

# The WFP-X Moonshot Toolkit



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**INNOVATION  
ACCELERATOR**

# 1. Toolkit introduction

## ○ Purpose of the Toolkit

Moonshot thinking is the process of translating huge societal problems into tangible, future-ready solutions that can improve life for the many and the few.

Use these design-thinking inspired methods, created over a 9 month period and tested with local Tanzanian innovators, to design solutions that can change the world.

## ○ The WFP-X project

WFP-X is a grassroots moonshot innovation project that the WFP Innovation Accelerator and Tanzania Innovation Hub embarked upon to tackle the huge problems facing growing megacities. By working closely with 9 local innovators, engaging actively with international stakeholders in global food security and coupling rigorous research with a hands-on design thinking approach, the WFP-X programme produced 5 prototypes that could, if scaled, support a food secure future for Dar Es Salaam.

Dar Es Salaam, the capital of Tanzania, is expected to become one of the World's largest megacities by 2030. The city's population is expected to grow from approximately 4.5 million citizens today to over 10 million in the next 10 years. This more than doubling of the city's size is likely to usher in challenging living conditions due to food insecurity, overabundance and misuse of waste, and increases in pollution.

The WFP Innovation Accelerator and the WFP Tanzania Innovation Hub decided to take these challenges head on. By working together to design a 9-month innovation incubation programme which practically explored solutions to the 7 huge problems facing the city. WFP-X focuses on saving lives through tangible tests, prototypes and products, and changing lives by driving systems change across the ecosystem in Tanzania and future growing megacities.

## ○ Dar Es Salaam's 2030 Challenges

The meteoric growth of Dar Es Salaam is surfacing underlying challenges throughout the diverse food-system of the city. As part of the WFP-X process, our task was to surface these threats and explore how we might help our Tanzanian innovators design solutions that could feasibly improve the future food security of Dar Es Salaam's citizens.

We surfaced 7 huge problem spaces through extensive research and multiple stakeholder interviews. By mapping the Dar Es Salaam food system, we noticed the complexity of the relationships between vendors, citizens and producers. Broad yet specific, the problem areas articulated below allow the nature of the relationships and stakeholders to elevate while also providing us the focus in setting clear boundaries for ideation and product design.

To create the direction, we translated the 7 huge problems into a guiding North Star, otherwise known as a 'Falsification Wheel', which sets the limits and criteria for the ideas later on in the process. For an idea to succeed, it was required to address at least 2 of the 9 sections of the North Star, helping us very quickly select ideas and progress them to the prototyping stage. Tool (11) in the toolkit provides you with a walkthrough on how to design your own North Star Falsification Wheel for your moonshot programme.



### Problem 1

#### What you reap is not what you sow

Food yields need to grow over the next decade to keep up with population growth

#### Description:

While Tanzania is currently self-sufficient in food production, yields per hectare have been stagnant over several decades. Given the growing population, the demand for food will outstrip supply by 2030 unless major changes in productivity are achieved.

#### Key Facts

- Grain and vegetable yields in the US and Europe are 3-5 times higher compared to that of Tanzania.
- 40-75% of water on farm is lost to evaporation and runoff. 95% of food production in Tanzania is rain fed using traditional systems which are expensive and less efficient.
- Smallholder farmers operate on 2 hectares or less, using non-mechanized farming methods. That represents 90% of land under cultivation in Tanzania.



### Problem 2

#### Gone too soon - post harvest loss

To create a food secure future, the amount of food lost post-harvest must be reduced

#### Description

Significant quantities of food produced and harvested will never reach the mouths of consumers due to losses throughout the value chain. Current storage, packaging and transport practices will continue to undermine food supply as demand grows.

#### Key Facts

- 18-32% of fruits and vegetables and 40% of grains are lost post-harvest
- Causes of post-harvest loss:
  - 1/3 of all losses are perceived to be at the farmgate due to rat and insect infestations, while the rest is lost during transport, processing and naturally occurring spoilage.
  - Of 9.4 million tonnes of cereal produced each year, poor harvesting and processing technologies will contribute to 3.7 million tonnes of that being lost.



**Problem 3**  
**Long journey to a short shelf-life**

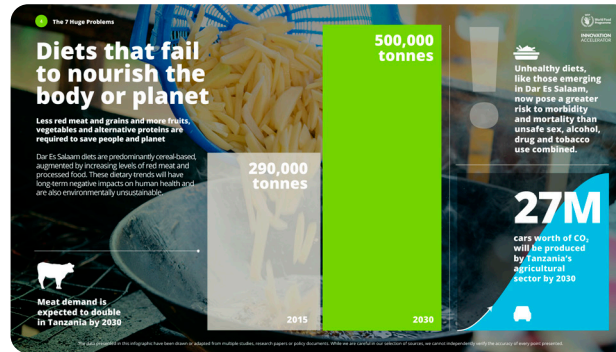
Food is transported over long distances in hot climates, leading to lots of waste

**Description:**

Most raw food has a limited shelf life of 1-10 days before spoiling. Because food in Tanzania is transported and stored without refrigeration or treatment, significant quantities are lost.

**Key Facts**

- Causes of spoilage:
  - Most spoilage is caused by microorganisms which thrive in warm humid environments prevalent in Tanzania and Dar es Salaam specifically.
  - Food produced in Tanzania's major food producing regions can take several days in transit to get to Dar es Salaam, followed by days of inner-city movement from wholesale to retail to table.
- Up to 1/3 of food that is ultimately consumed will lose nutritional value depending on the time from farm to fork.
- Only 1/4 of Tanzania's urban population has refrigeration
- Limiting dietary choice and reducing shelf life of produce even further.



**Problem 4**  
**Diets that fail to nourish the body or planet**

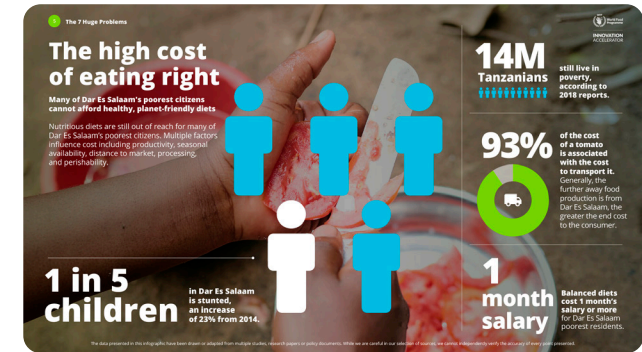
Meats and grains need to be replaced with healthy alternatives to save people and planet

**Description**

Problem: Dar es Salaam diets are predominantly cereal-based, augmented by increasing levels of red meat and processed food. These diets and their trendlines will not only have long-term negative impacts on human health, but are also environmentally unsustainable.

**Key Facts**

- Dar es Salaam's diet:
- 60% of a typical meal consists of maize and rice
  - Meat demand is expected to double in Tanzania by 2030 (visualize: from 290,000 tonnes in 2015 to 500,000 tonnes by 2030).
    - +1.2 billion metric tonnes of CO<sub>2</sub> from agriculture by 2030. This is the equivalent of 27 million passenger vehicles driven in a year.



**Problem 5**  
**The high cost of eating right.**

The average Tanzanian can't afford the high cost of a healthy planet-friendly diet.

**Description**

Nutritious diets are still out of reach for many of Dar Es Salaam's poorest citizens. Multiple factors influence cost including productivity, seasonal availability, distance to market, processing, and even perishability. And transitioning to a planetary diet could only increase those costs.

**Key facts:**

- One in 5 children in Dar es Salaam is stunted, an increase of 23% from 2014.
- 14 million Tanzanians still live in poverty, according to 2018 reports.
- 93% of the cost of a tomato is associated with the cost to transport it. Generally, the further away food production is from Dar, the greater the end cost to the consumer.
- Balanced diets cost 1 month's salary or more for Dar Es Salaam poorest residents.



**Problem 6**

**Cooking your food and the planet**

For a healthier city, we need sources of cooking fuel that are more planet-friendly.

**Description**

Charcoal is the primary cooking fuel and the main driver of deforestation. While Liquefied Petroleum Gas is growing as a cleaner alternative, upfront costs create barriers to access.

**Key Facts:**

- 60% of Dar Es Salaam residents use charcoal as main fuel source. And up to 88% use it as part of a fuel mix.
- Dar Es Salaam accounts for 50% of all charcoal consumed in the country.
- It can cost up to ½ month’s salary in startup equipment to switch from charcoal to gas. This, as well as outlays for multi-week refills create significant barriers to use, even though it may be cheaper than charcoal over the long run.
- 70% of forest loss is caused by charcoal use. By 2030 charcoal consumption will double, leading to increased CO<sub>2</sub> emissions and deforestation.



**Problem 7**

**Wasted waste**

Waste needs to be repurposed to make Dar Es Salaam a healthier city

**Description**

Waste generation in Dar es Salaam is increasing at an alarming rate. Most of that waste is organic and illegally dumped within the city or transported to an open dumpsite, imposing significant risk for both human and environmental health.

**Key Facts:**

- Nature of waste:
  - 15,000 MT of waste is expected to be generated per day within the city in 2030. This is up from 4,200 MT in 2012.
  - 74% of waste is organic, driven by high levels of food spoilage that occurs prior to reaching the table.
- Inefficient and polluting waste management:
  - ½ of all waste is dumped illegally or burned within the city limits
  - The rest is transported to an open dump site outside the city, where the refuse goes untreated.

# Phases of the project

To solve the challenges of 2030, the WFP Innovation Accelerator and Tanzania Innovation Hub designed a 5-stage programme to support the design of grassroots innovations built by Tanzanian innovators, for Tanzanian citizens by leveraging inspiration from systems thinking, and the amazing work of others working in the food-innovation space. Below we've described each stage to ground the rest of the toolkit and help you navigate your own moonshot innovation process:

## Phase 1

### Preparing to Launch

Phase 0, as some may call it, was our first step on the journey. Recruiting the 9 local Tanzanian innovators, preparing the calendar and designing the process.

## Phase 2

### Huge Problems

In the 'Huge Problems' phase we researched and explored the challenges facing the city uncovering 7 huge problems that Dar Es Salaam will likely face if nothing changes over the next 10 years.

## Phase 3

### Breakthrough Approach

By grounding ourselves in the Huge Problems, and designing a North Star and set of falsification criteria, we generated 100 ideas that could feasibly bend the trend toward a healthier and more prosperous future.

## Phase 4

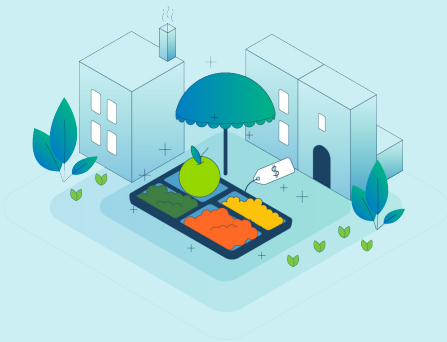
### Tethered to the Possible

The difference between science fiction and innovation is the act of building the ideas. We designed, developed and implemented 5 testable prototypes with potential to improve Dar Es Salaam's urban food security.

## Phase 5

### Landing

Finally our final showcase brought the second installment of the WFP-X programme to an end on April 30th, 2021.



## A snapshot of WFP-X's outputs

### Forever Food

A gum arabic coating produced from native acacia trees which doubles the shelf-life of most fruits and vegetables.

### NoveX

A bacteria based fodder with 30% more protein than traditional animal feed produced on natural organic food waste.

### Mama Lishe Poa

A franchise made up of local producers and food sellers (Mama Lishes) providing healthy, plant-forward diets at low cost.

### Mr Bin's Gas

Organic waste turned to biogas through a neighbourhood-based modular waste collection and gas production system.

### NextMeat

A safe, healthy meat-alternative produced using a traditional source of high-quality protein: soldier-fly larvae.

# 2.Tools and resources

## ○ **Preparing to Launch**

- T0: Recruiting your Innovators
- T1: Getting to know each other
- T2: Designing how to work together

## ○ **Huge Problems**

- T3: Mapping probable future using KPI trajectories
- T4: Peak into the future
- T5: Moonshot North Star
- T6: Defining the Moonshot
- T7: Innovator Lightning Talks
- T8: Mapping the system & Overlaying forces
- T9: Define the Huge Problems
- T10: Socialize the System Narrative
- T11: North Star Falsification
- T12: Applying a frontier mindset

## ○ **Radical Solutions / Breakthrough Approaches**

- T13: Sketch it out
- T14: Not so Blue Ocean
- T15: 100 Iterations -Iterate to Elevate

## ○ **Tethered to the Possible**

- T16: Low Fi Prototype
- T17: Med-Fi Canvas
- T18: Hi-Fi Applications



## What you can expect to find in the toolkit

Under each of the phases, described below, we've compiled the key tools used for solving complex challenges like the question of urban food security which we tackled as part of WFP-X.

### Preparing to Launch

This phase, and the tools within, focus on setting up and getting your moonshot initiative started.

### Huge Problems

Once you are up-and-running with your innovators recruited and acquainted, your next task is to explore your problem space and concretise the 'Huge Problems' and 'North Star' which will guide the moonshot process.

### Breakthrough Approach

Once you have identified the Huge Problems you are tackling and articulated a North Star, you are now ready for generating impactful moonshot ideas and falsifying them to ensure they can really drive change.

### Tethered to the Possible

You'll then select your testable ideas and start making them real with simple prototypes that evaluate the feasibility and level of impact with help from your innovator team.

### Landing

Once you have prototyped the ideas, you now have the opportunity to turn them into businesses. Real moonshots, ready for launch!

## About the tools you will find

This toolkit is a collection of facilitated activities, research guides, application processes and general guidance for delivering a moonshot innovation initiative. As part of the toolkit, you'll find 4 categories of tools and some of them might be a combination of more than one:

### Facilitated Activities

Post-it note based activities which can be conducted virtually or in person.

### Research Activities

Longer research activities to get greater understanding of your specific context.

### Applications

At each stage you might need your innovations to apply to enter the next stage of the process.

### Guidelines

General notes of guidance to support you in various processes such as recruiting your innovator team.



# Phase 01 Preparing to Launch



**Tool 0** Recruiting your Innovators The first step in building impactful local moonshots.

## WFPX2.0 Innovation Team Criteria, Selection Process and Results

In order to design a successful moonshot process, we believed that the innovation team needed to be **diverse** (covering a spectrum of issues associated with our 4 pillars: food systems, ag ecosystem, the rural economy and infrastructure) and **representative** (with members from public, private, and research organizations associated with emerging technologies in agriculture).

**STEP 1 Selection Criteria**

Based on this overview we propose the following criteria:

- Technical diversity:** We should look to have 50-100% of the relevant sectors well-represented in our selection. Relevant food security ecosystem representatives in the team include:
  - Land usage & Urban planning
  - Water systems
  - Food production/Agriculture
  - Food processing
  - Nutrition
  - Rural management
  - Technical design
  - Industrial/technological engineering
  - Software Engineering, Data Analytics, GIS, Machine Learning
  - School of science
  - Energy
- Gender balance:** We should look to achieve gender parity (50%) within the team.
- Sector diversity:** We should look to have relative equity in the mix of public, private, and research expertise.
- Innovation mindset:** An innovation mindset will be critical for the creative process. These are a number of qualities one could look to help predict whether or not one has an innovation mindset. Our observations are that, one important and generally desirable attribute during a short intensive process are:
  - Disruptive people are natural experts in one area but are equally curious and flexible in exploring and developing solutions in other areas as well. Disruptive individuals on an innovation team will allow us to do more with less as they can help in areas of their own expertise but are capable and interested in exploring areas in other fields and cross-fertilizing. 2. Sharp people also tend to be great collaborators and attribute their successes to what they have learned from others.

**Interview Questions:**  
**What areas outside of agriculture/agricultural expertise have you studied or applied your talent, and best relatively knowledgeable about?**

WFP Innovation Accelerator | Phase 1 Toolkit Start

**Tool 1** Getting to know each other An icebreaker exercise to familiarise the team.

**Risk Tolerance**

All future critical to the innovation process, we seek individuals that generally have a higher risk tolerance. This will reduce their willingness to try things that may be untested and unproven.

**Figure 1: Histogram to see risk to general**

**How willing are you to take risks, in general? Rank of 1-5. In a large study of 126 respondents conducted in Germany applied this general risk question to study demographic variations. A second study using guest experimental and area specific risk expressions based on the general question was a strong predictor of actual risk taking. 10-100% SDT. Among our innovation team, we would expect most to be in the 3-5 range.**

**Talents Value**

An openness to talk about failure and what can be learned from it is the contrary to risk tolerance above. We want people who can easily speak to their own failures and what they learned from it.

**Objective Scoring:**

- Low:** Those who struggle to identify any failure
- Moderate:** Those who identify a "failure" that they really don't know - i.e. a failure because of something outside of their control.
- High:** Those who can articulate clearly (and often) a failure to their career and demonstrate some learning for it - i.e. can articulate what they would have done differently to render a different outcome.

**Interview Questions:**  
**What was your biggest professional failure and what did you learn from it?**

**1-Shape Personality**

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WFP Innovation Accelerator | Phase 1 Toolkit Start

**Tool 1** Getting to know each other An icebreaker exercise to familiarise the team.

## Breakout room practice

**Your task in this step**  
 We will create breakout rooms and randomly assign 2 people in each. You will have 3 minutes to complete the task assigned to the room.

**Suggested time**  
 10 minutes

**Steps**

- STEP 1** Innovation paired and break one by one
- STEP 2** Present your digital speed
- STEP 3** One must talk about above

**Round 1**  
 Tell each other one of your earliest childhood memories; then together create nicknames for each other, inspired by that information.

**Round 2**  
 Tell each other about one recent failure (big or small); then together create a life motto, inspired by that information.

**Round 3**  
 Tell each other about one recent success (big or small); then together create a "touchdown dance", inspired by that information.

WFP Innovation Accelerator | Phase 1 Toolkit Start

**Tool 2** Designing how to work together Defining the guideposts for maximizing collaboration and cooperation.

**Description**  
 This exercise allows a diverse group of innovators to build a charter they will employ for effective team work, based on their own experience, as well as insights from Google and expectations from the management team.

**Suggested time**  
 60 minutes

**Level of difficulty**  
 Low

**Materials needed**  
 Mural board or flip chart paper

**Steps**

- 1 Define the workings of a great team
- 2 Identify your team's most productive conditions
- 3 Set the rules of collaboration
- 4 Think about Psychological Safety
- 5 Craft your team charter

WFP Innovation Accelerator | Phase 1 Toolkit Start

**Tool 0/ Recruiting your Innovators**  
 The first step in building impactful local moonshots.



**Tool 1/ Getting to know each other**  
 An icebreaker exercise to familiarise the team.



**Tool 2/ Designing how to work together**  
 Defining the guideposts for maximizing collaboration and cooperation.



# Phase 02 Huge Problems



## Tool 3/ Mapping

Creating a picture of the probable future for a given country/area through broad-based research and forecasting of future outcomes based on trajectories. probable future using KPI trajectories.



## Tool 4/ Peak into the future

Exploring probable/preferred future concept and country-specific probable future state to intentionally design better futures.



## Tool 5/ Moonshot North Star

Creating a vision for the preferred future state.



## Tool 6/ Defining the Moonshot

To establish the criteria of what makes an innovation a moonshot.



## Tool 7/ Innovator Lightning Talks

Deep dives into the local system from the viewpoint of the innovators and their areas of expertise while participants actively listen for, produce and consolidate forces at work within the system.



## Tool 8/ Mapping the system & Overlaying forces

Build a visual systems map and synthesize key insights for each part of that system.



## Tool 9/ Define the Huge Problems

Design some engaging, detailed huge problems to anchor your process around.



## Tool 10/ Socialize the System Narrative

Conduct field interviews with stakeholders within the system map.



## Tool 11/ North Star Falsification

Creating the threshold criteria that will prove/disprove whether an idea can achieve North Star outcomes.



## Tool 12/ Applying a frontier mindset

Frontier technology exercise.



# Phase 03 Breakthrough Approach



**Tool 13**

## Sketch it out

Introducing the concept of visual thinking

**Description**

Research suggests that drawing or 'doodling' helps unlock creativity and can often help convey meaning better than verbal descriptions alone. This exercise helps participants practice visual thinking they will be using during ideation.

**Suggested time** 1.5 hrs

**Level of difficulty** Low

**Materials needed** Mural board, phone camera, paper

**Steps**

- 1 Boot-up as many ideas as possible.
- 2 Crazy 8's: Sketch out as many ideas as possible.
- 3 Present and vote the most compelling ideas.
- 4 Solution Sketch: Draw again based on the most interesting ideas.

Check how we used this in WFP-X:  
 Mural 10k: <https://www.wfp.org/publications/mural10k>  
 Mural 4K: <https://www.wfp.org/publications/mural4k>

WFP Innovation Accelerator | Phase 3 Breakthrough Approach

**Tool 14 Not so Blue Ocean**

Find and present examples of others who have found radical solutions to similar huge problems elsewhere in the world that also meet at least 3 of the falsification criteria.

## Participants research

**Your task in this step**

Each week, facilitators select 1-2 huge problems to focus on. Participants research innovative solutions to those problems applied elsewhere and fill out the radical solution canvas.

**Steps**

- STEP 1 Select huge problem
- STEP 2 Participants research
- STEP 3 Present and present to groups

**Go where others have been**

**Huge problem**  
Select one of our huge problems.

**Radical solution**  
Each innovator identifies a radical solution, a solution somewhere in the world, current or historical, that disrupted the system in one or more ways.

**Falsification criteria**  
Ensure that the radical solution meets at least 3 of our falsification criteria.

**To explore where we want to go**

**Sectors**  
Which would be affected? (ex. Cooking fuel, edible oils)

**Stakeholders**  
Which stakeholders from the context would be most impacted by such a solution?

**Barriers**  
What barriers unique to your context could inhibit its application or success?

WFP Innovation Accelerator | Phase 3 Breakthrough Approach

**Tool 15/ 100 Iterations - Iterate to Elevate**

Creating a moonshot bank of ideas.

## Iterate to Elevate

**Your task in this step**

Innovators can then use the iterate to elevate worksheet in mural to further synthesize ideas coming out of the 100 iterations session as well as other ideas for improving that the innovator may come up with.

**Steps**

- STEP 1 Select huge problem
- STEP 2 Present
- STEP 3 Present the ideas
- STEP 4 Iterate to Elevate
- STEP 5 Add to the idea bank

**Your idea**

**All the iterations**

**Selected 2-5 iterations**

**2x2 Narrowing**

Criteria 1:  
To what degree does this iteration help your idea fulfil relevant falsification criteria?

Criteria 2:  
To what degree does this iteration help your idea disrupt the system or stakeholder roles in the system?

The Moonshot Zone

WFP Innovation Accelerator | Phase 3 Breakthrough Approach

## Tool 13/ Sketch it out

Introducing the concept of visual thinking.



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