Dalberg
Data
Insights

Lead Solutions Engineer Case Study Assessment

Dalberg Data Insights

2024/25

Introduction

This case study is designed to evaluate your ability to design and develop technical solutions that drive impact and meet complex stakeholder requirements. **As a Lead Solutions Engineer at Dalberg Data Insights, you will be expected to create robust architectures, design intuitive systems, and coordinate cross-functional teams to deliver high quality, scalable solutions in dynamic development contexts.**

The task emphasizes the ability to:

- Engage stakeholders to gather insights and identify requirements.
- Develop a solution architecture that aligns with program objectives, prioritizing usability and impact.
- Communicate technical decisions effectively to both technical and non-technical audiences.

As you approach this task, you should focus on:

- Leveraging a modular and scalable approach to architecture design, detailing each component's functionality and interactions.
- Applying best practices in coding and software design to set a strong foundation for team collaboration.
- Ensuring that proposed solutions are actionable and aligned with the clients' requirements.

You have the freedom to use your preferred technology stack and tools. This flexibility allows you to showcase your technical expertise while emphasizing solutions that can be seamlessly adopted and implemented by diverse stakeholders.

Program Context

Strengthening Rural Institutions to Empower Women and Build Climate Resilience in Kenya

Dalberg Data Insights (DDI) has been engaged to support a large-scale initiative aimed at strengthening rural institutions as drivers of women's economic empowerment and climate resilience in Kenya. The program's mission is to **enhance the livelihoods of 3 million farmers – 66% of whom are women across 45 rural counties**. This includes increasing access to financial services, promoting food security, and building women's agency over income while addressing systemic challenges in the agricultural sector.

To achieve these objectives, the initiative involves a consortium of implementing partners, each contributing through distinct roles and expertise. These partners work collaboratively under national and county-level program coordination units (PCUs) to ensure integrated service delivery. A critical task for DDI, lies in ensuring insights generated from available data are actionable, accessible, and impactful for program stakeholders at both national and county levels.

DDI has been tasked with designing an innovative data solution that provides targeted insights to drive decision-making across multiple program dimensions. This solution must also consider improvements to existing workflows and tools, leveraging partnerships and expertise to maximize impact. More information about the program and its objectives can be found in the Program Requirements Presentation.

Assignment

Assume you are a Lead Solutions Engineer at Dalberg Data Insights (DDI) assigned to a project with a client who is hoping to improve development outcomes. Your role is to design a robust, scalable solution that integrates and streamlines data from various sources, enabling effective decision-making by program stakeholders. Because the client is reluctant to create or improve existing dashboards, your solution should propose a complementary use case that addresses the identified challenges and delivers actionable insights through alternative means.

Your deliverables will include:

- A list of **stakeholder interview questions** to identify the toolkit features required to address their needs effectively.
- A **solution architecture diagram** for the proposed solution, developed up to the C2 level of the C4 model.
- A **well-documented code submission** that outlines the structure of the proposed solution and implements a small representative subset of the logic.

Note: *Approach the coding exercise as a design exercise – we are less interested in seeing you implementing more than 1 method or class, but in you showing a vision for software architecture, writing surface logic or requirements for each method as docstring, arguments and return statements, how methods and modules will be called from the application entry point, designing and setting up endpoints, etc. Consider what the rest of the team will implement based on your vision, and you will be responsible for quality checks, unblocking people, sharing your implementation for a small subset of the logic, and orchestrating multiple pieces of work.*

General guidelines

- **Complete the case study assignment** given on the subsequent pages, which also include the program presentation detailing their requirements.
- You have **72 hours** to complete the task from the moment that you download these instructions, but it will likely take you less time than that. Do not leave it to the last minute to submit your solution.
- We **do not accept late submissions** without prior communication. In case of unforeseen challenges that make you unable to complete the case study, please contact ddi.careers@dalberg.com as early as possible and before the deadline has passed. We will grant extensions on a case-by-case basis for exceptional circumstances.
- To ensure unbiased and anonymous scoring, please **do not mention your name** in any of the file names or bodies.
- You may not disclose any part of the assignment or your solution with any other person. Violations of this policy will lead to disqualification of your current and future applications.
- The use of Generative AI models (e.g., ChatGPT) is allowed as long as it does not compromise the quality of your work.
- Assume that all information is given in the task, however, should there be any clarifying questions, please email ddi.careers@dalberg.com and put dennis.mwika@dalberg.com and denys.sementsov@dalberg.com in CC.

Submission guidelines

Once you have completed the assignment, we would like to ask you to submit the following two outputs using the link that was sent to you in our initial email. **Do not email us your results.**

Engagement and Solution Design

- Your output should include both the list of stakeholder interview questions and solution architecture for your proposed solution as described in the assignment section.
- You can use any tool to create your output for both the stakeholder interview questions and the solution architecture diagram, e.g., Microsoft Word/PowerPoint, Excalidraw.
- Please combine this output and upload it as **one PDF file**.

Code

- We also expect you to submit all code that you wrote for this case study.
- After uploading the solution framework (i.e., the **PDF file**) on the submission's portal, you will be asked to upload your code repository that includes your proposed project structure **as a zipped folder.**
- Please refrain from **publishing your work on any public platforms**, including Git repositories, to maintain confidentiality and align with submission guidelines.

Program Requirements Presentation

Program Overview

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Program Impact:

Increase food production, incomes, and resilient livelihoods of **3 million farmers, 66% of whom are women, in the 45 rural counties** in Kenya

Program Overview

What we do

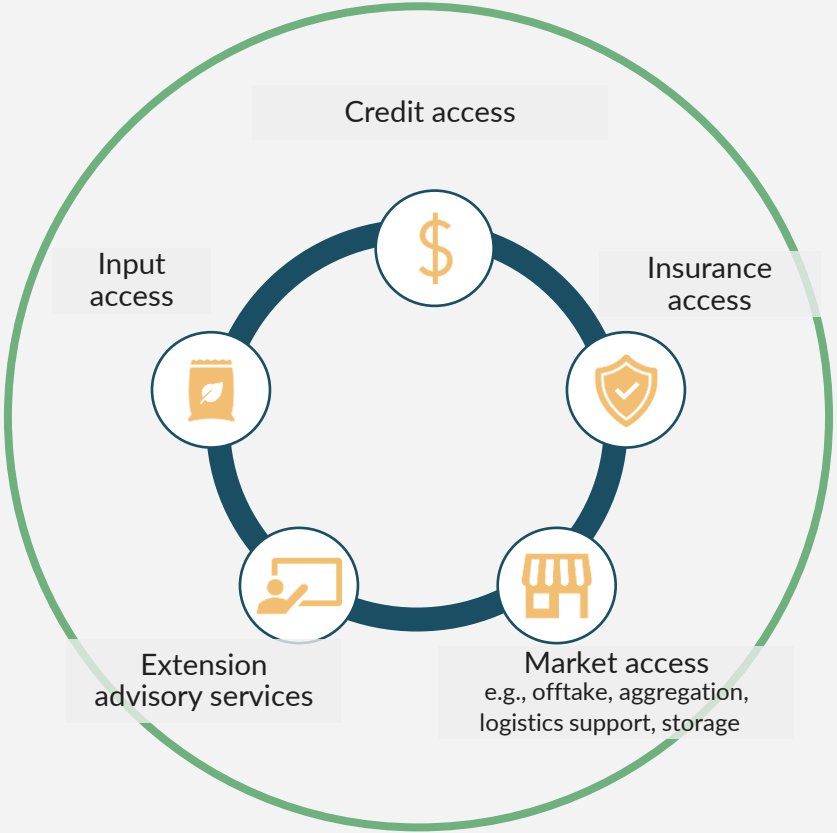
- ✓ Build more **resilient rural agricultural livelihoods** with increased access to financial services and markets, particularly for women, to drive increases in income
- ✓ Increase **women's agency** over their own incomes
- ✓ Promote **food security** through enhanced agricultural production

Mechanisms of change

(the solution should enable a decision-making process that is aimed at improving items below and on the right)

1. **Increase rural women's use of financial and non-financial services,** leveraging the national network of digitized credit and financial data warehouse
2. **Strengthen access to markets** through digitized climate-smart agtechs and agribusinesses
3. **Ensure integrated service provision** that includes access to inputs, information, extension and capacity building, and digital technology to enhance agricultural production

Drivers



Learning

What do we want to learn?

Value for rural women

Product/Service Offering
Access to Markets
Digital Tools
Participation in Governance

Value for service providers

Business case
Positioning in the Market
Value of data

Ecosystem transformation

Project Success
Benefit to the ecosystem

Who are the implementing partners and what will they do?

All partners will work collaboratively and leverage their mandates, expertise, and networks to **strengthen 1500 orgs through national and county program coordination units (PCUs) to serve 3 million farmers, 66% of whom are female in the 45 rural counties in Kenya**

National PCU and 45 County PCUs

- Develop guidelines, manuals, and documentation for institutional capacity building.
- Promote initiative for increased participation, engagement, and ownership.
- Ensure ongoing capacity building at all levels.
- Establish performance metrics to track progress post-initiative.
- Document successful strategies for scaling up.
- Foster partnerships and collaboration within the Ministry and ecosystem.

Coordinating Partner

- Facilitate relationship with the
- Connect with financial service providers.
- Connect with agtechs and agribusinesses.
- Share insights and learnings with internal and external partners.

Technical Partner

- Digitize entities and data
- Collect data
- Provide capacity building on digital tools

Data Partner

- Provide a Big Data Platform hosting digitized data, enabling data-driven decision-making for policy changes.

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- Study women's agency through 5 topics.
- Collaborate with members to design gender-transformative approaches.
- Distil insights and deliver them to partners and PCUs across 5 main drivers.
- Offer technical and project infrastructure support.

How will we ensure women are at the center?

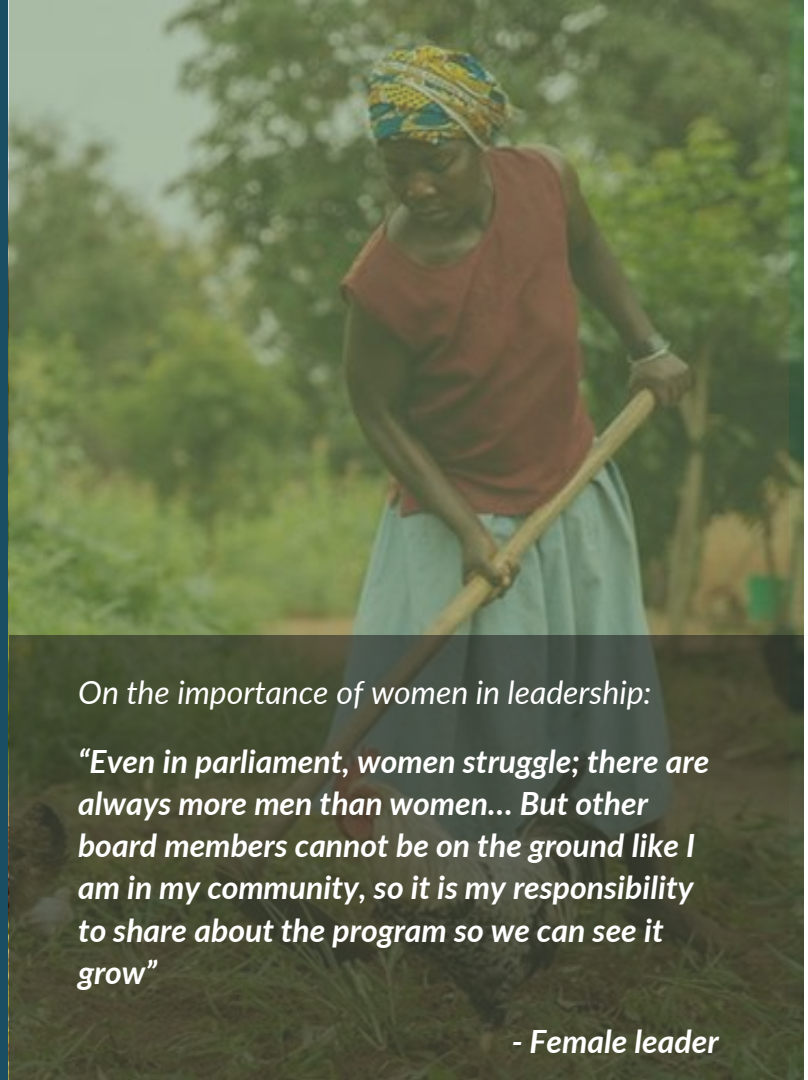
1. Deeply involve women in the design of the products, services, and processes of the program by using a **community-centered design approach** to shape the program design.

2. Amplify women's voice and representation in the **program governance structures,** aiming for **gender-equitable leadership.**

3. Generate **data and use cases** that drive financial services for rural women through data collected on data partner's digital platforms.

4. Enhance credit flow to rural women by **creating credit histories** for women and **directly linking the** program to banks, fintechs, and other infrastructure.

5. Ensure that the data collected is shared with the ecosystem and can be used to **understand customers. particularly women,** better, resulting in products and services that are tailored to their experience and serve their needs



On top of existing solutions

Data Collection and Storage

Key activities: Rapid Phone-Based Surveys, Analysis, Reporting, Persisting the data, Supplying data to other products in the program
Tools: Postgres (pipelines, databases)

Rapid Baseline and Endline study to understand i) access and use of the program services, ii) changes in member and non-member behavior over time, iii) impact the program services on women's access to finance, markets, inputs, information, extension, and capacity building, and digital technology, iv) reasons for membership/non-membership

Challenges: Data distribution, Data model flexibility and scalability

Business Analytics

Key activities: Data Mining, Dashboard analysis
Tools: Power BI (dashboard, visualizations)

Dashboard data analysis to understand the impact of interventions across multiple dimensions and filters. Accessing and ensuring unbiased, clean data delivery from the database (data collection and storage pilar) to the end users (insights pilar). Ensure data harmonization, clean, concise visualizations, data standardization, bias checks, etc.

Challenges: The UI/UX of the dashboard makes using it difficult. There is a lack of data pre-processing, slow speed, non-real-time data

Insights Mining and Distribution

Key activities: Desk review, Ecosystem Mapping, Large Scale Quantitative Research, Quantitative Intervention Testing, Analysis, Reporting
Tools: Teams, WhatsApp, PowerPoint, Word (meetings, conversations, manual reports and presentations)

Evaluating digitally-enabled value chain development and assessment of program outcomes Analyzing how specific design features of service delivery can increase the uptake of digital agricultural services. Distribution of findings across the program partners and within the program

Challenges: heavy, manual process that is prone to errors

Consolidate broader program learnings and collaboratively create knowledge products and outputs, introduce analysis lenses like gender, financial instruments (e.g. loans), usage, retention etc

Dalberg Workstream

Distil insights and deliver them to partners and PCUs across five main drivers. **The client lost trust in the dashboard and will henceforth be very reluctant to create another dashboard or improve the existing one, so you have to develop a complementary use case rather than improving one.** You have access to the data but cannot influence how data is stored or fetched.

[Prepare and suggest improvement for Dalberg and leveraging existing partners that improve existing solution]