EXPLORE AI
ACADEMY

Maji Ndogo: Visualizing the currents of change in Maji Ndogo

Communicating our findings in Maji Ndogo

Aziza Naledi
Online

Dear Dalila and team

How is the little one doing?

It has been a tough week for me. I have been trying to go through the report Chidi's team sent a couple of weeks ago, but it has been hard to understand how all of this fits together. I am struggling to understand the status at the national and provincial levels. How are people getting water? How many people in Maji Ndogo are without basic water? How much capital do we need to make these upgrades and what is it spent on?

Then we really need to see the problem at the provincial level. The provincial leaders I appointed are in the best position to make decisions about their province, so we should have some way for them to understand where they will need to spend their funds.

Would you mind focussing on creating a report that will help us see this data so we can get some of these projects started?
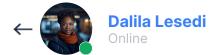
Best regards,
Aziza

07:25

Dalila Lesedi
Online

I'm sure you saw that Pres. Naledi gave us some clearer instructions for the report. It often happens that the people we're supporting have changing needs, and we have to adapt.

07:32

We're creating this report to support decision-makers by providing them with accurate and understandable data relevant to their decisions. But what do they want? The best way of knowing is by putting yourself in their shoes. If we were the users, how would we want to interact with the dashboard? This is called a user story, which answers the question: "As a user, I want to..." and designing the report to meet that need.

07:39

So, let's put ourselves in the shoes of one of our users. Imagine you are **Pres. Naledi** for a moment.
As Aziza, I want to:

1. See the key points of the survey results so I understand the overall status of water access in Maji Ndogo.

2. Know how many people are affected by water access challenges in Maji Ndogo and what those challenges are.

3. Know how much money we will need to complete the upgrades, and where that money needs to be spent.

4. Understand this data on a national level and a provincial level.

07:47

If we use this user story as a blueprint to create a page in the report for Pres. Naledi, we can create visuals for each of her concerns. Doing this automatically answers the "Why do we need this visual?" question.

07:51

3

Dalila Lesedi
Online

Next, for each of these user stories, we have to think about **what data** the user will need to answer that question.

07:58

So let's apply the **what**.

1. I want to see the key points of the survey results so I understand the overall status of water access in Maji Ndogo.

   - We should summarise population-related access to water on a national and provincial level.
   - A lot of people in Maji Ndogo live in rural and urban areas, so we should summarise their results and the challenges they face separately.

2. I want to know how many people are affected by water access challenges in Maji Ndogo and what those challenges are.

   - We need to communicate the number of sources, and also the amount of people affected by these sources.
   - Perhaps we should also consider making the less important sources like `tap_in_homes` less visible since we're not upgrading those.

3. I want to know how much money we will need to complete the upgrades, and where that money needs to be spent.

   - This one will need a bit of work from us. There is some financial data in our data model called `infrastructure_cost`, but we will need to do some calculations to include this type of data.
   - Pres. Naledi will need to see this data at a national, provincial, and rural/urban level, and even per improvement type.

4. I want to understand this data on a national level and a provincial level.

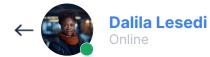   - We have to take this into account, as well as at a rural/urban split.

08:04

4

Dalila Lesedi
Online

Then **how** will we visualise that data? We may change this as we go, but let's start with a set of visualisations, and we'll add more, or remove some as we go along:

1. I want to see the key points of the survey results so I understand the overall status of water access in Maji Ndogo.

   - We can split the page into rural vs. urban, and then show the population of Maji Ndogo, and highlight key metrics.

2. I want to know how many people are affected by water access challenges in Maji Ndogo and what those challenges are.

   - Here we show the distribution of source types in rural vs. urban populations
   - A sorted visual of the number of source types.

3. I want to know how much money we will need to complete the upgrades, and where that money needs to be spent.

   - We need to show a single number representing the data nationally, and per province.
   - We should also break down costs in various ways:
     – per province
     – rural/urban
     – source type

4. I want to understand this data on a national level and a provincial level.

   - If we build the report well, we can drill down into different categories.

08:11

5

Dalila Lesedi
Online

Our second user is a **provincial leader**. Their user story is: As a leader of a particular province, I want to see data only relevant to my province, I need to understand the state of water access in my province, the scope of work we have to complete, and understand the financial aspects related to the improvements.

08:18

We will need to show the following data:

1. Total people served for each water source type in a province.

2. Number of water sources, their type, and whether it is rural or urban.

3. Show the relevant stats for towns in that province.

4. Add relevant provincial data. Queues, gender compositions and crime, broken taps by town, etc., in provinces where it is relevant.

5. Summary of improvements and costs.

08:26

So we're going to build the first page together, and you have the honour of wrapping up the rest of the pages.

08:33

Let's start at the top with Pres. Naledi's page. If we look back at the story, we see 3 components; Population/water breakdown, "What do we need to do?", and "How much will it cost?". Let's split our dashboard into three components, but also reserve some space for slicers somewhere, and reserve some space for the big idea results that are linked to the purpose: "How much do we need to spend in Maji Ndogo, and what will that money do?"
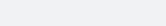
08:38

Dalila Lesedi
Online

This is my thinking. You are welcome to build your's like mine, but try to do something different if you're comfortable.

08:45

Maji Ndogo Water
National water survey results

Page controls
Province selector

High **impact** summaries:
What will it cost?
What will we get for that money?

Number of **people** affected per source at a:
National level
Rural/Urban

Number of **improvements** at a:
Provincial level
Source type level

What will this **cost**?
Budget by province
Budget by improvement type

08:53

7

I grouped similar things in boxes, and the three different boxes tell this story:

- Who are we doing this for and where are they?

- What do we need to do, and where do we need to do it?

- What will this cost?

The data story is natural in this order. We don't start with cost, then who we're improving water for, and end with what we want to do. Make sense?

09:01

So... go ahead!! Create a new visuals page, `National`, split it up like mine if you want, create a title, and start adding visuals! 📊 Also, add a slicer to the controls section so that we can select provinces.

09:05

Introduction
Setting the stage for our data exploration journey.

1 User focus
Tailoring report design for decision-makers

2 Data and visuals
Identifying needs and crafting visual solutions

3 Data Insights
Transforming analysis into strategic actions

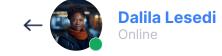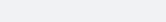## 4 Provincial Perspective
Customizing reports for localized decision-making

5 Enriching data
Delving into data processing and analysis

6 Report Creation
Crafting data narratives for impactful reporting

Dalila Lesedi
Online

I also added a map. So now, when we select a province in the slicer, the map highlights where that province is.
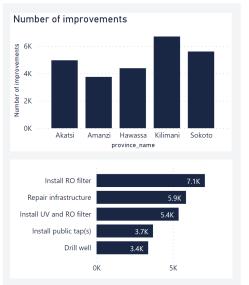
Maji Ndogo Water
National water survey results

| Akatsi | Amanzi | Hawassa | Kilimani | Sokoto |

High **impact** summaries:
What will it cost?
What will we get for that money?

location_type ● Rural ● Urban
Akatsi
Amanzi
Hawassa
Kilimani
Sokoto
0M — 5M

Number of improvements
6K
4K
2K
0K
Akatsi Amanzi Hawassa Kilimani Sokoto
province_name

What will this **cost**?
Budget by province
Budget by improvement type

river
shared_tap
tap_in_home
tap_in_home...
well
0M — 5M — 10M
Population

Install RO filter — 7.1K
Repair infrastructure — 5.9K
Install UV and RO filter — 5.4K
Install public tap(s) — 3.7K
Drill well — 3.4K
0K — 5K

09:09

9

Do you notice that your improvements column chart has more categories than mine? I used a bit of DAX to aggregate all of the Install 1-8 taps values into one called `Install public tap(s)*`, and shortened Diagnose local infrastructure too. Do you see the * in "Install public tap(s)*"? It is because the meaning of this category isn't quite the same now that we've aggregated it. What does a value of 3696 for Install public tap(s) mean? You should add a short note explaining it somewhere nearby, or use a tooltip! 💬

09:12

Here is the DAX I used in `project_progress`. I added a `<BLANK>` value in there so you can figure out what you need to use:

```
Aggregated_improvements =
IF(
    CONTAINSSTRING(
        'project_progress'[improvement], "<BLANK>"
    ),
    "Install public tap(s)*",
    IF(
        'project_progress'[improvement] == "Diagnose local infrastructure",
        "Repair infrastructure",
        'project_progress'[improvement]
    )
)
```

09:17

Up to this point, we only used our data as-is. To make more impactful visuals, we need to do some calculations and summarise data.
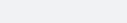
09:29

Let's start off with the budget. No surprise; these improvements will cost a lot of money. To make sure we are spending it wisely, we will create a budget.

09:33

The project managers added an `infrastructure_cost` table that has an estimate of what it will cost to make that repair. For each `improvement` in `Infrastructure_cost`, there is a cost of improving a water source in US Dollars. For example, to improve one river source, we have to drill a well, which will cost $ 8500.

09:36

Our project planners thought through the costs a bit more and realised that rural water sources are much harder to improve than urban ones. So they suggested that we add 50% to the cost of any rural source's improvement budget. So we need to increase the `Budgeted_improvement_cost` by 50%. We'll call that `Rural_adjusted_cost`.

09:43

Create a new column called `Rural_adjusted_cost` and calculate the increased budget for each of the improvements.

09:49

We will start off slow today... Here's my calculation:

```
Rural_adjusted cost =
    infrastructure_cost[unit_cost_USD] * 1.5
```

09:56

11

Next up, `Budgeted_improvement_cost`. Now that we know the cost of each improvement, let's update the `project_progress` table with a new column that calculates the cost of each improvement, based on the type of improvement, and whether it is rural or not.

10:00

Create a DAX formula that looks up the improvement in the `project_progress` table, and either fetches the `unit_cost_USD` value, if the source is in a town, or fetches `Rural_adjusted_cost` if the source is in a rural area.

10:06

Dalila is letting go of your hand now! This is what I used, but I added some <BLANK> values for you to fill in:

```
Budgeted_improvement_cost =
    IF(
        'project_progress'[<BLANK>] == "<BLANK>",
        <BLANK>('infrastructure_cost'[Rural_adjusted cost]), <BLANK>('infrastructure_cost'[unit_cost_USD])
    )
```

10:12

The next column we will need to create is `Basic_water_access`. How will we know if we succeeded in the project? "Dalila, come on..." I hear you say, "When people have water!" Yes... But how do we measure that?

10:21

Dalila Lesedi
Online

We can classify water sources according to the UN requirements:

Service level	Definition
Safely managed	Drinking water from an improved source that is **accessible on premises**, available when needed, and **free from** faecal and priority chemical **contamination**.
Basic	Drinking water from an improved source, provided **collection time is not more than 30 minutes** for a round trip, including queue time.
Limited	Drinking water from an improved source, for which **collection time exceeds 30 minutes** for a round trip, including queue time.
Unimproved	Drinking water from an **unprotected** dug **well** or unprotected **spring**.
Surface water	Drinking water **directly from** a river, dam, lake, pond, stream, canal, or irrigation canal.

10:27

In order for a water source to be classified as **basic**, it must satisfy these requirements:

- Rivers are not improved sources, so they are not included.

- Wells are improved, **only** if they are clean. So all contaminated wells are excluded.

- Public taps are improved sources, but **only** if the queue time is less than 30 min.

- Broken infrastructure "taps" are not basic, because they do not work.

- All taps installed in homes across Maji Ndogo are at least basic. They are actually safely managed.
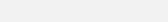
10:34

Once we know the water access level, we can estimate how many people's lives we will improve by upgrading all of the water sources.

10:41

So we need to first calculate where our access level is, and as we make repairs, we will hopefully get that number close to 100% access. This is our goal! So if we spend money on this project, we can measure how water access improves, to make sure what we're doing is making a difference.

10:48

So the idea is to calculate the number of clean wells, the number of public taps with queue times < 30 min, and taps in homes, then use that to calculate how many people have access to basic water. We could do that directly, but including all the conditional flow logic will complicate things a little too much.

10:55

So we break it into three steps:

1. Classify sources as `Basic Access` or `Below Basic Access` in a new column. Which table should we use?

   - For wells, we have to check if it is polluted from the `well_pollution` table, which is just a lookup.
   - But to get the queue time of a shared tap, we have to remember that shared taps were visited multiple times, so it is not as simple as fetching the queue time for each row, because there are multiple entries for each `source_id`.

2. Once we have that, we can sum up all of the people using a basic water source, divided by the total population.

11:00

Dalila Lesedi
Online

Step 1 is complex, so let's break it down together a bit more. Step A, we have to calculate the average queue time for each source. This means we need to aggregate per source.
Step B, we need to create the control flow logic to check wells and taps to classify them as being basic or not.

11:03

Step A: Let's calculate the average queue time for each water source first in the `water_source` table. Remember, we want to aggregate queue times - using the average - for each `source_id` so that the average queue times are calculated for each source.

11:08

This is what I used, but I added some <BLANK> values for you to fill in:

```
Average_queue_time =
    CALCULATE(
        <BLANK>('visits'[<BLANK>]), // Calculate the average time in queue
        FILTER(
            'visits',
            'visits'[<BLANK>] = 'water_source'[<BLANK>] // Filter the visits for each specific water source
        )
    )
```

11:12

Ok, now we should have a new column with average queue times for each water source!

11:22

15

Step B: We classify each source as being basic or below basic.

11:26

This is mine, but I added some <BLANK> values for you to fill in:

```
Basic_water_access =
    IF(
        AND( // Checks if the water source is a well and if its clean
            <BLANK>,
            <BLANK>
        ),
        "Basic Access", // Assigns 'Basic Access' if both conditions are true (clean well)
        IF( // Checks if the water source is a tap inside the home
            <BLANK>,
            "Basic Access", // Assigns 'Basic Access' if true (tap in home)
            IF(
                AND( // Checks if the water source is a shared tap and the average queue time is less than 30 minutes
                    <BLANK>,
                    <BLANK> < 30
                ),
                "Basic Access", // Assigns 'Basic Access' if both conditions are true (shared tap with queue < 30 min)
                "Below Basic Access" // Assigns 'Below Basic Access' if none of the above conditions are met
            )
        )
    )
```

11:30

Ok, now the final step is to create a new measure that calculates the basic water access level as the number of people who have basic access to water divided by the total number of people in Maji Ndogo. Remember to format this as a % and show no decimals.
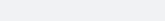
11:38   16

And a last-last step! The basic access percentage tells us how many people have access to basic water services, but we might also need the percentage of people who don't have access to basic water too. If you think about this, we want that number to be 0 once we're all done, right?

11:47

Ok, so now we have calculated two things; how much will all of these upgrades cost, and what will be the impact? I think we're ready to complete the report now!

11:52

Dalila Lesedi
Online

Now in the third block we want to give the President all of the financial information she will need to make decisions. She w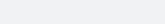ill want to understand the costs at a provincial level, and also understand what the different improvements will cost us.

11:59

Since Pres. Aziza will have to send the local provinces some funds, we really have to give her numbers too! So we will create a budget table. The downside is that tables struggle to show a part-of-a-whole story, let's visualise the budget too.

12:04

Add budget tables that have the breakdown of costs per province and per improvement type. Add a visual that will show the percentages of the budget allocated to each province.

12:08

Doesn't fit into that block well does it? 🙈
Instead of trying to cram all of the information into the third block, let's make a bookmark! We can make a button that will toggle between the `Province` and `Improvements` tables. This way the user can choose which data to focus on.

12:12

First, here are some images I made for the buttons:

📄 **Buttons.zip**

12:20

18

Dalila Lesedi
Online

We will create two bookmarks, `Province` and `Improvements`. For the `Province` bookmark, we will hide the `Improvements_table`, and for `Improvements` we will hide the `Province_table`, and we will use the buttons to toggle between these two bookmarks.

12:26

Use the selection and bookmarks panes to add two buttons that toggle between `Province` and `Improvements` bookmarks. Hints:

1. Remember to name the visuals, buttons, and images properly.

2. Add two buttons and add the two images as images.

3. Use the selection pane to display and hide the elements we don't want to see in a bookmark. See the image below for what I display in my `Improvements` bookmark.

4. Before connecting the functions to the buttons, make sure that everything works when you toggle between bookmarks.

5. The button showing in the `Province` bookmark should open the `Improvements` bookmark and vice-versa. Use this to set the actions.

6. Make sure the buttons are in front of your images. Move elements up and down the selection pane to do this.

7. Test your buttons to see if they work.

12:29

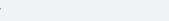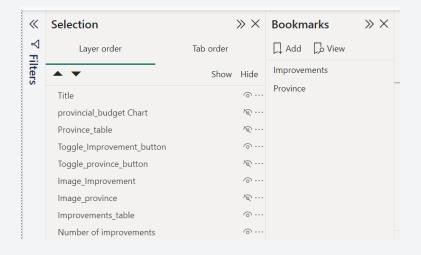This is my Improvements bookmark: (Note which of the visuals are displayed.)

12:33

Dalila Lesedi
Online

When it is all done, your two panels will look something like this:

Improvement	Qty	Budget
Diagnose local infrastructure	5856	$2 554 475
Drill well	3379	$38 862 000
Install 1 taps nearby	1037	$2 862 000
Install 2 taps nearby	307	$1 654 000
Install 3 taps nearby	300	$2 502 000
Install 4 taps nearby	342	$3 760 000
Install 5 taps nearby	308	$4 220 000
Install 6 taps nearby	282	$4 626 000
Install 7 taps nearby	360	$6 895 000
Install 8 taps nearby	760	$16 504 000
Install RO filter	7093	$39 965 100
Install UV and RO filter	5374	$22 332 800
Total	**25398**	**$146 737 375**

Province	Population	Qty	Budget
Akatsi	5 993 306	4963	$31 355 075
Amanzi	5 431 826	3748	$13 428 275
Hawassa	3 843 810	4384	$22 553 325
Kilimani	6 584 764	6700	$39 249 225
Sokoto	5 774 434	5603	$40 151 475
Total	**27 628 140**	**25398**	**$146 737 375**

12:41

Next to our heading, we add a placeholder for some high-impact statistics. This is why we calculated the water access and no-access measures. If you think about it, the point of this report is to help Pres. Naledi make data-driven decisions. She needs to know how much money we will need, and what problem the money will solve. So the total cost and total improvement numbers are the key metrics we want to display.

12:46

Add a card with the total cost of upgrades, the current percentage of basic access to water, and what percentage of people's lives will be improved.
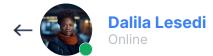
12:52

You can use this DAX code to add the plus sign (+) to the Improvement % card if you want:

```
Formatted_change =
    VAR
        ChangePct =
        [Access once_complete] * 100
    RETURN

    IF(
        ChangePct > 0,
            "+" & FORMAT(ChangePct, "0") & "%",
        FORMAT(ChangePct, "0") & "%"
    )
```
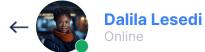
12:55

Introduction
Setting the stage for our data exploration journey.

1 **User focus**
Tailoring report design for decision-makers

2 **Data and visuals**
Identifying needs and crafting visual solutions

3 **Data Insights**
Transforming analysis into strategic actions

4 **Provincial Perspective**
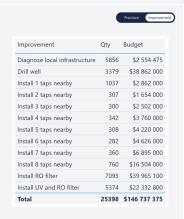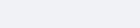Customizing reports for localized decision-making

5 **Enriching data**
Delving into data processing and analysis
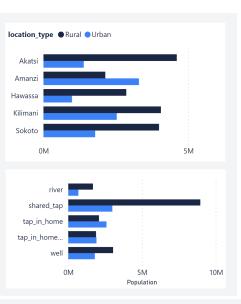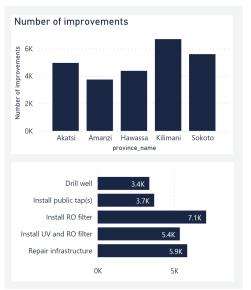
6 **Report Creation**
Crafting data narratives for impactful reporting
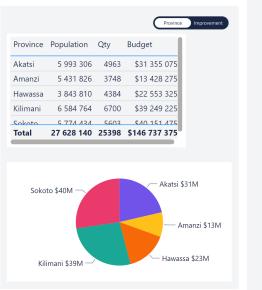
And this is mine! It's ok if yours looks different, in fact, I prefer that!
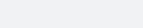
Maji Ndogo Water
National water survey results

| Akatsi | Amanzi | Hawassa | Kilimani | Sokoto |

% Pop access to basic water
34%

Total budget (USD):
$147M

% Improvement
+64%

location_type ● Rural ● Urban
(horizontal bar chart: Akatsi, Amanzi, Hawassa, Kilimani, Sokoto from 0M to 5M)

Number of improvements
(bar chart: Akatsi, Amanzi, Hawassa, Kilimani, Sokoto — province_name, 0K to 6K)

Province | Improvement

Province	Population	Qty	Budget
Akatsi	5 993 306	4963	$31 355 075
Amanzi	5 431 826	3748	$13 428 275
Hawassa	3 843 810	4384	$22 553 325
Kilimani	6 584 764	6700	$39 249 025
Sokoto	5 774 434	5603	$40 151 475
Total	**27 628 140**	**25398**	**$146 737 375**

(horizontal bar chart: river, shared_tap, tap_in_home, tap_in_home..., well — Population 0M to 10M)

Drill well	3.4K
Install public tap(s)	3.7K
Install RO filter	7.1K
Install UV and RO filter	5.4K
Repair infrastructure	5.9K

(0K to 5K)

(pie chart)
Sokoto $40M
Akatsi $31M
Amanzi $13M
Hawassa $23M
Kilimani $39M

13:02

23

Dalila Lesedi
Online

Now we have built the National level report, but we still need to make one for each province. Use my example for Sokoto as guidance to make new pages for each province. Once you made it for one, it is simple to duplicate the pages, and tweak them to tell the story of each province. For example, what would the provincial leader of Amanzi need to know? At a minimum, you will need a breakdown of the budget for each town (quantity and cost), the two visuals showing the urban/rural split and the budget allocation visual for each province.

Sokoto Report

town_name	Population	Count of improvement	Budget	Cost/Citizen
Rural	3 989 718	3852	$32 075 025	$8.04
Ilanga	420 790	415	$1 768 950	$4.20
Majengo	338 162	332	$1 555 550	$4.60
Kofi	295 438	278	$1 394 350	$4.72
Bahari	259 578	254	$1 204 700	$4.64
Marang	256 826	265	$1 183 900	$4.61
Cheche	213 922	207	$969 000	$4.53
Total	**5 774 434**	**5603**	**$40 151 475**	**$6.95**

Budget allocation

11.69% 0.95%
17.6%
49.3%
20.46%

Rural/Urban spending

Urban $8M
Rural $32M

Aggregated_improvements	Qty	Budget
Drill well	1709	$19 796 500
Install public tap(s)	669	$8 214 000
Install RO filter	1301	$7 066 500
Install UV and RO filter	1082	$4 692 800
Repair infrastructure	842	$381 675
Total	**5603**	**$40 151 475**

Improvements

Drill well	1709
Install RO filter	1301
Install UV and RO filter	1082
Repair infrastructure	842
Install public tap(s)	669

0   500   1 000   1 500

Total budget

$40 151 475

13:06

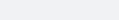Then make sure to add drill-through options so you can drill through to the provincial pages from the main page.

13:09

Dalila Lesedi
Online
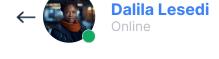
Now this report is far from perfect. It is better to get a report like this into the hands of the user, to see if they find it useful before we spend hours optimising and perfecting it. It is better to iterate and improve the dashboard over time. For now, improve it like you want, but keep the principles in mind!

13:12

So this is it... I'll publish the dashboard once you are done, and let Pres. Naledi know. They will be using this report to get teams on the ground to solve the water crisis using our support. Isn't that exciting? Everything we did up to this point was to help our team make data-driven decisions on how to solve the water crisis, and now it is actually happening! It makes me feel so good at the end of a project to look back at where I was before, and compare it to where I am now.

13:15

Anyway, I need to go pick up my daughter, Ziza, from pre-school, so we'll chat soon! Look after yourself until then!

13:22