

# Distributed and heterogeneous data analysis for smart urban planning

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**Abstract.** Over the past decade, ‘smart’ cities have capitalized on new technologies and insights to transform their systems, operations and services. The rationale behind the use of these technologies is that an evidence-based, analytical approach to decision-making will lead to more robust and sustainable outcomes. However, harvesting high-quality data from the dense network of sensors embedded in the urban infrastructure, and combining this data with social network data, poses many challenges. In this paper, we investigate the use of an intelligent middleware – Device Nimbus – to support data capture and analysis techniques to inform urban planning and design. We report results from a ‘Living Campus’ experiment at the University of Melbourne, Australia focused on a public learning space case study. Local perspectives, collected via crowdsourcing, are combined with distributed and heterogeneous environmental sensor data. Our analysis shows that Device Nimbus’ data integration and intelligent modules provide high-quality support for decision-making and planning.

**Keywords:** smart city, smart campus, middleware, data fusion, urban design, urban planning.