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## ***Holistic AGRO-ICT-solutions considering also the integration of horizontal and vertical stakeholders***

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DI Walter H. MAYER  
PROGIS Software GmbH, Austria

The food insecurity situation is effected by global warming, population growth, focus on bio-energy, low technology acceptance, unfavourable policies, sustainability criteria, changing natural risk-situation, subsidies etc. Sustainability-, agriculture-, forestry- and environmental targets belong together and influence each other. Therefore we need **new types of ICT based land management**, covering protection of land and biodiversity, ensuring sustainable management based on multipurpose use of land, optimising economical benefits and taking into consideration land use potential and its carrying capacity. **ICT technologies**, integrating **local and science based expert data, easy to use software** and manageable **precision farming technologies** will be essential to achieve sustainable bettering. Large and small farms must have access to know-how, equipment and technologies to optimise food/wood production processes to reach nutritional- and/or biomass targets. New advisory services will be a must, more and better advice is necessary to support the farmer in a more and more complex situation regarding the integrated models for agriculture – forestry-environmental management and natural risk management.

We summarize subsequent the benefits of integrated technologies where farmers, advisors, contractors, supply chains, industries and consumers are integrated:

GIS gives detailed information on **size and location of fields** - base for calculation and logistics. Farm management tools allow **cultivation planning, documentation (also GLOBALGAP), nutrient- and CO<sub>2</sub>-balance, cost calculations** and provide information for trust centers or farm advisory services. **Logistic solutions** with central and mobile GIS systems allow planning of complete regions and serves **farmers, food-industries and contractors**. **Meteo-data** allow better decisions. **Business-plans assist cooperation with banks and insurance companies**. Machine interfaces allow the set up of **precision or virtual farming** solutions for groups of users, further **statistical analysis** for regions or countries and a possible **upgrade with forest- or environmental caretaking** solutions are supported. **Risk management** solutions can help to better defining and measuring farmer's integration into environmental caretaking. We can show solutions and discuss the requirements – technological and organizational - to use these technologies.

### **THE OVERALL CONCEPT - "AGROoffice"**

**The farmers worldwide must be enabled to feed 10 billion people in 2050, manage sustainable and CO<sub>2</sub>-neutral bio-energy and run environmental caretaking and natural risk management.**

## **TECHNOLOGIES BEHIND – “WinGIS + applications”**

object-oriented and hybrid raster- (images) and vector- (polygons, lines, symbols, text etc.) GIS (Geographical Information System) named WinGIS that beside the location and the link of an object to a database with an internal or external database also enables the use of an SDK (Software Development Kit) to link any database with AX-technology to the GIS component as well as develop with tools customized user-interfaces that allow an integration of time and activity management as well of an expert information system. Since 2010 in cooperation with Microsoft, their worldwide available Bing maps ([www.bing.com](http://www.bing.com)) – also other maps can be used instead or crunched – are linked to the system and allow working in any country worldwide. Further around 20 applications are supporting agriculture, forestry, environmental caretaking and risk management and the integrated chain-partners. Further following will be discussed and shown:

- **user interface integrates geography, db, time management and expert information**
- **farm management or farm advisory management – with “DokuPlant”**
- **forest management – with “Forest-office”**
- **others – “community-gis” and “pipe-gis”**
- **horizontal integration**
- **logistics – logistic centre and mobgis – just in time delivery of agricultural products**
- **precision farming - WinGIS based PF tools for cost optimisation**
- **virtual farming – better cooperation - a new way for smallholders**
- **land consolidation – for the Austrian government**
- **environmental and risk management – a new way enabling farmers to be integrated**
- **vertical integration**
- **chain management – from farm to fork**
- **trust centre – the rural area notary´s office**
- **system integration**
- **site analysis and soil management**
- **agro meteorology integration**

- **energy and CO<sub>2</sub> balance**
- **banks and insurance integration**
- **new organisation models**
- **cooperation is a must**
- **new advisory centres**
- **need to be optimized and must use latest technologies**
- **beneficiaries**
- **and how to integrate them**

### **BENEFITS IN DETAIL**

Not all benefits can be listed, some of them show already the power of an integrated system:

- GIS gives detailed size of the fields as base for exact calculation
- GIS gives exact location of the field for later logistics use
- Farm management allows with underlying expert data planning and documentation
- Farm management as a tool supports e.g. GLOBALGAP's documentation needs
- Farm management allows nutrient- and CO<sub>2</sub>-balance and is a subsidy tool if needed
- Farm management allows calculations (cost, contribution margin etc.) of fields/farms
- Farm management gives access to traceability (§§) and documents sustainability (§§)
- Farm management and GIS allow the development of modern advisory services
- Logistic and mobile GIS tools allow detailed logistic planning of complete regions
- Logistic and mobile GIS tools serve farmers, food industries and contractors

- Meteorology-data integration allows better decisions – just in times of climate change
- More benefit comes from business for banks or information for insurance companies
- Machine interfaces (ISO- or CAN-BUS) allow integration of precision farming
- Group solutions allow statistical analysis for regions or even countries
- Upgrade with forestry (forest inventory and forest management or forest logistics)
- Environmental caretaking solutions allow even farmers integration into this topic
- Risk management solutions allow also farmers integration in risk management
- Banks and insurance integration gives a win-win situation also for farmers
- A trust center allows the integration of different users of agro-information
- IT will support fast distributing of new scientific know how – feedback will support

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Contact:  
DI Walter H. MAYER  
PROGIS Software GmbH, Austria  
Postgasse 6, A-9500 Villach  
Phone: +43 4242 26332  
Email: [mayer@progis.com](mailto:mayer@progis.com)  
Fax: +43 4242 26332 7  
Homepage: [www.progis.com](http://www.progis.com)