Escuela Superior de Arte y Diseño de Andalucía

TFG

Graphic design and sustainable development.

Supporting agriculture in developing countries through an adaptable digital assistant: Demeter

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INDEX OF ABBREVIATIONS

AI	Artificial intelligence
FAO	Organización de las Naciones Unidas para la Agricultura y la Alimentación (Food and Agriculture Organization of the United Nations)
Fig.	Figure
OCDE	Organización para la Cooperación y el Desarrollo Económicos (Organization for Economic Cooperation and Development)
OCI	Oracle Cloud Infrastructure
p.	Page
SDGs	Sustainable Development Goals
SIASAR	Sistema de Información de Agua y Saneamiento Rural (Rural Water and Sanitation Information System)
TFG	Trabajo Final de Grado (Final Degree Project)
UN	United Nations

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1. ABSTRACT/KEYWORDS

ABSTRACT

This work aims to **design a digital assistant that supports the sustainable development of agriculture in developing countries**, especially focused on rural producers. This is a project that includes all the research and analysis of the current situation of farmers in these countries, the prototyping and design of a digital assistant and the development of an appropriate image for this fictitious project.

This project aims to defend **graphic design as an effective tool** within the action plans of the United Nations (UN) seeking to promote its Sustainable Development Goals (SDGs).

In the first part of the work the project, its objectives and the topic are contextualized. Here we justify the **real need** for a project of these characteristics and the role of graphic design in it. Then we move on to the development phase of **graphic design applied to a digital assistant**: from the first sketches to the final interface.

The evolution of this work corresponds to the graphic conclusions drawn from the research and its respective chromatic, typographic and conceptual application. Also with the development of a virtual assistant prototype, the development of a corporate identity and the presentation of the final results.

KEYWORDS

Graphic design; Web design; Sustainable Development Goals; digitization of the primary sector; user experience; digital assistant.

2. JUSTIFICATION

According to the International Fund for Agricultural Development (IFAD), in 2050 there will be more than 9 billion people living on Earth, 2 billion more people to feed than today. Meeting the world's growing needs will require doubling agricultural production by 2050, **reducing food waste and achieving sustainable and efficient food systems.**

In some developing areas, small-scale production accounts for up to 80% of total production, such as in Sub-Saharan Africa and some parts of Asia. However, millions of rural residents suffer from a lack of food, resources, financing, education or infrastructure.

Furthermore, climate change especially affects crops in rural areas whose inhabitants have a very limited capacity to adapt.

Due to these types of global needs, the SDGs arise. The **Sustainable Development Goals (SDGs)** were adopted by the United Nations (UN) in 2015 as a universal call to end poverty, protect the planet and ensure that by 2030 all people enjoy peace and prosperity.

The 17 SDGs are integrated: they recognize that action in one area will affect outcomes in other areas and that development must balance social, economic and environmental sustainability.

Among these objectives, number 4 stands out: **quality education**. This objective is based on the firm conviction that **education is one of the most powerful and proven drivers to guarantee sustainable development.**

An example of this integration is its correlation with goal number 12 Responsible production and consumption, which seeks to ensure that people around the world have the relevant information and knowledge to sustainable development and adaptation to a lifestyle in harmony with nature.

The SDGs are implemented through various specialized agencies within the UN and through international cooperation. One such body is the **International Fund for Agricultural Development (IFAD)**, which emerged in response to the food crisis of the early 1970s, when global food shortages were causing widespread famine and malnutrition.

IFAD focuses primarily on the rural poor because they are the **most disadvantaged communities globally**. Three quarters of the world's poorest and most undernourished people live in rural areas of developing countries. Most of these women, men and children depend on small-scale agriculture for their livelihood and development.

FIDA considers agriculture as a business; it can not only be used for subsistence but also as **an engine for economic development in these areas.** The vision of this organization is for people in rural areas to be business owners and know what they need to be successful.

To overcome the challenges of the SDGs, IFAD supports rural small-scale producers and connects them to markets. However, IFAD does not consider the factor of agricultural education within its action plans, being an **essential piece in the diversification of crops, the implementation of new techniques and the sustainable adaptation of agriculture to nature.**

The UN, on the other hand, does have active projects in agricultural education such as the NEXO Approach in Central America. In this project, new strategies are proposed to promote the development of irrigation in rural areas. For example, a proposal for a cascade thematic training and technical advisory system.

However, **the system presents serious structural problems** that compromise its effectiveness. Mainly it supposes a structure in which technical knowledge is not available to users since the program trains professionals who in turn will train the beneficiaries through courses. These courses are limited due to the number of places and budget availability for the current year. Furthermore, the information is not personalized nor does it respond to their problems in real time.

Although rural areas in developing countries have low educational rates, farmers must learn knowledge rather than being able to consult practical solutions. This aspect is crucial as it reduces the real effectiveness of the training plans.

These problems are not exclusive to the NEXO Approach, but we can observe them in countless training projects. **Despite the advance of new technologies, the structure and methodology of the training systems has not changed substantially.**

Thus, it is concluded that **it is necessary to boost agriculture in rural areas of developing countries through an effective, practical and understandable agricultural education system.**
This education would favor rural economic development, adaptation to more complex technologies and facilitate action against climate change.

3. GOALS

Main goal:

- Design a prototype of an adaptable digital assistant that advises and supports farmers in rural areas of developing countries.

Secondary goals:

- Use graphic design as an effective tool within UN action plans.

- Promote the Sustainable Development Goals through graphic design.

- Contribute to the digitalization of agriculture.

- Design a corporate identity and image suitable for the project and the assistant.

- Adapt the design of the digital assistant to the users.

- Develop an effective and understandable line of communication between the assistant and the user.

- Promote access to information for rural communities.

4. INVESTIGATION

BRIEFING

What?

A prototype of a digital assistant will be designed to function as an intermediary between technical knowledge and farmers. Graphic design will be used as a tool to encourage farmers in rural areas and developing countries.

Why?

Around 40% of the world's population lives in rural areas in developing countries, of which 80% live in extreme poverty (IFAD, 2024).

This digital assistant involves the creation of a communication, education and support tool for agriculture in the most disadvantaged sectors. Rural development is essential to eradicating hunger and poverty, and is crucial to achieving the SDGs. (UN, 2018)

Furthermore, this education would favor rural economic development, adaptation to more complex technologies and facilitate action against climate change.

When?

This project has been developed from the beginning of February 2024 until its final delivery on June 16th 2024.

For whom?

This information is expanded in the Target section (p. 15) but, in summary, this project is aimed at those disadvantaged farmers who live in rural areas of developing countries and who share the following characteristics:

- They do not have access to quality education in agricultural matters.
- They do not have access to technological resources for their crops or the necessary knowledge to apply them.
- An optimization in the use of its resources, water, energy and knowledge would improve its production, as well as its economy and adaptation to the effects of climate change.

SWOT

Weaknesses	Threats
- Requires a very extensive database and its continuous updating. - It is difficult to adapt the communication of information to such a large target. - In favor of accessibility we could fall into an unattractive interface design. - The image of the project and the design of the assistant must convey professionalism and security but be attractive and approachable.	- Users should have access to the internet, which is difficult in rural areas. - Not all scientists will want to participate in the development of this project. - The target may not want to use this app due to lack of interest or knowledge.
Strengths	**Opportunities**
- Actively contributes to progress on the SDGs. - It is an innovation in agricultural education and training systems. - It represents an innovation in the design of interfaces aimed at a broad target with a low educational level. - Resolves an important existing need.	- There is no project that focuses on the digitalization of rural environments from this point of view. - As a result of climate change, the scarcity of resources and the awareness-raising work carried out by the UN, there is a lot of investment in this sector.

Fig. 1: SWOT, own elaboration.

CAME

Correct	Adapt
- The project should include a series of professionals and scientists focused on updating, adapting and expanding the database. - Adapt the app prototype to the characteristics of each action area. - Make an attractive design that does not compromise readability but captures the user's attention. In turn, the design factor in corporate image and advertising would be exploited more.	- The assistant will be designed to work without internet, that is, it will download the data and updates once it has a connection but without it it would be completely functional. - In those more remote areas where an internet connection is impossible, a connection to the satellite network will be installed. - Integrate the project within the strategic framework of IFAD since it has international recognition and support. - A technical trainer would be sent to the communities in which it is implemented to teach them the benefits of this technology and how to use it.
Maintain	**Explore**
- Exploit the fact that we solve a real and important need. - Raise awareness about the social, environmental and productive improvement that it would entail. - Design a readable and accessible interface that is eye-catching and effective. - Design a professional corporate image.	- Take advantage of the fact that there is no project currently that has this approach. - Take advantage of the growing interest of governments in the digitalization of the agricultural sector. - Highlight the role of graphic design as a tool to improve the communication of information and the user experience of farmers in education.

Fig. 2: CAME, own elaboration.

TARGET

Market

This project is aimed at **agricultural producers in rural areas of developing countries.**

Segment

The target is very broad since the assistant could be adapted regarding the crop and the region to the specific needs of the producers. It is important to highlight that **we do not seek to reach the target to create a need, but to understand in depth the challenges they face** and be able to provide an effective solution.

The information necessary for the study of this target has been extracted from the IFAD website, since this project would be developed within its strategic framework and therefore shares a target.

In its Countries section there is a study of the rural population in the different countries in which FIDA operates, which analyzes the different needs and challenges of these people.

Data from these countries can be consulted individually or grouped into the following regions:

- ASIA AND THE PACIFIC
- EASTERN AND SOUTHERN AFRICA
- LATIN AMERICA AND THE CARIBBEAN
- NEAR EAST, NORTH AFRICA, EUROPE AND CENTRAL ASIA
- WEST AND CENTRAL AFRICA

In addition, for the methodological criteria, its been taken into account the **analysis of the target** explained in chapters 6, 7 and 14 of the book Project Guide to UX Design (R. Unger and C. Chandler, 2012).

After analyzing rural farmers in IFAD's areas of action, the following **common characteristics** are extracted:

-They don't have access to quality education in agricultural matters.
-They don't have access to technological resources for their crops or the necessary knowledge to apply them.
- An optimization in the use of its resources, water, energy and knowledge would improve their production, as well as their economy and adaptation hability to the effects of climate change.

The market segmentation variables that are going to be applied are the **cultural level** and **technical needs**. In turn, we will divide this target into two profiles: **young people** and **adults**.

EMPATHY MAP

ADULTS

What do they think or feel?

- They feel at a disadvantage compared to large farms and foreign markets.
- They suffer from a lack of education and access to information.
- They do not like changes and distrust new technologies.
- The vast majority have a subsistence economy with family farms.
- As a general rule, they group together in communities and trust the advice of other members, especially the older ones.
- They feel devastated by the conditions of precariousness and extreme poverty in which they live.

What do they hear?

- They take into account the opinions of their community.
- They listen especially to the elderly.
- They listen to the problems in their environment, especially those related to limited access to resources and food.

What do they see?

- They see that the rest of the farmers have problems similar to theirs.
- They see that much of the technical knowledge of their activity is out of their reach.
- They see the effects of climate change on their crops, despite not understanding it or being aware of its cause.
- They see a bleak and harsh reality in their lives due to extreme poverty.

What are they doing?

- They have a small farm.
- They try to survive through agriculture.
- Some trade locally with their surpluses.
- They are trying to improve their way of life.

Slowdowns

- Lack of education and access to information.
- Serious situation of precariousness and extreme poverty.
- The effects of climate change affect their crops.
- They are at a disadvantage compared to large farms and foreign markets.
- Very limited access to resources.

Aspirations

- Improve their quality of life and get out of poverty.
- Increase and improve their production and profits.
- They hope that effective measures are taken from governments.

YOUNG PEOPLE

What do they think or feel?

- They feel at a disadvantage compared to large farms and foreign markets.
- They suffer from a lack of education and access to information, but not as much as the oldest generations.
- They are open to changes and trust new technologies.
- The vast majority have a subsistence economy with family farms.
- They are more familiar with online communities, internet and new technologies.
- They have hope for a better future but feel frustrated by their poverty situation.

What do they hear?

- They take into account the opinions of their community.
- They listen especially to the elderly.
- They listen to the problems in their environment, especially those related to limited access to resources and food.
- Many have access to the internet and listen to other people's comments and posts on social networks.

What do they see?

- They see that the rest of the farmers have problems similar to theirs.
- They see that much of the technical knowledge of their activity is out of their reach.

- They see the effects of climate change on their crops, despite maybe not understanding it or being aware of its cause.
- They see a bleak and harsh reality in their lives due to extreme poverty.
- Most with access to the internet see how other people enjoy better living conditions.

Slowdowns

- Lack of education but a slightly better access to information thanks to the use of the Internet.
- Serious situation of precariousness and extreme poverty.
- The effects of climate change affect their crops.
- They are at a disadvantage compared to large farms and foreign markets.
- Very limited access to resources.

Aspirations

- Improve their quality of life and get out of poverty.
- Increase and improve their production and profits.
- They hope that effective measures are taken from governments.

Fig. 3: Example of customer persona, own elaboration.

CUSTOMER PERSONA

Profile
Name: Joao Melo
Age: 40 years
Occupation: owns a small farm
Personality: hard-working, extroverted and suspicious of changes

Demographic data
Male gender
Education level: couldn't finish middle school due to Angola's Civil War
Income: lower class
Angolan nationality

Habits
Joao spends his days working at the farm with his oldest children. He has a self-sufficiency economy that takes away most of his free time but when he does find time to relax, he likes listening to music on the radio and playing handball with his friends.

Interests
He likes to follow handball news since it is the most popular sport in Angola. Joao is also interested in learning new techniques to improve his farm, but most of the advice he can get is from the other farmers in his village.

Challenges
Joel is facing economic problems. His productivity level is low and he generally produces little or no surplus.
Climate change is affecting his farm and he doesn't know how to adapt to it.
Also, Joao would like to learn new techniques to improve his production, but his educational level in addition to his lack of access to resources make it nearly impossible for him to make a real change.

Frustrations
Joao is having a difficult time because of the precariousness he faces and is bothered by the impotence he has been feeling for a long time. He also feels neglected by his government and is unhappy about his lack of understanding of new technologies.

Goals
Joao hopes to find a way to adapt his farm to the drastic changes currently occurring. He would like to see more involvement of the government in improving the quality of life of citizens and being able to offer a dignified and safe life to his family.

MISION, VISION AND VALUES

Mission

The mission of the project is to **transform education processes and agricultural systems so that they are more inclusive, productive, resilient and sustainable.** It seeks to invest in the millions of most vulnerable small-scale farmers living in rural areas and develop their resilience to climate change.

Vision

The development of this work is integrated into FIDA's Strategic Framework and as collaborators we share their vision of the future. We imagine **dynamic, inclusive and sustainable rural economies in which people live full lives,** without poverty or hunger and **with access to sustainable and effective agricultural development**.

Values

- Development
- Innovation
- Inclusivity
- Learning
- Sustainability

5. CONSULTED SOURCES

BASIC CONCEPTS

What is Graphic design?

Graphic design consists of projecting visual communication through elements such as drawings, sketches, photographs, diagrams, colors, etc. This type of communication is established between a sender, which can be a company, a person or a social group, who transmits a message with an important idea to its target audience. In summary, graphic design provides graphic solutions to problems and needs.

What is UX design?

UX is the design of products and services prioritizing the human being, with the aim of creating pleasant and optimal experiences for users. It is commonly thought that UX design can only be used on digital products such as websites or mobile applications. However, it is a discipline that can be implemented in both digital and physical services or products.

What is Artifical Inteligence?

Artificial intelligence (AI) is a field of computer science that focuses on creating systems that can perform tasks that typically require human intelligence, such as learning, reasoning, and perception.

THEORETICAL FRAMEWORK

This work proposes the creation of a digital assistant for farmers in rural areas of developing countries.

For its correct execution, this documentation process will consist of three parts: The first, a **study of the SDGs and the needs of these farmers**; Then it will continue with a **study of projects and sources** that support the development of this work, an **analysis of the best methodology** to carry it out, and, finally, it will end with the **conclusions** drawn from the research.

In relation to the **SDGs**, the UN defines them as objectives that "are designed to end poverty, hunger, AIDS and discrimination against women and girls. "The creativity, knowledge, technology and financial resources of the entire society are necessary to achieve the SDGs in all contexts." (United Nations, 2018).

The 17 SDGs are **integrated**: they recognize that action in one area will affect outcomes in other areas and that development must balance social, economic and environmental sustainability.

Among these objectives, number 4 stands out: **quality education**. This objective is based on the **firm conviction that education is one of the most powerful and proven drivers to guarantee sustainable development**.
Some of the SDGs that support the promotion of education for the inhabitants of developing countries are:

- Objective 17
ALLIANCE TO ACHIEVE THE OBJECTIVES:
"Improving access to technology and knowledge is an important way to exchange ideas and foster innovation. "

- Objective 5
GENDER EQUALITY:
"Improve the use of enabling technology, particularly information and communications technology, to promote women's empowerment."

- Objective 12
RESPONSIBLE PRODUCTION AND CONSUMPTION
"By 2030, ensure that people around the world have the information and knowledge relevant to sustainable development and adaptation to a life in harmony with nature."

- Objective 3
HEALTH & WELLNESS
“Strengthen the capacity of all countries, particularly developing countries, for early warning, risk reduction and management of national and global health risks.” (United Nations, 2018).

Among the executing bodies of the measures developed to promote the SDGs, we find the **Food and Agriculture Organization of the United Nations (FAO)**, who, according to their website, are a specialized agency of the UN that directs international activities. aimed at eradicating hunger. (FAO, 2024)

In terms of education, FAO offers the FAO Learning Academy, which consists of a series of multilingual distance education courses accessible for free. However, these courses have limited places, require a permanent internet connection and require a medium-high educational level.

The OECD-FAO Agricultural Outlook 2023-2032 report describes the main trends in production, consumption and trade. “Farmers in low- and middle-income countries, especially Brazil and India, are expected to achieve growth rates above the world average for maize, wheat and rice, by using better adapted seeds and **optimize crop management**.” (OECD-FAO, 2023, p.47).

Another body within the UN that supports the SDGs is **IFAD**.

IFAD focuses primarily on the rural poor because they are the **most disadvantaged communities globally**. Three quarters of the world’s poorest and most undernourished people live in rural areas of developing countries. (IFAD, 2016)

From their IFAD Strategic Framework 2016-2025 document. Enabling inclusive and sustainable rural transformation (IFAD, 2016) we can extract its **main strategic objectives**:

- Increase the productive capacities of the poor rural population;
- Increase the benefits derived from participation in the markets, and
- Strengthen the environmental sustainability and the capacity for resistance to climate change of its economic activities.

In the Regions section of the IFAD website, there is a study of the rural population in the different countries in which IFAD operates, which analyzes the different needs and challenges of these people.

Fig. 4: UN logotype. Resource: un.org

Fig. 5: SDGs logotype. Resource: un.org

Fig. 6: IFAD logotype. Resource: ifad.org

Data for these countries can be consulted individually or grouped into the following regions:

- Asia and the Pacific
- Eastern and Southern Africa
- America
- Near East, North Africa, Europe and Central Asia
- West and Central Africa

After analyzing rural farmers in IFAD's areas of action, the following **common characteristics** are extracted:

-They don't have access to quality education in agricultural matters.
-They don't have access to technological resources for their crops or the necessary knowledge to apply them.
- An optimization in the use of their resources, water, energy and knowledge would improve their production, as well as their economy and adaptation ability to the effects of climate change.

To overcome the challenges of the SDGs, IFAD supports rural small-scale producers and connects them to markets. However, IFAD does not consider the factor of agricultural education within its action plans, being **"an essential piece in the diversification of crops, the implementation of new techniques and the sustainable adaptation of agriculture to nature"** (United Nations, 2018).

Not from within IFAD, but the UN has active projects in agricultural education such as the NEXO Approach in Central America.
In this project, new strategies are proposed to promote the development of irrigation in rural areas. For example, training projects for farmers in irrigation through training courses.

In relation to the latter, the document NEXO Approach in Central America: new strategies to promote irrigation development in rural areas stands out. Diagnosis and proposal to promote irrigation in family agriculture in Guatemala by Marcela Aedo, consultant of the Water and Energy and Agricultural Development and Biodiversity Units of the Natural Resources Division of the Economic Commission for Latin America and the Caribbean (ECLAC) .

Here the author carries out a proposal for a cascade thematic training and technical advice system (Fig. 7) (M. Aedo, 2020, pg. 63).

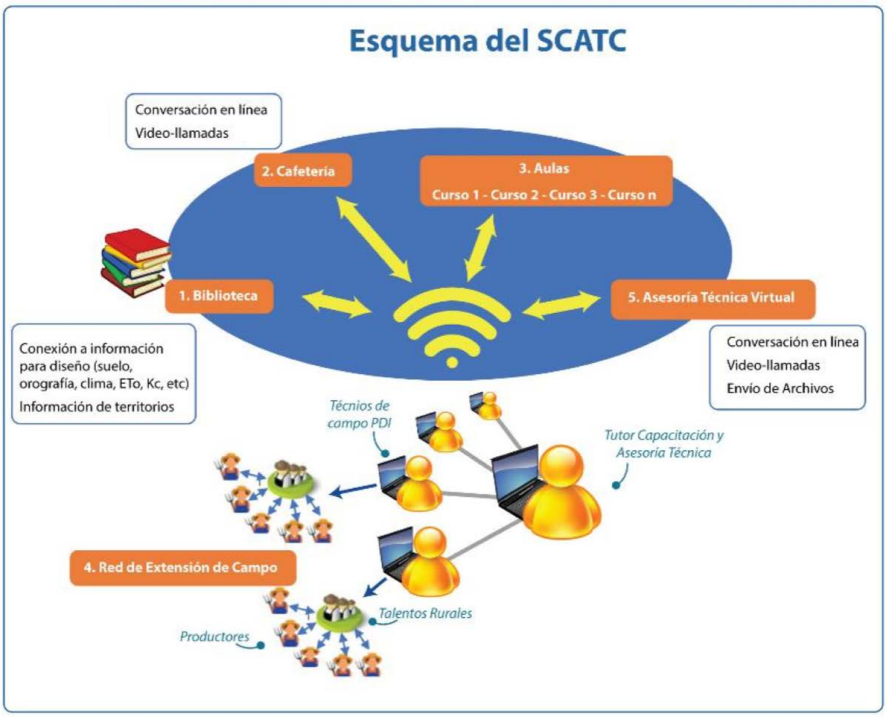


Fig. 7: SCATC scheme.
Resource: NEXO Approach, Economic Commission for Latin America and the Caribbean (ECLAC), 2020.

At this point, we open the research to sources outside the United Nations to corroborate the need for an effective, adaptable and universal education project.

Supporting this need for effective education in rural areas we find the article Problems of rural extension in Latin America, by Fernando Landini, doctor in psychology and assigned to the National Scientific and Technical Research Council of Argentina.

In this article, Landini contributes to the **knowledge of the problems faced by rural extension workers in Latin America** through a survey of open questions to technicians working in ten different countries.

He argues that "it is necessary to generate strategies to reorganize extension practices, which is not achieved only by changing extension institutions, but also, and in a particular way, through reflective and critical training processes that allow modifying the way of working. according to more participatory and horizontal schemes" (Landini, 2016)

Important figures, both scientific and political, have already spoken about this issue. This is the case of Cecilia López Montano, Minister of Agriculture of Colombia. She argued the following in 2022, in Washington DC, during a dialogue on the role of the primary sector in regional economic recovery and global food security: "It is impossible to make a transformation to sustainable agriculture in the face of inequality, which implies more knowledge. "If we continue to sacrifice this commitment and focus only on climate change, we will not be able to solve the problem (...) we must focus on comprehensive disaster management and strengthening information systems." (C. López Montano, 2022)

In reference to the situation in other focus areas it is not very different. For example, in **Thailand**, projects are carried out to create technical capacities for institutional adaptation, such as the National Adaptation Plan in Integrated Agriculture **(NAP-Ag) carried out in conjunction with the** United Nations Development Program **(UNDP) and** whose objective is precisely to guide peasants and farmers in their adaptation to climatological phenomena, but also in the correct use of natural resources. (Chile, 2024)

Finally, focusing a more on the final development of this project. For the **methodological criteria**, its been taken into account the analysis of the target explained in chapters 6, 7 and 14 of the book Project Guide to UX Design **(R. Unger and C. Chandler, 2012).**

Thus, it is concluded that it **is necessary to increase agriculture in rural areas of developing countries through an effective, practical and understandable agricultural education system**.
This education would favor rural economic development, adaptation to more complex technologies and facilitate action against climate change.

There is a **real need** in the world for a project like this and graphic design can be used as an **effective tool** in the creation of a new training system to assist the most vulnerable farmers.

STATE OF ART

In this section, an exhaustive and updated investigation of all **relevant knowledge, advances and existing developments will be carried out**. These will be investigated in relation to the implementation of digital technologies in developing countries, mobile applications related to cultivation, the optimization of the user experience and the development of a digital assistant.

First of all, we find the Rural Water and Sanitation Information System (SIASAR) tool (Fig. 8). This is a joint initiative initiated by the governments of Honduras, Nicaragua and Panama whose strategic objective is to have a basic, updated and contrasted information tool on the existing rural water supply and sanitation services in a country. (SIASAR, 2017)

This project is interesting since the **same target is shared**. The principles of this software are:

- **Simple**: as little information as necessary, but no less.
- Institutionalized: framed in the processes and responsibilities of the sector.
- **Public**: open and transparent to all actors.
- **Harmonized**: adapted to the context of each country but harmonized to ensure comparability and the use of economies of scale.
- **Adapted**: responding to the needs of communities, different levels of government, and various sector actors and non-governmental organizations.
- **Flexible**: with the ability to evolve to adapt to future changes and requirements.
- **Modern**: using the latest technology to simplify collection processes.
- **Expandable**: developed taking into account its expansion to new countries and regions.

These principles are fundamental for the development of the assistant since they are **developed for the same target and are designed to optimize the digital implementation**. Furthermore, for this reason the technical aspects of graphic design applied to the development of SIASAR's image are also taken into account.

Next, we explore other apps and projects for cultivation regardless of their purpose, in order to g**ather more aesthetic and web design references**. In this search the following stand out:

Fig. 9: GoAigua logotype.
Resource: linkedin.com
Fig. 8: SIASAR logotype.
Resource: globalsiasar.org

Fig. 10: Agerpix logotype.
Resource: agerpix.com

Fig. 11: Sensoplag logotype.
Resource: sensoplag.es

- **GoAigua**: platform for the comprehensive management of irrigation infrastructure and networks in agriculture.
- **Agerpix**: company specialized in improving the profitability of agricultural processes using artificial intelligence, whose data allows agricultural companies to make the most efficient and strategic decisions. Its careful corporate image and the design and user experience of its applications stand out.

- **Sensoplag**: This project aims to produce a control system to reduce this type of pests, a system integrated by digital tools that achieve early detection, continuous monitoring of the pest and, consequently, to be able to prevent it.In this project **we can see very clearly how artificial intelligence can help the agricultural sector** even though its graphic image is not very developed.

There are numerous applications and virtual assistants that use artificial intelligence, and we have also seen that most of the references implement it, which is why a search for information on artificial intelligence is carried out.

The definition of a **AI** is a field of computer science that focuses on creating systems that can perform tasks that typically require human intelligence, such as learning, reasoning, and perception. (Wikipedia, 2024)

We find for example Oracle Cloud Infrastructure (OCI), a set of complementary cloud services that enable you to build and run a range of applications and services in a highly available hosted environment.

From OCI they argue that those digital assistants that use AI and machine learning are able to understand and learn your preferences based on your past actions. They can use their understanding of you to make predictions of your behavior and make recommendations based on your history and preferences. In this way, **working with a digital assistant becomes a personalized experience tailored to the needs of the user.** (OIC, 2024)

This not only benefits the development of the assistant but also represents **an improvement in its UX Design** and opens the door to new **innovations** in this field that could not be carried out before due to the lack of this technology. Such as the development of an assistant controlled completely by voice commands.

Very recently, the latest version of **ChatGPT 4** has been released, which consists of a virtual assistant powered by artificial intelligence that, thanks to it, can now not only converse in writing, but also listen and speak. This novelty has been taken into account as a reference due to its improvement in the user experience.

Fig. 12: Duolingo corporative pet. Resource: duolingo.com

Exploring deeper into the topic of user experience in virtual assistants is the language learning app **Duolingo**. The mission of The company is to offer **free, fun and accessible education to everyone**. (A World of Characters: How Our Characters Can Help You Learn Languages, 2020)

They highlight the brand identity design from this benchmark, with one of its main goals being to **make it easier for our users to spend time with their products**. They have a corporate mascot named Duo.

Finally, in relation to the **aesthetics of the project**, a search was carried out in relation to the iconography of agriculture around the world. Here we find references to the figure of the Greek goddess of agriculture Demeter. This is the case of Carolina Figueroa León's study Comparative study between the goddesses Artemis, Demeter and the Hittian goddess Hannahanna regarding fertility. Here the author refers to the traditional iconography related to this figure, such as her animal symbol, the **bee**.

The bee appears mentioned in both the cult of Artemis and that of the goddess Demeter. They are on all continents, except Antarctica since they **can be found in all habitats** where there are flowering plants (@NatGeoES, 2009).

The **conclusions of the state-of-the-art research** will serve as guides in the graphic development of this work:

- The most common corporate colors in this type of projects are blue and green.

- Bees can be an element that all farmers in the world identify with.

- An assistant powered by artificial intelligence results in a personalized experience tailored to the needs of the user.

- Applications that enliven the user experience make it easier for the user to spend time with these products.

- A close image that maintains trust and professionalism is the best option for this target.

- In the development of the interface, the image of the app and the assistant, legibility and contrast must be prioritized since the media in which it will be reproduced can be very precarious.

- Implementing a system that does not depend on continuous internet connection is useful and has already been implemented successfully.

6. METHODOLOGY

To achieve the established objectives, it is necessary to propose a strategy that helps organize the work phases necessary to achieve an optimal result.

This TFG consists of **three fundamental phases** that have helped carry out this project:

First is the research phase about the situation of farmers in developing countries, their needs and the active projects that are being carried out in terms of education.

Once the data obtained in the previous phase has been analyzed, a strategy for developing a digital assistant prototype and defining the technical specifications of this work are established.

The last phase corresponds to the final development of the project, in which the entire visual part of said assistant is created, its corporate image, web design and its possible applications in different formats.

Fig. 13: Adobe Illustrator logotype.
Resource: wikipedia.com

Fig. 14: Adobe Photoshop logotype.
Resource: wikipedia.com

Fig. 15: Adobe InDesign logotype.
Resource: figma.com

Fig. 16: Figma logotype.
Resource: figma.com

RESOURCES

During the research process of this project, several different alternatives were analyzed to achieve the best result within the time constraints of the project..

Initially, the design of the assistant was thought to be 3D modeled in **Blender**, which is why the Blender course for beginners by Carlos Sifuentes Haro was carried out on the Doméstika platform.
After carrying out several modeling tests, it was concluded that the expected results were not being obtained.

So we switched to the **Adobe Illustrator** program, in which most of the graphic development of this project was carried out.

Figma was used to prototype the application, some graphic resources and images were processed in **Photoshop** and the final dossier was laid out in **Adobe InDesign**.

7. CHRONOLOGY

Planning and organizing the project tasks is essential to finish all processes on time and achieve our objectives.

The following table shows the schedule of the monthly organization of the Final degree project tasks:

Month	Tasks		
February	- Topic selection - Search of a tutor	- Start of the investigation	
March	- Concept - Investigation	- DAFO/CAME - Briefing	- Methodology
April	- Intermediate presentation of the TFG - Investigation	- Sketches -Fixing intermediate presentation corrections	- Start of the development - Technical aspects
May	- Design of the assitant - App prototype	- Corporative image - Interface design	
June	- App prototype - Final tfg layout	- Final presentation of the TFG	

Fig. 17: Chronology, own elaboration.

8. DEVELOPMENT

PROJECT SPECIFICATIONS

The general technical aspects of this project will be detailed below, these are organized into the following specifications:

Demeter structure

Research, adaptation and execution:

- **Research and adaptation apparatus**: made up of technicians and professionals who investigate the agricultural and sociological processes of the action areas. Through Demeter's digital base, they develop the information that will be offered to users and the necessary adaptations of the assistant, taking into account their specific needs. User data will be uploaded to this digital database in order to be studied and optimize the effectiveness of the assistant. Reports of problems and requests for questions will also be attended to.

- **Execution apparatus**: made up of implementation technicians, who will go to the action areas to introduce the app and use the assistant.

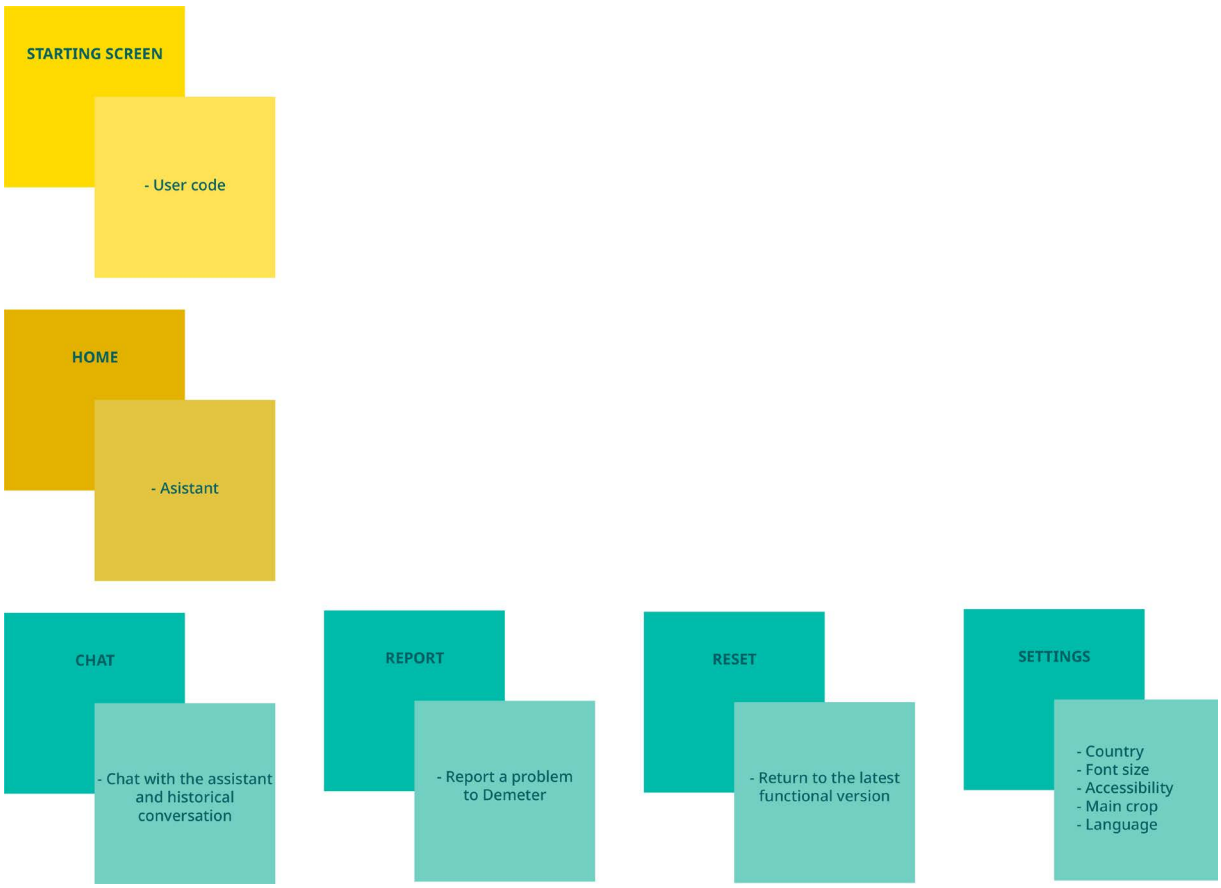


Fig. 18: Elements of the app, own elaboration.

Assistant

From the Demeter database, a **user code** will be created with which the end user will register the app. In this way, the system settings will be predetermined for the needs of each farmer. The **elements of the app** (Fig. 18) are as follows:

- **Starting screen**: the user code will be integrated here.

- **Home**: it is the assistant itself, which will be animated and a dynamic conversation will begin resembling one in real life.

- **Menu**: from here you can access the rest of the app's functions.

- **Chat**: the Chat option allows you to switch to a written conversation with the assistant and view the history of the conversations, allowing the user to review the information.

- **Report**: this feature allows users to report a problem to the Demeter digital database in order to maximize the effectiveness and autonomy of the assistant.

- **Reset**: this option offers the user the possibility of resetting the assistant to its last functional, registered version and solving errors such as logic loops in a simple way. It is also useful if the user accidentally changes the system settings and does not know how to restore them.

- **Settings**: these are the assistant settings. Since it is adapted from the beginning, it is not necessary to make changes, however, we offer this possibility so that the user is able to customize it to their liking. These are:

  - **Country**: you can change the language in which the assistant and the app communicate.
  - **Font size**: to improve reading. The user can decide the font size.
  - **Accessibility**: specific adjustment, depending on the user's needs to guarantee people with disabilities, use on equal terms.
  - **Main crop**: define the main crop that the farmer develops, which optimizes the assistant's responses and suggestions
  - **Speech:** in pursuit of inclusiveness, this setting allows the user to decide how the assistant communicates based on gender criteria (feminine, masculine and neutral) or education (low, medium or high)

Tone, communication and design

After analyzing the conclusions drawn from the state-of-the-art research, it has been decided that the assistant's tone should be **friendly and close**, without losing sight of the **professionalism and trust** that we must convey.

This is because users will mostly be people with a low educational level and will spend considerable time on the application, so communication must be entertaining and understandable so as not to lose their attention.

In addition, the assistant will frequently remind of the importance of the user's participation and **encourage** them to continue being part of the project.

- Tutorials:
The assistant can develop a series of tutorials to educate the user in using the app and understanding its functions. These tutorials can be done as many times as the user needs.

- Assitant commands:
Thanks to the implementation of artificial intelligence, the Demeter can be controlled in its entirety, using voice or touch commands.

The assistant's name is **Dee**, making a play on words between Demeter and the word bee.

Finally, in relation to the image of the interface, it has been decided to make it **as simple and understandable as possible**. The colors and graphics will seek the maximum possible contrast, so readability will be prioritized in case the device on which it is used is in poor condition.

Noto Sans has been selected for the project's typography. Noto is a global font collection for writing in all modern and ancient languages. This font is translated into 800 languages and it has italic styles, multiple weights and widths, and 3,741 glyphs.

Internet connection

The Demeter app will be developed to be **used without a constant Internet connection.** This is so since many of the rural areas of the target countries may present network connectivity problems due to isolation. Once the wizard has been installed, the data from the digital database will be downloaded and can be used without problem.

However, updates and some functions such as Reset do depend on the Internet connection, but only during data download. So if a farmer who travels to the city once a month, he can take the phone and at the same time he connects he can re-update the system.

In the areas where this connection is impossible, a **satellite Internet connection** point would be installed from Demeter.

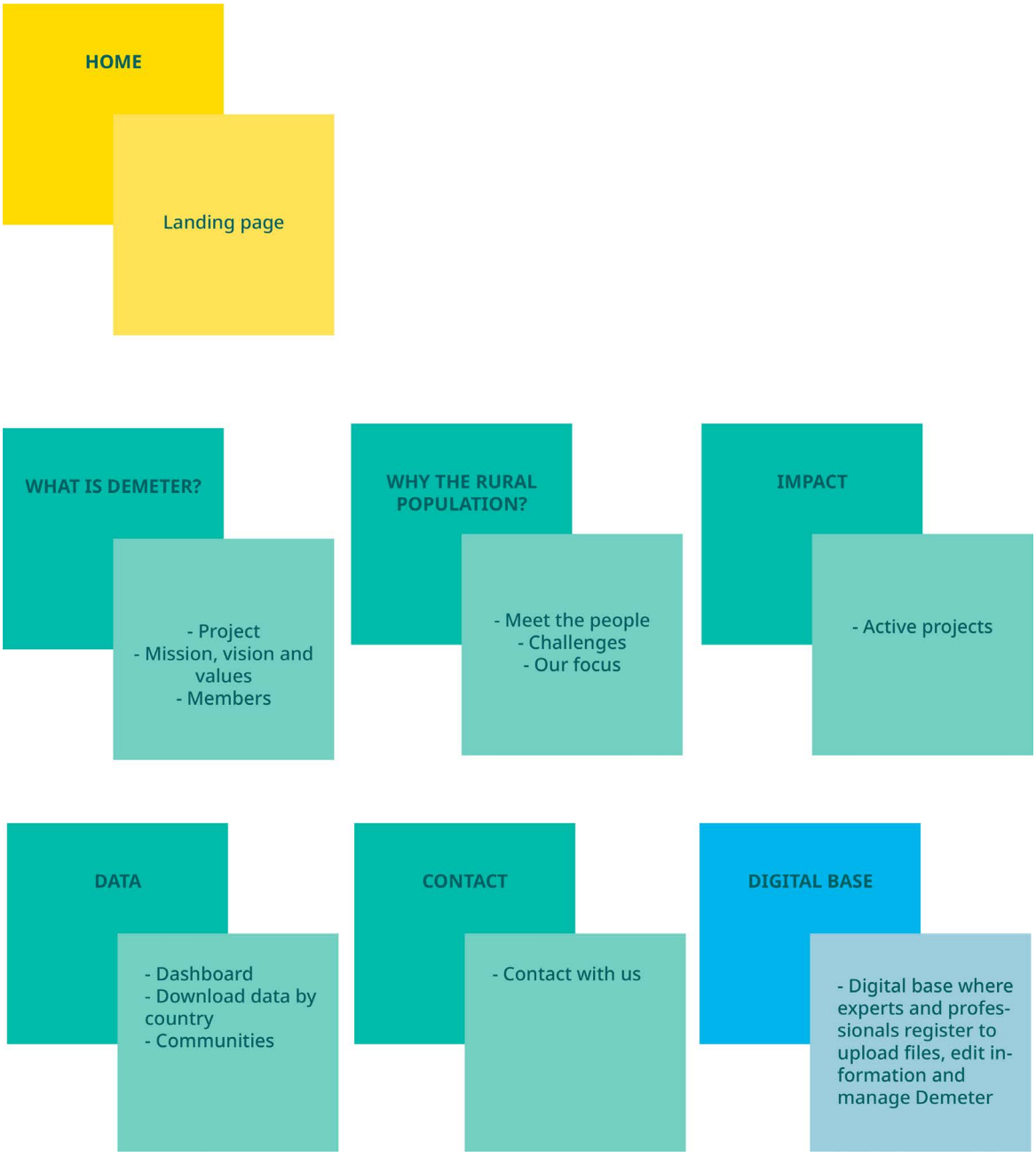


Fig. 19: Elements of the website, own elaboration.

SKETCHES

This section includes all the sketches and ideas that led to the final design of the graphic elements of the digital assistant.

Sketches of the logotype

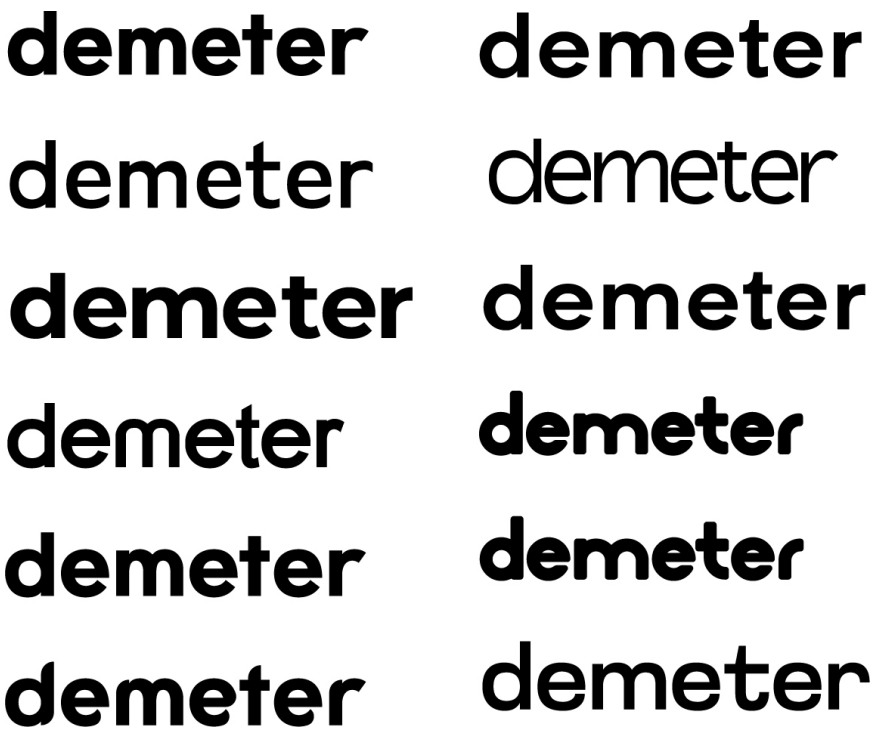


Fig. 20: Discarded fonts for the logotype, own elaboration.

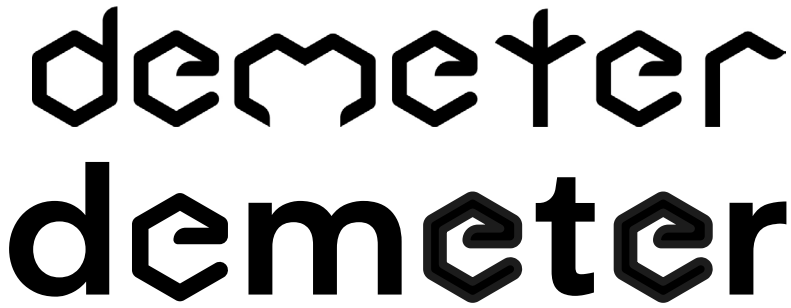


Fig. 21: Discarded logo sketches, own elaboration.

Sketches of the asistant and app design

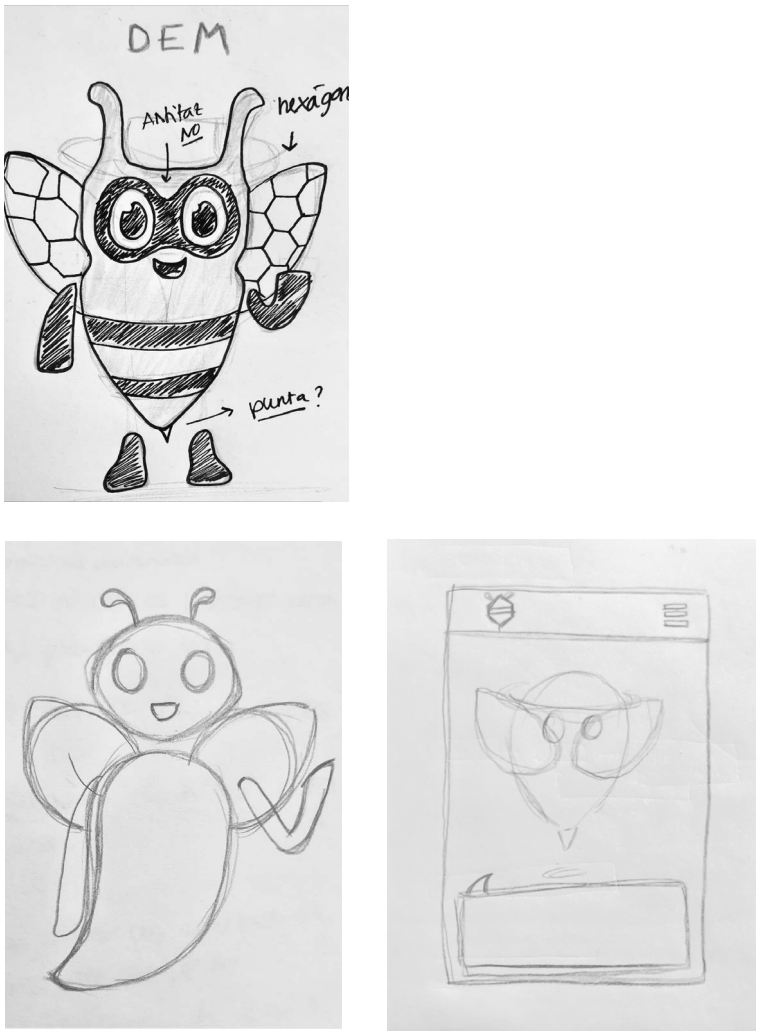


Fig. 22: Sketches for the asistant and app design, own elaboration.

Color tests

Fig. 23: Color palette tests, own elaboration.

ADVERTISING

Since this project **does not seek to create a need in the public**, but rather to help solve a real problem, there is no real need for a common advertising campaign.

Furthermore, the advertising of this campaign, due to the very nature of the target, would not be focused on the end user, but rather on making this project known among scientific communities and international institutions.

That being said, it is important to polish the corporate image of the project applied to its recognition among the public and potential sponsors and collaborators. Therefore, **web banners** will be designed to place on the IFAD and UN web pages.

Also, we believe that it is important to connect our work with people and make known the importance of this project. So the implementation on **social networks** will be designed, since platforms like **Instagram** will help us make the impact of Demeter visible and strengthen the international community.

9. FINAL RESULTS

In this section the final results of the previous conclusions are graphically developed.

CONCEPT

The concept of this project is **inspired by the classic symbols of agriculture**. The figure of the Greek goddess Demeter has been used as a reference for the naming.
The rest of the image has been decided to revolve around the symbol of this goddess: the **bee**.

The bee has been used as a reference in the color palette and the creation of the geometry of the graphics, with a grid inspired by the shape of honeycombs.

Fig. 24: Gold plaque embossed with winged bee goddes. Resource: wikipedia.com

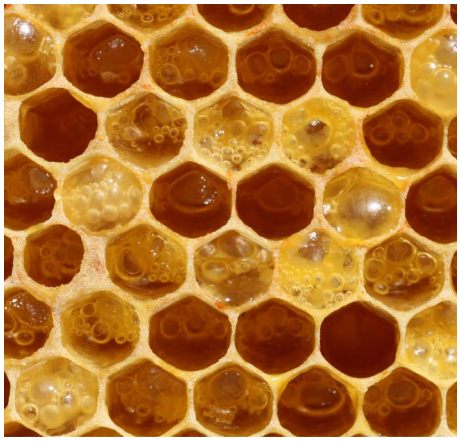


Fig. 25: Grid inspired by the shape of honeycombs, own elaboration

CORPORATE IDENTITY

Corporate identity includes the visual components that express the personality and values of a company. It is the way in which it is presented to society as a whole.
The elements of the corporate identity are the following:

Logo

Metuo bold

A B C D E F G H I J K L M N Ñ O
P Q R S T U V W X Y Z

a b c d e f g h i j k l m n ñ o
p q r s t u v w x y z

Fig. 26: Base font for logo, own elaboration

Fig. 27: Metuo font modifications, own elaboration

Fig. 28: Demeter's final imagotipo, own elaboration

Fig. 29: Demeter's logo creativity, own elaboration

Color palette

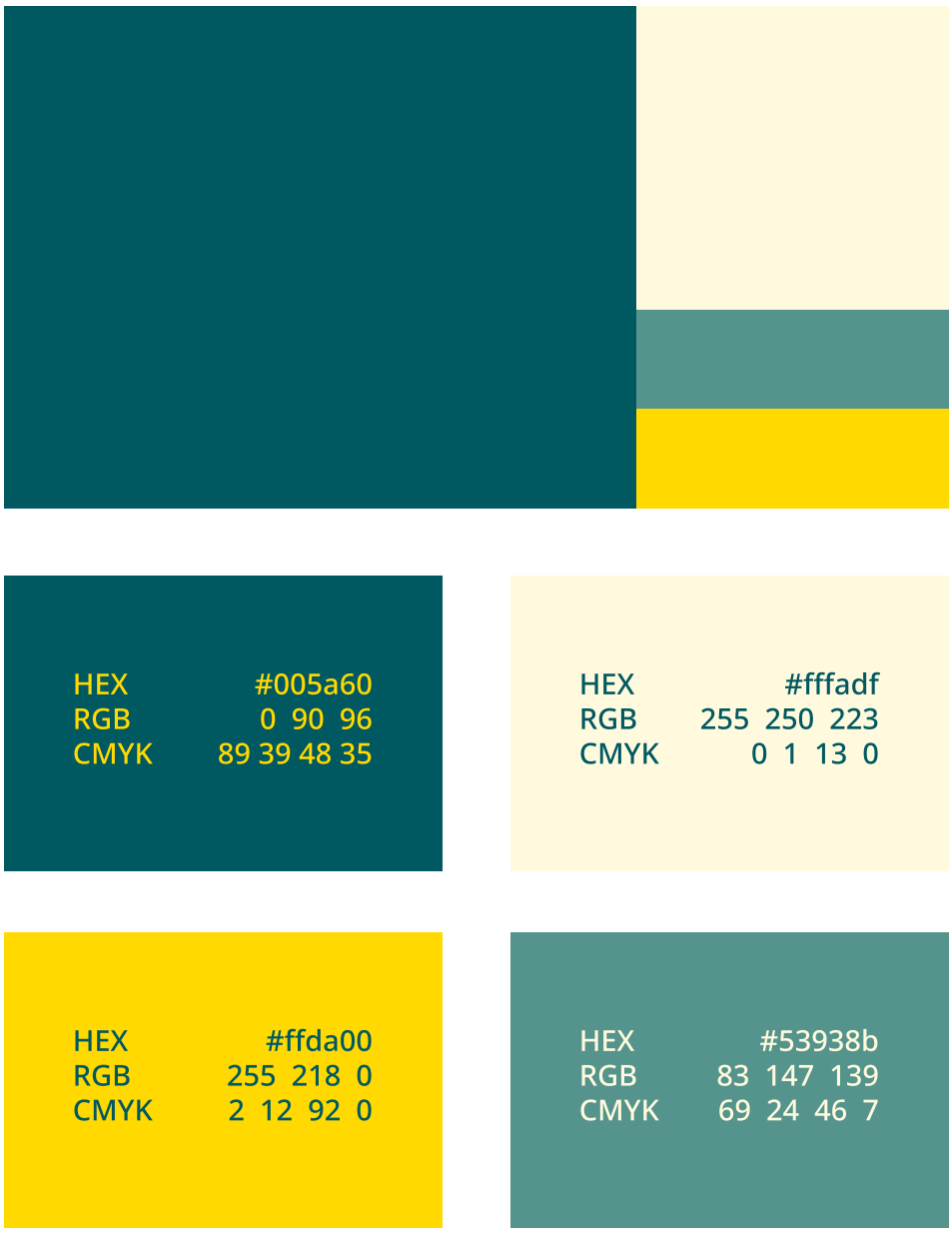


Fig. 30: Proportions and codes of the color palette, own elaboration

Typography

Noto Sans Display Bold

A B C D E F G H I J K L M N Ñ O P Q
R S T U V W X Y Z

a b c d e f g h i j k l m n ñ o p
q r s t u v w x y z

Noto Sans Regular

A B C D E F G H I J K L M N Ñ O P
Q R S T U V W X Y Z

a b c d e f g h i j k l m n ñ o p
q r s t u v w x y z

Fig. 31: Typography implementation example, own elaboration

Graphic resources

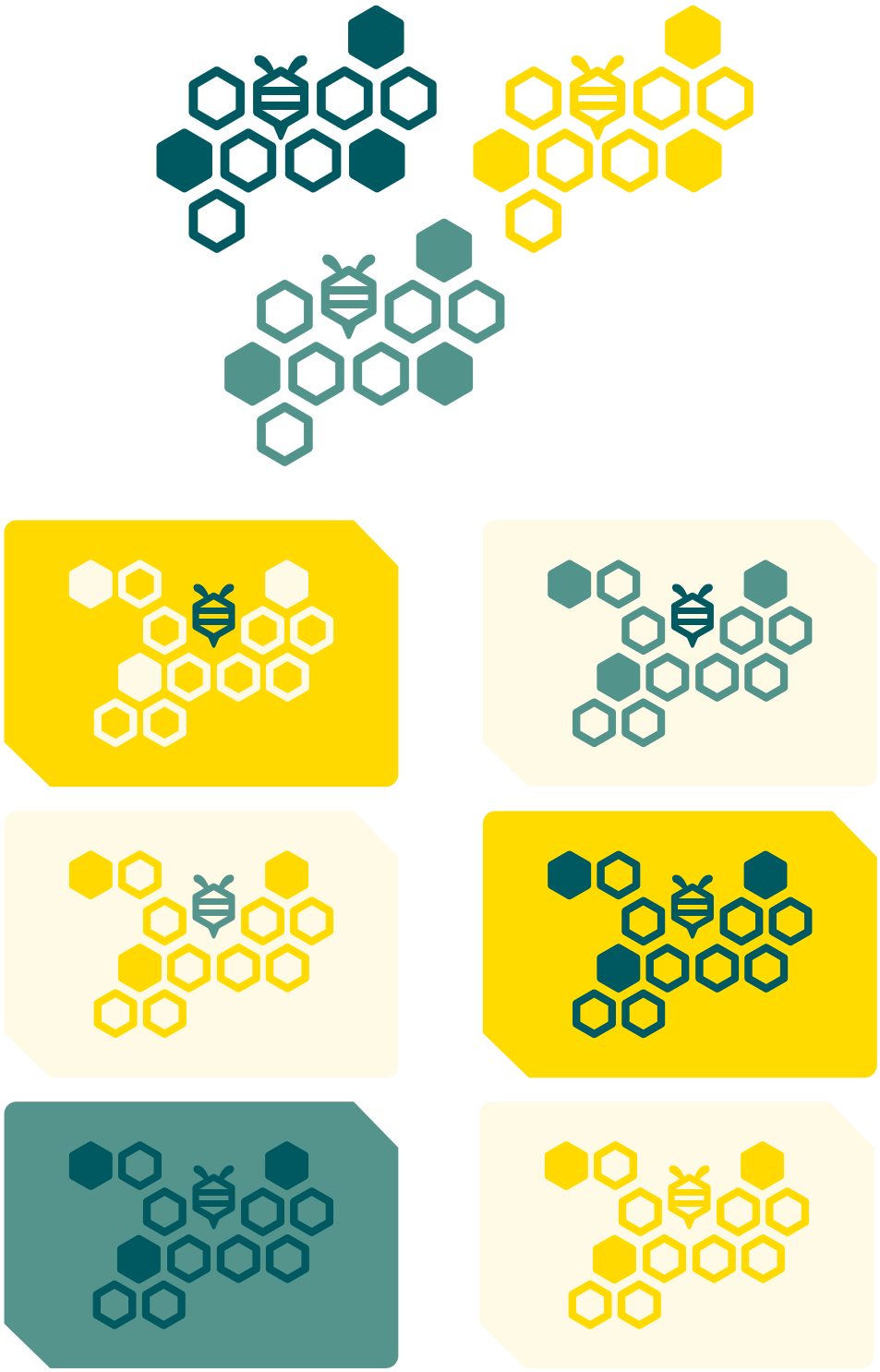


Fig. 32: Graphic resources for Demeter, own elaboration

ASSISTANT

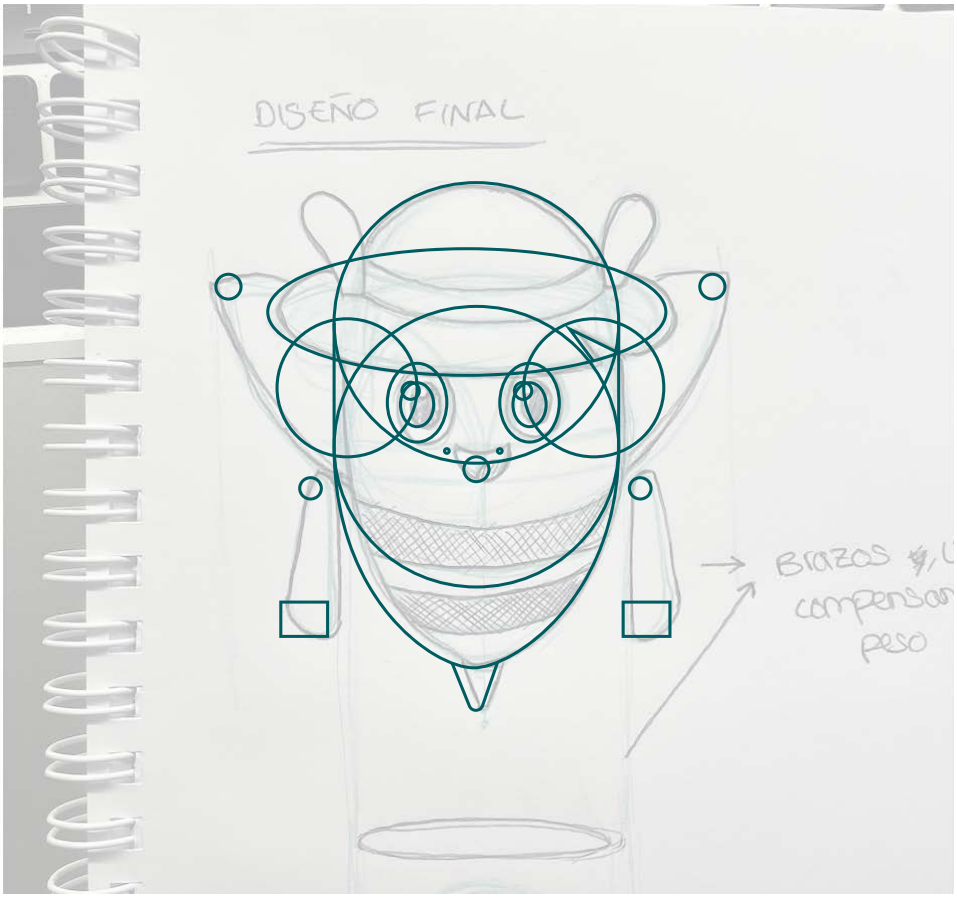


Fig. 33: Dee final design, own elaboration

Fig. 34: Assitant perspectives, own elaboration

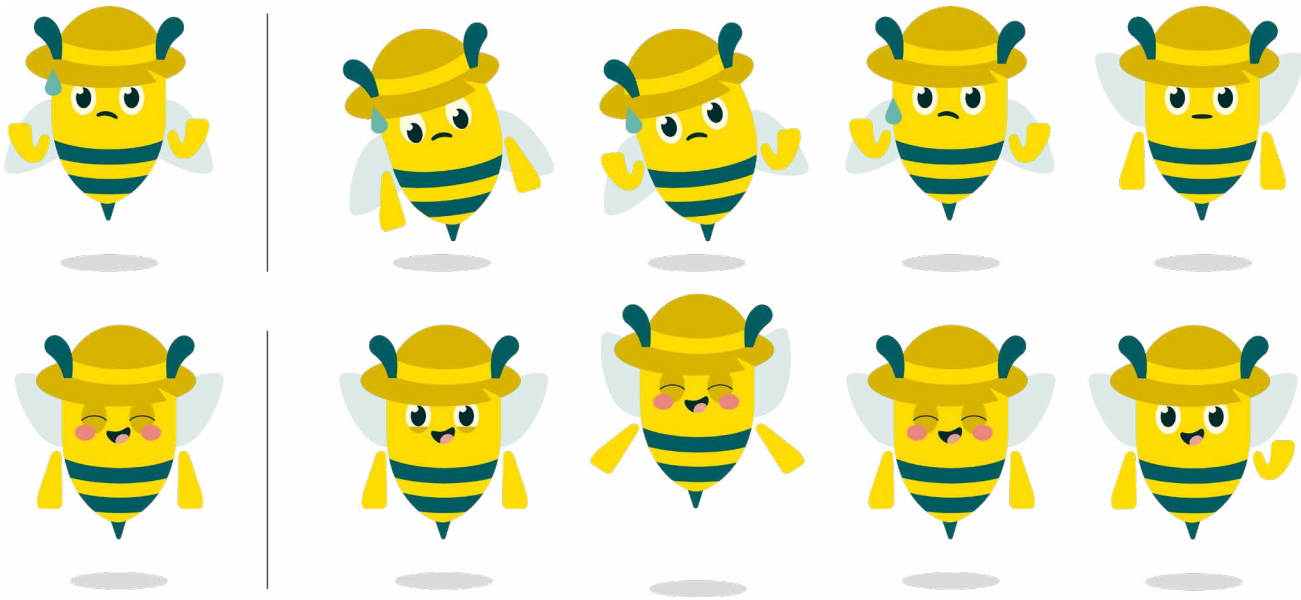


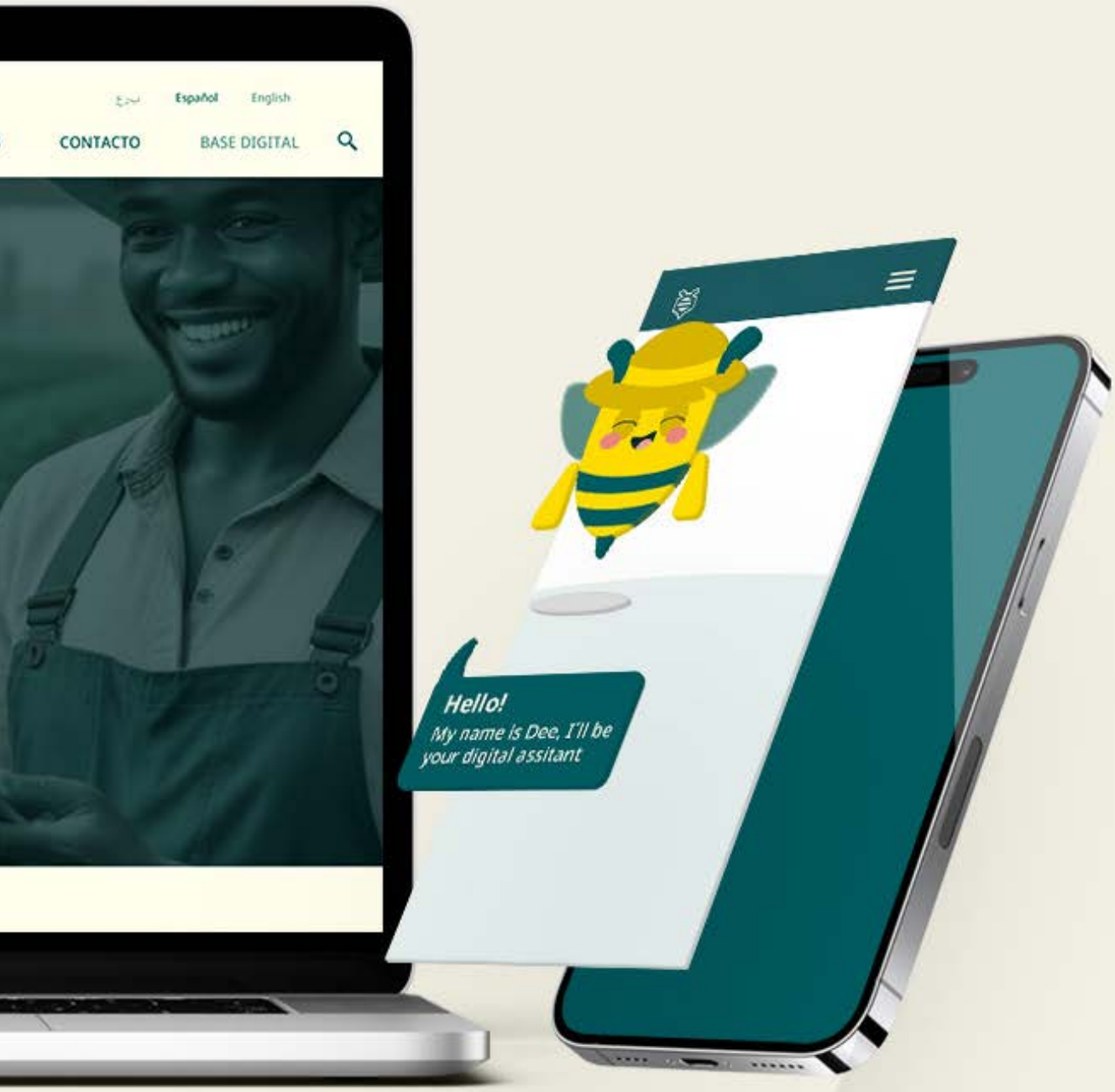
Fig. 35: Dee's expressions, own elaboration

Fig. 36: Dee creativity, own elaboration


Impact in
Africa
meet
dee
Hello!
How
do we
implement
demeter
meet
dee
Impact in
Africa


Impact in
Asia
How
do we
implement
demet
ame is Dee, I'll be
ur digital assitant
meet
dee
Hello!
My name is Dee, I'll be
your digital assitant
Impact in
Latin
erica


demeter
¿QUÉ ES DEMETER?
¿POR QUÉ LA POBLACIÓN RURAL?
IMPACTO
DATOS
demeter
Tu asistente agrícola: solidario y digital


Español
English
CONTACTO
BASE DIGITAL
Hello!
My name is Dee, I'll be your digital assitant

ICONS

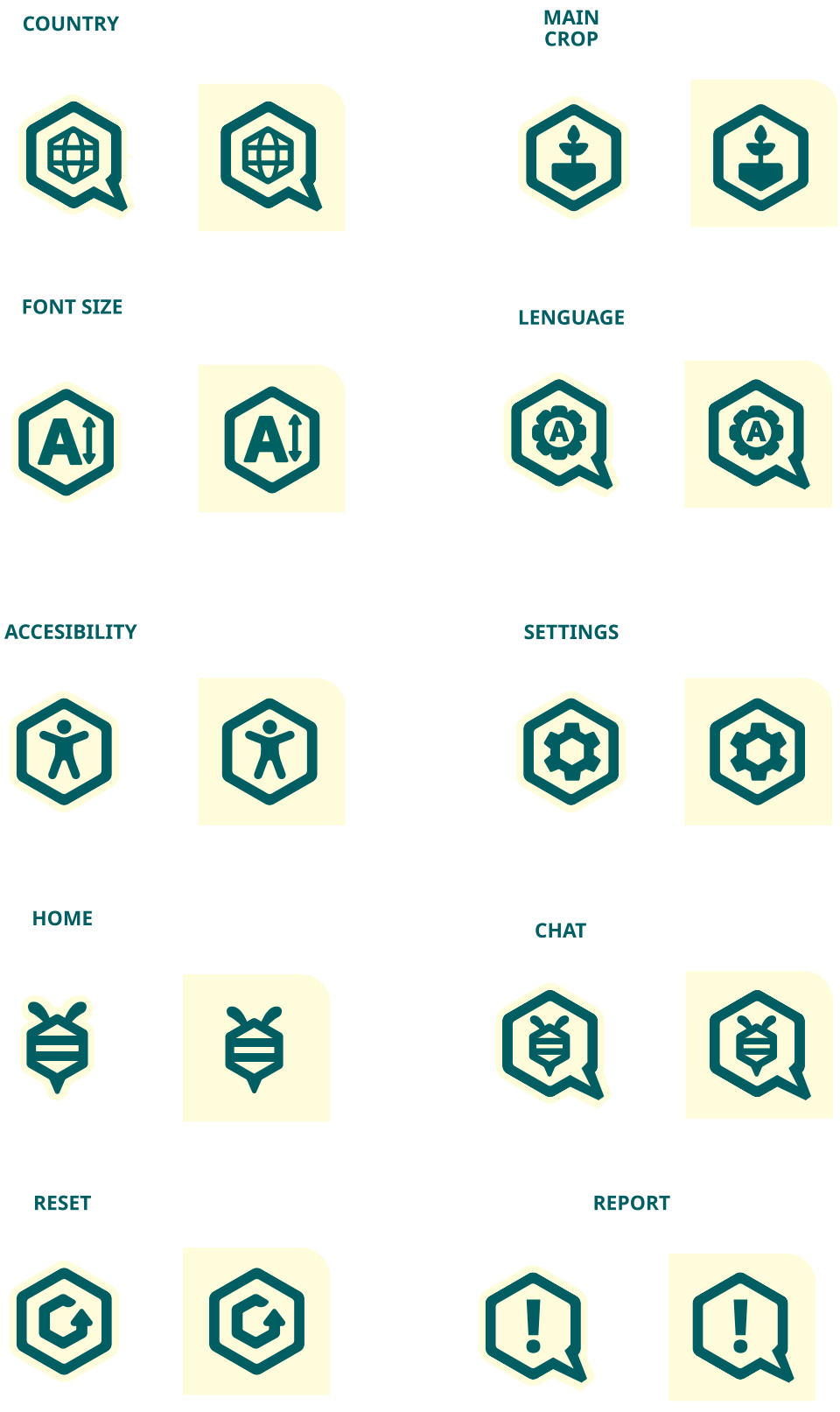


Fig. 37: Icons, own elaboration

INTERFACE

A prototype of the Demeter application has been developed in Figma. The visualization of these prototypes is designed to resemble the experience as closely as possible to one in real life, in this way you can have a better understanding of how it would work.
This prototype has two different flows:

- Flow 1: It is an example of some basic questions to the assistant, which one knows how to answer and the other does not. This is to resemble how it works in real life.

- Flow 2: Here the assistant gives us a tutorial through the app and the users themselves can try how it would really be like.

Link to the web and app prototype in Figma:
DEMETER PROTOTYPE

https://www.figma.com/design/k3zFLQYWUZbruuhsBZNiZ0/INTERFAZ---DEMETER?node-id=0-1&t=g4y5Eu8rD76f7N2b-1

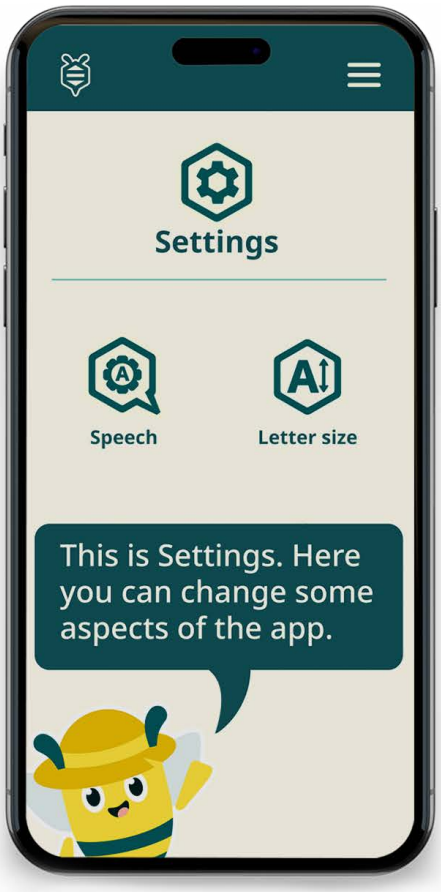
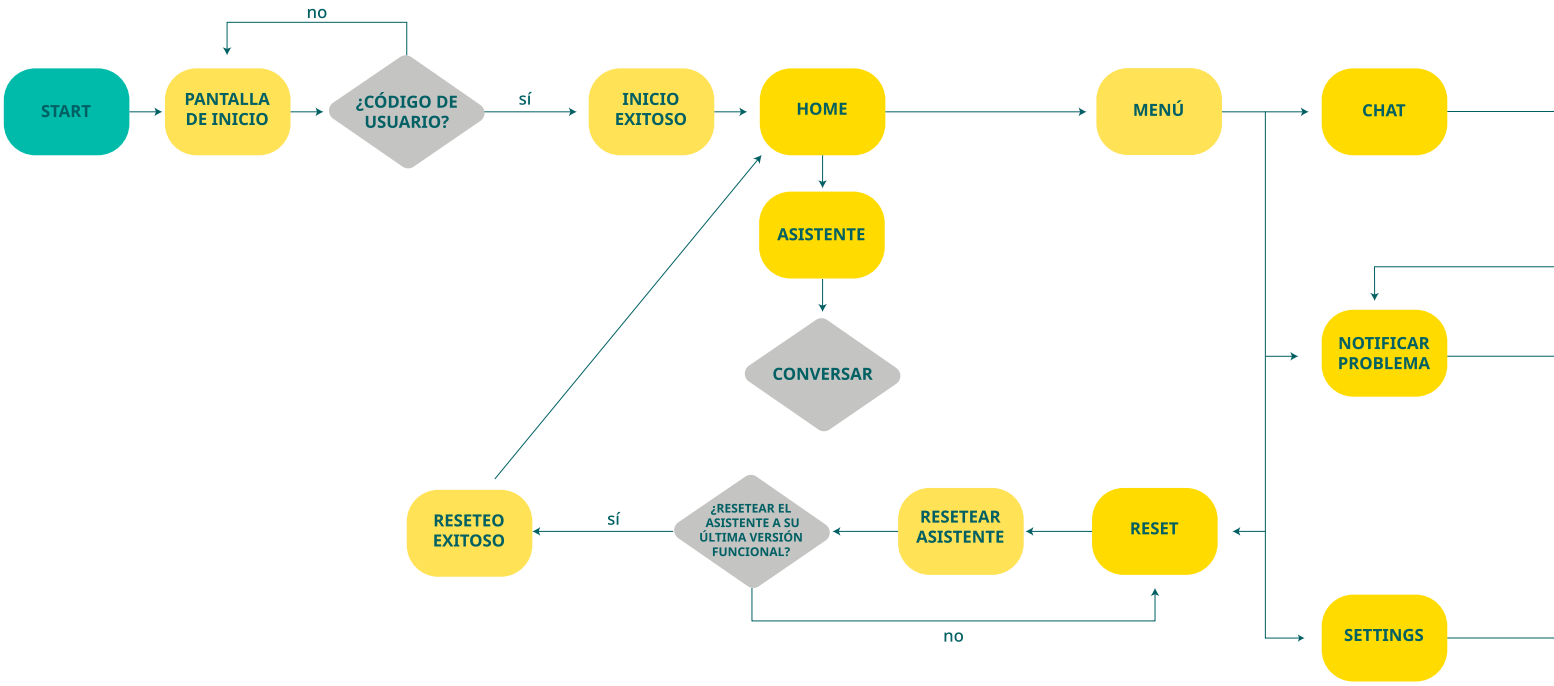
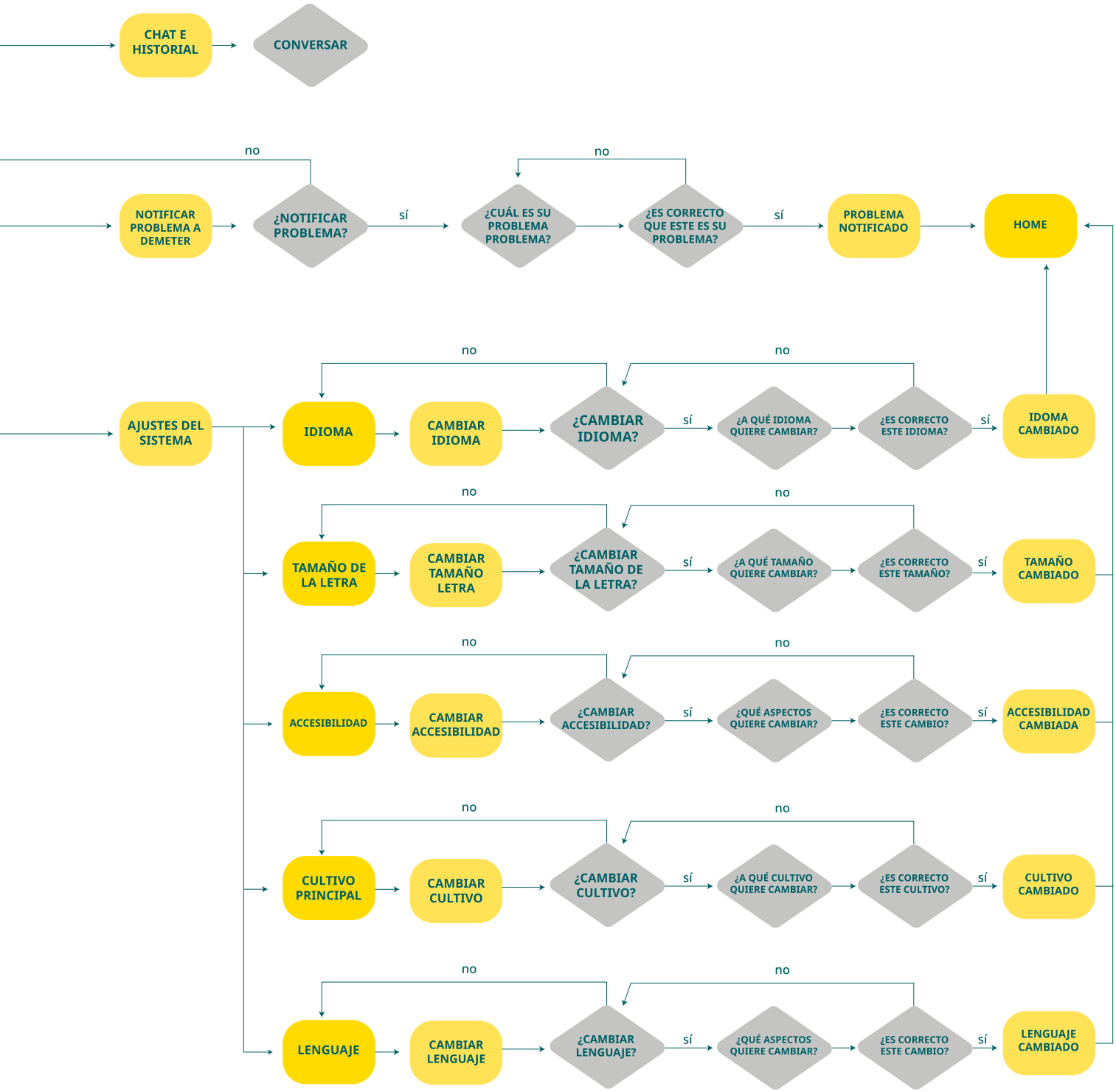


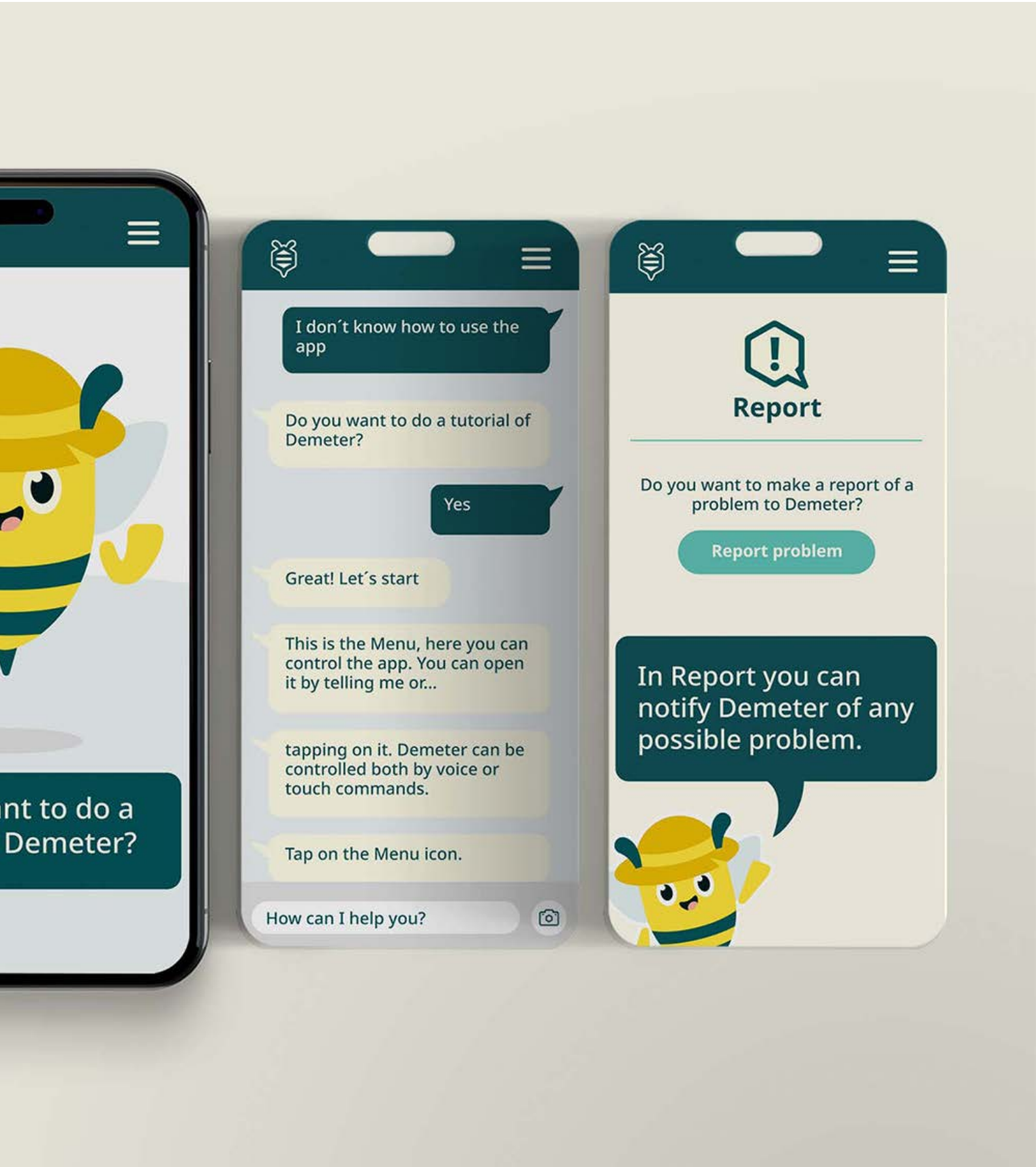
Fig. 38: Demeter app tutorial mock-up, own elaboration

User flow


START
PANTALLA DE INICIO
¿CÓDIGO DE USUARIO?
no
sí
INICIO EXITOSO
HOME
MENÚ
CHAT
ASISTENTE
CONVERSAR
NOTIFICAR PROBLEMA
RESETEO EXITOSO
sí
¿RESETEAR EL ASISTENTE A SU ÚLTIMA VERSIÓN FUNCIONAL?
RESETEAR ASISTENTE
RESET
no
SETTINGS


CHAT E HISTORIAL
CONVERSAR
no
NOTIFICAR PROBLEMA A DEMETER
¿NOTIFICAR PROBLEMA?
sí
no
¿CUÁL ES SU PROBLEMA PROBLEMA?
¿ES CORRECTO QUE ESTE ES SU PROBLEMA?
sí
PROBLEMA NOTIFICADO
HOME
AJUSTES DEL SISTEMA
IDIOMA
CAMBIAR IDIOMA
¿CAMBIAR IDIOMA?
¿A QUÉ IDIOMA QUIERE CAMBIAR?
¿ES CORRECTO ESTE IDIOMA?
IDOMA CAMBIADO
TAMAÑO DE LA LETRA
CAMBIAR TAMAÑO LETRA
¿CAMBIAR TAMAÑO DE LA LETRA?
¿A QUÉ TAMAÑO QUIERE CAMBIAR?
¿ES CORRECTO ESTE TAMAÑO?
TAMAÑO CAMBIADO
ACCESIBILIDAD
CAMBIAR ACCESIBILIDAD
¿CAMBIAR ACCESIBILIDAD?
¿QUÉ ASPECTOS QUIERE CAMBIAR?
¿ES CORRECTO ESTE CAMBIO?
ACCESIBILIDAD CAMBIADA
CULTIVO PRINCIPAL
CAMBIAR CULTIVO
¿CAMBIAR CULTIVO?
¿A QUÉ CULTIVO QUIERE CAMBIAR?
¿ES CORRECTO ESTE CULTIVO?
CULTIVO CAMBIADO
LENGUAJE
CAMBIAR LENGUAJE
¿CAMBIAR LENGUAJE?
¿QUÉ ASPECTOS QUIERE CAMBIAR?
¿ES CORRECTO ESTE CAMBIO?
LENGUAJE CAMBIADO


Settings
Speech
Letter size
Tap on the Home icon
Chat
Reset
This is the Menu, here you can open the rest of my funtions.
Do you wa
tutorial of


nt to do a
Demeter?
I don´t know how to use the app
Do you want to do a tutorial of Demeter?
Yes
Great! Let´s start
This is the Menu, here you can control the app. You can open it by telling me or...
tapping on it. Demeter can be controlled both by voice or touch commands.
Tap on the Menu icon.
How can I help you?
Report
Do you want to make a report of a problem to Demeter?
Report problem
In Report you can notify Demeter of any possible problem.

10. CONCLUSIONS

CONCLUSIONS

After completing this Final Degree Project, the objectives established at the beginning have been reviewed in order to design a prototype of an adaptable digital assistant, to be able to correctly transmit the values, mission and vision of the project and contribute to the support of farmers in rural areas.

It should be noted that in this project only a prototype could be developed since doing a detailed investigation requires much more time and resources. This project is intended to be continued in the future and opens a possible new line of action.

However, it is concluded that all established objectives have been achieved, creating a digital assistant that helps boost the crops of the most vulnerable farmers. An extensive research has been developed that supports the project, its technical aspects have been defended properly and the final graphic results have been successfully developed.

ACQUIRED SKILLS

This project has been a challenge from the beginning. Web design and development, as well as UX design, were not branches of graphic design that I had mastered. However, with time and dedication I have learned a lot about these disciplines and this knowledge has helped me have a more multidisciplinary vision of design.

As mentioned in the Resources section, a 3D design course was also carried out at Domestika. Before starting this project I only had the most basic notions of Blender. However, and despite not having finally developed the 3D assistant, this research process has been very useful for me to improve my skills in Blender.

I can say that this task has been very enriching on a professional level and has served as practice for future jobs and working life.

Finally, one of my main personal motivations for carrying out this project was to demonstrate that graphic design can be used as a tool to intervene and improve people's lives. I feel very satisfied to be able to say that I have defended these ideas correctly.

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