Creating impacts with open data for agriculture and nutrition in Kenya

BO-20-007-440 '*Add Q1 Creating impact open data in Kenia*'

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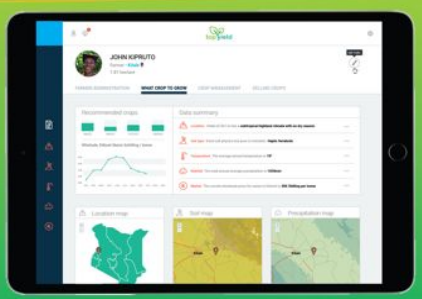


Summary

Open data is data that anyone can access, use and share. It is widely recognised as a priority goal by the development community and a driver for economic growth. Open data has the potential to contribute to one of the sustainable development goals: ending hunger. Recent high level interest has drawn special attention to the importance of open data in light of growing and critical global challenges affecting the health and welfare of people everywhere, including: the G8 Open Data Charter in 2013, the World Bank in 2014 and the GODAN Summit in New York in 2016. The June 2017 Ministerial Conference on Open data for Agriculture and Nutrition hosted by the Kenyan Minister for Agriculture, Livestock and Fisheries culminated in the Nairobi declaration in which 15 African countries commit themselves to strengthen the role of open data for their agricultural development.

The Government of Kenya is actively pursuing an open data policy in the field of agriculture and nutrition and has its own open data portal that features hundreds of data sets on agriculture and nutrition. There are also many other data collections that are of great value. With all these data sources available on the supply side, there is scope to deploy them for creating impacts in agriculture and nutrition, specifically with respect to food security. However, steps of enrichment of data to information and knowledge need to be taken, just as understanding the (user) needs or the beneficiaries that could work with the data.

This project scoped the supply (i.e. available datasets) and demand (requirements of end users) of (open) data for agriculture and nutrition in the Kenyan context and developed showcases and a prototype, that focused on potential impacts of use of data in agriculture and nutrition in Kenya. The showcases and prototype are transferable to other African countries:

1. Support to student led agricultural extension (led by University of Nairobi)
2. Using open data to support evidence-based policy making (led by WEnR)
3. Supporting start-ups (led by CTA)
4. Joint actions across the value chain for people, planet and profit (led by CABI). This showcase is the basis for the prototype (co-developed by WEnR and CABI).

During a reflection workshop in Nairobi with over 25 representatives from Kenyan government, -business and -research, feedback was gathered to test whether the problem was correctly identified, if the right (open) data was used, if the proposed solution was workable and whether the solution had an obvious business model with stakeholders.

Main findings include:

- collaboration among value chain players through open data will optimize the supply chain with shared benefits
- business involvement is crucial to guarantee continuity of a solution and must be present from the onset.
- User driven co-development is necessary to identify required data, share local data and open local data since not all the required data is openly available, or easily accessible.
- prototyping is a useful mechanism to match supply with demand.

We recommend co-development of a prototype to bring open data closer to a fully functioning application via a standardised method. The prototype could focus on the middle-tier of identifying and obtaining the right inputs and strengthen the position of and trust between farmers, agri-dealers and traders.

Introduction

Recent high level interest has drawn special attention to the importance of open data in light of growing and critical global challenges affecting the health and welfare of people everywhere (2013 G8 Open Data Charter, post-2015 Data Revolution and recommendations from a 2014 UN Independent Expert Advisory Group). The recent GODAN Summit 2016 in New York highlighted the potential of open data to contribute to one of the sustainable development goals:ending hunger. It ended with a commitment of many governments and other stakeholders to further develop innovations in open data towards ending hunger.

The Ministry of Economic Affairs (directorate ELVV), the Netherlands, has been involved in GODAN since 2013 and its involvement in open data has focused on the aspect of creating impacts. As a result of the efforts of ELVV, the following outcomes were achieved:

1. Internationally the focus on impacts and end-user driven is well accepted and clearly setting the agenda of GODAN as an international network. This focus helps the Netherlands to benefit from the international activities taken up by the GODAN network.
2. New partnerships were created between Dutch private sector players and international partners that allow new services to be developed and Dutch private sector partners to have a visual position.

The Government of Kenya is actively pursuing an open data policy in the field of agriculture and nutrition and has its own open data portal that features hundreds of data sets on agriculture and nutrition. There are also many other data collections that are of great value in the open data space.

At the GODAN Summit 2016 a group of partners met in a side meeting to discuss potential collaboration around showcasing open and private data for use in agricultural and nutritional development in Kenya. These partners were: Government of Kenya, University of Nairobi, CABI, Ministry of Economic Affairs of the Netherlands, CTA, Rothamsted Research, Netherlands Space Office and Wageningen University & Research.

In this first step in the collaboration, CABI, CANIS (University of Nairobi), CTA and Wageningen University & Research participated to scope the best options for creating impacts with open data in the Kenyan nutritional and agricultural context, which resulted in this workshop in Kenya.

Objectives of the workshop

The objectives of this workshop were twofold:

1. Scoping the supply (i.e. available data sets) and demand (requirements of end users) of (open) data for agriculture and nutrition in the Kenyan context
2. Develop showcases focusing on potential impacts of use of data in agriculture and nutrition

The rationale behind these two objectives is that the Dutch Government strongly believes that open data for agriculture and nutrition should be based on three pillars. Any approach should be:

- Impact driven
- Putting the end user should be in the driving seat
- Focused on a chain approach

Joint reflection on the showcases with stakeholders from KALRO, KEPHIS and the Ministry of Agriculture, Livestock and Fisheries and the Director General of KNBS, allows us to arrive at a shared understanding, obtain feedback from the participants in the workshop on the showcases, understand the main drivers of change but also what the barriers are, and enable a focused action agenda going forward in building the showcases and prototype and building capacity on open data.

Approach

The workshop discussions were based on practical cases in the Kenyan context. In order to achieve this, we developed showcases with factsheets for 4 cases (fully described in Annex III) which are:

1. Support to student led agricultural extension (CANIS)
2. Supporting start-ups in agriculture and nutrition (CTA)
3. Using open data to support evidence-based policy making (Wageningen Environmental Research)
4. Joint Action across the value chain for people, planet and profit (CABI, Wageningen Environmental Research)

Each showcase is described in terms of:

- Title of the showcase;
- Description of the problem and potential solution;
- Expected impacts/benefit, including beneficiaries;
- Data sources and topics;
- Workflow of using the data, with what actors, and how;
- Transferability of the showcase to other locations.

The presentation of these four cases was followed by parallel breakout groups per showcase. In these groups we focussed on validation of the cases and completeness check. More specifically, the following questions were used to give direction:

- Have we correctly identified the problem? If not, what is the problem then; how could it be redefined?
- Do we have the right data to help build a solution? If not, why not?
- Is it FAIR (Findable, Accessible, Interoperable, Reusable)
- If a solution is proposed in a case, is it workable?
- Is there an obvious business model behind a solution? If not, what could it be?
- Are the right stakeholders involved?

The afternoon session started with a presentation of a prototype which was based on showcase 4. This prototype was presented as a series of PowerPoint slides showing possible functionality of the prototype as a non-clickable demo (see annex VII). This presentation and the presentation of the other three showcases were used as input for discussion in parallel breakout groups, in order to define an action plan for a working prototype.

Workshop outcomes

From the parallel sessions in the morning and the short discussion directly after the presentation of the prototype, it turned out that most of the questions and remarks were focused around the following topics:

- Business models
- Applicability of the prototype
- Use of local data

Business models

It did not come as a surprise that business models in the context of open data were in many people's minds. Many organisations are interested in opening their data but are unsure of the associated costs and benefits. It requires a transition in thinking, from a business model of selling data and updates of data towards selling services based on the needs of potential customers. It is a transition from supply driven to demand driven business.

Whatever business model is applied, the following questions are a good starting point[1]:

- What are your organization's' goals?
- How is data used now, and how could it be used better in the future?
- How can you get data driven value for your business?
- How do the business models compare?

Many of the participants in the workshop were representing the Kenyan government, universities and NGO's. Many of these organisations are not necessarily interested in promoting open data not for their own financial gain, but in order to have wider social, environmental and economic benefits. In contrast, some of the participants were representing business which do have a direct interest in increasing benefits for their own organisation.

These seemingly contrasting goals do not necessarily mean different business models. It could well be that instead of a simple business model (a farmer or a donor or a agrobusiness pays for the data or service) rather a mixed, or freemium,model could be the way to go. Such models could serve both the goals of government, as businesses who want to make a profit. As an example of a freemium model, a basic version of a product, or service, can be made available for free, financed by the government, with a version of the product, or service, that may have added value attracting an additional price tag.

As examples of these added services, value added service insurance or, access to plant doctors came up.The free product acts as marketing, establishing the provider in the marketplace and increasing the take-up of the paid-for product[1]. Whatever model is being implemented, the general feeling was that the service model should not be too complex, nor the payment options.

It was generally acknowledged that there exist many examples around us that we should learn from. These included applications developed in other sectors e.g PharmNet[2]. It also emerged that we must learn from from sustainability challenges experienced by other services e.g icow[3].

Trust was also established as a key factor for development of any successful application. It was therefore agreed that for the success of one of the variants of the prototype it would be vital to develop a certification scheme for ago-dealers and to accredit agribusinesses and agro-dealers with certificates approved by a trusted body: the agrochemical association of Kenya (AAK)[4] and/or KEPHIS[5]. It was noted that the proposed platform could act as a builder of trust by profiling only certified agribusinesses or gives more prominence to certified agribusinesses in search results. For certification to happen it is important to closely work together with agribusinesses and innovation hubs

[1] https://theodi.org/guides/how-make-business-case-open-data
[2] https://www.businesscalltoaction.org/member/pharmnet
[3] http://www.icow.co.ke
[4] http://www.agrochem.co.ke
[5] http://www.kephis.org

(we note that there are about 8,000 stockists/ agro dealers in Kenya).

Quality of the provided services is also key so agencies like KALRO, CABI and CANIS can provide quality assurance.

Applicability of the prototype

The prototype

- Should provide information to all value chain actors (input suppliers, policy enablers/ supporters, producers and consumers)
- Consumers – subsidies, price regulation, quality control
- Traders/ distributors – infrastructure, issues to address post harvest handling, value addition and processing, market research and access to finance/ credit
- Policy enablers – sensitization/ awareness, advocacy
- Policy supporters – Data infrastructure, adoptive research

Use of local data

Most of the data used in the prototype originate from global or national sources (e.g. soil-, meteo- and market price data). The advantage of these large scale data sources is the enablement of their automated processing facilitated by the data's uniformity across space and time. Local data (e.g. crop variety, crop calendars, outbreaks of pests and diseases, pesticide and fertilizer use) are expected to enrich, improve the quality and broaden the scope of potential services. Many data sources for local data were identified by their attending owners. The owners declared to be eager to open up their local data for societal impact, but they require support for doing so. Opening up may be hampered by political, privacy, economic competition and trade sensitivity issues but also because there is lack of capacity or awareness to do so. Since many data sources are available; an approach for determining what data to open up first is needed. Co-development with the intended end-users and data-providers is elementary to ensure service acceptance and uptake. The prototype is a useful basis for starting such co-development.

Concluding remarks and recommendations

Concluding remarks

During the workshop many things were said by the participants. Some of these remarks were shared amongst participants, others were valid only for specific participant applications.

The following list covers the shared conclusions of the group, which are the result of the discussions in the breakout groups on the 4 cases and reported back plenary, or the result of the discussions in the afternoon, where we discussed business model, applicability of the prototype and the use of local data.

- For any solution to be successful, looking at the whole value chain is crucial.
- Identify the problem holder and define the problem, start with the demand and from there work towards the supplier.
- Local problems need local data to solve them
- Don't reinvent the wheel. There are successful examples of Open Data initiative around us. Learn from what they did

- Without trust or confidence that data is valid and partners are qualified, initiatives are bound to fail
- Cooperation, collaboration and co-creation by the partners in the value chain are key
- Capacity building and awareness of each other's' needs is important at all levels
- Be aware of cultural differences
- There is more data available that people think, but is is not open (yet) or is in an unusable format
- Having data not opened up is not always because of commercial or legal restrictions, but in many cases because there is lack of awareness that data when shared could be very useful to others

Recommendations

Further developing a prototype seems a perfect way to intensify collaboration and to investigate how co-creation and co-development can lead to an application or service with a sustainable business model behind. The participants are aware that working together along the whole value chain is crucial.

Having said that, there seems to be particular interest in the role of the agri dealers in the chain. Certification of agri dealers by and under supervision of independent institutions such as KALRO, CABI and CANIS working with trade agencies such as AAK might be a good step forward in strengthening this part of the value chain. More particular, this will increase farmers's trust that they are buying the right product/service by an agri dealer.

The next prototype could then focus on this part of the chain, in order to mobilize agri dealers to responsibly bring timely inputs (seeds, fertilizers, pest control products) to farmers in need of fertilizer or pest control in Kenya combined with certification of agri dealers with an ICT solution (principally mobile) to link farmers to certified agribusiness. This will help to counter use of fake agro chemicals and will increase trust. Open weather data, open data on soils and plant diseases etc should be integrated in this prototype to support better informed farm management by smallholders.

Annex I - Agenda

Location: KALRO, Kaptagat road, Loresho Nairobi Kenya
Date: October 3, 2017

08:15 Guest arrival and registration
08:45 Introductions

- Welcome by the host (Dr. Eliud Krieger, Director General, KALRO)
- CANIS (Prof. Kiama, Principal CAVS)
- Government of the Netherlands (Rik Martens, first secretary food security)
- Government of Kenya, Director General, Kenya National Bureau of Statistics
- Global Open Data for Agriculture and Nutrition (Martin Parr & Onno Roosenschoon, GODAN)
- PlantWise Kenya (Florence Chege, CABI)

09:00 Workshop participant introduce themselves
09:30 Workshop objective (Onno Roosenschoon, WEnR)
10:00 Show case presentations

- Support to student led agriculture (Kiringai Kamau, CANIS)
- Using open data to support evidence-based policy making (Peter Verweij, WEnR)
- Supporting Start-ups (Chipo Msengezi, CTA)
- Joint actions across the value chain for people, planet and profit (Martin Macharia, CABI)

10:45 TEA BREAK
11:00 Parallel breakout groups per showcase: validation / completeness check
11:45 Plenary reporting

12:45 LUNCH BREAK

14:00 Presentation of prototype (Martin Macharia and Peter Verweij)
14:15 Plenary feedback round
15:15 COFFEE and parallel breakout groups to define action plan for prototype
16:00 Plenary reporting
16:40 Joint reflection

- Find priority actions
- Round of feedback: what lessons did you learn? What could be actions for you?

17:15 Closing

18:00 Depart for drinks and dinner

Annex II - Participants

Wageningen University & Research, CABI, CANIS and CTA undertook an open data showcase in September 2016 which has culminated to the workshop that was undertaken in Nairobi by the High level Open Data Showcase partners as follows:

Presenters

1. Onno Roosenschoon, Facilitator
2. Kiringai Kamau, Showcase 1
3. Peter Verweij, Lead Consultant – Showcase 2 and prototype
4. Chipo Msengezi, Showcase 3
5. Martin Macharia, Showcase 4 and prototype

Participants

The following people participated in the meeting for the full duration of the workshop or only in the morning or afternoon session:

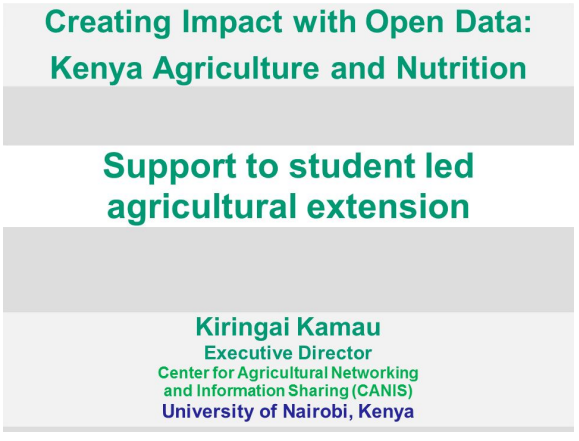
NAME	ORGANISATION	EMAIL
1. Alexander Valetor	Yielder	alexander@yielder.world
2. Andrew Guchu	KPCU	wachiragichu@gmail.com
3. Anthony Esilaba	KALRO	anthony.esilaba@kalro.org
4. Boniface Akuku	KALRO	boniface.akuku@kalro.org
5. Byron Anangure	RCMD	banangure@rcmrd.org
6. Chipo Msengezi	CTA & GODAN	msengezi@cta.
7. Daniel Karanja	CABI	d.karanja@cabi.org
8. Eunice Ringera	KEPHIS	eringera@kephis.org
9. Felister Makini	KALRO	felister.makini@kalro.org
10. Florence Chege	CABI	f.chege@cabi.org
11. Francis Muthami	KCSAP (MOALF)	fkmuthami@kapp.go.ke
12. G.A Keya	KALRO	george.keya@kalro.org
13. Gerbren Haaksma	Yielder	querbren@yielder.world
14. Humphrey Wattanga	CRA	wattanga@gmail.com
15. Jan Willem	eProd	janwillem@eprod-solutions.com
16. John Mburu	University of Nairobi	John.Mburu@uonbi.ac.ke
17. John Mburu	AGECON	jmburu@yahoo.com
18. John Nderitu	UON	huria@uonbi.ac.ke.
19. Joseph Kariuki	VACID Africa	joseph.kariuki2011@gmail.com
20. Kenneth Mubea	RCMD	mubea@rcmrd.org
21. Kiringai Kamau	CANIS	kiringai@gmail.com
22. Martin Macharia	CABI	m.macharia@cabi.org
23. Martin Parr	CABI & GODAN	m.parr@cabi.org
24. Muchiri Nyaggah	LDRI	muchiri@developcocal.org
25. Muthoni Livingstone	UTANRMP	mlivingsotne2004@gmail.com
26. Nduta Karanja	Digital Hands Africa	ndutagkaranja@gmail.com

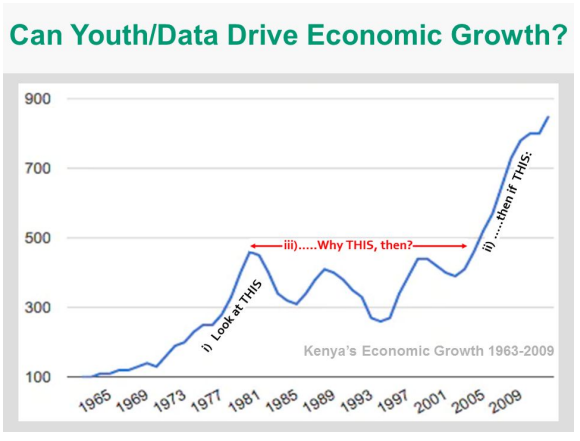
27. Niek Van Duivenbooden	Trimpact	niek@trimpact.nl
28. Onno Roosenschoon	Wageningen Environmental Research & GODAN	onno.roosenschoon@wur.nl
29. Patrick Mwaniki	KNBS	pmwaniki@knbs.or.ke
30. Peter Verweij	Wageningen Environmental Research	peter.verweij@wur.nl
31. Rose Makenzie	EKN	rose.makenzi@minbuza.nl
32. Wachira Kagwongo	Kenya Potato Council	nkaguongo@npck.org
33. Patrick Musila Mwaniki	KNBS	pmwaniki@knbs.or.ke

Annex III - Support to student led agricultural extension (showcase 1)

Factsheet

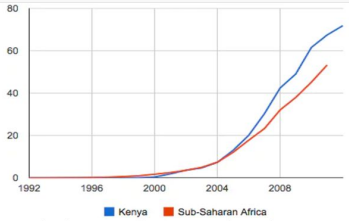
Presentation





What with Mobile Data Driven Infusion…?

1. To tap from the growing mobility bulge…
2. To drive wealth and employment leaning innovations for our youth…
3. To surge ahead in the digital space!

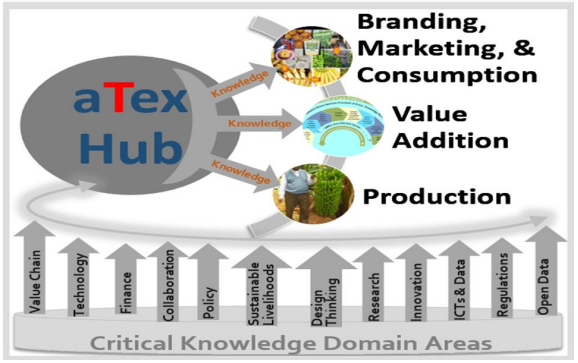


4. To promote data driven agriculture as the sector that gives Kenya the ***'opportunity edge'*** over the 'continental others'…
5. To integrate value chain frameworks with mobile innovations to create new ways for economic growth and development…
6. In organizational frameworks that host food-systems leaning value chains to illuminate opportunities for youth agripreneurs!

Youth Doing Agriculture…Need guidance!

Youth though need organization….

Knowledge &Technology - aTex Hub!



Can Collaboration Achieve it?

1. What if we use knowledge to address the challenges presented by the various agricultural sector shocks to fortress our economy against the imbalances that exist?

2. Can collaboration between research, academia, government, development actors, private sector, and producers work?

3. Is human centered ***design thinking*** backed by knowledge with investments lacking?

Thank You

Feedback

Aspect	**Remark**
Identification of the problem	· Yes the problem has been correctly identified as poor extension services
Data	· We have enough data and right data
FAIR	· The data is not easily findable, accessible, interoperable and reusable

Business model	· There is a business model but need to look at others and also what has been tested in other countries · Need to involve the government

Annex IV - Using open data to support evidence-based policy making (showcase 2)

Factsheet

Creating impact with open data:
Kenya agriculture and nutrition

Using open data to support evidence-based policy making

Potato is the second food crop in Kenya and an important source of income. There is a steady increase in the production and consumption of potato in terms of number of varieties grown, volume and geographical spread.

Potato production in Kenya is expected to expand further as the accelerating climate change impacts other food crops like maize which is already under pressure by the increasing spread of diseases. However there is a large supply-demand gap on desired potato varieties hampered by farmer accessibility to markets, local availability of those varieties and price fluctuations due to a lack of storage facilities[1].

Data in the form of maps and graphs is a common language between the actors in the potato value chain (including national and county level government officials) and facilitates shared understanding and effective collaboration. Workshops with storytelling, participatory mapping of issues and joint exploration of potential measures and their likely impacts are used to formulate a common strategy and contribute to the agricultural master plan.

Expected impacts and benefits

- **Improved understanding between stakeholders. During the workshop participants are encouraged to listen to each other and co-develop ideas.**
- **Participants have a more active understanding of issues by visualising impacts of measures and the trade-offs and synergies between different measures. Potential measures might include additional selling points for potato varieties, or a shared storage facility.**
- **Government awareness of the importance of and bottlenecks in the potato value chain helping to optimize policy making**
- **Farmer communities understand the growing demand for potatoes and may choose to start growing (more) potatoes**
- **Farmer communities understand how to benefit from the government subsidised fertiliser program**
- **Value chain actors can create a partnership model of potato production and marketing. Actors include all levels from seed development, production, multiplication and distribution through to potato processing and consumption**
- **Interest of international companies to partner with local companies**
- **Identification of data-availability bottlenecks as result of hands-on group work with available open data**

[1] Manyasa, E., 2015, ware potato market survey in Kenya

OPEN DATA IMPACT

Open data is data that anyone can access, use and share. It is widely recognised as a priority goal by the development community and a driver for economic growth. High level interest has drawn special attention to the importance of open data in the light of growing global challenges affecting the health and welfare of people everywhere.

THE KENYAN CONTEXT

The Government of Kenya is pursuing an active open data policy and has its own open data portal that features hundreds of data sets on agriculture and nutrition.

AGRICULTURE & NUTRITION

With all these data sources available on the supply side, there is scope to deploy them for creating impacts in agriculture and nutrition, specifically with respect to food security. However, steps of enrichment of data to knowledge need to be taken, just as understanding the needs of the beneficiaries that could work with the data.

MATCHING WITH DEMAND

The supply and demand of open data for agriculture and nutrition are matched in the Kenyan context. Showcases focus on potential impacts of use of open data in agriculture and nutrition in Kenya. The showcases are transferable to other African countries.

Creating impact with open data:
Kenya agriculture and nutrition

Data sources and topics

- MAPSPAM — Harvested area, physical area, production and yield — WWW.MAPSPAM.INFO
- Global Yield Gap Atlas — Yield gap information on nutrient and water availability — WWW.YIELDGAP.ORG
- Plant diseases — WWW.PLANTWISE.ORG
- AgMIP — Climate change scenarios — WWW.AGMIP.ORG
- KENYA openData — Kenya open data on many topics such as agriculture, environment, water, census — WWW.OPENDATA.GO.KE
- AFRICA INFORMATION HIGHWAY — Africa Information Highway, incl. the financial sector database — DATAPORTAL.OPENDATA FORAFRICA.ORG
- FAO — FAO census and FAO ecological zones — WWW.FAO.ORG/FAOSTAT
- WRI — WRI on topics like land form, irrigation, etc — WWW.WRI.ORG/RESOURCES/DATA_SETS

Workflow

Guidance on where to get data enables extension officers to prepare for visiting farmers and help them to obtain the best results (see also CABI's PlantWise and plant clinics, haller).

Transferability

This type of participatory workshop is applied in a great variety of settings and domains. Commonly participants include policy makers, decision makers, experts, NGO's, interest groups, associations, cooperatives and industry representatives. Main benefits are facilitating joint action setting: reduced lead time for problem scoping, improving understanding between participants and better problem comprehension by using (open) data.

Advice on actions needed to enable operationalisation

- **Identification of workshop participants to represent the full potato value chain actors**
- **Interviews with workshop participants during scoping and workshop preparation**
- **Cross-check required data availability based on interviews**

[2] Verweij et al., 2016, QUICKScan as a quick and participatory methodology for problem identification and scoping in policy processes

Presentation

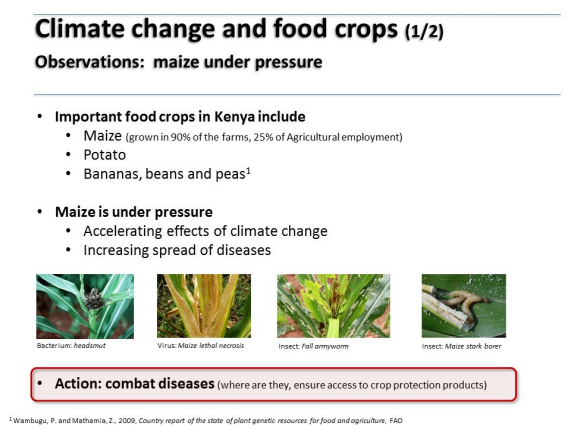
Creating impact with open data:
Kenya agriculture and nutrition

Using open data to support evidence-based policy making

Peter Verweij, Sander Janssen

Nairobi, 3 October 2017

quickscan — A tool to facilitate the decision process in participatory settings — quick, easy, transparent



Climate change and food crops (1/2)

Observations: maize under pressure

- **Important food crops in Kenya include**
  - Maize (grown in 90% of the farms, 25% of Agricultural employment)
  - Potato
  - Bananas, beans and peas[1]
- **Maize is under pressure**
  - Accelerating effects of climate change
  - Increasing spread of diseases

Bacterium: *headsmut* | Virus: *Maize lethal necrosis* | Insect: *Fall armyworm* | Insect: *Maize stork borer*

- **Action: combat diseases** (where are they, ensure access to crop protection products)

[1] Wambugu, P. and Mathamia, Z., 2009, *Country report of the state of plant genetic resources for food and agriculture*, FAO

Climate change and food crops (2/2)

Longer term: adapt to climate change

- **Potential for potato**
  - Already 2nd largest food crop in Kenya
  - Already important source of income[2]
  - Climate change has positive effects on potato yields in Kenya[3]
  - But: supply-demand gap on desired potato varieties and quality
    - Lack of farmer accessibility to markets
    - Local availability of varieties
    - Price fluctuations due to lack of storage facilities

Rising potato fields, yields and prices, *Kenya world potato atlas*, 2007, CGIAR

Potato transport

Supermarket selling potato

- **How to determine to take what (policy) actions where ?**

[2] Manyasa, E., 2015, *Ware potato market survey in Kenya*, SNV Kenya
[3] Elseehy, M., Shaheen, S., *Climate change and potato*, CIP and WRI, retrieved from https://www.slideshare.net/sarashaheen2/potato-climate-change-64392049

Participatory mapping & modelling

QUICKScan issue and hotspot identification

Participatory mapping approach

- Facilitated workshop with decision makers, stakeholders and experts
- Integrating expert knowledge, tacit knowledge and values

Software tool

- to support the exploratory dialogue
- by linking knowlege to available spatial and statistical data

- **Which coffee areas are, production-wise, most affected by climate variability change?**
- **What factors determine production levels?**

Process (1/3)

Setup

- **Two 2-day workshops**
  - national scale
  - Local scale
- **Participants**
  - ministry of agriculture,
  - local government,
  - coffee federation (FNC),
  - Nestlé (private sector),
  - Scientists (integrated water management, coffee production, soil, spatial data)
  - extension officers
- **Open data**
  - ASTER - Digital Elevation Model (incl. slope, slope length, aspect) *[30m²]*
  - National open data clearinghouse – roads (for accessibility – travel time)
  - ClimWatAdapt - climate (variability) projections *[1 km²]*
  - FNC – land use map *[25 m²]*
  - Hanssen – world de-/re-forestation map *[30m²]*
- **Closed data**
  - FNC & Nestlé – Farm: location, size, yields, farmer age and – gender
  - FNC – water saving and pollution reduction implementations

Process (2/3)

Issue inventory

- **Break out groups**
  - Inventory of drivers for coffee production (and check against available data)
  - Discussion on potential scenarios
  - Determine potential measures and their likely impacts

Process (2/3)

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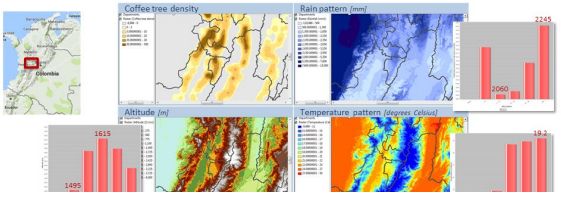
  - Discussion on potential scenarios
  - Determine potential measures and their likely impacts
- **Results of a group** (excerpt)
  - Drivers: soil climate, topography, farmer age, schooling, input availability, etc.
  - Climate scenario: warmer, more extreme events



Process (2/3)

Issue inventory

- **Break out groups**
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- **Results of a group** (excerpt)
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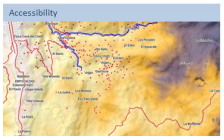
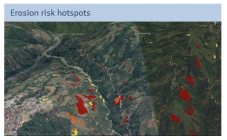
  - Climate scenario: warmer, more extreme events
    - Need climate proof varieties: older unschooled male farmers are hesitant
    - New optimal areas have low accessibility (harvesting personnel, inputs, (health) services)
    - New optimal areas are on steeper areas -> erosion risk





Process (3/3)

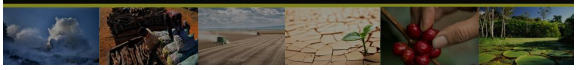
Group synthesis

- **Break out groups**
  - Inventory of drivers for coffee production (and check against available data)
  - Discussion on potential scenarios
  - Determine potential measures and their likely impacts
- **Results of a group** (excerpt)
  - Drivers: soil climate, topography, farmer age, schooling, input availability, etc.
  - Climate scenario: warmer, more extreme events
    - Need climate proof varieties: older unschooled male farmers are hesitant
    - New optimal areas have low accessibility (harvesting personnel, inputs, (health) services)
    - New optimal areas are on steeper areas -> erosion risk
- **Group synthesis**
  - Each group reports
  - Discuss and synthesize
    - Stimulate climate proof varieties
    - Advocate coffee as cash crop to farmers in near future optimal areas
    - Provide training to new farmers
    - Improve accessibility (e.g. improve road quality)

How could this approach be applied in the Kenyan context?

- **Objective**
  - Joint identification for hotspots for potato production
  - Joint identification of actions (e.g. insurance, central storage and transport, packaging, etc.)
- **Participants**
  - National government (e.g. setup incentives to diversify crops, or fiscal policies),
  - County government (e.g. initiate cooperatives, improve road quality),
  - Kenya potato council,
  - International Potato Centre (CIP)
  - Others? (e.g. consumer markets, seed potato producers, input suppliers)
- **Data sources**

End of slideshow



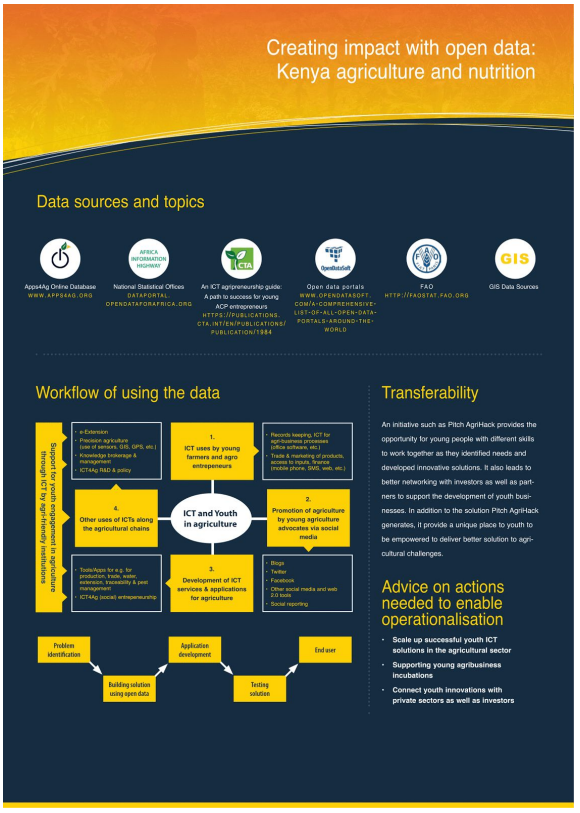
Feedback

Aspect	Remark
Identification of the problem	· The showcase identifies a real problem (climate change effects on food crops) · Quantity and quality of food crops and impact of climate change · Transition to nutritious food available while recognizing changes in the environment/ climate · Soil depletion · Attention to climate resilient crop varieties · Changes in consumer requirements, varieties
Right data	· Kenya soil survey datasets (find out about their coverage) · Look for Soil fertility maps (although done along time ago) · Look for KEPHIS datasets/ national pesticide datasets
Business model	· Crops must be profitable · Cultural aspects influence crop choices · Dual agricultural economy needs to be put into consideration (large and small scale farmers)

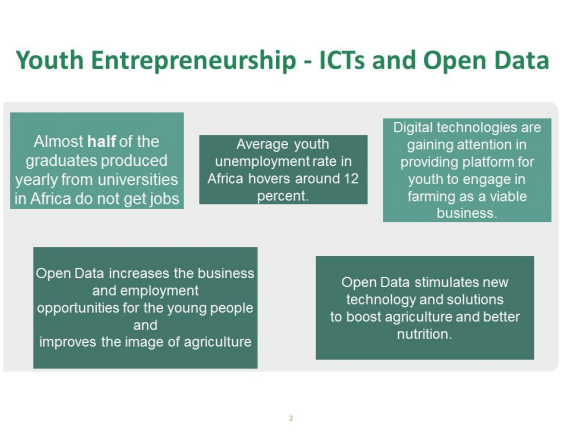
Stakeholders	· Policies must be in place/ options for development · Build consensus among the stakeholders · Mapping – climate change (soil, crops) · The workshop to build a solution on data needs (stakeholders) · Bring together data owners(soils, fertilizer) and Data analysis expertise · Work to identify issues and set action plans · Choices must be made based on knowledge and incentives

Annex V - Supporting start-ups in agriculture and nutrition (showcase 3)

Factsheet



Presentation



Data sources

AFRICA INFORMATION HIGHWAY
National Statistical Offices
DATAPORTAL.OPENDATAFORAFRICA.ORG

FAO
HTTP://FAOSTAT.FAO.ORG

KENYA OpenData
Kenya open data on many topics such as agriculture, environment, water, census
WWW.OPENDATA.GO.KE

GIS
GIS Data Sources

Open data portals
WWW.OPENDATASOFT.COM/A-COMPREHENSIVE-LIST-OF-ALL-OPEN-DATA-PORTALS-AROUND-THE-WORLD

An ICT agripreneurship guide: A path to success for young ACP entrepreneurs
HTTPS://PUBLICATIONS.CTA.INT/EN/PUBLICATIONS/PUBLICATION/1984

3

CTA AgriHack Talent Programme

AgriHack Talent

Supporting ICT innovation and entrepreneurship in agriculture by youth

Facilitated by the ARDYIS project

Agrihack involves a **start-up competition**, provides a business training boot camp, **offers grants**, **hackathons** and facilitates access to investments, additional capacity building and promotional opportunities.

HACKATHON =

An event during which computer programmers (and development stakeholders) collaborate intensively to develop an ICT application or platform addressing a specific challenge.

4

CTA AgriHack Talent Programme

AgriHack Talent

Supporting ICT innovation and entrepreneurship in agriculture by youth

Data in Hackathons

Bringing together software and agricultural innovators to create the beginnings of practical solutions that allow for better utilizing, collecting, and/or making more accessible open data to improve our food system.

5

Case: FarmDrive, Kenya
First AgriHack winner 2013

FarmDrive

Alternative Credit Scoring for Smallholder Farmers

FarmDrive uses mobile phones, alternative data, and machine learning to close the critical data gap that prevents financial institutions from lending to creditworthy smallholder farmers.

SMALLHOLDER FARMER

1. SMS the word FARMDRIVE to 21342 to register
2. Keep records of your expenses, revenues, and yields.
3. Apply for a loan
4. Get approved and receive your loan via M-PESA
5. Repay your loan on time

6

FarmDrive

FarmDrive, Kenya

Alternative Credit Scoring for Smallholder Farmers

FINANCIAL INSTITUTIONS

Increased Portfolio

reduced time spent on manually assessing farmer's data for creditworthiness >>> increased agriculture loan products

Risk Mitigation

Farmers' data + Credit risk algorithm = credit scores that account for the many factors that affect the repayment capacity of farmers.

Cost Reduction

- Reduction of costly on-the-ground recruitment expenses
- Data-driven loan product development reduce losses
- scalability of FarmDrive's model reduces operational costs

Farm Drive's use of data

- They collect data from farmers – land data, crop data, yield data, demographic data etc.
- Weather and climate data
- Soil data

Data is fed into their algorithm to calculate the credit scores

Young start-ups do not have much funds to spend on datasets – mainly open data

8

Results

Following the support, **FarmDrive** has registered **3500 farmers** and a total of **750 loans** were disbursed to Kenyan farmers worth up to **15 million KSh**.

An assessment by Farmdrive showed that the **income** of farmers involved has increased by **31.71 %** and access to credit has increased by **54.81%**.

Farmdrive also attracted investments of **$100,000** from an international venture capital firm.

175 young ICT innovators to date have benefited from AgriHack Talent activities

Other prominent AgriHack winners:
Ensibuuko, Uganda – whose services where launched in 2013 after it won CTA's hackathon – **won 500 000 USD investments** from a **Canadian Venture Capital** firm in 2016.

9

Expected benefits

- New opportunities to foster agribusiness and agricultural development using data and ICTs.
- Increased youth employment
- Increased innovation that support the development of agricultural sector
- Interest of private sector to partner with youth start-ups to develop business
- Youth become job creators rather than job seekers
- Increased opportunities to learn and solve problems in agricultural contexts, using data and ICTs

10

Advice on actions needed to enable operationalisation

- Provide access to more open data for agriculture
- Data needs to be accurate, granular and frequently updated.
- Support young agribusiness incubations
- Scale up successful youth ICT solutions in the agricultural sector
- Connect youth innovations with private sector as well as investors

11

Conclusion and proposition

An initiative such as the AgriHack Talent Programme provides the opportunity for young people with different skill set to work together to identify needs and apply data and ICTs to develop innovative solutions.

Is this a viable solution for Kenya? Are there similar models?
Have local startups been successful?
What is needed to make such a programme work here?
Who needs to be involved?

12

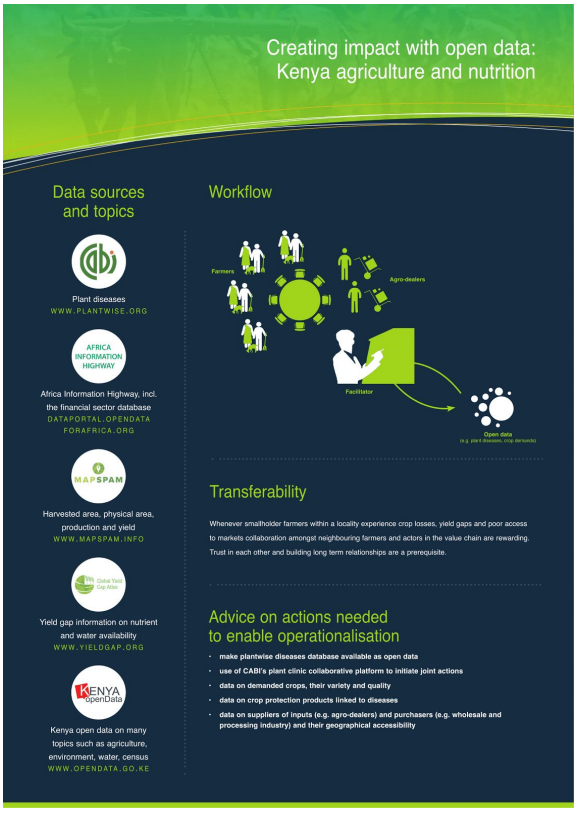
Feedback

Aspect	**Remark**
Identification of the problem	· Interrogate development plans e.g. review the 2017 – 2022 government strategy on agriculture specifically on access to markets and youth engagement in agriculture · Many farmers (including youth) have challenges finding markets for their produce · Use ICT to expose (at a cheap cost) what agricultural commodities are produced and available for sale · Youth lack business opportunities and support hence find agriculture less profitable · Understand Kenya (80% of the land is dry and livestock farming is predominant, high unemployment, low education) · Engage stakeholders to find entry points, bring together people with the problems and those with the solutions
Right data	Yes the right data is available but: · Need to prioritise open data (markets) · Make information available · Start with the market, who has the problem? · Enable the farmer get the information wanted

	· Build capacity and legal framework
Business model	· Work with businesses that are already working and have succeeded in sustainability · Start with people already doing something
Stakeholders	· All actors in the value chain (input suppliers, researchers, enablers (government) and consumers · Identify value chains where we could add value (especially in the leather industry)

Annex VI - Joint action across the value chain for people, planet and profit (showcase 4)

Factsheet



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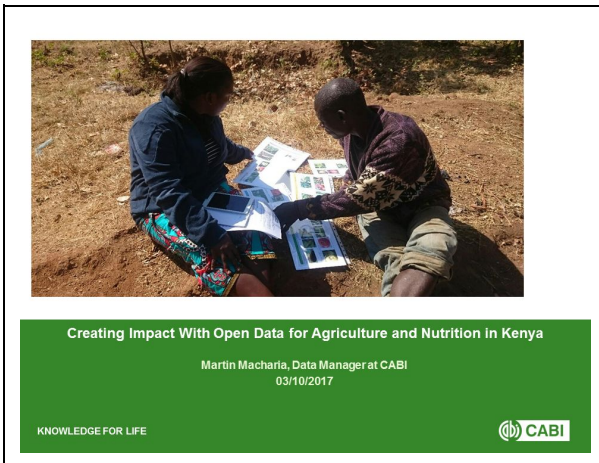
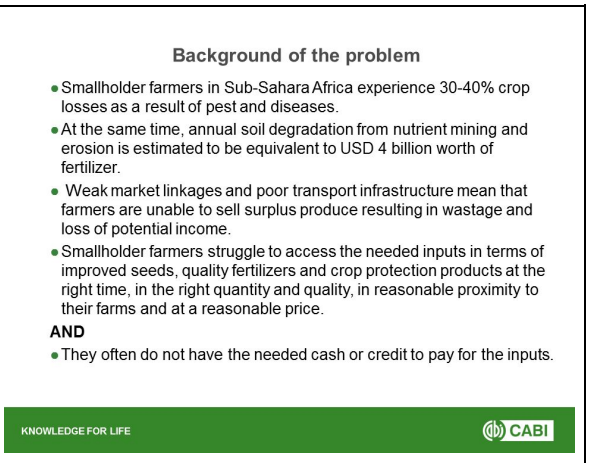




As part of the solution

- Farmers need access to timely and accurate information on:
  - how to combat pest and diseases,
  - how to manage their soils in a manner that best suits their conditions, what crop varieties best suit their local soils and climate and are resistant to local pests and diseases,
  - how to manage pest attacks to minimise losses and maximise profit, which crops or varieties sell well locally, or withstand transport to more distant markets and how to access information on inputs.
- Farm input suppliers; agro-dealers and extension advisors on the other hand need information on the right products and recommendations to give to farmers relevant for the local conditions.

So what is needed

- Data needs to be available and accessible to everyone in a usable form to provide the above practical solutions to policymakers, input suppliers and farmers.
- The power of using huge amounts of data generated every day and from diverse sources leveraged with parallel developments in information and communication technologies and data science has yet to be fully exploited to enable smallholder famers access accurate and timely data on weather, plant and soil health as well as market information to plan and achieve the best yield and crop prices.
- In the developing world many farmers use mobile phones as their main communication tool and therefore mobile phones can be used to channel this information once packaged in a usable format.

How do we link supply and demand for open data to address the challenges

- The proposed prototype aims to combine localised open spatial data on:
  - crop suitability,
  - soil fertility, climate,
  - pests and diseases and
  - market information on selected crop - maize.
- The tool will process these spatial layers using geo-statistical techniques and
- present the information on an interface / dashboard that enables the user source content for decision making.

Expected impacts / Benefits

- Enable farmers get localized crop pest, disease and soil management information
- Equip extension officers and agro-dealers with information to provide farmers with suitable input for their local context
- Ensure that the right pest, disease and soil management products and services are available locally
- Provide information that is responsive to local pest and diseases and soil health problems in a usable format
- Bridge information gaps by identify geographically similar areas in terms of agro-ecological zones so that farmers and extension service providers in areas that are similar, even though far apart, can share and learn from each other on best practices, or take advantage of available management practices that have worked in other similar regions

Data

Maize crop suitability map

- Maize crop cover -AFSIS (http://africasoils.net/)

Soil data

- www.soilgrids.org
- http://data.isric.org/geonetwork/srv/eng/catalog.search#/metadata/4648929a-8031-49cc-9d56-9f3aeff2f8d9
- organic carbon, total nitrogen, pH(H2O), CECsoil, CECclay, base saturation, effective CEC, aluminium saturation, CaCO3 content, gypsum content, exchangeable sodium percentage (ESP), electrical conductivity of saturated paste (ECe), bulk density, content of sand, silt and clay, content of coarse fragments, and available water capacity.

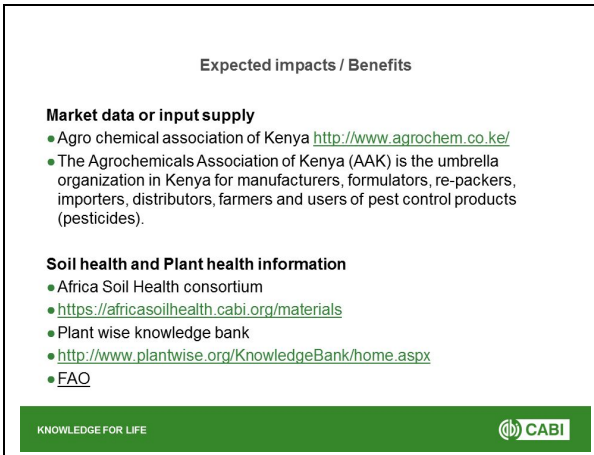
Expected impacts / Benefits

Crop pest and diseases

- The PlantWise Knowledge Bank - a global resource to help combat plant health problems. The database allows user to select their location from a menu to view country- or region-specific plant health information.
- http://www.plantwise.org/KnowledgeBank/home.aspx
- https://www.plantwise.org/KnowledgeBank/login.aspx?ReturnUrl=%2fKnowledgeBank%2fClinics%2fPlantClinicsHome.aspx

Climate/ weather data

- http://www.meteo.go.ke
- weather.com



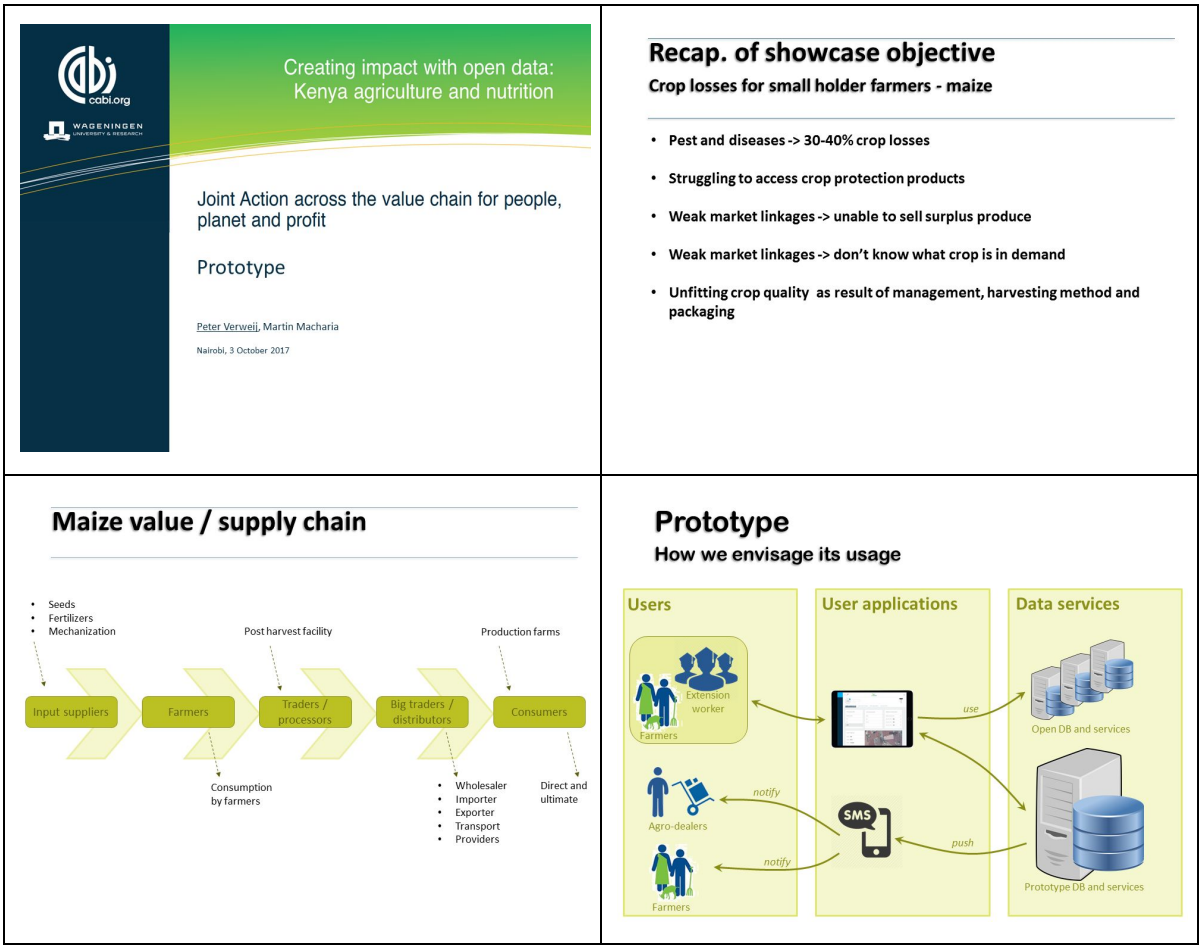
Feedback

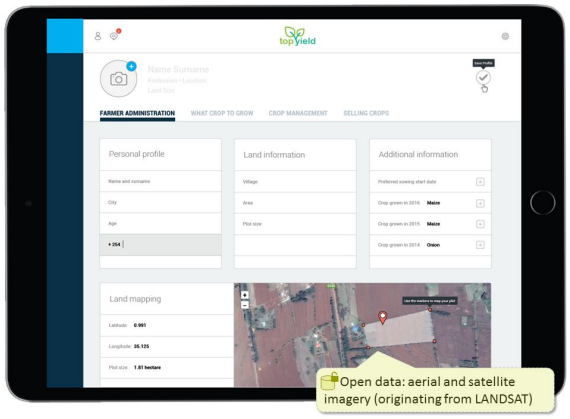
Aspect	Remark
Identification of the problem	· Information gaps farmers face need data from different sources (joint action) · Data from different sources is presented in different formats and might be confusing
Business model	· How will the tool sustainable/ How will the tool pay for itself · Can we involve the private sector and provide the information as a paid service · Are farmers willing to pay for the information provided by the tool, the tool needs to provide detailed information for farmers to be willing to pay for the information · Find out what existing tools provide to farmers
Right data	· Include soil maps developed by KALRO · Integrate affordable soil test kits in the innovation · Planwise online data management platform might not have data on very current plant problems and very complex problems because there is a validation process that has to be done before the data is commissioned
Identification of the problem	· Information gaps farmers face need data from different sources (joint action) · Data from different sources is presented in different formats and might be confusing

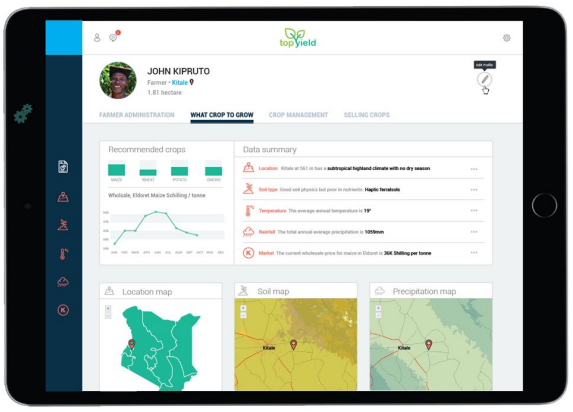
Annex VII - Prototype

A prototype based on showcase 4 entitled '*Joint action across the value chain for people, planet and profit*' was presented to the workshop participants and individual feedback sought. The prototype represents a practical implementation of the showcase. Based on the plenary feedback, the individual responses were grouped into 3 critical topics concerning the prototype. The 3 topics/ subjects which included applicability of the prototype, business model in the prototype, use of local data and stakeholder involvement were further discussed in breakout groups and solutions to address the topics identified. The feedback from the 3 groups is outlined below.

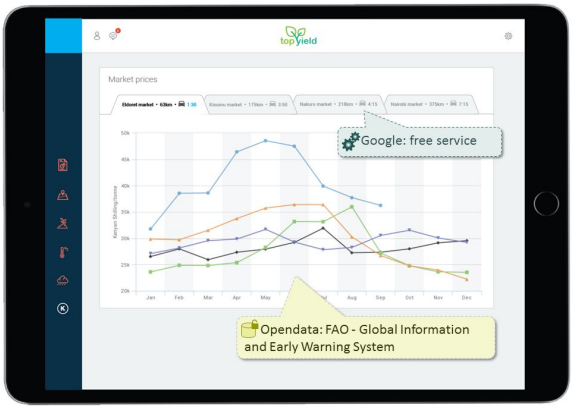
Presentation

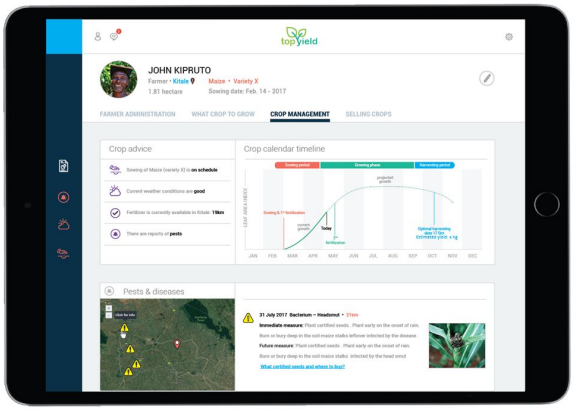


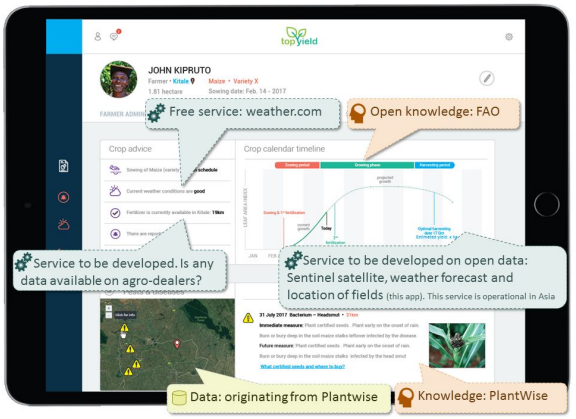

topyield
FARMER ADMINISTRATION
WHAT CROP TO GROW
CROP MANAGEMENT
SELLING CROPS
Personal profile
Land information
Additional information
Land mapping
Open data: aerial and satellite imagery (originating from LANDSAT)

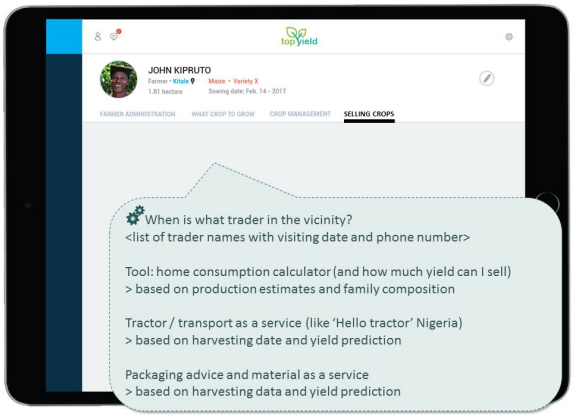

topyield
JOHN KIPRUTO
Recommended crops
Data summary
Location map
Soil map
Precipitation map

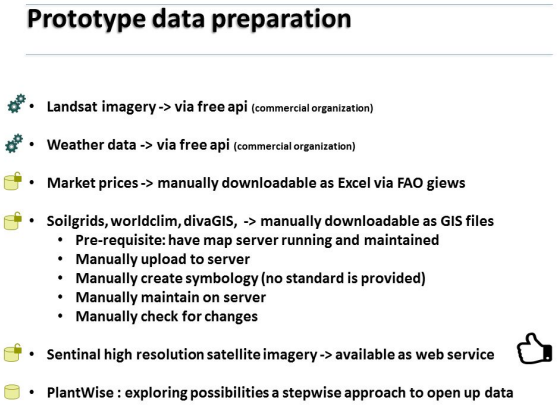
topyield
JOHN KIPRUTO
Service to be developed
Recommended crops
Data summary
Open data: FAO - Global Information and Early Warning System
Open data: ISRIC soilgrids 250m2
Open data: worldclim 1km2
Location map
Soil map
Precipitation map
Open data: divaGIS, roads and admin. boundaries

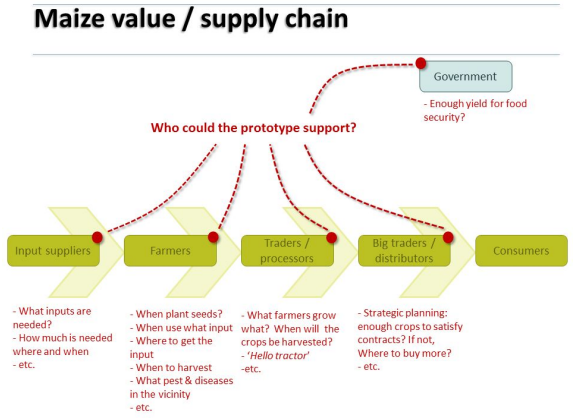

topyield
Market prices
Google: free service
Opendata: FAO - Global Information and Early Warning System


topyield
JOHN KIPRUTO
FARMER ADMINISTRATION
WHAT CROP TO GROW
CROP MANAGEMENT
SELLING CROPS
Crop advice
Crop calendar timeline
Pests & diseases


topyield
JOHN KIPRUTO
Free service: weather.com
Open knowledge: FAO
Crop advice
Crop calendar timeline
Service to be developed. Is any data available on agro-dealers?
Service to be developed on open data: Sentinel satellite, weather forecast and location of fields (this app). This service is operational in Asia
Data: originating from Plantwise
Knowledge: PlantWise







Suggestions

Topic	Suggested approaches
Business model	· Explore a simple Vs mixed Vs freemium model - Simple : farmers pays or donor pays or agribusiness pays · We must learn from from sustainability challenges experienced by other services e.g icow example · Service model should not be too complex · Payment options to explore (payment for application download, commoditize data, shop window model, agribusiness incentives) · Learn from applications developed in other sectors e.g (PharmNet) · Work closely with agribusinesses and innovation hubs (there are about 8,000 stockists/ agrodealers) · Develop a certification scheme for ago-dealers · Accredit agribusinesses/ agro-dealers with certificates approved by the agrochemical association of kenya or KEPHIS · Agencies like KALRO, CABI and CANIS can provide quality assurance · The platform profiles only certified agribusinesses or gives more profile to certified · Application purchased with value added service (e.g. Insurance, access to plant doctors)
Applicability of the prototype	· Should provide information to all value chain actors (input suppliers, policy enablers/ supporters, producers and consumers)

	· Consumers – subsidies, price regulation, quality control · Traders/ distributors – infrastructure, issues to address post harvest handling, value addition and processing, market research and access to finance/ credit · Policy enablers – sensitization/ awareness, advocacy · Policy supporters – Data infrastructure, adoptive research
Use of local data	· What to grow – location data (open street maps, RCMRD, Agro-ecological Zones), soil maps (AFSIS, KALRO, Ministry of pants), precipitation data (GEOclim data, Kenya meteorological data, TAHMO · Crop management – crop advice (KALRO), crop calendar (Ministry of agriculture, county government extension, crop mask), Pest and disease(Pesticide and Products Control Board –PPCB): online book updated annually · CROPNUT – soil data especially fertility data · LandPKS – Data on suitability of crops · Selling crops – data from farmer organizations, AgriProFocus (agribusiness, support development projects, supply and market information, trade data) · Market prices – Ministry of agriculture (gives data daily to mass media), Betta grains · Trade data (AgriProFocus, National Potato Council, different agencies (Tea, coffee etc., cooperatives (e.g. Milk cooperatives), KEPHIS (required seed)

Annex VIII - Inventory of lessons learnt

Organisation	**The way forward / what did you learn**
KEPHIS	Safe trade facilitation; reduced interception for effective market access and importation of low risk materials (protection of Kenya's agriculture) How: ● Online (open data) access to pest reports/distribution in Kenya ● Reduced budget costs on surveillances ● Effective pest risk analysis Support farmers in pest identification (laboratory), improve on pest reporting; reduce cost on diagnosis An online app for facilitating pest diagnosis and management (Expert sharing portal) Training farmers/farmer advisory on pest disease diagnosis and management: ● Lab tests ● Lab results ● Recommendations given (Can be online advisory or face to face consultancy Gap: Deficit in pest and disease management.
CABI	Learned more about options for development of services that can make use of Plantwise data. Want to work with Wageningen + CABI ARC to move to develop a solid proposal. Write up a business case for the agribusiness certification + platform. Project and pitch back to funders of this workshop in Government of Netherlands.
Digital Hands Africa	I have learnt about the startup competition from CTA. Working with young people and the greatest challenge our organization has is mentorship. I believe I could elaborate with CTA for mentorship to help young people venture into agriculture. I have learnt the impact of open data on agriculture I commit to promote youth involvement in agriculture using open data
YIELDER	To further develop the case of open data for farmers we seek to partner with: The student extension service (partnership) PlantWise/CABI; CTA agritech and mentorship; WeNR as partner on projects/proposals; Ministry of water for learning/partner pilot; KALRO as information partner
KALRO	● I have leant that the effective application of open data in agricultural development requires a collaboration effort to achieve the desired outcomes. ● KALRO can collaborate with the public and private partnerships that include NARES,universities, NGO's, private sector, CGIAR and international Agricultural Research Centers in Kenya in agriculture and nutrition, open data sharing and dissemination for improving agricultural productivity ● Promotion of utilization of research knowledge by the shareholders.

	● Promote the piloting of open data in commercialization of agriculture value chains. ● Work with partners to responsibly open up data ● Investing in capacity building and sharing data to support farming communities ● Improve investment to support youth in agriculture as well as data initiatives.
Upper Tana Natural Resources Management Project	● Project objective of: Food security and incomes for rural communities ● Joint Activity: Development of appropriate application that can support data gathering, sharing and learning ● Lesson: The importance of Open Data in KM & Learning for impacts in agriculture & nutrition. ● Action: Work with students who will support in data gathering and development of possible farmer friendly applications for data use, sharing, decision making. ● Learnt many uses of open data (e.g. crop management, pest, disease management.)
RCMRD	Participants have experiences moving forward which can be a good engagement point for learning the best experiences. ● RCMRD has an open data portal. We look forward to having more collaboration with stakeholder from this workshop e.g. CABI who have open data. ● Workshop will be well organized. ● Share our experiences as a center ● Copy model of engagement from meeting (facilitation) ● Priority actors as KALRO ● Facilitate data collection and compilation into open data sets for dissemination to the relevant stakeholders in the agriculture and nutrition sector in Kenya
National Potato Council of Kenya	● Use open data as a business model for National Potato Council of Kenya. ● Wish NPCK to partner with marketers.
VACID Africa	VACID could benefit from collaboration with CABI in farmer linkages. 1 Network with others on the topic/actions of open data possibilities.
CABI Kenya	● Geo conferencing clinics-Working with RCMRD ● Sharing crop diseases alerts-working with e.g. water watch cooperative ● Link plant line to our data4Ag programme and our goal of employment generation. ● Data exists, but who can deliver the data is not clear. ● Projects that work on Open Data seem not to know each other increasing risks to duplicate ● efforts. ● A partnership of KALRO, WeNR, CABI, and CANIS would help create tools that will deliver ● information to smallholder farmers, ● Currently most of the data/info sits in databases ● Collaboration in open data

	● Joint workshops (frequent) in order to share developments after this workshop e.g. RCMRD ● help a breakfast meeting on data sharing in April 2017 ● User groups in open data ● Data sharing agreements ● Capacity building-RCMRD can collaborate in terms of resource persons etc. ● Joint projects ● Funding opportunities e.g. GCF ● Continue to seek a sustainable mechanism for plant clinics because they give/generate 'unique data' in Kenya not being gathered by any other organization to date & which can be used to improve agriculture in Kenya. ● Investigate other initiatives on youth in Agritec/startups, m-cubators, hackathons, etc. in Kenya. ● What can I learn? Who can I collaborate with? ● Mapping of actors that can provide local data with DevSAT ® (Pending funding)
CANIS	● Many efforts are already ongoing which would benefit from the Student Led Agricultural Extension ● KALRO has the infrastructure to support the data driven dimension of the CANIS aTex thinking ● CANIS learned that many data aligned initiatives are being undertaken in silos by research and ● implementation partners ● CANIS undertakes to seek out each partner with a desire to work with others and promote ● collaboration between them through CANIS mandate of networking and information sharing ● CANIS will assess the value chain orientation of the programmes implemented by partners and ● align them through a food systems aligned value chain implementation using open data thinking

Annex IX - Draft business model for linking certified agribusinesses to farmers

Key challenges to address

- Farmers receive much of their farm input practice advice from agridealers
- Good agricultural practice from CABI, KALRO, etc is not reaching enough farmers because they are not currently using agridealers fully to promote it.
- How can farmers trust that they are being sold the right product / service?
- Any viable farmer advice service must learn from sustainability challenges faced by farmer-pays services in the mobile sector including well thought through examples such as iCow.

The solution

- We seek to mobilize agridealers to responsibly bring timely inputs (seeds, fertilizers, pest control products) to farmers in need of fertilizer or pest control in Kenya
- Combines a certification of agridealers with an ICT solution (principally mobile) to link farmers to certified agribusiness
- Seeks to counter use of fake agrochemicals
- Certification model developed with with Agrochemical Association of Kenya (AAK) and involves training component to achieve certification.
- Platform profiles only certified business or (alternatively gives enhanced prominence to those businesses)
- Agridealer pays because…
    - Certification seen as an added stamp of quality
    - Route to farmers
    - Intelligence on demand
- UX considerations considered could be packaged alongside other value-added services which might help sustainability (some free and others paid for) such as
    - Crop insurance
    - Find a Plant Doctor
    - Market price
    - Weather

Conditions for success

- Validated by user and market needs assessments
- Effective engagement with a network of upto 8000 agridealer stockists in Kenya
- ICT service developed with innovation hub in Kenya
- Ministry buy-in. Note importance of this scheme in helping the task of traceability.
- Donor or other investment to take concept to market-viable model

Is anyone else doing this?

- Not that we know of - at least not in Kenya

- ‘PharmaNet’ in another sector has some similarities
- Akorion in Uganda also cited as an interface between farmers and private sector decision support

Fit of the Current Prototype

- Core service proposition should not be too complex. Prototype as currently posited is too general and UX too complex and needs revising for more focussed addressing of user needs.