

# Colouring London – A Crowdsourcing Platform for Geospatial Data Related to London’s Building Stock

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## Summary

This paper reports on the development of a new crowdsourcing platform for capturing attribute data related to every building in London. We cover the motivations for the project; the decisions that were made in relation to the data being captured; the interface itself – its design and features; and the progress to date with beta testing in advance of a full launch in early 2019.

**KEYWORDS:** Crowdsourcing, VGI, Participatory Mapping, London, Building Attributes

## 1. Background and Project Rationale

This paper reports on the initial phases (design and beta testing leading up to full launch) of the Colouring London project (<https://beta.colouring.london/>), a new crowdsourcing platform designed to collect accurate attribute information on every building in London. The project has been funded in its initial phase by Historic England, with the Ordnance Survey and the Greater London Authority as key project partners, providing data and licencing support, respectively.

Building stock forms the principal physical component of cities and is a society’s largest socio-cultural and economic resource (Bradley and Kohler, 2007; Kohler and Hassler, 2002). Buildings are also the largest single sector in energy end-use world-wide (Weisz and Steinberger, 2010), where the greatest potential for energy reduction lies (European Commission, 2011), and where urban populations spend most of their lives and financial resources (BPIE, 2011). Reuse of older stock is now considered a key strategy in energy reduction (Huuhka and Lahdensivu, 2016), with diversity of age and use within stock considered a crucial component for innovation, creativity, urban regeneration, and social cohesion (Jacobs, 1961; NTHP, 2014; UNESCO, 2017; World Bank, 2012).

The need for detailed information on the composition of the urban stock, and its long-term dynamic behaviour was recognised in the 1990s in the context of energy analysis, along with problems with data access (Kohler and Hassler, 2002). Since this time, rapid global urbanisation (Chávez et al., 2011); the move towards longer time-horizons for urban planning to support more sustainability and resilience in cities (Emqvist et al., 2018; Moffatt, 2014) and a growth in understanding of the scale of the building stock’s contribution to energy and waste flows (European Commission, 2011) have led to increased interest in these areas. This has been coupled with increasingly stringent legislation in relation to emissions and resource conservation, generating, in Europe, a paradigm shift from new-build to reuse and revised focus in planning and construction on the existing stock (EU, 2008; Huuhka and Lahdensivu, 2016; Kohler et al., 2009).

In parallel, growth in the science of industrial ecology and the field of urban metabolism and the development of closed loop cycles for energy and material urban flows (Chávez et al., 2011), has led

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to new interest in building lifespans (Aksözen et al., 2017; Hond, 2000; Tanikawa and Hashimoto, 2009) for which data on building age, size, use at building level along with time-series data relating to historical constructions and demolitions are required.

In this context, then, there is a clear need for high quality building data to support buildings research and policy formation in all of these areas. Outside of the UK, these data are common place and freely available – for example the Netherlands’ Cadastre, Land Registry and Mapping Agency (Kadaster) publishes building attribute data including age and function that can be linked to detailed building geometry data to produce high quality maps of age and use (Figure 1). Similar data (albeit of varying quality) can be found in the US from alternative sources (Figure 2).

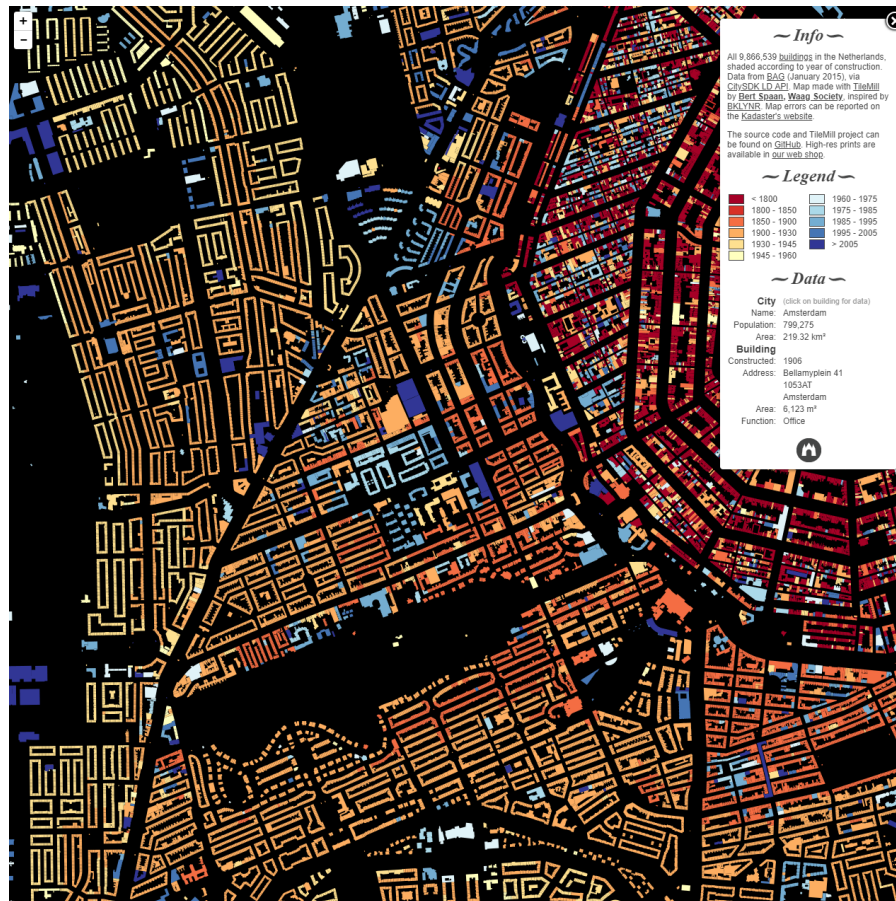
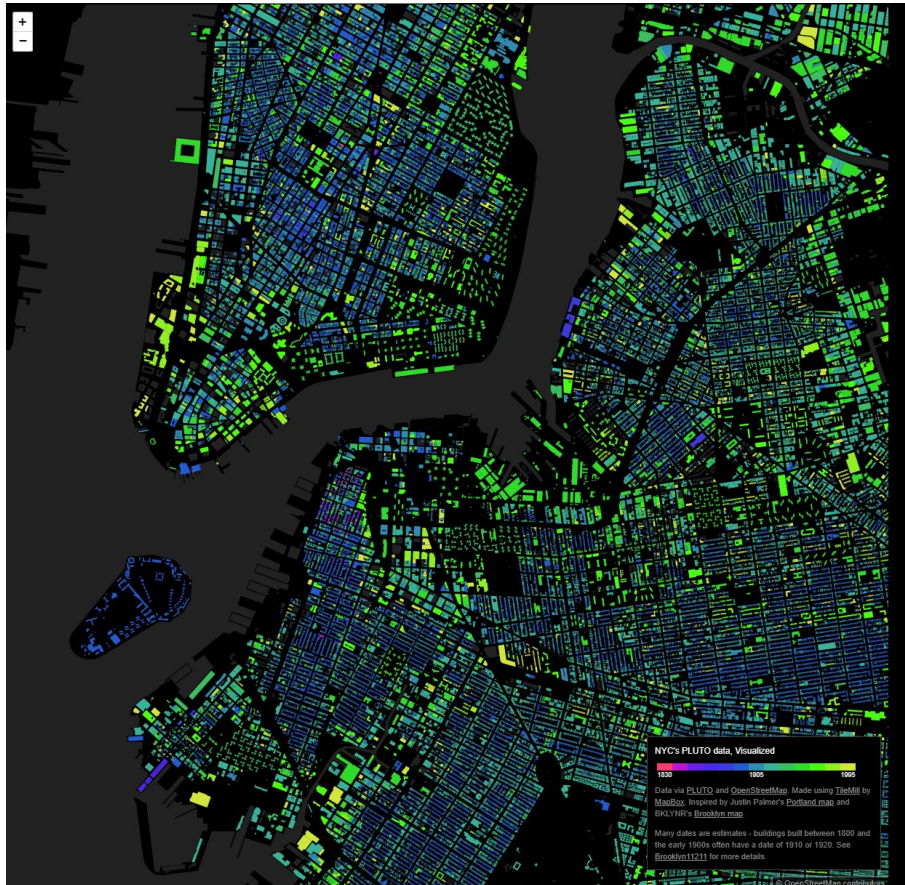


Figure 1 – Building Attribute Data from the Netherlands Cadastre, Land Registry and Mapping Agency - (<http://code.waag.org>)

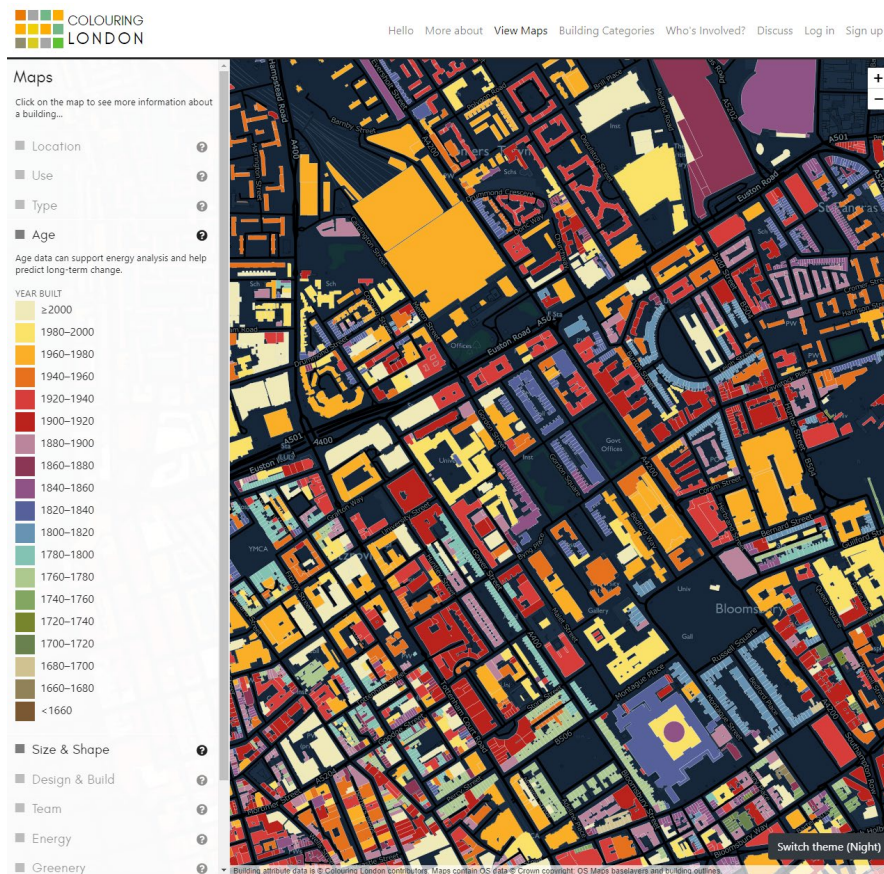


**Figure 2 – Building Attribute Data from New York’s Pluto Dataset - (<http://bdon.org/building-age-nyc>)**

But in stark contrast to other countries in Europe and the rest of the world, there is a conspicuous lack of accurate, open and joined-up data in this area in the UK. As outlined by Grover (2008), the UK does not have a cadastral system linking land, property and taxation systems. Building locations, geometries and property boundaries are accurately recorded by the Ordnance Survey and made available through MasterMap; the land registry keeps a record of property ownership; while the Valuation Office Agency (VOA) records fiscal and other associated data related to buildings, but these data cannot be linked by researchers outside of a government context. Filling this gap, organisations such as the Geoinformation Group have produced proprietary products such as the UKBuildings Dataset - <http://www.geoinformationgroup.co.uk/ukbuildings> - but access to these data are restricted to those who can pay and the methodologies underpinning the model estimations are unclear. As such, there is a pressing need for new, open and high quality building attribute data in this area.

## 2. Platform Design and Initial Release

Addressing this gap, the Colouring London project has the simple (but perhaps bold) aim of crowdsourcing these data. Initially, our focus is London but if successful the project will look to scale to the whole country. The platform is web-based and has been designed so that as users contribute data for individual buildings, they are immediately coloured in according to the attribute value and the category of the data submitted – hence ‘Colouring London’ (Figure 3). All attribute data submitted to the site are subsequently made freely available for download, with the Unique Property Reference Number (UPRN) the primary key allowing for linkage back to geometries.



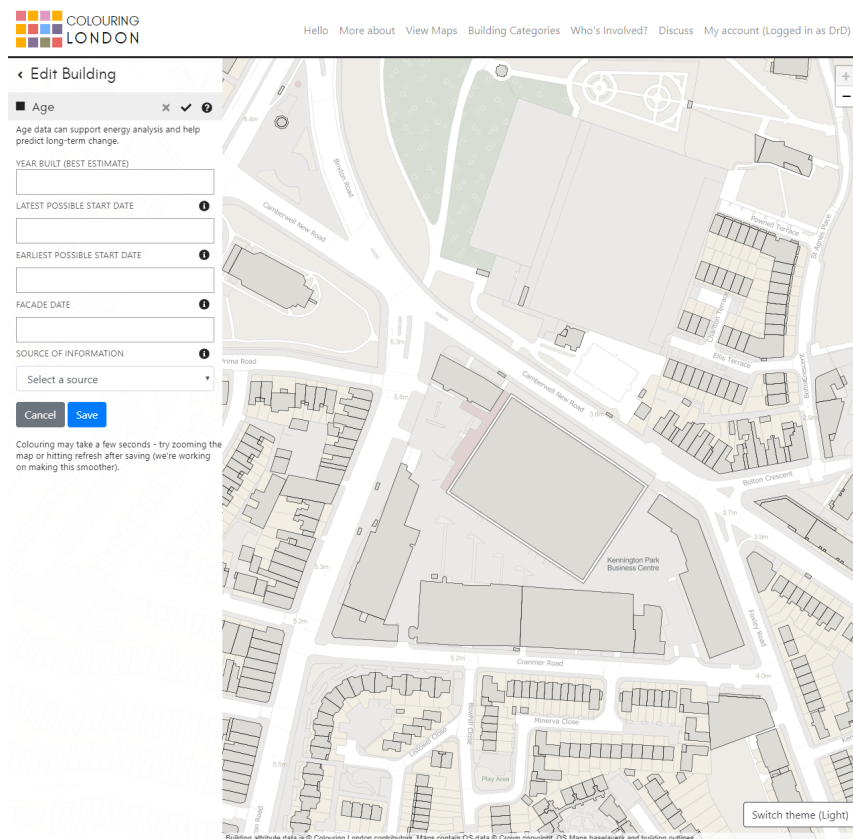
**Figure 3 – A screenshot of the Colouring London interface (<https://beta.colouring.london/>)**

In this first phase of the platform, data are collected for a range of attribute categories; decisions on which were made in consultation with project stakeholders and experts working in the heritage, energy and urban heat analysis, urban morphology, planning and local government sectors. These domains include: location (user contributed, thus open, address information); land use (how used today, e.g. residential, retail, recreation etc.); type (original use); age; size and shape (number of storeys, floor area); construction (materials used, shape of roof, detached); who built it (architect, developer); energy (efficiency and retrofitting); planning (whether listed or protected); demolition (whether proposed, pending or a rebuild history on the site); and “like me?” (for sentiment).

Research into volunteered geographic information (Coleman, Georgiadou and Labonte, 2009) suggests that users and contributors to Colouring London are likely to fall within 5 main categories: Neophytes (those with no formal background in the area); Interested Amateurs (some interest in the subject, but gaining experience); Expert Amateurs (may have excellent knowledge and a passion for the subject, but not formally involved or making a living from); Expert Professionals (has studied and practices in the subject and relies on it for a living); and Expert Authorities (has widely studied and long practiced in the area and is recognised to possess an established record). The main web-based interface is likely to cater most effectively for those who fall in the first three categories – i.e. those who will be contributing data on a building-by-building basis, however expert users (those who potentially may have larger volumes of data) can contribute data via a bulk-upload facility. The project has a range of advisers and supporting organisations who will be able to contribute in this way (including the London Boroughs of Kensington and Chelsea, Westminster and Camden; the Building Research Establishment, various local neighbourhood forums and the Survey of London).

The Colouring London project will be publicly launched fully in early 2019 (alpha and beta testing having been underway since mid-2018). Users of the site are able to log in and contribute information on any building by clicking on its MasterMap outline. Once information is entered and saved, the map

re-renders and colours the building in near real-time.



**Figure 4 – Contributing Data via the web-interface.**

Much like the user-generated content in OpenStreetMap or Wikipedia, all data can be updated or overwritten which, of course, brings with it its own set of issues related to data quality, husbandry and security which have all been discussed at length in this area before (Girres and Touya, 2010). In order to monitor the edit process, edit logs will be kept, with Colouring London also hosting a discussion forum for all ongoing issues related to both the data and the interface itself (<https://discuss.colouring.london/>).

### 3. Conclusions

Colouring London represents a highly significant development for building-related research in the UK. The extensive VGI database we are developing will be transformational for a whole range of sectors. For academics these new data will open a vast range of research possibilities, for example allowing us to test the hypotheses put forward by Jacobs and others that urban problem solving will be facilitated by working with information at the micro-scale; or providing the evidence base for research on age, typology, demolitions, and development, allowing for the validation of a variety of models. The full launch of the site in early 2019 will mark just the first stage of a continuing endeavour.

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### **Biographies**

Polly Hudson is a Doctoral research student in the Bartlett Centre for Advanced Spatial Analysis (CASA), UCL. Her research looks at methods of analysing rates and spatial patterns of demolition over long time periods, in relation to specific building typologies and land uses.

Adam Dennett is Associate Professor and Head of Department at the Bartlett Centre for Advanced Spatial Analysis (CASA), UCL. He has a background in population geography, GIS and spatial analysis and is current co-Editor in Chief of Applied Spatial Analysis and Policy.

Tom Russell is a Software Technician on the Infrastructure Structure Transitions Research Consortium - Mistral project, currently working on designing and developing national infrastructure planning models and tools, in collaboration with infrastructure sector and modelling specialists across several universities. Tom is the lead developer for Colouring London.

Duncan Smith is a Lecturer in GIS and Visualisation at the Bartlett Centre for Advanced Spatial Analysis (CASA), UCL. His research interests are in the study of urban geography, the built-environment, transport accessibility and sustainability using spatial analysis, visualisation and modelling methods.