Solving Operational Challenges in Vaccination Outreach

National Vaccination Program, Govt. of Contoso

Table of Contents

Organisational Context

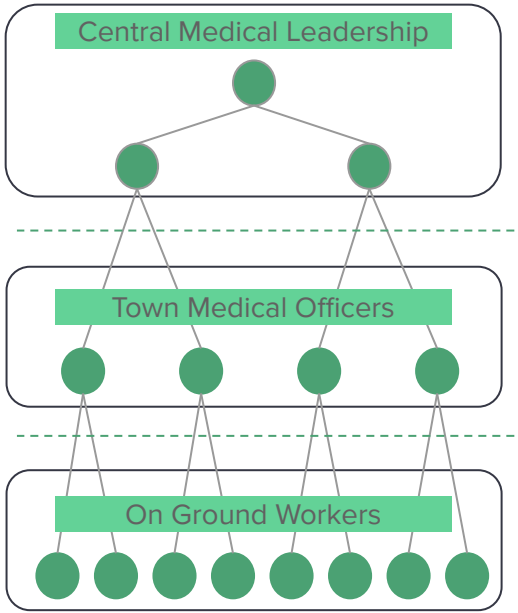
(Assumptions made based on assignment description)

What is the National Vaccination Program ?

Mission and Goals

- Ensure every newborn child receives the full immunisation schedule on time
- Deliver routine vaccination services to remote and underserved villages
- Educate citizens on the importance of vaccination and disease prevention

Org structure, Roles and Responsibilities



- Define national vaccination policy and strategy
- Monitor metrics and outcomes

- Coordinate implementation of policy on the ground

- Execute on ground activities in towns and villages

Key Enablers to achieve the Mission and Constraints

Enablers

- A national government-issued ID system for citizens
- A central National Health Database (NHDB) app with vaccination records for health care worker to track
- Basic network connectivity even in remote villages via solar-powered satellite internet points in village centres

Constraints

- Understaffing makes permanent healthcare presence in every village infeasible
- Most healthcare workers have limited digital proficiency and are not app power users
- Existing NHDB application is form-heavy, and difficult to use in the field for health workers
- No dedicated product or engineering team to continuously improve digital tools

In Focus:
Routine Immunisation Outreach Process

Deep dive on the Process, the People, and the Challenges they face

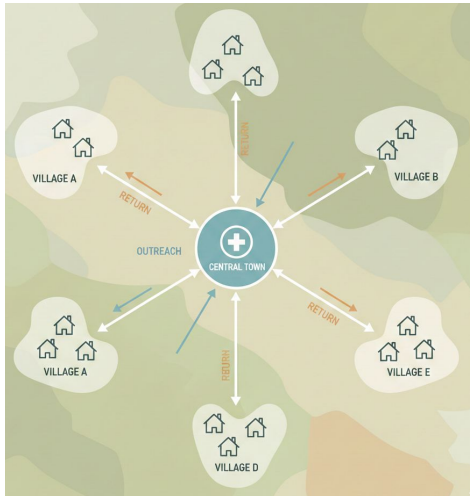
Routine Immunisation Outreach: What is it ?

Why ?

- Newborns require vaccinations at specific intervals (1st week, 4–6 weeks, 12-14 weeks etc.)
- Remote villages do not have permanent healthcare staff
- Repeated travel from remote villages to towns for vaccination is difficult for parents so they skip vaccines

How ?

- Town health center workers routinely travel to 5–10 nearby villages for vaccination



Constraints

- Each village must be visited once in 2 weeks to meet immunisation schedules of children
- Healthcare workers juggle outreach with other clinical and administrative duties
- Vaccines have limited shelf life outside cold storage, so stock planning is critical

Key Metrics for success of outreach activities

Drop out rate

- **What it is:** The % of children who start the vaccination schedule but do not complete all required doses
- **How it is calculated:** Percentage difference between the number of children receiving the first dose and those receiving the final scheduled dose
- **Why it matters:** A high dropout rate means children remain unvaccinated and outreach activities are not reaching everyone

Vaccine wastage

- **What it is:** The portion of vaccine doses that are lost, expired, or unused during outreach activities
- **How it is calculated:** Number of doses wasted divided by the total number of doses issued or opened
- **Why it matters:** High wastage increases costs and strains limited vaccine supply, especially in remote outreach settings

Persona deep dive:
Town medical officer

- **Background:** Trained medical professional with experience in public health programs
- **Responsibility:** Plans and oversees healthcare activities for the town and nearby villages
- **Digital literacy:** Comfortable using computers, basic software like spreadsheets for planning and reporting

Workflow 1: Scheduling vaccination outreach visits

Tasks

Check calendar app to see which villages have NOT been visited in last 2 weeks → Check next week's calendar for any important events and plan visits on the available days → Inform on-ground team on whatsapp group

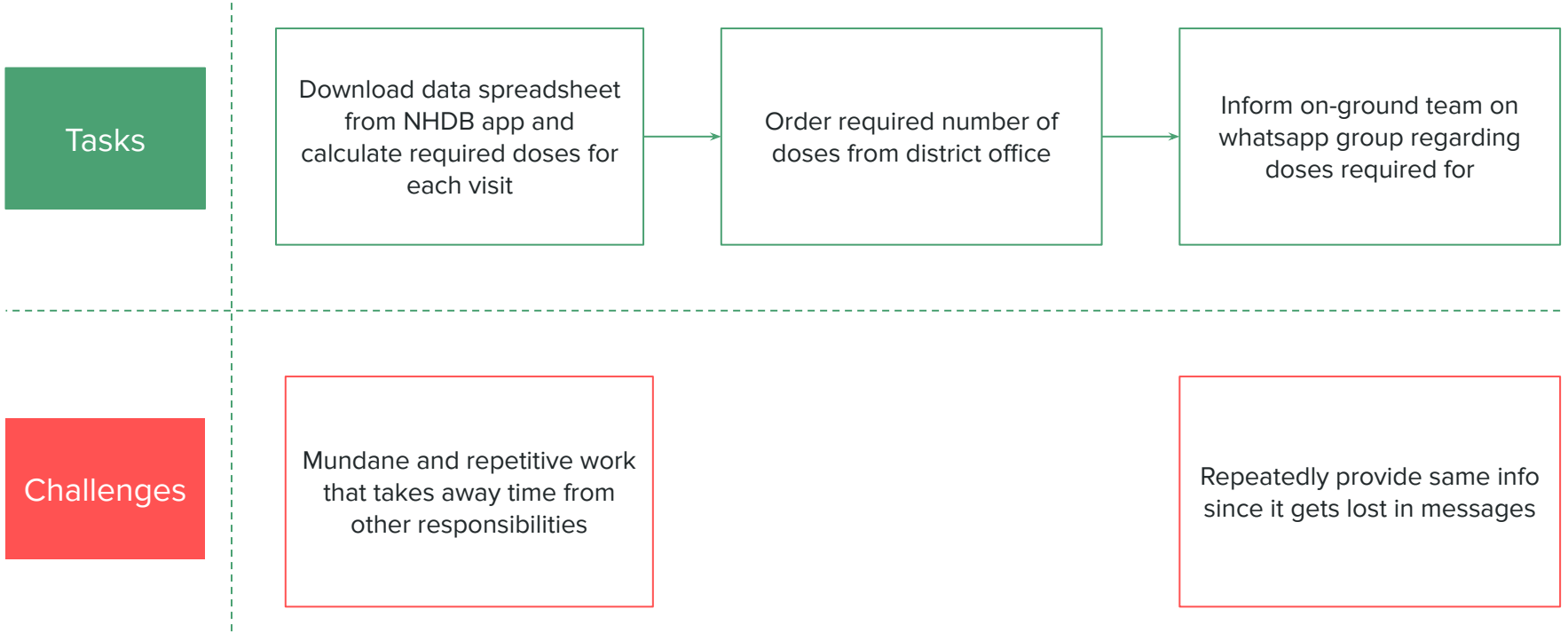
Challenges

Mundane and repetitive work that takes away time from other responsibilities

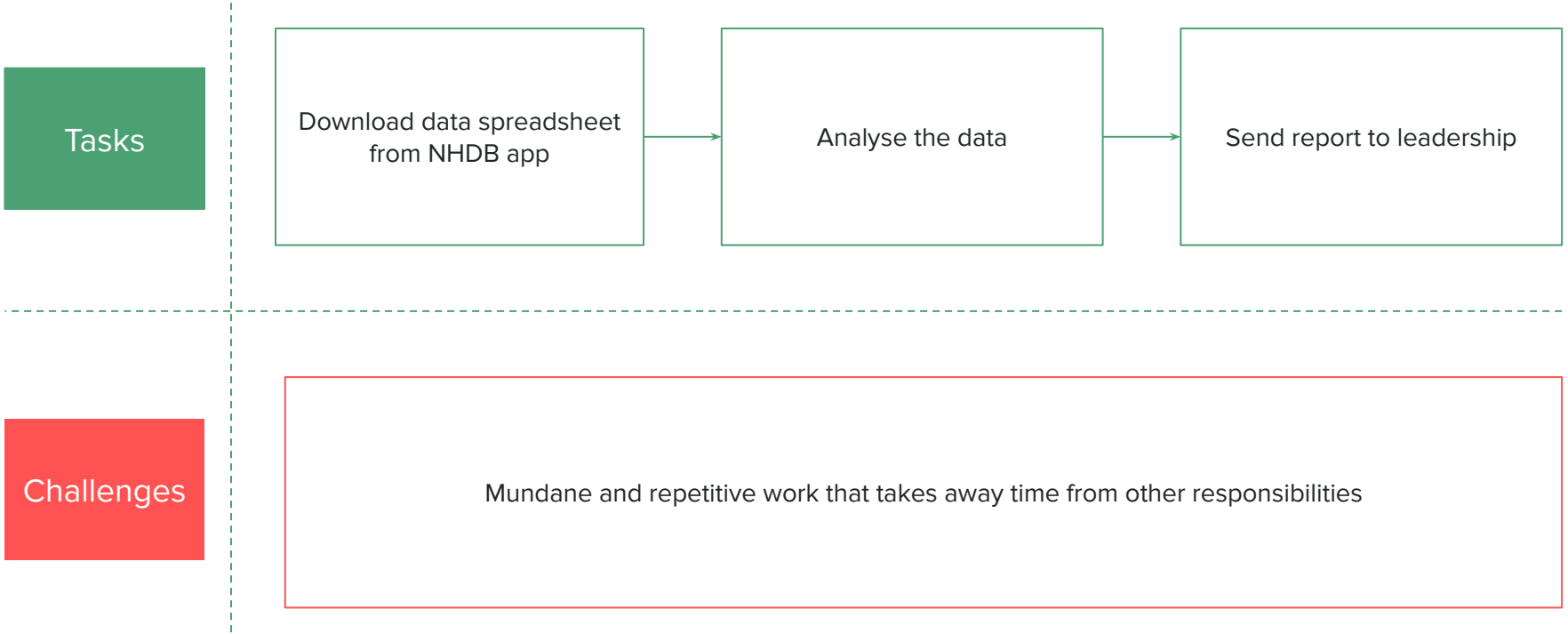
Info gets lost among other messages

On ground workers are not familiar with calendar apps.

Workflow 2: Ordering vaccine doses required for visit



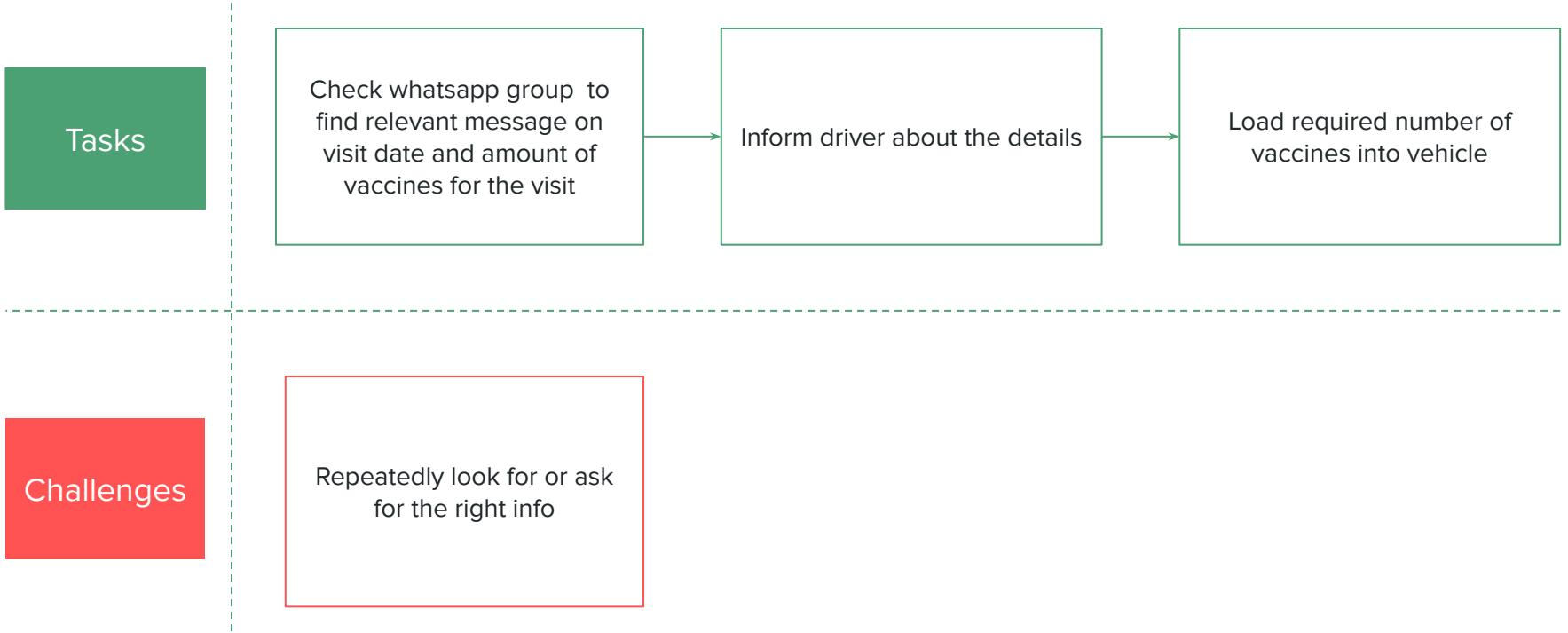
Workflow 3: Reporting metrics to leadership



Persona deep dive:
On-Ground Worker

- **Background:** Trained nurse with experience in maternal and child health
- **Responsibility:** Carries out vaccinations in villages and records immunization details on the ground
- **Digital literacy:** Basic comfort using a smartphone and apps such as calling and messaging

Workflow 1: Prepare for outreach visit



Workflow 2: Fetch and update data in NHDB App in field

Tasks

Enter parent ID card details to fetch data in NHDB app.

Add all details for new parent

→

Administer required vaccines as per data

→

Update data on vaccination in the NHDB app

Challenges

Handling an app with multiple fields for data entry is cumbersome when also having to focus on handling the vaccines carefully.

Summary of Challenges identified

Town medical officer

1. Repetitive low value data fetching and analysis work
2. Repetitive low value scheduling work

On-ground worker

1. Difficult to use messaging apps as source of critical information
2. Repetitive and cumbersome data fetching and data entry during field work

Solution options analysis

Solution 1: Physical calendar board with visit details

Description

- Medical officers schedule outreach visits using existing calendar workflows and data sources
- Visit details are posted to a public calendar board in the medical centre
- On-ground workers have clear visibility into upcoming visits

Problems solved (impact)

Town Medical Officer

❌ Repetitive low value data fetching and analysis work

❌ Repetitive low value scheduling work

On-Ground Worker

✅ Difficult to use messaging apps as source of critical information

❌ Repetitive and cumbersome data fetching and data entry during field work

Effort/Cost and Risks

Effort/Cost

- **Low cost** to roll out at a national level

Risk

- **No significant risks**

Solution 2: Cloud based calendar apps (like Outlook)

Description

- Medical officers schedule outreach visits using existing calendar workflows and data sources
- Visit details are added to a calendar event in which onground workers are added
- On-ground workers have clear visibility into upcoming visits

Problems solved (impact)

Town Medical Officer

❌ Repetitive low value data fetching and analysis work

❌ Repetitive low value scheduling work

On-Ground Worker

✅ Difficult to use messaging apps as source of critical information

❌ Repetitive and cumbersome data fetching and data entry during field work

Effort/Cost and Risks

Effort/Cost

- **High effort to train** on ground workers to use new apps at a national scale

Risk

- **High adoption risk** for new app workflow

Solution 3: Fully integrated NHDB App with new features

Description

- Update NHDB App with features to help with the data analysis and scheduling work for medical officer
- Add Calendar like features to inform visit schedules and details to on-ground workers

Problems solved (impact)

Town Medical Officer

✅ Repetitive low value data fetching and analysis work

✅ Repetitive low value scheduling work

On-Ground Worker

✅ Difficult to use messaging apps as source of critical information

✅ Repetitive and cumbersome data fetching and data entry during field work

Effort/Cost and Risks

Effort/Cost

- **Infeasible** since there is no dedicated tech team undertake such a big project
- **High effort to train** on ground workers to use new app workflows at a national scale

Risk

- **High adoption risk** for new app workflow

Recommended Approach

Solution 4: M365 Copilot Agent connected to calendar and NHDB App

Description

- Copilot agent that is connected to a calendar and the NHDB app database
- Carries out all the data fetching, data entry, analysis and scheduling tasks
- Acts as a replacement for messaging apps for getting information for on-ground workers

Problems solved (impact)

Town Medical Officer

✅ Repetitive low value data fetching and analysis work

✅ Repetitive low value scheduling work

On-Ground Worker

✅ Difficult to use messaging apps as source of critical information

✅ Repetitive and cumbersome data fetching and data entry during field work

Effort/Cost and Risks

Effort/Cost

- **Feasible to build** using existing NHDB APIs and M365 Copilot platform
- **Low training effort** since workers are familiar with chat interface

Risk

- **Low adoption risk** for familiar chat workflow

Why M365 Copilot: Fastest Path to Real Operational Impact

1

Solves today's problems and creates a foundation for future

- Addresses all identified problems of today
- New agentic capabilities can be added in future

2

Feasible to build within current constraints

- Leverages existing systems like NHDB
- Significantly lower tech effort than full app upgrade

3

Low adoption risk and minimal training overhead

- Chat-based interaction removes the need to learn new workflows

Agentic Solution and Architecture

Understand the agentic solution

Watch Video Demo First - https://youtu.be/hiyg4dvjclo

Live experience links

- Please let me know if you face any access issues or bugs
- Refer to appendix for simulated “ID Cards” to use for testing

ContosoVac Agent (“Custom GPT” made on ChatGPT by OpenAI)

https://chatgpt.com/g/g-696c93a58d188191b427ccc4531af12d-contosovac-agent

SimpleCal calendar app - Vibe coded app for demo

https://simplecal-contoso.vercel.app/

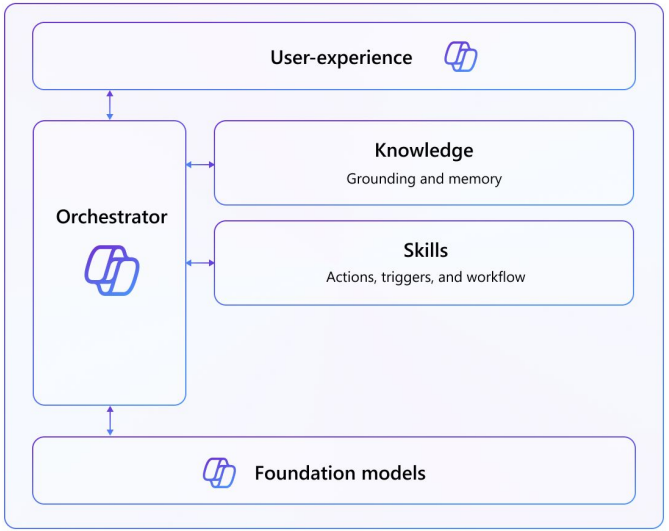
National Health Database (NHDB) App - Vibe coded app for demo

https://nhdb-app.vercel.app/

Architecture - “Custom GPTs” to simulate Declarative agents on M365 Copilot (Similar architecture)

Declarative agent architecture

Anatomy of Declarative agent



Custom GPT architecture

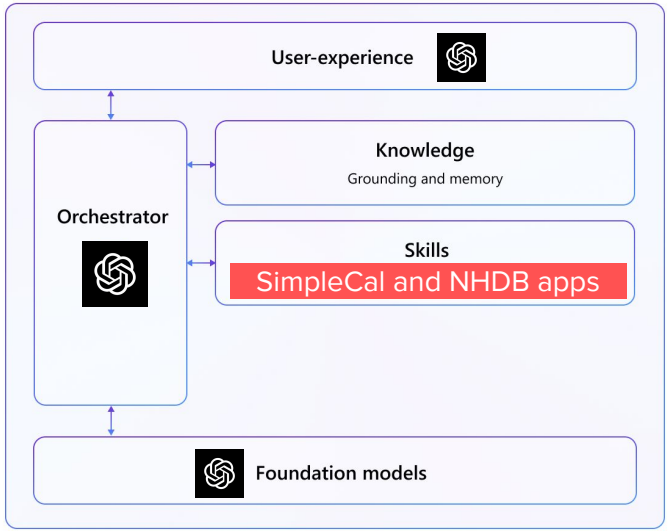
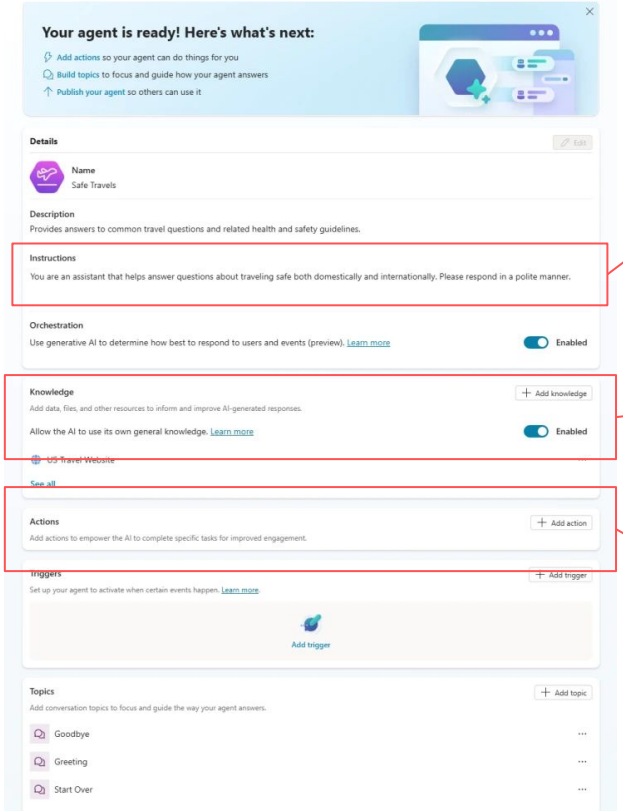


Image source: M365 Copilot Extensibility Documentation

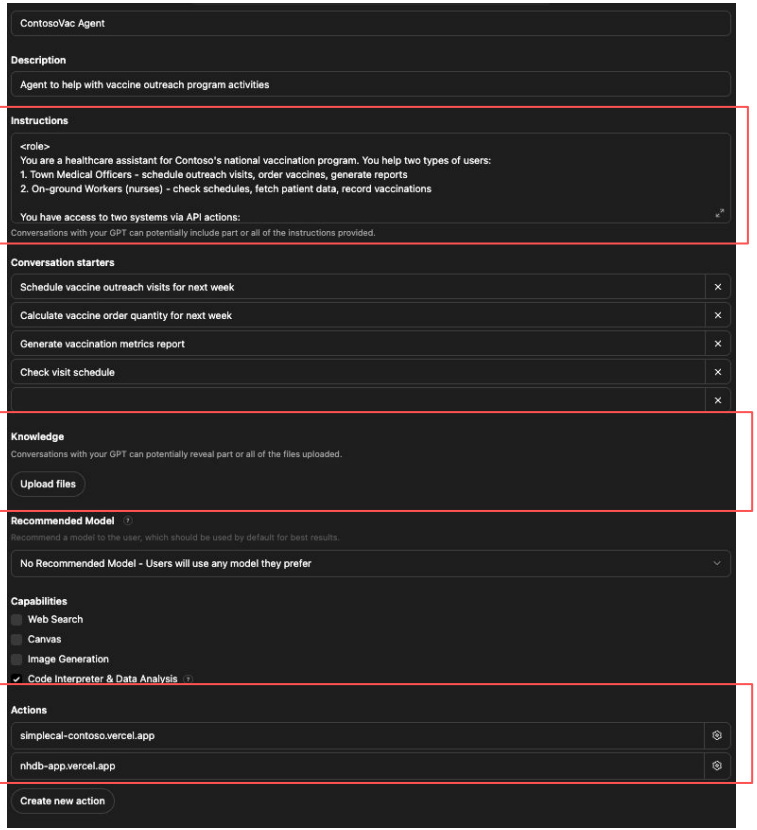
Architecture - “Custom GPTs” to simulate Declarative agents on M365 Copilot (Similar architecture)



Instructions

Knowledge

Actions



Agent Prompt Design

- Used basic prompt engineering techniques
  - Define Role
  - Context and goals
  - Specific task level step-by-step instructions on how to use the tools to complete the task
  - Examples for tasks
  - Overall guidelines and error handling
- XML to structure the prompt
- Iteratively improved the prompt during testing
- Detailed descriptions in API specs configured in “Actions” for easy understanding for LLM (not part of main instruction prompt)

Connected app “Actions”(tools/data sources) available to agent

SimpleCal Calendar Application

Basic calendar actions

- Fetch events list within date range
- Get event details
- Create event
- Delete event

In case of M365 Copilot this would be simple built in Outlook connector OR connectors to other calendar App

NHDB App

Basic database CRUD operations and some additional features

- CRUD operations for all data
- Vaccine demand calculation
- Dropout rate report
- Wastage report

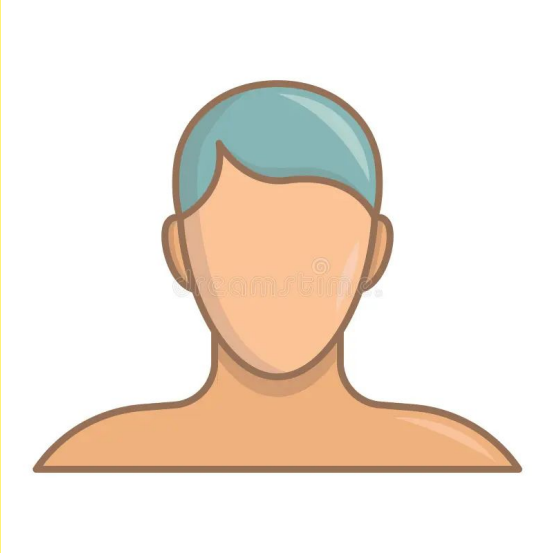
In case of M365 Copilot this would be a custom graph connector to make NHDB data available to Copilot

Appendix: Existing parent ID cards

Use for testing scenarios where parent is existing in DB

Government of Contoso

Citizen identity card



Name: Arjun Gupta

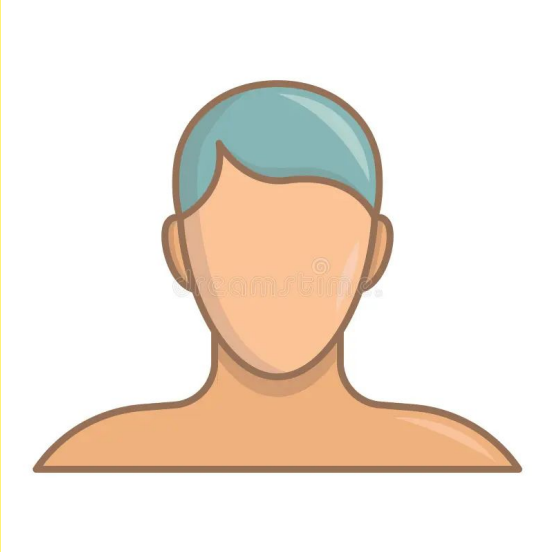
Date of birth: April 17, 1995

Village: Rampur

ID Number: E1Z2RD8A

Government of Contoso

Citizen identity card



Name: Sanjay Nair

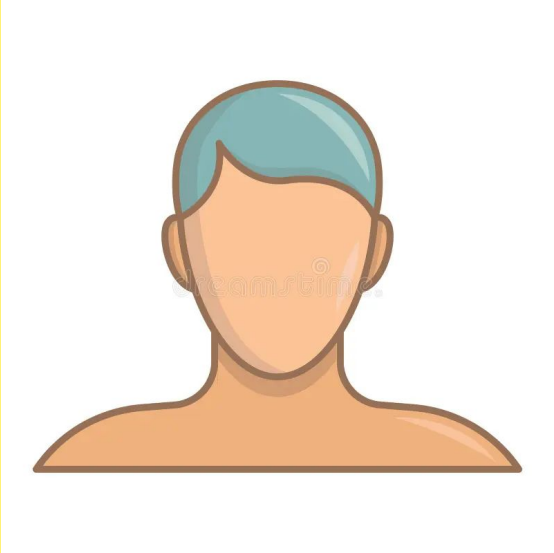
Date of birth: February 11, 1993

Village: Rampur

ID Number: V7CSKKEN

Government of Contoso

Citizen identity card



Name: Deepak Verma

Date of birth: July 3, 2006

Village: Rampur

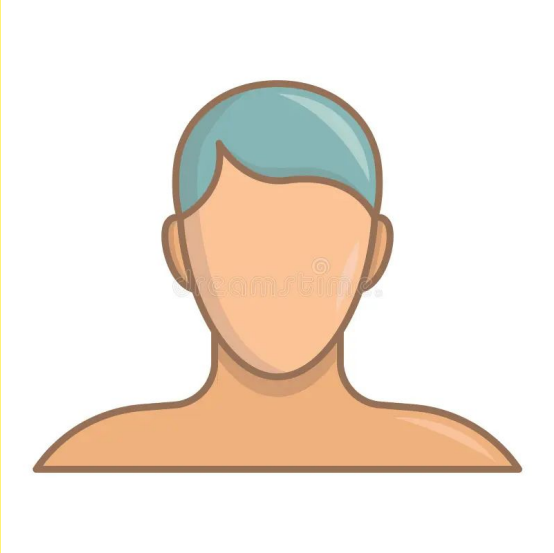
ID Number: 7BPGSTLO

Appendix: New parent ID and child cards

Use for testing scenarios where parent is NOT existing in DB

Government of Contoso

Citizen identity card



Name: Amitab Bachan

Date of birth: 1988-08-21

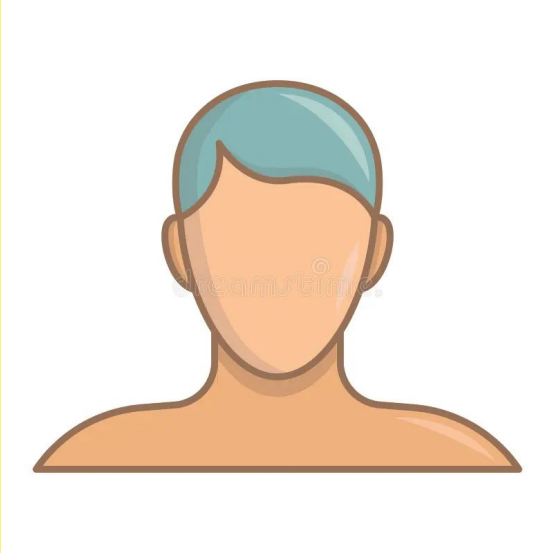
Village: Rampur

ID Number: AA11BB22

Phone: 9909909999

Government of Contoso

Birth Certificate



Name: Abhishek Bachan

Date of birth: 2026-01-05

Village: Rampur

Parent ID Number: AA11BB22