MCP for digital public infrastructure

Beginner masterclass/showcase workshop

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Agenda

01 Why access to DPI matters

02 MCP in everyday words

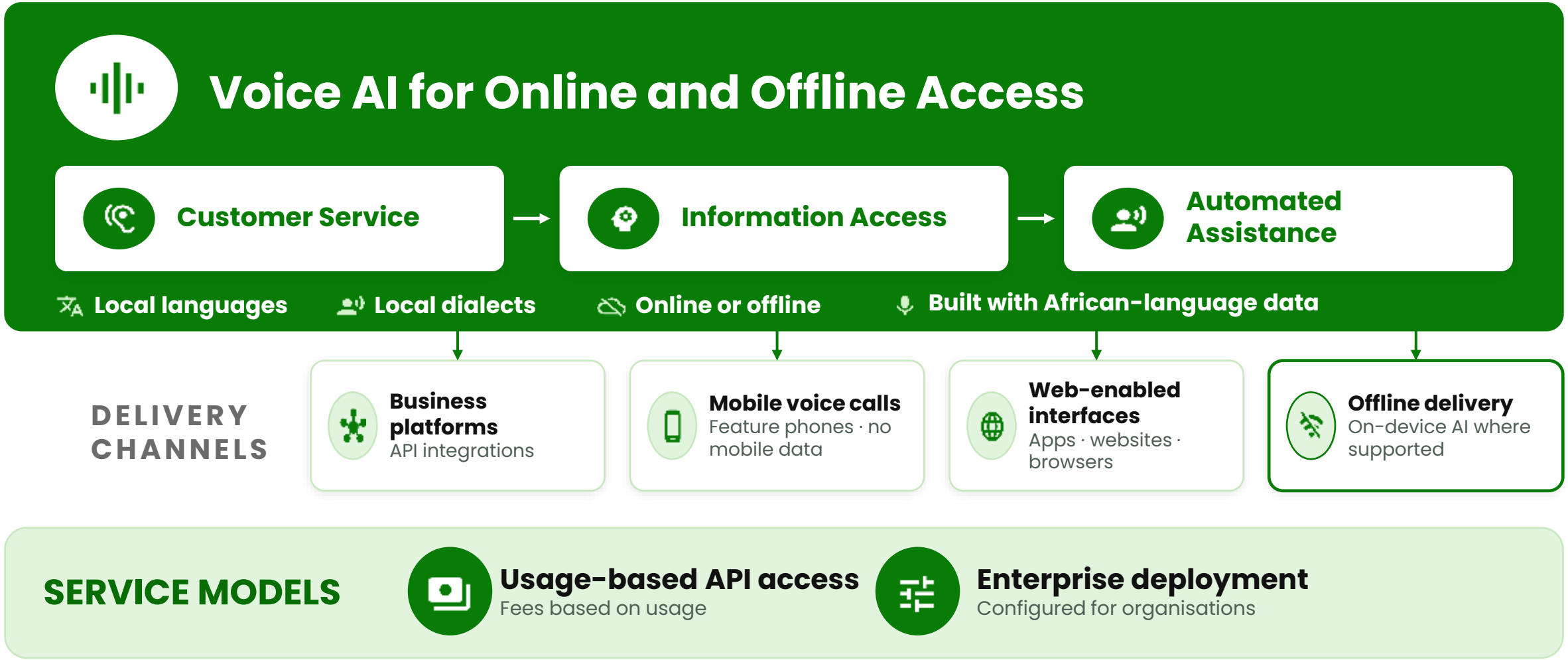
03 Five layers, registry to citizen

04 Hands-on: build, test, break

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About EqualyzAI :

We develop African-language voice AI infrastructure for internet and non-internet channels



Digital public infrastructure supports essential services



Identity

Who you are



Credentials

What you have earned



Payments

How money moves



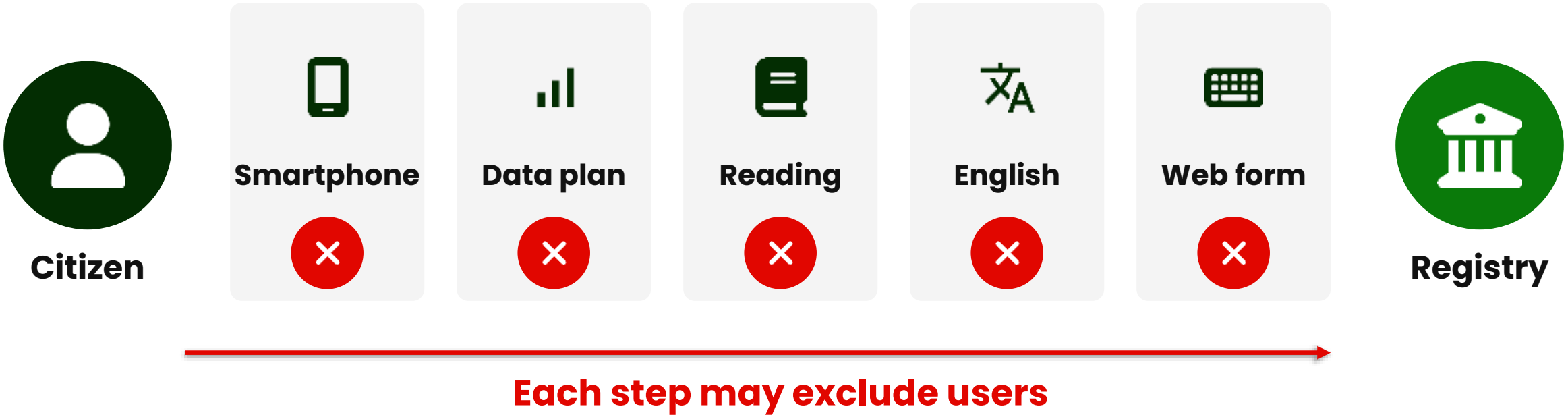
Health records

Your care history

These systems often have different access requirements.

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Digital public services can be difficult to access



Digital-only services can exclude those with limited access.

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Mobile internet access remains unequal

63%

of Africans within mobile broadband coverage do not use mobile internet

60%

of mobile internet users in Sub-Saharan Africa use 3G or feature phones

$39

entry-level smartphone: 26% of monthly GDP per capita in Sub-Saharan Africa

Voice calls can reach people without mobile data.

Sources: GSMA, State of Mobile Internet Connectivity 2025; GSMA, Mobile Economy Africa 2026; GSMA, Accelerating Smartphone Adoption in Africa (2025).

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Connecting citizens to public services through voice



- Any phone
- Local language
- No data plan

Approved registry services become available by phone.

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Agenda

01 Why access to DPI matters

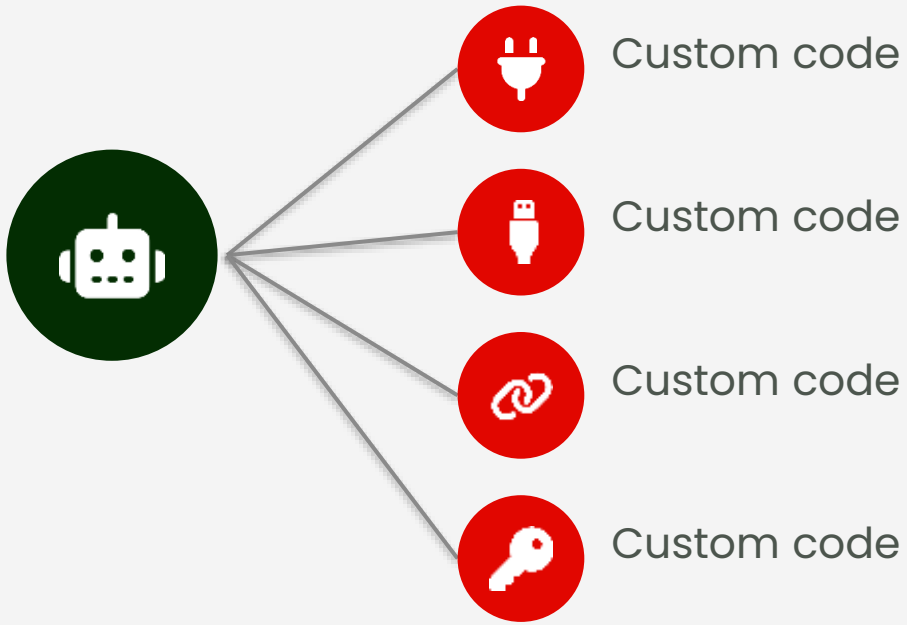
02 **Understanding MCP**

03 Five components of the service

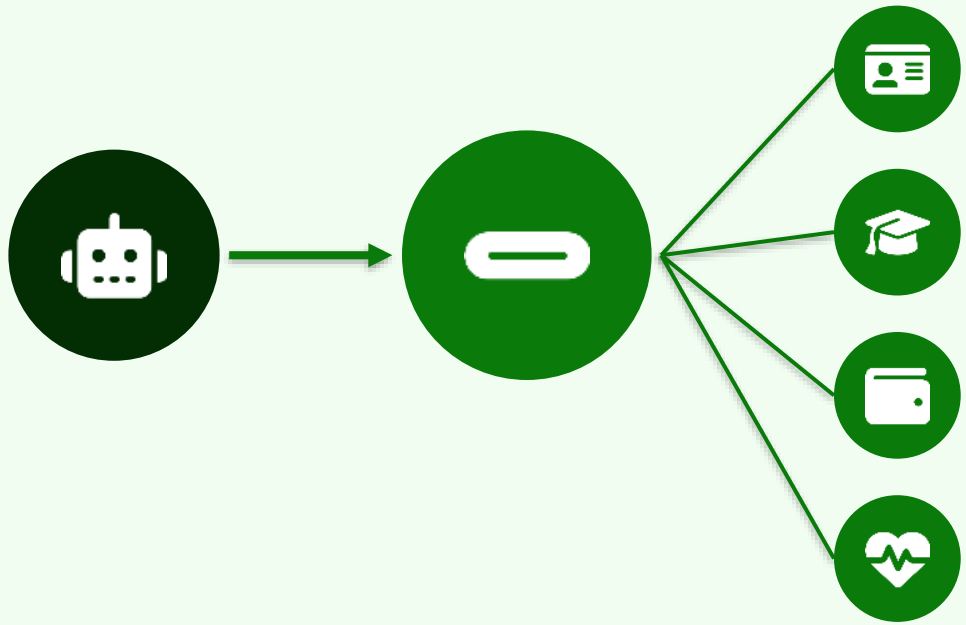
04 Hands-on: build and test

MCP: A common standard for AI tools

Before: separate integrations



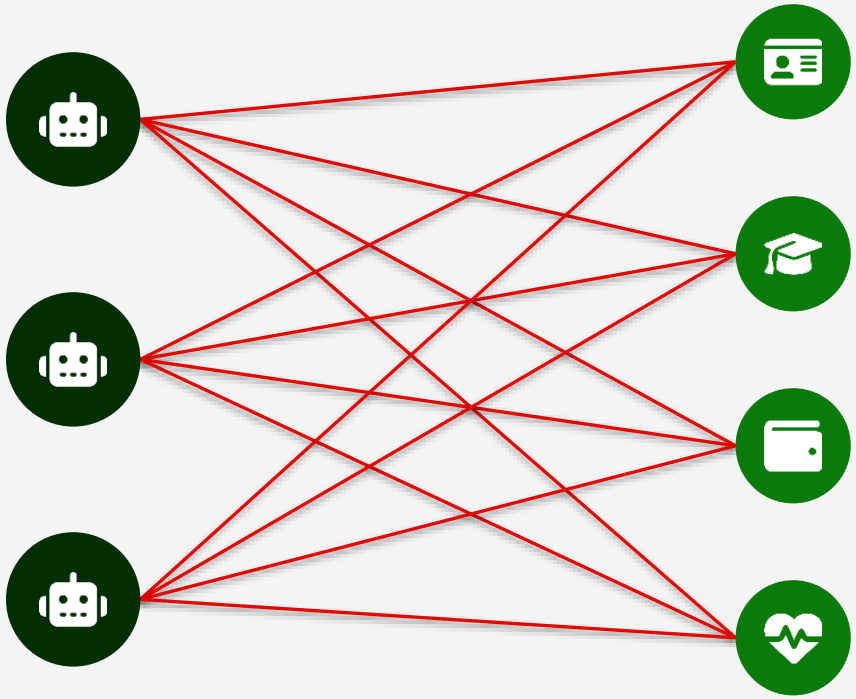
With MCP: a shared interface



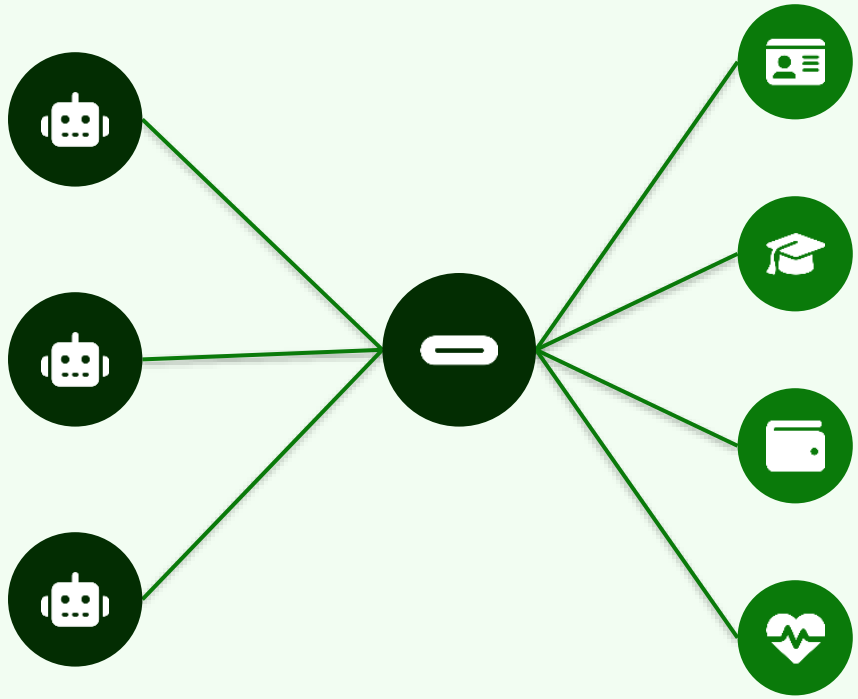
Compatible AI applications use a standard interface.

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How MCP can reduce custom integrations



12 direct links (3 × 4)

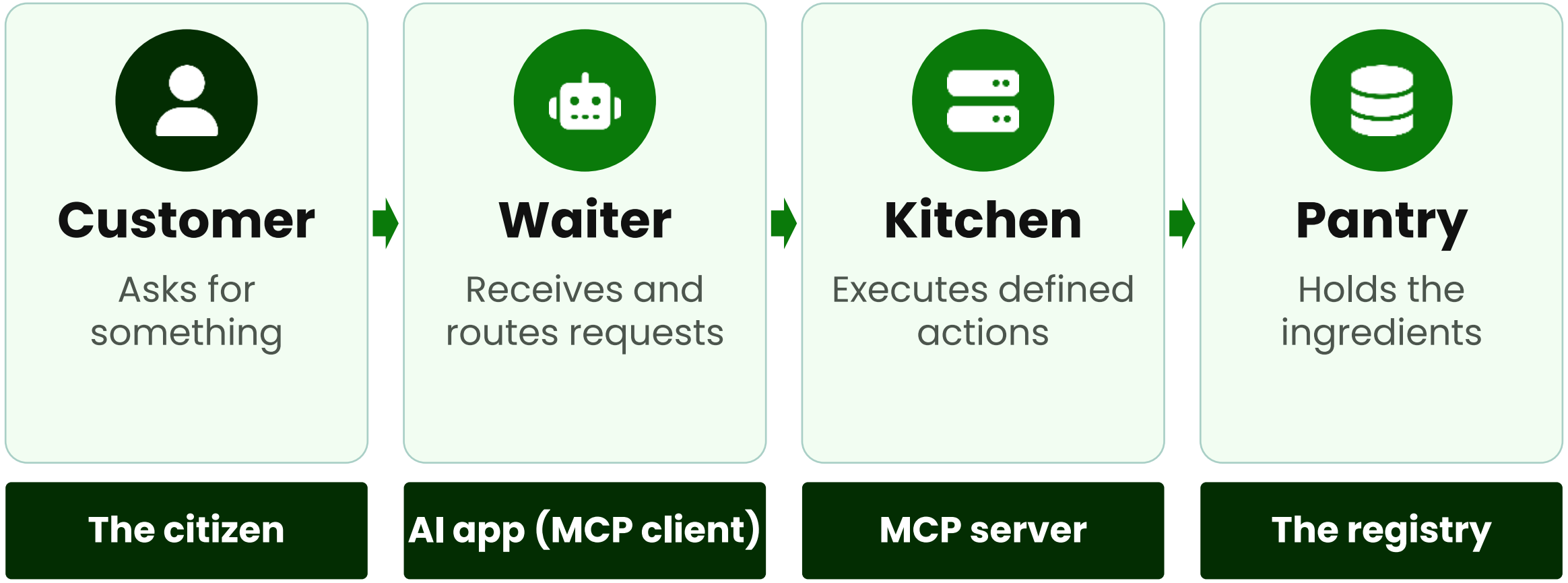


7 interface components (3 + 4)

A new registry can reuse the standard interface.

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MCP roles: A restaurant analogy



AI accesses the registry through the server.

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Three core MCP server capabilities



Tools

Actions an AI app can run

`verify_certificate`



Resources

Information an app can retrieve

Registry rules, FAQs



Prompts

Reusable task instructions

A verification workflow

Today we build tools that perform defined actions.

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An MCP tool defines an action

`verify_credential`

What it does

Checks a certificate against a registry

Required inputs

Certificate number and surname

Response

Status, institution and year

The tool description guides AI selection

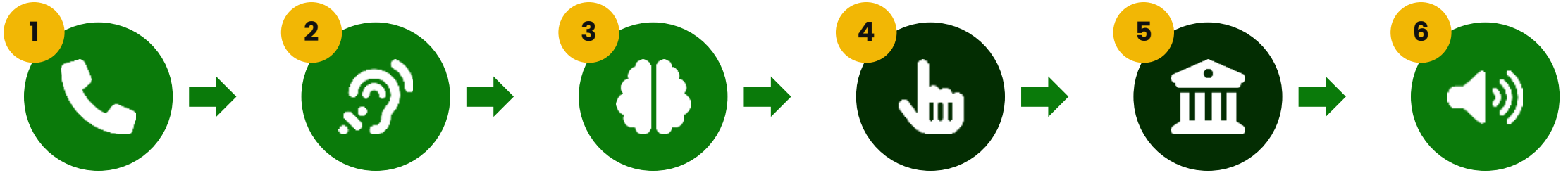
Clear description: better selection

Vague description: more errors

Clear tool descriptions reduce selection errors.

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How a phone request reaches a registry



1 Call and speak

In Hausa, any phone

2 Transcribe

Speech becomes text

3 Interpret

AI interprets the request

4 Invoke the tool

Credential verification

5 Query the registry

Authorised result

6 Reply

Spoken back in Hausa

MCP connects the AI application to the registry tool.

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Secure registry access through MCP



- **Define approved actions**
- **Implement permissions and consent**
- **Log requests appropriately**

Security controls must be implemented.

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Agenda

01 Why access to DPI matters

02 Understanding MCP

03 **Five components of the service**

04 Hands-on: build and test

Five components of an MCP-enabled service

5	**Access channels**	Phone, SMS, USSD, web and apps
4	**Speech and language processing**	Speech-to-text and voice
3	**AI reasoning and knowledge**	Model responses using approved knowledge
2	**MCP server and tools**	Defined actions and standard interfaces
1	**Official data sources**	Verified records and services

For each layer

- **What it does**
- **What it costs**
- **Common risks**

Illustrative service architecture

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Layer 1: Official data sources



Think of it as

Authoritative records and services

What it does

Maintains official records: identity, qualifications and payments

What it costs

- Existing systems may reduce initial costs
- APIs, availability and data quality

Common risks

- No secure API is available
- Duplicate or out-of-date records
- Unclear legal basis for access

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Layer 2: MCP server and tools



Think of it as

Defined registry functions for AI apps

What it does

Exposes registry functions as tools; security and logging require implementation

What it costs

- Development, hosting and maintenance
- Security review and monitoring

Common risks

- Unclear descriptions lead to tool errors
- Tools have excessive permissions
- Registry API changes without notice

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Layer 3: AI reasoning and knowledge



Think of it as

AI model using approved information

What it does

Interprets requests and uses approved documents to explain results

What it costs

- Model usage fees or hosting costs
- Token costs vary by model and language

Common risks

- Incorrect or unsupported answers
- Out-of-date policy documents
- Inappropriate disclosure of personal data

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Layer 4: Speech and language processing



Think of it as

Speech-to-text and voice

Layer 4 of 5

What it does

Converts speech to text and generates speech in supported languages

What it costs

- Speech data and model development
- Hosting and processing per minute

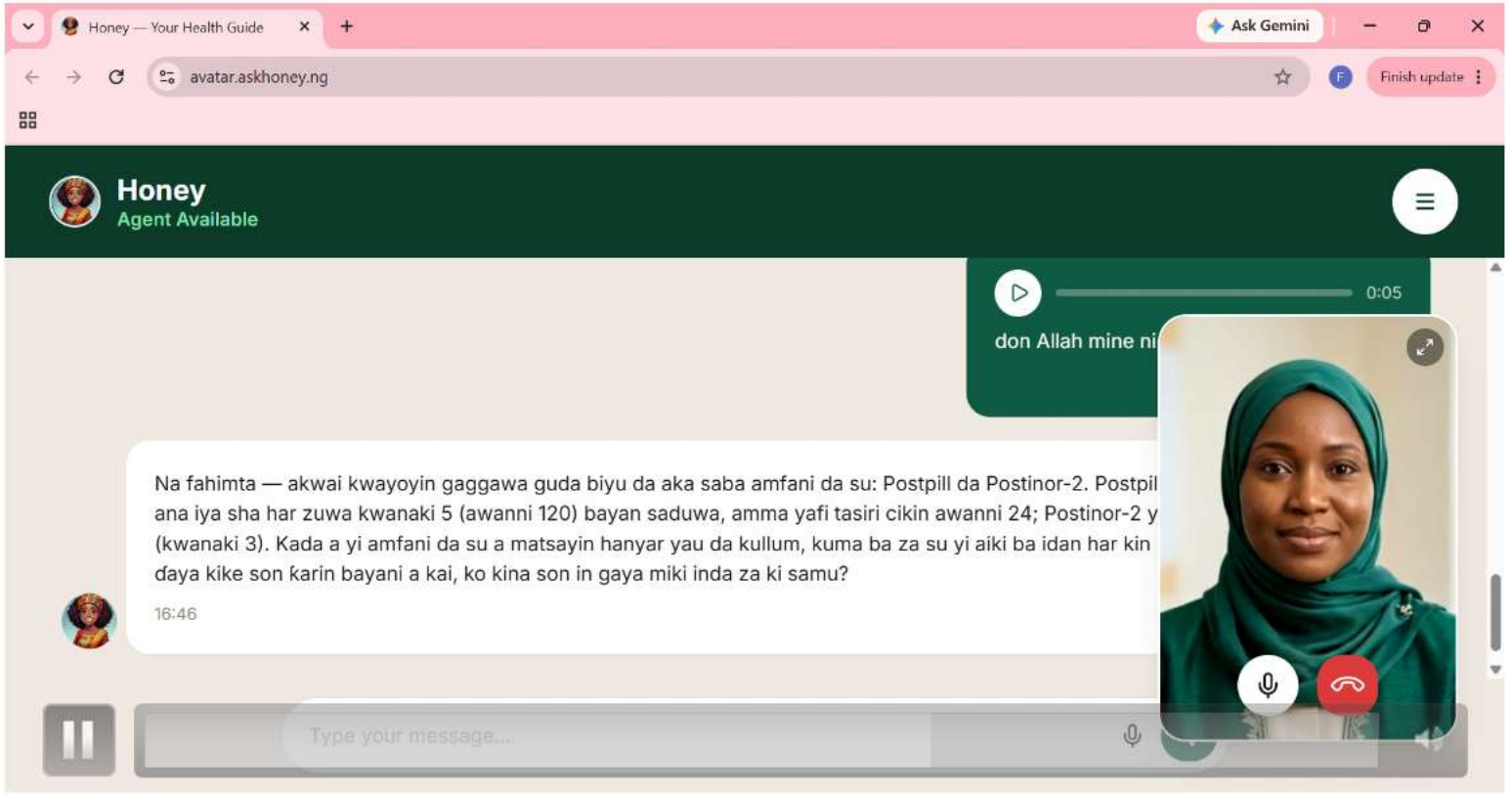
Common risks

- Accents, dialects and code-switching
- Names, numbers and IDs recognised wrongly
- Noisy lines and poor audio

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Demo: A Hausa-language voice health assistant





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Layer 5: Access channels



Think of it as

Phone calls, SMS, USSD and web

What it does

Offers access through internet and non-data channels

What it costs

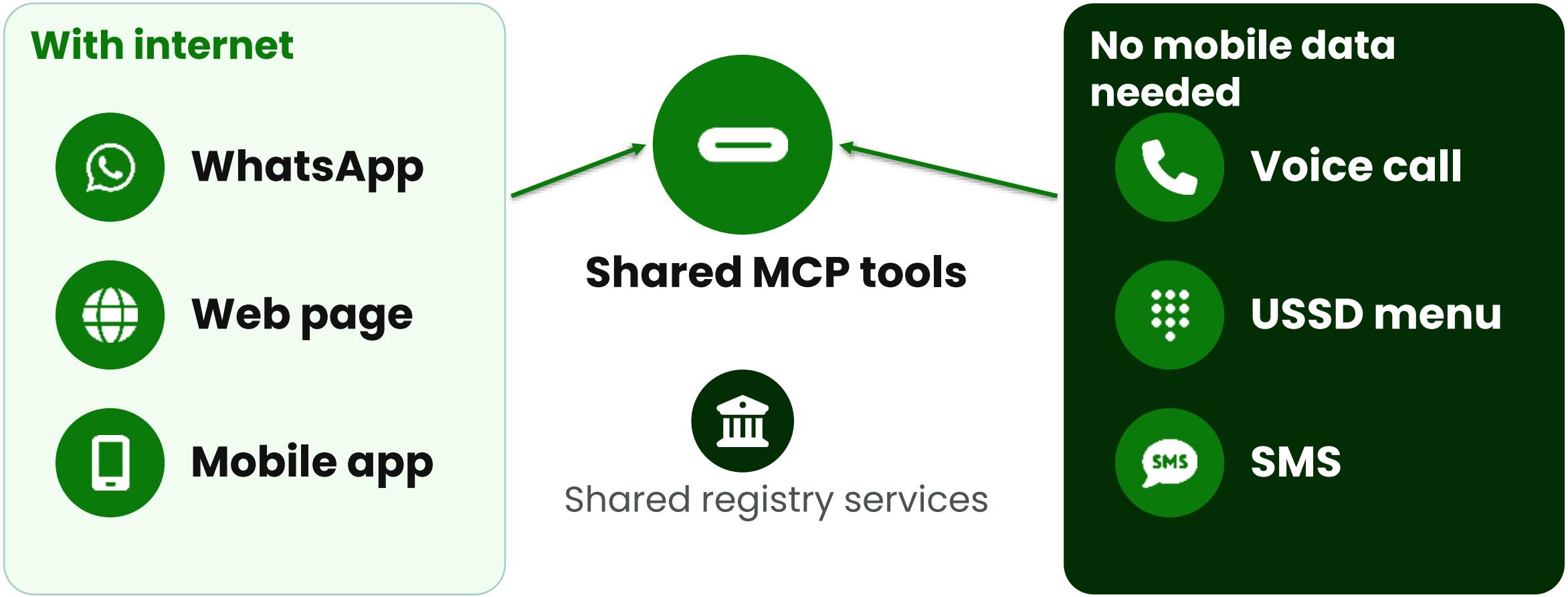
- Telecom minutes, short codes and SMS
- Decide who pays: citizen, government or operator

Common risks

- Dropped calls and USSD session timeouts
- Verifying the caller's identity
- Cost to the citizen if not toll-free

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One service through multiple channels

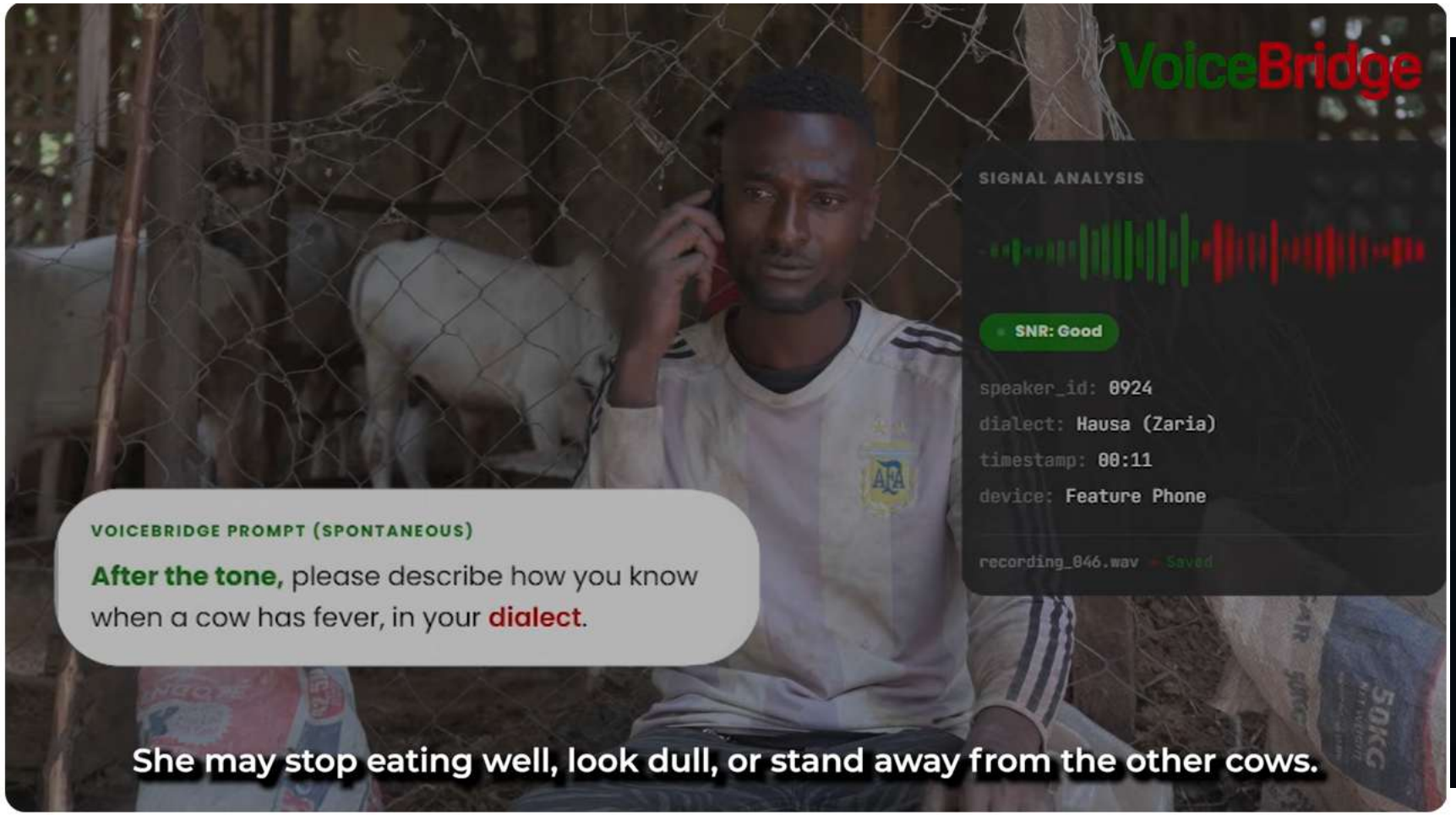


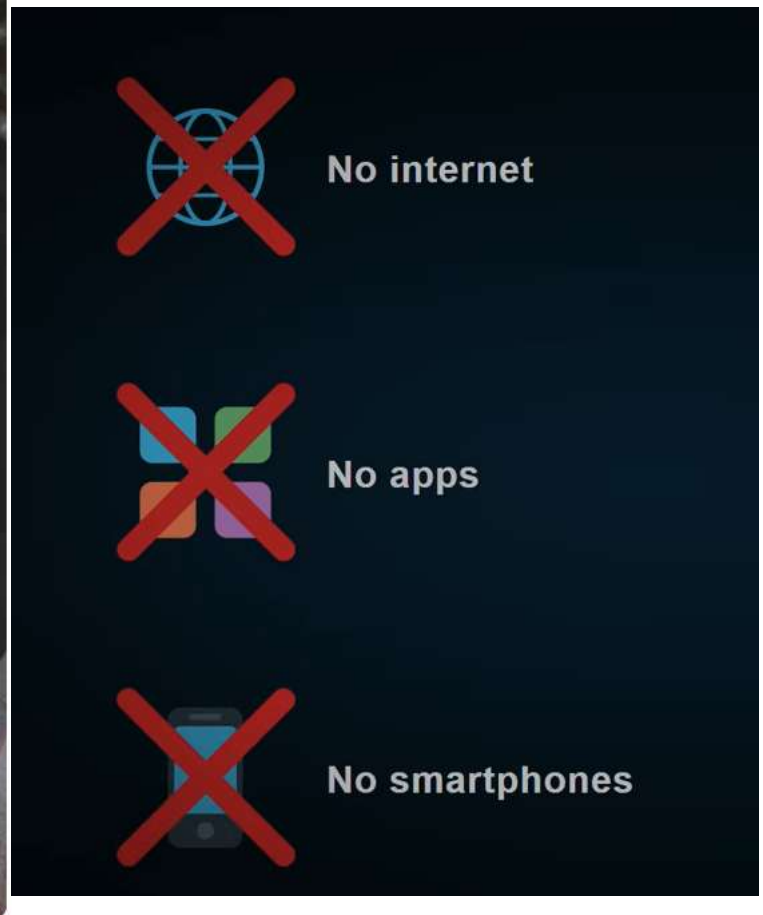
Reuse registry tools across supported channels.

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VoiceBridge: Contributing speech data by phone call

Watch the VoiceBridge demonstration





EqualyzAI VoiceBridge - Enables users with no access to smartphones cont... 16K views 6mo ago

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Other examples of what we have built



MCP for credential verification

AI applications can verify credentials through approved registry tools



Local-language access to services

People interact with services in their own language

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Implementation costs, risks and controls

Layer	Main cost	Where it breaks	Design fix
1 Registries	API, uptime, data clean-up	Portal only, poor data	Start with one read-only action
2 MCP	Light server, engineering days	Vague tools, too much access	Small tools, clear labels, logs
3 Knowledge	Per-token model cost	Wrong or outdated answers	Approved documents, cite sources
4 Language	Speech data, compute per minute	Misheard names and numbers	Read back and confirm
5 Channels	Airtime, short codes, SMS	Dropped calls, timeouts, cost	Toll-free, short sessions, SMS receipt

Good design addresses security, data, access and cost.

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Safeguards for public AI services



Informed consent

Seek consent where required



Data minimisation

Disclose only necessary information



Audit records

Log relevant actions securely



Human support

Provide an escalation option

Public services require safeguards.

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Agenda

01 Why access to DPI matters

02 Understanding MCP

03 Five components of the service

04 **Hands-on: build and test**

Workshop: Build a credential verification tool



Sample registry

registry.csv



Create an MCP tool

server.py, about 20 lines



Test the tool

MCP Inspector



Connect an AI assistant

English or Pidgin



Then test common errors and failure scenarios

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Workshop setup requirements

1 Python 3.10 or newer



```
python --version
```

2 Install the MCP SDK



```
pip install "mcp[cli]"
```

3 Testing interface



MCP Inspector (opens with mcp dev)

4 Exercise files



registry.csv and server.py

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Step 1: Review the sample registry

cert_id	surname	qualification	institution	year	status
NG-2021-0042	Okafor	BSc Nursing	University A	2021	valid
NG-2019-0117	Bello	HND Accounting	Polytechnic B	2019	valid
NG-2020-0233	Adeyemi	BEd Education	College C	2020	**revoked**
NG-2022-0310	Musa	Diploma Agriculture	College D	2022	valid

Fictional training data. Real registries require secure APIs and access controls.

Step 2: Create a credential verification tool

```python
from mcp.server.fastmcp import FastMCP
import csv

mcp = FastMCP("Credential Registry")
RECORDS = {r["cert_id"]: r for r in
           csv.DictReader(open("registry.csv"))}

@mcp.tool()
def verify_credential(cert_id: str, surname: str) -> dict:
    """Check if a certificate is genuine.
    Needs the certificate ID and the holder's surname."""
    r = RECORDS.get(cert_id.strip().upper())
    if not r or r["surname"].lower() != surname.strip().lower():
        return {"valid": False, "reason": "No matching record"}
    return {"valid": r["status"] == "valid",
            "qualification": r["qualification"],
            "institution": r["institution"], "year": r["year"]}

if __name__ == "__main__":
    mcp.run()
```

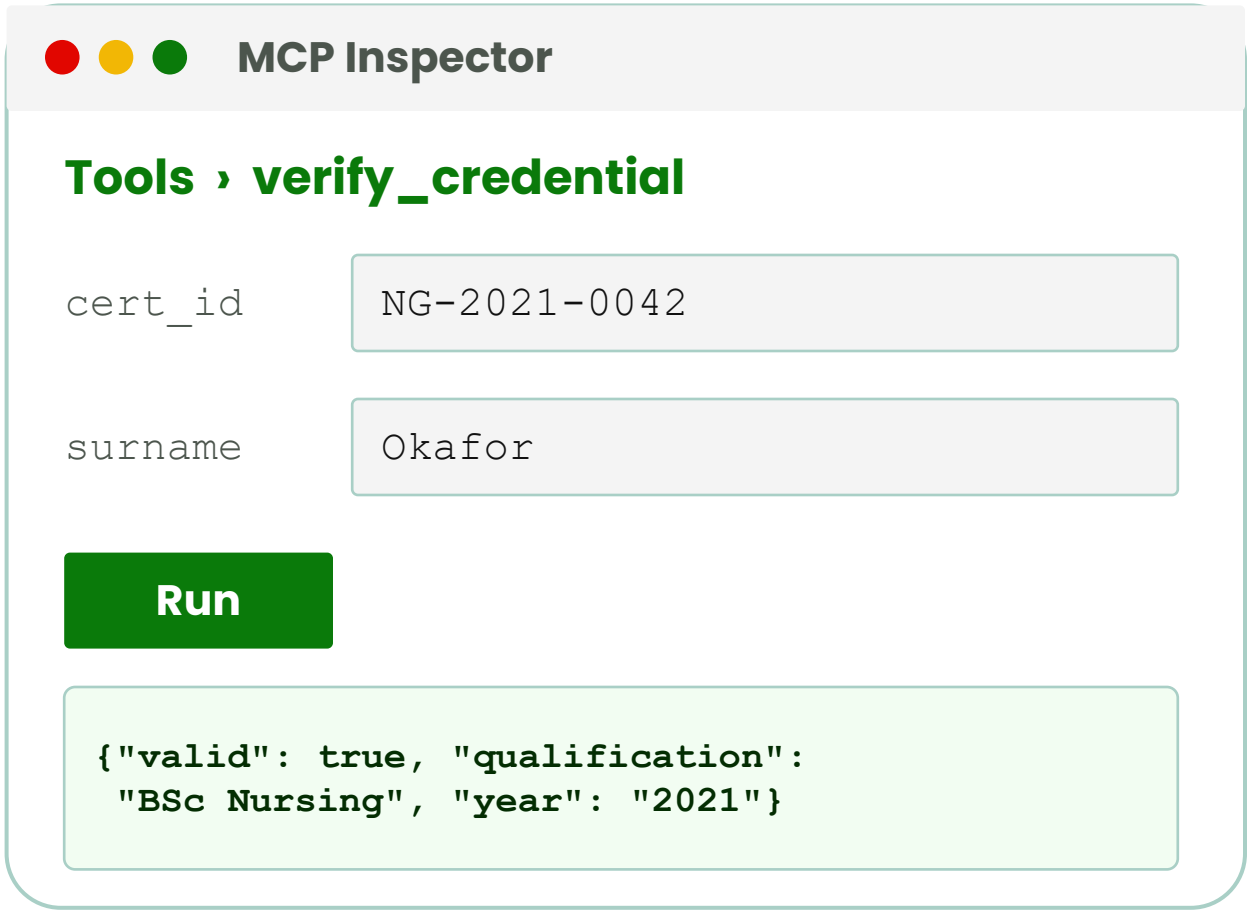
1. Name the server
2. Load the registry
3. Define the MCP tool
4. Describe the tool clearly
5. Check ID and surname
6. Return the required result

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Step 3: Test with MCP Inspector

```
$ mcp dev server.py
```

1. Open the link it prints
2. Click Connect
3. Open Tools, choose verify_credential
4. Enter NG-2021-0042 and Okafor, then Run



Now test revoked certificate NG-2020-0233. What happens?

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Step 4: Add a credential status tool

```
@mcp.tool()
def check_status(cert_id: str) -> dict:
    """Return only whether a certificate
    is valid or revoked. Use when the
    caller does not know the surname."""
    r =
RECORDS.get(cert_id.strip().upper())
    if not r:
        return {"found": False}
    return {"found": True,
            "status": r["status"]}
```



Describe the tool

When should the AI use this tool?



Restart and test

`mcp dev server.py`



Security question

Is ID-only status lookup safe for personal data?

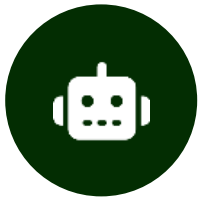
10 minutes. Facilitators are available to help.

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Step 5: Connect an AI assistant

```
$ mcp install server.py
```

Registers your server with Claude Desktop. Restart the app and your tools appear.



The AI uses descriptions to select a tool.

English

Is certificate NG-2021-0042 for Okafor genuine?

Pidgin

Abeg check if certificate NG-2019-0117 na correct one. Name na Bello.

Another language

Does the model understand and select the right tool?

Check the selected tool and its response.

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Step 6: Test common failure scenarios

Wrong number

NG-2021-42

Wrong surname

Right ID, different name

Revoked certificate

Adeyemi, NG-2020-0233

Someone else's data

'Show me everything about Musa'

Registry offline

Rename registry.csv and retry

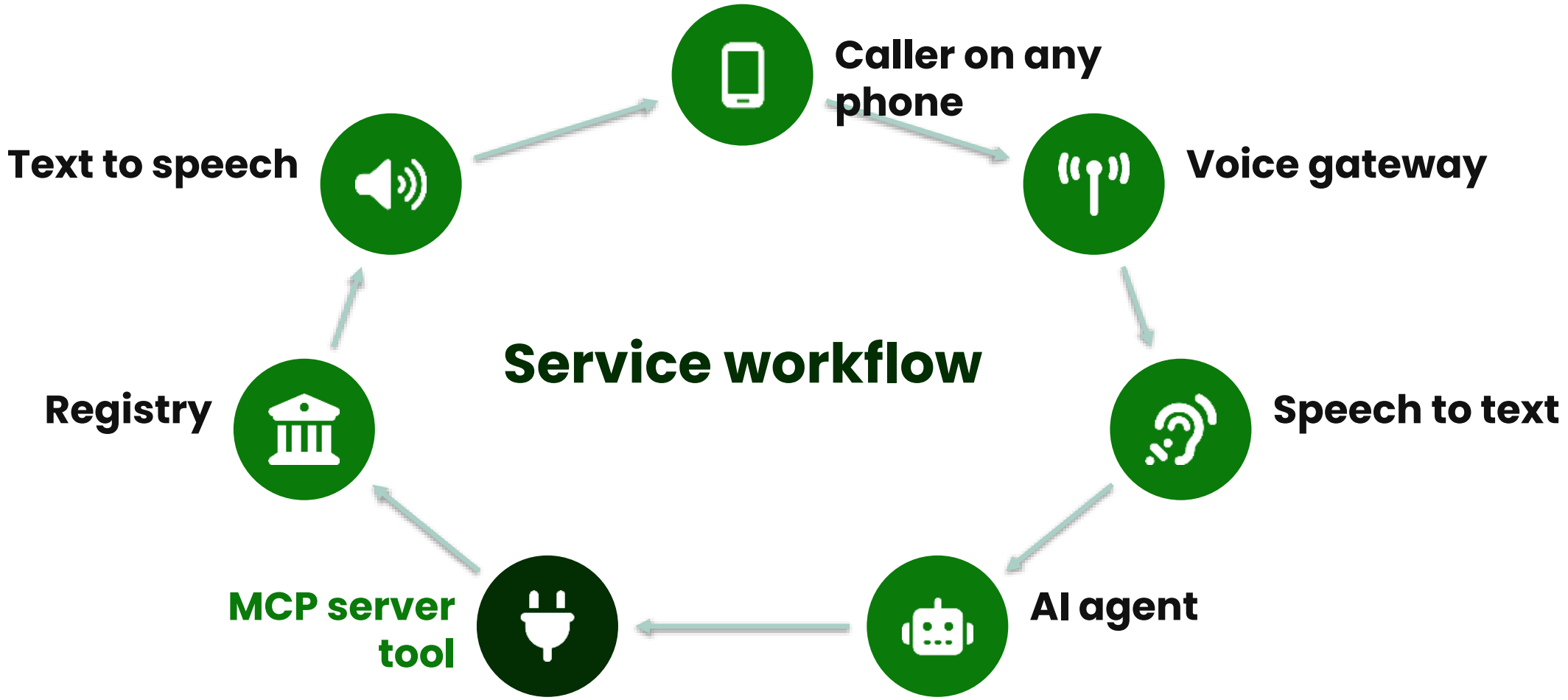
Vague request

'Check my paper'

For each test: compare actual and expected results. Improve the tool as needed.

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Live demo: Using MCP through a phone call



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Group exercise: MCP for a public service

1. Which registry should we start with?
2. Which specific action should the AI perform?
3. What minimum information is required?
4. How will access and consent be managed?
5. Who pays for the service?

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Key lessons

1



MCP standardises AI access to external tools and information

2



Voice and local language extend access through phone calls

3



Plan for security, reliability, permissions and cost

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EqualyzAI
AI Infrastructure for the Next Billion
www.equalyz.ai

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Meet the co-founders



Bayo Adekanmbi

PhD

22-year Pan-African experience serving 300m customers as C-level technical and business executive responsible for innovation, analytics, AI and strategy for Africa's 2 largest telecommunication companies (MTN Nigeria, MTN South Africa, Airtel Africa UK Plc) serving over 300 million customers in 28+ countries

Technical AI award winner in AI solutions *(Gates Foundation Grand Challenge 2023, UNESCO Top 100 AI product for SDG)*

PhD, University of London



Ife Adebara

PhD

Over seven years of experience in natural language processing (NLP), linguistics, and language policy with expertise in in Afrocentric NLP.

Winner of UNESCO Global Top 10 AI Solutions and the builder of language models for Africa (Cheetah, Serengeti, AfroLID)

PhD Computational Linguistics, University of British Columbia Canada focused on LLM for 517 African Languages

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