Towards a Crowdsourced Digital Coffee Atlas for Sustainable Coffee Farming

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The team

Kirstin Kohler

Manuel Walter

Project Context – Co-Innovation / Students with External Partners

Problem given to the students

How can smallholder coffee farmers get empowered by digital technology to sustain climate change ?

Methodology

- Design driven
- Talk to users
- Talk to experts
- Show prototypes
- Learn from feedback

Aim of the talk

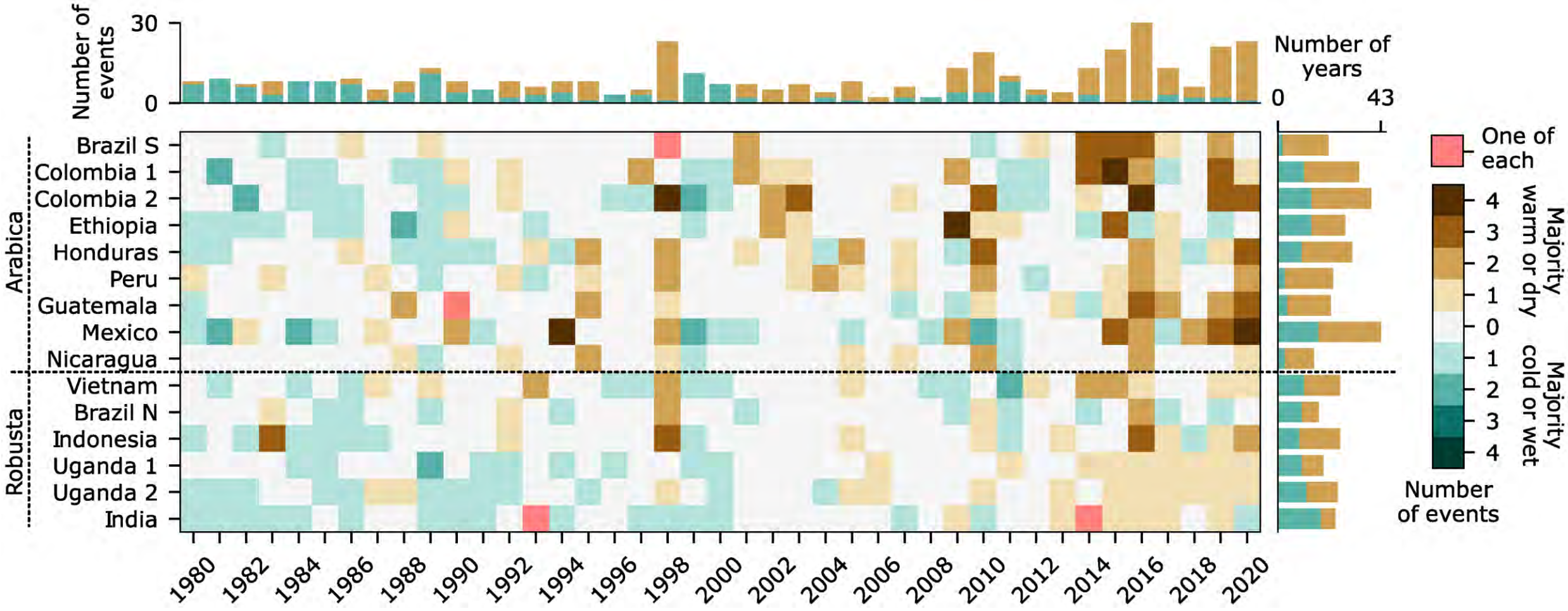
- Present the students’ solution to the problem
- Show a roadmap how to get there

(to find partners and possibilities to bring this vision to life)

Meet a typical farmer

- Himal Kumar
- Smallholder coffee farmer
- India

Increasing climate hazards



Richardson D, Kath J, Byrareddy VM, Monselesan DP, Risbey JS, Squire DT, et al. (2023) Synchronous climate hazards pose an increasing challenge to global coffee production. PLOS Clim 2(3): e0000134. https://doi.org/10.1371/journal.pclm.0000134

Crop loss due to increased temperature

https://pixabay.com/photos/farming-coffee-colombian-coffee-6959629/

Quality loss due to diseases

https://coffeeandclimate.org/climate-change-effects-on-coffee/

Himal‘s questions

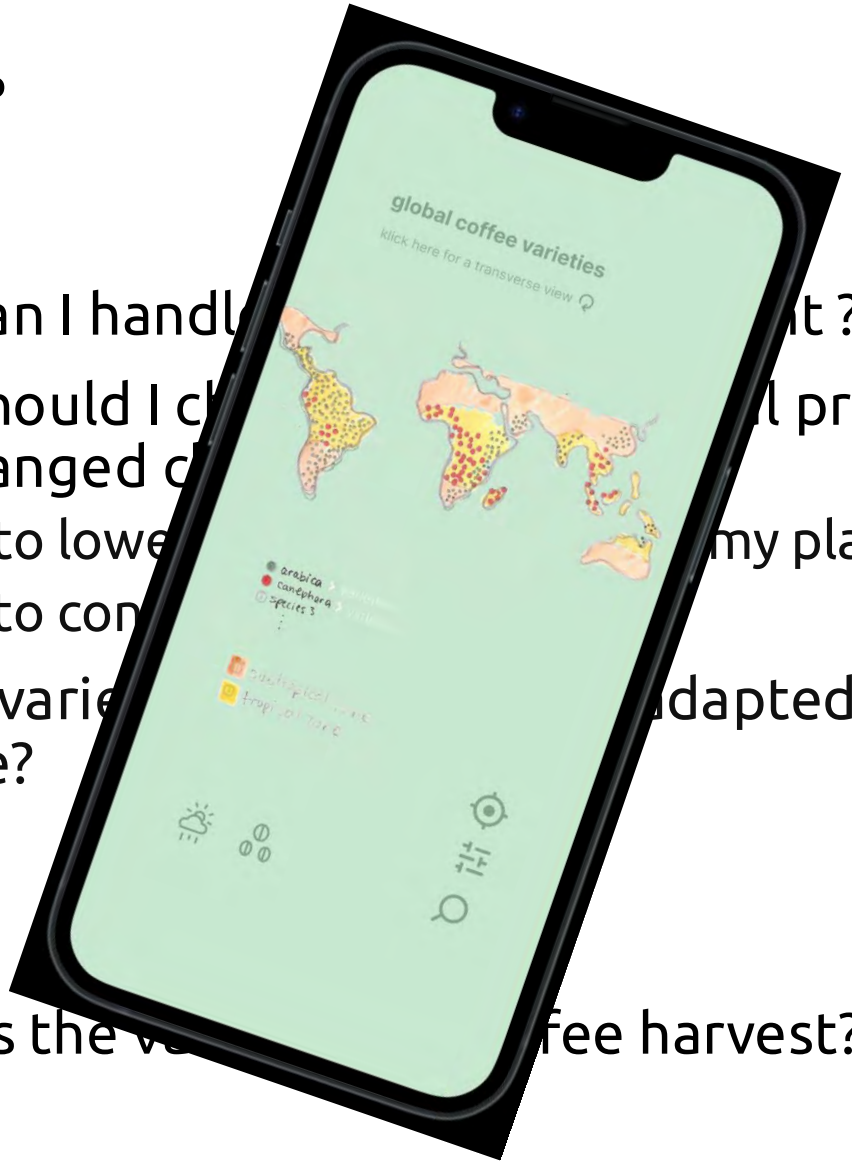
Himal Kumar
smallholder coffee farmer
India

- How can I handle the diseases of my coffee plants ?
- How can I change my agricultural praxis to sustain the changed climate conditions ?
  - How to lower the temperature for my plants?
  - How to conserve the soil?
- Which coffee variety is better adapted to the climate change than the current ones?
- What is the “true” value of my coffee harvest on a global market?

Empowerment ....

Himal Kumar
smallholder coffee farmer
India

- How can I handl t ?
- How should I ch l praxis to sustain the changed c
  - How to lowe my plants?
  - How to con
- Which varie dapted to the climate change?
- What is the v fee harvest?



Solution: A Global Coffee Atlas

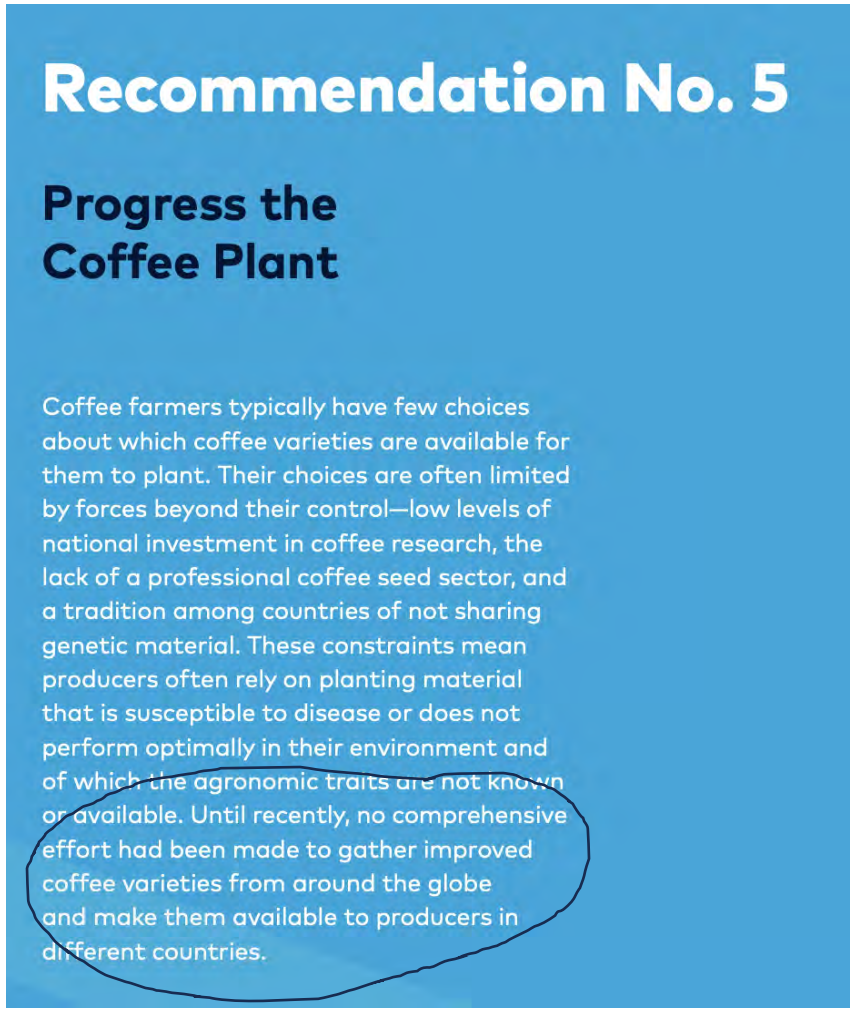
… as instrument to sustain climate change as smallholder coffee farmers

Offering features like

- Disease identification
- Knowledge about agricultural practices
- Recommendation of coffee varieties well adapted to foreseen climate conditions
- Information on actual market prices on specific varieties

But

A worldwide knowldge gap …



Recommendation No. 5

Progress the Coffee Plant

Coffee farmers typically have few choices about which coffee varieties are available for them to plant. Their choices are often limited by forces beyond their control—low levels of national investment in coffee research, the lack of a professional coffee seed sector, and a tradition among countries of not sharing genetic material. These constraints mean producers often rely on planting material that is susceptible to disease or does not perform optimally in their environment and of which the agronomic traits are not known or available. Until recently, no comprehensive effort had been made to gather improved coffee varieties from around the globe and make them available to producers in different countries.

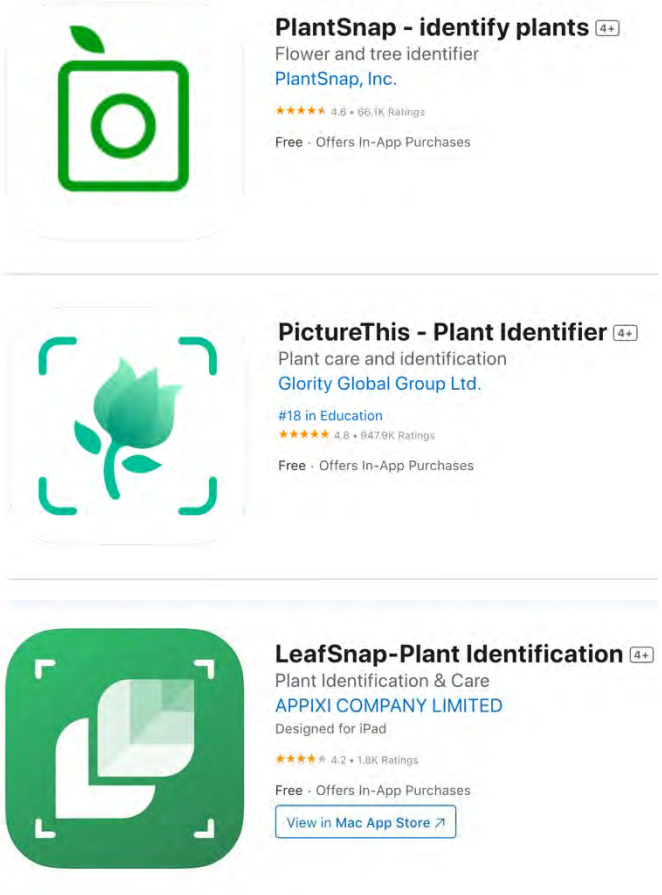
on coffee varieties

- Same varieties are called differently in different local areas (not the biological name)
- There is no global map/atlas showing which varieties are growing where, and under which climate conditions

A comprehensive identification process of coffee varieties and their worldwide location is key and not established yet!

Climate Change and Coffee: Acting Globally and Locally (https://sca.coffee/availableresearch)

Also ...



the identification of plants is technologically possible through AI based image recognition

Implementation Roadmap – Coffee Atlas

Value for farmers

Coffee Atlas:
Recommendation to climate actions on varieties

Search for partners and financing

3 years

5 years

Development focus

Implementation Roadmap – Coffee Atlas

Value for farmers

How to identify coffee varieties around the world ?

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Implementation Roadmap – Coffee Atlas

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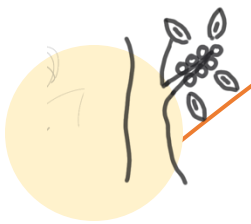
How to identify coffee varieties around the world ?



Get farmers to provide pictures of plants and their location to fill up the Coffee Atlas
Provide them valuable information as motivation to provide pictures

Coffee Atlas:
Recommendation to climate actions on varieties

Search for partners and financing

3 years

5 years

Development focus

Implementation Roadmap – One Year

Value for farmers

First App Version:
Identification of diseases and information on market prices

Search for partners and financing

1 year

Development focus

Implementation Roadmap – One Year

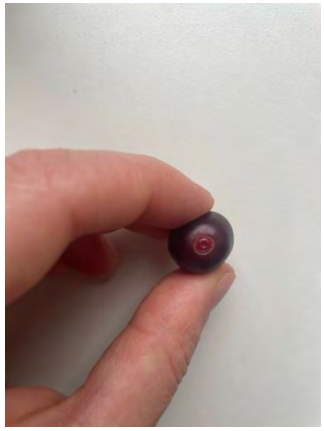
Value for farmers

Search for partners and financing

Train AI & Built Content

1 year

Development focus



Implementation Roadmap – First App

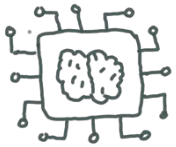
Value for farmers

First App Version:
Identification of diseases and varieties
information on market prices

Search for partners and financing

Train AI & Built Content

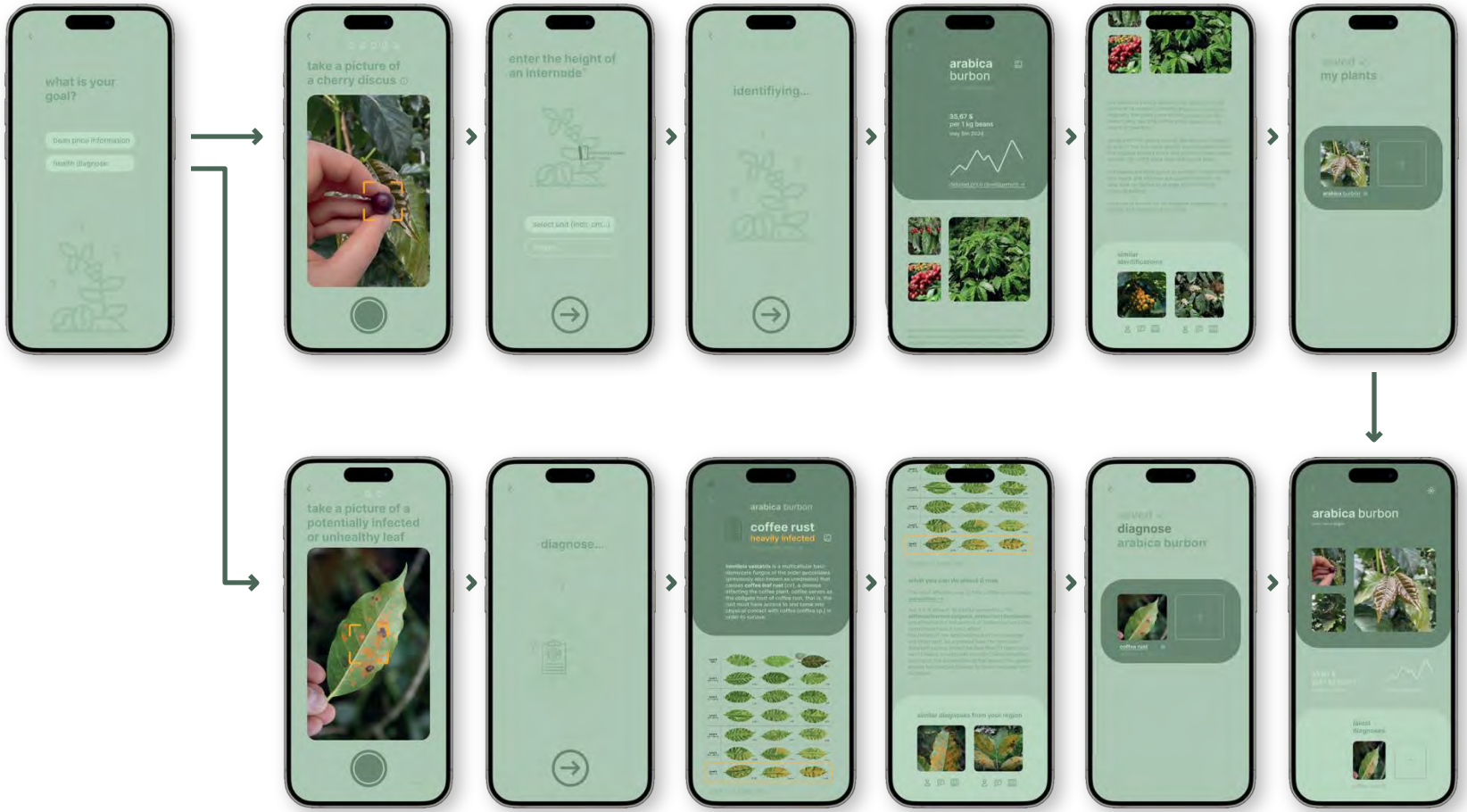
1 year



Development focus

Train AI with cultivars from botanical gardens
Built up content on diseases and valuable actions on climate chance
Connect to data on pricing

Identification of diseases and varieties



Implementation Roadmap – Coffee Atlas

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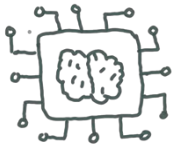

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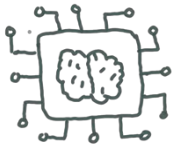
Train AI & Built Content

Crowdsource Data

1 year

3 years



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Train AI with cultivars from botanical gardens
Build up content on diseases and valuable actions on climate chance
Connect to data on pricing

Build database with information about identified varieties worldwide and their exact location and climate conditions,
crowdsourcing with app users

Implementation Roadmap – Coffee Atlas

Value for farmers

First App Version:
Identification of diseases and varieties
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Coffee Atlas:
Recommendation to climate actions on varieties

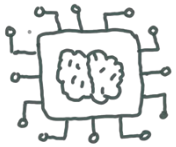
Search for partners and financing

Train AI & Built Content

1 year

Crowdsource Data

3 years



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Implementation Roadmap – Coffee Atlas

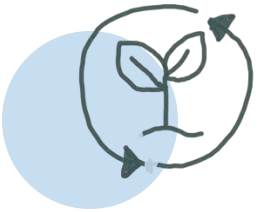
Value for farmers

Search for partners and financing

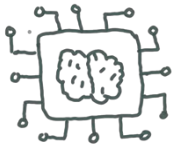
First App Version:
Identification of diseases and species
information on market prices

Coffee Atlas:
Recommendation to climate actions on varieties

Extended Coffee Atlas:
Improved access to market information, direct trade relationships



Train AI & Built Content — 1 year — Crowdsource Data — 3 years — Rollout Impact — 5 years



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Further rollout and improvement of content to empower small, local farmers globally for sustainable farming

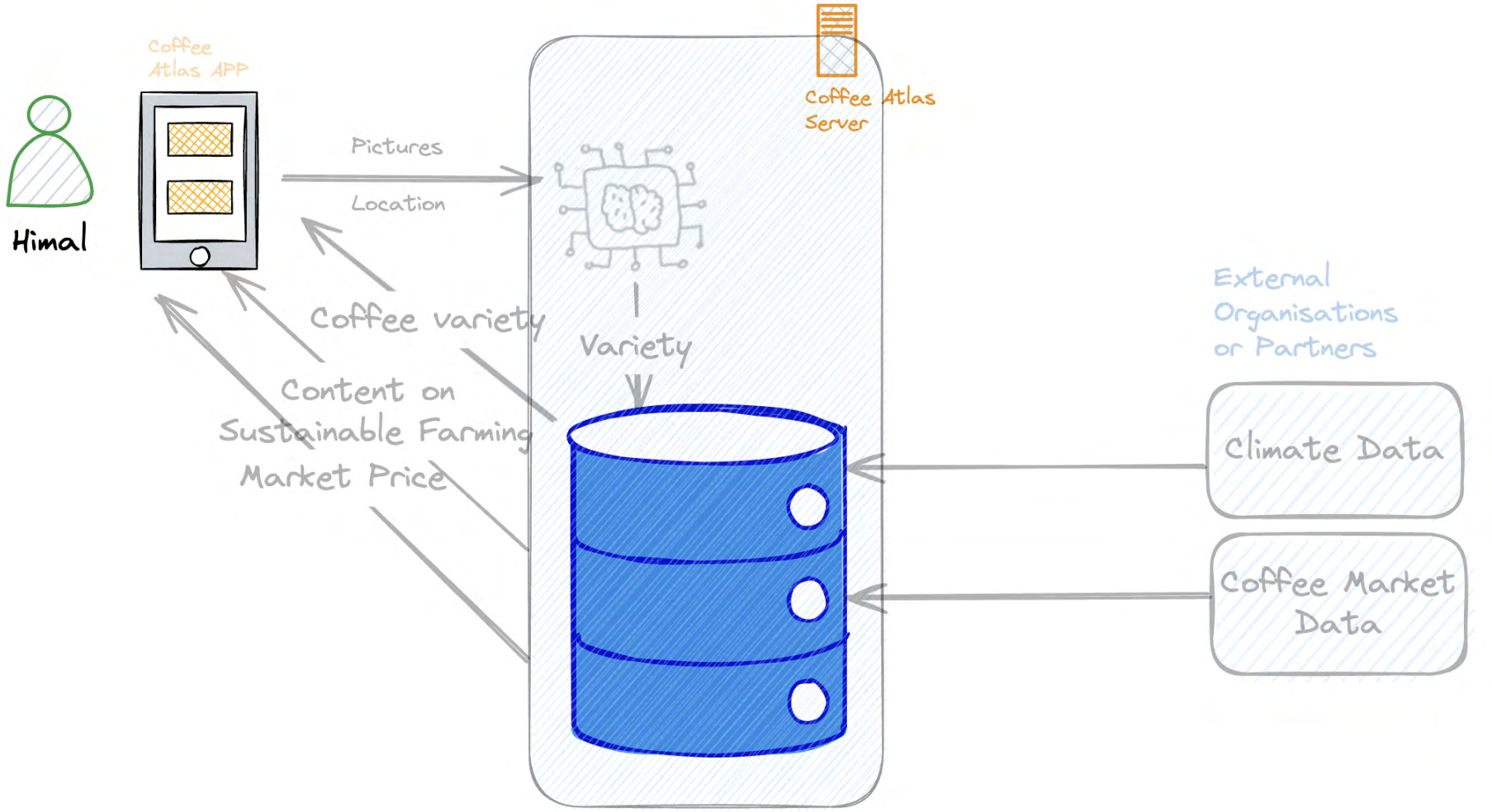
Sustainable coffee farming

- Empower farmers to take actions on climate change
- Allow farmers to “understand“ the true value of their coffee harvest and start building trading relationships

Researchers as second target group

- Identify varieties their research is based on

First sketch software architecture



What it takes to get it started?

Expertise in technology

- Expertise in AI & App Developers
- Server to store the data
- Translation to different languages

Expertise in biology

- Access to cultivars (biological gardens)
- Genetic tests to reassure the correctness of image recognition and/or provide additional identification possibilities

Expertise in sustainable coffee farming

- Knowledge on the treatment of rust and plat parasites
- Soil conservation, water reservoirs
- Agroforesting

Other

- Access to data about micro and macro climate
- Access to past and actual coffee prices on the global market
- Marketing campaign: Reach out to farmers to enable crowdsourcing

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