CfP - FIFTH OPEN SOURCE GIS CONFERENCE - OSGIS 2014

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2<sup>nd</sup>-3<sup>rd</sup> September, University of Nottingham Website: <u>http://www.nottingham.ac.uk/osgis</u>

OSGIS workshop:

#### « AgriGIS: Open Source and Open Data in Crop Modelling and Related Agriculture Issues »

organised by Didier G. Leibovici, Suchith Anand, Jeremy Morley, Mike Jackson University of Nottingham (Nottingham Geospatial Institute) Tuong Thuy Vu University of Nottingham Malaysia Campus (Geography) Sean Mayes, Rumiana Ray, Charlie Hodgman University of Nottingham (Plant Sciences)

11am-1pm

1. Didier Leibovici

"the GRASP initiative, Geospatial Resource for Agricultural Species, pests and Pathogens with integrated workflow modelling to support Global Food Security"

2. Sam Meek

" Open Source & Open Standards: the GRASP platform"

3. Roberto Santos

"GeoGermplasmDB and visualisation of genetic variation: a Bambara groundnut case study" 4. round table discussion on

"Interoperability & e-enabled research for crop modelling and related agriculture issues"



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"Geospatial Resource for Agricultural Species and Pests with integrated workflow modelling to support Global Food Security (GRASP-GFS)"

Interoperability from data integration to geocomputational forecasts

Dr. Didier G Leibovici, Dr. Sam Meek, Dr. Suchith Anand, Pr. Mike Jackson University of Nottingham, Nottingham Geospatial Science Dr. Rumiana Ray, Dr. Sean Mayes, Pr. Charlie Hodgman, Pr. Sayed Azam-Ali University of Nottingham, Crop Science / CPIB, CFFRC (Malaysia)

#### and other partners UK, Australia,...



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## from prototyping to operational

BBSRC Software Enhancement and Maturation 2014



#### a multidisciplinary project between

**Geospatial Resource for Agricultural Species and Pests** 

GRASP

Crop sciences / Plant Sciences /Agronomy & Geospatial Sciences

- genetic & phenotypic & trait information
- agricultural & environmental information
- geospatial architecture & data & models management

"Geospatial Resource for Agricultural Species and Pests with integrated workflow modelling to support Global Food Security (GRASP-GFS): a prototype"

BBSRC TRDF call 2 Support for Development of Bioinformatic Tools and Computational Approaches to the Biosciences 2013



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#### **GRASP & Long term objectives**

- i. Providing an interoperable platform compliant with GEOSS for geospatial risk assessment in agriculture in relation to species, pathogens and pests
- ii. Research on an open source/standards based framework for crossdisciplinary geospatial data and models integration exploiting genetic trait diversity in animal and crop breeding to support food security analysis at different scales
- iii. Development of a GEOSS architecture using integrated workflow modelling and geocomputation to allow refinements and uncertainty assessments of models supporting food security planning scenarios linked to crop selection and climate change
- iv. Working in synergy with UK and Malaysian partners within the "WikiCrop/CropBASE" framework supporting the Crops for the Future Research Centre (CFFRC) initiative particularly on underutilised crops
- v. Engaging with the UK and the international wheat pathology, entomology and breeding communities developing models relevant to the GRASP-GFS generic model for agricultural trait diversity in relation to the changing environment, pest, pathogen pressures and climate



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Generic workflow of the GRASP project use and reuse of available information





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## **Spatial Data Infrastructure: achieved**

- GeogermplasmDB → genotypic variations
   CropStoreDB + OGC
- Workflow composition → crop modelling
   *e.g.* coupling a disease model with APSIM
- Quality & error propagation → metadata & decision classical error propagation (multiple-run) meta-propagation of uncertainty (WPS)

#### major crops (wheat) and underutilised crop (Bambara groundnut)



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## geogermplasmDB



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# Workflow composition / wheat model eyespot disease



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## **Quality & error propagation**

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	Quality Assurance web processing service WoQc-WPS contribution to the European FP7 COBWEB project	MetaPunT
	- quality controls WPS GetCapabilities	An Open Source tool for Meta-Propagation of uncerTainties in Geospatial Processing
	BPMN Authoring Tools for QA/QC	A Contribution to the FP7 EuroGEOSS European project from the (Centre for Geospatial Science) Nottingham Geospatial Institute
	Quality Assurance workflow authoring tool contribution to the European F COBWEB project	I Dr Didier G. Leibovici & Dr Amir Pourabdollah
	- JBPM workflow authoring tool	Download MetaPunt 1.2 Desktop Application
		Download System Documents
	• GRASP	OGC's WPS (Web Processing Service): Get Canabilities
	Geospatial Resources for Agriculture Species and Pests: GRASP	
	- cron models WPS GetCanabilities	DescribeProcess PuntValue(single)
Dr. Didier G. Leibovici & Dr. Sam Meek	- crop models with Geleapaonnies	Source Code (Eclipse project)
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Data Sources

▶ Start

► End

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Propagating Quality

From "Light" To "Green Intensity"

From "Precipitation" To "Green Intensity

ture" To "Cr

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Data Source Sub-eleme

Punt it !

Get Capabilities Describe Process

Punt all !

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# **OS OS & Workflow management**

Open standard

**BPMN 2.0, XPDL (metamodel)** 

ISO 19115 /19157 (metadata quality see also meta-propagation), OGC WPS profiling **ISO/TC 211** 

- **Open Source**
- Java eclipse framework development,
- Together libraries (with XPDL)
- pyWPS or WPS4R
- OS map viewer (data map, quality map,) thumbnail picture ...



Workflow Editor



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Workshop 5- AgriGIS workshop (led by Didier Leibovici, University of Nottingham) 11 A26, Business School South







exploring horizons

52north

#### Achieved (BBSRC 2013) and Planned

- prototyping has been demonstrated
- building blocks of the architecture in place
- exemplar case studies well underway
   so far 50-60% of long term objectives
- maturing the prototype
- as component of the GEOSS infrastructure
- multivariate uncertainty assessments
- geo-visual analytics across data and models
- exemplar integrated modelling case studies

#### Thank you for your support



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## In project

- Maturing the **geospatial germplasm database** with selected crop data: wheat, Brassica data including Oilseed rape, and bambara groundnut
- Developing the metadata support for data & processes enabling workflow composition as well as linking to genetic data and environmental information
- Enhancing usability using **geo-visual analytics for data mash-ups**, spatial association analysis and crop geoworkflow models
- Maturing uncertainty assessment along with enhancement multivariate error propagation for better decision-making
- Providing fully interoperable OGC compatible interfaces for GEOSS with portability demonstrations using Open source software such as QGIS from the OSGeo stack
- Illustrating examples of the GRASP platform functionalities using a crop rotation integrated modelling under global food security scenario



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## Potential funding ... for the year coming

• H2020-EINFRA-2015-1

http://ec.europa.eu/research/participants/portal/desktop/en/opp ortunities/h2020/topics/2144-einfra-9-2015.html

## • H2020-SFS-2015-2

#### http://ec.europa.eu/research/participants/portal/desktop/en/opp ortunities/h2020/topics/2338-sfs-05-2015.html



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