



DEVELOPMENT OF A RAINWATER HARVESTING SYSTEM AS AN APPROPRIATE TECHNOLOGY WITHIN THE FRAMEWORK OF A HUMANITARIAN ENGINEERING PROJECT

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This project used the appropriate technology development process to build a **Rainwater Harvesting System** at **Wormser Erlebnisgarten**, an environmental education center located in Worms, Germany. By showcasing sustainable water management, the project supports the center's mission of fostering environmental awareness and hands-on learning for all ages.

1. Problem Statement

The area faces significant challenges due to limited access to water and inadequate maintenance of existing water infrastructure. These issues result in unreliable water availability and frequent system failures, which severely impact the daily lives and activities of the local population. Addressing these problems is critical to ensuring a consistent and sustainable water supply for the community of the garden.

2. Main Question

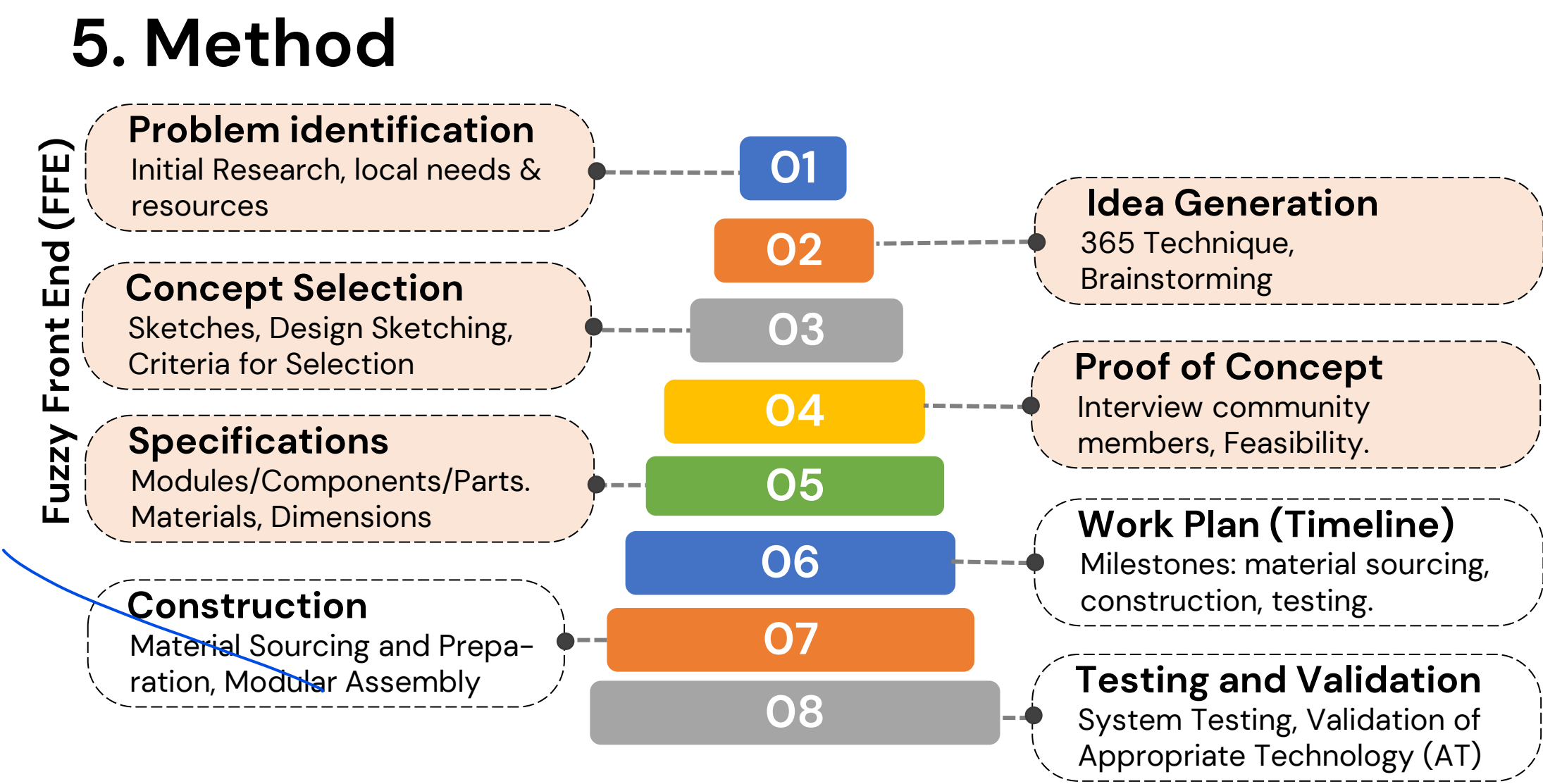
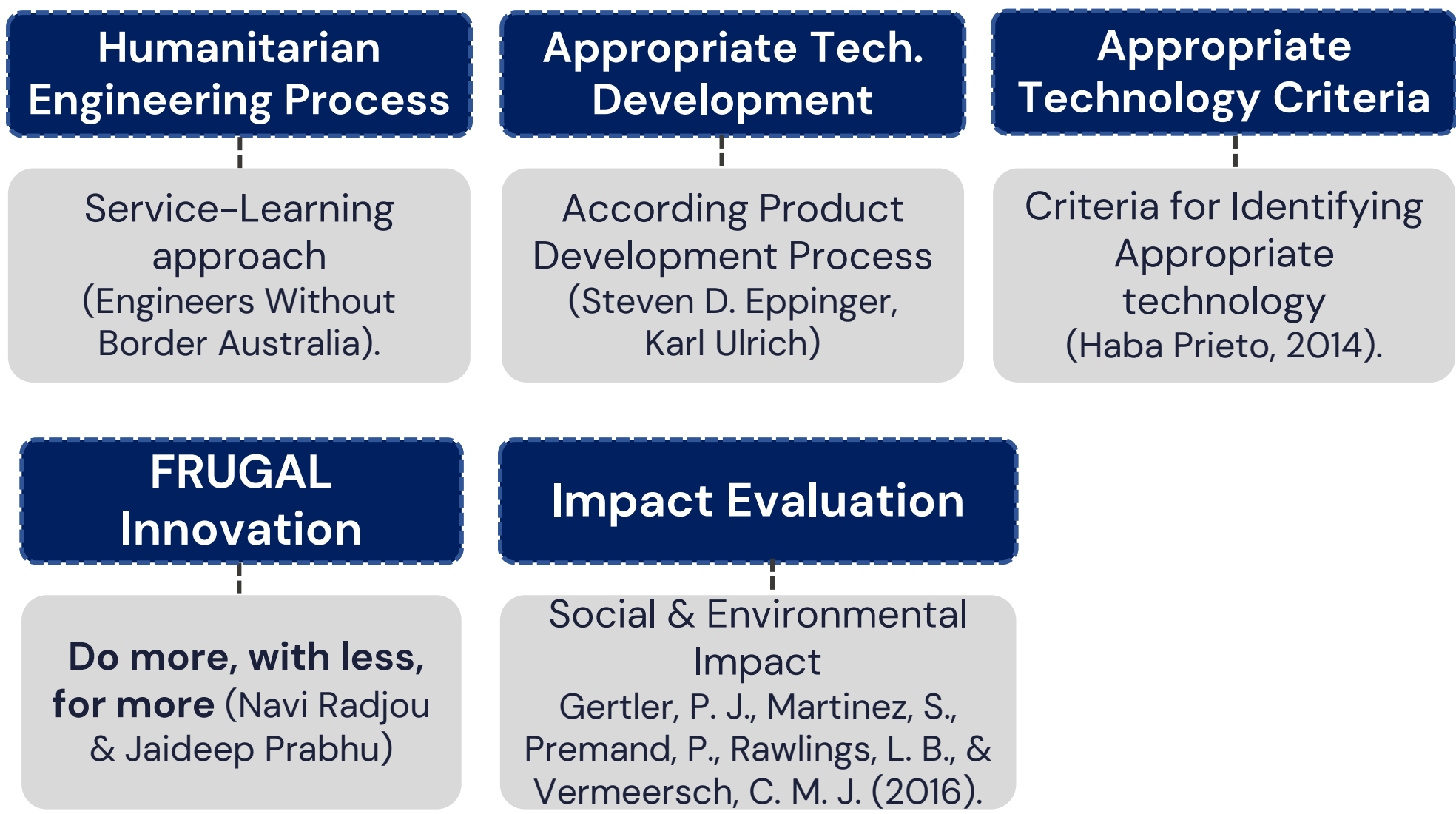
How to increase access to water using easier maintenance appropriate technology?

3. Objectives

To increase access to water by implementing easier-maintenance appropriate technology that can collect and store up to 100 liters of rainwater per installation, with a focus on cost-effective and eco-friendly design tailored to local environmental conditions.

- 3.1 Install a wooden gutter system to collect at least 30 liters with a Rain Water Harvesting System.
- 3.2 Use locally available materials and basic tools for construction.
- 3.3 Complete the project in 4 days with daily milestones.

4. Theory



6. Discussion

This initiative exemplifies appropriate technology, showing that effective solutions can be developed with limited resources. It highlights the power of community efforts and proves that similar systems can be replicated in resource-constrained areas to address water scarcity. This rainwater harvesting system showcases environmentally sustainable design using local materials. V-shaped gutters and recycled plastic bottles ensure efficient, low-cost water collection. Testing confirmed minimal leakage and reliable performance, offering a scalable solution for water-scarce communities



Criteria for identifying appropriate technologies (Haba Prieto, S. 2014).		Yes	No
1	It solves a specific need of a specific social group.	X	
2	Adapt the original design to the local condition.	X	
3	Flexible design to respond to environmental changes.	X	
4	Low costs for execution, operation and maintenance	X	
5	According to the management capabilities of the locality	X	
6	Environmentally sustainable	X	
7	Promotes training by involving beneficiaries	X	
8	Facilitates social and cultural appropriation	X	
9	Promotes the participation of men and women equally	X	

7. Conclusions

- *The rainwater harvesting system demonstrates that integrating humanitarian engineering principles with advanced water technology can produce sustainable, scalable solutions that effectively meet the water needs of underserved communities.
- *This project enhanced community resilience by establishing a sustainable water source and empowering local residents through educational initiatives.
- *This interdisciplinary approach enhances the design's effectiveness by ensuring that diverse perspectives are taken into account when addressing community needs.

8. References

1. S. Haba Prieto, "Aceptabilidad social de tecnologías sostenibles para el tratamiento de aguas residuales en áreas urbanas de India. Caso de estudio en Nagpur," M.S. thesis, Univ. Polit cnica de Catalu a, Barcelona, Spain, 2014. [Online]. Available: https://upcommons.upc.edu/bitstream/handle/2117/76329/TFM_spanish.pdf?sequence=1&isAllowed=y

2. Engineers Without Borders Australia, "Home," Engineers Without Borders Australia. <https://ewb.org.au/> (accessed Sep. 25, 2024).

3. S. D. Eppinger and K. Ulrich, Product Design and Development. New York, NY, USA: McGraw-Hill, 1995.

4. Y. A. Bhatti and M. Ventresca, "The emerging market for frugal innovation: fad, fashion, or fit?," Fashion, or Fit, 2012.

5. P. J. Gertler, S. Martinez, P. Premand, L. B. Rawlings, and C. M. J. Vermeersch, Impact Evaluation in Practice, 2nd ed. Washington, DC, USA: World Bank Publications, 2016.

6. BregHouse, "How to Make Traditional Wooden Gutters from Trees: Slovenian Style," Slovenia: Life in the SLO Lane, Apr. 10, 2020. [Online]. Available: <https://breghouse.com/2020/04/10/how-to-make-traditional-wooden-gutters-from-trees-slovenian-style/>. [Accessed: Sep. 25, 2024].

