

## Technology Innovation to Apply the Freecycle Concept: Background, Evolution and Technological Solutions

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### ABSTRACT

**Purpose:** This article shows the proposal of a useful application, which facilitates communication and interaction between two people, promoting and putting into practice the concept of Freecycle. The aim is to improve the quality of life for people.

**Methodology/Approach:** A contextualisation of the theme is done, namely the concept of Freecycle, showing how it emerged and evolved, as well as how technology can be applied to it for its promotion. Based on this study, the information systems and technological architectures of the proposed solution are shown.

**Findings:** Freecycle has been gaining more and more relevance, being seen as a way to reduce the waste of goods, which can lead to the reduction of raw materials spent to produce new goods. The proposed application allows this concept to be put into practice, playing an active role in improving the quality of products.

**Research Limitation/implication:** The application is under development, and this article presents the results achieved so far. In the future, more tests will be done when the application is fully developed with a larger population.

**Originality/Value of paper:** The currently existing applications do not contemplate all the potentialities of Freecycle, so the proposed solution intends to improve the dissemination of this concept and reduce the emission of greenhouse gases, protecting the quality of life on our planet.

**Category:** Research paper

**Keywords:** freecycle; ecological footprint; sharing economy; 3Rs

## 1 INTRODUCTION

The planet is changing. Global climate change already has observable effects on the environment. The effects that scientists predicted in the past are now occurring.

According to Quercus (Quercus, 2021), the evolution of products available in the market and the way they are made available to the consumer has led to a significant increase in waste production. This growth has led to a wide debate involving various environmental issues associated with the sustainability of the planet in a scenario where the increase in consumption is reflected proportionally in the amount of waste that needs to be eliminated, deteriorating the quality of life of our planet.

The extraction of raw materials from nature has huge associated environmental impacts, adding to the high consumption of water and energy involved not only in the extraction phase but also in the transportation, transformation, and manufacturing of products.

This trend led, in turn, to a second problem: lack of adequate space for the installation of landfills to dispose of the waste produced, as well as the need to resolve their environmental impacts, namely the production of leaching water and methane, a gas with high global warming potential.

It was from here that the need arose to change the way waste was seen, starting with the need to reduce its production. Thus, a new concept was created, the 3Rs policy: Reduce, Reuse and Recycle.

The 3Rs policy consists of a set of action measures that are applied and valid for all types of solid, liquid and gaseous waste/effluents.

Thus, the first step to solving the problem of waste management is to reduce the amount of waste produced (Espuny et al., 2022). When we use creativity, it is possible to use different materials for new functionalities, avoiding the production of waste and, with this, preserving the product's quality.

In fact, most of the objects we buy are not biodegradable (namely those with plastic) from clothing, furniture, equipment among others. Living in today's highly consumerist society we are faced with two problems: The first is how to dispose of so much plastic, knowing that it is extremely harmful to the earth's ecosystem and that much of it is sent to landfill and incinerated creating greenhouse gas emissions (GHG) that are highly damaging to our ecosystem. Moreover, the second problem is that as we throw away this waste, more and more is produced to meet the demand.

In recent years, global climate change has been one of the most urgent environmental challenges facing society. Annual CO<sub>2</sub> emissions per capita worldwide have increased from 2.2t in 1990 to 7.5t in 2014, with China being the largest producer and consequently the largest emitter of GHGs in the world (Sun et al., 2019).

As one of the major sources of GHG emissions, waste management activities have recently attracted the attention of governments and many researchers. According to the emission reduction experience of some developed countries, waste is the second largest research area for emission reduction after energy. Therefore, reducing GHG emissions from Municipal Solid Waste (MSW) disposal is one of the most effective ways to achieve emission reduction.

According to the United Nations, our planet is drowning in plastic pollution. Researchers estimate that more than 8.3 billion tonnes of plastic have been produced since the early 1950s and about 60% of that plastic ended up in a landfill or in the environment. Today, we produce about 300 million tonnes of plastic waste every year, almost equivalent to the weight of all humanity. If current trends continue, our oceans by 2050 could contain more plastic than fish (United Nations, 2021; Schmidt et al., 2017). This scenario can have a very negative impact on people's quality of life.

There is a practice in certain countries of donating materials, used objects that are in a reasonable state of preservation, by stripping the current owners of them next to dumpsters, with messages such as: "Free".

To solve these problems, some concepts have been created, of which Freecycle stands out. Created by Deron Beal, this concept aims to enable members of the Freecycle network to give away items in an excellent state of preservation freely and without any reservations or forms of negotiation, helping to create a sense of social spiritual generosity, as well as strengthening ties in the local community and promoting the values of sustainability and reuse.

The sharing economy seemingly encompasses online peer-to-peer economic activities as diverse as rental (Airbnb), for-profit service provision (Uber), and gifting (Freecycle). The Silicon Valley success stories of Airbnb and Uber have catalysed a vibrant sharing economy discourse, participated in by the media, incumbent industries, entrepreneurs and grassroots activists (Martin, 2016). Despite belonging to a community devoted to consumption, albeit an alternative form of consumption, freecyclers are active members of civic life (Nelson et al., 2007).

The use of technology can contribute significantly to the evolution of this concept. In fact, technology has been advancing more and more in recent years, and consequently, communication and interaction have become increasingly faster and more effective, having a planetary scope. At this level, the mobile phone has an increasingly important role in society, no longer being just an extension of the body but also becoming an extension of personality, identity, lifestyle, and social status. Moreover, according to (Schmitz et al., 2016), the ease of understanding, intuitive handling and reliability have been found to drive its use by people.

Following these premises, this article presents the architecture for a mobile application that proposes to offer an interface to facilitate communication and interaction between two people who want to dispose of or receive used items for

free. With this application is intended to reduce the consumption of goods and, consequently GHG emissions (Nicholson et al., 2021), improving the quality of life of people and the planet itself.

The idea is that anyone can dispose of their used material (which is still of good quality), whether furniture, kitchen accessories, textiles, or sports equipment, among others, without having the trouble of carrying or transporting this material. You also won't have the burden of conscience of knowing that it is almost a moral crime to throw away an object that could be reused by others, and, most importantly, knowing that you are helping the environment by reducing the ecological footprint produced by humans.

## **2 STATE OF THE ART**

This section will discuss the state of the art, namely the general background, the historical background, the rise of the Freecycle concept, factors driving Freecycle's recent rise, evolution perspective, technology and its symbiosis with Freecycle, and similar proposals.

### **2.1 Background**

Greenhouse gas emissions from municipal solid waste and associated climate change impacts are gaining attention around the world (Bulkeley & Gregson, 2009).

Faced with an inequality stemming from global economic recession, real environmental degradation and climate change, many inhabitants of advanced capitalist nations in the 21st century have been exploring lifestyles and practices that present alternatives to the environment, challenging the status quo mental base market (Black & Cherrier, 2010).

Many of these alternatives are shaped by online platforms, forums and Internet-mediated organisations, which classify consumer goods based on the sustainability of production practices. Some, such as the apartment-sharing website Airbnb or ride-sharing apps (Lyft and Uber), have become ways of generating profits for venture capitalists and are hailed in the public sphere as agents of change in hotel and car traffic culture, respectively (Belk, 2014).

The Freecycle network, Freecycle Network (Freecycle Network, 2023), is a non-profit organisation that has existed since 2003. This one has not joined this for-profit branch of the sharing economy, remaining committed to its goals of reducing consumer waste while helping people by donating gifts (in good quality) to strangers with no ulterior motives. To reduce waste on the planet, companies must produce better-quality products. The principles of TQM (Total Quality Management) are very important and contribute decisively to reducing waste. The typical characteristic of TQM contains sentences such as orientation to customers,

engagement of all employees, constant improvement and integration of quality management in the whole organisation (Zgodavova, Petrik and Solc, 2014).

This network and its millions of members make objects and materials available to strangers and is a robust and increasingly popular element of the sharing economy (Yülek and Santos, 2022). Unlike the highly profitable Airbnb and Lyft, the Freecycle Network prohibits making a profit or even bartering, providing an altruism-based alternative to capitalist markets while keeping tons of trash out of landfills (Sari, 2010).

With a few simple rules, a small group of staff and few enforcement mechanisms, this organisation facilitates the decentralisation of a massive flow of goods between more than eight million people. Tons of specific items, such as used clothes, furniture, and electronic equipment, are advertised through online messaging platforms and distributed to interested individuals without exchanging money or other goods, practising charity by offering goods to others (Aptekar, 2016; Figueiredo et al., 2021).

## **2.2 Historical Background**

On May 1, 2003, Deron Beal sent the first email announcing the Freecycle Network to about 30 or 40 friends and a host of non-profit organisations in Tucson, Arizona. At the time Deron Beal founded the Freecycle Network, he was working for a small Non-Governmental Organisation (NGO) called RISE, which provided recycling services to downtown businesses and employed struggling Tucson locals on a transitional basis when there were those in need of support.

Since the team preferred to recycle rather than throw away items still in excellent condition, they began calling or driving to various NGOs to see if they wanted to keep the items. However, Deron Beal felt it was imperative that there was an easier way to streamline this process of reuse and distribution. So there he decided to create the first Freecycle mailing list, so that everyone in Tucson could give or receive items. In addition, that's how Freecycle got off the ground.

The Freecycle concept has since spread to over 110 countries, where there are thousands of local groups representing millions of members – people helping people and "changing the world one gift at a time." It currently consists of 5,340 groups with 9,041,547 members in over 110 countries around the world. As a result, the Freecycle Network currently keeps over a thousand tonnes a day out of landfills. This is equivalent to fifteen times the height of Mount Everest in the year 2019 alone if the rubbish trucks were stacked!

By giving freely and without any reservations or forms of negotiation, Freecycle Network members contribute to creating a sense of social spiritual generosity, just as they strengthen local community ties and promote the values of sustainability and reuse. All people from all lifestyles come together to turn waste into treasure (Freecycle Network, 2023).

Their official mission is to "build a worldwide gifting movement" that reduces waste, saves precious resources and lightens the load on landfills, allowing members to benefit from the strength of a larger community.

### **2.3 The Rise of the Freecycle Concept**

At first glance, giving in Freecycle appears to be driven by altruism, defined as "the desire to intentionally benefit another person without expecting a return." However, study results indicate that altruism and solidarity are secondary to the main goal of the concept, the desire to reduce environmental degradation.

The powerful combination of helping the planet and the community at a stroke is a more than valid motive.

Practitioners of the concept express a common sentiment about the good feelings one gets when one gives. The good feelings derive partly from the altruistic intention to help others and partly from being the object of gratitude.

Sometimes, this concept is compared to charitable giving, such as handing over used clothes at a social collection site. However, it does not offer an opportunity to "see the reward" (Albinsson and Yasanthi Perera, 2009). In fact, it is different than giving to charity as there is a direct personal reward by knowing the recipient.

One of the reasons why people choose to donate through Freecycle instead of giving to charities, although some even offer to receive donations at the donor's home, is for the sake of convenience. The ability to get rid of one thing at a time is advantageous as sometimes there is no space to store multiple items until we have enough to take away for donation. Although there are collection trucks, they don't always fit into the donor's timeline. For example, a new piece of furniture has been purchased, and the old one needs to disappear as quickly as possible and with minimal effort. The Freecycle concept enables this.

In addition, users explained that many items for donation are not accepted by charities because they are a bit damaged. However, even items that are damaged or have wear marks can be reused and recycled. Some can be used for restoration, for example, furniture or mechanical equipment, and others reused and recycled to create accessories, textile materials or works of art (Burns, 2012).

Even given the many advantages, it should be noted that donating through Freecycle requires a few steps. 1) post the item online; 2) fill out some response fields; 3) find a recipient; 4) schedule a collection time and location. Sometimes, it can take several email exchanges or phone calls to set up a time when a member can pick up the goods in question, which means spending a certain amount of time.

Despite this, one of the reasons why Freecycle participants do not simply throw away their unwanted goods is that it is a rewarding activity associated with emotions. As such, all this work is rewarding, contributing to improving people's quality of life.

## 2.4 Factors Driving Freecycle's Recent Rise

Freecycle is part of the growing number of alternative consumption practices that reflect a concern for the plight of the environment and, to a lesser extent, labour practices. The emergence and subsequent incorporation and commodification of fairly traded food are indicative of a cultural shift, especially among middle-class consumers in wealthy countries (Albinsson & Yasanthi Perera, 2012).

Freecycle is an explicitly environmentalist organisation with a mission to keep 'stuff' out of landfills by exploring the growing interest in practices that reduce the ecological footprint, such as recycling and reusing water bottles, buying local produce, using public transport or using bicycles as a primary mode of transport.

The idea of Freecycle, of not throwing away and helping people not having to buy something new, is really based on Ecology, and that's also a difference. People don't need to be needy; they just need to want what they are being offered.

Unlike the brutal growth around other for-profit sharing economy practitioners, Freecycle represents a purer form of this economy, offering an alternative to capitalist markets while motivating the local community with altruistic behaviour.

This ideology also fits into debates about the political potential of a proliferating field of alternative consumption practices, known under various labels including 'conscious consumption', despite the fact that there is no government support of any kind, as there are no indirect costs, i.e., neither tax deductions nor charity incentive supports (Liu et al., 2020).

People who participate in this sharing economy often do not know the recipient of their goods, nor will they possibly find them again. One explanation of this giving behaviour through the Freecycle concept is altruism, solidarity and indirect reciprocity with those who care about the environment or some combination of the previously mentioned options.

Moreover, online platforms provide the concept with appropriate structures, so by following some social norms and moral principles, the giving behaviour through Freecycle becomes more organised.

Thus, giving through Freecycle presents itself as a more convenient way than other methods to get rid of unwanted, used items while still leaving a sense of satisfaction in the knowledge that we are not only saving the planet but also helping someone.

## 2.5 Evolution Perspective

The evolution of this practice is directly related to the current technological development. Through technology, we obtain tools capable of changing the current paradigm of the global market (Eden, 2017).

Many Freecycle donors are driven by organisation, wanting to solve the clutter in their homes trying to do it in the most convenient way possible.

Instead of having to find one person, among those we know, who might need something we want to de-clutter, usually, someone replies that they are interested, so it is much quicker and more comprehensive when something is posted online.

With mobile devices and apps, time is saved because the offer is made entirely at the donor's discretion.

Therefore, mobile devices and applications give this concept added value because of the users', givers' and receivers' desire for greater convenience and their simplicity and practicality. For this reason, many people, in order to meet this need, look for applications available in the market.

## **2.6 Technology and its Symbiosis with Freecycle**

The sharing economy, driven by advanced technologies and social networks, is a significant economic and innovative force (Santos and Barbosa, 2006; Doiro et al., 2017; Jimenez et al., 2019; Zgodavova et al., 2020). Numerous prominent startups have used social networks and advanced technologies to build platforms and applications for collaborative consumption (Lee et al., 2016).

The internet provides a place to share concepts, ideas and goods. Thus, cyberspace promotes a new era of altruism that contrasts with the selfishness of commodification (Torricke-Barton, 2021).

According to Statista (Statista, 2021), the global digital population in October 2020 already exceeded 4.6 billion people with access to and active on the Internet. Hundreds of millions of people are now part of online communities. Some 4.2 billion people use the Internet via mobile devices and over 4 billion are social media users via them. In fact, mobile devices are now the most used channel to access the Internet worldwide, accounting for 91 per cent of all users.

Admittedly, more than 4 billion people are not online. Now, the middle class enjoys most of the benefits of connectivity. Nevertheless, that does not diminish the impact of the internet.

The internet is now a new kind of community, being the largest in history, as large as the global population in 1960. It crosses all borders and cultures, and there are enough people connected for the internet to become a planetary infrastructure for communications and collaboration.

One of the big drivers of internet usage has been mobile devices such as smartphones. These have become ubiquitous and have changed the way people organise, relate, communicate and live day to day. As users carry their mobile devices everywhere, at every hour, they have become one of the most important personal information processing interfaces.

Users realise the growing value of mobile devices and quickly switch and upgrade to innovative brands with innovative features, gaining easy access to available applications. In today's global market, applications for mobile devices have

become commonplace in daily consumer life as the smartphone has become an important segment of the mobile device market (Chun, 2013).

Mobile app users love their convenience and simplicity. On their smartphones, they can do a quick search for the app they need and, once found, easily download and install it. These factors have driven the massive growth and expansion of mobile apps in ways that desktop app developers could not have imagined (Digital Turbine, 2021; Harvey et al., 2017).

Although the Freecycle Network originates from online platforms (forums) where people are grouped by zones and, through message exchange, can recycle and reuse materials, mobile applications allow for greater convenience and simplicity for members. With them, unwanted items which are still of good quality can be efficiently disposed of, maximising their usefulness for everyone and reducing time consumption in this process, improving the product quality (Gomes et al., 2022; Craveiro et al., 2023; Santos et al., 2017; Rodrigues et al., 2019; Sá et al., 2023; Santos et al., 2014). Therefore, we can think locally but act globally.

## **2.7 Similar Proposals**

As a means of comparison to the proposal presented in this article, it is important to mention some applications found that share the same concept, such as TradeMade (TradeMade, 2023), Freegle (Freegle, 2023), Freecycle + trash nothing! (TrashNothing, 2023).

TradeMade stands out as a Freecycle application because it uses a slightly different concept. Items and services are exchanged in any combination. According to the people themselves, TradeMade offers a way to get value out of things and services while saving money and reducing waste. It contains some interesting features, such as the ability to post ads in a simple way, the use of filters to facilitate the search evaluation between users and the provision of a chat to simplify trading. One of the biggest problems with this application is that it's paid and only available on the App Store for iPhone.

Freegle is an application developed by [ilovefreegle.org](http://ilovefreegle.org) and operates only in the UK. In this application, we can enter articles, search or even order articles. Registration is also not mandatory if we just want to search for items and now we want to contact the donor; we just have to insert our email and send a message.

In the case of the Good Use application, it is mandatory to create an account and a list of items we want to offer or receive. The items must be in good usable condition. It is possible through the application to leave a public comment to the donor or send a private message. It also allows you to exchange items between users. This application only operates in IOS systems.

Of all the applications analysed, the one that most closely resembles the proposal presented is Freecycle + Trash Nothing! In this application, we can search for any city worldwide or just authorise the application to use the geolocation sensor of the mobile device. Users can donate or search for items by zone. If they just want

to search, they do not need to register, but if they want to donate or contact the donor, they have to register. However, after a while of experimentation, it was verified that the layout is not attractive, and in Portugal, there is no adherence by users.

### **3 ARCHITECTURE**

This section shows the architecture of the proposed system, namely the general proposal, the Information Systems Architecture, and the Technological Architecture.

#### **3.1 Proposal**

Following these premises, we intend to develop a useful application with practical and functional objectives, which facilitates communication and interaction between people who want to get rid of items which are still of good quality nonetheless are no longer useful to them but have potential use for other people.

This solution will address an important aspect, which is a gap in the models developed so far since there is no attractive way to bring together the essential and practical features for the owners of goods to donate them to strangers in a safe and comprehensive way.

In a more detailed way, it is intended to develop a mobile application that can incorporate the best features existing in the most reputable applications on the market, with the particularity of including some new features and with a wider scope. These new features include, for example, direct contact between users or the possibility of assigning a rating to a donation. This will facilitate interaction between donor and recipient while also ensuring an improvement in the quality of the donations themselves.

These features allow greater simplicity and customisation in the process of sharing goods with strangers as well as simplifying their interaction.

The application proposed in this article intends to put the Freecycle concept into practice, facilitating the exchange of goods between individuals and thus helping to reduce the human ecological footprint, preserving the quality of life on our planet.

With the development of this application, it is intended to:

- Facilitate communication and interaction between two or more people who want to offer and receive used items;
- Encourage citizens to use the Freecycle concept based on a shared economy;
- Provide security for those involved in the service;

- Reduce the waste of articles and the GHG emissions emitted by their excessive production.

The application is aimed at everyone who wishes to make use of the service of donating used items.

The intention of this application is also to initially cover the Portuguese market and then expand to a planetary scale.

The main functionalities implemented in the application are:

- Post and search for an article in a simple way;
- Finding articles corresponding to a location within a certain radius;
- Finding articles corresponding to the user's need;
- Create donor and recipient profiles;
- Access a chat to exchange messages between donor and recipient;
- Add articles to favourites;
- View the history of articles and their donors.

### 3.2 Information Systems Architecture

The information systems architecture was thought and designed to contain all the systems that the application needs to be implemented. As such, it was systematised to contain modular and autonomous systems in the event that technologies are changed over time and/or systems are contracted out to other companies or are eliminated, all without affecting the performance of the application, i.e. with a view to the future, for example, 5 years into the future (Figure 1).

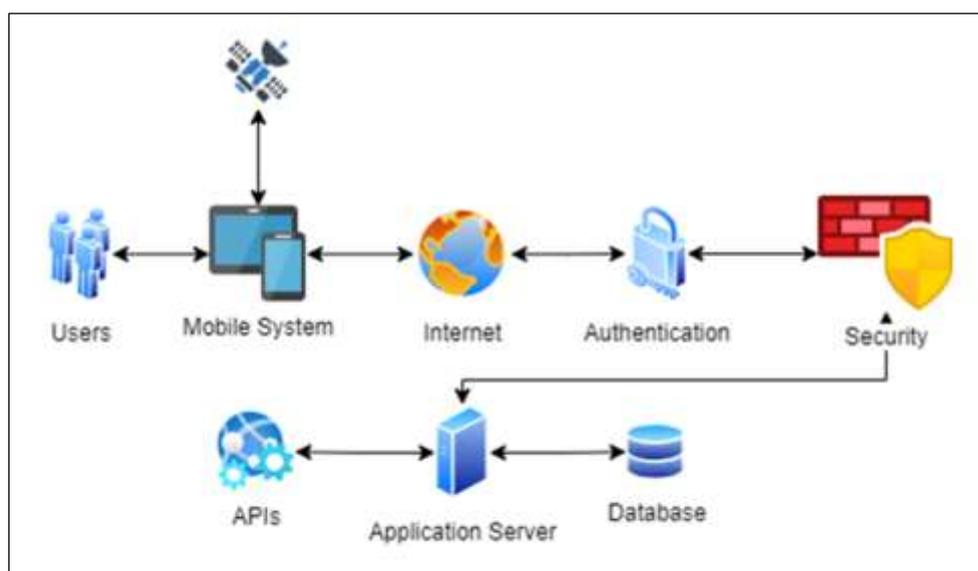


Figure 1 – Information Systems Architecture

Depending on the Requirements Engineering, the systems required to implement the application will be determined, as well as the characteristics of the architecture's components (application, server and external services).

### **3.3 Technological Architecture**

Following the information systems architecture, the technological architecture reflects how the application will be implemented regarding the technological aspect.

The architecture presented here was thus chosen due to the knowledge of these technologies and due to the technologies available on the market that we feel more comfortable developing the application, never neglecting changes that may be necessary or just for the sake of simplifying the process.

As the application above mentioned is a mobile application and the two types of users of the application will have to have mobile devices, either smartphones and/or tablets. These same devices typically contain built-in web and geolocation systems. The mobile system will be developed for Android systems. APIs are used to facilitate user actions and all the application data, user data and donations will be stored in the cloud. Regarding the geolocation system, the technologies used through the smartphones will be GPS (Global Positioning System) and GPRS (General Packet Radio Service), so that the "tracking" of the users' positions will be the most reliable and fastest possible.

In the systems referred to above, the geolocation system technology will use APIs (Application Programming Interface), due to the simplicity of implementation and the reliability of service demonstrated over time.

All data packets before being received by the main application server will pass through a security system which will have as main features encrypted sections (OAuth token) for users, security protocols. This connection will be provided by Google's security policies. This way, the privacy policy and data security is safeguarded.

As far as the server is concerned, it is implemented in the Google Cloud: Cloud Computing Services, due to the existing tools and also because of the knowledge we have about it, and thus be easier to manage. The data center will be built in Firebase for the insertion and reading of data relating to user data and donations (Figure 2).

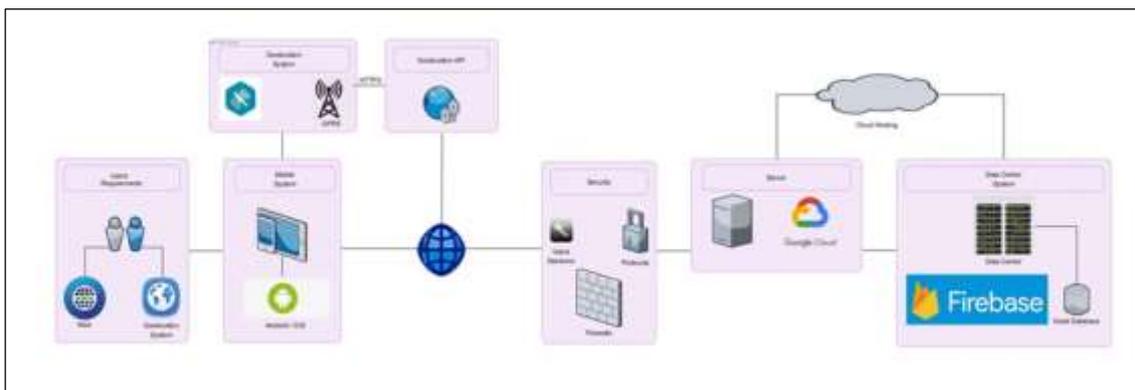


Figure 2 – Technological Architecture

Firebase is a comprehensive mobile and web application platform introduced by Google in 2011. Firebase has grown dramatically over the years, providing developers with a powerful suite of tools to create innovative and intuitive mobile and web apps. In addition to providing an array of backend services, Firebase also offers an array of front-end library SDKs and other development tools that allow developers to quickly and efficiently build apps for iOS, Android and the web. With Firebase's easy-to-use platform, developers can quickly and securely create engaging apps for virtually any platform.

Both the server and the data centre will be hosted in the Cloud due to the initial investment. Later, if beneficial, these systems may be transferred to proprietary hosting.

#### 4 DISCUSSION

It is notorious how our planet is changing. Global climate change already has observable effects on the environment. The effects that scientists predicted in the past would result from global climate change are now occurring, glaciers have shrunk, ice on rivers and lakes is thawing rapidly, the variety of plants and animals has reduced, and trees are flowering early. There is also accelerated sea level rise and more intense heat waves.

Scientists believe that global temperatures will continue to rise in the coming decades, mainly due to GHGs produced by human activities. The Intergovernmental Panel on Climate Change (IPCC), which includes more than 1,300 scientists from the United States and other countries, predicts a temperature increase of 1.4 to 5.5 degrees Celsius in the next century.

The global climate is expected to continue to change throughout this century and beyond. The magnitude of climate change in the coming decades depends mainly on the amount of heat-trapping gases emitted globally and how sensitive the Earth's climate is to these emissions.

All these aspects are degrading the quality of life of people and the planet.

According to the IPCC (NASA, 2020), the extent of the effects of climate change on individual regions will vary over time according to the ability of different social and environmental systems to mitigate and adapt to the changes.

Following this line of thought, and as the main motivation for this work, the suggested application results in the adoption of a new solution to the need to reduce the levels of greenhouse gas emissions caused by the excessive production of goods due to the high amount of waste that is incinerated and sent to landfills.

During the literature review carried out, and according to the studies of (Yaman, 2020) and (Lekve-Bjelle et al., 2021), it was found that there are indeed significant benefits to the environment when putting the proposed concept into practice.

Through other studies ((Osburg & Lohrmann, 2017) (Klug, 2017)), it was also found that there is a high potential due to citizens' concern about global warming, but also in relation to the benefits of a sharing economy.

The usefulness of mobile applications in everyday life, both in social and professional contexts, is unquestionable. The reason for the increase in this usefulness stems from the sharp and continuous growth in the sale of mobile devices, as well as the quantity and quality of the services made available. A simple activity like reading a book or a newspaper has become more convenient on mobile devices, so we have become increasingly dependent on the features that these technologies provide us.

The use of mobile applications for understanding global warming and climate change has become incredibly useful in recent years. It allows people to track carbon footprints, identify energy-saving techniques, and access accurate climate change information. Through this, individuals and communities can work together to reduce their impact on the environment and help mitigate the effects of global warming.

In short, the gains that come from this application can be:

- Reduction of waste by reusing products instead of putting them in the rubbish bin;
- Reduction in the consumption of raw materials because if the products are going to be reused, it won't be necessary to spend raw materials on creating new ones to replace them;
- By reducing the production of new goods, we also reduce the energy required in this process, as well as greenhouse gas emissions.

All this results in the application of the 3Rs policy: reusing materials, reducing the waste of goods, reducing energy consumption and greenhouse gas emissions, helping to improve the quality of the planet.

## 5 CONCLUSION

By publishing this article, we seek to contribute to the dissemination and sharing of the knowledge gained about the concept and possibilities of Freecycle. Freecycle is an online resource that connects people who are looking to get rid of items which are still of good quality with others who are in need of them. Through this platform, people can save money, reduce waste, and help others find new homes for items that they no longer need or want. This not only helps individuals and families, but it also benefits the environment by reducing the amount of waste that goes to landfills, preserving the quality of our planet.

We hope that our findings will open up new avenues of exploration and understanding for the advancement of Freecycle and its application to modern society. We believe that with increased research and education about the use of Freecycle, we can create a more sustainable planet for future generations to enjoy. We must make meaningful strides now to create a sustainable planet for future generations. Developing green technologies must be priorities to ensure our Earth remains livable for generations to come. Freecycle is just one of the many steps we can take to leave behind a cleaner, healthier world. We owe it to those who come after us to make sure the planet is a safe and thriving place for them to experience.

This approach may inspire future research and initiatives in this field, ultimately allowing an improvement of our planet. We all have a responsibility to work towards the improvement of our planet in order to protect it for future generations. Everyone can do something, from reducing our carbon footprint to being conscious about what we buy and how we get around. Together, we can make a difference to help save and improve our planet.

This article is intended to develop a mobile application that can incorporate the best features existing in the most reputable applications on the market, such as greater simplicity and customisation in the process of sharing goods with strangers as well as simplifying their interaction. The application proposed in this article intends to put the Freecycle concept into practice, facilitating the exchange of goods between individuals and thus helping to reduce the human ecological footprint.

The fundamental intention is to preserve the planet, thereby improving the quality of life of current people and safeguarding that of future generations. Regarding future work to be done, it is necessary to further improve the solution developed, namely the possibility to search for items in a wider radius, the evaluation of the satisfaction of the donor in relation to the receiver and vice-versa, the modification of the settings, profile, personal data, requests of each user and the creation of dashboards for all users. These improvements and expansions are important for the continuous evolution of the application, offering an enhanced experience to users and meeting their changing needs. Therefore, future work consists of deepening the research, enhancing existing features and exploring new functionalities that add value to the developed system.

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## CONFLICTS OF INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.



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