



Resilient Cities 2016 Background Paper

Urban Resilience in Canada Research priorities and best practices for climate resilient cities

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Abstract

This background paper presents a summary of the results found during a six-month knowledge synthesis project. The project sought to uncover knowledge gaps, best practices, and future research areas for urban resilience (no original research was conducted). The rapidly evolving resilience literature was scanned in order to produce the insights presented below. This scan was primarily conducted with grey literature, but academic literature was also included where relevant. It was found that important research areas exist in both the social and physical resilience practices, and that the next two years will be very important for the evolution of measurements and evaluation practices for resilience actions. For example it was found that the use of process indicators and outcome harvesting is likely to be very important in evaluating the implementation of various strategic resilience frameworks (e.g., City Resilience Framework, UNISDR Ten Essentials). The importance of recognizing social capital, as both an outcome and a determinant of resilience, is also discussed.



The past year saw the launch of the Sustainable Development Goals, the Sendai Framework for Disaster Risk Reduction, the Paris Agreement, Mission Innovation, and countless other steps towards a better world. It was also a big year for the field of urban resilience, with many important initiatives being launched in the last 18 months. This background paper presents findings from a larger project, which was conducted from November 2015 to May 2016 (full report available at: www.craig-brown-phd.com/urban-resilience/). This project was designed to provide a synthesis of the current research and activity in the area of urban resilience, and to highlight gaps in the knowledge around urban resilience in order to influence and guide future work being carried out by the many resilience practitioners across Canada.

Precise definitions of resilience are essential in order to avoid confusion, to properly direct action, and to enable measurement and evaluation (Bours et al., 2014a). The present work accepts the simple yet transformative definition that resilience is the “capacity to buffer change, learn, and develop” (Folke et al., 2002). It was found that urban resilience finds common ground with climate change adaptation, current formulations of which tend to be more nuanced than they were a decade ago. For example, the Paris Agreement’s definitions of adaptation include a shift towards adaptation as a process of iterative cycles (as opposed to isolated actions), normative principles for adaptation (e.g., diversity and inclusion), and a wider array of stakeholders (Bahadur et al., 2016). This is important as the more aligned these two fields of practice become, the greater the potential for beneficial synergies.

Social Resilience

Urban resilience, like sustainability, often has social, as well as economic and environmental, prerogatives, and urban resilience strategies are often informed by social justice agendas (Brisley et al., 2012). But it is not just the outcomes of resilience initiatives that are social; the determinants of resilience are also often social in nature. Bahadur et al. (2016) highlight that an emerging area of work in this area involves enhancing the capacity of the resilience process to explore “how power relations affect how people benefit (or do not benefit) from resilience-



building projects.” For example, equitable access to essential resources and capitals cannot be assumed, and resilience planning mechanisms need to take this into account. Examples include Grosvenor (2014) including community issues in its vulnerability index, or the importance of social resources (capital) in the recovery after Hurricane Sandy, where it was found that “people living in neighborhoods with more social connections and resources are more resilient” and that “social resources can help neighborhoods overcome economic barriers to resilience” (The Associated Press-NORC Centre for Public Affairs, 2012).

Resilience Action

Climate change adaptation activity can often be used as a proxy indicator of resilience activity. The 2014 scientific assessment performed by NRCan found that “adaptation implementation in Canada is still in its early stages” but that action was being facilitated by concrete tools which include strategies, frameworks, guidance documents, decision support tools (e.g., maps and visualizations, guidance for scenario interpretation and use, and adaptation guidebooks and toolkits) (Eyzaguirre and Warren, 2014). Holly-Purcell (2015) echoes this for resilience, writing that there is a “vast array of tools and diagnostics designed to assess, measure, monitor, and improve city-level resilience.”

A great deal of important work within the larger field of practice of urban resilience is concerned with the ability of critical infrastructure (e.g., stormwater management, electricity distribution, transportation systems) to function during extreme events. In line with IPCC (2014) recommendations, Canada’s Public Infrastructure Engineering Vulnerability Committee has created the PIEVC Engineering Protocol to assess the vulnerability of critical Canadian infrastructure. Results from a high-level assessment of the climate change induced infrastructure vulnerabilities faced by Toronto Hydro, the first deployment of PIEVC for this sector at this scale, suggest that increasing capacity during heat waves, and further exploring adaptation measures for climate events causing structural damage issues remain pressing issues (AECOM and Risk Sciences International [RSI], 2015). Further work should also involve



exploring the relationships between engineers working in this area, and non-engineers designing and rolling out city resilience plans.

The American Council for an Energy-Efficient Economy (ACEEE) makes explicit connections between energy efficiency and resiliency (Riberio et al., 2015). Things like energy-efficient buildings, district energy systems, and transit-oriented development all have clear resilience benefits in the areas of emergency response and recovery, social and economic benefits, and climate mitigation and adaptation (Ribeiro et al., 2015; Smith and Levermore, 2008; Xu, Sathaye, Akbari, Garg and Tetali, 2012). C40 and Arup (2015) point out that in “2015, cities reported taking a total of 438 adaptation actions” and with the exception of flood mapping, buildings can play a role in increasing the remaining four most popular actions. Encouragingly, the 2016 Federal Budget allocates \$40 million over five years to “to integrate climate resilience into building design guides and codes” that will apply to both buildings and the rehabilitation of public infrastructure (Government of Canada, 2016). Further work needs to critically evaluate and influence these new standards and codes so that they maximize their resilience potential. But it is not just the design of buildings which is important; better understanding the behaviour of occupants within buildings is an important part of improving a building’s resilience (Brown and Gorgolewski, 2015).

Strategic Frameworks

There are numerous strategic frameworks available for cities to use in resilience assessment and planning (though little guidance for evaluation of initiatives is offered). The City Resilience Framework was developed by Arup (with support from the Rockefeller Foundation) and is meant to “identify critical areas of weakness, and to identify actions and programs to improve the city’s resilience” (da Silva and Morera, 2014a; The Rockefeller Foundation and Arup, 2015). The framework enables a process during which stakeholders work towards an action plan for resilience, instead of the checkbox (or cookbook) approach where certain prescriptive elements must be present. For Boulder, Colorado, the City Resilience Framework was used iteratively to guide a process of arriving at three major priority areas. It has been used in many other cities as well, and resilience strategies are currently being release on near-monthly basis.



At the highest governmental level, urban resilience assessment and planning is facilitated by the United Nations International Strategy for Disaster Risk Reduction (UNISDR). Their “Making My City Resilient Campaign” has attracted over 3,000 cities that have pledged to take part. Current activity in this somewhat convoluted program includes the development of the Local Urban Indicator Tool and the piloting of the resilience scorecard. There is also an important collaboration between UNISDR and the World Council on City Data, during which experts offer their guidance on the finalization of the Local Urban Indicator Tool and a new ISO standard for city resilience (similar to ISO 37120).

Important work has also been conducted in Toronto, who in 2014 conducted a review climate resilience best practices in New York City, San Francisco, Chicago, Seattle/King County, Calgary, and Vancouver, finding that “cities are developing indicators to measure whether their programs and actions are successfully moving towards their climate resilience goals” (City of Toronto, 2014). The City of Toronto has highlighted many areas of further work, much of which will be conducted internally, but which nonetheless include: integrating climate change resilience into decision making, increasing the resilience of Toronto's services and infrastructure, ensuring that priority populations are served by resilience initiatives, developing partnerships with the private sector and broader public sector, and supporting improvements in the personal resilience of residents and businesses.

Resilience Measurement

Echoing Eyzaguirre and Warren (2014), Bahadur et al. (2016) highlight that the “development of new tools for measuring and assessing resilience is essential so we can better understand effective resilience interventions” (Bahadur et al., 2016). It is to this end that The Windward Fund granted \$800,000 to create the Resilience Measurement Community of Practice. It is expected that the community of practice will touch on many of the measurement issues that are discussed in this report, though ensuring this is the case is an area of further research.



The indicators used in resilience assessment and evaluation are a widely debated topic. On the one hand, the use of indicators is often central to resilience assessment and planning. Hicks et al. (2016) point out that indicators are powerful because “they are scalable across geographic areas and, when designed well, reduce complex phenomena to simple measures” (Hicks et al., 2016). Issues of standardization and indexing were briefly explored, as well as the merits and drawbacks of resilience indexes. On the other hand, it was found that though quantitative approaches have led to much important progress, there are those who echo the warnings originally offered by Meadows (1998), raising compelling objections to over-quantification (e.g., Cox and Hamlen, 2015), and lamenting that “by summarizing data into a single quantitative score, indices take on an objective authority that commands, but does not necessarily merit, respect” (da Silva and Morera, 2014c). To this end the report engages in a discussion around subjective data collection, process indicators, and outcome harvesting, in order to alert our knowledge users that alternate methods of “measuring without indicators” are possible, and often desirable and necessary. To this end, Bours, McGinn and Pringle (2014b) highlight that thinking about data availability is a very important step in the design of a resilience or CCA program. Much of this work requires the use of proxy indicators, which Bours et al. (2014a) define as “(more) easily-measurable ‘stand-ins’ for concepts or variables for which data is unavailable.”

And finally, further work needs to continue efforts to ‘mainstream’ urban resilience. Despite a great deal of activity in this area, the extent to which action will be taken, and taken in a timely manner is yet to be seen. Various practical and theoretical ways forward are presented in the full report, including future work which duly emphasizes the net-positive effects of resilience action.



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Bio:

In addition to various contract work (e.g., BOMA Canada, University of Toronto), I am primarily employed as a postdoctoral researcher in the field of urban resilience, focusing on measurement and evaluation of resilience initiatives. As my career unfolds I plan to be a part of world-class research into resilience, sustainability, and the built environment; continuing to forge relationships with practitioners, academics, and decision-makers. I also plan to continue to grow as an effective instructor that inspires students to reach their potential, while also thinking critically about their future careers.

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