



Creating a **SUSTAINABLE VISION** via **Engineered Solutions**

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Scalability Goals

In the dynamic landscape of technology and business, the concept of scalability has become progressively crucial. Scalability refers to the ability of a system, network, or process to handle growing amounts of work, resources, or users efficiently.

Scalability goes beyond just accommodating growth; it involves creating solutions that can adapt, expand, and evolve over time while maintaining effectiveness and efficiency.

Scalable design encircles various disciplines, including architecture, software development, product design, and more.

Scalability then aims to address the challenges of variance in demand, or a change in demand. Designers can reduce unpredictability by offering flexible and adaptable designs.

Designing for Scalability allows easier eventual re-use of a working model to the demand of a new similar need situation.

Case Study in Design "Grüner Würfel"

In Bielefeld, Germany, a building called the "Grüner Würfel" or the "Green Cube" was constructed with novel characteristics.

This unique building sports creeping ivy plants on all sides - by design. The center of the "Green Cube district" of Bielefeld is located on the Kesselbrink. It is a hip corner of the neighborhood.

Community Center

This green building offers a wide range of possibilities. There are regular activities and events such as mobile games, dance activities for teenagers and young adults, yoga classes, painting classes, networking meetings and much more.



Good Design should be refined and improved

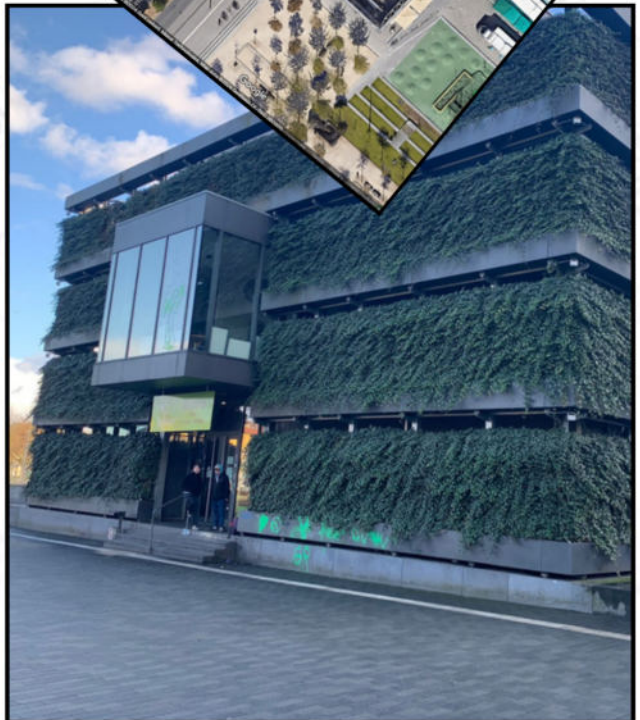
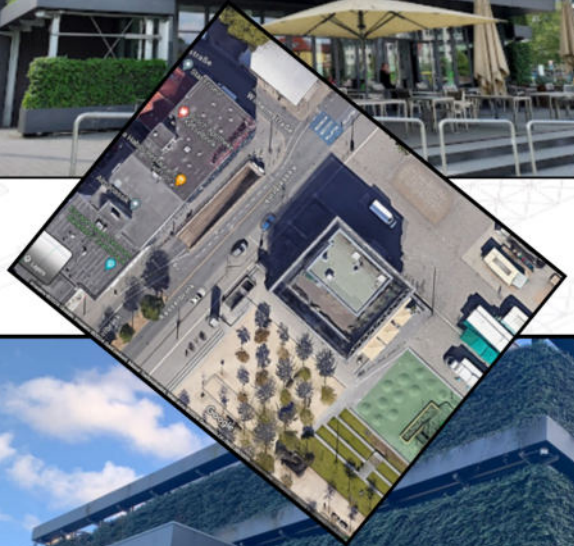
The concept of the "Green Cube" could and should be enhanced. For instance - by substituting groundcover like ivy with food crops - would that improve the result dramatically? Indeed, incorporating food production or flowering elements right onto the walls of buildings or houses is feasible and proven in this example.

By utilizing integrated planters within the structure for plants, a variety of creeping living walls such as grapevines, passion fruit, strawberries, or other desired food crops can be cultivated indoors or outdoors. This fusion of nature and practicality creates an ideal combination for a delightful living experience. Imagine the beauty of a plant cascading across your wall while simultaneously enjoying the fruits it bears.

This is where the Green Cube meets Scalability. This building could and should be scaled to other uses. The idea is worthy of rebuilding and improving.

Maintenance Efficiency

The wall plantings could thrive on water collected from the roof or even from groundwater. A photovoltaic system could be integrated with pumps to automatically irrigate the plantings integrated with the outer walls.





Integrated **Water management** offers an enhanced benefit of promoting plant growth while providing an innovative approach to reducing water needs from the local municipality.

In regions where infrastructure is lacking - Water independency is also quite an achievement. With such a building that strives to retain and recycle the rain that falls upon it - the possibility of water autarchy begins to look very promising.

Engineering Mandate

Engineers need to identify designs of merit such as the Grüner Würfel and refine and improve those plans - especially where Modular Planning is possible.

It would be a productive exercise to scale this working planning to alternative sizing and uses. Scaling could allow a broad audience to implement this concept at their desired location.

Fellowship Implications

The fellows in the Jacquelyn Jestine Sanders Foundation are working on water management for a green Madagascar. Several disciplines are demanded for this project such as wastewater treatment or recycling, storage, filtration, and capturing rainwater.

Scaling the “Grüner Würfel”

The concept of scalable design is exemplified by the creeping plants on the walls, A simple design decision that is making nature accessible to anyone utilizing such a building, whether it is built as a large office building or a small Green Cube house.

Modular Design

A key goal of the JJSF Fellowship Water Infrastructure Design Project is establishing scalable designs for each infrastructure component (or “Module”). These Module designs set the stage for implementations of scaled systems under varying circumstances or demands.

Using scalable design in the JJSF fellowship is opportune because the designs that the Fellows will show could be re-used and resized on any site that may need a similar concept or design. Clean scalable design will make this rescaling work easier later.

The Foundation is seeking to build modular, scalable designs that can be used not only at the University - but all across Madagascar. The Fellows should take the resulting plans and their experience out to the West and to the South .. and manage Water!

Scalable designs are built with flexibility in mind. They consist of modular components or elements that can be easily modified, replaced, or expanded without disrupting the overall functionality.

By separating the design factors and functionalities into independent modules, designers can scale specific parts of a system or product as needed, without a need to redesign the core structures.

A perfect example is the reduction of a large Water Infrastructure need, like that on the University Campus. We are breaking the large problem into “Design Chunks” which even a few dedicated Graduate Students can Analyze and solve with some professional support. i.e the Fellowship Program.

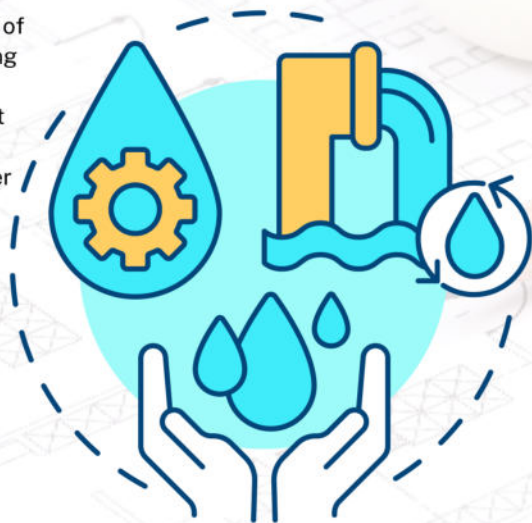
“Our assertion is that by designing Modules with scalability as a planning factor, we will raise significantly the value of our Engineering results”
- JJSF President, Kenneth Coman

Optimized Cost Efficiency

In today's competitive and cost intensive economic environment, change is inevitable. We could have new needs arise in the middle of our project or a customer may want something to be changed because of many factors and circumstances. Scalable designs are resilient to change and can seamlessly adapt to evolving requirements, technologies, and user needs.

Whether it's accommodating new features, requiring additional services, or supporting different sizes of water demand, scalable solutions can easily incorporate changes without demanding extensive redesign or redevelopment.

Ideally - scalable design is more **Cost-Effective**. This Cost-effectiveness arises by optimizing resource utilization and minimizing overhead associated with scaling a re-design. By adopting cloud-based infrastructure, virtualization, or distributed computing techniques, organizations can scale their operations efficiently without incurring unnecessary expenses.



Additionally, scalable designs often offer a **pay-as-you-go** model, allowing businesses or universities to scale resources according to demand, thereby reducing upfront investment in Modules of Infrastructure. We are even sizing the operational costs. Parallels can be drawn in the water management sector as well.

For the case of Wastewater Filtration Systems, scalable design principles can be applied to wastewater treatment plants and filtration systems. By incorporating modular components and flexible infrastructure, these systems can be easily expanded or upgraded to accommodate increasing wastewater volumes or stricter water quality standards.



Thank you to the Designers and Investors in the Grüner Würfel. Your work has been an inspiration to us for good design that warrants a few more iterations of improvements for the future.



Automated monitoring and control systems enable real-time adjustments to optimize filtration efficiency and minimize energy consumption.

Scalable wastewater filtration systems ensure that communities can effectively manage and treat wastewater without overburdening existing infrastructure.

On the other hand, scalable design principles are also essential in rainwater harvesting and storage systems, which capture and utilize rainwater for various purposes, including irrigation, landscaping, and potable water use.

Scalable rainwater harvesting systems consist of modular storage tanks, filtration units, and distribution networks that can be customized to meet specific water demand requirements. Lagoons are another definite possibility.

Scalable rainwater harvesting solutions can be implemented at varying scale, from individual households to large commercial or institutional buildings, providing flexibility and adaptability to varying water management needs.



Focus on Sustainability

In the era of climate change and environmental awareness, scalable design also encompasses sustainability considerations. Designers strive to minimize the environmental impact of products, services, and infrastructure by incorporating energy-efficient technologies, optimizing resource utilization, and adopting eco-friendly practices. Scalable design solutions prioritize sustainability, ensuring that scalability does not come at the expense of environmental degradation or resource depletion.

Scalable design is - for JJSF - about designing in a way so that the resulting plans can easily be fitted to a new site specific demand. We are planning once for many different sites. This is asserted as highly efficient modular planning for the [developing] world.



A big Thank you to the local Universities of Madagascar for their support of the Jacquelyn Jestine Sanders Foundation Fellowship Program.



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Modular, Scalable & Sustainable

In conclusion, scalable design represents a mind shift in how we proceed toward the creation of systems or products. By embracing flexibility, adaptability, cost-effectiveness at the design stage - designers can develop sustainable solutions that can grow and evolve alongside the ever-changing demands of the modern [developing] world. As technology continues to advance and business landscapes evolve, scalable design can play an increasingly vital role in shaping the future of innovation and progress where varying demand exists as barriers for development.

Let us encourage each and every fellow of the Jacquelyn Jestine Sanders Foundation Fellowship for the important and valuable work that they are doing. We seek, through this project, to realize a better future!