



KEYNOTE SPEAKER

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AGRICULTURE 4.0 AND RURAL DEVELOPMENT

Robotics / Mechanization



Can Mother Earth Feed 9+ Billion by 2 Land Area **Arable Land for** 30% of Earth food, feed and fiber production ~15 billion 10% hectares ~1.5 billion hectares PERSON ~ 0.2 hectare, equivalent to a plot of land 45m x 45m in 2010 0.2 compared to a required minimum area of 0.5 hectare per person HECTARE 2012 2050 2100 Growing Population

Population Population Population Population Number of people to be fed Description Population

Can we produce sufficient food from 0.2 hectare?

Food security is a formidable challenge

The citizens of the world must work together for a hunger-free and more peaceful world using the best conventional crop technology and the best of biotechology in a policy framework conducive to crop production.

For more information, please visit - www.isaaa.org

Agriculture 4.0 and rural development

Robotics / Mechanization

- Lack of workers
- Water scarcity

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- Environment impact Expected climate change has negative impacts on soil productivity
- Food Waste
- Food security Interrelationships connection to human wellbeing
- Soil compaction
- Higher efficiency on the resources usage
 - Land based renewable energy and renewable materials

production conflict



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Robotics / Mechanization

PRECISION AGRICULTURE / FORESTRY ACTION CYCLE DATA ANALYSIS COMPLETE CYCLE AND DECISION PRESCRIPTION VARIABILITY MEASUREMENT MAP "BIG DATA" right time, robots, sensor networks, NDVI. right amount, GIS productivity map, soil right place map,. **ACTION – VARIABLE RATE TECHNOLOGIES (VRT)** fertilisation, irrigation, phytosanitary treatments, harvest,...

Tendency:

- Gather all relevant/type/amount of available information
- Apply the right amount at right time and place
- Act chirurgical at the right time and place



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Success Cases:

- Extensive crops and logistics
- Milking robots.

Benefits:

- Improves yield, land use, environmental impact and management
- Increases precision and quality in the process
- Extends operation time and Reduces unit costs
- Provides a quantitative decision base (ability to gather data and assess the state of crops and







livestock)



Agriculture 4.0 and rural development

Robotics / Mechanization

The use of robotics/mechanization in agriculture is **not fully democratized** in agriculture. (permanent crop, countries)

Challenges:

How we move/promote robots/mechanization for **more complex scenarios**, **fruit, vegetables, small farmers** and we make more **cost-effective** for low competitive countries

Agriculture is **cost driven, unit costs and yield** improvements are the only real argument for automation. However automation:

- reduces environmental impact for example with selective pesticide dosing, reduced levels of ground compaction and higher levels of land utilization
- Promotes the **economy of rural areas**

Should R&D on mechanization/robotics be driven only by the end-users?







Robotics / Mechanization

Challenges:

In factories we can easily increase the production to satisfy the demand. Provide in-field processing and packing crop monitoring to livestock management and harvesting. **Food-processing in the field?**

Multiple small robots vs Big machinery? (less soil compaction, better adaption to the farm size)

Urban farms, food factories? Local VS Intensive VS Rural VS short chains

Service Robots (ex. UBER) VS proprietary farm robots? Small proprietaries VS true farmers community?

Safety: behavior of autonomous machines in low-deterministic environment. Control in mixed environments, how to get a robot to the field and the driver back home?

Robot Agriculture more ecofriendly/Bio (let the ecosystem do the job of plant protection) – less monoculture more polyculture -> more modular and smaller agricultural robots -> Fuel vs Electrical motors based