Cranfield UNIVERSITY

Report Prepared for the Department for Environment, Food and Rural Affairs

Report of Activity for LandIS Support

Quarterly Progress Report
1st April – 30th June 2011

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For the Department for Environment, Food and Rural Affairs

by
Caroline Keay, Timothy Farewell, Adnan Younas and Stephen Hallett

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DEFRA Contract No. SP1608
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CHANGE HISTORY

Version	*Date*	*Summary of change*
1.0	26/7/2011	First Issue

Reference to this report should be made as follows:

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Progress with the LandIS Support Contract

Reporting Period: 1 April, 2011 – 30 June, 2011

This document represents the third milestone for the LandIS Support contract SP1608.

Database Maintenance

No specific maintenance issues are reported in this period. The LandIS 'Virtual Server' continues to provide good service to the project. The service team in the Cranfield University IT computing group provides a high standard of maintenance care and support. An upgrade of the Oracle RDBMS and ArcSDE platform has been planned for the summer of this year.

Web Tools Usage

The Soilscapes Viewer is now widely used. We are planning a redevelopment of the tool and have accordingly placed a series of requests for feedback from users onto pages associated with the tool. We will collate such comments received and factor these into our design plans.

The Soil Site Reporter (http://www.landis.org.uk/reports/) continues to be used extensively with numbers steadily increasing. In the current period there have been 18 new organisations and 153 new users registered. These include 4 new Universities and 92 new student registrations. In total 538 reports have been generated this quarter.

The following figures illustrate the level of response and use of the reporter to-date (figure 1):

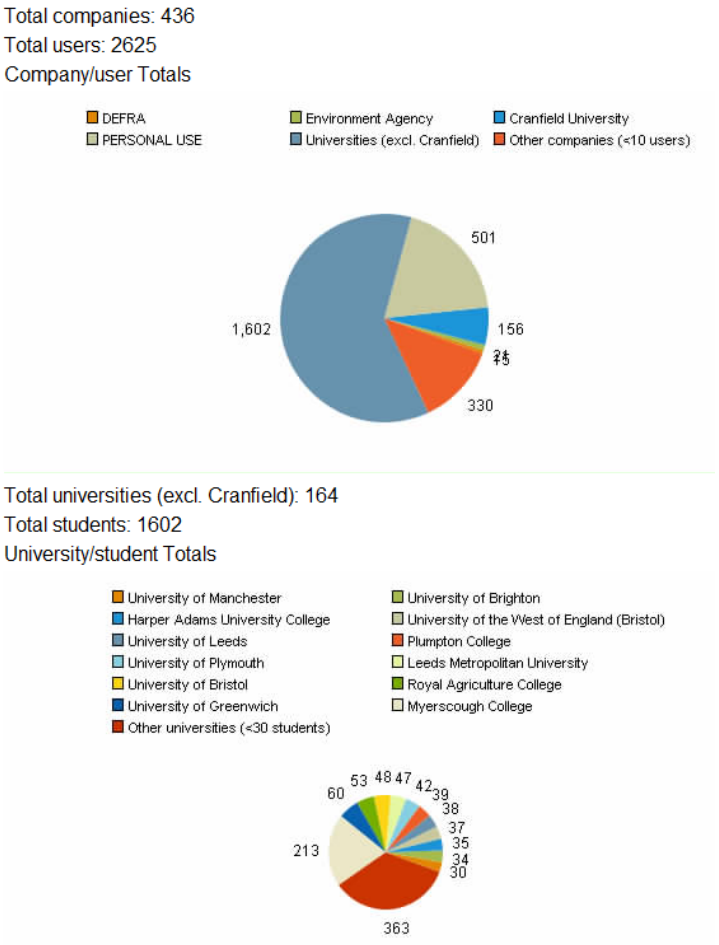


Figure 1 Summary of Soil Site Reporter uptake by user group

Cataloguing of the Paper Soil Profile Descriptions

Thanks to the help of casual labouring staff Vicente Garcia-Garcia, Chris Barber and Claudia Mayr we are now over half way through sorting and cataloguing the six filing cabinets of paper soil profile descriptions in the archive. This will enable a digital record to be held and accessed describing the range of soil profiles available from NSRI.

Improved Data Descriptions

The soilscapes information brochure, the first in the series of new brochures, is now available on the LandIS website. These new brochures will seek to describe in more detail the range of interpreted soils data from NSRI. More dataset brochures are in progress. The Soilscapes brochure is available online at:
http://www.landis.org.uk/downloads/downloads/Soilscapes_Brochure.pdf

LandIS Website Improvements

The LandIS website has undergone a series of technical improvements to improve its stability and performance. Files from the legacy website are to be removed from the server with folders being restructured. The website news section has been updated, following our new drive to place topical stakeholder-focussed news items online, the latest of which are:

- Redevelopment of Soilscapes viewer: April 2011
- Gold under Bracken: April 2011
- GIS at Cranfield: May 2011
- Clay Shrinkage and Swelling: June 2011

Soilscapes Viewer User-Satisfaction Survey

A user-satisfaction survey for Soilscapes Viewer has been put in place to extend the simple feedback mechanism that had been used previously. The new questionnaire, at http://www.landis.org.uk/feedback/user_survey.cfm allows users to record their views and comments on the proposed developments. May we take the opportunity to request colleagues from the Soils Policy Team help by recording their specific comments in this survey.

Enquiries

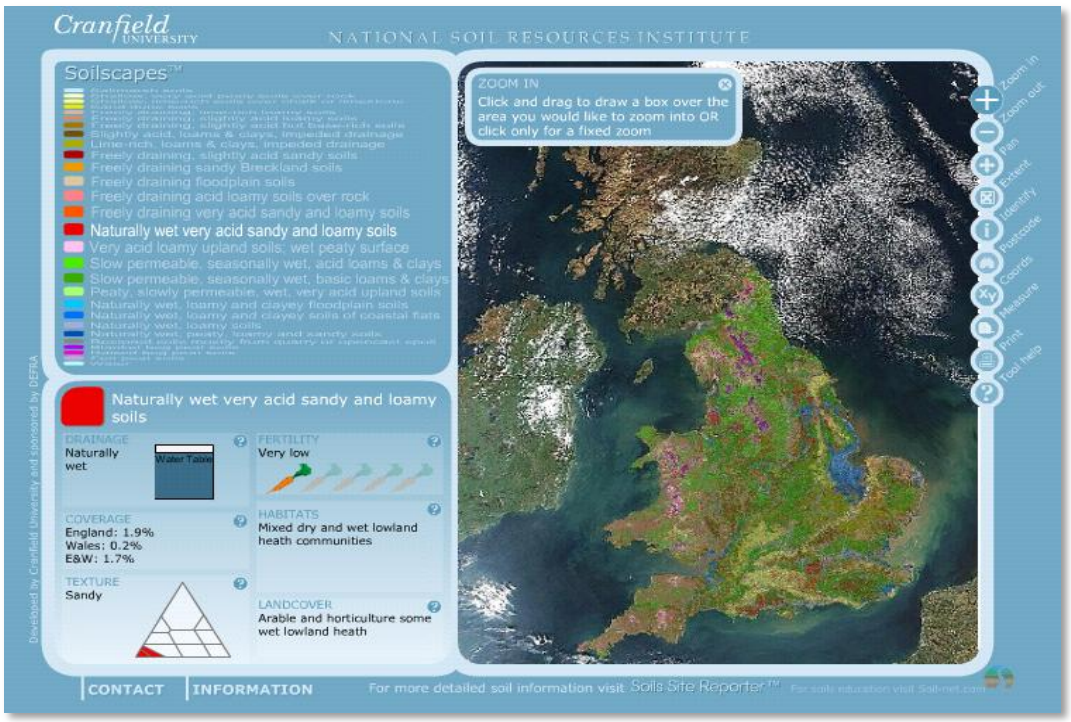
The datalease team has continued to provide expert guidance for those investigating the use of soils data in their research or work. This quarter we have continued to assist people from the academic, government, commercial, financial and charitable sectors.

New Soilscapes Viewer interface

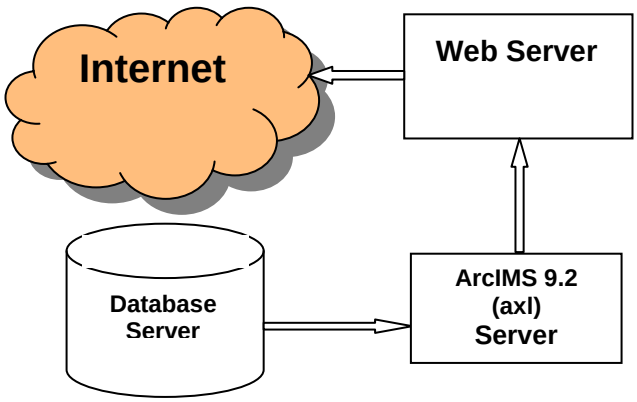
The Soilscapes Viewer is a **free**, **easy-to-use**, **online** soil reporting tool which produces **summary** soils information for a specific location, based upon the NSRI “Soilscapes” soil thematic dataset.

The free Soilscapes viewer provides a summary description of the soils at specified locations across England and Wales. Tools are provided to allow the user to navigate around the map, to change the scale of view, to pan the view, to query the information at a given specified point and finally to produce printed output. These tools are slightly outdated and limited in terms of technology and usage.

Based on the recent feedback users have expressed their difficulties in using Soilscapes for example as a result of the colour scheme, icons and text size and speed. Therefore a programme of redevelopment has been commenced. The existing interface is as shown below.



Current Soilscapes Viewer Architecture



The current architecture is based on ESRI 'ArcIMS', which today is almost an outdated technology as ESRI have stopped developing it any further, although they are still providing support for it up until version 10. Here, no further development means, it won't be able to cope with current and emerging web trends. Also it has been argued in many of the ESRI publications that ArcGIS Server is now preferable than ArcIMS in many ways, such as, better performance in terms of speed and processing. We will therefore now adopt ArcGIS Server technology to replace ArcIMS.

Why Consider Migration?

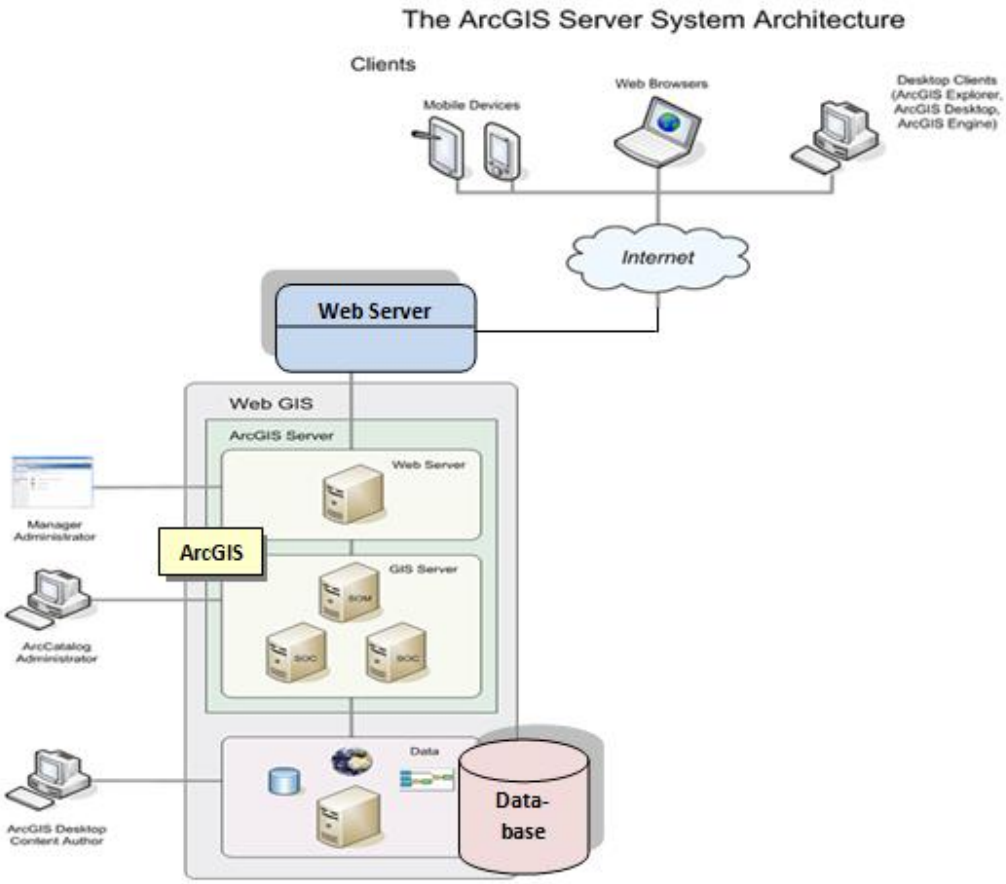
"The next major release after ArcGIS 10 will be the last planned release for ArcIMS. Users can continue to use existing versions of ArcIMS after this time; however, we will no longer provide new releases."

ESRI Deprecation Plan

There are many other factors which need to be considered before migrating to ArcGIS Server 10, especially from ArcIMS 9.2. ArcGIS Server supports a range of other newer emergent methods such as web service technologies which are fast and more reliable.

Also trends in web development are changing quite rapidly e.g., contemporary users are used to having more control in applications, such as being able to 'drag and drop' menus and features around the screen. Also, a more powerful and rich user interface based application needs rapid development toolkits to enable it to be prototyped and built quickly.

Next Generation of Soilscapes Architecture



Why Flex API (Application Protocol Interface)?

ESRI are now recommending that developers should use a web services based pattern with the ArcGIS Web Mapping APIs for JavaScript, Flex, or Silverlight. The NSRI team have faced a number of questions in selecting which API to use:

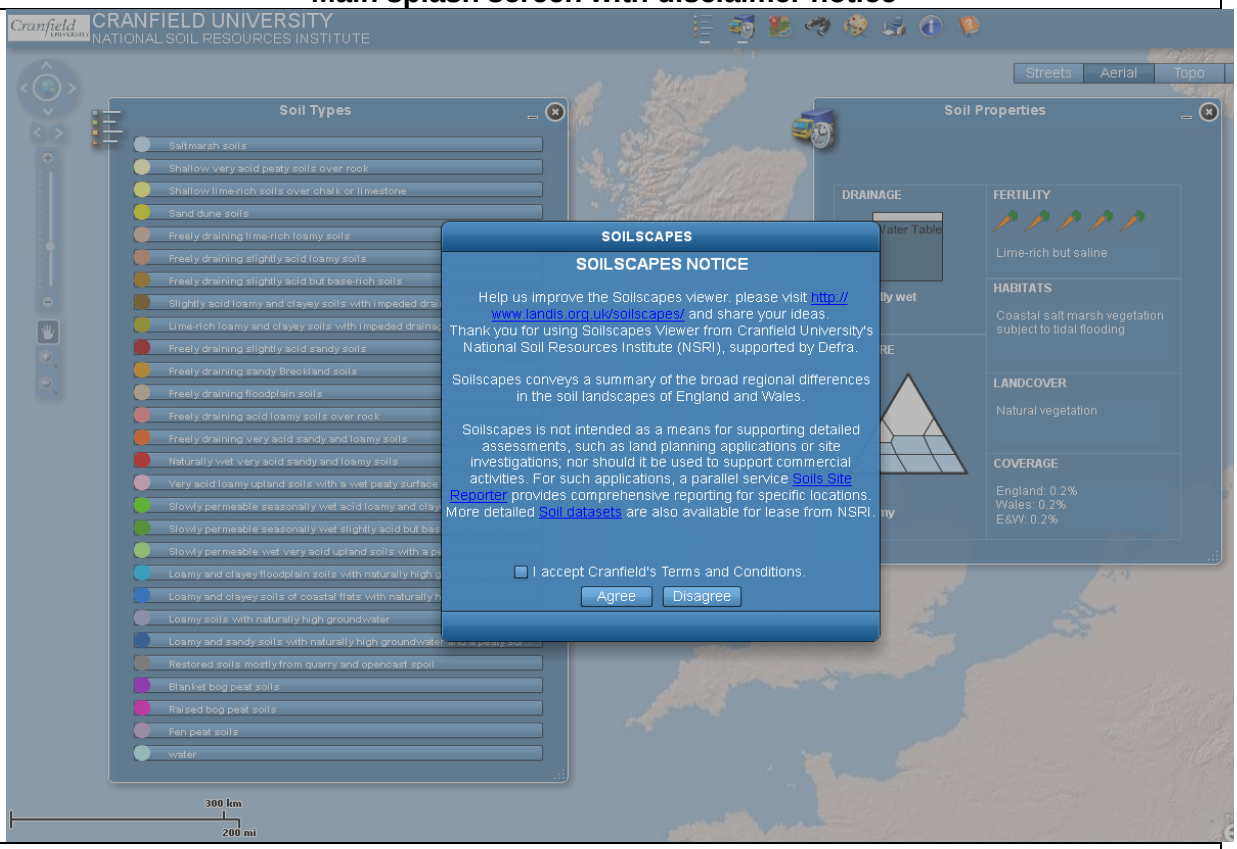
- **Are Browser Plug-ins an Option?** Flex and Silver light requires such plug-ins.
- **Developer Preferences?** JavaScript and/or Flex
- **What browsers are supported?** More or less all commonly used browsers. Flex and Silver light can work on most of the browsers but JavaScript have some compatibility issues.
- **Does the site need to be "mobile-enabled"?** Yes but with less features
- **How extensible and scalable will the new application be?** Depends on user suggestions.
- **What developer tools arerequired?** Dreamweaver, Flash builder
- **Which base maps should be used?** Customised.

Based on these considerations the Flex API was selected as it provides out-of-the-box tools and ‘widgets’ and also has better ‘community support’.

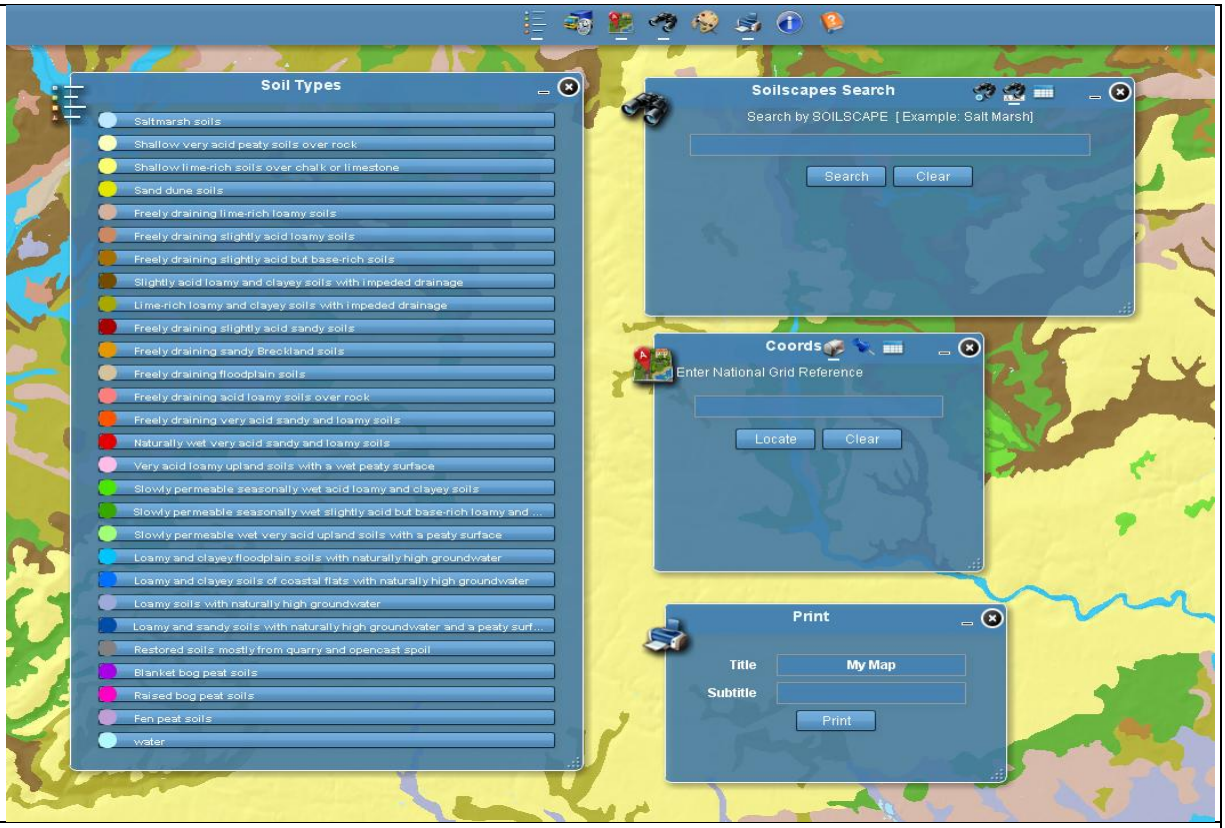
The next generation of Soilscapes viewer is shown below in some snapshots demonstrating the rich user interface of the early prototypes under development. It can be seen to provide user-friendly mouse events as well as more in-depth options for deriving information out of Soilscapes viewer efficiently on many devices.

This new Soilscapes viewer will have a range of different options, which can be seen in the snapshots below. All the features can be used to perform different operations on the map e.g., to identify a point to see the specific soil properties, measure the area on a map, search soil map data (limited access), print the snapshot etc. All these features are flexible so the user can minimise, close or move the windows around the screen.

Main splash screen with disclaimer notice

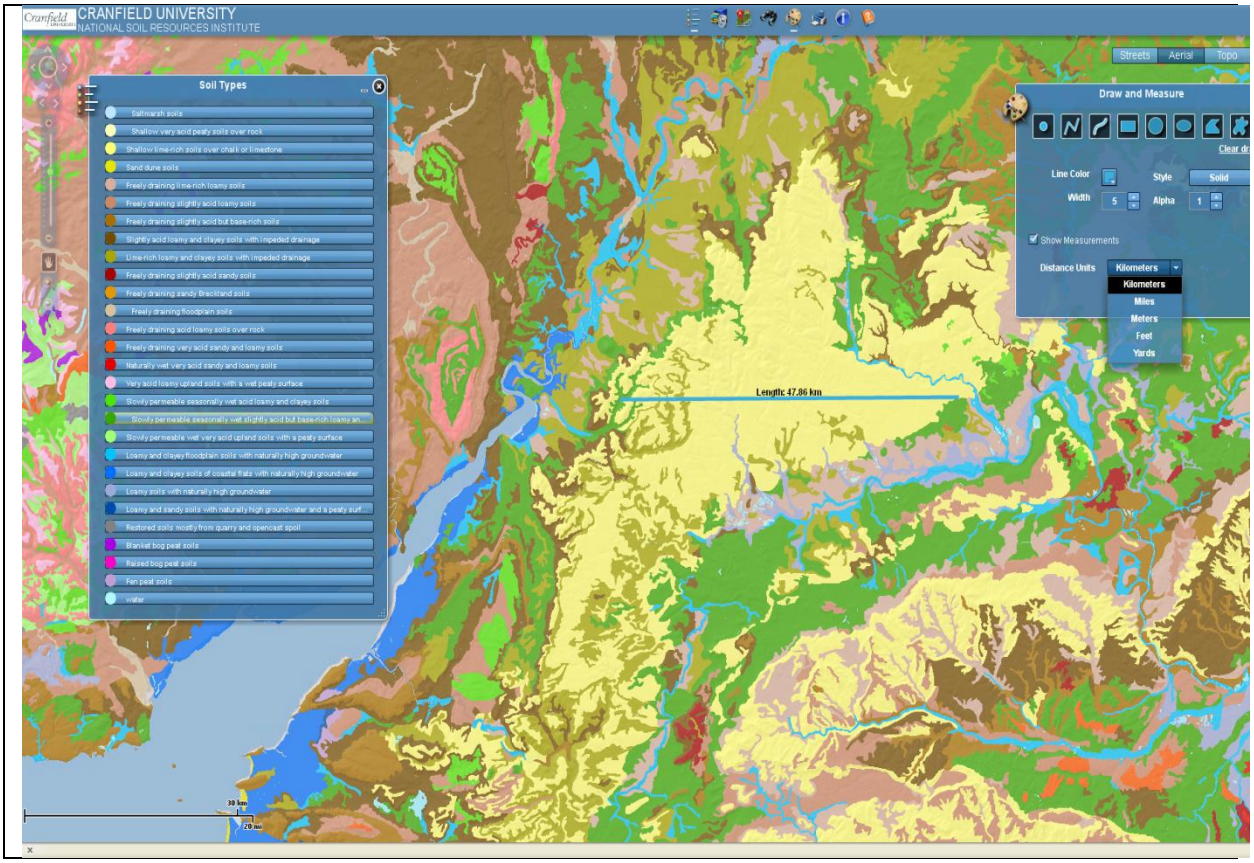


Soil types, Search, Co-ordinate search and Print widgets



Identify widget with popup window

Measure and Draw graphics overlay widget



Next Steps

Development of prototypes continues with the new Soilscapes Viewer prototypes. Having homed in now on a single development technology (after trialling a range of options), progress has been quite satisfactory. It is hoped to be able to present Defra with an advanced prototype within the next reporting period for comment.

INSPIRE Conference 2011

Caroline Keay attended the INSPIRE Conference 2011 in Edinburgh from 27th June to the 1st July.

Key points arising from Conference:

Defra's UKlocations team talked about their contribution to INSPIRE and how they are organising the UK's response. Working groups are being organised for each of the Annexes identifying the key organisations that will be responsible for data provision under INSPIRE. Working Groups for Annex I and II have already been assigned and Annex III groups will be developed soon. NSRI are hoping to be included as the main contributers to the Annex III Soil theme.

On-line mapping services, such as WMS/WFS and CSW appear to be the most desirable way of providing INSPIRE compliant maps and metadata. Direct links to which could be presented through the UKlocations portal, so that Defra and other users can discover, view, and download the data directly in their GIS applications. However for this to work security arrangements would need to be addressed. The company Conterra offer two modules: securityManager and licenceManager, which allows controlled access to wms and wfs services. However this solution does not come cheaply. The UKlocations team are going to

be investigating security and licencing options and we were therefore advised to wait for their conclusions.

INSPIRE Soil Data Specification

The INSPIRE Data Specification v2.0 for Annex II and III were released on 21st June 2011.

The INSPIRE Directive (Directive 2007/2/EC) defines Soil as follows: “Soil and subsoil characterised according to depth, texture, structure and content of particles and organic material, stoniness, erosion, where appropriate mean slope and anticipated water storage capacity”. Based on the definition the scope for the soil theme contains the following elements:

a) Soil inventories, providing one-off assessments of soil conditions and/or soil properties at certain locations and at a specific point in time, and soil monitoring, providing a series of assessments showing how soil conditions and/or properties change over time.

b) Soil mapping, providing a spatial presentation of the properties linked to the soils, including soil types; typically, soil maps are derived with the help of data available in soil inventories

c) Thematic maps derived from soil information, possibly in combination with non-soil data.

LandIS contains data that fits directly into all three of these elements: Soil inventories are covered by the National Soil Inventory (including monitoring as sites are revisited), plus also the Auger bore and full profile description datasets identify specific point in time data. Soil mapping at a national and local scale with associated information on soil types (associations and series). Thematic maps are also an increasingly important part of LandIS such as soil compaction, texture, wetness class etc.

The present Data Specification model consists of:
- A Core Model containing a core of objects and attributes that are considered to be essential to act as a basis for further INSPIRE legislation (see Figure 2).
- Extensions to the Core Model for 4 selected Use Cases: an extension demonstrates how a particular use cases can be implemented starting from the Core Model, by adding objects and attributes.

The scope for soil theme includes the following real world phenomena:
- soil profiles;
- soil sites, soil plots, soil samples;
- soil delineated areas (determination based on certain soil characteristics);
- soil characteristics that change over time (allowing soil monitoring);
- soil contamination.

There are at present very few EU Directives putting strict requirements on soil data specifications or formats. In most cases soil data formats are involved only indirectly. Depending on the country, soil related legislation can be present at national level. Some of the national legislation, touching on soil, was established as consequence of EU legislation (for example the Water Frame Work Directive).

One of the biggest challenges to harmonisation across Europe has been identified as the lack of a uniform soil classification specification. This will be a particular challenge for the soil information in LandIS as it is built on the basis of a National classification scheme peculiar to England and Wales. Although some attempt has been made to classify the National Soil map associations to the World Reference Base system, a lot of work will be required to

reclassify the soil series to harmonised international standards and to develop the depth of associated thematic information that is held within the soil series concept.

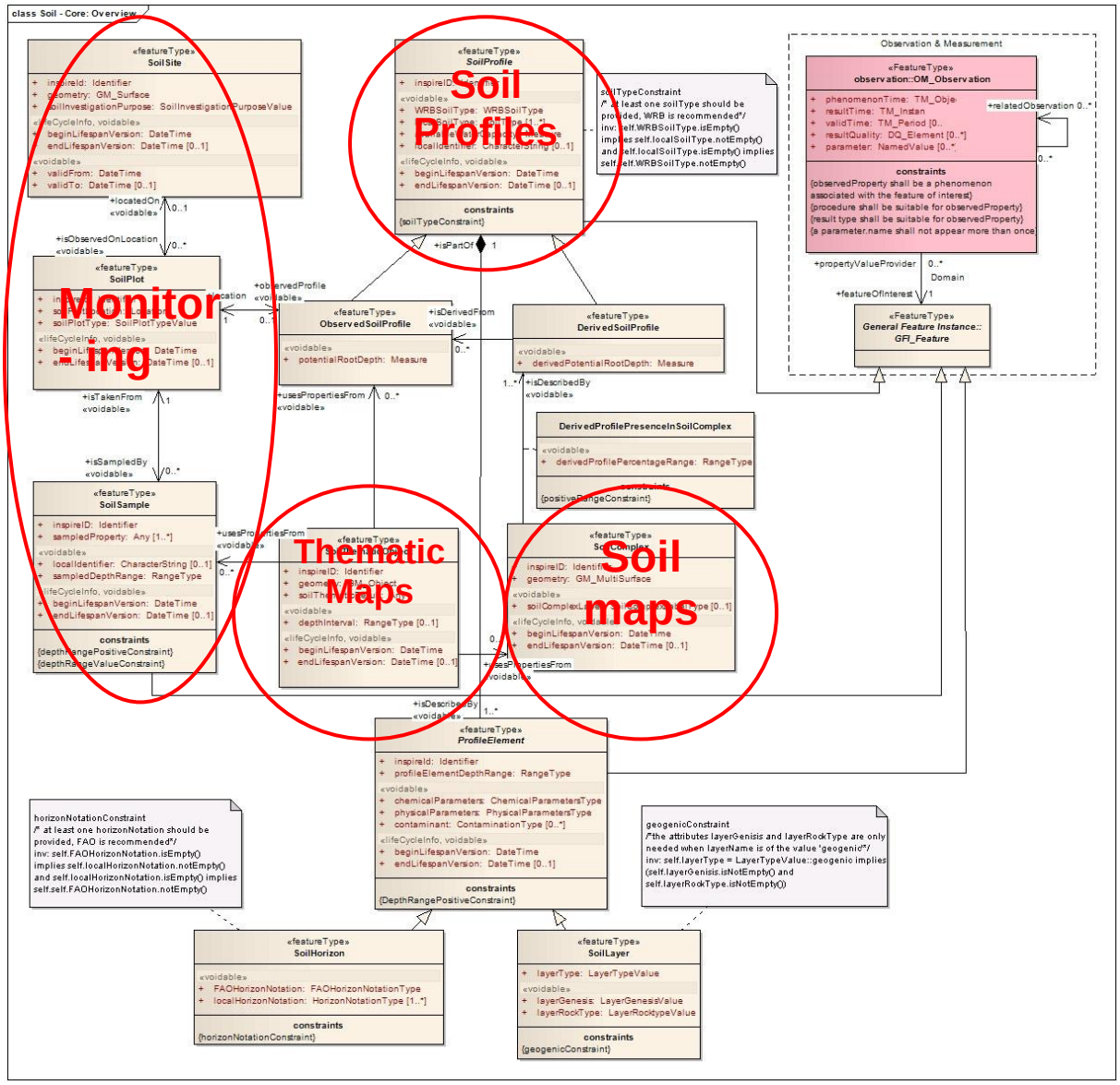


Figure 2 UML class diagram: Overview of the SOIL CORE application schema

Further to the INSPIRE conference, Dr Stephen Hallett has also recently become an invited member of the International Union of Soil Science, working group on soil information standards. Again the movement around Europe and further afield internationally highlight the importance of this moment in time as standards for soils information become formalised. It is seen as important that NSRI are able to represent the interests of furthering LandIS within this context.

LandIS PERSONNEL/TIME

Time put down to the LandIS project for the period Apr 2011 to Jun 2011 with budgeted days for Year 2 of the LandIS contract (Apr2011-Mar 2012) in brackets:

Staff	Days Used	Budgeted Days
Caroline Keay	14.3	(59) days
Stephen Hallett	2.5	(29) days
Timothy Farewell	14	(60) days
Adnan Younas	30.3	(119) days
Sara Larman	17.6	(60) days
Ian Truckell	2.1	(14) days
Bob Jones	0	(2) days
Jacqueline Hannam	0	(1) days

Defra Data Lease budget used between 1st October 2010 and 30th June 2011

£1,750 has been spent from the total project budget of £9,460 allocated for Defra projects for year 1 and 2 of the project. New data leases this quarter have been highlighted in the tables below as "***NEW***".

COMPLETE LIST OF DATA LEASES FUNDED BY DEFRA VIA THE LANDIS FUND (OCT 2010 – JUN 2011)

Organisation	Abstract	Purpose of Use	Start Date	End Date	P&A	Uncharged Royalty
Data Lease funded by DEFRA via the LandIS fund						
World Conservation Monitoring Centre UNEP	NATMAPvector, NATMAPsoilscapes, NATMAP1000 HORIZONfundamentals & hydraulics, NSItopsoil 1 (carbon), NSItopsoil 2 (carbon Consortium Licence use by: R. H.Young - Nottingham University. & I.Bateman -UEA.	UK National Ecosystem Assessment- Project code 0126. (original licence L0013/00552 Defra)	09-Mar-09	31-Mar-11	£975	£239,040
Defra and the Welsh Assembly Government	1. Wetness class: map showing soil associations in which more than 65% of the association area comprises soils having wetness class IV, V or VI. 2. Maps (with associated shape files) of shallow, stony, coarse, fine textured and peat soils. We would supply	determining Less Favoured Areas in England and Wales. Consortium licence in conjunction with Natural England ref: LC0013/008 and Welsh Assembly Government ref: LC0200/001	01-DEC-10	30-NOV-14	£400	£618,500
NEW University of Reading	NATMAPvector	Diversification of grassland through the manipulation of plant-soil interactions and the identification of indicators of restorability. Defra 2004-2012	21-Apr-11	20-Apr-12	£375	£75,000
				TOTAL (Defra)	**£1,750**	**£932,540**

Organisation	Abstract	Purpose of Use	Start Date	End Date	P&A	Uncharged Royalty
Bona Fide Research						
University of Lancaster	NSI topsoil data, (including that modified by Pat Bellamy), Ecosse Soil Carbon Dataset . Also outline of England and Wales.	Soil carbon management in UK - PhD research by D. Dennis Konadu	01-Oct-10	01-Oct-13	£375	£12,432
University of Aberdeen & University of Reading	NATMAPvector for England and Wales Examining NVC Community Type Change with climate change. Consortium Licence with Geoff Griffiths (Reading) and Pete Smith (Aberdeen)	For use on Defra Priority Habitats, Protected Sites and Climate Change: DEFRA CR0439	01-Oct-10	01-Oct-11	£975	£75,000
Cranfield University	For the 10km sheet TL04 around Wilstead: NATMAP Vector plus an extract from sheet 147 Luton & Bedford.	PhD thesis on 'Site-specific land management of cereal crops based on proximal soil sensing'	16-MAR-11	28-MAR-11	£0	£225
NEW University of Southampton	NATMAP vector SOILSERIESHydrology HORIZON FUNDAMENTALS HORIZON HYDRAULICS	Use for the purposes of the ETI project known as ''Biomass System Value Chain Modelling'' ETI ref: L0249/00596.	01-Apr-11	31-Mar-15	£375	£60,000
NEW University of Reading	NATMAPvector	Conflicting demands of land use, soil biodiversity, and the sustainable delivery of ecosystem goods and services in Europe. European Commission FP7 2008-2012.	21-Apr-11	20-Apr-12	£375	£75,000

Organisation	Abstract	Purpose of Use	Start Date	End Date	P&A	Uncharged Royalty
NEW University of Cardiff	NATMAPvector, SOILSERIEShydrology, HORIZONhydraulics, HORIZONfundamentals NATMAP 1000	PhD - Kate Walker. Climate change and dynamic sediment controls on stream organisms: a case study in the Severn Catchment.	01-May-11	30-Apr-12	£375	£14,000
NEW University of East Anglia	NATMAP vector SOILSERIES hydrology HORIZON fundamentals HORIZON hydraulics	RELU project - Market-based mechanisms for protection of water resources - Tamar catchment - SW England.	04-May-11	03-May-12	£375	£5,000
NEW University of Cardiff	NATMAPvector, SOILSERIEShydrology, HORIZONhydraulics, HORIZONfundamentals NATMAP 1000	PhD - Becky March. Climate change and dynamic sediment controls on stream organisms: a case study in the Severn Catchment.	01-May-11	30-Apr-12	0	£14,000
NEW Produce World Ltd	NATMAPvector 3 detailed sheet maps - Spalding & Boston Cambridge & Ely, Ross-on-Wye All SOILSERIES and HORIZON and MAPUNIT soils attribute data. Soils profiles catalogue	PhD - Guy Thallon.	25-Oct-10	24-Oct-15	0	£700,000
NEW Cranfield University	For an area in the Midlands: NATMAPvector, NATMAP5000, HORIZONfundamentals	PhD is 3D soil property mapping, the data will be used for creating a 3D map of the soil organic carbon in the west Midlands area.	13-Jun-11	01-Jul-12	0	£1,142
			TOTAL (Crown and Bona fide Research)		**£2,850**	**£956,799**