OpenPlanetaryMap: Building the first Open Planetary Mapping and Social platform for researchers, educators, storytellers, and the general public

N. Manaud[1], A. Nass[2], M. Lewando[3], S. van Gasselt[4],
A.P. Rossi[5], T. Hare[6], J. Carter[7], H. Hargitai[8]

[1]SpaceFrog Design, Toulouse, France; nicolas@spacefrog.design, [2]German Aerospace Center, Institute of Planetary Research, Berlin, Germany, [3]CodeMacabre, UK, [4]Dep. Land Economics, National Chengchi University, Taipei, Taiwan, [5]Department of Physics and Earth Sciences, Jacobs-University Bremen, Bremen, Germany, [6]USGS, Astrogeology Team, Flagstaff, USA, [7]Institut d'Astrophysique Spatial, Orsay, France,[8]NASA Ames Research Center/ NPP, Moffett Field, USA

Introduction: The popularity and ubiquity of web interactive maps constitute a powerful leverage for telling stories, educating and engaging a wide and diverse audience with planetary sciences. A few excellent planetary interactive maps [e.g. 1,2,3] exist but they are either too complex for non-experts, or they are closed-systems that do not allow for collaborative learning, social interactions, and reusability of data.

OpenPlanetaryMap (OPM) is a collaborative effort from within the OpenPlanetary community [4] and based on "Where On Mars?", a previous outreach project to visualise ESA's ExoMars Rover landing sites candidates [5]. OPM is supported and made possible thank to CARTO [6] and Europlanet [7] through their respective grant programmes.

Our long-term vision is to build a community around an Open Planetary Mapping and Social platform for space enthusiasts, planetary scientists, educators and storytellers. Our goal is to enable them to easily and collaboratively create and share location-based knowledge and maps of others planets of our Solar System.

Objectives: We aim to launch a first prototype version of the OpenPlanetaryMap platform at next the Lunar and Planetary Science Conference in March 2018.

Web Map Interface: As part of this platform, we will develop a web map interface that will make it easy and enjoyable for novice people to discover, search, share, discuss and add their own places on Mars (we will expand to other planets in a second stage). We aim to provide a social experience that will help creating an emotional connection with Mars and incentives to learn and share knowledge about it.

Open Datasets Repository: A key element of the platform will be an open datasets repository containing a curated selection of location-based information and places of interest about Martian geography, topography, geology, weather, climate, scientific missions and discoveries, robotic and human exploration. These scientifically accurate data sets, along with public crowdsourced datasets, will be programmatically accessible and reusable by others to develop third-party applications for specific scientific or outreach purposes.

Basemap: We will also design and implement at least one beautifully crafted vector-based basemap of Mars that will serve as the base layer of our web map interface and enrich its overall user experience. It will be made publicly available to foster the creation by others of theme-based maps of Mars that can be easily shared on the web and social media.

Initial concepts: Initially, the places on Mars the audience will learn about will include information from curated datasets, as well as from a public crowdsourced dataset of *Places*. These Places will either be related to a physical object or phenomenon (i.e.: crater, dune, gully, dust devil, cloud), or to a more abstract one that contributes to increasing knowledge of Mars (i.e.: scientific publication, blog article, Wikipedia page, tweet, panoramic image, video, question, story, event). Our audience will also learn from discussions they have with each other, including with planetary scientists.
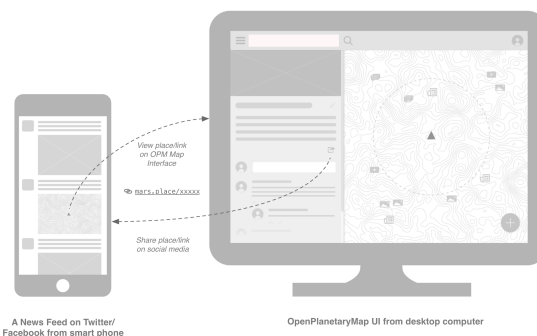

Figure 1: This illustrates the basic concept for the OPM web map interface and sharing places.

One particular requirement that is key to the success of our platform is the capability to

handle multiple users and groups for our project team of planetary scientists and cartographers to collaboratively store and manage, publicly and privately share, datasets.

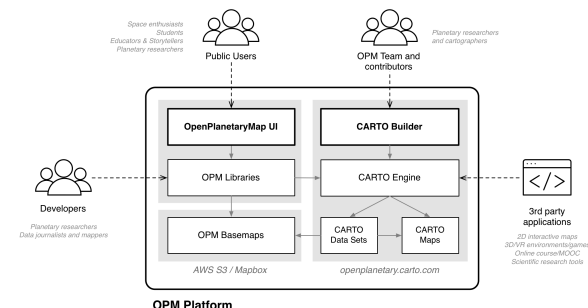The OPM platform will almost entirely rely on the CARTO Engine and Builder.

Figure 2: This illustrates how CARTO will fit into the OPM platform, and what users and applications interact with it.

Approach: We are a small interdisciplinary and international team of researchers, developers and designers passionate about planetary mapping and cartography. We started to form our team in January 2017 and held a first meeting in Berlin two months later to kick-off the project. Throughout the project, we will adopt an iterative development approach and try to follow a user-centered design process as much as possible; including user research, prototyping and testing methods. We will organize co-located hackathons at planetary data workshops and other events, to learn from potential users and experts, and stay in line with our objectives.

Being collaborative by nature, we will encourage everyone who is interested in this project to contribute [8,9] with their expertise: in planetary cartography, web development, geospatial data processing or any other areas that we haven't yet thought of.

Intended outcome and impact: We aim to make novice people feel that Mars is at their reach, both in terms of knowledge and preconceived physical proximity. We want them to use our future web application to quickly and regularly learn something about Mars, just like people head to Google Maps to find their bearings or any location-based information.

With an Open Data and Open Science philosophy in mind, we aim to encourage planetary scientists and mappers to share and collaborate on research data sets in a way that is beneficial to all parties: peers, graduate students, science communicators and the general public.

We aim to encourage science communicators, educators and storytellers to contextualise more their publications or resources by providing better location information, so as to allow their audience for further exploration and better understanding of a related topic or story.

Being an open source project, we also hope to encourage a younger audience of STEM students to apply or acquire new skills in cartography, Geographical Information System (GIS), and programming, by contributing to the OPM software and platform development.

References: [1] ASU's Mars Space Flight Facility JMARS: https://jmars.asu.edu
[2] PDS Geosciences Node Orbital Data Explorer (ODE): http://ode.rsl.wustl.edu
[3] NASA MarsTrek: https://marstrek.jpl.nasa.gov
[4] OpenPlanetary: http://openplanetary.co
[5] "Where On Mars?", http://whereonmars.co
[6] CARTO: https://carto.com
[7] https://www.europlanet-eu.org
[8] OPM website: http://openplanetarymap.org
[9] OPM github repository: https://github.com/openplanetary/opm