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AGRICULTURAL BIO-ECONOMY INNOVATION PARTNERSHIP PROGRAMME (ABIPP)

G20 GIB MEETING

Dr Maneshree Jugmohan-Naidu
Department of Science, Technology and Innovation

25 February 2025

Policy Linkages: Agricultural bio-economy

NATIONAL DEVELOPMENT PLAN 2030

Agenda 2063
The Africa we Want

Decadal Plan

- Modernising productive sectors
- inclusivity, transformation, partnerships, creativity,
- Learning,
- entrepreneurship

- Cabinet, 2013
- Socio-economic impact
- Prototypes and products
- Value chain approach
- Coordination
- Start-ups
- jobs

AAMP
AGRICULTURE AND AGRO-PROCESSING MASTER PLAN

- Support for food security, inclusive growth, job creation, and export growth;
- Markets expansion and market access.
- Comprehensive farmer support, R&D and extension services
- Creating enabling infrastructure and trade facilitation
- Localised food, import replacement and expanded agro-processing
- Approved: May 2022.

SUSTAINABLE DEVELOPMENT GOALS

Technology Transfer:
Incubation, VC, IP Fund, etc.

technology innovation AGENCY
Innovating Tomorrow Together

seda
SMALL ENTERPRISE DEVELOPMENT AGENCY
an agency of the dsbd

IPR ACT &
National Intellectual Property Management Office (NIPMO)

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PROBLEM STATEMENT – BUILDING AN AGRICULTURAL BIO-ECONOMY IN SOUTH AFRICA

- Triple challenges:
- Unemployment (~30%), inequality (Gini coeff.: 0.68) and poverty.
- Most food secure country on the African continent but but household food insecurity
- 35000 commercial farmer (5% Black), 300-700 000 smallholders.

- Agric sector - most resilient, Covid 19 – but many challenges contribute to low productivity and GDP growth:
- High input cost, prices, competition, loadshedding – climate change, droughts
- Rural/non-metro areas – 3.1 million agric households in poorest provinces with limited access to basic services (Limpopo (32.2%), the Eastern Cape (44.3%) and KZN (32.9%).
- - arable land underutilised

- Global Food Security Index (2019), the South African food and nutrition statistics are as follows: a) Malnutrition: 6,2%; b) Stunting: 27,4%; c) Share of the population below the global poverty level: 15%; and d) Obesity: 27%.

PERFORMANCE OF AGRICULTURE IN SOUTH AFRICA

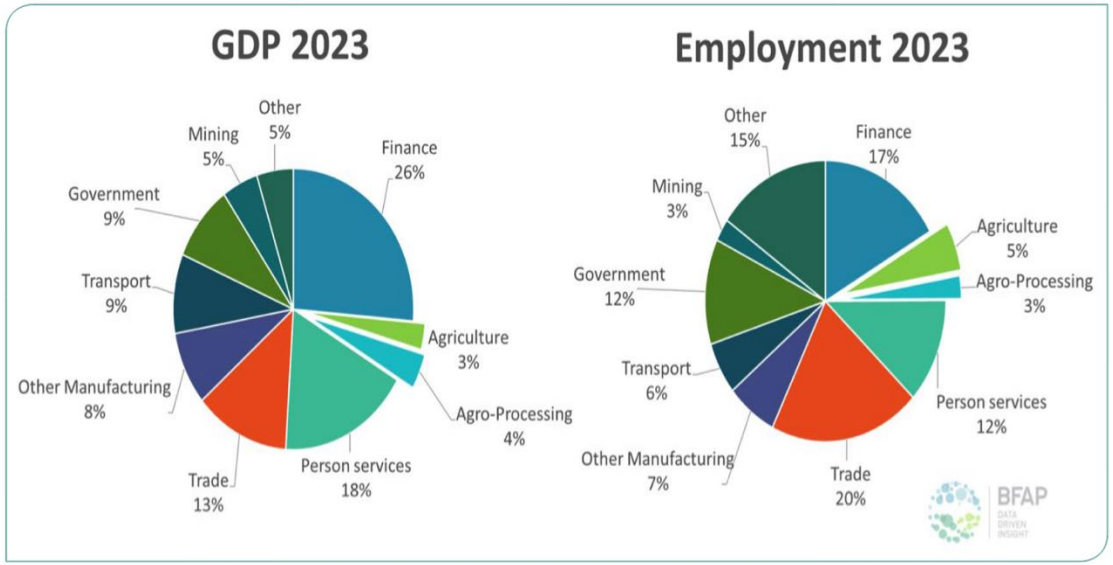

Figure 1: Agriculture and agro-processing's share to South African economy and employment

Source: StatsSA, 2024

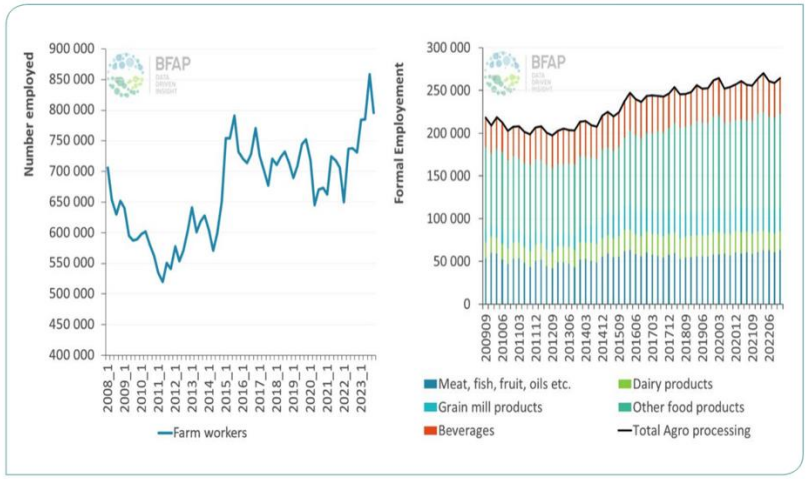

Figure 2: Agriculture's performance compared to the rest of the economy - employment

Source: StatsSA, 2024

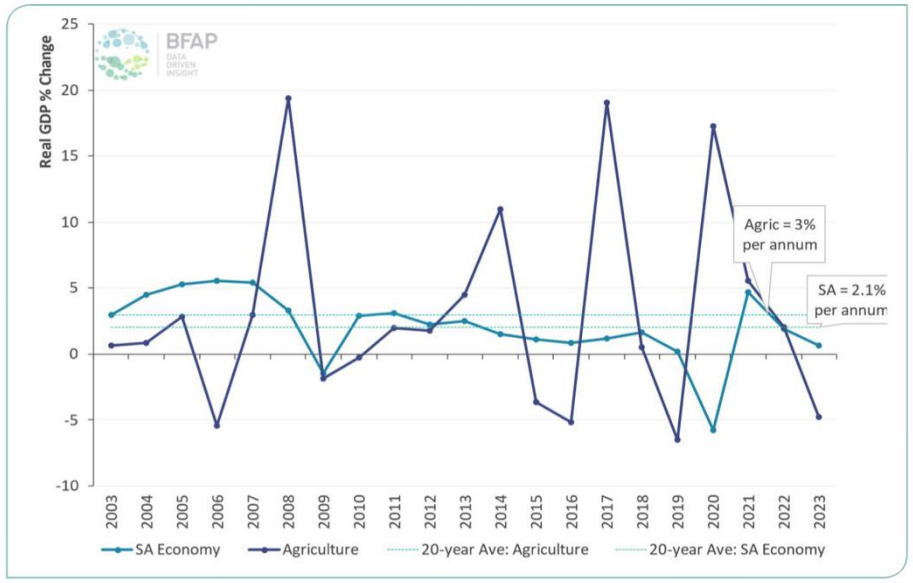

Figure 3: Agriculture's performance compared to the rest of the economy - GDP

Source: StatsSA, 2024

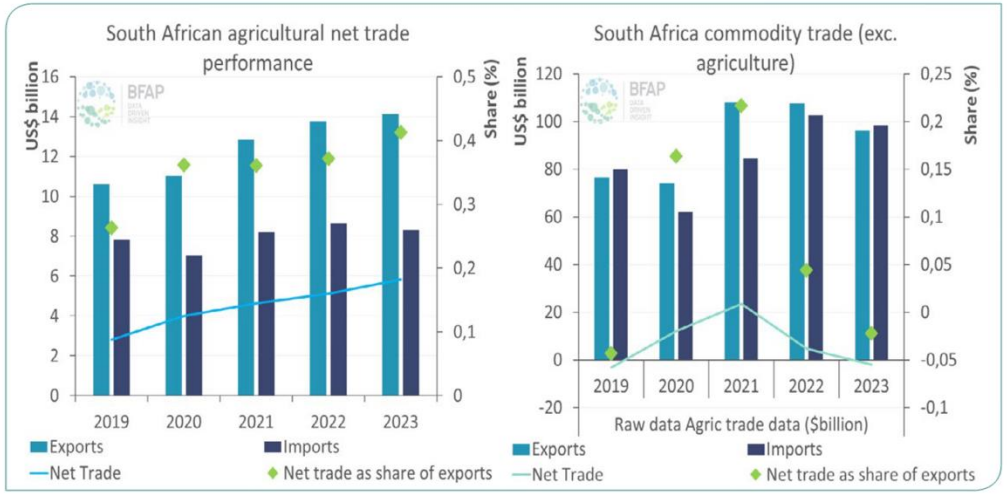

Figure 5: South African agricultural trade versus trade in the rest of the economy

Source: ITC, 2024

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SCIENCE TECHNOLOGY AND INNOVATION IN AGRICULTURE

- Global innovation index – SA ranks 57th (innovation outputs) (cf.132 countries)
- Large proportion of biotech is in agriculture
- Government funds 52.5% of all R&D, of which agric - 25%.
- 1st SA Business Innovation survey in Agric (2016-2018) - Most used advanced technologies:
  - Precision agriculture technologies (49.2%)
  - Soil sensor technologies (35.9%)
  - Crop sensors (31.8%)
- TEA for agric 4.2 % in 2021 (GEM SA report 2021/22) (global average (5.4%)
- Venture Capital is increasing - Agritech (7.7%) in top 5 sectors (SAVCA 2022)
- SA researchers' citation impact for agric is higher than the world avg
- Large Science Platforms
- Main obstacles to tech transfer in agriculture is the market, followed by regulatory, technology refinements and funding challenges (Jugmohan-Naidu, 2019).

A SHIFT FROM BIOTECH TO BIO-ECONOMY IN THE AGRICULTURAL SECTOR……

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THEORY OF CHANGE

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Innovation Driving Growth

Key Challenges

- Need for productivity – plants and animals
- Security of supply – Sustainability
- Pests and diseases
- Control – mitigation products, green economy solutions
- Climate change
- Energy efficiency
- Biosecurity – detection, diagnosis, and early warning systems
- Nutrition (hidden hunger)
- Agility – technology dissemination to farmers
- Profitability
- Household food security and Food safety
- Land and agrarian reform

INTERVENTIONS

Crop/plant improvement, molecular breeding and genome engineering
Crop Improvement: (Wheat, Maize, Potato, Cotton , sorghum, soya)
Climate Resilience research
Smart and Precision Agriculture
Biosecurity Research Hub: (Plant health, Diagnostics, monitoring)

Animal Improvement, molecular breeding and genome engineering
Animal Improvement
Animal vaccines
Livestock Genomics Programme
Aquaculture
Livestock Identification and Traceability Systems (LITS)
Beef Bio-innovation Cluster
Dairy Breeding programme

Bio-innovation in support of Food and Nutrition and farmer innovation

DDM Agro-innovations

Small scale farmer technology diffusion
(Grapes, Low-chill apples, Urban Agriculture)

Agroprocessing value chain development
(marula, honeybush, maize, Cape Aloe, vegetables, soya, aqua, Bambara groundnut, beans, legumes, eo,)

Digital Agriculture

Value chain analysis:
- Sorghum
- Canola
- Dryland Rice
- Cassava
- Macadamia

Mobile soil / VC safety labs / clinics

Agricultural Bio-economy Innovation Partnership Programme (ABIPP)

Sector Innovation Funds (SIFs):
(PHI, Wine, Forestry, Rooibos*

OUTPUTS

New Products, processes, Tech services: High-value crop and animal value chains are efficient, agile and robust.

Support new and emerging farmers to become commercialised

Bio-innovation in support of food and Nutrition security

High-end skills, MSc, PhD, technicians

Agro-processing (niche products) in rural communities

Digital technology:
Decision support systems for farmers
Biosecurity – early warning systems
Precision agriculture – e.g. Phenotyping
Remote sensing, Smart tools
Land-use plans (e.g. SDFs)

OUTCOME /IMPACT

- Increased GDP
- Decision support tools to promote productivity and incomes
- Biosecurity – from pests and diseases
- Boost rural economies
- Traceability
- Sustainability
- SMMEs
- Job creation as a result of skills transfer
- Inclusion & Competitiveness

Coordination, facilitation and multi-disciplinary, multi-institutional agricultural innovation programmes to drive productive value chains

AGRICULTURAL BIO-INNOVATION PARTNERSHIP PROGRAMME (ABIPP)

- PPPs are the mainstay of any successful STI Programme
- **ABIPP** – instrument to implement the Agricultural Bio-economy. **TIA** – implementing agent
- **Goal**: Increased productivity, food security and sustainable rural development
- Principles – Inclusivity, transformation, partnerships
- Focus on co-funded multi-disciplinary, multi-institutional agricultural bio-innovation programmes
  - new product development,
  - new processes, including agro-processing
  - development and dissemination of technological services

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MODERNISING AGRICULTURE – WHAT DOES THIS MEAN FOR SA

New technologies should be ***socially appropriate, affordable for largescale use*** *and effective at improving people's lives (Knickel et al., 2013).*

Public-Private Partnerships

Coordination and reduced duplication

Transformation and inclusivity

Principles

Resilience and Sustainability

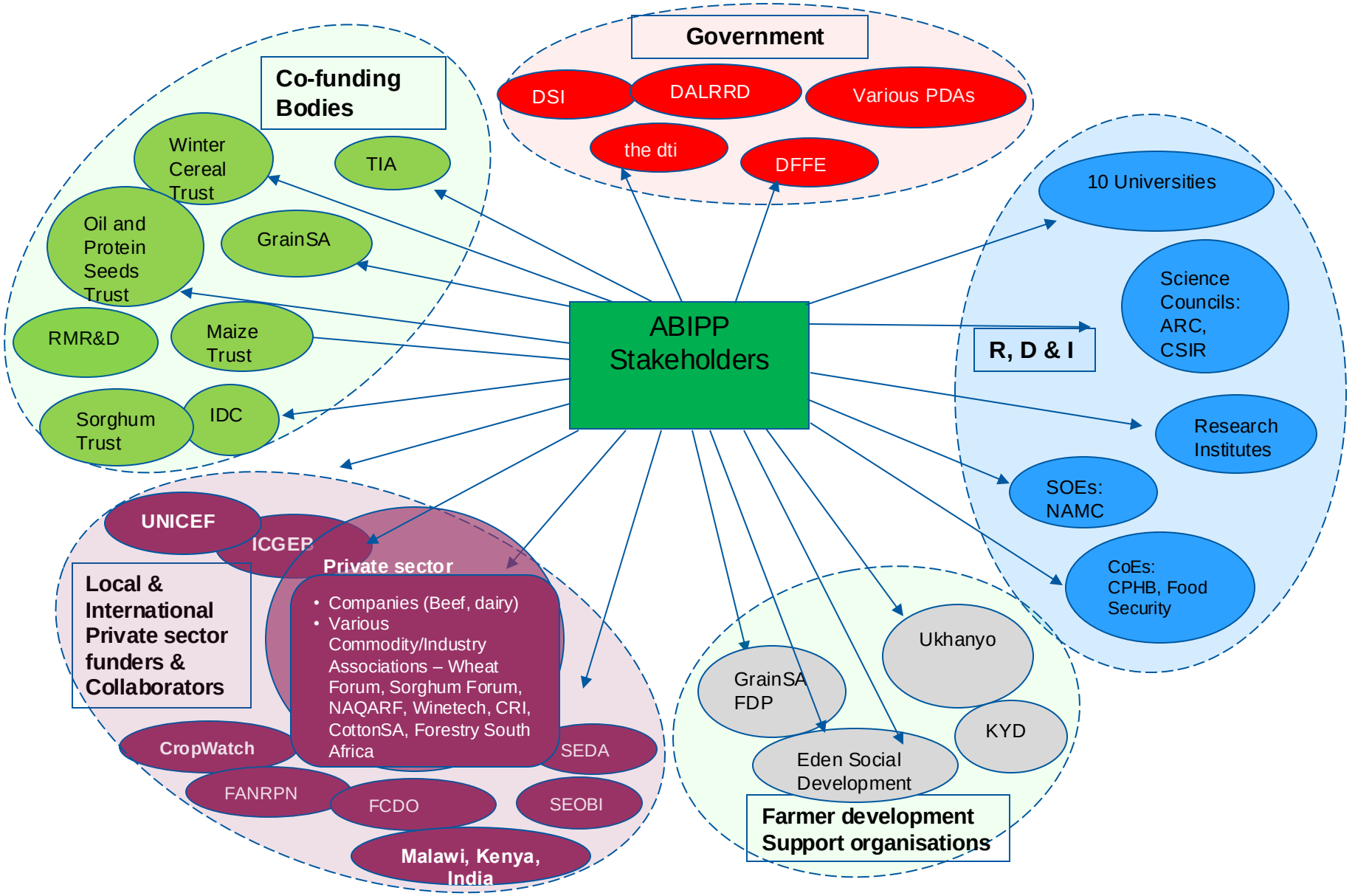
Agility and Increased efficiency

New growth:

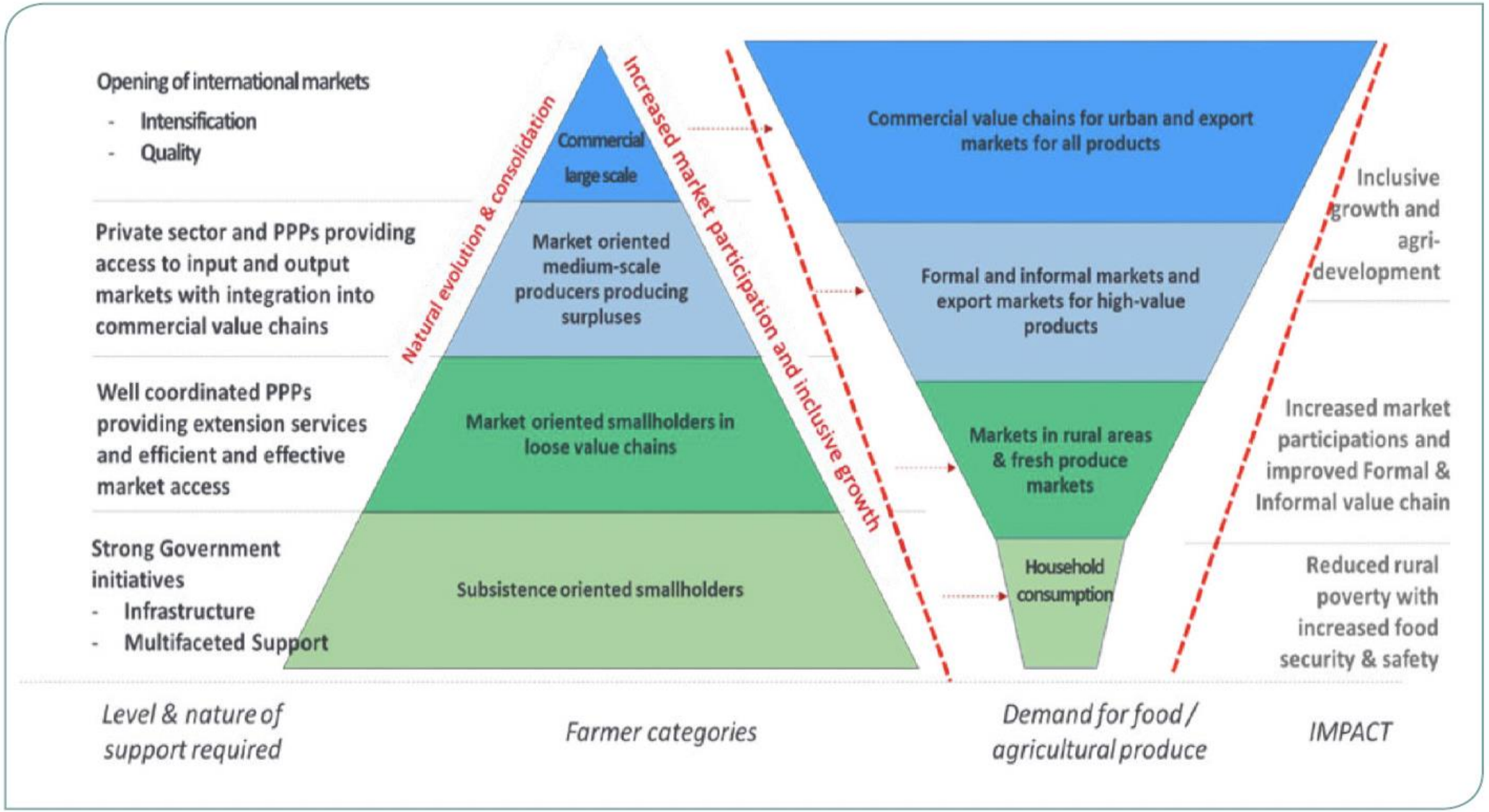
- Niche areas
- Modern technology
- Value chain development
- National systems
- Service delivery
- Skills

E.g. ABIPP instrument - Focus on co-funded **multi-disciplinary, multi-institutional agricultural bio-innovation programmes** – support pipeline for TIA, SEDA, Etc.

ABIPP PARTNERS

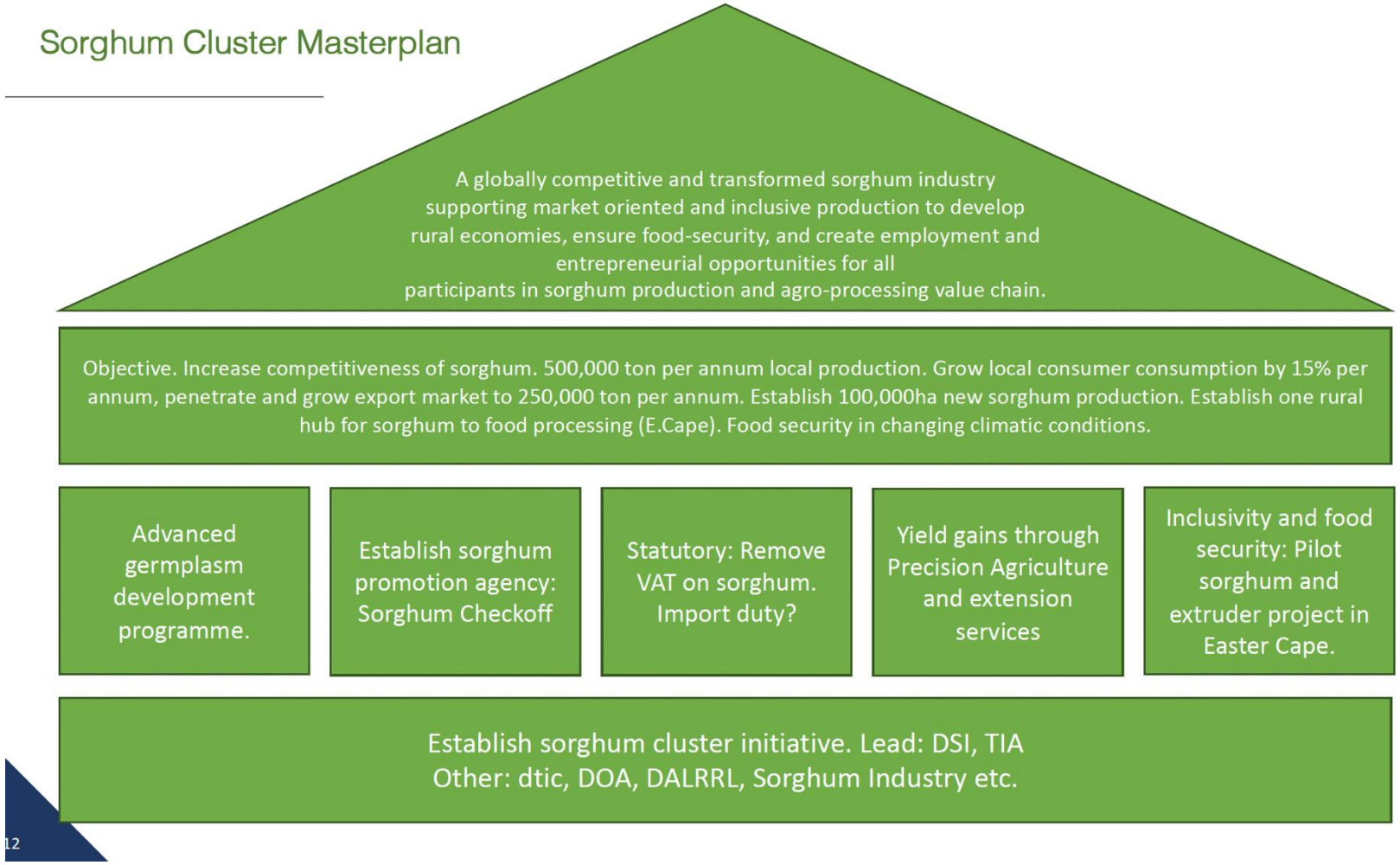


ADRESSING THE RURAL URBAN DIVIDE



Potential Framework linking producer support to dedicated value chains, BFAP Baseline- 2024

TECHNO-ECONOMIC FEASIBILITY STUDIES: VALUE CHAIN DEVELOPMENT - SORGHUM

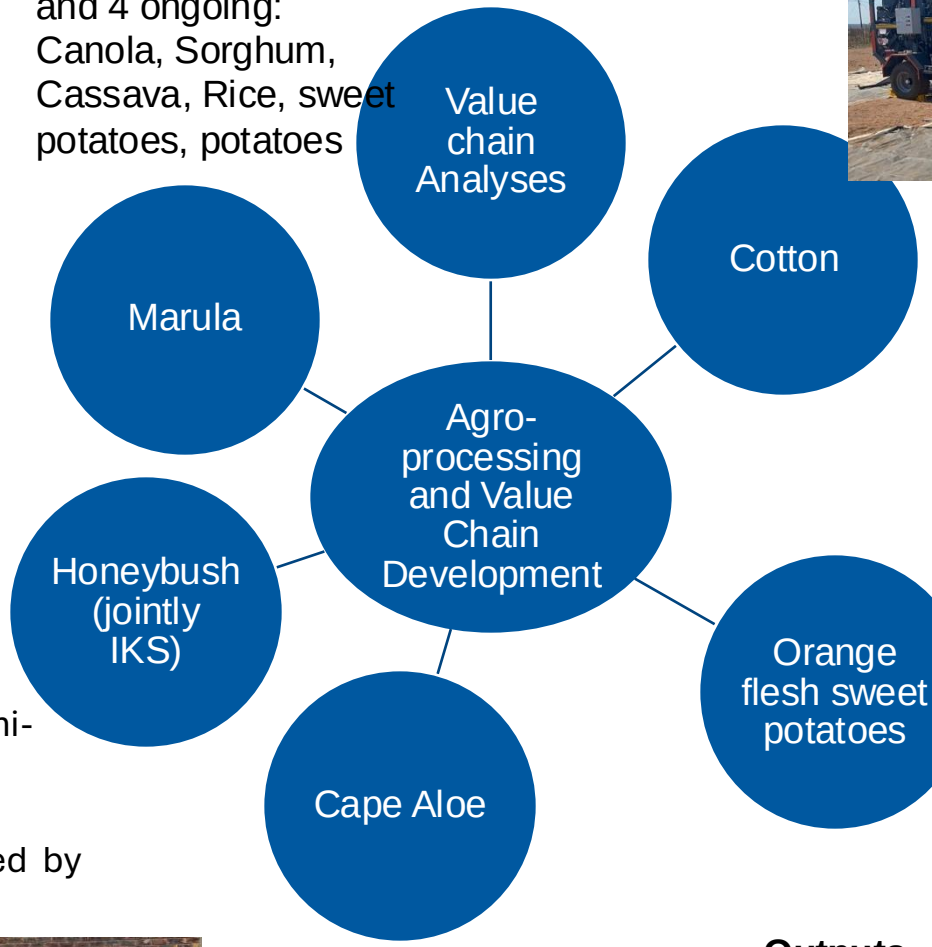


NB. Other projects; Canola, Cassava, Marula, Cape aloe (CSIR)

AGRO-PROCESSING AND VALUE CHAIN DEVELOPMENT

Output: 1 complete and 4 ongoing: Canola, Sorghum, Cassava, Rice, sweet potatoes, potatoes

Outputs:
- Market &technology feasibility complete;
- Pilot initiated
- DSTI, TIA, IDC funding



Outputs:
- **1 technology demonstrations** – 2 cotton balers.
- 9 farmers benefitted.
- CottonSA

Outputs
- 4 SMMEs supported
- 23 black emerging farmers
- 4 permanent jobs and 13 semi-permanent/temporary jobs
- R4 771 900 over three years - includesR2 280 590 co-funded by TIA

Outputs
- 6 prototypes - 3 in market
- 3 SMMEs supported
- Tech transfer – microwave tech – North Carolina (US) and CSIR
- SANBIO, ARC, CSIR, McCain

Outputs
- 3 SMMEs - business development and commercialization
- 6 Prototypes (200g lab scale)
- 22 farmers received trained.
- CSIR led

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STRATEGIC FLAGSHIPS - WHEAT BREEDING PLATFORM

- Wheat is an important staple in most African countries;
- Entire African continent is a net importer of wheat, i.e.
    - South Africa: ±R5.5 billion (1,89 mil ton)
    - Kenya: ±R2.4 billion (800 000 ton)
    - Mozambique: ±R1.5 billion (300 000 ton);
- Large foreign exchange outflows, negative for job creation;
- Dependency on world markets for basic food supply;
- DSI have invested approximately R5 million p.a. in a wheat breeding platform since 2018 supporting our farmers with new climate resilient and pest-resistant cultivars;
- The South African Cultivar and Technology Agency was established to administer a statutory levy on wheat to promote innovation among breeding companies and develop a sustainable seed funding programme;
- The DSI funds the pre-breeding research and the cereal industry co-funds the breeding and some pre-breeding (ARC); and
- Since 2018 several hundred have been taken up into breeding programs by different breeding companies and the ARC.
- Over 30 new cultivars released since 2015 by the individual breeding programs: ARC, Syngenta and Corteva.

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Stellenbosch UNIVERSITY
IYUNIVESITHI
UNIVERSITEIT

syngenta

CORTEVA™ agriscience

ARC • LNR
Excellence in Agricultural Research and Development

GRAIN SA
GRAAN SA

Public Private Partnerships: The Grain Research and Policy Centre

VISION AND MISSION

Facilitate and coordinate grain and oilseed research and policy matters to ensure producer sustainability and profitability

Aim:

- Identifying producer, industry and government needs & challenges
- Establishing a research network to resolve agricultural needs & challenges
- Communicating research results
- Improving local research capacity

CROP IMPROVEMENT CONSORTIUM

- Wheat Breeding Platform
- Public-private partnership to increase wheat productivity
- Tolerance of wheat cultivars to pre-harvest sprouting
- Adaptability of winter grains in the Eastern Cape
- Training of developing farmers in the winter cereals growing areas

CLIMATE RESILIENCE CONSORTIUM

- Expanding maize cultivars for tolerance to heat and drought stress
- Investigate impact of maize planting dates on yield, quality and physiology
- Establishment of long-term agronomic trials to determine crop response trends

PLANT HEALTH CONSORTIUM

- Diagnostic Clinic and Survey of pest and diseases
- Survey data used for research prioritisation and for commodity export negotiations
- The South African Sclerotinia Research Network – fungicide registration trials
- Biosecurity Hub: Participation in biosecurity matters

FOOD & NUTRITION SECURITY

- Promote agro-processing in low-income communities (nixtamalization)
- Identify additional processing methods to improve nutrient content and utilisation of crops
- Demonstrate and develop local capacity for the production of pulses

HUMAN CAPITAL DEVELOPMENT

- Develop local human research capacity and address critical skills gap
- Promote transformation in the agricultural research community

CULTIVAR EVALUATION

- Provide producers with independent information on the performance and adaptability of cultivars
- Promote profitability and sustainability
- Commodities: Sorghum & Maize

NATIONAL GRAIN RESEARCH PROGRAMME

- Platform for increased collaboration between industry, government and research community
- The NGRP will serve as the vehicle to drive industry-relevant and producer-focussed research

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MAIZE TRUST

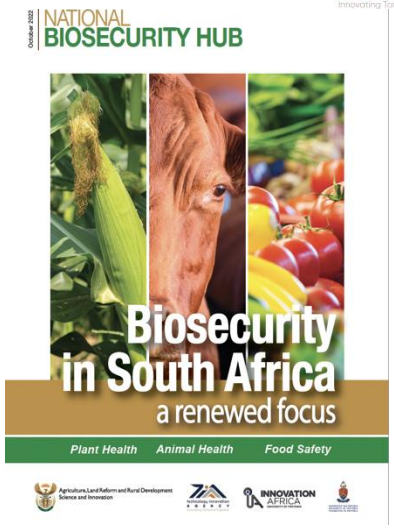
OPDT/OAC

The Sasol Agricultural Trust

SAWCIT

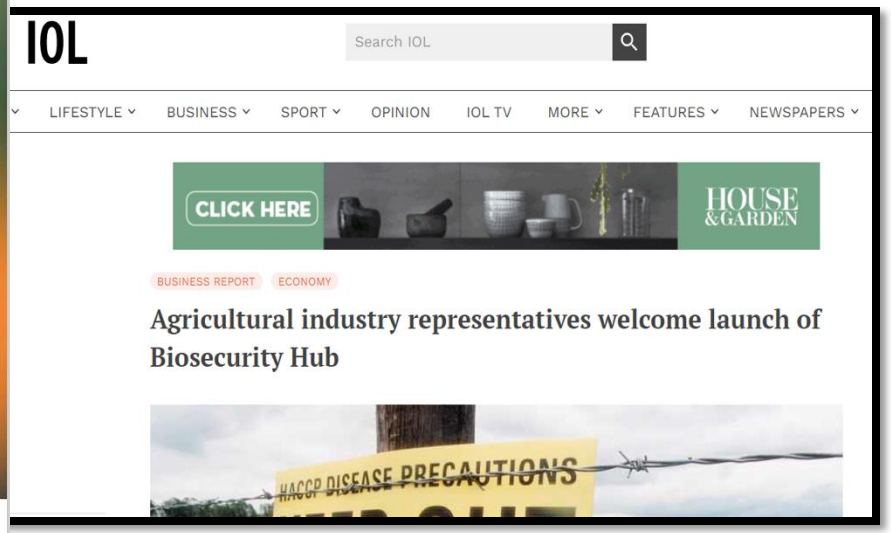
The Sorghum Trust

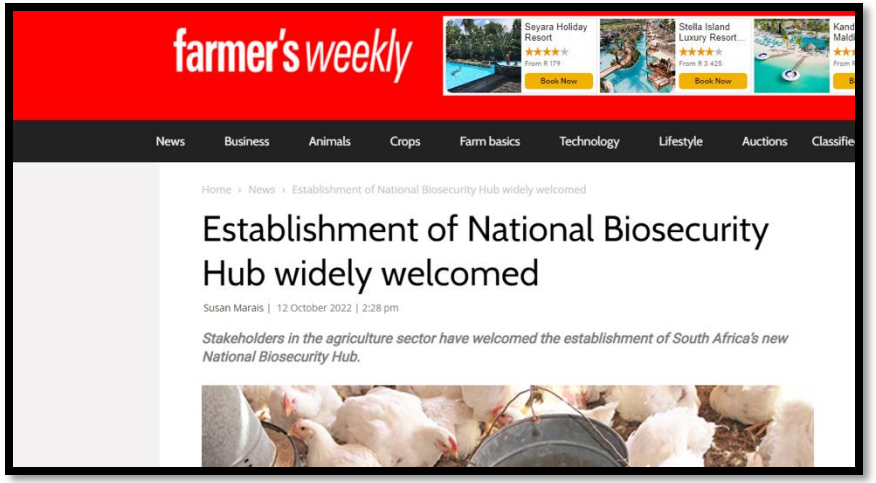
Launch of the National Biosecurity Hub



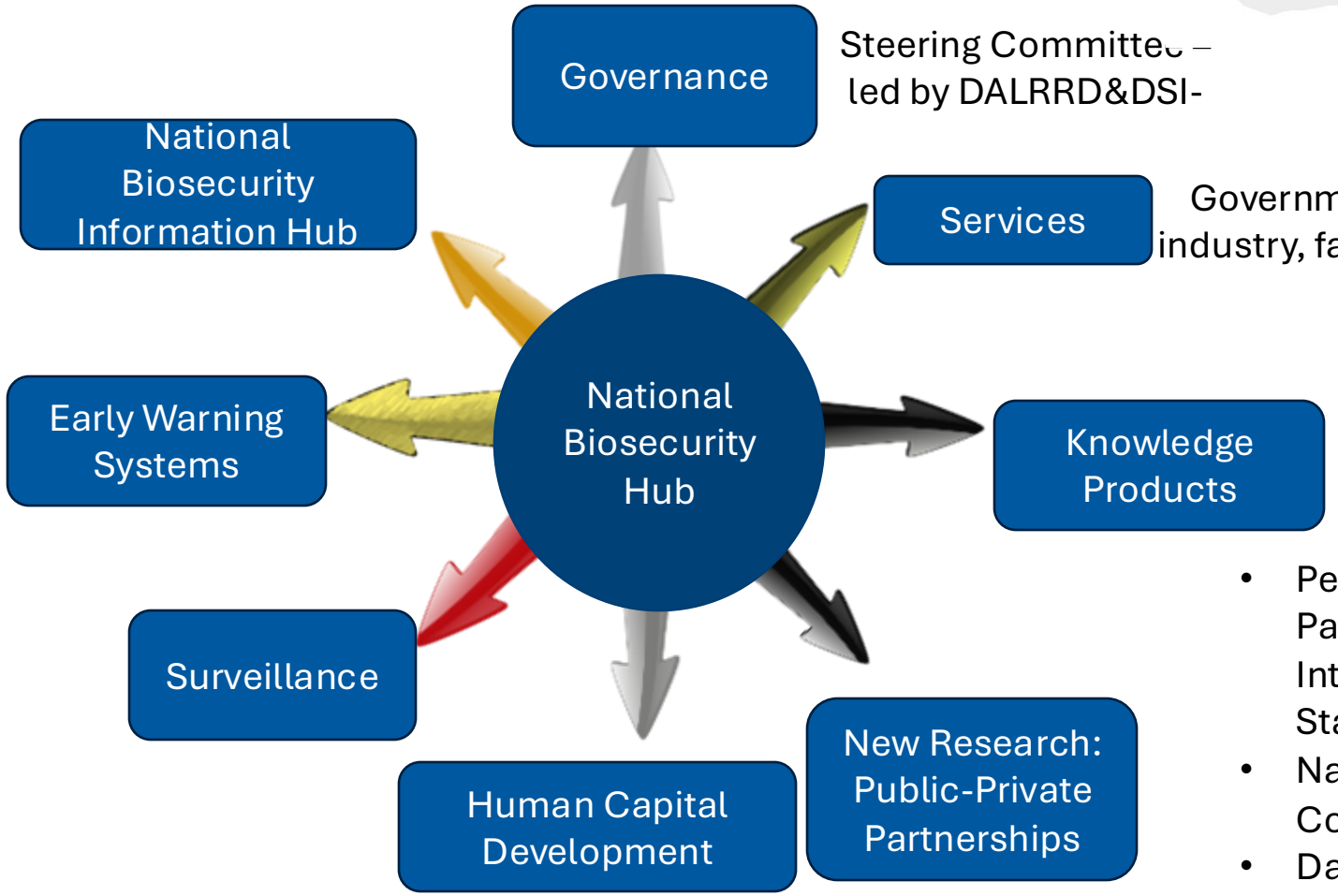
E- Journal : Commitment to a renewed focus

- Successful launch on 11 October 2022





THE NATIONAL BIOSECURITY HUB



Surveillance and early warning:
(Climate Change - Plant and animal Health, Food Safety)

- identify/monitor new species circulating in SA.
- Big data/predictive models
- Epidemiological studies.

- Pest Risk Packages- International Standards;
- National Collections;
- Data hubs;
- APPs.
- Enhanced regulation

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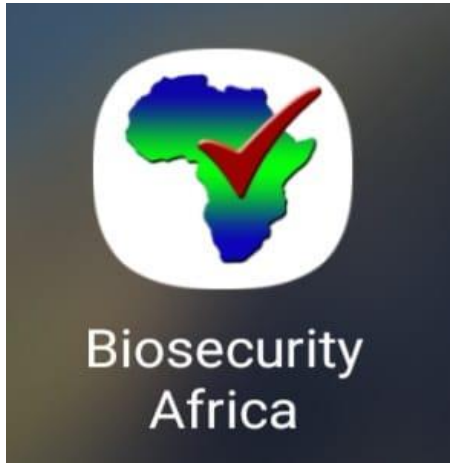
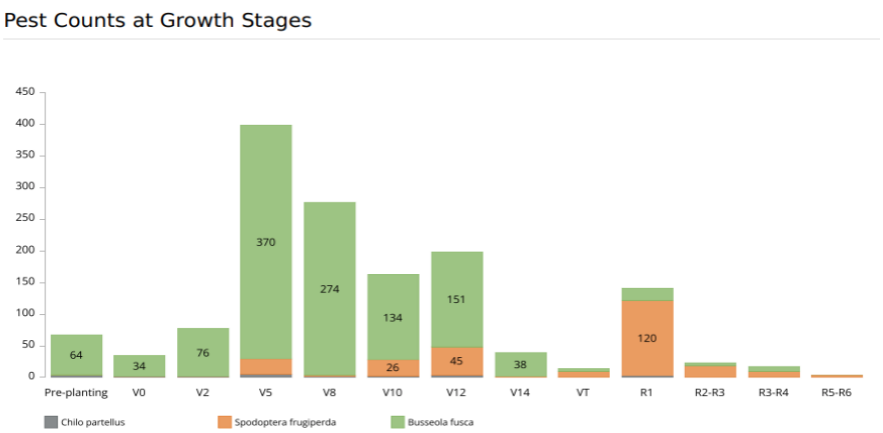
DIGITAL DECISION SUPPORT SYSTEMS; INFORMATION HUB OF THE NATIONAL BIOSECURITY HUB

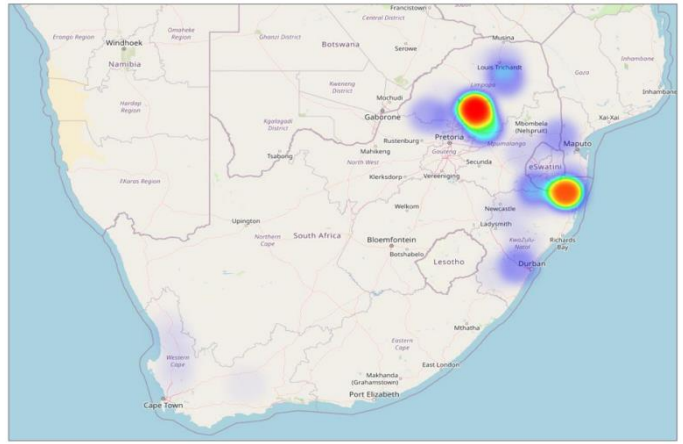
Integration Makes Digital Tools Useful



Biosecurity Africa app used for **data collection (Cropwatch)**



Data is stored for long-term record keeping. Table of surveillance data for 3 pests (Fall armyworm, Chilo and maize stalk borer).



Data is visualized in the form of a heat map (Fall armyworm)

- Biosecurity Africa app used to capture, store & visualize data
- Partnerships enable the flow of information (i.e. from Biosecurity Africa app to Information Hub
- NB! Other examples – SASSAM – Eastern Cape.

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INNOVATION AFRICA
UNIVERSITY OF PRETORIA

BIO-INNOVATION IN SUPPORT OF FOOD AND NUTRITION AND FARMER DEVELOPMENT SUPPORT - PARTNERSHIPS WITH INDUSTRY

- Production and pest surveys; wheat, maize, sunflower, canola, beans.
- Processing: Maize, beans, awareness

Production sorghum, canola, wheat.
Processing:Training
Nixtamalisation - Maize

- Bambara groundnut production, processing, packaging.
- KwaSA
- District model

- Soybean production and processing

	GrainSA	Ukhanyo	CTAFS (UKZN)	OPOT
Total investment (R)	1 M p.a.	700 000 x2	2 M (total)	~2 M p.a.

Total Outputs to date:

- No. of black farmers supported and growing towards commercial scale (growing from subsistence, emerging, small scale and commercial) : **638**
- Black emerging farmers benefitting from technology/innovation support: **3194**
- No. Of beneficiaries – communities, women and youth: **23153**
- **15** permanent jobs. (farmers)

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BIO-INNOVATION AQUACULTURE PROGRAMME

Aquaculture Incubation Programme – launch of 7 canned products

application of an oxidant rich olive pomace for use in aquatic animal feed

Nelson Mandela University

Aqua Optima

Karoo catch

Bio-innovation Aquaculture Programme

InnoVenton-DCTS Nelson Mandela University (NMU)

Low tech spirulina Demonstration – 2 prototypes completed – floating fish feed containing spirulina

CSIR TiLV &ISKV

Prototype – diagnostic kit complete and validation (Malawi)

Franklin Marsh

In-pipe Mini-Hydro Powered Energy Recovery System at Aquaculture Plants

Fine Bubble Technologies Pty (Ltd)

Nanobubble Technology and its application in school feeding schemes- Veg. and aquaculture

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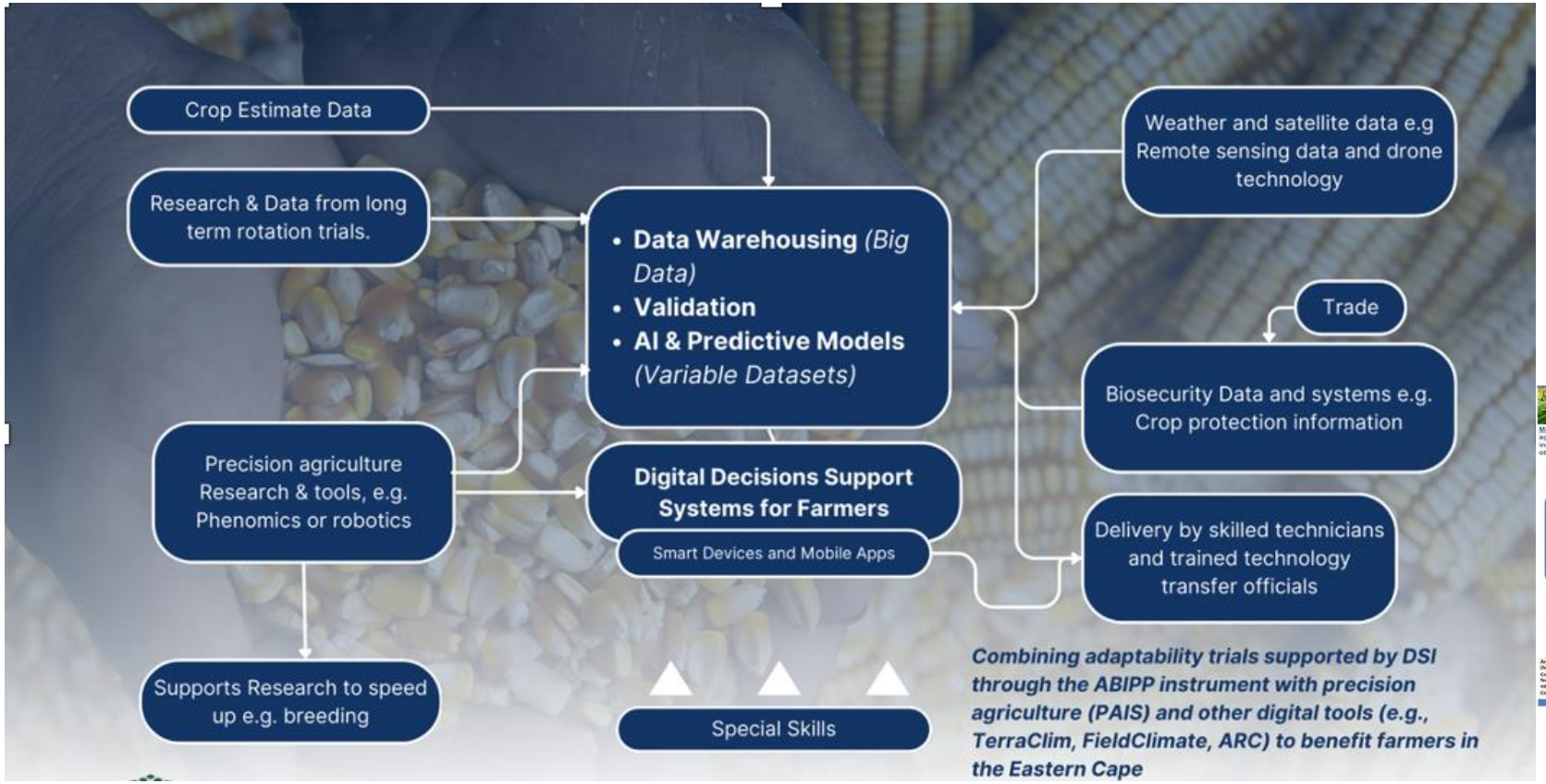
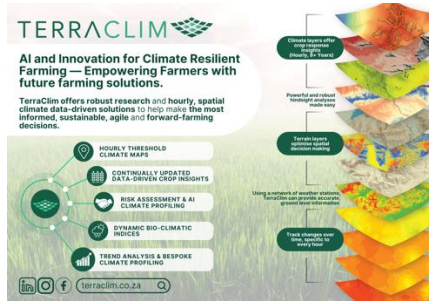
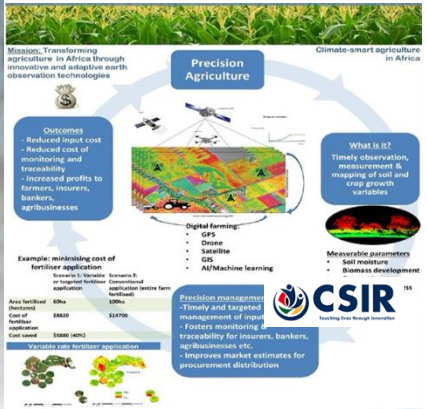
DIGITAL DECISION SUPPORT SYSTEMS: SYSTEM OF SYSTEMS FOR OPPORTUNITIES MAPPING – (SASSAM)

Farm management decision support tool that empowers farmers with near real-time insights for precision crop management, by harnessing the power of satellite imagery, big data analytics, climate modelling and agronomic data.







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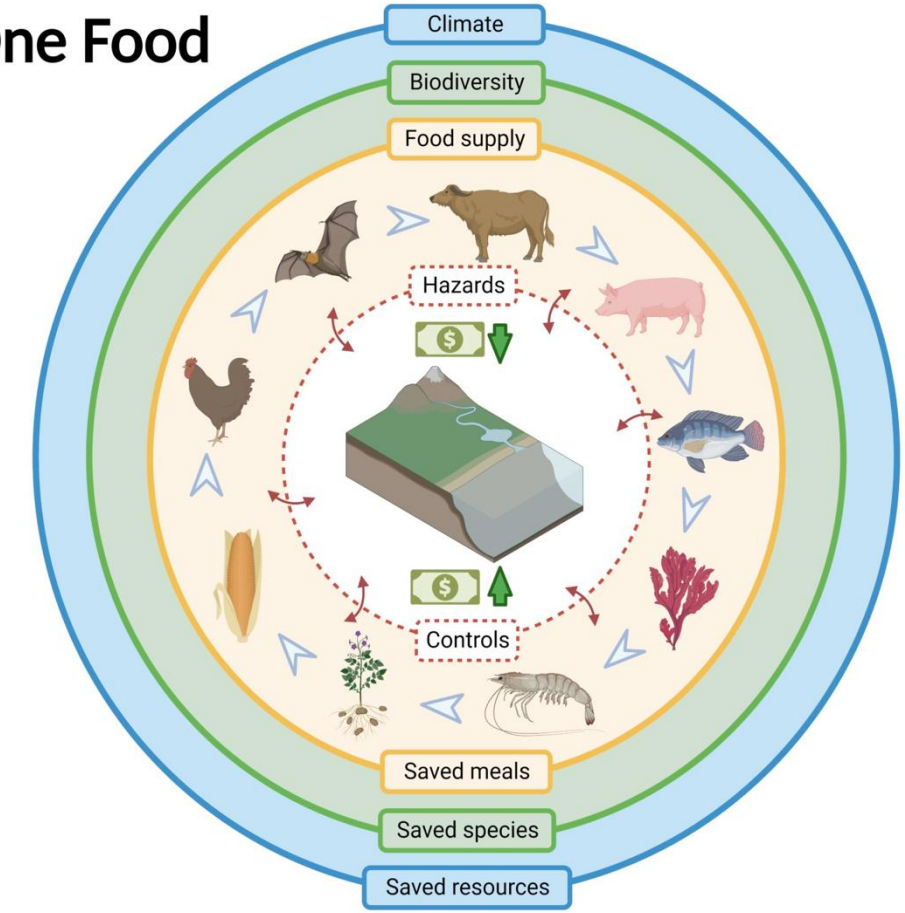
FOOD SYSTEMS TRANSFORMATION: ONE FOOD PROGRAMME

The **One Food Programme** is a UK-SA collaboration which aims to articulate the importance of identifying and controlling hazards in food system as a tangible means to operationalise One Health.

OBJECTIVE: optimise the health of humans, animals, plants and ecosystems, with each being equally important.

Builds on the interdisciplinary food systems approach and involves sustainably balancing the health of the environment, people, and food sources (animals and crops/plants).

One Food = One Health



Partners: CSIR, CEFAS, HSRC, ARC, FAO

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UK International Development
Partnership | Progress | Prosperity

ABIPP SUCCESSES (2017/18 – 2023/24)

Innovation support to farmers

- 638 small scale black farmers towards producing soybean commercially;
- 5181 farmers benefitted from technology/innovation support programmes. Access to new tech., pest and disease information, etc.)

Co - Funding Leveraged

- **ABIPP** 411 million(industry, TIA and IDC) from investment of approximately R135 million; R100M over next 10 yrs from DALRRD

Students/jobs

- Approx.20 post-graduates p.a. MSc, PhDs
- 10 postdocs
- 14 permanent jobs (9 women farmers and 7 technicians.
- 23 interns/technicians –unemployed graduates - 5 permanent jobs in 3 yrs

ABIPP , Total Budget: 21 M p.a.

Knowledge products

- 1555 wheat pre-breeding lines;
- 30 new cultivars (PBRs) by local seed breeding companies;
- 4 aquaculture SMMEs and 2HEIs supported with development of new technologies;
- 26 prototypes – aquaculture, cape aloe –aquaculture diagnostic, OFSP, dairy waste, 4 In 1 Seed Oil Press, cracker, dewatering, molding, etc.
- TIA TICP – BGP – databank established; 6915 genotypes completed.
- Beef Genomic Cluster TIA approved 50M for Ph2 - 2024/25), GEBVs for 3 beef breeds released;
- 14 animal health products (vaccines) at TRL 7 and 8;
- I technology demonstration (cotton balers – 2 sites)
- 1 Point of care for FMD commercialised.
- 14 consortia
- 1 National biosecurity hub established
- 1 digital info hub pilot (biosecurity)
- 1 PAIS piloted
- 1 digital decision interface approved

Food and nutrition security

- mycotoxins, nutrition, dry beans, nixtamalization); 9053 community members trained (soya) , 1091 training courses (16839 attendees; EC, KZN, Mpumalanga.
- UKZN – KwaSA –DDM Model: Amadumbe, imfino and Bambara groundnut
- 25153 beneficiaries – communities, women youth

Agro-processing and Value chain analysis

- Marula (ongoing)
- Honeybush (joint project with IKS);
- Rice cultivar trials
- Sorghum (feasib. complete)
- Sorghum cluster established
- Cape aloe complete – handover to 3 SMMEs
- Canola, cassava (ongoing);
- Soy – yoghurt, milk, snacks;
- Maize nixtamalized products.
- Orange flesh sweet potato (ARC, NAMC, SANBIO, CSIR)
- Cotton – baler demonstration complete

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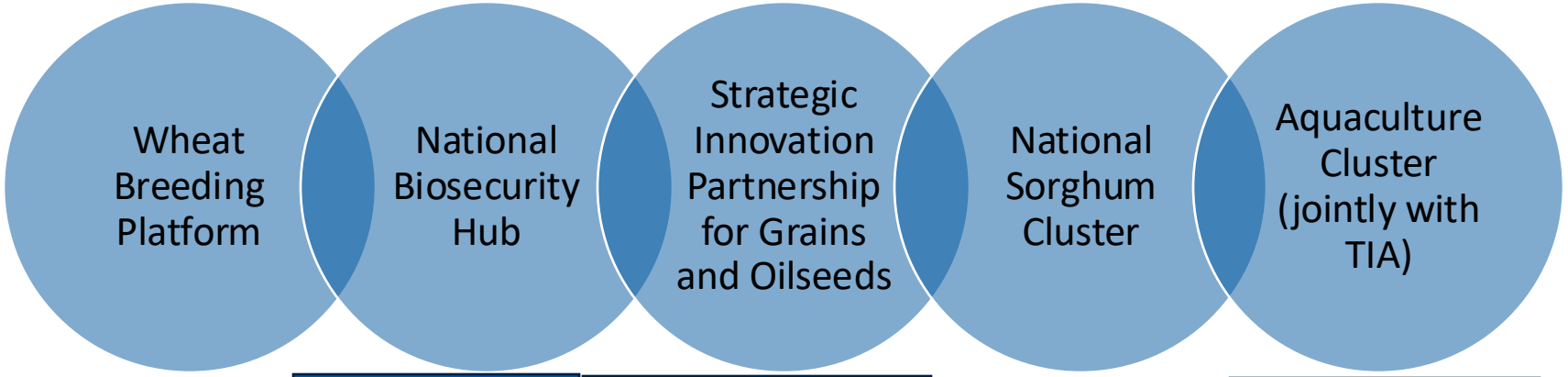
KEY STRATEGIC FLAGSHIP PROGRAMMES OF ABIPP



1200 Lines released
30 cultivars registered

Digital pilot - Information Hub

Co- funding of R50 M per annum.

R6.7m invested by ABIPP. R1 274 691 co-funding New.

10 prototypes:
two low-tech spirulina prototypes; one diagnostic kit (TRL) 6);
demonstration and launch of seven canned products by Karoo Catch (

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Solidarity
Equality
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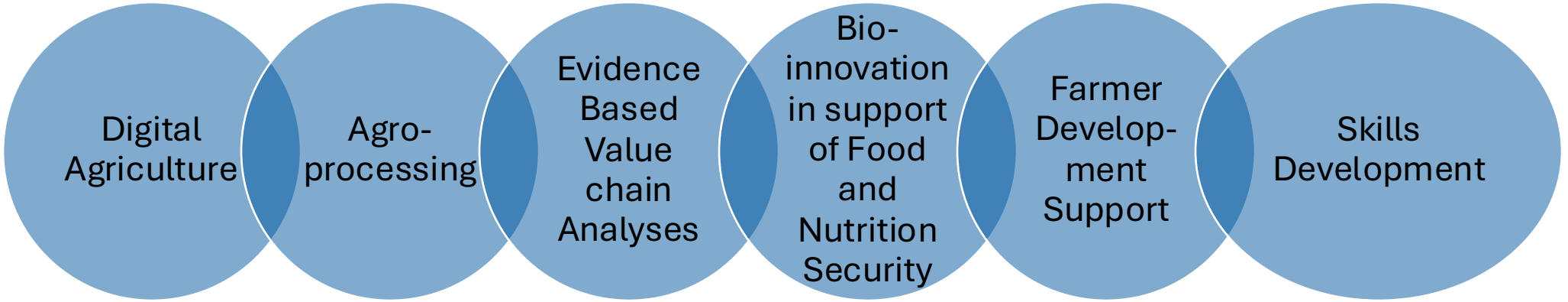
CROSS-CUTTING FLAGSHIP PROGRAMMES OF ABIPP



Biosecurity Hub information Hub

Pilot Project
R1M p.a.
3M in total
50 M leveraged from DALRRD

Value chain Development
- Marula
- Honeybush
- Cape Aloe

New opportunities: Sorghum; Canola; Cassava; Rice

~R20M funded to date
Marula, co-funded by TIA,IDC
Cassava – co-funded by TIA, NAMC
Sorghum – co-funded by the sorghum Trust

Soybean, maize, Niche, underutilised and indigenous crops (NUS): Bambara, groundnut, amadumbe, leafy vegetables

Soybean Food and Nutrition Programme

Co-funded by OPOT

Pre-breeding,; Agro-processing; Awareness; Zero VAT rating;

Co-funded by farmer development organisations,
In kind:
GrainSA,
Ukhanyo;
Sorghum Forum;
CottonSA

interns, technicians, Farmer training, business and entrepreneurship

10 Interns co-funded by SACTA – linked to Biosecurity Hub
72 black MSc/PhD students

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Thank you