

**Identyti: Digital Storage of Personal Identification Documents**

**The Zero Energy Building: A Driver of Change Towards Environmentally Focused Technologies**

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Eric Burbach  
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Technical Project Team Members

Eric Burbach  
Chris Han  
Sri Jayakumar  
Samantha Kostleni  
Gio Lee  
Amanda Murray

On my honor as a University Student, I have neither given nor received  
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## **Introduction**

Global climate change is negatively impacting the earth. This climate change is almost certainly human-caused, and the effects of this crisis are far-reaching. Overtime, these effects will become insurmountable. Ultimately, this level of climate change will lead to the end of humankind and potentially all life on Earth. The causes of climate change have evolved to be more human-centric, specifically in the last 50-100 years. The Intergovernmental Panel on Climate Change's (IPCC) 5th Assessment Report, published in 2014, states that climate change is extremely, about 95%, likely caused by humans (IPCC, 2014). A supporting report states that there is "no convincing alternative explanation" to humans causing climate change (USGCRP, n.d.). The effects stemming from this issue are tangible; rising global temperatures, rising sea levels, warming oceans, shrinking ice sheets, glacial retreat, decreased snow cover, declining arctic sea ice, an increase in extreme weather events, and ocean acidification just to name several ("Climate Change: Vital Signs of the Planet", n.d.). This problem is not only far reaching, it is also extremely drastic; convincing arguments have been made that humankind only has 11 years before facing irreversible damage to the environment and the planet (General Assembly, 2019). Regardless of how long we have to fix this issue, climate change is already causing many secondary, indirect problems in the world. The warming of the globe also causes problems with loss of energy production, overpopulation, overconsumption, destruction of land, and more. These problems have already appeared worldwide, and they can only be completely solved if the crisis of climate change is resolved. The solutions to this problem are expansive and complicated. In this paper, I will explore one of these technologies: the zero-carbon building.

For the second proposed project for the technical capstone, we are working with Identityti, a Darden School of Business start-up seeking to change the way the world shares and receives identification documents. Currently, most identification documents (Drivers License, Passport, Insurance card, etc) are handled as strictly hard copies, and the process for getting those documents can be difficult. While there are currently some ways to verify the validity of someone's drivers' license online, those are predominately used for the sale of alcohol and other restricted substances and not for any official government identification (Larson, 2019). This means that people must keep hard copies of these documents and all the documents they need to apply for them, which can be burdensome. One could digitize their own documents, but that leads to another problem; there is no system designed for digital storage of sensitive personal documents. WIRED magazine recently published a "Guide to Your Personal Data (and Who Is Using It)" in which they detailed how companies like Google are collecting and storing every click and keystroke made in their web browser, store this data along with user identities, and use it to serve targeted ads to the users (Matsakis, 2019). In other words, major document storage companies (Google, Dropbox) collect data on their users and leverage that data for capital gain. Storing private documents on those servers makes users vulnerable.

### **Technical Topic**

Identityti seeks to help users keep their private documents private, and to make everyone's life a little bit easier. Our deliverable to them will be a proof-of-concept showing documents that can be stored securely on the internet, which they'll use when meeting with investors and potential stakeholders to garner support for this technology. As such, the fundamental goal of our

project is to build a document storage service that is secure, easy to navigate, and allows users to access the product on mobile and desktop devices. Users should be able to upload, view, and download their documents on demand. We also want this product to support enterprise accounts which can issue personal documents and tell users what they need to have to apply for such documents.

Because the documents uploaded to this platform are typically highly sensitive, data security will be a critical challenge to tackle. Login authentication would be performed by Auth0 which already provides an array of mitigating web-app security breaches such as anomaly detection and force email verification (Poza 2018). Additionally, in order to allow clients to access their data from anywhere, the documents they upload will be stored in the cloud, specifically in an AWS S3 bucket. When uploading the documents, the application will save certain metadata associated with the document allowing the client to easily search/sort/categorize the document, making it convenient and faster to find it later. The International Data Corporation, who is a provider of market intelligence, conducted a study on their workers to gauge how much time they spend weekly looking for physical documents. In a group of 1200 workers, IDC found that “they spend an average of 4.5 hours a week looking for documents” (Biddle, 2017). Since Identityti is targeted at both consumers and enterprise clients alike, searching for these documents on Identityti, whether the client is an individual or a business, will be much faster than searching for physical documents.

One concern for storing sensitive data in the cloud is that these services can be compromised. However, in order to mitigate this issue, the plan is to encrypt the data stored in S3, so that even if the bucket is compromised, only encrypted data can be recovered. By storing

these encrypted files in the cloud, Identityti offers a secure and fast solution for clients, allowing them to easily share their documents with enterprises.

Identityti also provides benefits for enterprise clients. A major problem that large enterprises face is the sheer size of information they have to process and handle. Using Identityti, enterprises have the ability to create an account in order to manage all of their employees' data. For example, when onboarding a new employee, an enterprise client could request the necessary documents, such as identification and tax reports, from the new employee through Identityti. In this way, Identityti creates a secure and simple path of communication between enterprises and employees for personal, confidential documents. Instead of requiring users to carry physical documents and submit them to enterprises, Identityti creates a channel to share these documents electronically.

To fulfill our goals we've identified these requirements:

#### Minimum

- As a user, I should be able to create a customer account, so that I can access persisted data.
- As a user, I should be able to login to my account, so that I can access persisted data.
- As a user, I would like to be able to upload my documents, so that I can store them for future use.
- As a user, I would like my documents to be stored, so that I can access them for future use.
- As a user, I should be able to view my documents, so that I feel confident my documents are stored.

- As a user, I would only like my documents to be accessed by those I have authorized, so that I feel confident in the security of my personal information.
- As a user, I would like to be able to easily locate my documents, so that I can find what I need when I need it.
- As a user, I should be able to retrieve my documents, so that I can use them when I need them.
- As a user, I should be able to access the application from a mobile device, so that I can upload or share documents on the go.

### Desired

- As a user, I would like to be able to search for my documents, so that I can easily find documents when I need them.
- As a user, I would like different options for sorting and filtering my documents, so that I can easily find relevant documents when I need them.
- As a user, I would like the app to recognize what type of document (driver's license, birth certificate, etc) I am uploading, so that it is easy for me to organize and find my documents later.
- As a user, I should be able to create an enterprise account.
- As a user I should be able to authorize other users to view my documents, so that I can provide my documents when necessary.
- As an enterprise client, I should be able to request documents from other users, so that I can validate their identity and provide access to appropriate resources.

## Optional

- As a user I should be able to limit the time another user can view my document.
- As an enterprise client, I should be able to create a new type of document with a list of required documents needed.
- As a user, I should be able to identify which required documents I am missing.
- As a user I should be able to delete my documents.
- As an admin, I should not be able to view user's documents.

## **STS Topic**

The problems that climate change presents are becoming more and more ominous as time passes. Climate change is a topic that has gone through much controversy in its lifespan. Due to the large amount of debate over climate change, there has been massive amounts of research done on the topic. It has been made abundantly clear that humans are the primary cause of climate change. However, the ways in which humankind are a factor in climate change are not singular. Humankind has affected climate change in all sorts of ways, including overconsumption, carbon emissions, and pollution (Brown, 2009). New technologies are constantly being created that benefit the environment. Fuel-efficient cars, efficient renewable energies, and many other new technologies all help slow down these negative changes to our environment. However, there are also many new technologies that work against this effort. These technologies can cause more creation of waste, cause more pollution, and more. A large portion of carbon emissions comes from a small number of big corporations; 71% of all global emissions

come from only 100 companies (Riley, 2017). This means that it is up to those companies to reduce their own emissions. As a society, there are other aspects to focus on to reduce emissions. Big cities play a major role in creating carbon emissions. Large, urban areas with skyscrapers and densely packed buildings allow for more carbon emissions per square foot than more spread-out, rural areas.

One technology that is helping to alleviate the effects of climate change is the zero-carbon building, or the net-zero building. The goal of the net-zero building is to reduce the emissions produced by a house or building, one of the biggest sources of emissions in a large city or a rural area. Buildings create large amounts of emissions from heating, cooling, lighting, and electronics. This is a huge drain of energy that is especially amplified in densely populated areas. This is an area in need of major improvement in terms of reducing emissions. In order to reduce emissions in buildings, the amount of energy use in buildings must be reduced. To accomplish this, net-zero buildings seek to reduce the energy usage of buildings in every way possible, such as airflow, insulation, and lighting through innovations in design and implementations of new technologies (Torcellini, Pless, & Deru, 2006). Net-zero buildings aim to reduce their net energy consumption to zero. Effectively, the building should create as much renewable energy as it uses. The effects of these buildings are incredibly extensive. In major cities, the use of these buildings cuts emissions immensely. Not only will major cities and urban areas improve from the implementation of this technology, but the entire planet will benefit from this reduction of carbon emissions. The design and creation of these buildings is one that is completely focused on the impact it has on the environment. This is an interesting phenomenon that does not occur often in the creation of new technologies; the design process of a new technology rarely

considers its effects on the environment. In today's society, this is a necessary step in the design process that often gets skipped. In order to improve the conditions of the environment and the earth, every technology should work towards benefitting the environment as opposed to hurting it. This research is important because it helps to solve one of the most important problems in society. In order to maintain a sustainable living situation on Earth, a paradigm shift must take place in technology like it has with net-zero buildings; the process of designing a new technology must consider the environmental impact that technology will have. This paradigm shift is well-exemplified in net-zero buildings. Using the net-zero building as a primary example, other technologies should take after this ideology. When new technologies create an emphasis in their designs for environmental benefit, the environment will benefit. If a paradigm shift like this were to occur, the problems society is facing in climate change will be drastically reduced and much easier to approach. Thus, this paradigm shift is an extremely important one that should be implemented in the design process of new technologies.

## **Research Question and Methods**

The research question for this project is: How does the zero-carbon building demonstrate the paradigm shift from energy inefficient technologies to energy efficient technologies, and how do the environmental considerations impacting the design of these buildings exemplify how the environment should be considered in all design processes of new technologies? To conduct this research, the primary methodology will be documentary research, as well as some historical case studies to support this documentary research. With these two methodologies, there will be

evidence to create a convincing argument. These methodologies will be the most effective approach to the given research question because there is already a plethora of research done on the causes and effects of climate change. The documentation on net-zero buildings and their effects also has a solid foundation with lots of research to explore. Using the documentary research methodology, it will be easier to utilize this pre-existing information in order to create an argument and back it up. Case studies will aid in proving the concept and the effectiveness of net-zero buildings. For these reasons, documentary research and historical case studies will be the most useful methodologies to answer this research question. Using these methods, the paradigm shift from energy inefficient technologies to energy efficient technologies will be explored. This paradigm shift will “provide model problems and solutions for a community of researchers” who are involved in designing new technologies (Kuhn, 2012). Ultimately, this shift will create massive changes in the design of new technologies.

## **Conclusion**

The STS research question of net-zero buildings will be answered in the first proposed research project. The paradigm shift from inefficient to efficient energy usage in these buildings should then be used to show the need for this paradigm shift in all technologies. The design process of all technologies should follow suit and consider the environment in every aspect of design. These findings should then be used to display how they can benefit the environment and help reduce the problematic effects of climate change.

In the second proposed research project, the technical deliverable will be a fully functioning web application with the capability of storing a user's important personal documents and giving the user the ability to utilize those documents in many ways. This project helps solve the problems of losing important personal documents and the hassle of needing to organize and obtain all the correct documents for a given task. The outcome of this project should be a fully completed web-application with the aforementioned functionalities.

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