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The iMars WebGIS – A Central Hub for Displaying and Distributing Co-Registered Data of Mars

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Project Background

The iMars-project [1] is an EU funded R&D project which has started in 2014 and which is aimed at developing an automated processing system for generating image stacks of high-precision, co-registered, terrain-corrected and multi-temporal data of Mars obtained since 1977. It is anticipated that the entire NASA and ESA record of orbital image data will be co-registered and terrain-corrected in 2015 [1] so that time-series data can be generated for subsequent analyses. Such analyses will be conducted automatically using change-detection algorithms or interactively and visually using the citizen-science concept implemented at Zooniverse [2]. For more detailed information see [1] and visit the project's website at http://www.i-Mars.eu.

Close user interaction plays a paramount role within iMars which requires sophisticated concepts for data handling and communication allowing users to integrate, analyse and visualise data from a central location. This interactive data hub will be realised through open-source webGIS implementations and by providing webGIS services to the user community using established OGC-protocols (see Fig. 1, [3, 4, 5]).

Navigation Concepts and Requirements

A common understanding of requirements is of utmost importance for project success and its acceptance in the user community. Requirements put forward by developers and the general project aims are weighed against user requirements that have been (and are being) collected through processes such as user workshops or community discussions. Finally, these – mostly functional – requirements are complemented by project-internal and technical requirements. The first official workshop was held at the EGU 2014 General Assembly in Vienna in May 2014 [1] and is (at the time of writing) accompanied by an online user survey based on a questionnaire.

As a central component of iMars, the webGIS will need to handle a massive amount of data and data layers streamed from different sources over the web. Additionally, it requires to be slick in terms of design, and intuitive in terms of navigation and speed while offering high-level functionality for raster data display and analysis.

For planetary data (and user community) only a few web-based GIS have been implemented during the last decade and even fewer can be considered as being established in and accepted by the user community. Most web-based services today are either archive systems providing data gateways and form-based extraction of meta-information (data- and clearinghouse-type implementations, see [6]) as realised in the Planetary Data System (PDS) and the Planetary Science Archive (PSA) nodes. Or, alternatively, web-based services are map-focussed systems targeted at visualisation rather than ancillary data and metadata access (e.g., [7] or Google Mars). Both form either so-called *Data Sharing* or *Information Sharing* types of *Internet GIS* [6].

Options for higher-level analyses, i.e. the *Knowledge Sharing* type of Internet GIS, are currently only

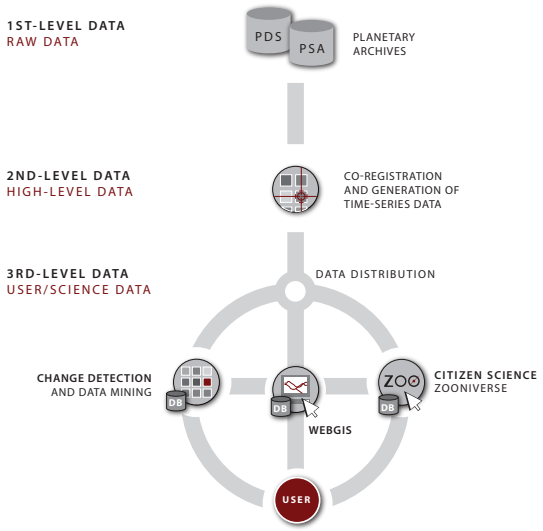

Figure 1: General project workflow from unprocessed raw data (1) to higher level science data (2) and results obtained from citizen science (3). The iMars webGIS is the central hub which integrates higher-level co-registered data products as well as results from user analysis.

provided through the JMars platform (see, e.g. [8]) and the former PIGWAD service and its derivatives that started service in 1999 (e.g., [9]). Both systems have a more complex setup than current map-focused information platforms, and they require a more conservative navigation approach when compared to modern pyramid-based pan and zoom map portrayals.

The largest challenge we have to face in iMars are not implementation of established protocols and data formats allowing to navigate data intuitively and conveniently without significant lag but rather concerned with providing higher-level tools for analyses to bridge the gap between a map-focused information-based webGIS and map-focused knowledge-based system. The latter allows significantly more data interactivity and provides means to store information and extract knowledge based on sophisticated analyses.

Outlook

For the EPSC a second online-survey emphasising the webGIS user interface will be launched. It will be accessible via the iMars website (http://www.i-Mars.eu) during the EPSC and asks for community feedback with respect to webGIS functionality and interaction.

Please do consider completing the survey to help us ensure that we provide a system which is *fit for purpose*.

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