Digital City Data Platform

Carsten Friedrich[1], Guy Barnett[1], Drew Devereux[1], Ryan Fraser[1], Raymundo Marcos-Martinez[1], Jacqui Meyers[1], Bella Robinson[1], Geoff Squire[1], Simon Toze[1], Bo Yan[1], Jonathan Yu[1]

[1]CSIRO, Australia, Carsten.Friedrich@data61.csiro.au

BACKGROUND

There are many existing data access web portals, such as AURIN[1], National Map[2], or the AuScope Grid Portal and Virtual Geophysics Laboratory[3]. While they allow data owners as well as researchers who are developing analytical codes to make their data and codes available to users, there are often few incentives for them to do so.

VISION

The CSIRO Digital City Data Platform (DCDP) project is building a portal that not only allows researchers and developers to make their data and code findable and accessible, it is establishing an online marketplace environment where data owners and code developers can attach licenses and usage fees to their datasets and codes.

Users can access data, code, and licenses directly through the portal and owners are compensated in turn. Once licensed, datasets (or subsets of them) are available for download and code can be directly executed through DCDP in the cloud on Amazon AWS, NeCTAR, or HPC environments.

We plan to extend this model in the future to allow users to add value to existing data offerings and in turn offer the value-added datasets to other users, establishing a licensing and reimbursement chain for the benefit of all participants. We hope that this marketplace will create a real incentive for data-owners and developers to make their work available to the community and in turn provide them with additional funds to continue their research and develop new products in the future.

While the architecture and vision of the platform is generic, the CSIRO DCDP focuses on urban datasets and analytic codes as this was a particular need identified in the CSIRO.

TECHNOLOGY

The DCDP is being developed on top of the AuScope SISS stack, the AuScope Virtual Geophysics Laboratory, and the CSIRO Scientific Software Solution Center. The AuScope platforms have a long history of reliably offering data access and analytic code execution in a production environment at AuScope. They have also been adopted successfully outside AuScope previously and were a natural fit for our needs as well as easily adaptable to our task.

CONTENT

The DCDP will focus on a few initial data and code offerings to test the marketplace vision and develop robust business models and processes.

Initial datasets will include select data products from Urban Monitor, an "urban monitoring system, based on consistent data and methods that are able to track and communicate changes in features of interest in a way that has previously not been possible."[4]

The Urban Monitor data products included cover greater Sydney and were collected in summer 2016. Data layers include:
* optical imagery (red, green, blue and near infrared, calibrated to ground reflectance, at 20cm resolution)
* elevation layers including digital surface model (DSM), ground elevation model (GEM) and normalised surface model (NSM), at 20cm resolution
* classification layers such as vegetation mask and tree mask

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[1] https://aurin.org.au/
[2] https://nationalmap.gov.au/
[3] http://avre.auscope.org/store
[4] Caccetta, P et al. Urban Monitor: Enabling effective monitoring and management of urban and coastal environments using digital aerial photography; Final Report – Transformation of aerial photography into digital raster information product. CSIRO, Australia.

* thermal layers including land surface temperature (LST) and urban heat island (UHI), at 25m resolution. UHI is a simple model-based estimate of temperature change attributable to urbanisation.

Code run within the DCDP enables the integration and analysis of data to deliver derived datasets and analytics at a spatial scale that suits the user (e.g. local government area or suburb). As an initial example, preliminary market research has identified the difficulty that local governments have in accessing and analyzing information to manage urban green assets (e.g. urban trees) and to prepare urban heat mitigation strategies. In the DCDP, users can select their region of interest and run code to analyze spatial interactions between urban vegetation, surface urban heat, and populations vulnerable to extreme heat events. A report is automatically generated which includes maps of the distribution of key urban environmental parameters and hotspots where vegetation cover is low, and heat exposure and vulnerability are high. The report and/or the data layers that are produced after the code execution can then be downloaded by the user.

DIGITAL CITY DATA PLATFORM

The following section shows some example screenshots of the data access section of the DCDP portal.

Figure 1 shows the interactive Data Explorer page of the DCDP. Datasets are registered in OGC compliant catalogue services and are findable by various search facets. Search results can be previewed as a map overlay in the portal. Subsets of the data can be selected by drawing a bounding box on the screen or by selecting a predefined geographic area, e.g. suburb or local government area boundary.
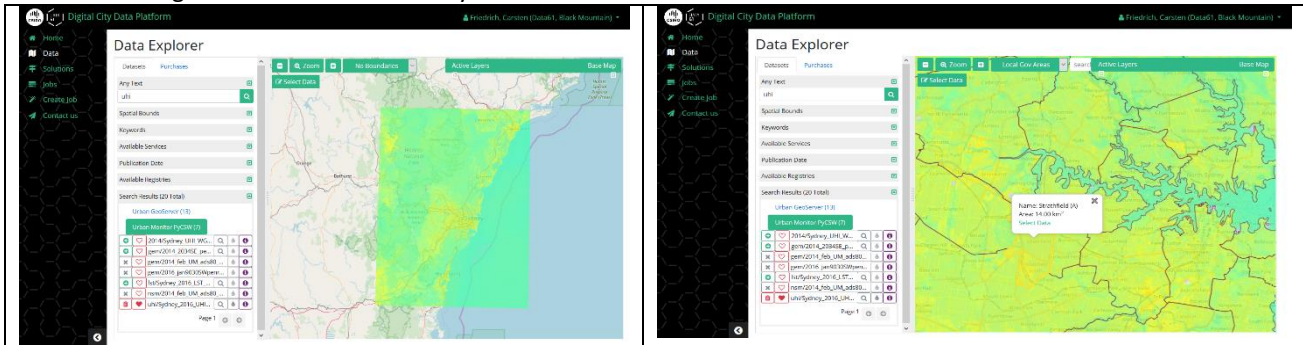
Figure 1: DCDP Data Explorer page. Datasets are findable by various search facets and can be viewed in the portal. Subsets of a dataset can be selected by bounding box or geographic region

Figure 2 shows how a subsection of a dataset can be selected and licensed within the portal. Payment is done securely via Stripe[5], a 3rd party online payment processing service. Once payment has been confirmed, the data can be downloaded by the user.
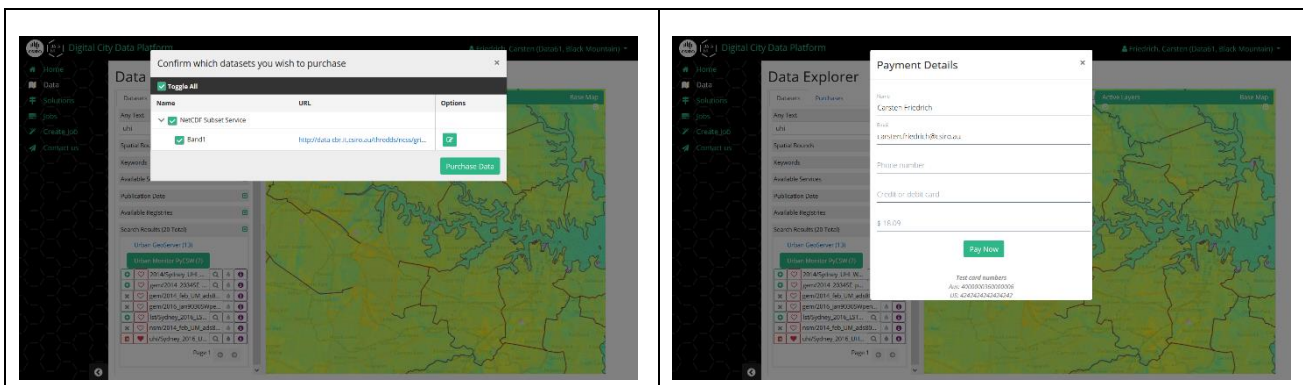
Figure 2: Once selected, a dataset can be licensed, paid for, and downloaded directly through the DCDP.

ACKNOWLEDGEMENTS

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[5] https://stripe.com/au