

Workshop Panel: Applications of VGI in Science and Operations

Space, Time, and Disaster

Finding the < **T** > in **dynamic VGI** applications



Christoph Aubrecht – D. Özceylan Aubrecht, J. Ungar, S. Freire, K. Steinnocher

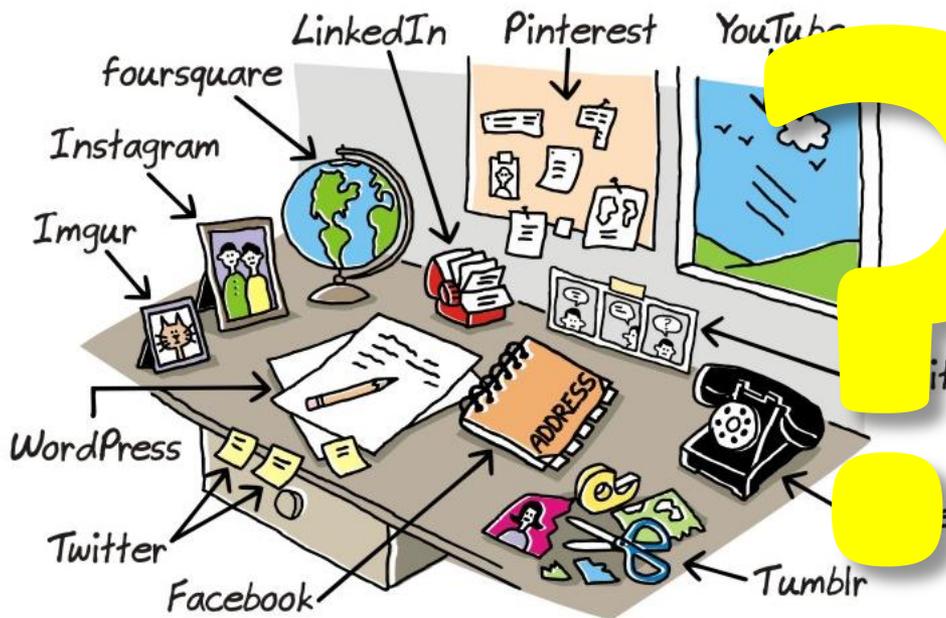
VGI@GIScience 2014
Vienna, Austria | September 23, 2014



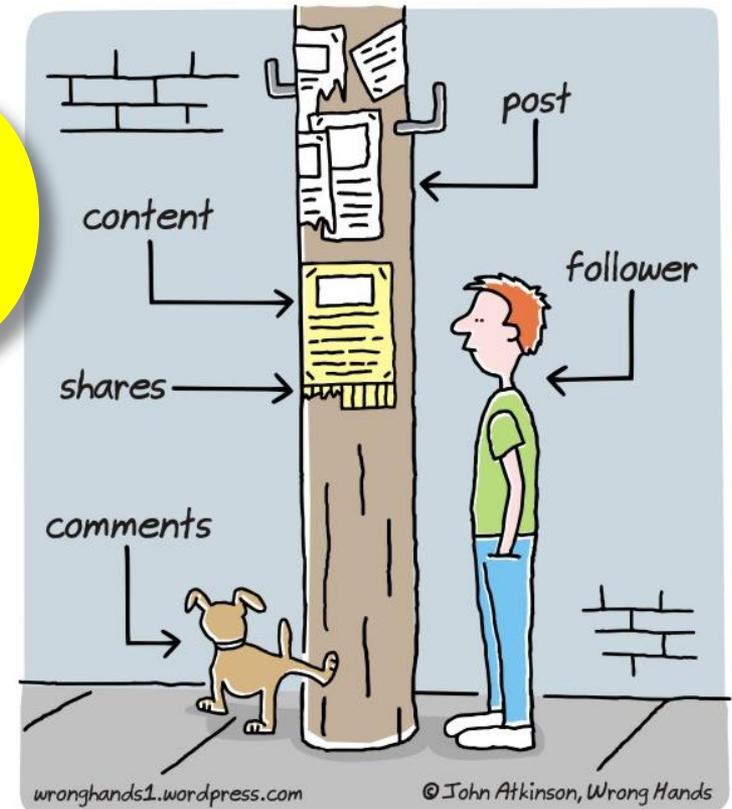
Volunteering (geo)info, social network(ing), (geo)sharing ...

What are we actually talking about ...?

vintage social networking



simplified blogging



Panel questions

- (1) How is the spatial component, such as scale and accuracy, of VGI being handled in scientific or operational applications?
- (2) How are the limitations of VGI being dealt with in an applied spatial modeling environment?
- (3) What would be one specific aspect that you consider missing or under-represented in the current 'VGI landscape'?
- (4) Does VGI have a potential to impact governance?

The spatial component of volunteered information

■ The way of volunteering GI

■ Unguided individual contribution

- 'Unintentional' collective information
 - Foursquare, Facebook places, [Twitter], ...
- Geographic domain 'theoretically' non-focused
 - Users contribute from anywhere, mostly providing information on their own locations, thus being very localized



■ Guided crowd-sourced information

- Intentional collective information
 - Humanitarian OpenStreetMap, Ushahidi, Google person finder, ...
- Geographic domain usually very focused
 - Users contribute from anywhere, on any given location
- Crowd selection based on
 - Crowd members' inherent location
 - Crowd members' specific expertise



The spatial component of volunteered information

- The way of volunteering GI
 - Unguided individual contribution
 - ‘Unintentional’ collective information
 - Foursquare, Facebook places, [Twitter], ...
 - Geographic domain ‘theoretically’ non-focused
 - Users contribute from anywhere, mostly providing information on their own locations, thus being very localized



■ Guided crowd-sourced information

<Scale> <Accuracy> <Completeness> ?

Unclear unsupervised compilation – focus is not on the collective nature

- Certain general contribution restrictions apply (ensuring a certain overall consistency level)
- Sort of self-organizing/crowd-directed quality assurance (‘Wikipedia principle’)
- *Cultural aspects affecting contribution-level and user perspective!*
 - Crowd members’ inherent location
 - Crowd members’ specific expertise

The spatial component of volunteered information

- **<Scale> <Accuracy> <Completeness>**  ? 
 - Focus is on getting the best [... quality ...] for a specific location
 - Strong case-specific restrictions apply on contribution type and format (aiming at consistent high quality)
 - Commonly top-down quality monitoring (e.g. duplicated information collection)
 - *Cultural aspects less dominant*
- Guided crowd-sourced information
 - Intentional collective information
 - Humanitarian OpenStreetMap, Ushahidi, Google person finder, ...
 - Geographic domain usually very focused
 - Users contribute from anywhere, on any given location
 - Crowd selection based on
 - Crowd members' inherent location
 - Crowd members' specific expertise



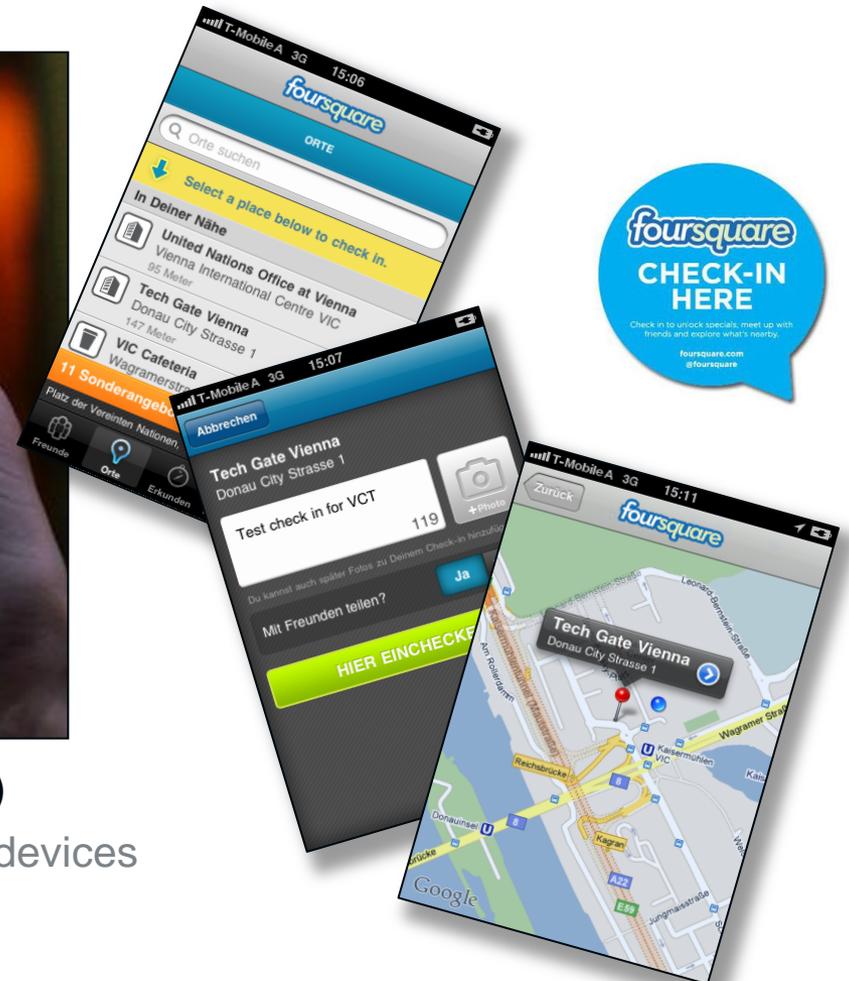
Panel questions

- (1) How is the spatial component, such as scale and accuracy, of VGI being handled in scientific or operational applications?
- (2) How are the limitations of VGI being dealt with in an applied spatial modeling environment?
- (3) What would be one specific aspect that you consider missing or under-represented in the current 'VGI landscape'?
- (4) Does VGI have a potential to impact governance?

Dealing with limitations of VGI

- The <V> is what makes VGI distinct from other spatially-explicit data
- However, this <V> also introduces significant uncertainties and limitations
 - Volunteering implies that data is not a random sample and contribution is surely not homogeneously distributed (referring to society as a whole or certain groups)
→ User bias
- Relevant/valuable factors for VGI-handling in an application context
 - Sample size of collective data set and spatial distribution of individual feature
→ spatial representativeness
 - Multi-user duplicative data contribution → validity assurance

Mapping **foursquare** “online activity”



- Location-based social networks (LBSN)
 - Increasing use of GPS-enabled mobile devices
→ *pervasive in the future ...?*



2010: OUR YEAR OF 3400% GROWTH

GLOBAL

The screenshot shows a Foursquare user profile for Douglas W. The profile features a large circular badge with a white rocket ship on a blue background with stars, all enclosed in a red border. To the right of the badge, the text reads: "NASA Explorer. You are now 220 miles above the Earth traveling at 17,500 mph and unlocked the NASA Explorer Badge! Show this badge and get a free scoop of astronaut ice cream." Below this, it says "Unlocked by Douglas W. on Fri Oct 22, 2010 at 10:09 AM." At the bottom left, under the heading "Douglas W.'s Badges", there are two smaller circular icons: one with a globe and one with the rocket ship.

TOTAL CHECK-INS

381,576,305

IN EVERY SINGLE COUNTRY
LAST COUNTRY TO CHECK IN: N. KOREA

BIGGEST EVENT

RALLY TO
RESTORE SANITY

30,525 CHECK-INS
10/30/10 – WASHINGTON, DC

CHECK-INS FROM SPACE

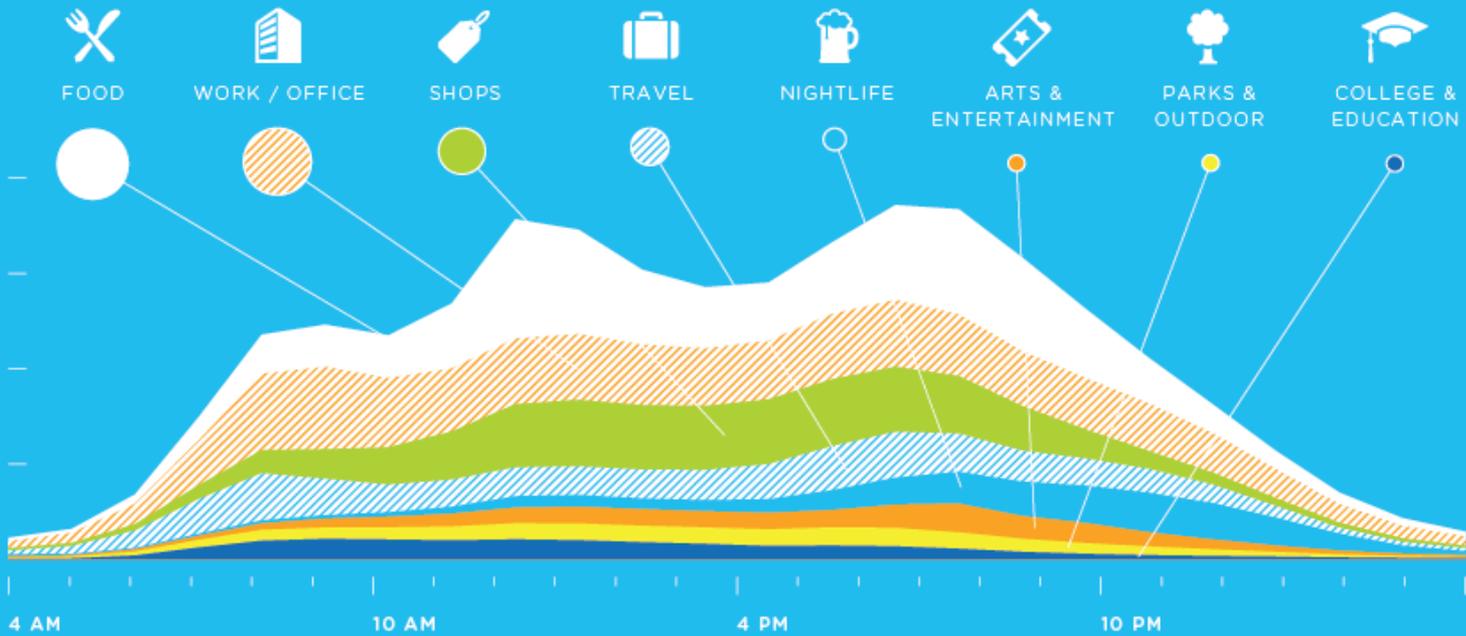
1 

FROM THE INTERNATIONAL SPACE STATION
OCTOBER 22, 2010



2010: OUR YEAR OF 3400% GROWTH

CHECK-INS BY CATEGORY THROUGHOUT THE DAY



TOTAL CHECK-INS

381,576,305

IN EVERY SINGLE COUNTRY
LAST COUNTRY TO CHECK IN: N. KOREA

BIGGEST EVENT

RALLY TO RESTORE SANITY

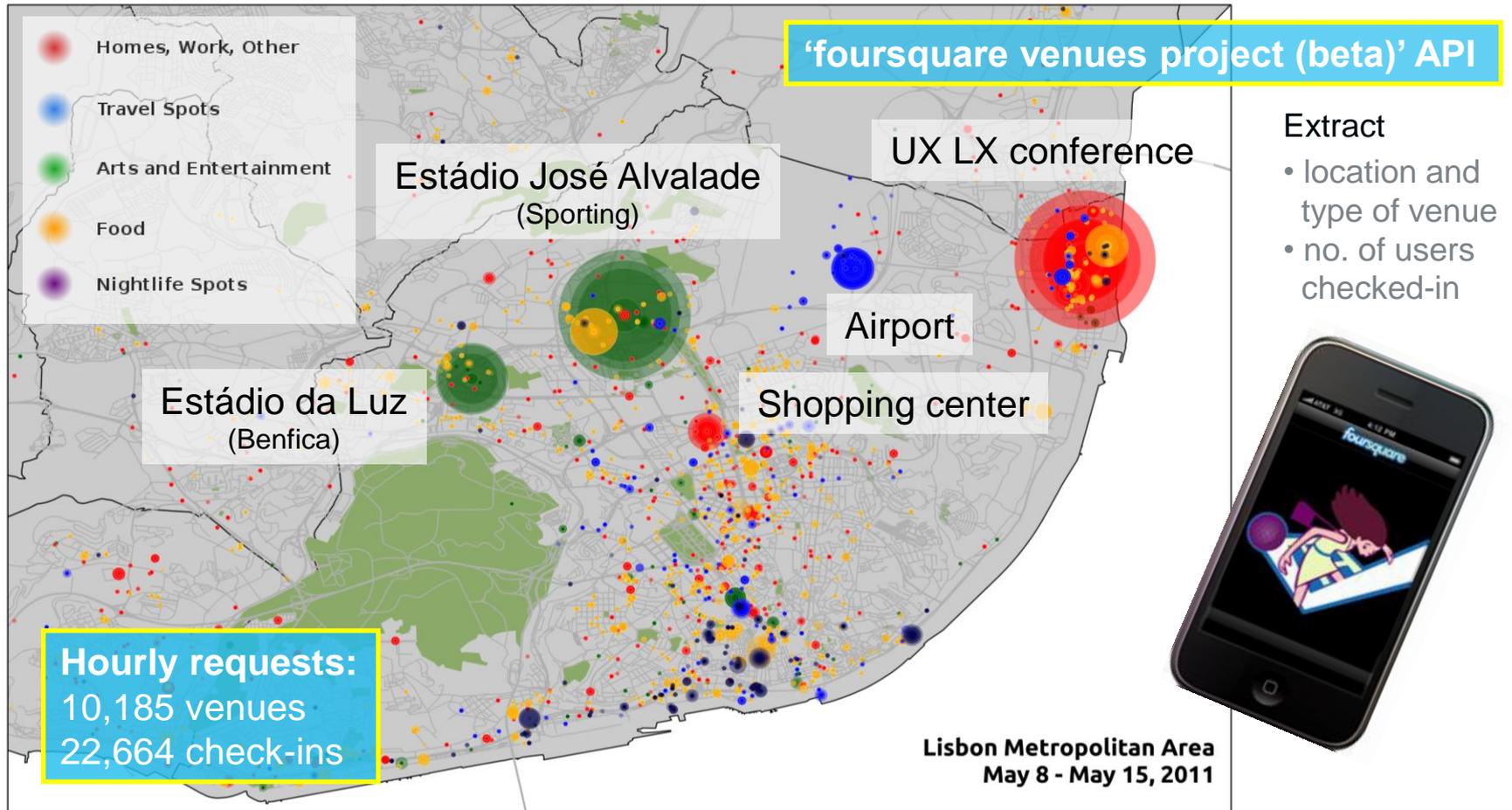
30,525 CHECK-INS
10/30/10 – WASHINGTON, DC

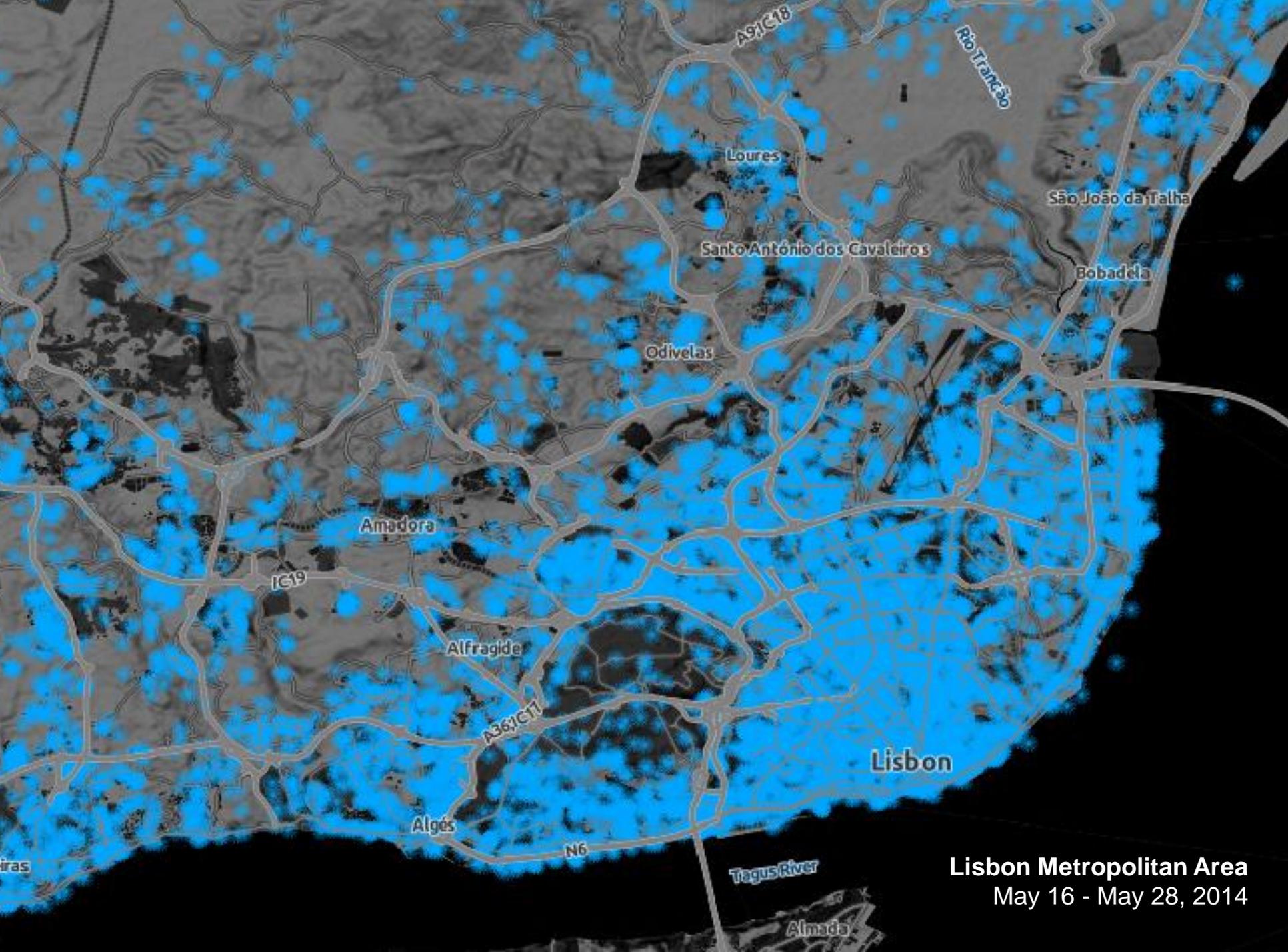
CHECK-INS FROM SPACE

1

FROM THE INTERNATIONAL SPACE STATION
OCTOBER 22, 2010

Mapping *foursquare* “online activity”





Lisbon Metropolitan Area
May 16 - May 28, 2014



2011 vs. 2014

Lisbon Metropolitan Area

The number of foursquare venues **is more than 4 times higher**, now ~43,000 as compared to ~10,000 in the 2011 study

Globally

More than **6 times as many users** in 2014, now more than 50 million as compared to 8 million in 2011

Lisbon Metropolitan Area
May 16 - May 28, 2014

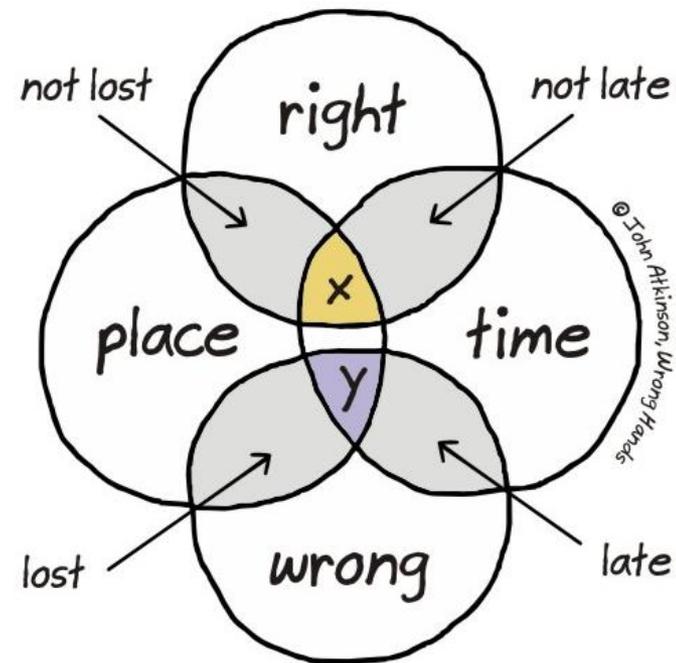
Panel questions

- (1) How is the spatial component, such as scale and accuracy, of VGI being handled in scientific or operational applications?
- (2) How are the limitations of VGI being dealt with in an applied spatial modeling environment?
- (3) What would be one specific aspect that you consider missing or under-represented in the current 'VGI landscape'?**
- (4) Does VGI have a potential to impact governance?

How to extract the missing <T> from V-G-I

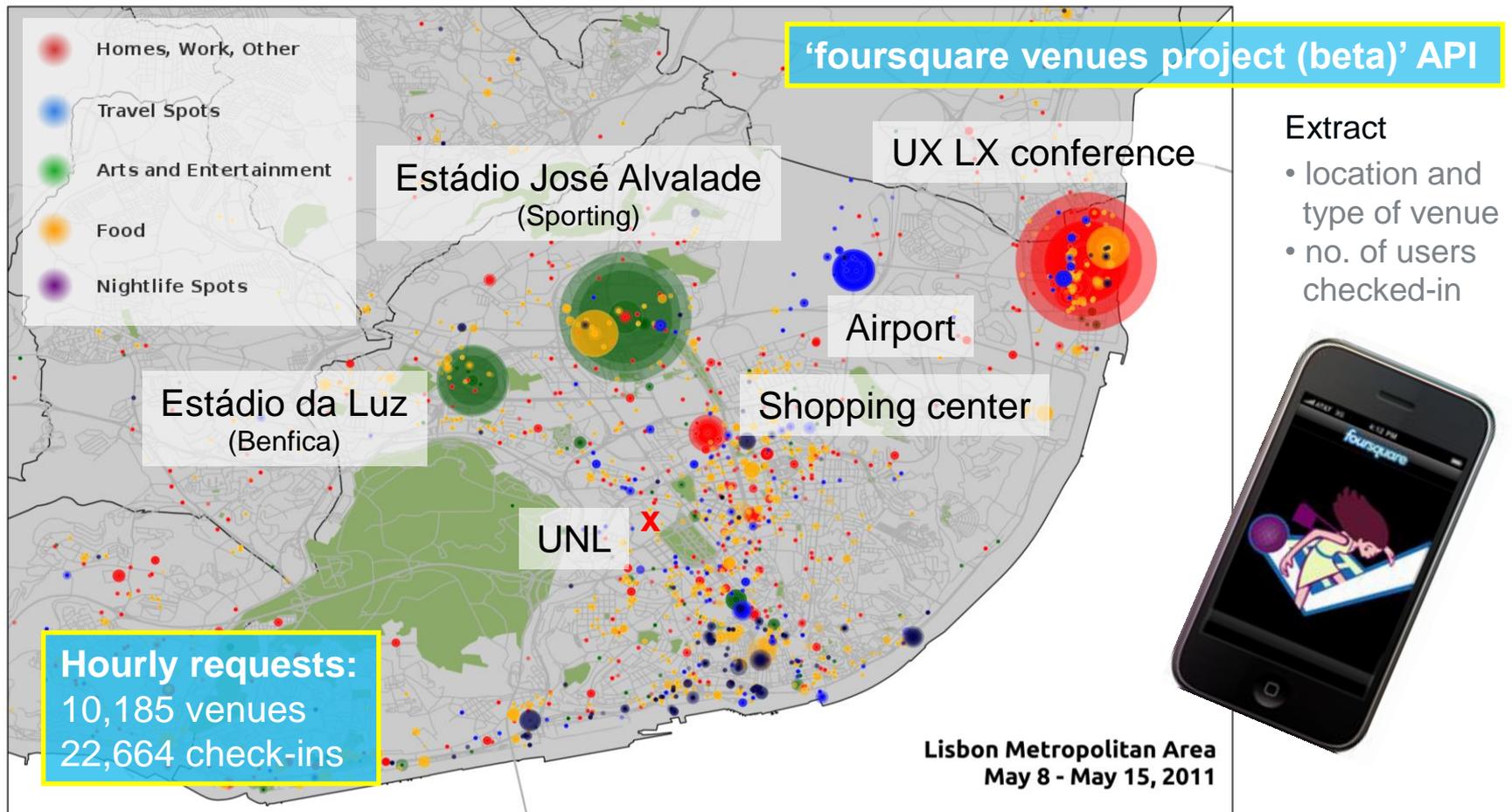
- With the 'close-to-pervasiveness' of VGI contribution options, not only the **spatial component** is becoming 'all-encompassing', but even more so the **temporal component**
- Time, space, place ...

How do we put that in a VGI context?

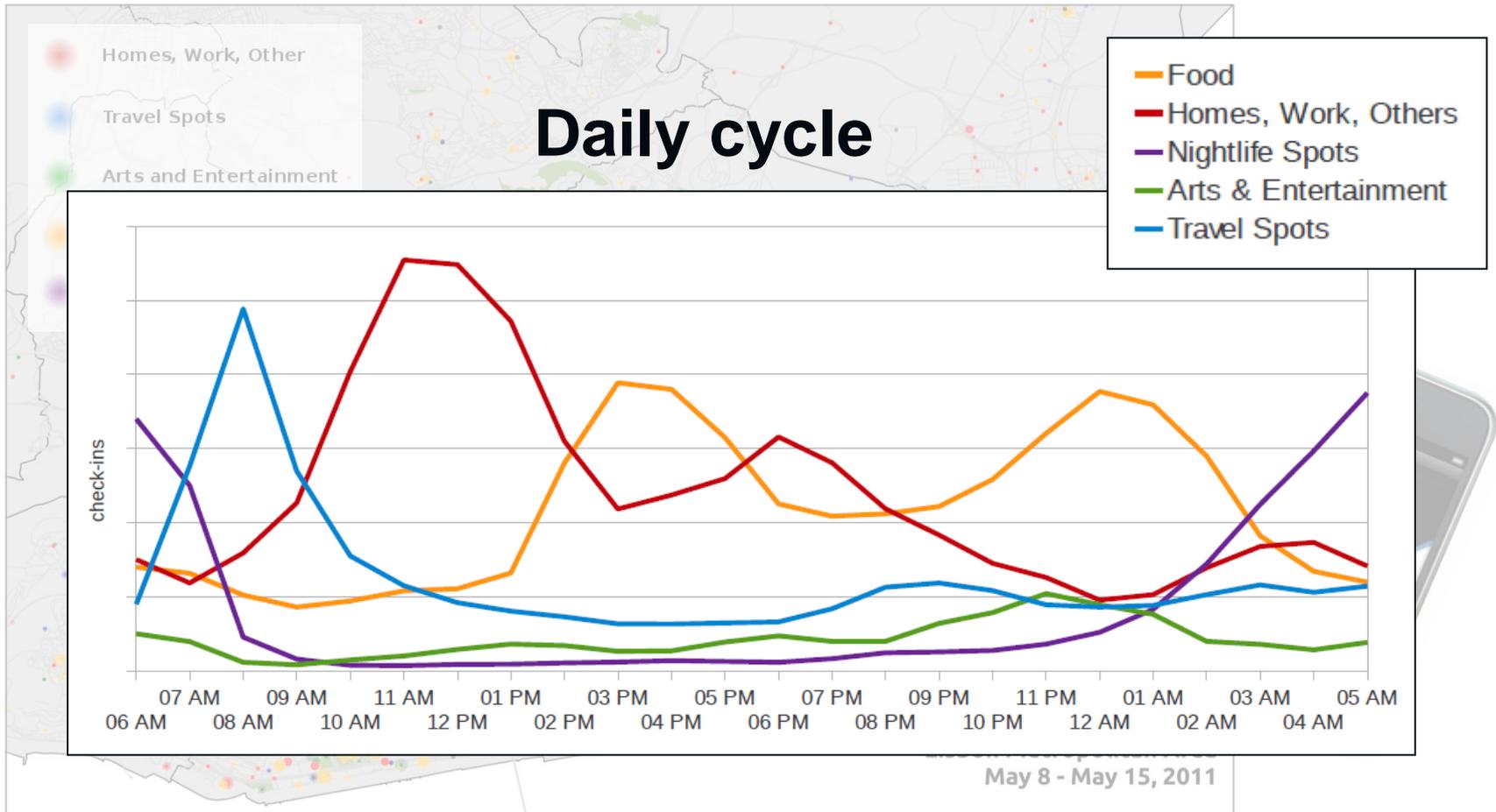


x success y failure

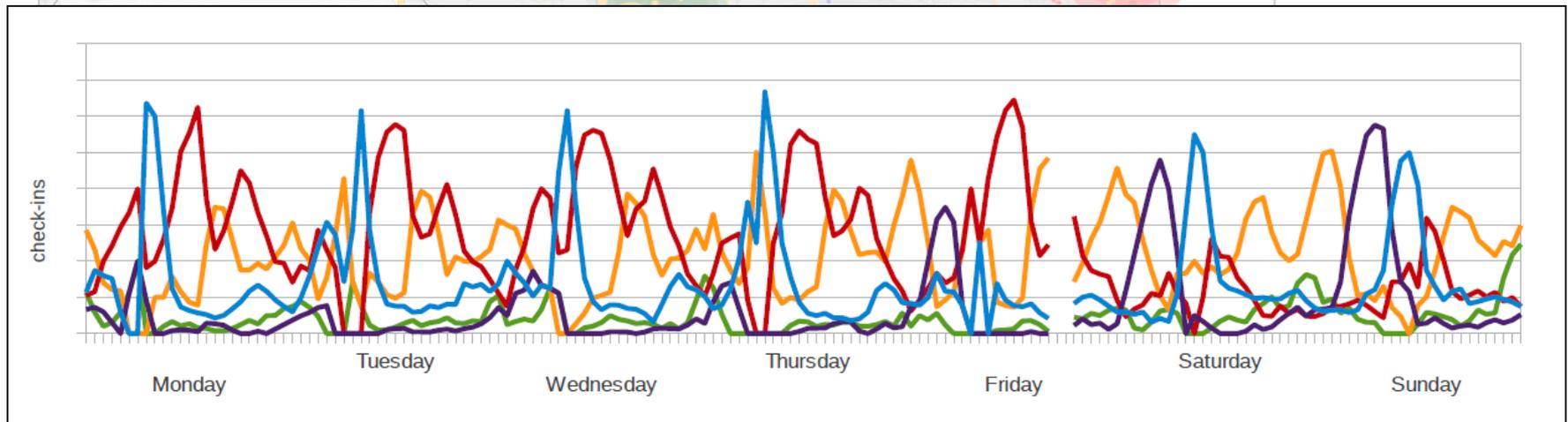
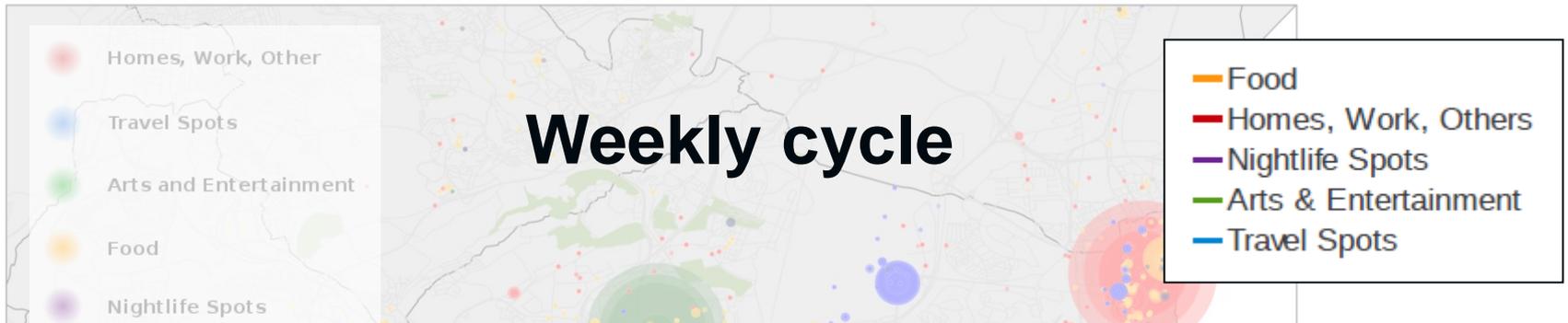
How to extract the missing <T> from V-G-I



How to extract the missing <T> from V-G-I



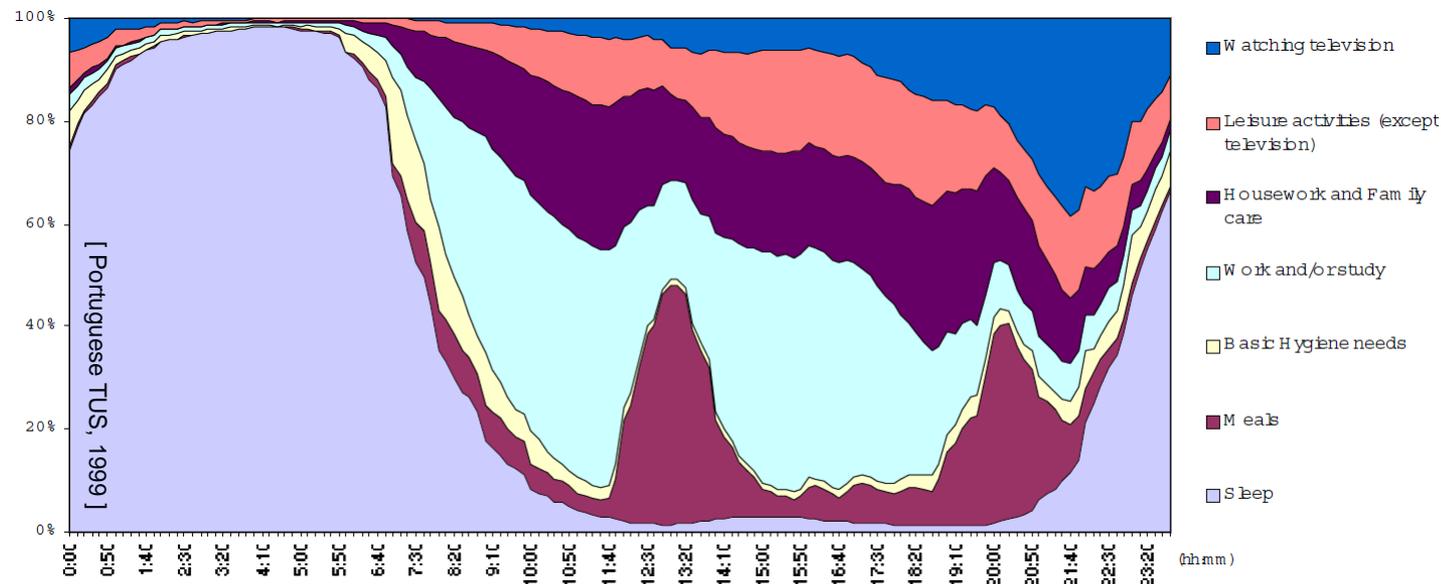
How to extract the missing <T> from V-G-I



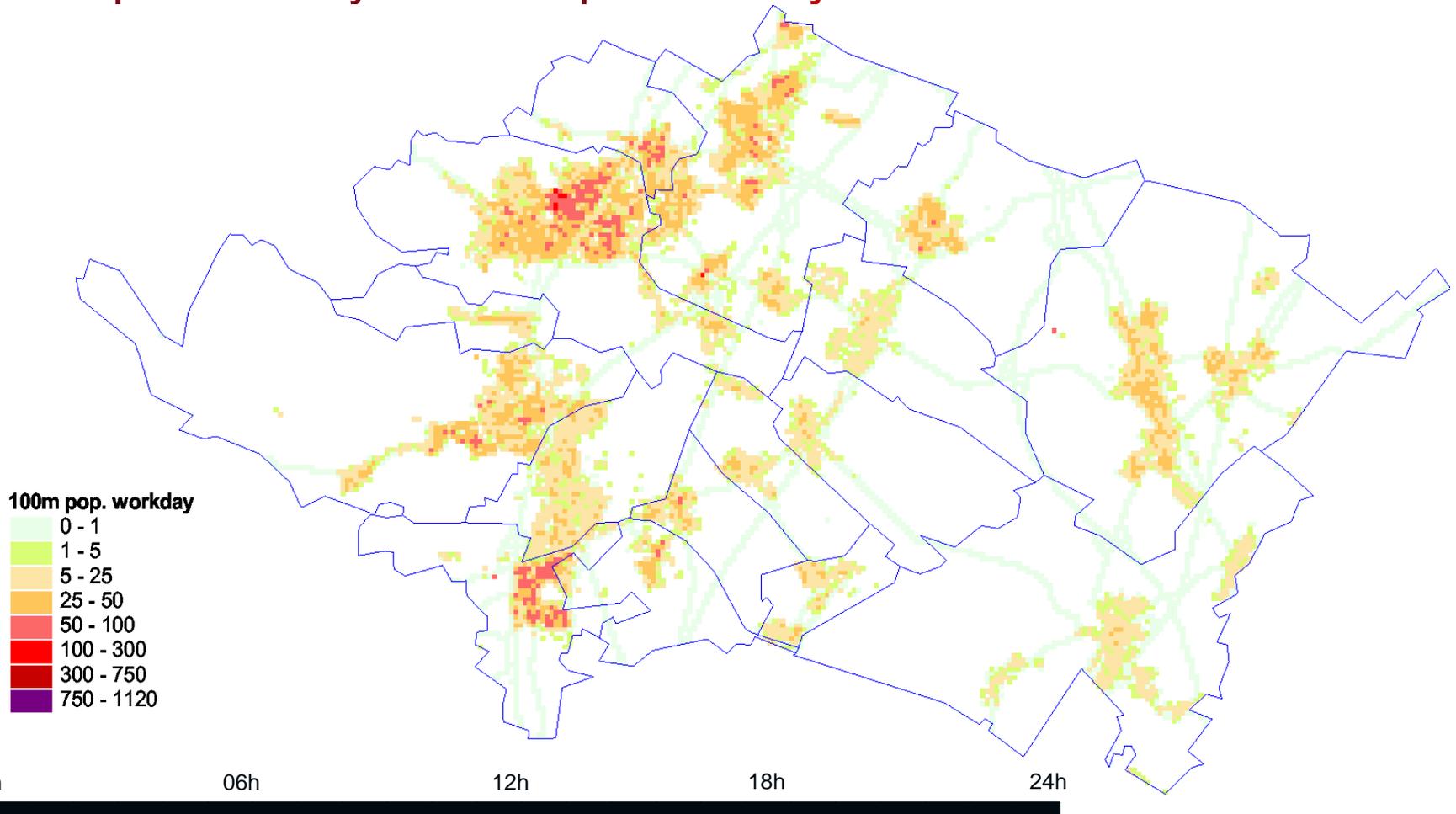
Lisbon Metropolitan Area
May 8 - May 15, 2011

How to extract the missing <T> from V-G-I

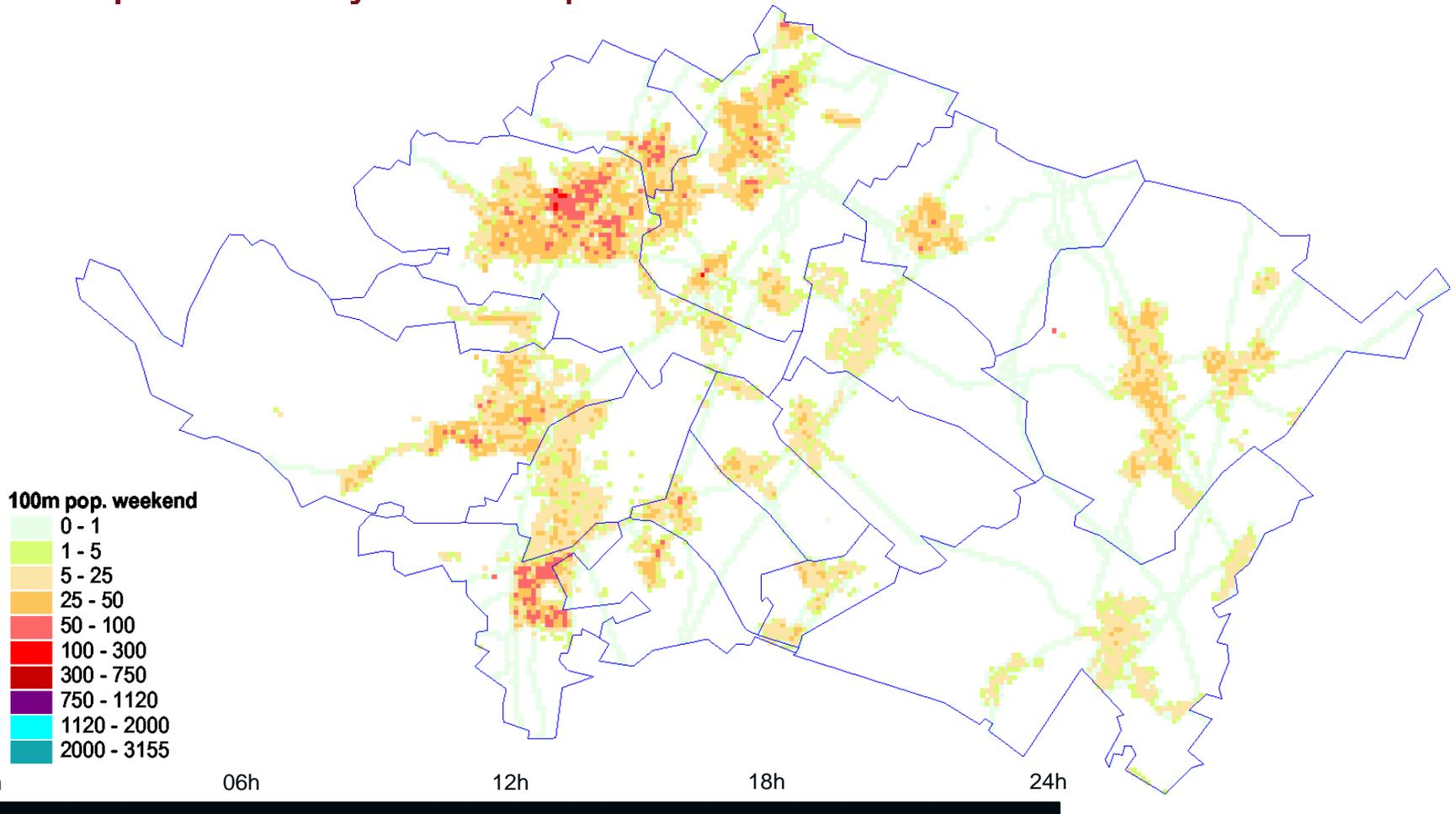
- Time use profiles as derived from classical time use surveys have long been instrumental in 'Time Geography'
- More recently → integration into **population dynamics mapping**
- **Problems:** irregular, inconsistent, strong spatial generalization (national level)



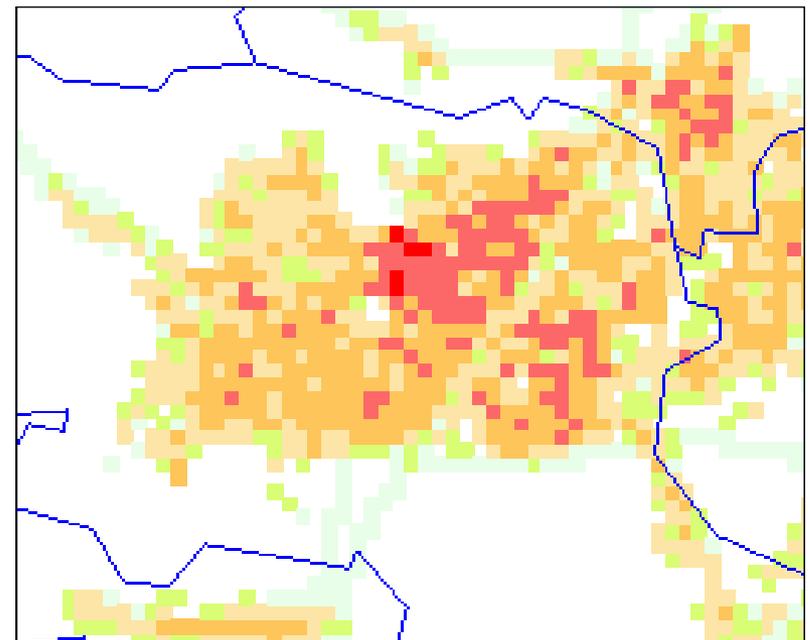
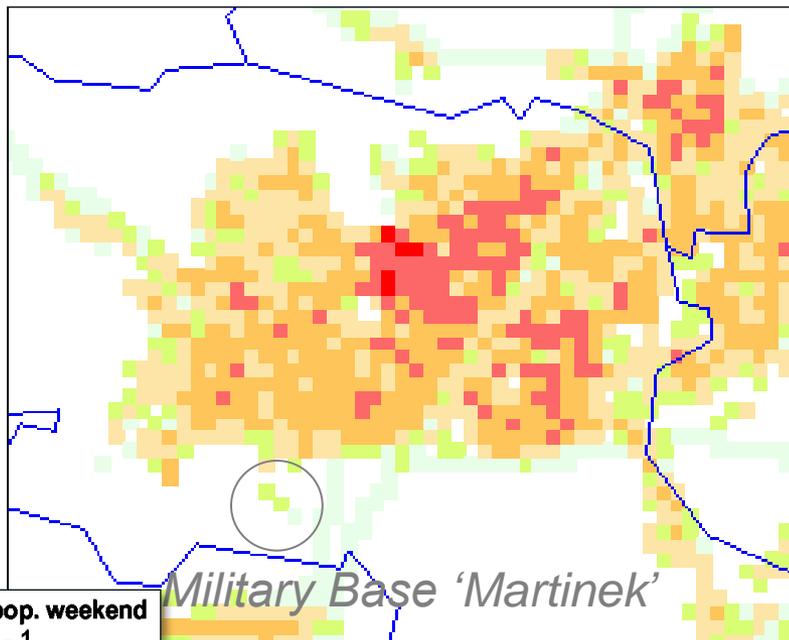
Population dynamics | Workday



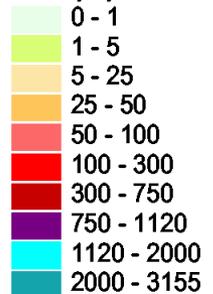
Population dynamics | Weekend



Population dynamics | Workday vs. Weekend



100m pop. weekend

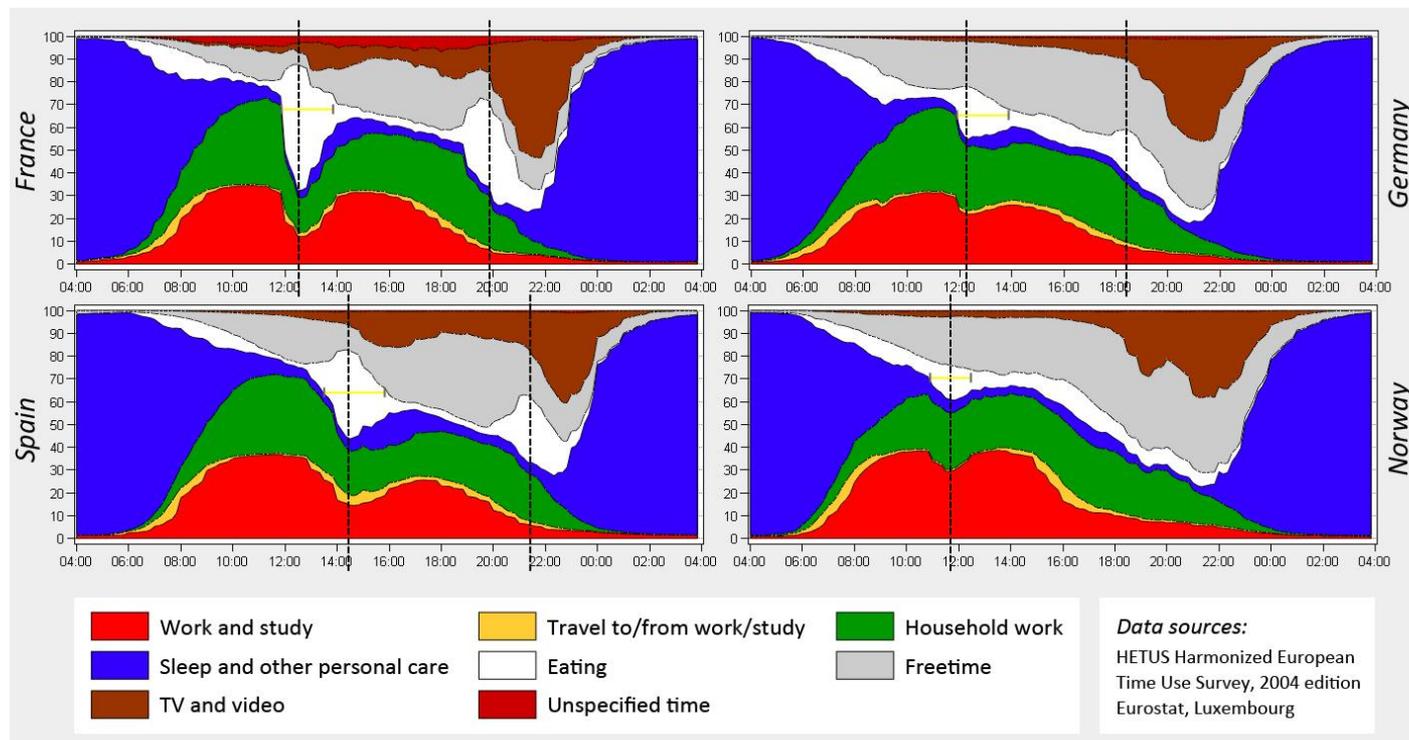


00h 06h 12h 18h 24h



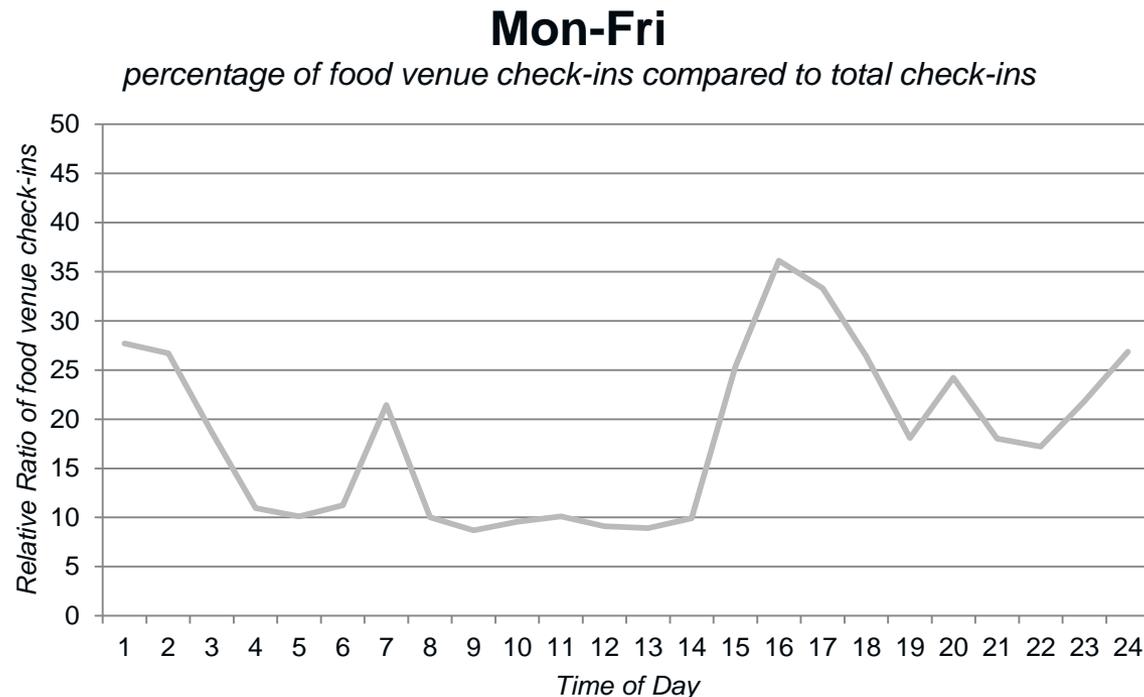
How to extract the missing $\langle T \rangle$ from V-G-I

- Classical TUS-derived TUP vs. VGI-derived TUP
 - Replacing, calibrating, specifying, etc.
 - Example: activity category 'eating' - basis: HETUS



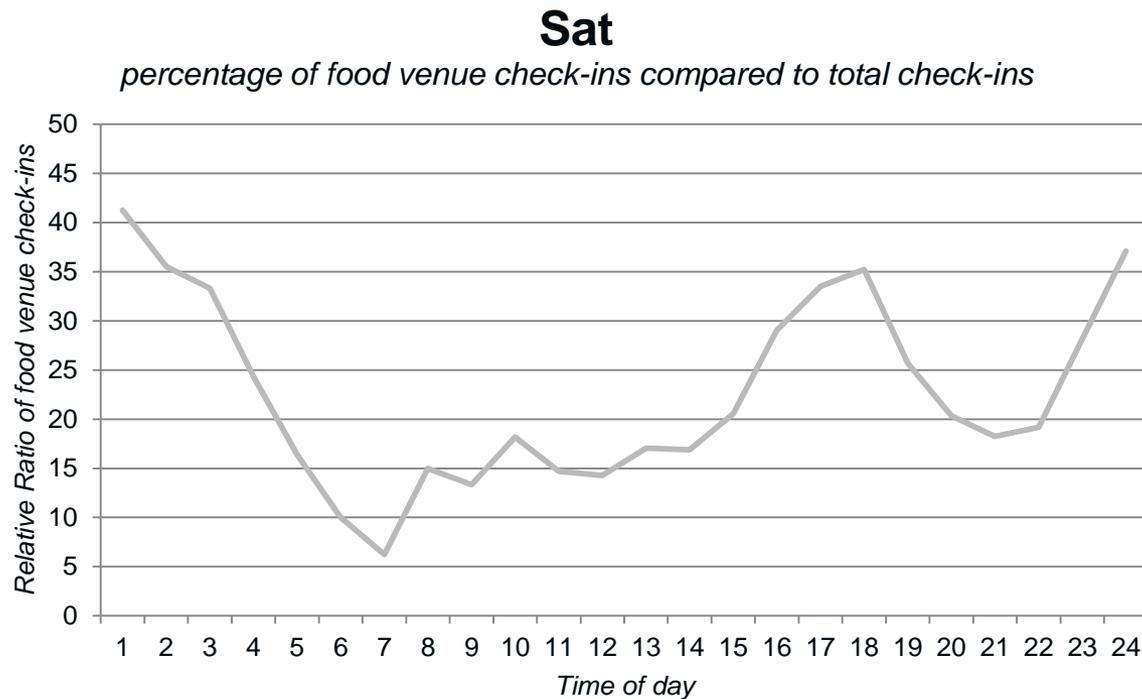
How to extract the missing <T> from V-G-I

- Classical TUS-derived TUP vs. VGI-derived TUP
 - Replacing, calibrating, specifying, etc.
 - Example: activity category 'eating' - basis: foursquare



How to extract the missing <T> from V-G-I

- Classical TUS-derived TUP vs. VGI-derived TUP
 - Replacing, calibrating, specifying, etc.
 - Example: activity category 'eating' - basis: foursquare

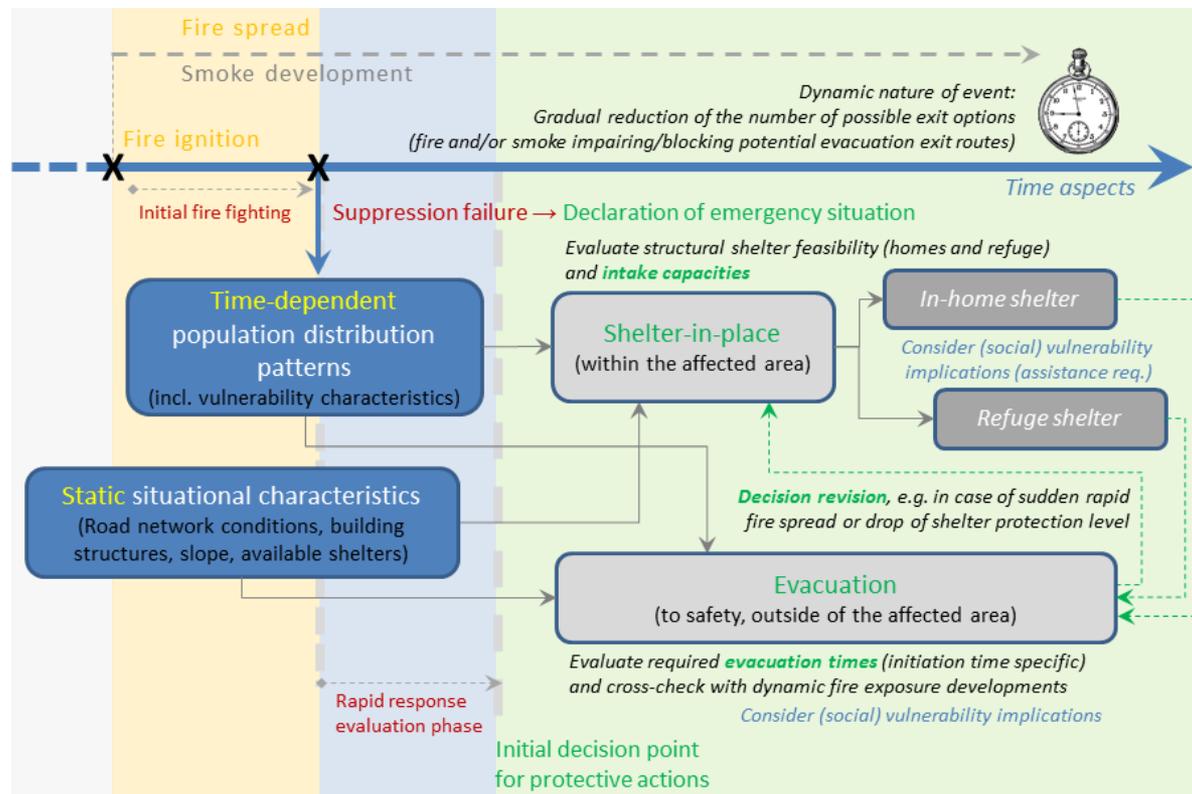


Panel questions

- (1) How is the spatial component, such as scale and accuracy, of VGI being handled in scientific or operational applications?
- (2) How are the limitations of VGI being dealt with in an applied spatial modeling environment?
- (3) What would be one specific aspect that you consider missing or under-represented in the current 'VGI landscape'?
- (4) Does VGI have a potential to impact governance?**

Impact on governance – the case of disaster management

- Using population distribution **dynamics** for population exposure mapping
 - Identifying elements at risk located in a hazard-prone area that are subject to potential adverse effects due to the hazard impact



BREATHING CITY

Manhattan's at **Work** and **Home** population by hour



Joey Cherdarchuk | @cherdarchuk | www.darkhorseanalytics.com/blog
Data: US Census Bureau, New York City, US Bureau of Labour Statistics

Thank you for your attention!

Christoph Aubrecht



Christoph Aubrecht

Disaster Risk and Geospatial Information Scientist
<http://homepage.univie.ac.at/christoph.aubrecht>

AIT Austrian Institute of Technology

Energy Department

Vienna | Austria

christoph.aubrecht@ait.ac.at | <http://www.ait.ac.at>

The World Bank

Social, Urban, Rural & Resilience (GP-SURR)

Washington DC | USA

caubrecht@worldbank.org | <http://www.worldbank.org>

GISCIENCE 2014

