Geo372
Vertiefung GIScience

Volunteered geographic information

Herbstsemester

Ross Purves

Last week

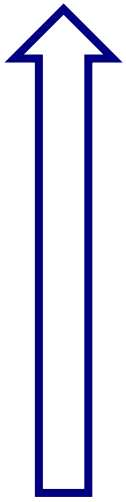
- Flurina introduced the related notions of **participatory** and **public participation GIS (PGIS** and **PPGIS)**
- **PPGIS** is embedded in the global north, and typically seen as a way of increasing participation and community involvement in decision making
- **PGIS** is often discussed in the context of indigenous people and the global south, and pays more attention to arguments about ways of understanding the world (and biases introduced through GIS)
- We saw how **categories** are important in the way we carve up (and thus **represent**) the world
- Flurina left you with an **exercise**

Last week's exercise

The project "Parc Adula" (www.parcadula.ch) aimed at creating a new national park in Switzerland, with the full participation of local communities. Now some of the communities want to create their own protected area in the form of a "Naturpark". Imagine that you were part of the project team and your task was to present an outline for a participatory GIS project:

- Define the **goal** of your participatory GIS project
- Which **stakeholders** would you involve?
- Define a **participatory method** you would use and the **types of data** to be collected
- At which **level** in the **ladder of participation** is your project situated?
- List **2 potential challenges** and how to address them

The ladder of participation



Public participation ladder (Wiedemann & Femers 1993)
Public partnership in the final decision
Public participation in assessing risk and recommending solutions
Public participation in defining interests and determining the agenda
Public right to object
Informing the public
Public right to know

http://geog.sdsu.edu/People/Pages/jankowski/public_html/web780/Wiedemann_Femers_1993.pdf

Another typology by Sherry R Arnstein is the **Ladder of Citizen Participation**

http://lithgow-schmidt.dk/sherry-arnstein/ladder-of-citizen-participation.html

Learning objectives

- You can critically discuss the importance of how we **define (and name**) the phenomena of **volunteered geographic information** (VGI)
- You can list examples of **VGI and its properties**
- You are aware of, and can describe, typical **participation inequality** in VGI and its **potential implications**
- You can describe and critically discuss **applications of VGI** in **societal and scientific applications**

Outline

- Origins of VGI
- Examples of VGI
- Some competing definitions and why they matter
- Research and VGI – a brief overview
- Research and VGI in Zurich
  - Placenames
  - Categories
  - A location-based game

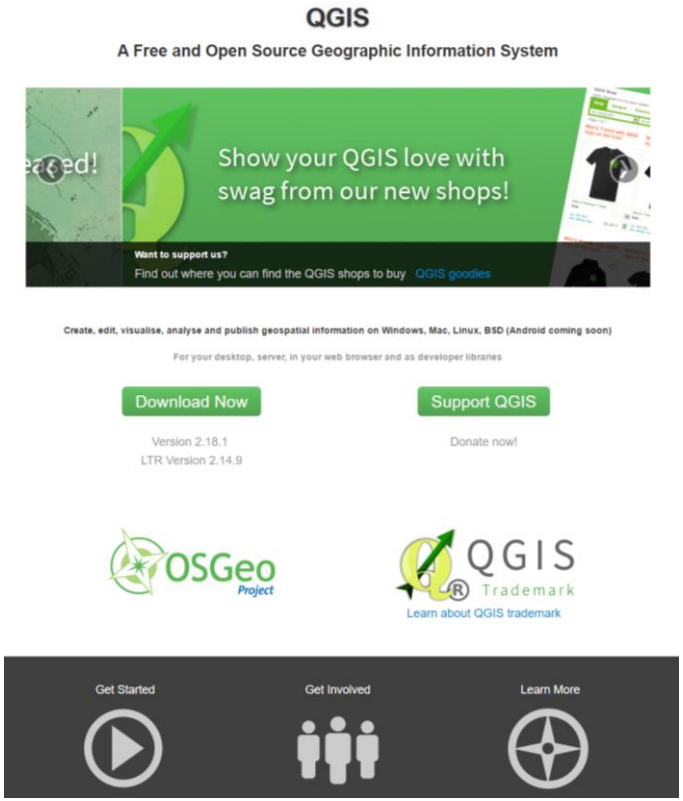
Goodchild's description of VGI

"a remarkable phenomenon that has become evident in recent months: the **widespread engagement** of **large numbers of private citizens**, often with **little in the way of formal qualifications**, in the **creation of geographic information**, a function that for centuries has been reserved to official agencies. They are **largely untrained** and their actions are **almost always voluntary**, and the **results may or may not be accurate**. But collectively, they represent a **dramatic innovation** that will certainly have profound impacts on geographic information systems (GIS) and more generally on the discipline of geography and its relationship to the general public. I term this **volunteered geographic information** (VGI), a special case of the more general Web phenomenon of **user generated content**, and it is the subject of this paper. "

Goodchild, 2007

Stimuli for VGI

- Emergence of **Web 2.0** – where information was shared and worked on collaboratively was a key driver of VGI
- **”New” technologies** simplified accidental and deliberate creation of spatial data in different ways, for different purposes…
- Finally, **Open Source software** and **Open Data** have played an important role in **“democratising” data production**



Source: https://en.wikipedia.org/wiki/Web_2.0#/media/File:Web_2.0_Map.svg

Source: https://opendata.ch

Some examples

- In the following, I give some examples which can be considered to be VGI
- However, these examples have significant differences, including:
  - **Initiators** of the project
  - **Motivations, demographics** and **behaviour** of contributors
  - Nature of the **data produced**
  - Use of **supporting data**
  - **Ownership** of the data produced

OpenStreetMap

https://openstreetmap.org

Wikipedia

1914 konnte die Universität ihr neues Hauptgebäude (Kollegiengebäude) an der Rämistrasse (gebaut nach Plänen von Karl Moser und Robert Curjel) beziehen. Dem Neubau(kredit) hatten 1908 die Stimmberechtigten der Stadt und des Kantons Zürich in einer Volksabstimmung zugestimmt.

1917 wurde die Zentralbibliothek Zürich eröffnet, die gleichzeitig Stadt-, Kantons- und Universitätsbibliothek ist.

1933, hundert Jahre nach der Gründung, zählte die Universität Zürich 2'033 Studierende.

1946 hielt Winston Churchill in der Aula der Universität Zürich seine bekannte Rede an die akademische Jugend der Welt. Die Rede gipfelte im bekannt gewordenen Aufruf an Europa: *«Therefore I say to you: let Europe arise!»*

Universität Zürich-Irchel [Bearbeiten | Quelltext bearbeiten]

Seit den 1950er Jahren nahm die Zahl der Studenten drastisch zu und die Platzverhältnisse wurden immer knapper. 1962 schlug die naturwissenschaftliche Fakultät vor, einen Teil der Universität in den Norden der Stadt zu verlegen.

1973 wurde mit den Bauarbeiten für die Universität Zürich-Irchel begonnen, die 1979 eingeweiht werden konnte (siehe auch: Irchelpark).

1983, hundertfünfzig Jahre nach ihrer Gründung, zählte die Universität Zürich 15'000 Studierende.

1984 wurde die Universitätsleitung ausgebaut, indem das Rektorat zu einem Hauptamt aufgewertet wurde und zwei Prorektorate geschaffen wurden.

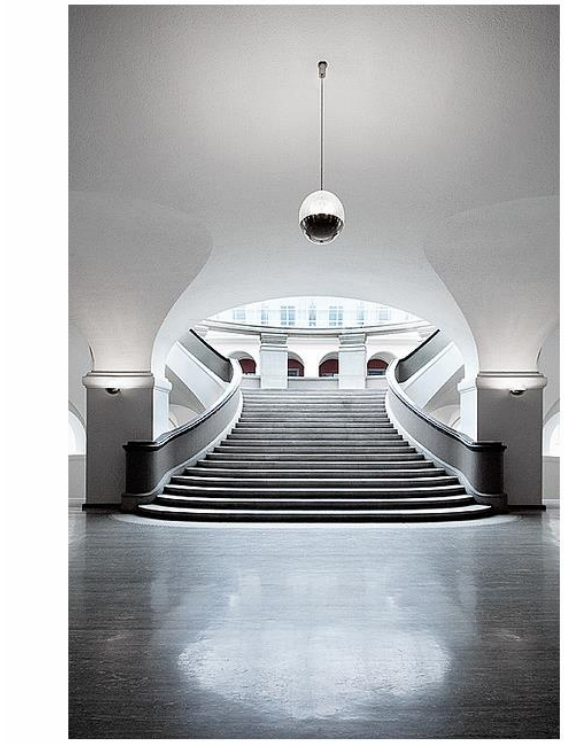
Ferdinand Sauerbruch an einer medizinischen Vorlesung zwischen 1910 und 1917

Anthropologisches Museum auf dem Campus Irchelpark

Campus der Universität Zürich-Irchel

https://www.wikipedia.org

Flickr



imposing stairway

By herbstkind
doris hausen + Add Contact

This photo was taken on March 30, 2009 in Fluntern, Gockhausen, ZH, CH, using a Canon EOS 350D Digital.

261 views 12 comments 9 favorites

This photo belongs to

herbstkind's photostream (938)

This photo also appears in

- most interesting (set)
- monocolor (set)
- architecture (set)
- stairs (set)
- symmetry (set)
- zürich 2009 (set)
- stairways (group)
- Symmetry (group)

Tags

architecture • stairs • treppe • uzh • universität • zürich • zurich • schweiz • switzerland • symmetry • symmetrie • architektur • university

Additional info

- Uploaded using Flickr Uploadr 3.0 (Mac)

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Some rights reserved

Comments and faves

hans-martin kudlinski (35 months ago)
seeeeeehr schön. auf den erten blick fragt man sich: was macht die discokugel da? beim genaueren hinschauen klärt sich dann alles auf :)

herbstkind pro (35 months ago)
naja, studenten wollen halt auch party machen und nicht nur studieren... ;)

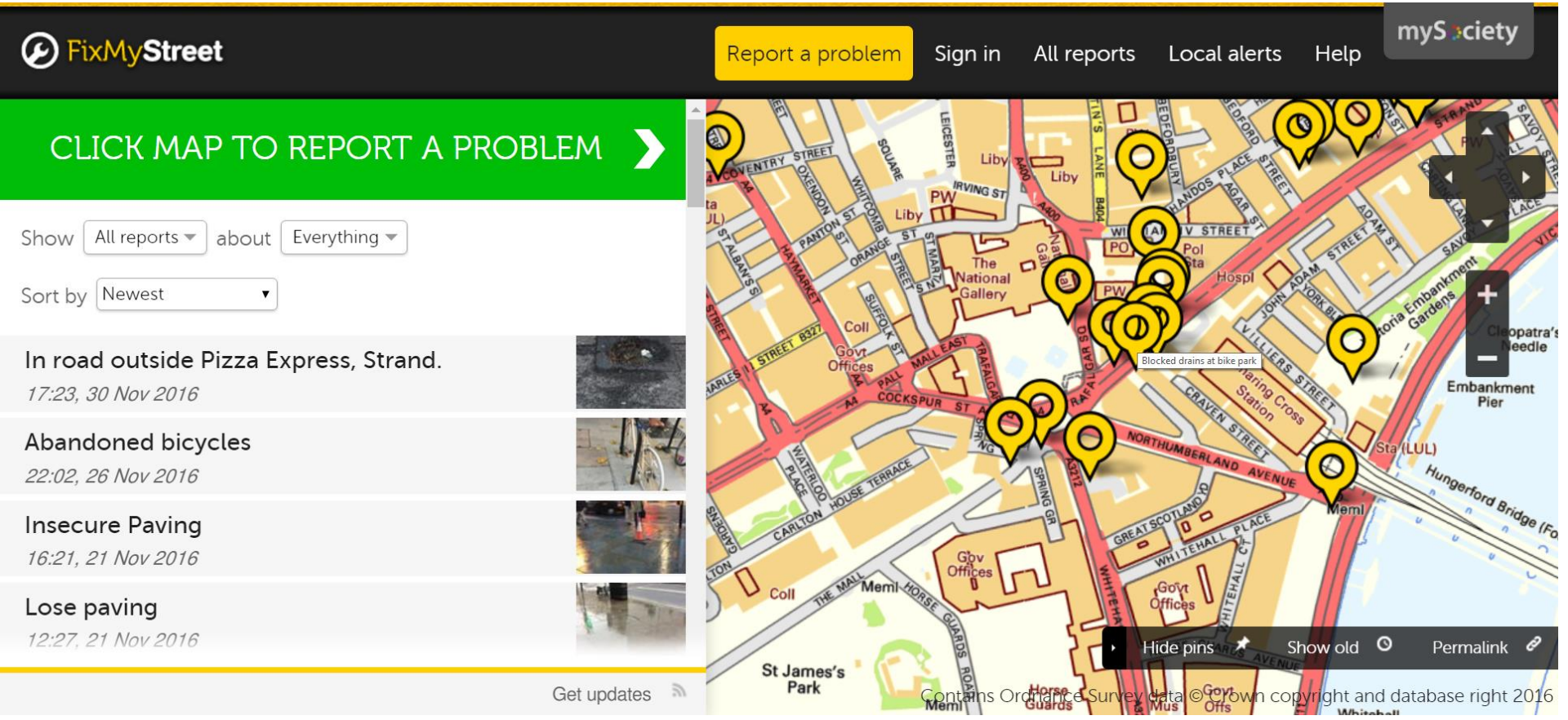
drayde (35 months ago)
Wunderbar!

https://www.flickr.com

Zueriwieneu

https://www.zueriwieneu.ch/

FixMyStreet



https://www.fixmystreet.com

Our examples

	OpenStreetMap	Wikipedia	Flickr	ZueriWieNeu	FixMyStreet
Initiators					
Motivations, demographics and behaviour					
Data produced					
Supporting data					
Data ownership					

Exercise (10 minutes)

- For each of the remaining four previous examples, try to say something about the questions I asked

The importance of definitions

- Volunteered geographic information was the term chosen by Goodchild, but it is **"contested"**
- Other ways of describing such data and data production include:
  - **Web 2.0**
  - **Neogeography**: geography without "formal" geographers
  - **Crowdsourcing**: Use of the internet to collect data or ideas (paid or unpaid)
  - **User generated content**
  - **Citizen science**: scientific research conducted not only by professional scientists (data are often central)

Problems with VGI as a term

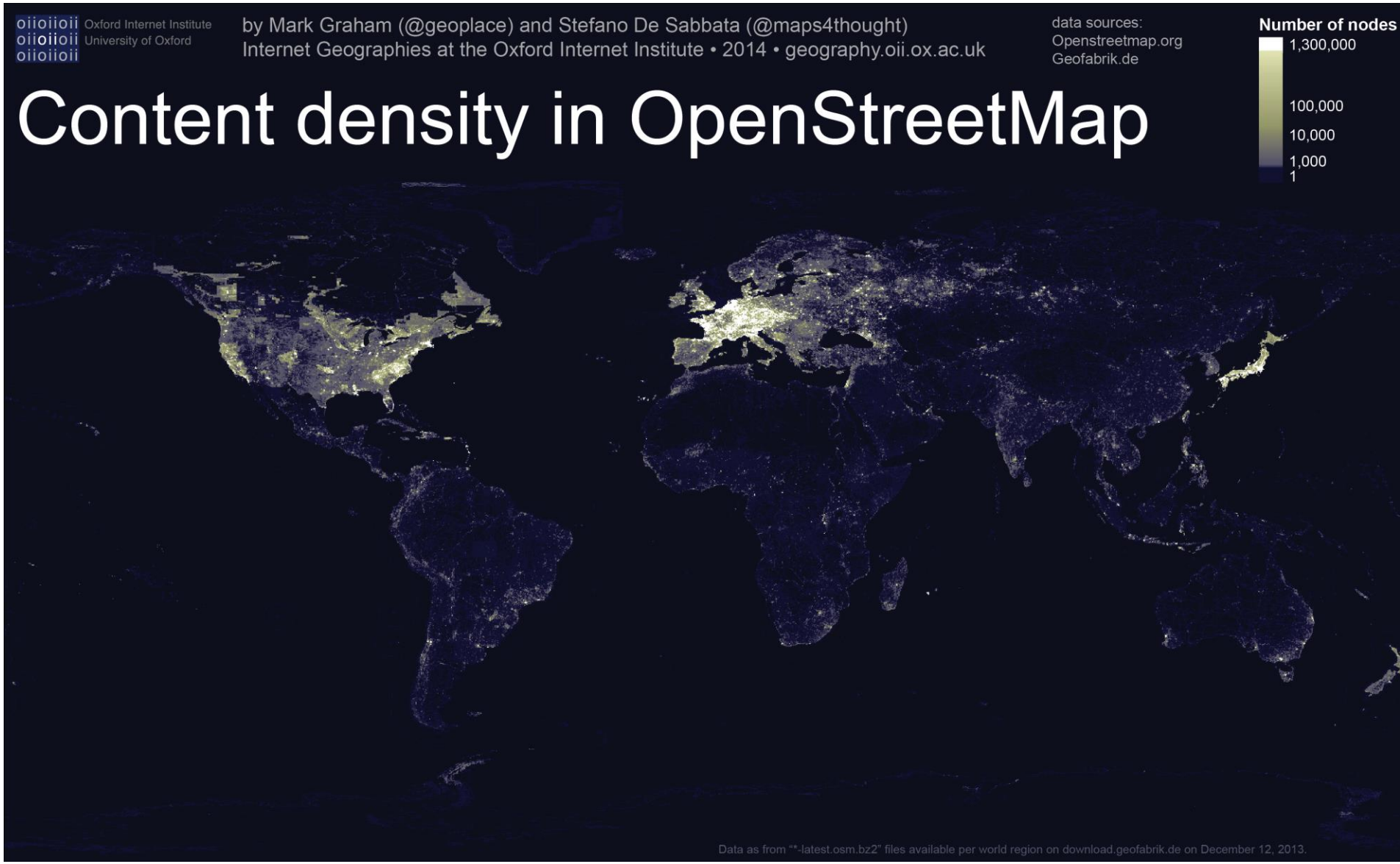
- Many data sources are **not created voluntarily**, or even **knowingly**
- **Volunteering** typically **implies knowing what** you volunteered for
- In many examples of VGI the **geographic component** is either **incidental** (e.g. Flickr images with coordinates) or **implicit** (e.g. through the use of placenames)
- Nonetheless, VGI is a very **commonly used term** – but only in GIScience

Participation and VGI

- Projects such as OSM are dominated by the notion of **participation inequality**
- Basic idea: **90% use the data**, **9% contribute** a **little**, **1% generate most** of the data
- For **Wikipedia** claimed to be **99.8%:0.2%:0.003%** (e.g. a tiny proportion contribute almost everything)
- Participation inequality can be **spatially** (e.g. whole towns by few individuals) or **temporally** (e.g. whole seasons by few individuals) **clustered**
- Very important to consider when analysing such data

Haklay 2016

Spatial participation inequality



Highly cited research on VGI

Flanagin, A. J. et al. (2008) The credibility of volunteered geographic information. GeoJournal.	Quality
Zook, Matthew, et al. (2010) VGI and crowdsourcing disaster relief: a case study of the Haitian earthquake. World Medical & Health Policy.	Application (disasters)
Coleman, D. J., et al. VGI: The nature and motivation of produsers [sic]. International Journal of Spatial Data Infrastructures Research	Participants
Sui, D. et al. (Eds.). (2012). Crowdsourcing geographic knowledge: VGI in theory and practice.	Overview
Elwood, S. (2008). VGI: future research directions motivated by critical, participatory, and feminist GIS. GeoJournal.	Overview
Goodchild, M. F., & Li, L. (2012). Assuring the quality of VGI. Spatial Statistics.	Quality
Zielstra, D., & Zipf, A. (2010). A comparative study of proprietary geodata and volunteered geographic information for Germany. AGILE.	Comparison/ quality
Elwood, S. et al. (2012). Researching volunteered geographic information: Spatial data, geographic research, and new social practice. *Annals of AAG*.	Overview
Haklay, M. et al. (2010). How many volunteers does it take to map an area well? The validity of Linus' law to VGI. *The Cartographic Journal*.	Participants/ quality
Seeger, C. J. (2008). The role of facilitated VGI in the landscape planning and site design process. *GeoJournal*.	Application (planning)
Jiang, B., & Liu, X. (2012). Scaling of geographic space from the perspective of city and field blocks and using volunteered geographic information. *IJGIS*.	Science (scale laws)

Research and VGI

- Many **overview papers**
- A very large number of papers have discussed **VGI quality** and **credibility**
- Papers exploring quality often **compared** VGI with administrative data sources (e.g. the comparisons with OSM we discussed in the data quality lecture)
- **Credibility** focuses on the extent to which both the **content (information) and source** are believable (**trustworthiness** and **expertise** of **contributors**)

Flanagin & Metzger (2008)

Research and VGI (2)

- A whole swathe of papers have focussed on **applications** of VGI
- Amongst the most popular of these are the use of VGI in dealing with the aftermath of **natural disasters**
- Other applied research has explored the use of VGI in areas such as **planning and landscape assessment**
- One question that can always be asked is are the data being used to **learn something new** or **repeat an existing task?**

Using VGI for science

- I'm going to focus on work done in Zurich
- We're particularly interested in using **new sources of data** to **explore how people understand the geographic world** around them
- We thus see VGI as a **complementary data source** to address some of the questions Flurina posed last week

Recall: Definition of a category

'A category exists whenever two or more distinguishable objects or events are treated equivalently'

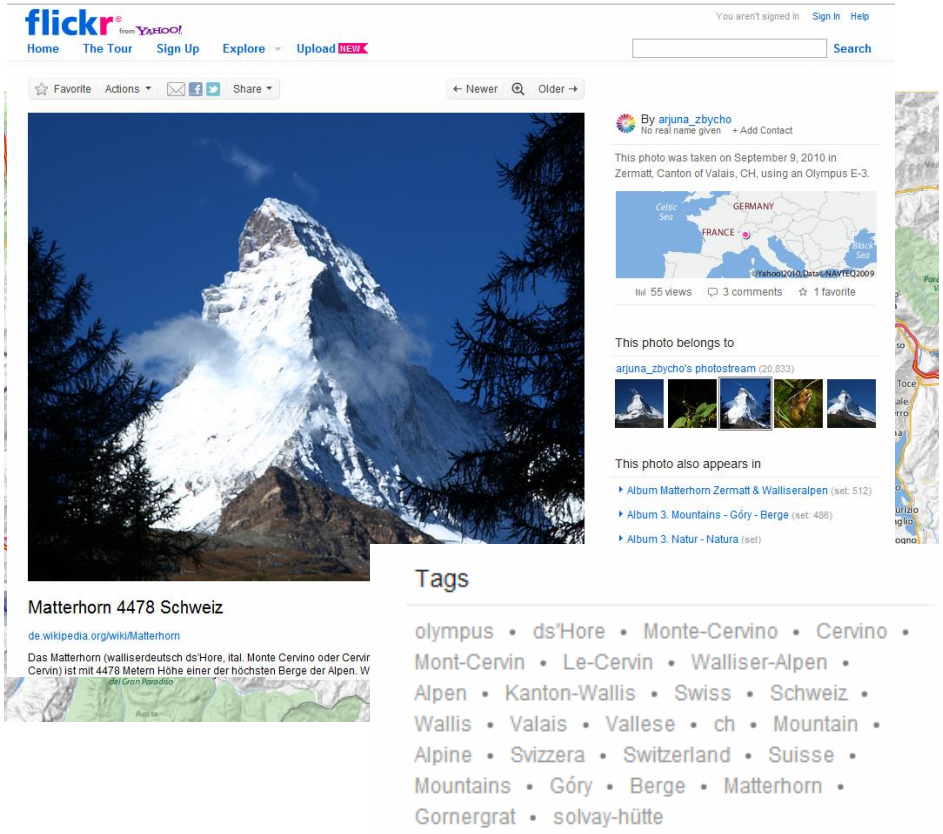
(Mervis & Rosch 1981, p. 89)

chair

chair

Using VGI to explore categories

- Flickr captures information related to categories in the **tags** users choose
- We also have information about **who** took an image, **when,** and sometimes **where**
- In the following, I'll show how such data can help us answer questions similar to those Flurina asked last week



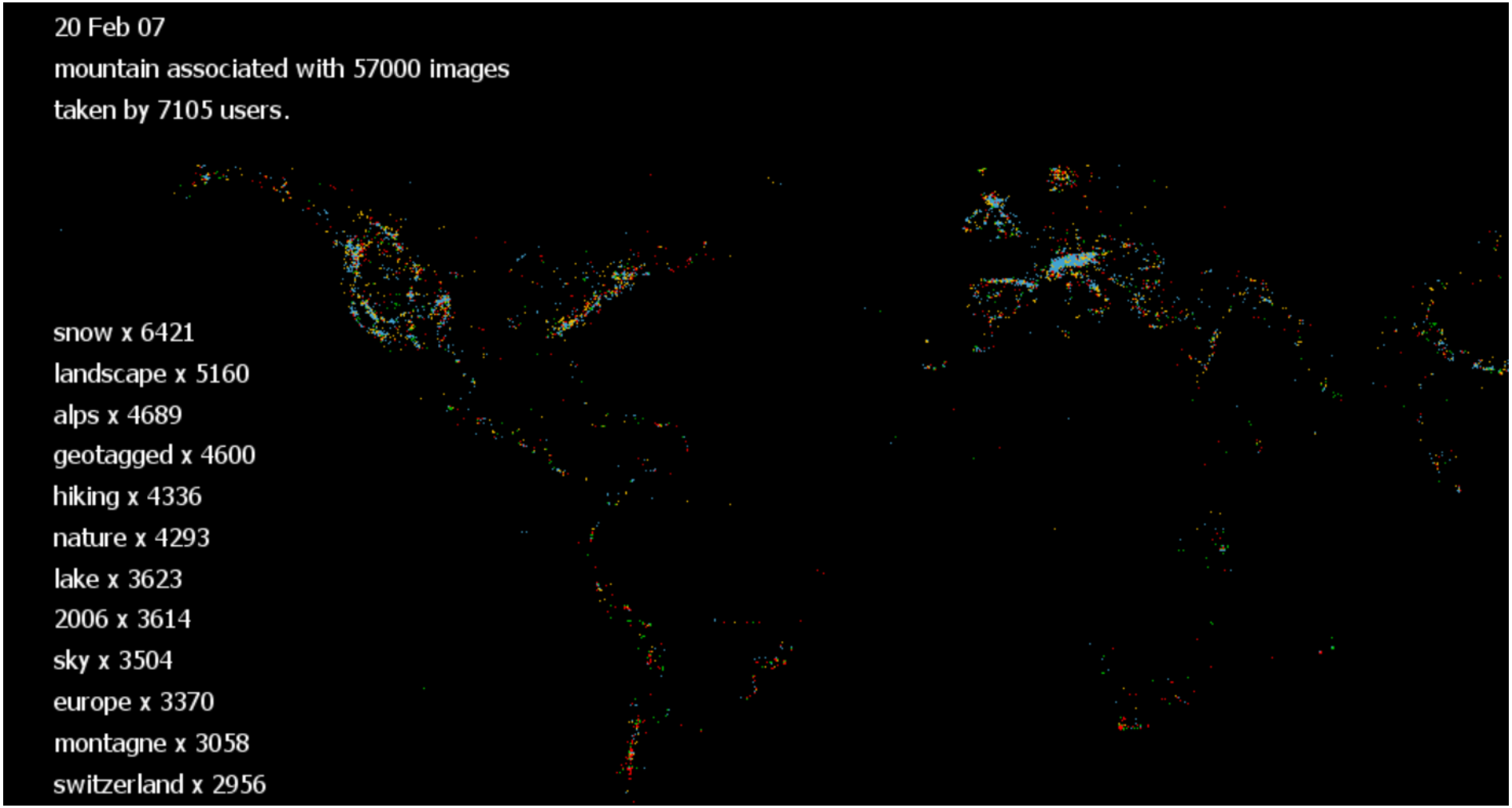
Write down five words you associate with this picture

Image Javier Corripio

Some theory from information science

Modes / Facets	Specific Of	Generic Of	About
Who?	Individually named persons, animals, things	Kinds of persons, animals, things	Mythical beings, abstraction manifested or symbolised by objects or beings
What?	Individually named events	Actions, conditions	Emotions, Abstractions manifested by actions
Where?	**Individually named geographic locations**	**Kind of place geographic or architectural**	Places symbolised, abstractions manifest by locale
When?	Linear time; dates or periods	Cyclical time; seasons, time of day	Emotions or abstraction symbolised by or manifest by

Panofsky-Shatford facet matrix – Shatford (1986)


20 Feb 07
mountain associated with 57000 images
taken by 7105 users.
snow x 6421
landscape x 5160
alps x 4689
geotagged x 4600
hiking x 4336
nature x 4293
lake x 3623
2006 x 3614
sky x 3504
europe x 3370
montagne x 3058
switzerland x 2956

Empirical studies on vernacular regions

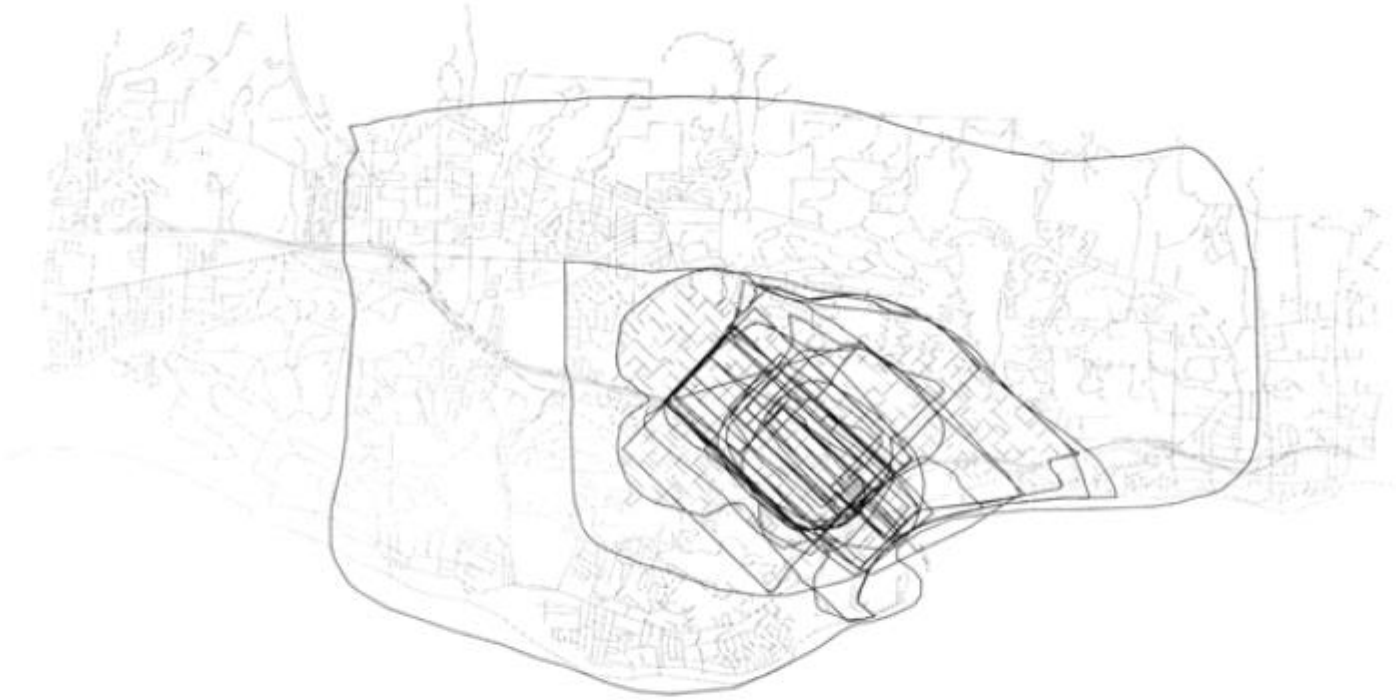
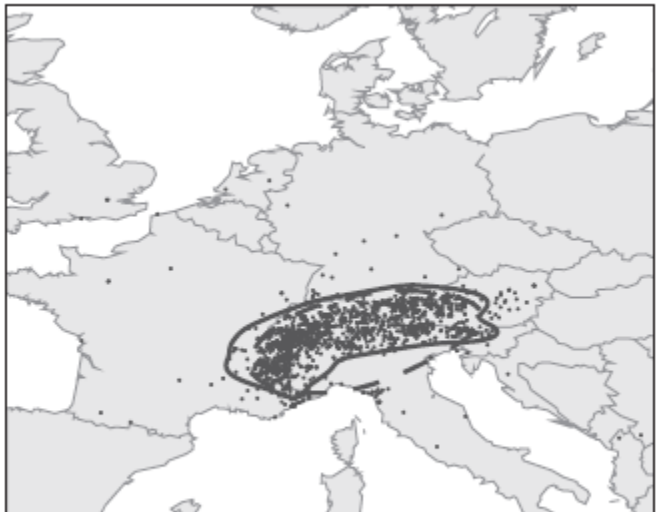


Figure 2. Raw-data polygons for each participant's default concept of downtown Santa Barbara.

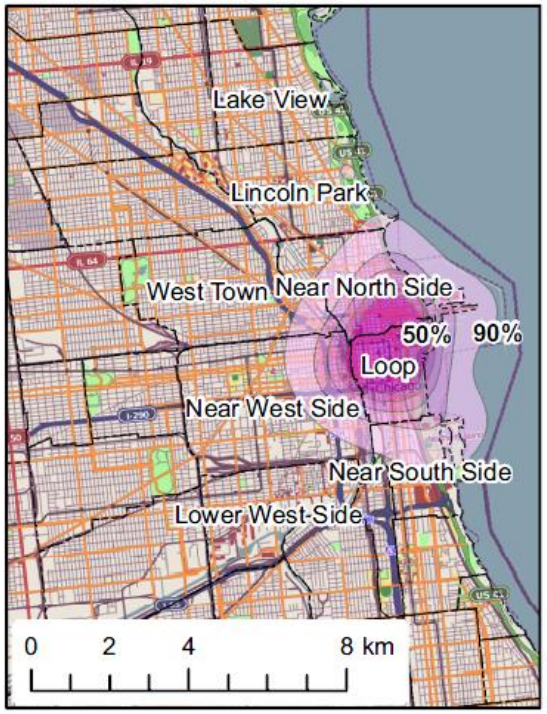
Montello et al., 2003

VGI and vernacular regions

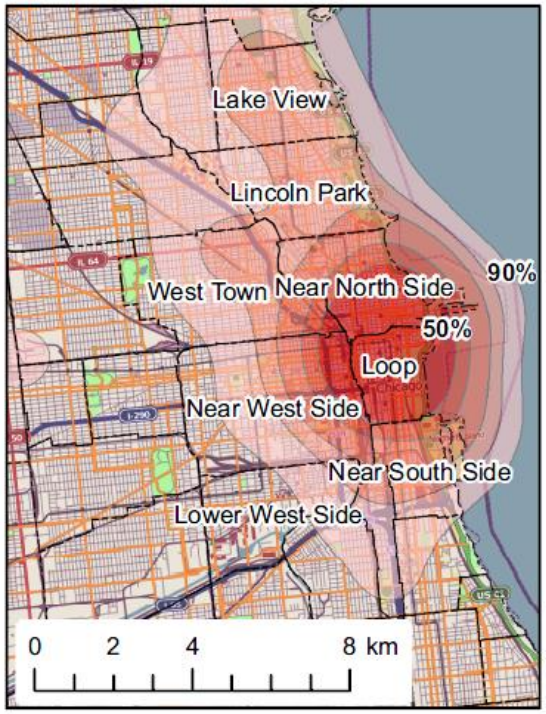
- Montello et al.'s work demonstrated that although different people conceptualised Downtown Santa Barbara differently, there was **sufficient consensus** to build a **shared model**
- **Placenames** are common tags used to describe images – and **vernacular and vague placenames** are often used
- If sufficient data are available, it is possible to **derive regions** based on VGI
- Unlike empirical studies, such an approach is (in principle) **easily scalable to many regions**



The Loop



Downtown

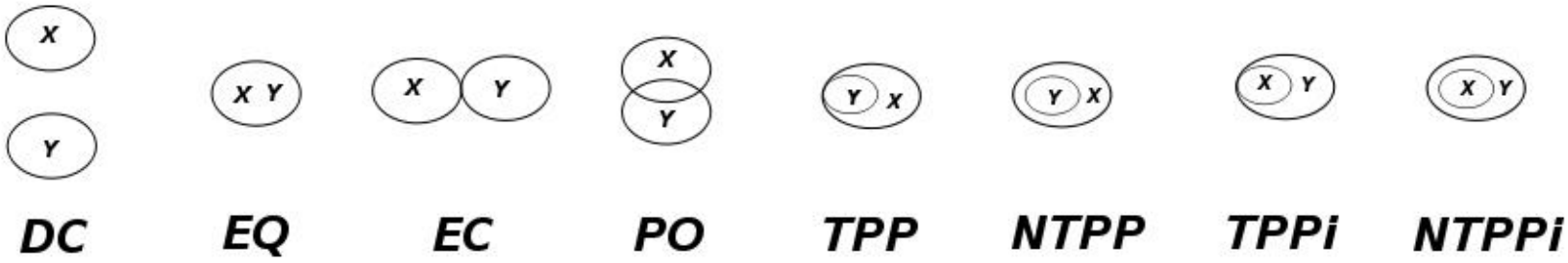


City

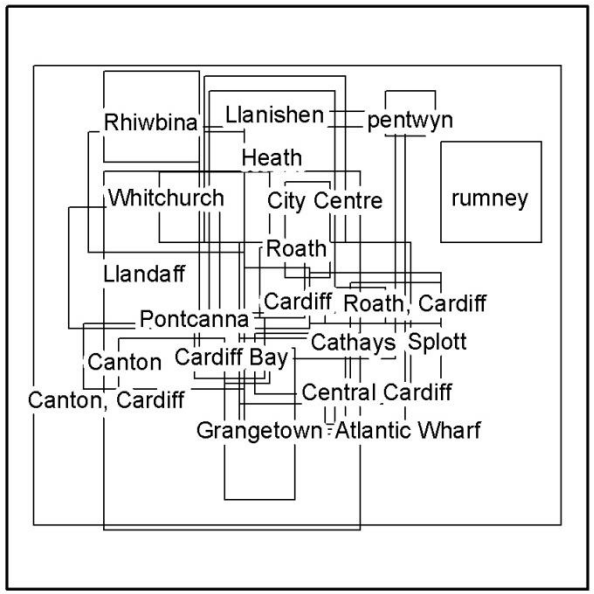
Grothe and Schaab, 2009; Hollenstein and Purves, 2010

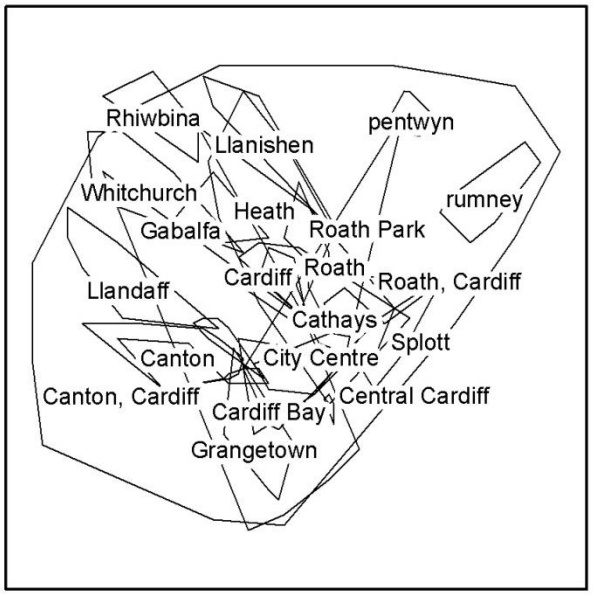
Exploring spatial relationships

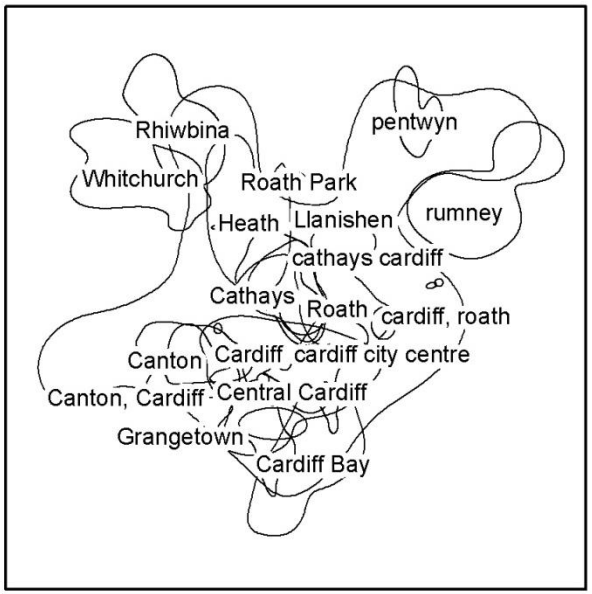
- The following results used VGI from a **classified advertising website** to derive regions
- The regions themselves are **allowed to overlap**, and are estimated using similar methods to those previously shown
- Here, we are more interested in the **spatial relationships between regions**, than their borders



Qualitative spatial relationships

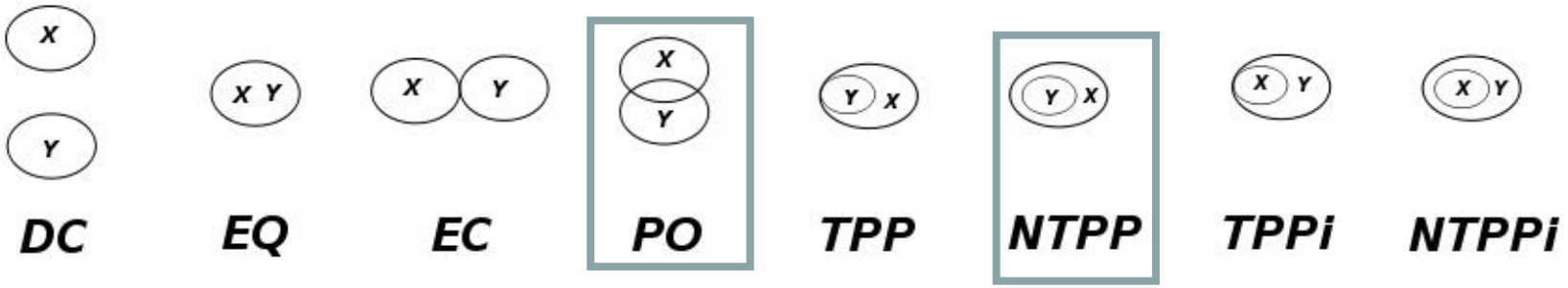






Regions derived (using different representations) for data mined from Gumtree in Cardiff

Twaroch et al., 2009



Qualitative spatial relationships

Placename	Cardiff Bay	Canton	Cathays	Roath	Cardiff	Rumney
Cardiff Bay	EQ	PO	PO	PO	PO	DC
Canton	PO	EQ	PO	PO	NTPP	DC
Cathays	PO	PO	EQ	PO	NTPP	DC
Roath	PO	PO	PO	EQ	NTPP	DC
Cardiff	PO	NTPPi	NTPPi	NTPPi	EQ	NTTPi
Rumney	DC	DC	DC	DC	NTPP	EQ

Rumney is in Cardiff **Cardiff Bay is near Canton**

Twaroch et al., 2009

VGI and placenames

- These results demonstrated the utility of VGI for exploring the **specific of/ where** facet of our matrix
- I show two aspects – how we can **derive regions** associated with placenames, and **explore the relationships** between placenames
- I didn't discuss how we go about **identifying candidate names** – this is an additional, and challenging research problem

VGI and geographic categories

- Geographic categories were traditionally explored by **elicitation experiments**
- We looked at how **similar the terms** used in describing VGI were
- Used rich data source from the UK (Geograph)

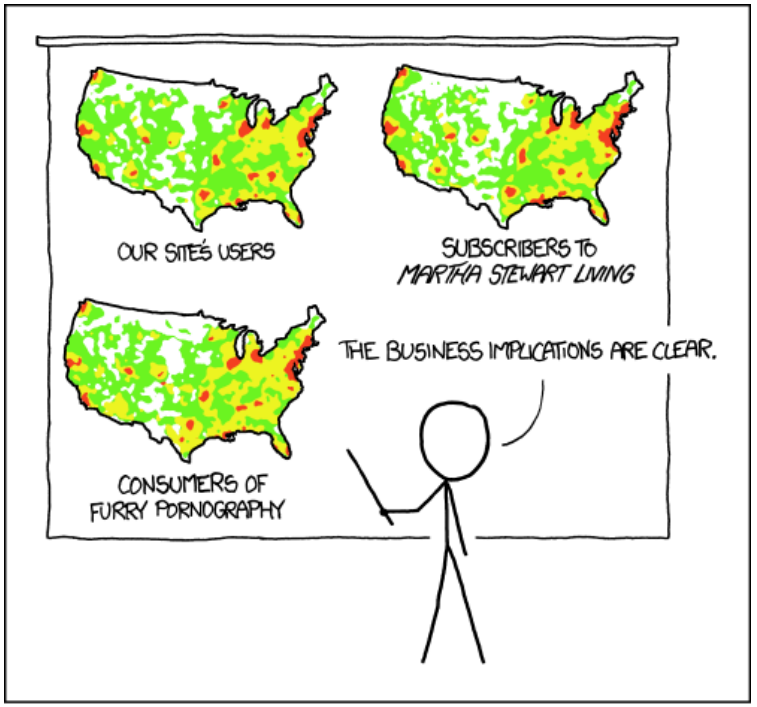
Battig & Montague	Smith & Mark	Geograph
Mountain	Mountain	Road
Hill	River	Hill
Valley	Lake	River
River	Ocean	Village
Rock	Valley	Building
Lake	Hill	Park
Canyon	Plain	Street
Cliff	Plateau	Valley
Ocean	Desert	Field
Cave	Volcano	Loch
	Sea	Land
	Island	Town
	Peninsula	Forest
	Forest	Map
	Stream	Sea
	Delta	Woodland
	Country	Tree
	Land	Beach
	City	Country
	Continent	Glen

Top ranked terms from Battig and Montague (1969), Smith and Mark (2001) and this work (Geograph).

Edwardes & Purves, 2007

Exploring use of categories in space using VGI

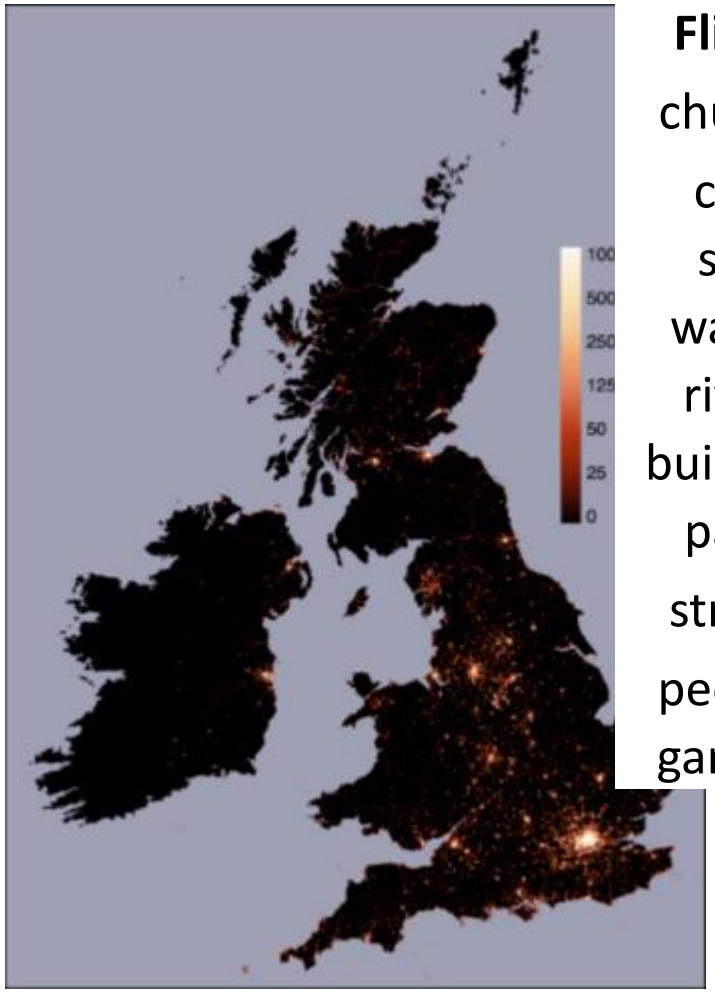
- The previous results replicated previous work
- However, because of the data volume and spatial coverage (c.f. our 800000 mountain images) we **can explore patterns in space**
- I'll show two examples of such work – but don't forget this cartoon!!



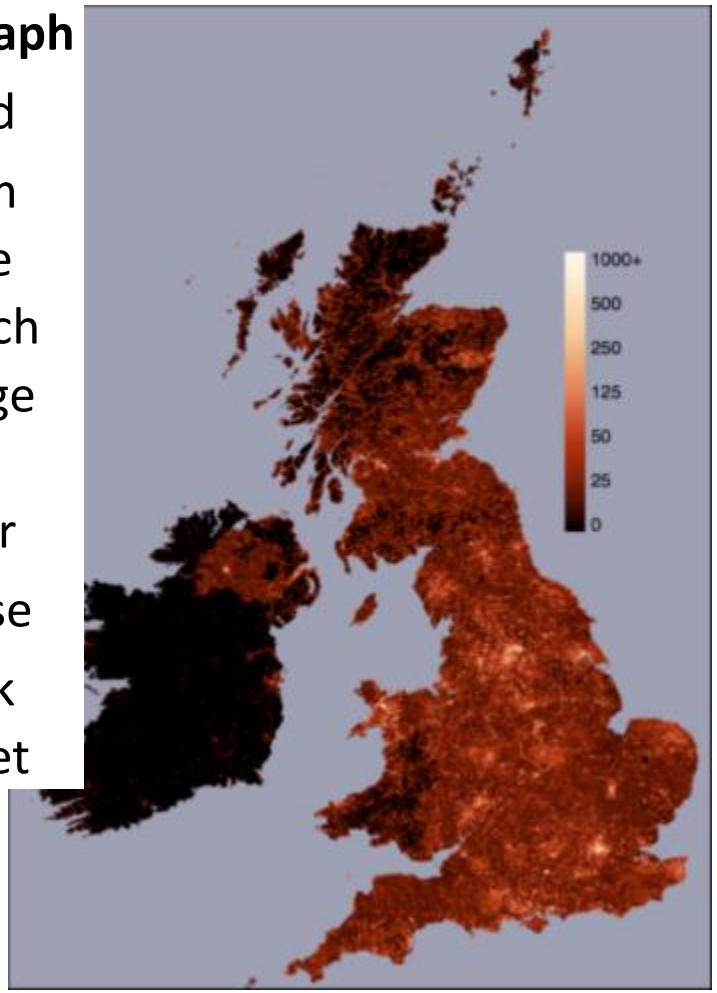
PET PEEVE #208:
GEOGRAPHIC PROFILE MAPS WHICH ARE BASICALLY JUST POPULATION MAPS

https://xkcd.com/1138/

Comparing collections in space



Flickr	Geograph
church	road
city	farm
sky	lane
water	church
river	bridge
building	hill
park	river
street	house
people	park
garden	street



~800000 Flickr images

~900000 Geograph images

Note the implications for frequencies of individual terms

Co-occurence

These tables show terms which **commonly occur together** (e.g. Happy Birthday)

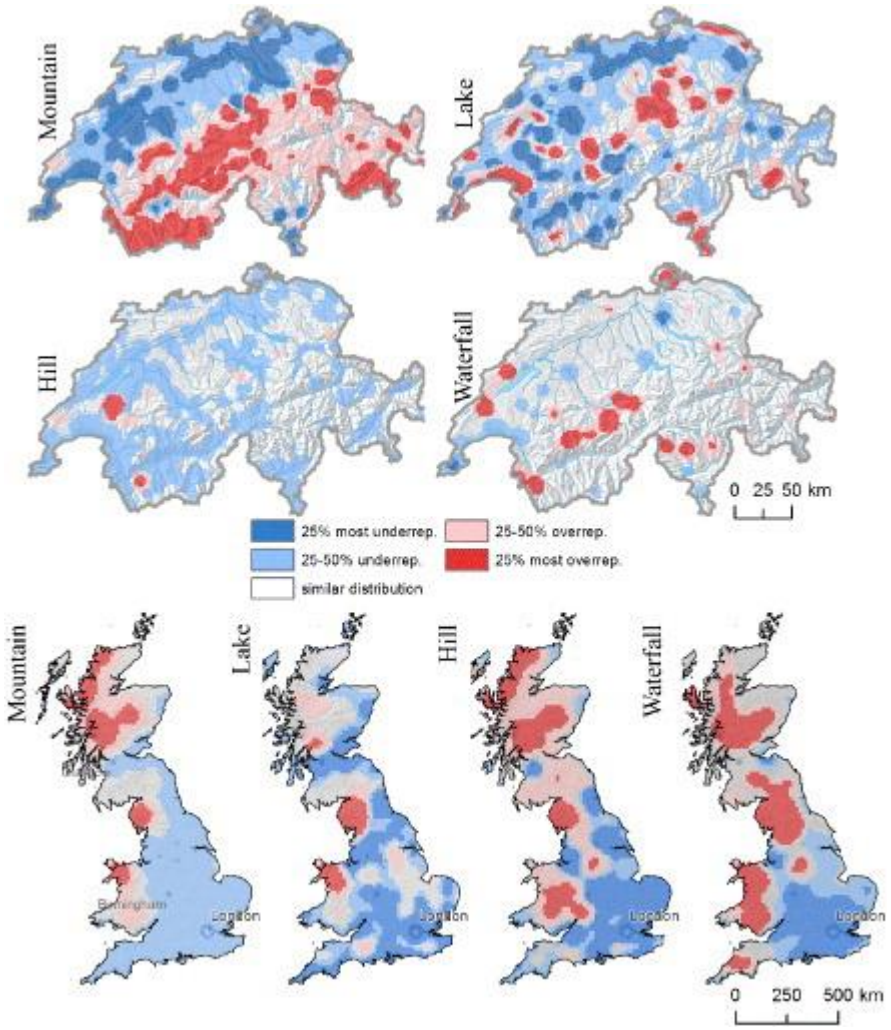
Beach		n=2824
Activities	**Elements**	**Qualities**
Surfing	Shingle	Sandy
Bathing	Sand	Deserted
Defence	Cliff	Eroded
Swimming	Headland	Soft
Tourism	Bay	Rocky
Wading	Sea	Warm
Protection	Rock	Glacial
Sport	Coast	Low
Shipping	Shore	Beautiful
Golf	Island	

Hill		n=16232
Activities	**Elements**	**Qualities**
Climbing	Fort	Steep
Skiing	Top	Distant
Holidays	Summit	Wooded
Observation	Horizon	Black
Sitting	Ridge	Rough
Walking	Sheep	Grassy
Running	Valley	Round
Cycling	Side	Big
Preservation	Trees	White
Escape	Track	Broad

Edwardes and Purves, 2007

Exploring geographic categories in space

- These figures show **geographic categories in space** not as raw frequencies, but as so-called χ-maps
- These show the proportion of images as **function of the underlying distribution**



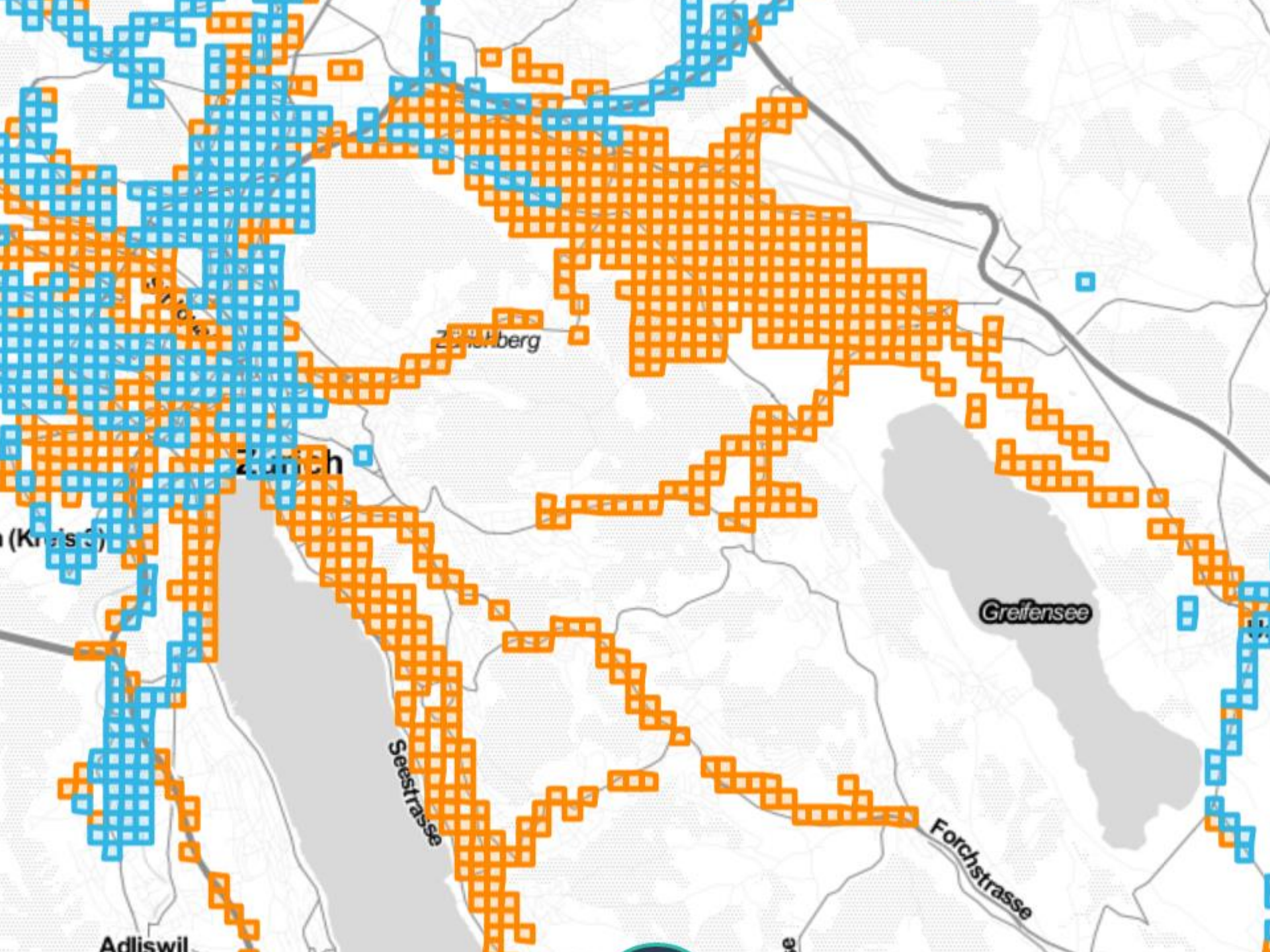
Purves & Derungs, 2015

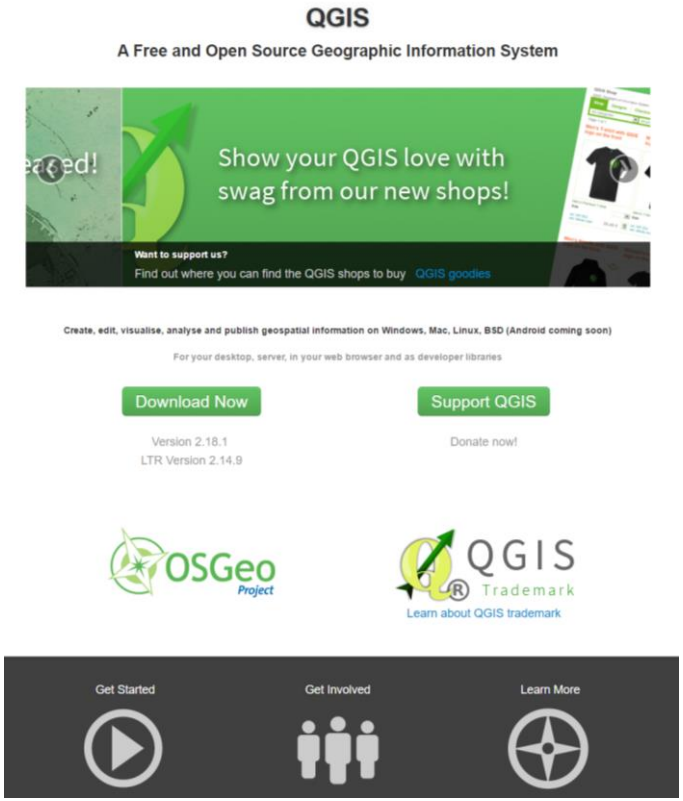
Categories in the wild

- The work I have shown you so far uses VGI to **explore categories**
- It was motivated by a desire to move elicitation experiments from the lecture theatre to the real world
- However, we still use data over which we have **limited control** (these were created for a different purpose, which we don't know about)
- How about **simply asking people what categories are where**?

Location-based game

- Manuel Bär is currently carrying out a **Masters thesis** exploring these ideas
- Manuel's aims are to "develop, implement, assess and analyse a real time tile-based location-based game with continuous gameplay, including narrative as well as competitive elements, focussing on geographic information mining."
- Key elements:
  - Game play required physical presence at tiles
  - Game has two teams and is based around a story
- To date, **6236** tiles have been captured
- You can play too: register at starborn.ch


Zürich
Greifensee
Seestrasse
Forchstrasse
Adliswil



Source: https://en.wikipedia.org/wiki/Web_2.0#/media/File:Web_2.0_Map.svg

Source: https://opendata.ch

Exercise

For the data release last week by the SBB, and based on what we have covered in the lecture, consider how VGI could be collected and analysed for a societally or scientifically interesting purpose, and think about:

- Initiators of the project
- Motivations, demographics and behaviour of contributors
- Nature of the data produced
- Use of supporting data (in this case the SBB real-time data)
- Ownership of the data produced

Summary

- I introduced some **key definitions** and the forces driving VGI
- Although the term is arguably poor, the **phenomena is incredibly important** for **modern geographic information**
- Has important **societal** and **scientific implications**
- When working with and studying VGI, it is important to do so **critically and carefully**

Next week

- We’re finished the lecture part of the course
- This afternoon you will present your posters, and by Thursday you will submit your reports on OLAT: https://lms.uzh.ch/url/RepositoryEntry/16159736105
- On 06.01.2017 at 1015 I will answer your questions about the course
- Please submit any questions you have through the OLAT forum
- You are also welcome to come and find me in my office

Some useful references

Goodchild, M. F. (2007). Citizens as sensors: the world of volunteered geography. *GeoJournal*, *69*(4), 211-221.

Flanagin, A. J., & Metzger, M. J. (2008). The credibility of volunteered geographic information. *GeoJournal*, *72*(3-4), 137-148.

Capineri et al. 2016. European Handbook of Crowdsourced Information

Purves, R. S., & Derungs, C. (2015). From Space to Place: Place-Based Explorations of Text. *International Journal of Humanities and Arts Computing*, *9*(1), 74-94.