Slide 1

Value Added Weather Advisories for Small-Scale Farmers in South Africa Delivered via Mobile Apps

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International Workshop on
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Slide 2

INTRODUCTION

- Agricultural production in South Africa is under rain-fed conditions in the semi-arid climate at a high altitude.
- Crops often suffer water deficit and water stress due to insufficient rainfall during growing season.
- Known gaps exist in technology transfer, including:
  – lack of climate outlook information and
  – lack of translation & interpretation - language & terminology used in advisories
  – main limitation to maize production is choice of planting dates due to low availability of accessible and accurate climate forecasts (Fisher et al. 2015)

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Slide 3

INTRODUCTION cont.

- Staple food in southern Africa = maize porridge eaten 2X per day,
- Farmers need to cultivate large areas of maize crops often in rain-fed marginal areas (Fisher et al. 2015).
- Maize is cultivated during summer rainfall season = no danger of frost.
- But semi-arid area has highly variable rainfall - amount & starting date.
- Therefore, farmers make plans for planting season, but usually must wait for sufficient rainfall before planting (Makuvaro et al. 2017).
- Therefore, important to assist farmers with agricultural information based on weather forecasts especially for planting decisions.

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INTRODUCTION cont.

- Vital that farmers have good local weather forecast
  – to assist in planning and on-farm decision-making.
- Publically available weather forecasts **only** give expected weather conditions for next 2 to 3 days for main centres.
- Farmer needs accurate weather forecast for the next 10 to 14 days, despite long distance from these centres (medium-term forecasts).
- Farmers' need to know which decisions they make on a regular basis are dependent on which weather parameters.
- If these relationships between climate parameters and on-farm operations known,
- Possible to add value to weather forecast
- As agricultural relevant information about farming activities.
- **Agromet advisories** = derived from **weather forecast** and **tailored to specific farming systems** and **locality** to be provided to the farmers.

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METHODS

- Held meetings with small-scale farmers & extension practitioners
- to assess needs of farmers about weather information for farming practices.
- Used this information to direct development of Agromet advisories
- following an action research methodology.
- After assessment of currently available weather forecasts & daily weather data,
- => decided to proceed with development of planting advisories
- & advice for spraying conditions for pests and diseases.

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METHODS cont.

- Use medium-term weather forecast European Centre for Medium-range Weather Forecast (ECMWF) (https://www.ecmwf.int/en/forecasts) via South African Weather Service (www.weathersa.co.za) and HydroNet (https://www.hydronet.co.za/)
  – including daily forecast of maximum & minimum air temperature, rainfall amounts, for up to 14 days on 15km grid across South Africa.
- Main maize growing areas of South Africa shown on map with long-term start dates for frost (0°C) calculated.
- Operation of knowledge engines (with agricultural criteria) were programmed in Python script,
- To access information from rainfall stations, weather forecasts & generate advice for each grid cell across South Africa for each day.
- Information is transferred to HydroNet platform for distribution to AgriCloud mobile App (downloadable free from Google Play Store).

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METHODS cont.

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- Or to be available via HydroNet platform by subscription.

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RESULTS AND DISCUSSION

Farmers' requests for AgriCloud App

- Farmers' needs identified in 2017
  – With one-on-one questionnaire at Agromet information meetings
  – across several provinces in South Africa.
- Main Findings
  – about a third of rural small-scale farmers have access to an android smart phone;
  – mostly obtain weather information from radio or TV broadcasts (Phahlane et al. 2019).
  – Farmers highlighted that currently available weather forecasts **not** for own locality,
  – but focus on main cities across country.
  – But know weather conditions, particularly rainfall, on own farms is different from stations reported.
- Farmers request more detailed weather forecast information for own location.
- They want to learn more about how to use such weather forecast information in their farming decisions.

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RESULTS AND DISCUSSION

Climate sensitive farm decisions

- This information drove researchers to investigate climate sensitive decisions in maize production farming systems used by dryland farmers in semi-arid areas.
- Leading to identification of few multifaceted processes in normal routine cropping programme that are sensitive to variable climatic conditions.
- Including:
  – critical stages in growth cycle of maize crop adversely affected by weather conditions,
  – needs an intervention to be taken by such a farmer.
  – Just the knowledge is not helpful.
  – Also need some action that a farmer can take to change adverse effect of weather parameters.
  – Develop criteria from historic climate data & a range of agricultural scientific studies with detailed information.
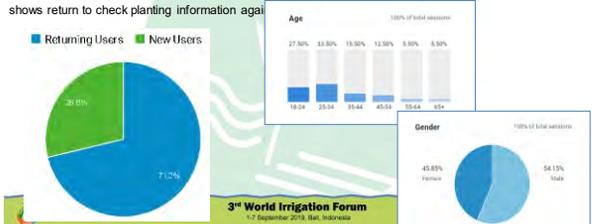
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RESULTS AND DISCUSSION

Knowledge engines

- All data sources & links to be identified
- Gain access via negotiation with data owners.
- Steps are time consuming & laborious
  – Much specific detail to be clarified
  – 'Use' agreements negotiated.
  – Specific agricultural information formulated into Knowledge Engines
  – containing specific algorithms
  – relate farming decisions to weather parameters.
- In operation mode these are run on a daily basis to generate advisories from the current weather forecast information.
- Calculated on a grid across the country,
- Advisories accessed on 15km grid bases for each registered farmer.

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RESULTS AND DISCUSSION

Rollout and use of AgriCloud App

- AgriCloud Mobile App live in September 2018
- after beta test phase since May 2019.
- Rollout to extension practitioners and farmers across eastern summer rainfall part of the country via a number of workshops and training sessions.
- Steep uptake monitored by # downloads from the Google Play Store during first half of summer rainy season when rains were expected.

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RESULTS AND DISCUSSION

Monitoring success of AgriCloud App

Return users > 70%,
shows return to check planting information agai

Younger farmers & extension workers = main users; most under 44years old
Equal spread of both males (54%) & females (45%) using AgriCloud.

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RESULTS AND DISCUSSION

Unique aspects of AgriCloud

1. AgriCloud advisories are available for **a specific location** selected by farmer on registration
   - Google type map to pinpoint exact location of farm.
   - important feature as requested by farmers to be relevant for their farm locations.
2. Available in all 11 South African official local languages.
   - distinct advantage to promote use in rural areas amongst semi-literate older community of small-scale farmers.
   - select a preferred language to give info to farmers mother tongue.
3. Information is updated on a daily basis,
   - forecast advisory given for each day in up-coming 10 to 14 days.
   - enables farmers to plan for their field operations more than a week in advance
   - To check back closer to time for an updated forecast advisory.
- Above implemented due to good testing of market prior to design & development

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New Additions to Platform

❖ **Wheat cultivar choice advisory** (for seed purchase)
- According to farm location in Western Cape
- Last 5 years information from ARC-SG cultivar trials
- Groups of cultivars according to yield potential.
- Details of yields, protein content, hectolitre mass, 1000 kernel mass, Disease resistance or susceptibility etc
- To be available in November 2019

❖ **Heat Stress for cattle & poultry**
❖ **Bee hive management**
❖ **Heat units for crops**

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ARC 2019 Guideline: production of small grains in the winter rainfall region

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RESULTS AND DISCUSSION

Crowdsourcing
- a crowdsourcing mode is build-in
- for farmers & extension officers to provide feedback on the current weather conditions at their own farm
- wind or rain or sunshine.
- In form of a selection of a simple pictorial record
- Focusing on weather hazards like thunderstorms, tornados, mist, frost, hail or flooding conditions.
- This collection of extreme weather conditions will help weather forecasting office to check their forecasts.
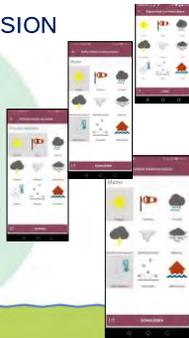
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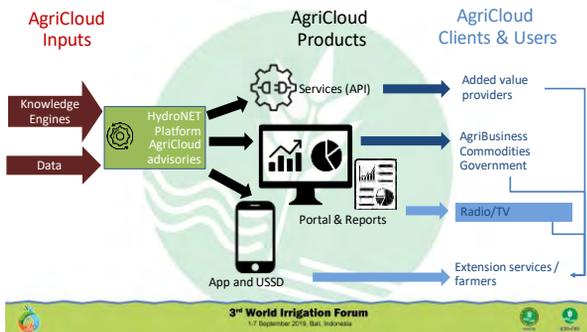
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CONCLUSIONS

- Information needed by farmers is added to current weather forecasts on a routine basis to create agro-climate or Agromet advisories that address the specific farming systems in their own location.
- Agromet advisories are delivered by mobile app to supply farming **relevant advice, in a local language on their phone in their hand and updated on a daily basis**.
- Mobile Apps integrate information about cropping and livestock systems with current short-term and medium-term weather forecasts to give advice on decisions about planting and spraying to farmers for their specific farm location for the upcoming 2 weeks.

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AgriCloud Inputs

Knowledge Engines
Data

HydroNET Platform AgriCloud advisories

AgriCloud Products

Services (API)

Portal & Reports

App and USSD

AgriCloud Clients & Users

Added value providers
AgriBusiness Commodities Government
Radio/TV
Extension services / farmers

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