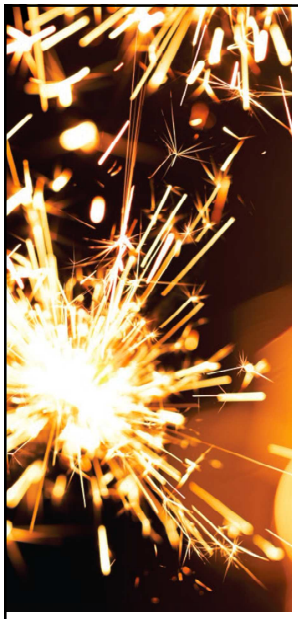

Linking urban change to health: Combining an interactive map-based platform to track built environment interventions with mobile sensing

Sparking Population Health Solutions
Ottawa, April 25-28

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Université de Montréal CRCHUM SPHERE Lab.org ESPUM L'ÉCOLE DE SANTÉ PUBLIQUE DE L'UNIVERSITÉ DE MONTRÉAL CIHR IRSC Canadian Institutes of Health Research Instituts de recherche en santé du Canada

Introduction

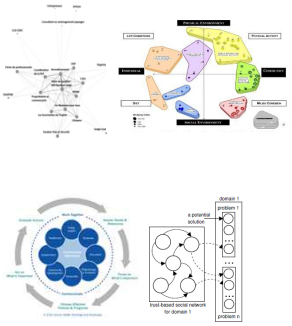
- Population health solutions often outside the health sector
- Urban contexts play 'upstream' role on health and health inequities
- Increasing convergence between cities' sustainability objectives with public health objectives
- Multiple actors, multiple views, multiple interests
- Urban change = natural experiment = great opportunity for population health (intervention) research

Multiple complexities

Decision making

Urban change

Impact on population health



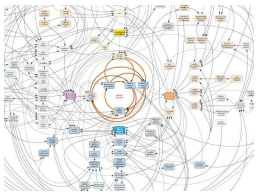
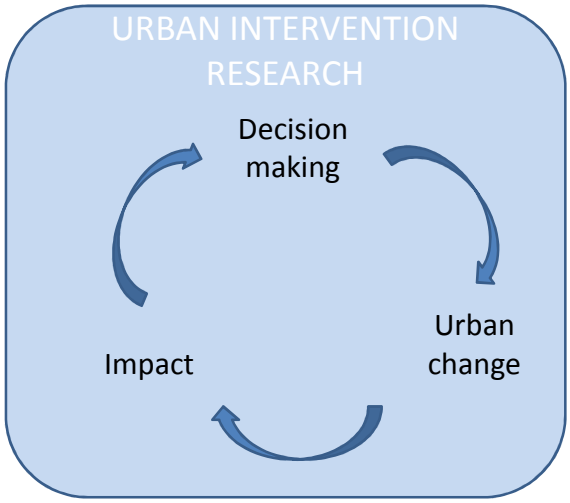
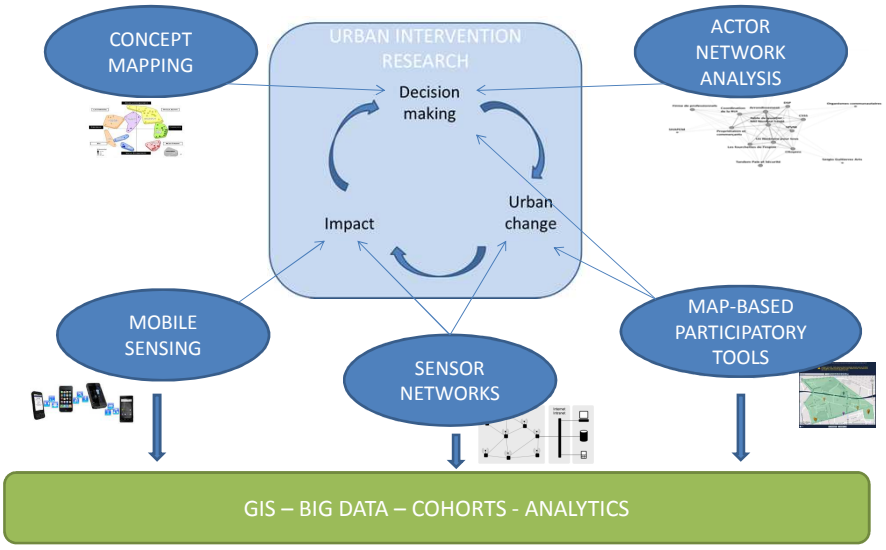


Illustration references: Rodriguez MA, et al. (2007) Smartocracy: Social Networks for Collective Decision Making. Proceedings of the 40th Hawaii Conderence on System Sciences; Kestens, Rondier et al. (2015) Revitalisation commerciale et verdissement Pascal/Lapierre : Processus et impacts. Rapport final. Pp.24.; Online resource: http://www.walhdab.org/?page=customsitemodels; The Foresight Obesity System Map; Urban timelapse Video by Pixel's Revenge, youtube

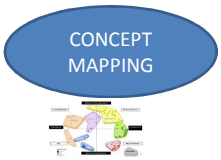


Interventions = Events in Systems
(Hawe, Shiell, Riley, 2009)

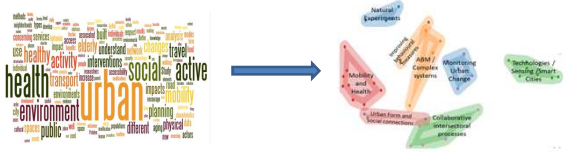
A toolset for urban intervention research



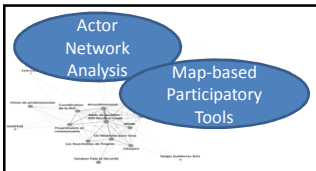
Concept Mapping



- Structured conceptualisation technique based on multidimensional scaling and cluster analysis used to document and synthesize views and perceptions of groups (Novak, Trochim)
- Has been used in various domains to facilitate collaborative planning and action (Lebel 2011, Schiller 2013, Cantinotti 2016)
- Question, Item generation, sorting and rating. mds & cluster analysis, interpretation

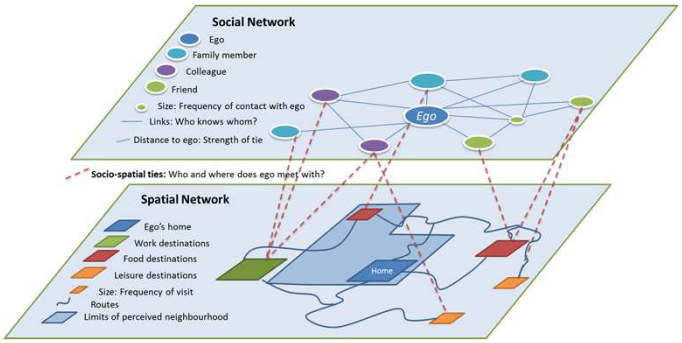


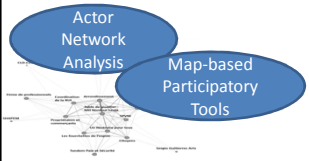
- Can also be useful to illustrate differences in views among sub-groups
- Interesting for research on intervention 'context', mixed method



Actor Network Analysis + Map-based Questionnaire

- Adaptation from VERITAS application which documents individual activity spaces (Chaix et al. 2012), and from VERITAS-SOCIAL app which further documents both spatial and social networks (Kestens et al. 2016)

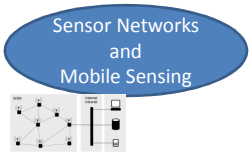




Actor network analysis + Map-based Questionnaire

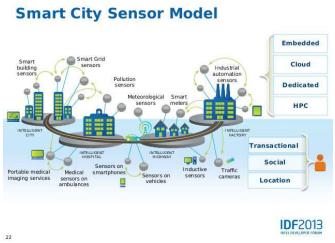
- VERITAS-INTERVENTION: Mapping interventions and associated actor networks
- Questionnaire on interventions about where, how, and who?
- Can be used for planned, ongoing or past interventions
- Can be used for participatory consultation
- Resulting data:
  - Geographic mapping of interventions
  - Network of actors
  - Possible continuous tracking of change

Video source: http://www.dailymotion.com/video/x102t8i_extension-de-la-ligne-d-vers-kehl-l-animation-3d-strasbourg_news; Extension de la ligne de tramway D vers Kehl.



Sensing Environments and Populations

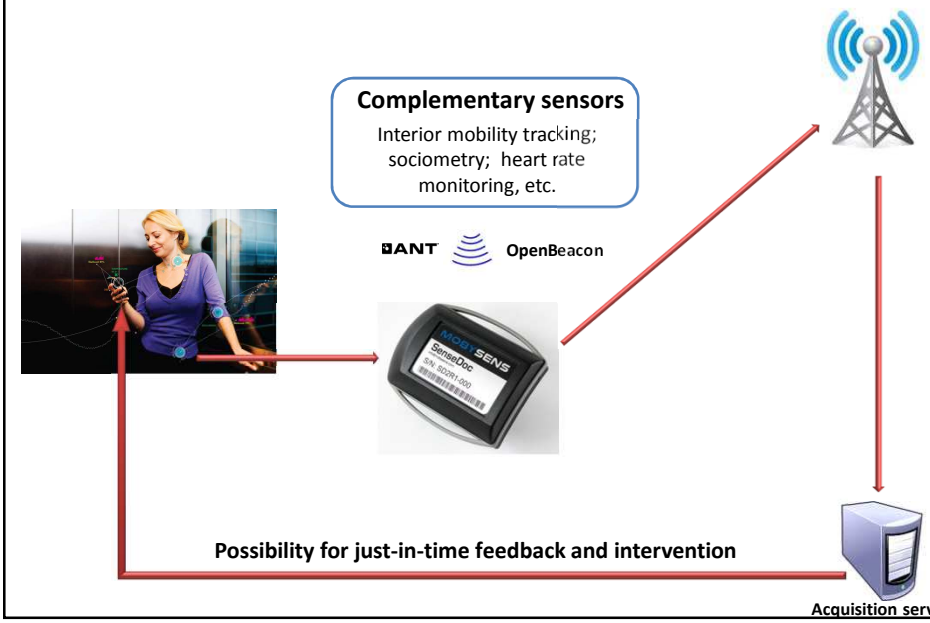
- Increasing presence of sensor networks – smart cities
- Increasing capacity of mobile sensing / wearable sensors (GPS, accelerometry, etc.)



- Rich spatio-temporal data on urban environments, behaviour, and health

Illustration sources: Intel Development Forum 2013, http://www.esri.in/esri-news/publication/vol9-issue1/articles/semantically-enriched-vision-of-smart-city; Nokia Sensing X Challenge http://sensing.xprize.org/news/enhancing-lives-and-breaking-down-barriers

Use of wearable sensors

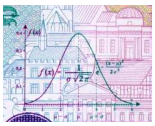


A toolset for urban intervention research

DECISION MAKING

CHANGING ENVIRONMENTS

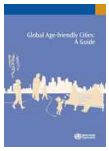
CHANGING BEHAVIOUR



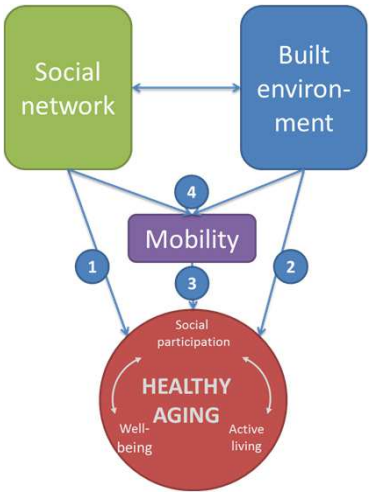
CHANGING POPULATION HEALTH / INEQUITIES

Example: QADA Built environment change and aging, Montreal

- Quebec Age-Friendly Cities Program, Quebec Ministry of Family and Elderly (QADA)



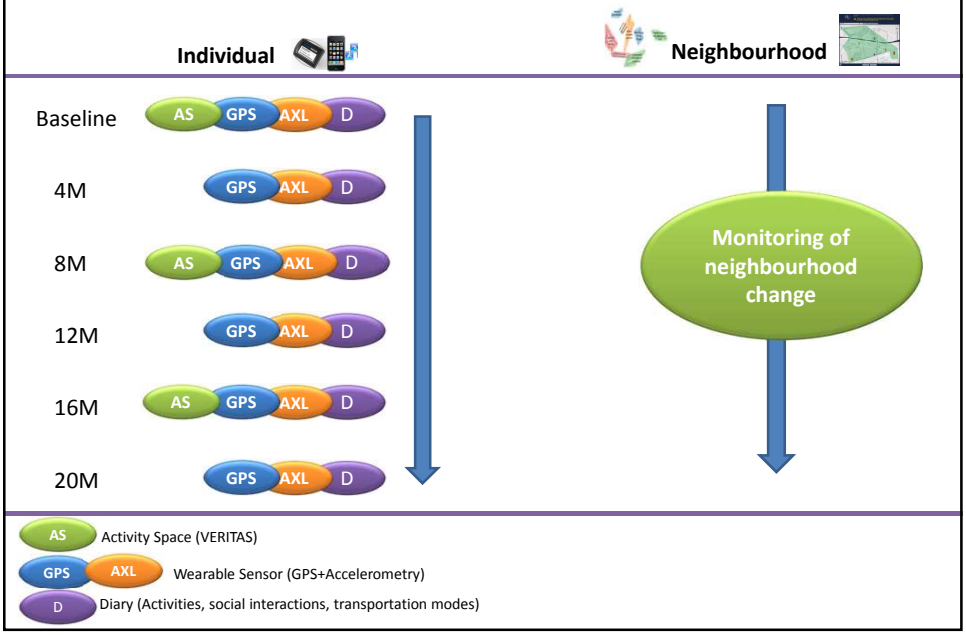
- Funding for a longitudinal cohort study with older adults in Rosemont neighbourhood, Montreal



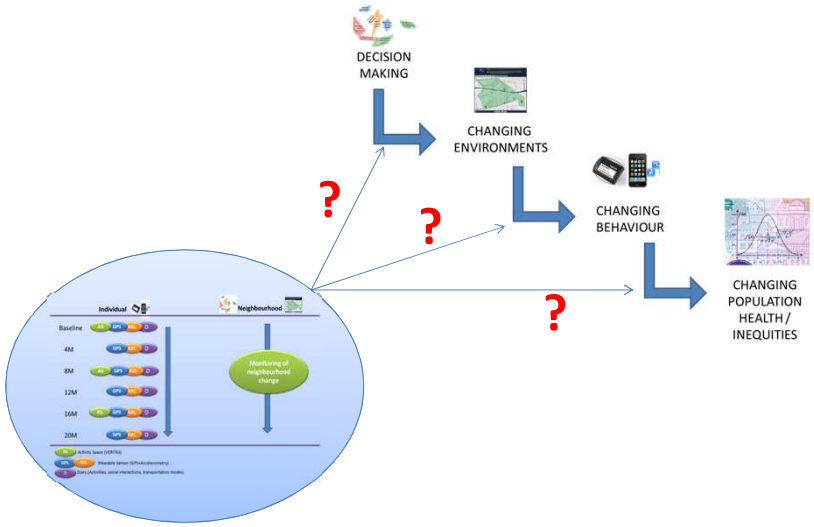
QADA wearable sensor project

- Building on ERA-AGE funded CURHA project (GPS tracking of older adults in Montreal, Luxembourg, and now Paris (HANC project, ANR))
- Co-developped with community organisations working with older adults and city borough
- Longitudinal design, 100 older adults living in Rosemont, central neighbourhood of Montreal
- Six waves of data collection, every 4 months, 7-day monitoring, total expected of 4,200 days of tracking
- Continuous tracking of neighbourhood change

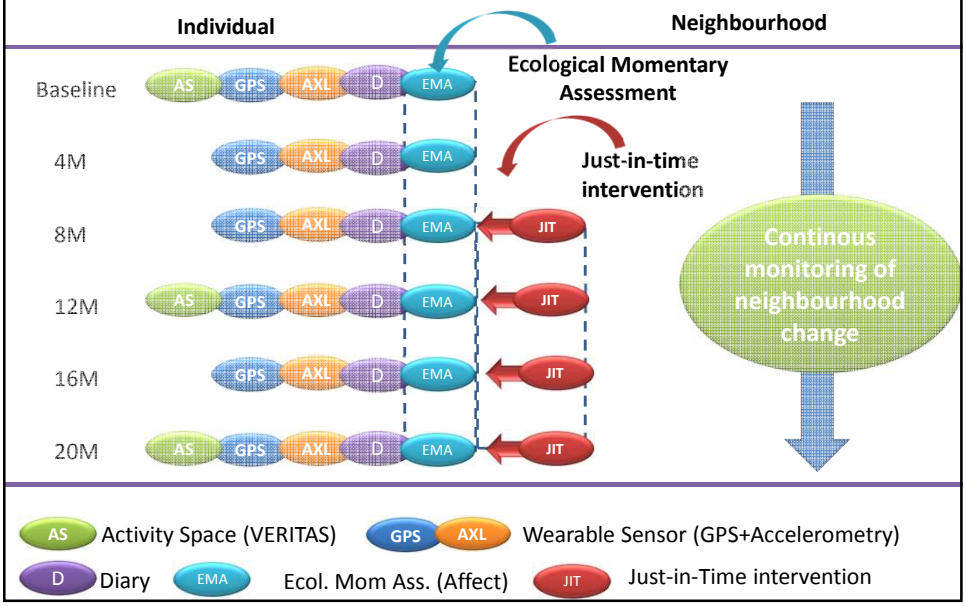
Measures



Analyses



Additional possibilities



A comprehensive approach for urban intervention research

- Trying to capitalise on existing and developing tools and methods for data collection and analysis of urban and behavioural change
- Framework to be possibly systematized through Urban Environment & Health INTERACT Team Grant (July 2016)
- Need for collaborative, transectoral expertise reflecting the complexity of processes at stake
- Continuous data streams allows quick turnaround, new ways to conduct research projects (i.e. Agile development)

Thank you!

Collaborative ideas/work:
Spherelab team (UdM, Can)
CURHA project (Can, Fra, Lux)
QADA project (UdM Can, Inserm Fra)
HANC project (Inserm, CNRS, UdM)
Nemesis team (Inserm, Fra)
Environment and Health INTERACT Team Grant LOI (UdM, SFU, Usask)

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Disclaimer: Y Kestens holds shares in spin-off companies that market the VERITAS application and the SenseDoc device (Treksoft / Mobysens)