HEALTHY ECONOMY:
MOBILE APPLICATION TO PROMOTE SUSTAINABILITY
IN TIMES OF PANDEMIC

Virca Afonso[1] ⓘD
Clara Silveira[2] ⓘD
Leonilde Reis[3] ⓘD

Abstract: *Information and communication technologies enhance the digital transformation of society by accelerating and impacting changes in people's lives. This paper presents a technological solution, within the scope of the Sustainable Development Goals that intends to implement initiatives to "Eradicate Poverty" and "Healthy Living", namely an application that provides suggestions to optimize savings. The application has underlying concerns in the scope of Psychological Health, as an integral part of the Health of the human being, allowing to perceive the user's state of mind. It is also considered relevant that people have good psychological health so that they can manage their resources in a rational and intelligent way. The agile methodology was behind the development of the project as a process that combines the iterative model and the incremental model. The Healthy Economy application thus contributes to raising awareness of the rational management of financial resources, promoting the Sustainable Development Goals.*

Keywords: *Agile software development, Information systems, Information and communication technologies, Sustainable development goals.*

1.   INTRODUCTION

Currently, it appears that most people find it difficult to effectively manage their financial resources to have minimal monthly expenses. It is considered that the abundance of available resources does not mean that they are inexhaustible; in this sense, if the resources are used in a balanced and rational way, more resources will be left for the most disadvantaged. The Sustainable Development Goals (SDGs) represent the priorities for the 2030 agenda signed by more than 190 countries. These require action on a global scale by governments, companies, and civil society to eradicate poverty and promote quality health in order to create a life with dignity and opportunities for all, within the limits of the planet. In view of financial concerns and aiming to optimize household spending, incorporating sustainability concerns, there is a need to manage monthly expenses and implement control mechanisms.

The importance of sustainability is increasingly recognized, but the broader impacts of software systems on sustainability are still unknown. It is important to mention that some case studies have shown that the inclusion of sustainability factors since the beginning of the process is an asset and promotes the Sustainable Development Goals (Reis, Silveira, Carvalho, & Mata, 2020; Silveira, Reis, Santos, & Mamede, 2020; Silveira, & Reis, 2021).

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[1]   Polytechnic Institute of Guarda, Guarda, Portugal
[2]   Polytechnic Institute of Guarda, Guarda, Portugal
[3]   Polytechnic Institute of Setúbal, Setúbal, Portugal

The main objective of this study is the development of a technological solution, with a functional prototype, based on the needs of the citizens, that can contribute to a more sustainable world, incorporating SDG 1 and SDG 3. The application, Healthy Economy, has underlying concerns in the field of Psychological Health and Expense Management. Raising awareness of sustainability among users is another goal.

2.   BACKGROUND

The Agenda for Sustainable Development, defined 17 objectives and 169 objectives, covering the social, economic and environmental dimensions worldwide (UNDP, 2021). These objectives focus on people, human rights and respond to growing social inequalities and pandemics. They also integrate issues such as peace, security and climate change. Currently, the world is facing a global health crisis due to COVID-19. In this analysis we highlight the SDG 1: End poverty in all its forms everywhere, and the SDG 3: Ensure healthy lives and promote well-being for all of all ages. Figure 1 illustrates these two SDGs.
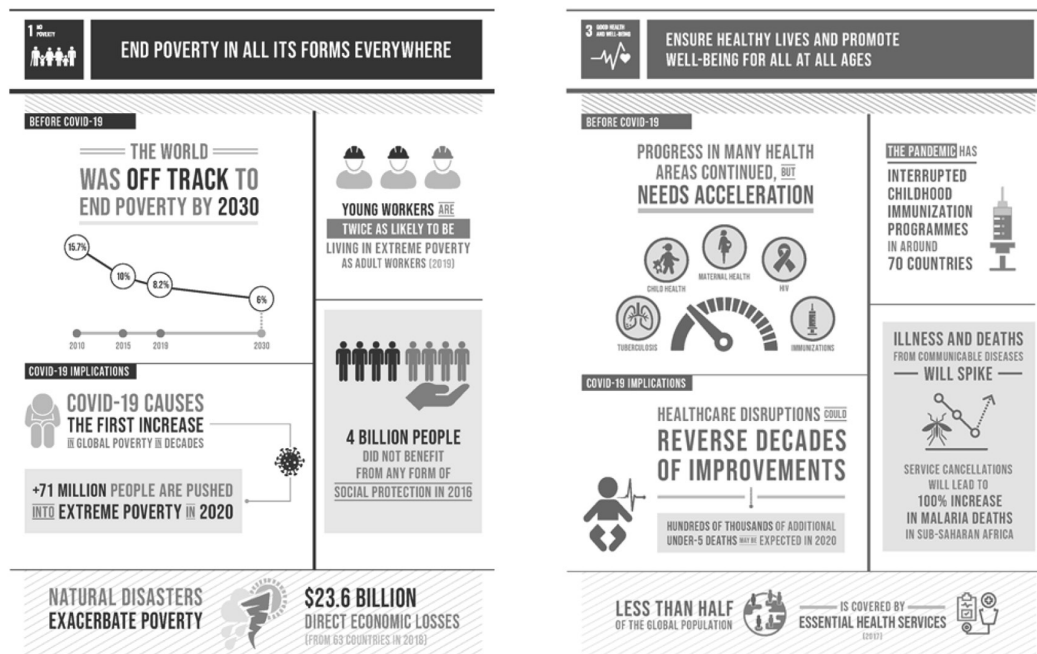

Figure 1. Goal 1 and Goal 3
Source: UNDP, 2021

Eradicating poverty in all its forms remains one of humanity's greatest challenges. Statistics indicate that 736 million people still live in extreme poverty (UNDP, 2021). Universal health coverage will also be essential to achieve SDG 3, eradicate poverty and reduce inequalities. In reality, good health is essential for sustainable development.

One of the current imperatives is to put health and sustainability at the center of the economy, implementing post-COVID-19 policies that achieve multiple goals - health, environmental sustainability, employment, and equitable socio-economic recovery (Guerriero, Haines, & Pagano, 2020). The emergence of mental health problems during a pandemic is extremely common, although difficult to address due to the complexity involved (Ransing *et al.*, 2020). In this sense, the proposed application implements integrated solutions for SDG 1 (No poverty), and SDG 3 (Good health and well-being).

Table 1 shows four existing applications in the market, two related to Expense Management and two related to Psychological Health. An analysis of these applications will help identify the requirements for inclusion in the Healthy Economy application.

Table 1. App features for expense management and psychological health promotion

Functional requirements	Mobills	Monefy	Sanvello	MindShift	Healthy Economy
Expense Management	Yes	Yes			Yes
Category management	Yes	Yes			Yes
Alerts and notifications	Yes	Yes			Yes
Answer questionnaire			Yes	Yes	Yes
Send and receive messages			Yes	Yes	Yes
Questionnaire history			Yes	Yes	Yes

Mobills is an application for personal financial control (Mobills Labs, 2021), with simple solutions for everyday problems. Users can enter all their expenses in the application and receive alert notifications. The Monefy application (Aimbity AS, 2021) allows you to add expenses or income by category. The Sanvello application (Sanvello Health, 2021) focuses on assisting people with anxiety problems. It is a solution based on empathy: meeting people where they are in times of need and surrounding them with tools and strategies that provide relief. The MindShift CBT application (Anxiety Canada, 2020) promotes a change in mentality and empowers patients to deal with different consequences of anxiety attacks.

The study of these applications allowed the identification and comparison of the main functional requirements. We found that it was necessary to have an application that integrated both dimensions (helping to manage expenses and helping to promote psychological health).

3. DEVELOPMENT OF THE HEALTHY ECONOMY APP

The agile methodology was selected to develop the Healthy Economy application as it improves the quality of the iterations in the development process. In this view, agile software development teams are responsible for applying the methods they consider necessary for the project in question, adapting the development process throughout the project as needed (Jacobson & Seidewitz, 2014).

3.1. Requirements Analysis

The Use Case practice is a requirements analysis technique that has been widely used in modern software engineering since its introduction by Ivar Jacobson. Use cases can help teams understand the big picture, indicating ways to use a system to achieve a specific goal for a specific user – called an actor (Jacobson, Lawson, McMahon, & Goedicke, 2017). The activity begins with the identification of actors.

To identify the actors of the application, the following questions were answered:
- Who is interested and who benefits from the application?
  Citizens with psychological and/or financial problems or with difficulty in managing their spending. A Psychology Professional who will provide psychological support to the citizen.

- Who provides, uses and deletes the information?
  The citizen himself who uses the application. He will, with his experience, share new solutions and give his opinion on those already provided by the app. A Psychology Professional who will create questionnaires, savings suggestions and send messages to the citizen.

Through these responses, it is concluded that we will have two main actors: Citizen and Psychology Professional. Table 2 shows the actors and their objectives. These objectives correspond to the use cases.

Table 2. Use Cases and actors

Actor	Use Cases
Citizen	Insert own expenses (e.g. food, restaurant, light, income)
	View own expenses and available balance
	Create spending limits by category
	Receive savings suggestions for overspending categories
	Receive psychological help
	Answer psychology questionnaires
	Send a request for help to the Psychology Professional
	View survey results
	Insert, change, and view user
Psychology Professional	Create and delete savings suggestions
	Create questionnaires
	Send and receive messages
	View survey results

Use cases provide the structure of requirements, that is, a systematic way of organizing requirements. This structure facilitates analysis, user interface design, architecture design, implementation, and testing.
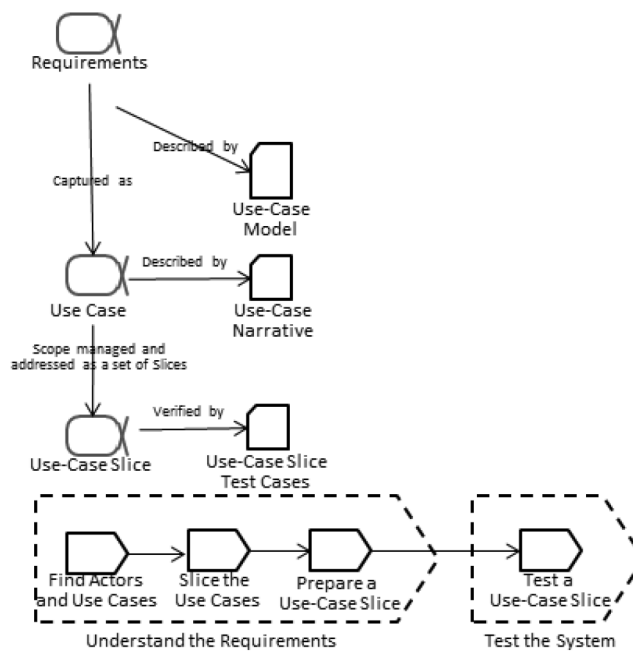

Figure 2. Capture requirements with use cases - Essence notation
Source: Jacobson, Lawson, McMahon, & Goedicke, 2017

Figure 2 represents the activities involved in capturing requirements with use cases, showing that the **Requirements** are decomposed into **Use Cases**, which in turn are divided into **Use Case Slices**. These are the three important things with which we have to work and make progress.

3.2. Technologies used

To develop the Healthy Economy app, the following technologies were used:
- Android studio - official development environment for Android app development;
- Android - operating system used;
- Firebase - store all data from the Health economy app;
- GitHub - repository to store all application code;
- Java - programming language used.

3.3. Prototypes of the app Healthy Economy

Figure 3 shows the application prototypes for: User login; View all expense categories and Insert own expenses by category.

Figure 4 shows the application prototypes for: Answer psychology questionnaires, Receive psychological help, and Send a request for help to the Psychology Professional.

The Healthy Economy mobile application is still under development and will be tested in the real context of a social organization.
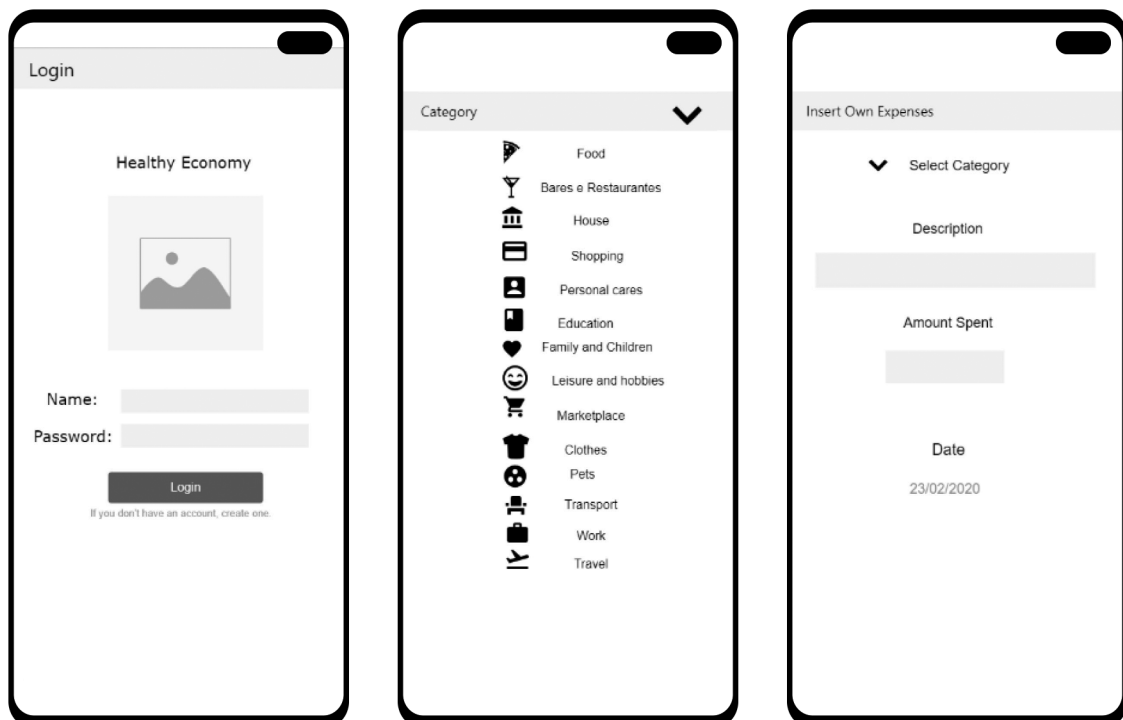

Figure 3. Application prototypes: Login, View expense categories, and Insert own expenses
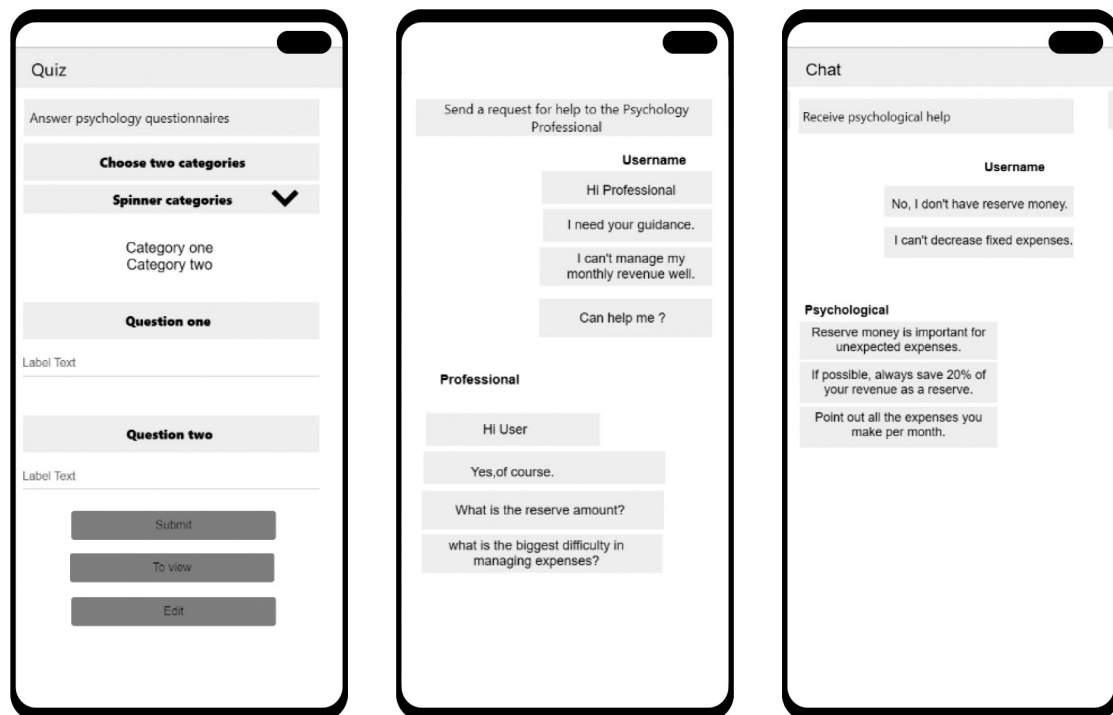
Figure 4. Mobile app prototypes for psychological help

4. FUTURE RESEARCH DIRECTIONS

The principles of the Karlskrona Manifesto are applied to the development of software systems (Becker et al., 2015; Penzenstadler, 2015), in particular: sustainability requires long-term thinking, as we must assess the benefits and impacts at various time scales: it is possible to meet the needs of future generations without sacrificing the prosperity of the current generation, as we can identify and make choices that benefit the present and future generations. For future work, it is relevant to continue to include sustainability factors in the development of software. On the other hand, technologies have an impact on the sustainability of people and the world, so we must continue to pass on the principles of sustainability knowledge to students in this field.

5. CONCLUSION

The Healthy Economy app aims to promote the SDG 1: End poverty in all its forms everywhere, and the SDG 3: Ensure healthy lives and promote well-being for all at all ages. It is important to note that this is not an easy task, it will be a long and difficult path, but this application is a contribution to achieve that goal. In pandemic times, it is very important that people have good psychological health so that they can manage their resources in a rational and intelligent way.

Software development incorporating sustainability concerns is a topic of great relevance. Given this relevance, this paper is a contribution to raise awareness among software professionals and end-users about the concepts underlying sustainability and the SDGs. It is also important to mention the importance of awareness for financial literacy and the consequent effect that it may have on the financial footprint. In this sense, the Sustainable Development Goals include the ambitions to be achieved for a better future.

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