


Action 11: Augment 'Genius Loci'

Book Chapter**Author(s):**

von Richthofen, Aurel 

Publication date:

2022

Permanent link:

<https://doi.org/10.3929/ethz-b-000567371>

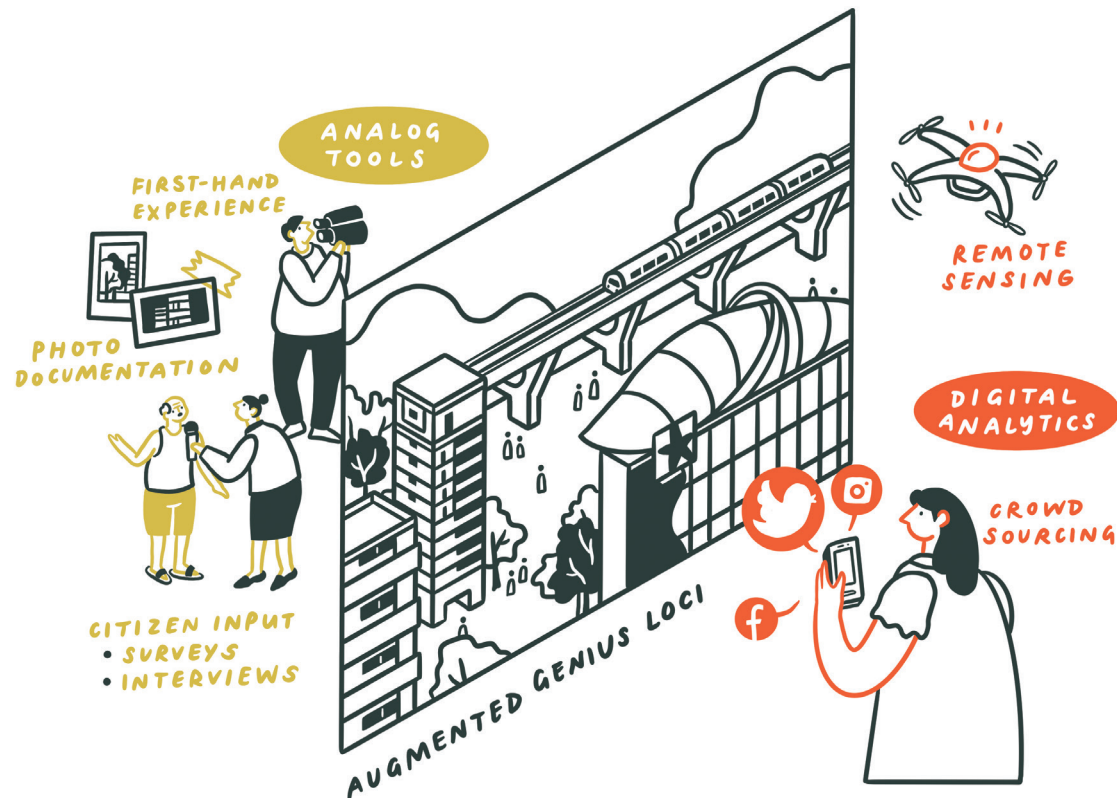
Rights / license:

In Copyright - Non-Commercial Use Permitted

Action 11

Augment 'Genius Loci'

→ Evidence 11 p. 233



Why

'Genius loci' not only refers to a location's distinctive atmosphere—the 'spirit of the place'—but also the fundamental principle that design should always respond to the context in which it is located. While spirit and atmosphere were hard to quantify in the past, new digital tools and a proliferation of available data can now contribute to the assessment of the intangible and qualitative aspects of a site. The same is true for the sort of contextual information that can be derived automatically and systematically at much faster rates using digital and augmented tools.

What

Based on phenomenology and the analogue techniques that supported it, genius loci was, until recently, the result of subjective observation, interpretation and presentation of the qualities of site, locality and context. Due to this subjectivity, the term was marginalised within urban studies, despite the fact that contextual information informs urban analysis and design at the earliest stages. However, the principle of responding to site-specific aspects is seen as key to sensitive, adapted and sustainable urban design. Digital techniques can now be used to systematically and automatically augment analogue ways to interpret sites. This leads to what we call a 'hybrid/hyper/cyber genius loci'.

How

In order to create this hybrid/hyper/cyber genius loci, we blend analogue and digital techniques, such as manually logging data, conducting analogue surveys and questionnaires, taking photographs and recording sounds and videos, and overlay these with crowd-sourced, remote-sensed, automatically collected and preprocessed data. In this way, capturing site data is not limited to predefined categories or rigid sample periods. Instead, the augmented hybrid/hyper/cyber genius loci concept allows us to blend data sets at any resolution and at any scale. Hybrid/hyper/cyber genius loci uses big data analytics to present the data in the form of dynamic maps, with the possibility of filtering and parsing spatial and temporal aspects. The augmented site analysis can then be recombined with reality using new technologies, such as virtual and augmented reality.

Evidence

in recreational areas, such as parks (43 per cent of travelled distance), and that a balanced distribution of residential and recreational land-use is a good predictor for the number of leisure walks and runs in an area.

At the network level, our team developed the 'Informed Design Platform' (You et al. 2019a; You et al. 2019b; Tunçer and You 2017; You and Tunçer 2016a; You and Tunçer 2016b) to support the upgrading of existing public spaces. It is a web platform that brings together and analyses big and small data about public space networks, integrating, analysing and visualising data from multiple sensor types, mobile phones, a space quality rating app, social media, and traditional surveys and workshops.

We also developed the 'Visit Potential Model' (Herthogs et al. 2018; Herthogs et al. 2019), a spatial interaction model for pedestrian networks that introduces network measures to estimate people's presence in public space, and the effect of public space qualities on this presence (see Figure 10.3); we used it to inform the design of public space networks in master-planning proposals (such as in the Waterfront Tanjong Pagar project, also in this publication).

Stakeholders

Stakeholder input has been a cornerstone of our evidence-informed approach to public space research and urban design support. We collected feedback directly (through workshops and experiments) and indirectly (through big data). For example, the 'Visit Potential Model' built on a model to predict visitor flows validated using mobile phone data (Schläpfer et al 2021). The 'Informed Design Platform' integrated both anonymised measured human data (e.g., location, direction, sound, footfall) and preference surveys (through a rating app and conventional community workshops). We derived characteristics of public spaces that encourage active leisure activities from people's running data (from *Strava* and *Endomondo*). Our work on pedestrian comfort integrated preferences surveys, Virtual Reality experiments, and pedestrian counting. Our MCDA framework for public space quality builds on collaborative expert workshops to rate and rank spatial qualities.

The strongest impact that we noticed when presenting our work is methodological. Through feedback, we have come to understand that our multimodal approach—combining 'novel' quantitative technologies (big data, AI, geospatial models),

a sensitivity towards qualitative design methods, and captivating topics (public space, walkability, art)—strikes a chord with different kinds of audiences. As a result, over the last few years we have had many engaging collaborations with researchers, practitioners and policy makers, often acting as a bridging partner connecting quantitative and qualitative realms. Such engagements now drive the quality of our research findings and its dissemination.

References

Balaban, Özgün (2019). 'Understanding urban leisure walking behaviour: Correlations between neighbourhood features and fitness tracking data'. PhD dissertation, Singapore University of Technology and Design (SUTD).

Balaban, Özgün and Bige Tunçer (2016). 'Visualizing urban sports movement', paper presented at Complexity & Simplicity—34th International Conference on Education and Research in Computer Aided Architectural Design in Europe (eCAADe 2016), Oulu.

——— (2017). 'Visualizing and analysing urban leisure runs by using sports tracking data', paper presented at ShoCK!—Sharing of Computable Knowledge!—35th International Conference on Education and Research in Computer Aided Architectural Design in Europe, Rome.

Carmona, Matthew (2015). 'Re-theorising contemporary public space: A new narrative and a new normative', *Journal of Urbanism: International Research on Placemaking and Urban Sustainability*, 8(4): 373–405.

——— (2019). 'Place value: Place quality and its impact on health, social, economic and environmental outcomes', *Journal of Urban Design*, 24(1): 1–48.

Forsyth, Ann (2015). 'What is a walkable place? The walkability debate in urban design', *URBAN DESIGN International*, 20(4): 274–92.

Future Cities Laboratory (2017). 'Pedestrian comfort in high pedestrian activity areas'. <https://fcl.ethz.ch/research/research-projects/pedestrian-comfort.html>.

Gehl, Jan (2010). *Cities for People*. Washington, DC: Island Press.

He, Peijun, Pieter Herthogs, Marco Cinelli, Ludovica Tomarchio, and Bige Tunçer (2018). 'A Multi-Criteria Decision Analysis based framework to evaluate public space quality', paper presented at Smart and Sustainable Built Environments 2018, Sydney, Australia.

——— (2020). 'A Multi-Criteria Decision Analysis based framework to evaluate public space quality', in *Smart and Sustainable Cities and Buildings, Contemporary Urban Design Thinking*, eds. Rob Roggema and Anouk Roggema, 273–85. Springer Nature.

Herthogs, Pieter, Fabien Clavier, Katja Knecht, Johannes Mueller, Zuzana Drillet, Yufan Miao, Kateryna Konieva, Aike Steentoft, Gerhard Schrotter, Reinhard Koenig, Markus Schläpfer, Bige Tunçer, and Gerhard Schmitt (2019). 'Big data informed urban design and governance', in *Future Cities Laboratory: Indicia 02*, eds. Stephen Cairns and Devisari Tunas, 99–110. Zürich: Lars Müller Publishers.

Herthogs, Pieter, Bige Tunçer, Markus Schläpfer, and Peijun He (2018). 'A weighted graph model to estimate people's presence in public space—The visit potential model', paper presented at in Computing for a Better Tomorrow—Proceedings of the 36th ECAADe Conference, Lodz.

Mueller, Johannes, Shiho Asada, and Ludovica Tomarchio (2020). 'Engaging the crowd: Lessons for outreach and tool design from a creative online participatory study', *International Journal of E-Planning Research*, 9(2): 66–79.

Schläpfer, Markus, Lei Dong, Kevin O'Keefe, Paolo Santi, Michael Szell, Hadrien Salat, Samuel Anklesaria, Mohammad Vazifeh, Carlo Ratti and Geoffrey B. West (2021). 'The Universal

Visitation Law of Human Mobility', *Nature* 593(7860): 522–527.

Silvennoinen, Heidi (2020). 'Stimulating, lively and low—A virtual reality experiment on public space quality in Singapore'. Master's thesis, Aalto University, Finland.

Silvennoinen, Heidi, Saskia Kuliga, Pieter Herthogs, Daniela Rodrigues-Recchia, and Bige Tunçer (forthcoming). 'Effects of Gehl's urban design guidelines on walkability: A virtual reality experiment in Singaporean public housing estates'. Manuscript under review.

Tomarchio, Ludovica, Stéphanie Hasler, Pieter Herthogs, Johannes Müller, Bige Tunçer, and Peijun He (2019). 'Using an online participation tool to collect relevant data for urban design: The construction of two participation exercises', paper presented at CAADRIA 2019 Intelligent & Informed, Wellington.

Tunçer, Bige, Zdravko Trivic, Rudi Stouffs, Jun Wei Mok, Joie Lim, Panagiotis Mavros, and Christoph Hölscher (2020). 'Informed design of pedestrian pathways', paper presented at RE: Anthropocene: Design in the Age of Humans—25th International Conference of the Association for Computer-Aided Architectural Design Research in Asia (CAADRIA), Bangkok.

Tunçer, Bige and Linlin You (2017). 'Multi-modal data to support urban design decision making', paper presented at ShoCK!—Sharing of Computable Knowledge!—35th International Conference on Education and Research in Computer Aided Architectural Design in Europe, Rome.

You, Linlin and Bige Tunçer (2016a). 'Informed Design Platform: Interpreting "big data" to adaptive place designs', paper presented at 2016 IEEE 16th International Conference on Data Mining Workshops (ICDMW), Barcelona.

——— (2016b). 'SAPAM: A scalable "activities in places" analysis mechanism for informed place design', paper presented at the 3rd IEEE/ACM International Conference on Big Data Computing, Applications and Technologies, Shanghai.

You, Linlin, Bige Tunçer, and Hexu Xing (2019a). 'Harnessing multi-source data about public sentiments and activities for informed design', *IEEE Transactions on Knowledge and Data Engineering*, 31(2): 343–56.

You, Linlin, Bige Tunçer, Rui Zhu, Hexu Xing, and Chau Yuen (2019b). 'A synergetic orchestration of objects, data, and services to enable smart cities', *IEEE Internet of Things Journal*, 6(6): 10496–507.

Augment 'Genius Loci'

Site, locality and context ground the research at Future Cities Laboratory (FCL) into the specific geographic, economic, cultural and climatic conditions of Singapore and South East Asia (Cairns and Tunas 2017; 2019). In that sense, most of FCL's research is responding to and informed by the context in which it is situated. Site-specific research also demands for appropriate and locally adapted tools. Those developed for the Global North are not necessarily adaptable without further improvement and modification for the location in the tropics.

During the first and second phases of FCL, researchers used and developed an array of analogue and digital tools that can be grouped into analytical, supporting, transforming and representational clusters, see *Indicia 02* (von Richthofen et al. 2019b; von Richthofen 2019). Interdisciplinary usage of both analogue and digital tools at FCL and the tracing of interlinkages can be analysed and interpreted using digital humanities techniques (Clavier and von Richthofen 2019; Costa and von Richthofen 2019).

A Collection of Neighbourhoods, shaped by defining site elements

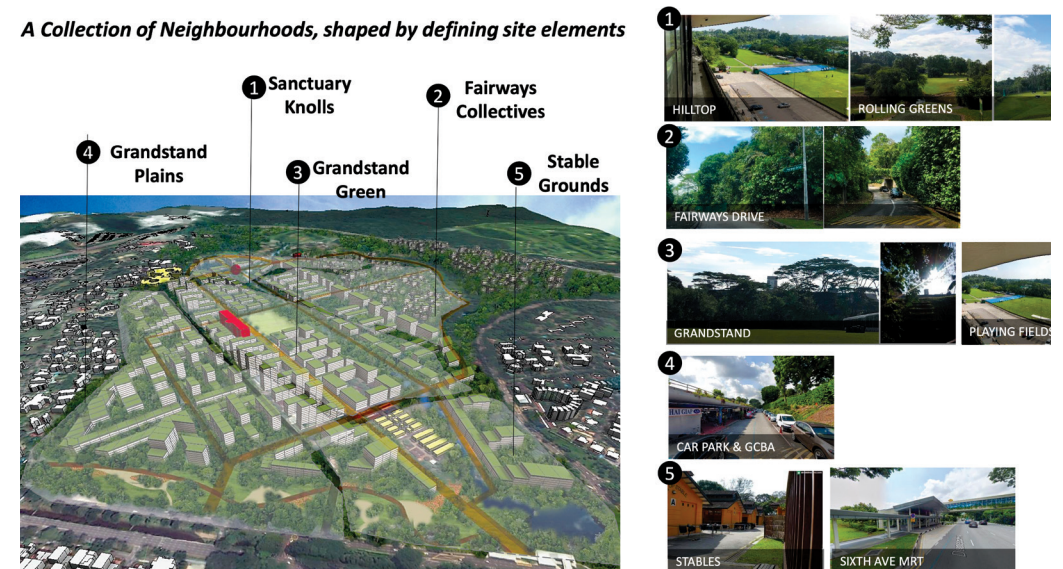


Fig. 11.1 Site analysis and mapping using the augmented genius loci technique, which blends analogue site observations with geo-referenced photos, photogrammetry, mapped satellite images, digital elevation models, procedural CityEngine models and 3D context models for the Turf Club in Singapore (Diagram by participants of the 2019 Advanced Studies in Urban Design course with URA and FCL).

Hybridisation of research methods and the repurposing of tools can be seen as a response to the necessity of site-specific tools. Contextuality and site specificity are also the underlying topics of the study of spatial use in cities by Tomarchio and Herthogs. The former analyses the use of cultural spaces in



Fig. 11.2 Collection of geo-referenced photos, GPS and photogrammetry data using tablets at the Turf City site in Singapore, with participants of the 2019 AS-UD course with URA and FCL.

Fig. 11.3 Remote sensing and site data interpretation using digital geo-information tools and CityEngine in Singapore, with participants of the 2019 AS-UD course with URA and FCL.

Fig. 11.4 Experiencing the augmented hybrid/hyper/cyber genius loci with augmented reality goggles and an enriched digital urban twin model during the visit of Amt für Städtebau in Zürich, with participants of the 2019 AS-UD course with URA and FCL.

Singapore based on social media data (Tomarchio et al. 2016; von Richthofen et al. 2019a) while the latter developed a tool to assess the use of public spaces (Herthogs et al. 2018). Within their research group 'Big Data Informed Urban Design and Governance', they combined these methods to develop multicriteria decision analysis and analysis frameworks (He et al. 2018). Contextual urban interpretation of data also leads to new forms of urban spatial representation, as shown in Figure 11.1—above and below ground—, and so-called digital twins (van Son et al. 2018; Gruen et al. 2019; Schrotter and Hürzeler 2020).

Stakeholders

The Advanced Studies in Urban Design (AS-UD) course, which was developed for the Urban Redevelopment Authority of Singapore (URA) and held for three years from 2017 to 2019, introduced various FCL research methods and findings to urban design officers (von Richthofen 2018). The way in which these materials are presented is tailored to the URA's pragmatic interest: How can this method be applied to the various urban design tasks? How can the research findings inform better urban design? Urban design projects necessarily start with an urban analysis generated by information gathered on the site, locality and context. The urban analysis critically references the canon of literature (see Further Reading). With the availability of hand-held connected devices such as tablets, smart phones and GPS recorders, participants could gather digital data while conducting the site visits, as shown in Figure 11.2. Here, conventional and digital methods started to blend into an augmented site analysis framework—the augmented hybrid/hyper/cyber genius loci, as shown in Figures 11.3 and 11.4.

References

- Cairns, Stephen and Devisari Tunas (eds) (2017). *Future Cities Laboratory: Indicia 01*. Zürich: Lars Müller Publishers.
- Cairns, Stephen and Devisari Tunas (eds) (2019). *Future Cities Laboratory: Indicia 02*. Zürich: Lars Müller Publishers.
- Clavier, Fabien and Aurel von Richthofen (2019). 'Looking behind the screen of big data', in *Future Cities Laboratory: Indicia 02*, eds. Stephen Cairns and Devisari Tunas, 93–5. Zürich: Lars Müller Publishers.
- Costa, Alberto and Aurel von Richthofen (2019). 'Taxonomic insights: Emerging tool clusters and research links', in *Future Cities Laboratory: Indicia 02*, eds. Stephen Cairns and Devisari Tunas, 76–9. Zürich: Lars Müller Publishers.
- Gruen, Armin, Simon Schubiger, Rongjun Qin, Gerhard Schrotter, Biao Xiong, Jiaqiang Li, Xiao Ling, Changun Xiao, Sidan Yao, and F. Nuesch (2019). 'Semantically enriched high resolution LOD 3 building model generation', *International Archives of the*

Photogrammetry, Remote Sensing and Spatial Information Sciences, XLII-4/W15: 11–18.

He, Peijun, Pieter Herthogs, Marco Cinelli, Ludovica Tomarchio, and Bige Tunçer (2018). 'A multi-criteria decision analysis based framework to evaluate public space quality', in *SASBE 2018 Sydney—Proceedings of Smart & Sustainable Built Environments: 6th CIB International Conference*, 286–97. Sydney: University of Technology Sydney.

Herthogs, Pieter, Bige Tunçer, Markus Schläpfer, and Peijun He (2018). 'A weighted graph model to estimate people's presence in public space—the visit potential model', in *Computing for a Better Tomorrow—Proceedings of the 36th ECAADe Conference*, Vol. 2, eds. Anetta Kępczyńska-Walczak and Sebastian Białkowski, 611–20. Lodz: Lodz University of Technology.

von Richthofen, Aurel (ed.) (2018). *Urban Elements—Advanced Studies in Urban Design*. Singapore: Future Cities Laboratory. <https://doi.org/10.3929/ethz-b-000270354>

von Richthofen, Aurel (2019). 'Digital tools, pipelines and protocols', in *Future Cities Laboratory: Indicia 02*, eds. Stephen Cairns and Devisari Tunas, 80–92. Zürich: Lars Müller Publishers.

von Richthofen, Aurel, Ludovica Tomarchio, and Alberto Costa (2019a). 'Identifying communities within the smart-cultural city of Singapore: A network analysis approach', *Smart Cities*, 2(1): 66–81.

von Richthofen, Aurel, Philipp Urech, and Adrienne Wilson

Joergensen (2019b). 'Physical tool taxonomy', in *Future Cities Laboratory: Indicia 02*, eds. Stephen Cairns and Devisari Tunas, 54–75. Zürich: Lars Müller Publishers.

Schrotter, Gerhard and Christian Hürzeler (2020). 'The digital twin of the city of Zurich for urban planning', *Journal of Photogrammetry, Remote Sensing and Geoinformation Science*, 88: 99–112.

van Son, Rob, Siow Wei Jaw, Jingya Yan, Viana Khoo, Rebecca Shu Wen Loo, Shaun S. K. Teo, and Gerhard Schrotter (2018). 'A framework for reliable three-dimensional underground utility mapping for urban planning', *International Archives of the Photogrammetry, Remote Sensing and Geoinformation Science*, XLII-4/W10: 209–14.

Tomarchio, Ludovica, Bige Tunçer, Linlin You, and Bernhard Klein (2016). 'Mapping planned and emerging art places in Singapore through social media feeds', in *Complexity & Simplicity—Proceedings of the 34th ECAADe Conference*, Vol. 2, eds. Hernejoa Aulikki, Toni Österlund, and Piia Markkanen, 437–46. Oulu: University of Oulu.

Further Reading

Burns, Carol J. and Andrea Kahn (eds) (2004). *Site Matters: Design Concepts, Histories, and Strategies*. London: Routledge.

Norberg-Schulz, Christian (1980). *Genius Loci: Towards a Phenomenology of Architecture*. New York: Rizzoli.

Jin, Jian Gang, Loon Ching Tang, Lijun Sun, and Der-Hong Lee (2014). 'Enhancing metro network resilience via localized integration with bus services', *Transportation Research Part E: Logistics and Transportation Review*, 63: 17–30. <https://doi.org/10.1016/j.jtre.2014.01.002>

Kostrzewska, Malgorzata and Bartosz Macikowski (2017). 'Towards hybrid urban mobility: Kick scooter as a means of individual transport in the city',

IOP Conference Series: Materials, Science and Engineering, 245(5): 052073. <https://doi.org/10.1088/1757-899X/245/5/052073>

Spickermann, Alexander, Volker Grienitz, and Heiko A. von der Gracht (2014). 'Heading towards a multimodal city of the future?: Multi-stakeholder scenarios for urban mobility', *Technological Forecasting and Social Change*, 89: 201–21. <https://doi.org/10.1016/j.techfore.2013.08.036>

Evidence 13 → Action 13 p. 30

Create Variable Transport Flow

Further Reading

Hillier, Bill (1996). 'Cities as movement economies', *URBAN DESIGN International*, 1(1): 41–60. <https://doi.org/10.1057/udi.1996.5>

Jensen, Ole B. (2009). 'Flows of meaning, cultures of movements—Urban mobility as meaningful everyday life practice', *Mobilities*, 4(1): 139–58. <https://doi.org/10.1080/17450100802658002>

Maheshwari, T. (2020). *An Urban Design Response to the Technological Shift in Transportation: How to Conduct Urban Design with Vehicle Automation, Sharing and*

Connectivity (Doctoral Thesis). ETH Zürich. <https://doi.org/10.3929/ethz-b-000448978>

Marshall, Stephen (2004). *Streets and Patterns*. London: Routledge.

Mehta, Vikas (2014). 'The street as ecology', in *Incomplete Streets: Processes, Practices and Possibilities*, eds. Stephen Zavestoski and Julian Agyeman, 114–36. London: Routledge.

Urry, John (2004). 'The "system" of automobility', *Theory, Culture & Society*, 21(4–5): 25–39. <https://doi.org/10.1177/0263276404046059>

Evidence 12 → Action 12 p. 28

Plan for Multimodal Transportation

References

Dowling, Robyn, Julia D. Irwin, Ian Faulks, and Richie Howitt (2015). 'Use of personal mobility devices for first-and-last mile travel: The Macquarie-Ryde trial', in *Proceedings of the 2015 Australasian Road Safety*

Conference, eds. R. H. Grzebieta, K. Armstrong, I. Lewis, L. Tunks, C. Howe, and C. Murray. Gold Coast, Queensland: Australian College of Road Safety.

Evidence 14 → Action 14 p. 32

Bundle Shared Rides

An agent-based transport simulation was used to test several design and policy options for shared and automated vehicles (SAVs) in order to understand the individual experience of access and mobility across a neighbourhood, and the extent of flexibility and control of the mobility system required to respond to variations