IDEA TO PROTOTYPE

CATAPULT DESIGN PRODUCT DESIGN ROADMAP

KOMAZA

“If all the world’s problems were technical, we would have solved them by now.”
-Benard Amadei
Founder of Engineers Without Borders

Mapping the design process.

To help KOMAZA’s rainwater harvesting technology effort get off the ground, we have outlined the process we would go through to get from goals and ideas to physical prototypes ready for field testing. We believe this process is best facilitated by someone with prior experience in product development, particularly given the challenges of manufacturing and distribution in developing countries. As such, we have also included a basic job description that includes experience and skill sets for an idea person.

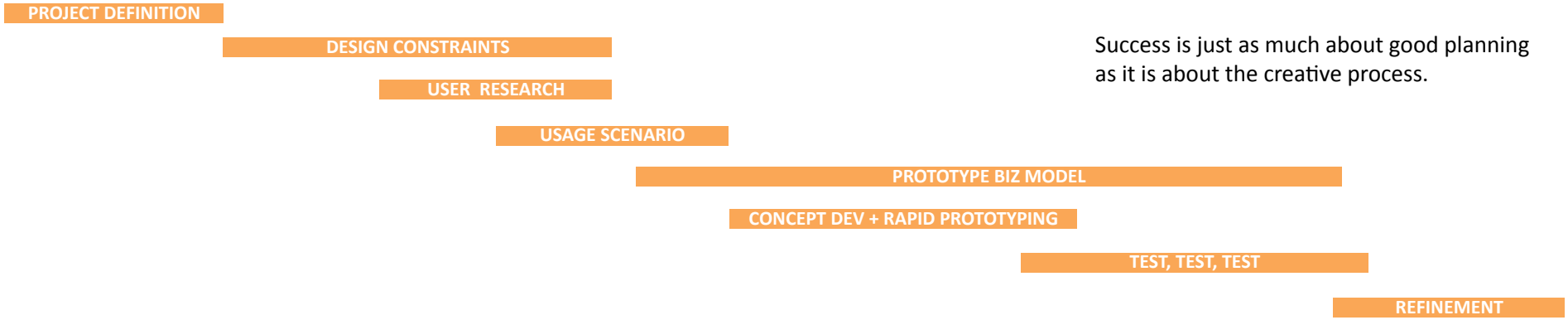
While this is by no means a comprehensive booklet, we hope to provoke questions, insight, and ideas as well as provide an overall framework as KOMAZA moves forward. We look forward to watching your success!

Develop a timeline.

Below we've outlined the general steps to get KOMAZA from concepts to physical prototypes to test in the field. Tasks within these steps are outlined in the following pages.

Many of these steps overlap and circle back on each other. The design process is cyclical and highly iterative. So much so that the best definition to the process lies within the timeline you develop. Define stop and start points, set concrete goals, and stick to it.

Success is just as much about good planning as it is about the creative process.



☐ Evaluate your overall goal and post it someplace visible.

☐ Create a timeline that includes key milestones, resources, and concrete deadlines.

Define your goals + resources.

☐ Define your budget for prototyping materials, labor, and vendors.

☐ Communicate your expectations for your timeline to your team.

☐ Outline your resource needs. What type of experts will you need? Staff members? And what will these folks needs access to?

☐ What other skillsets or needs do you have from external resources?

☐ Create a stakeholder map. This should include your end-users, donors or external funders, the "environment", Board members… who has needs that need to be met through this project? Who is your audience?

TIPS: Make your timeline realistic and stick to it no matter what!

We understand processes by mapping them. Visually map the entire process.

☐ Set the stage. Who is using the design, where, and what for? Define the problem statement.

☐ Develop concrete numbers. What is the average rainfall in Ganze? What season is best for rainfall collection? What is the relationship between surface area and storage size needs? How big is the system you need?

☐ Expert interviews. There are a variety of organizations in the rainwater harvesting sphere. What can you learn from each?

Generate the data to inform your design.

☐ Cost analysis. How much can this product cost and who will be paying for it

☐ What are the anticipated production volumes over the next three years?

☐ Are there local materials, manufacturing processes that limit your concepts? For example, if bio-degradeable plastics are not accessible, that is a material constraint.

☐ Consider environmental sustainability as well as financial sustainability.

☐ Other design constraints to consider: weight requirements, shipping size, pinch points, branding surfaces, product lifespan, maintenance, storage and transport, etc.

☐ Collect all constraints in a single document -- the Design Requirements Document.

ONGOING: Document your decision making, ideas, constraints, maps. Communicate your progress to your team and stakeholders.

☐ Key research: the how, why, what, and when?

☐ What already exists? What is the local state of the art? How do other cultures markets deal with this problem.

☐ Observe local needs and potential resources for inspiration and insight. What do people have access to, how do they operate day-to-day?

☐ How do other solutions deal with quality control?

Needfind and evaluate the state-of-the-art.

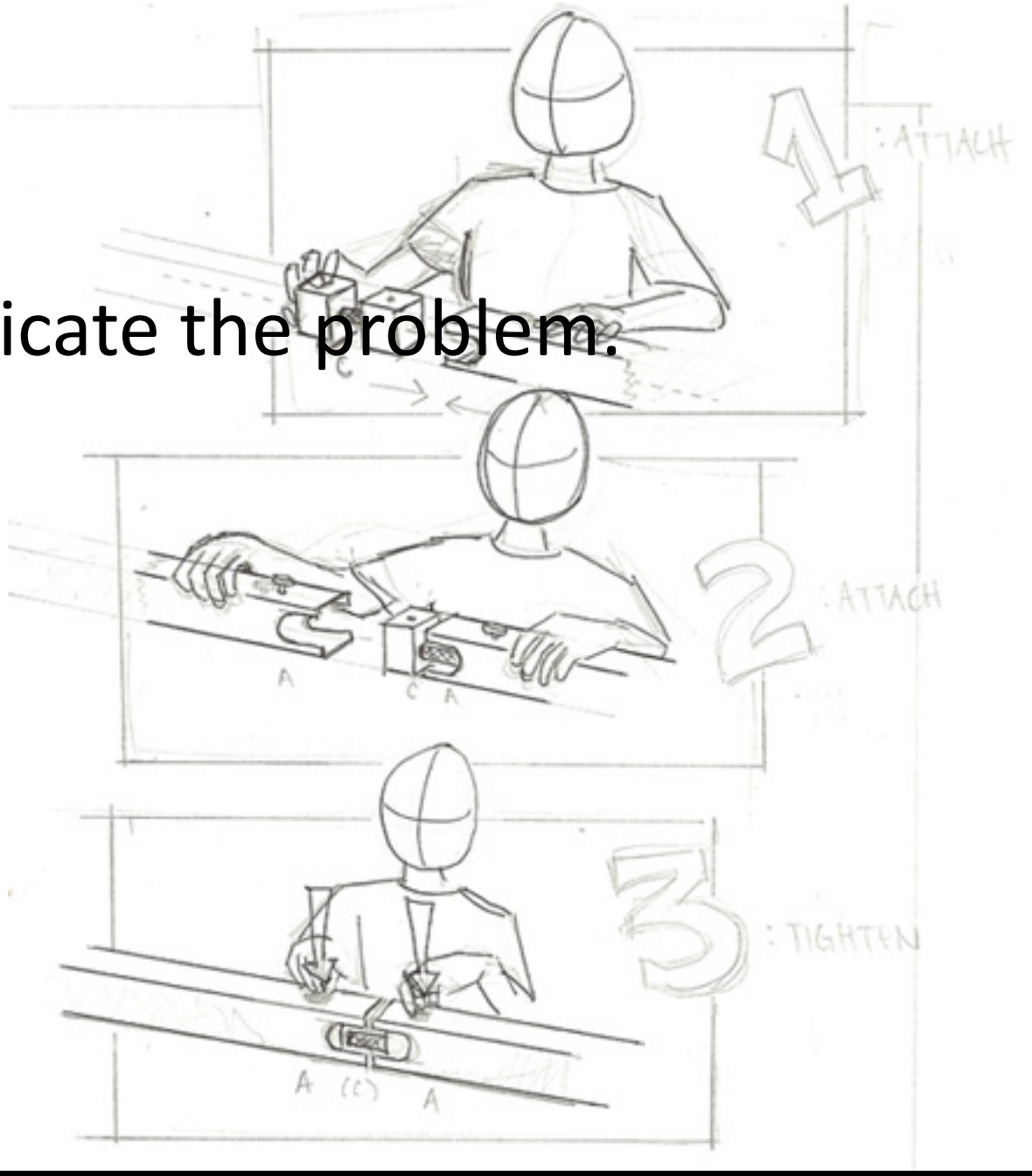
TIP: Most problems already have solutions. Don't reinvent the wheel, leverage prior art and expert knowledge to your advantage.

☐ Interview your stakeholders. How do they envision people interacting with your product? Is it dormant or dynamic?

☐ Generate a storyboard the represents a typical usage scenario. This is a primary communication tool for your users, contacts, public from here on out.

Visually communicate the problem.

ONGOING: Assess your progress, budget, and objectives. Make adjustments.



☐ Consider product distribution tomorrow and three years from now. Are there existing models that can be leveraged?

☐ Is there an education or marketing campaign coupled to your product?

☐ How and who will monitor the impact of your design? Does that number need to be communicated to your stakeholders

☐ Write a "Values & Vision Statement".

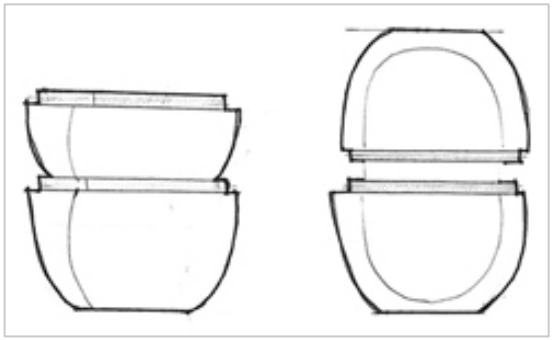
☐ Define your market – locally and globally. Is this a global problem in need of new solutions? What makes it compelling?

☐ Scalability. Are there stakeholder ambitions to scale the product? If so, how does that affect and inform your design objectives?

☐ Consider how your product will survive the "walk away" test? Who replace a broken part? Is the part locally available? Create a systems map the includes all factors of influence around your product.

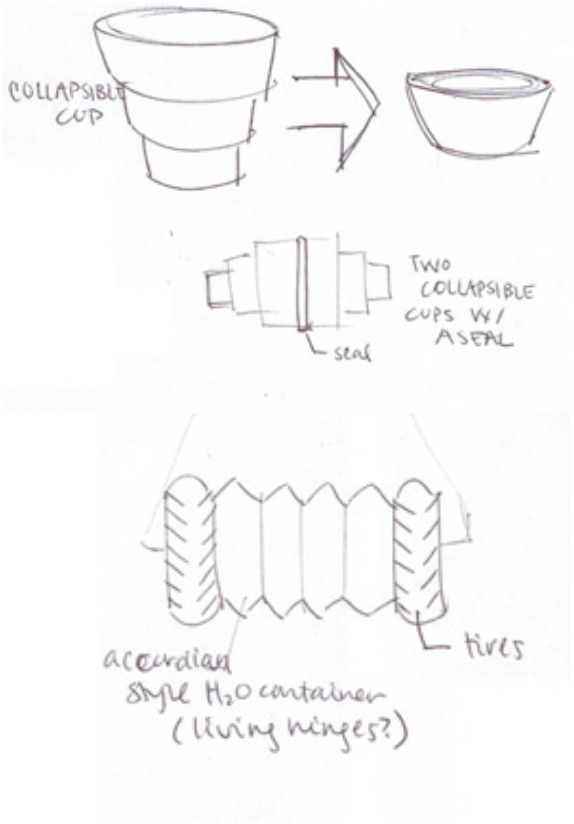
☐ Map potential supply chains and note the areas that need solutions. Consider the entire three years of production – will distribution remain the same over the entire three years?

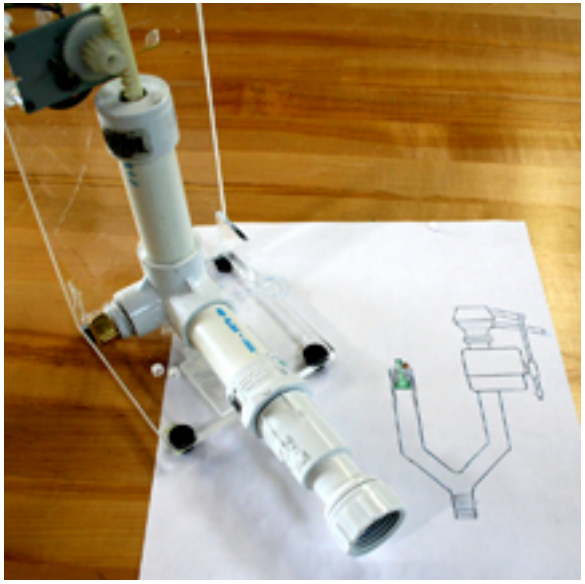
"How will this get to your end user?"



CASE STUDY: 30% of the cost associated with Hippo Water International's original design of the "Hippo Roller" was in shipping. The high cost limited their ability to take their product beyond South Africa and prompted a re-design effort to reach new markets.

- ☐ Hold a brainstorm to generate ideas for solutions to the problems you've defined. Include experts in your brainstorm as well as stakeholders or manufacturers.
- ☐ Document your brainstorm with thumbnail sketches of ideas.
- ☐ Sort the ideas into emerging categories – what were the most popular ideas? Why?
- ☐ Develop promising ideas further through rapid prototyping. Create as many physical prototypes in a short, defined timeline. Go for quantity, not quality.
- ☐ Generate "looks like" prototypes (form), "feels like" prototypes (function) as needed. Help your user understand the product experience.
- ☐ Get your prototypes in front of stakeholders as quickly as possible. They're the best judge of a good idea.
- ☐ Always give your users at least two prototypes so they have a point of comparison.





TIP: Put in your budget a plan to build and stock a basic prototyping shop. Suggested materials: hand drill, drill bits, spade bits, assembly table, rulers, scrap metal, wood, tabletop bandsaw, hammer, screwdriver, wrench, fasteners

Build early and often.

☐ Generate a test plan. This should include user tests as well as functional tests.

☐ Test your ideas on users and in the field. Does it perform as promised? How might you test for long-term environmental durability?

☐ Integrate the results of your tests and feedback into the next design iteration. Update your design constraints documentation as you learn more and strengthen your understanding of the issues.

☐ Have more brainstorm sessions on specific problems.

☐ Revisit your objectives and repeat the conceptual development process until you reach a promising prototype.

Develop metrics for “success.”

NOTE: The hardest part is knowing when to stop. There is always something about the design that will dissatisfy you. You could iterate forever. Every product you find on a store shelf is essentially still a prototype – someone can always make it better.

☐ Before finalizing your prototype, include potential vendors and manufacturers in your feedback loop.

☐ Start shopping for vendors. And expect that they will change your design.

☐ Refine your test plan for long-term field testing. Build a concrete timeline around field testing that pinpoints a stop and an end-time.

☐ How will you know if the field test is successful? Or, how will you know if it's a failure? Define the metrics you need to evaluate the design concept(s).

Realize your solution with a field test.

TIP: Selecting Vendors. Whether or not you've chosen a centralized or local manufacturing strategy, consider the following when selecting a vendor:

- Shop quotes from a variety of sources to check that costs are appropriate.
- If purchasing off-the-shelf components, ensure parts are readily available to your user.
- Ask for referrals.
- Does your vendor comply with safety standards and labor laws?
- Do they have a quality control program that meets your product's needs?
- Do you trust they will meet your volume needs on-budget and on-time?

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