantly provided.

7.1. Breaks in the sequences. Answers

As can be seen, all of the cases vary greatly and they form part of the work experience. Furthermore, they were shared through

theory and practice with the people who participated in the evaluations. With the model as a reference, and considering the great importance of research on memory and the brain's GPS, it is recommended that spatial and environmental changes, when necessary (i.e. urban changes or changes inside large buildings), are accompanied by very specific means of reorientation "of place, of route, and especially of new relationships" that could be created.

The previous examples that users worked on during the evaluations were carried out with human resources as a support and accompaniment, but without directing the experiences. Therefore, although they were free *to get lost in urban and building labyrinths*, there was always trust and especially the assurance that they could arrive at the destination, although that is not the rule. There are times when changes in the organization of the space lead to stressful situations or behavior crises, especially for people that consider tranquility to be part of their routine and habits, and they do not accept changes easily.

Given these alterations due to unexpected events in the sequences, for example, in transportation hubs, the metro, shopping malls and emergency and urgent care centers, it is not enough to just say "now go that way". There should be clear, comprehensible and specific references to new routes which are always related to the original route and which can be created from two alternatives:

- The placement of mobile elements such as tape or guides that are arranged to be introduced immediately, independent of the sounds and texts which are also necessary.

- A technological alternative that is widely commented on, starting with page 134 of chapter "2.2.3.2 Modified reality, light art[24]" in the second edition of the model for design. The text begins as such: Light art is an experience based on changes in perception that are achieved with light effects. It is the result of the combination of space and light, which has the ability to change dimensions, perspectives and colors where it acts. This is a type of original activity by the designer (architect, sculptor or painter with light) who takes part in calculating what is going to occur beyond the reality of spaces and colors.

[24] Cognitive Accessibility. Model for designing accessible spaces, Second Edition. 2015. La Ciudad Accesible.

In line with that proposed, work on National Patent 201331690 (method, system and software product for the spatial orientation of people[25]) is being carried out. The system has identified people's problems with direction-orientation and it establishes colorful, luminous spaces through technology that already exists on the market, as well as other technologies whose studies are already underway, so that people can orient themselves in normal circumstances, i.e. on their daily path, or reorient themselves between the place or position of the break and the final desired destination.

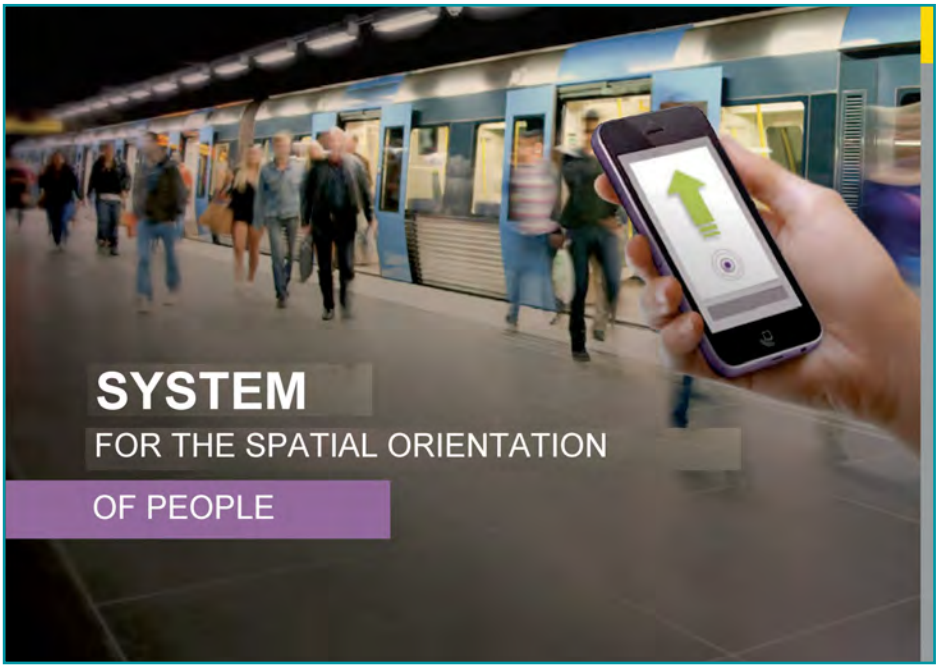


Figure 27. Presentation of the system. V CENTAC Conference, Malaga. 2014.

This system was developed in two phases: the first experimental phase (2015) and the second phase for understanding the comprehensive functioning of the beacons (Beacon iB001-N) by Alfonso Fernández Santamaría in his Final Project at the Higher Technical School of Computer Engineers, advised by Loïc Martínez Normand (2016).

[25] Published in the Official Industrial Property Gazette on 11/12/2015.

The final result was an application prototype for cellphones which detects the beacons and calculates paths on predefined maps.

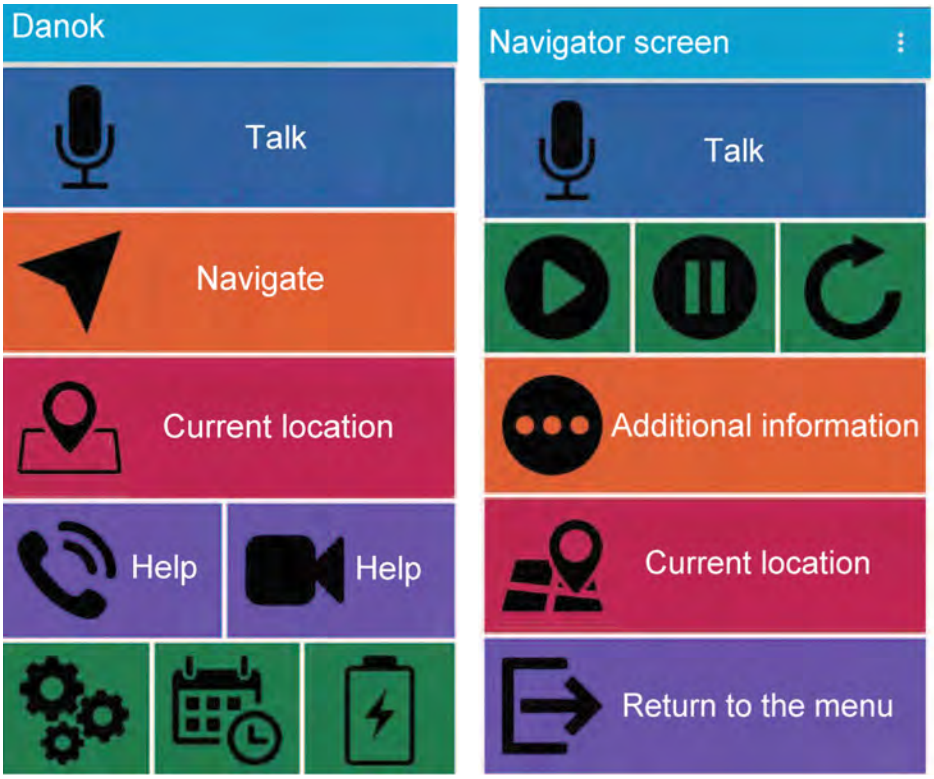


Figure 28. Screenshot of the Menu of the application./ La Ciudad Accesible.

Continuing this research can easily and simply improve spatial orientation through color and illumination systems, even in maze-like or complex spaces.

These recommendations can be very useful in maze-like contexts that are not easily controlled by the user or even by safety personnel. They are essential when using manual or technological solutions or in environments that may become uncontrolled, such as large public transportation hubs, hospitals and large auditoriums. They are not applicable to safety and emergency, where supported evacuation systems are based on the organization of maps and coordination with human support, although these systems have also had problems in providing for the evacuation of people with functional diversity.

7.2. Breaks in graphic references. Answers

There are other cases in which the sequence is not modified, but rather there is a fracture in the orienting sign or message, i.e. the color that was previously mentioned. The examples in the following images show, on one hand, the colors assigned to the general indicator text of the hub platforms: red; and, on the other hand, each island with its own reference that identifies it: blue, yellow and orange.

Images 51 and 52. Break in the use of colors in the Moncloa Hub in Madrid.

The break is created with the introduction of a unifying color, red, that is disrupting, since the platforms, or entrances are included and each of them have their own island and color that varies, either yellow, blue or orange. These differences in color are the message that is to be sent, since the platforms are identified with a different number. They do not need to have the same color (red).

It would probably be clearer to have the word "platform" placed on a neutral background (white or gray), using three colors for the islands 1, 2 and 3. A greater fracture occurs with the color orange, which corresponds to island 3 and is within the range of reds. This color is still used in some hubs to name and ensure that the emergency exit doors are noticeable (red is still used at the Avenida de América hub in Madrid). The color green of the previous signs assigned to the "exit" corresponds to the standards on evacuation and emergency colors.

The following images, in another context, modify the background of the information panel of the platforms (Avenida de América hub in Madrid).

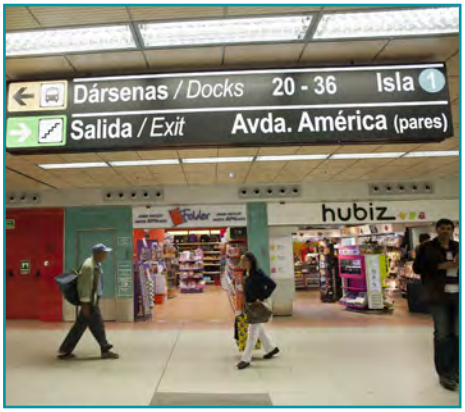


Image 53. Neutral colors, platforms.
Image 54. Emergency exit. Avenida de América hub in Madrid.

Adding to the confusion of evaluators, as well as travelers who use different transportation hubs in the same city, the changes proposed by the European standards that modify the recognized colors (red to green for safety and emergency exits) may lead to unanticipated reactions at times when an automatic reaction that is quick and immediate is exactly what is needed.

Information and awareness campaigns which identify new messages that, in this case, communicate colors[26] should be an important topic that service centers create awareness about through information campaigns located at the entrances of each building.

This should be carried out for at least a period of adaptation and until the new identity sign has been recognized.

[26] EN ISO 7010. The standard establishes a period of time for these changes to be carried out.

Color	Significado	Indicaciones y precisiones	Señal
Red	Sign of prohibition. Danger. Alarm Material and equipment to fight fires.	Dangerous behaviors. Identification and localization.	
Yellow	Warning sign.	Attention, precaution, verification.	
Blue	Sign of obligation.	Behavior or specific action. Obligation to use personal protective equipment.	
Green	Sign of rescue assistance. Safety situation.	Doors, exits, corridors, rescue or aid stations, venues return to normality.	

Figure 29. European Standard ISO 7010-2012 on Signs. Color assignment.

Image 55. Emergency exit (green color) in the tunnel.

The figures and images demonstrate that orientation and cognitive accessibility are not a matter of "taste", but rather physical and emotional safety. The markers indicating the direction in which the driver or pedestrian in the tunnel should go and the distances that inform them of how much farther they still have to travel to reach the safe zone constitute a set of standards that are essential for those involved in any situation in this closed and claustrophobic space.

They are an example to be followed, adapted to designs and architecture, in order to provide clarity to the long metro tunnels or maze-like paths of buildings for public use, such as hospitals, shopping malls, hubs, etc.

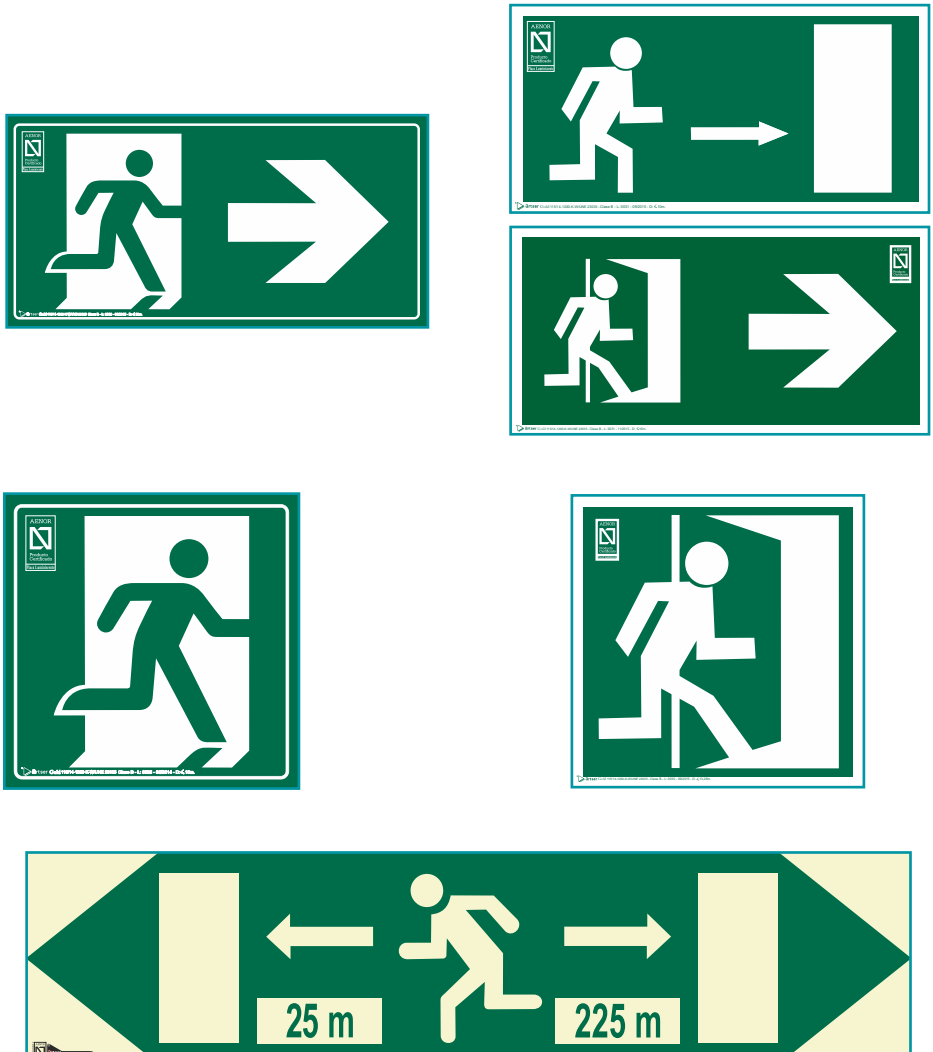


Figure 30. Emergency exits with pictograms: Left ISO 7010-2012. Right, old ISO. Bottom figure: with indicator of distances / ARTSER.

7.3. Safety and protection

The high-risk profile of people who may be easily affected by their emotions during the evaluation, those who are more confused and upset when facing danger than when in a daily situation without danger, should be considered. In these cases, the sequences between spaces where the people (activities) and exit doors are found should be perfectly marked with understandable and

graphic elements that are established by the standards as well as other elements that can complement the previous elements since the maps and complex tests will not be useful in any case. The exit doors will be colored as established by the standard. Bright colors are better than dark colors.

When activities that include people with cognitive diversity are programmed and the environments or buildings do not have suitable conditions for a quick and easy evacuation, such as when a cinema or theater does not have an exit with direct access to the street or they are truly maze-like[27], it is recommended that the sequences be conditioned with clear elements that can be moved or fixed, since they will ultimately be used by everyone. When there are long paths, the sequence must not be broken under any circumstances.

Here it is interesting to refer back to the title "The model and the brain's GPS" and remember that it is noted that: "These references should be objects of interest and be envisaged in the projects such that once placed and recognized, they are placed or identified in the safety and emergency plans as specific elements for orientation. The elements can be standardized to say: "follow the route to the ... mailboxes".

Maps without references or those that refer to a greater system of orientation lead to the loss of the keys needed to position people. In cases of emergency, this is not only serious, but essential for the survival of all.

[27] For some people, arriving to and especially leaving rooms for public use is a true adventure. This is the case with the Sala Negra of the Community of Madrid's Canal Theaters.

8. Conclusions

The study and inclusion of research has been essential in improving the system, i.e. the model and the method. In awareness of the richness in diversity and the need to design accessible spaces, design and function elements that are capable of strengthening personal and group skills should be introduced. This also includes acquired qualities and those that can be developed with regard to individuals' roles as evaluators, since the marker they use represents their *reality and diversity* and their knowledge of the model and the method. For these individuals, it is stimulating to receive recognition of the importance of their function based on universal accessibility as a support to technicians and specialists.

Improvements to the system will also bring higher quality to the environments and buildings. And, above all, knowing how they have an influence on the safety of people. By understanding the reason behind many actions and reactions of human functioning, certain decisions that are made, sometimes without being evaluated but being important, will be handled with more care especially if they have an influence on the lives of everyone.

This recently started work requires a significant amount of theory and especially a lot of practice. That is why professionals who have shown an interest in people, the environment and surroundings are so important. They support a work method based on theories, paradigms and experiences that have demonstrated throughout the 20th and 21st centuries that they to improve orientation and inclusion systems for people. Their participation, acceptance and openness towards the innovations presented here are inputs and outputs for those involved in the task of researching and returning inputs to improve the quality of life of all.

By incorporating this knowledge into their curriculum design, the collaborating universities will make it possible to work with new researchers so that the environment and functional diversity have their own responses. In this way, the right to space and social inclusion does not refer to the articles that list the rights, but rather to the true solutions that list the results and successes, which are certified as good practices of universal accessibility.

8.1. Participation in the community

This can be achieved more quickly when taking into account the measures suggested by Santiago Duhalde Bartolucci, who holds a Bachelor's Degree in Law and is a member of the 2015-2016 "Experts in Cognitive Accessibility" course developed by the International School of Accessibility of La Ciudad Accesible.

- A Work Office for Universal Accessibility will be established in each town or group of towns when these towns are sparsely populated.
- Each office will be made up of at least a Municipal Technician, a representative of associations for disabled people (NGOs), and an Accessibility consultant or professional trained in Universal Accessibility (physical, sensory, cognitive).
- The office will be responsible for evaluating the selected spaces, such that it should have the necessary participation of people with functional diversity, including people with intellectual or developmental disabilities. Proposals for improvement and the verification of its functionality will be made by people of the same collective.

- The effective participation of people when evaluating spaces will be ensured by means of their prior familiarization with the basic elements and concepts of universal accessibility, including cognitive accessibility in collaboration with the organizations that group them and supporting professionals who relate to them on a daily basis.

The collaboration of universities as an inclusive space to train everyone is one of the instrumental means, along with employment, to ensure fulfillment of the previous point and to create awareness in society.

With the method, compliance with the Convention on the Rights of People with Disabilities (CRDP) is ensured, which establishes in article 9 thereof on Accessibility "*To enable persons with disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications, including information and communications technologies and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas*".

It is also worth noting that the Principle of Equality of Opportunity established in article 3 led the United Nations Committee on the Rights of People with Disabilities to define Accessibility as "The precondition for persons with disabilities to live independently and participate fully and equally in society"; thus establishing Accessibility as a "right of access" per se (General Comment no. 2 2014).

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The value of this book for those who are interested in cognitive accessibility as an inclusive theory and practice is that it has been able to provide a model for designing accessible spaces and an inclusive methodology in which users with functional diversity participate in spatial evaluation processes.

Important scientific keys were taken into account based on the research on neuronal networks which shed light on the functioning and actions of people, and especially how memories and concept neurons, i.e. the Jennifer Aniston neuron, and the brain's GPS, identified by the 2014 Nobel Prize in Medicine as a system of positioning and searching for paths for spatial navigation, are developed and used.

We find ourselves with a book that is going to improve the role of evaluators with functional diversity in environments and buildings through a systemic approach by supporting technicians and experts in their work with universal accessibility in general and specifically with cognitive accessibility.

This book completes the author's trilogy on cognitive accessibility which has been made available by Servicio Editorial of La Ciudad Accesible. It joins the 'Model for designing accessible spaces. Cognitive spectrum' and the second updated edition of 'Cognitive Accessibility. Model for designing accessible spaces'.

Without a doubt, we are working with an emerging discipline that has been of great interest over the past few years for both the Public Administration, as well as for the associative movement itself and designers of inclusive spaces and environments.

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