# We need a more ethical dissemination of geographic information data and products

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**PUBLIC PROTECTION AND ETHICAL GEOSPATIAL DATA DISSEMINATION**
**AN INITIATIVE OF GEOIDE (PROJECT IV-23)**

# Outline

- *The talk in short*:

  The GIS world changed and is changing even more rapidly…

  …but software vendors and data producers did not change their practices as fast.

  This situation possibly creates more ethical problems …

  …but changes to professional practices could be adopted to make them more ethical

# A simplified view of GIS history

| | Phases | Users |
|---|---|---|
| 1960s | Pioneers | System developer |
| 1970s | Early adopters | |
| 1980s | Expansion | |
| 1990s | Democratization? | Expert user |
| 2000s | Neogeography | |
| 2010s | Real democratization? | My grand-mother |

# The new geospatial landscape

More data collected (e.g. earth observation, LiDAR, sensor networks, VGI)

+

More data made available (e.g. SDI/Data clearinghouse, Web services, mashups) and increasingly used in mobile devices

+

More, and more diverse, users and usages

=

**Possibility of more accidents, losses of money, time and lives due to data/map errors and misuses**

# Misuses likely to increase with new geolocation technologies

# Frequent accidents related to the (mis)use of geographic information

FILED UNDER GPS

## GPS coordinates lead demolition crew to destroy wrong house

By Paul Miller posted Jun 13th 2009 3:35PM

Tired of blaming GPS on petty mishaps like the destruction of cars, a demolition crew in Georgia has managed to accidentally destroy an entirely wrong house based on GPS coordinates. Oddly enough, it wasn't even the first time they'd been by: the man who cuts the grass noticed that the power box was missing from the home and holes were punched into the walls about a month ago -- it was suspected as vandalism, but it now seems that the stealthy, directionless demolition company was to blame. The demolition company says it had "paperwork" authorizing the destruction, complete with the coordinates and a description of the home, which the owner's father had built with his own hands "brick by brick."

[Thanks, Leonard]

## Driver follows GPS onto pedestrian walkway, into cherry tree

By Joshua Topolsky posted Jul 21st 2007 5:15PM

In another example of the evils of computer navigation, a 37-year-old trucker followed his GPS directions to their totally illogical conclusion when he drove his truck down a pedestrian walkway and wedged the delivery vehicle into a cherry tree. The driver, who was looking for a factory to drop off his cargo, blindly followed the female voice of his navigation system, apparently ignoring several no-entry signs and turning onto the walkway in broad daylight. The motorist then attempted to reverse out, damaging two lamp posts, a hedge, and of course the cherry tree, which Swiss workers later had to take a chainsaw to. The tucker was fined 650 Swiss francs (about $540), and his GPS was given a firmware update and a copy of Google Maps.

[Thanks, pork_musket]

World

# Wrong map leads to Timor border skirmish

October 10 1999 at 05:31PM

Get IOL on your mobile at m.iol.co.za

Dili, East Timor - Confusion over the exact location of the border between the two halves of Timor island triggered a clash involving a United Nations interven said on Sunday.

"The incident occurred 500m insid according to a 1992 Indonesian m The Indonesians were using a 19 which showed the village to be ins said on condition of anonymity.

Asked whether the contact had bee Indonesian security forces, he sai say."

Interfet earlier said that the clash o travelling near the border came un militias. It said two militiamen mig

Continues Below ↓

# Google map part of Central America dispute

***Last Updated: Monday, November 8, 2010 | 12:04 PM ET*** Comments14Recommend14

CBC News

*Costa Rica alleges Nicaraguan soldiers, shown here near the San Juan River on Nov. 4, recently crossed over into Costa Rica. However, Nicaraguan commander Eden Pastora told the Costa Rican newspaper La Nacion on Nov. 2 that a Google map shows that Nicaraguan troops were on their own side of the border. (Bismar Picado/La Prensa/Reuters)*

A Google map cited by Nicaragua after an alleged military incursion into Costa Rica had an error in it that is being fixed, Google says.

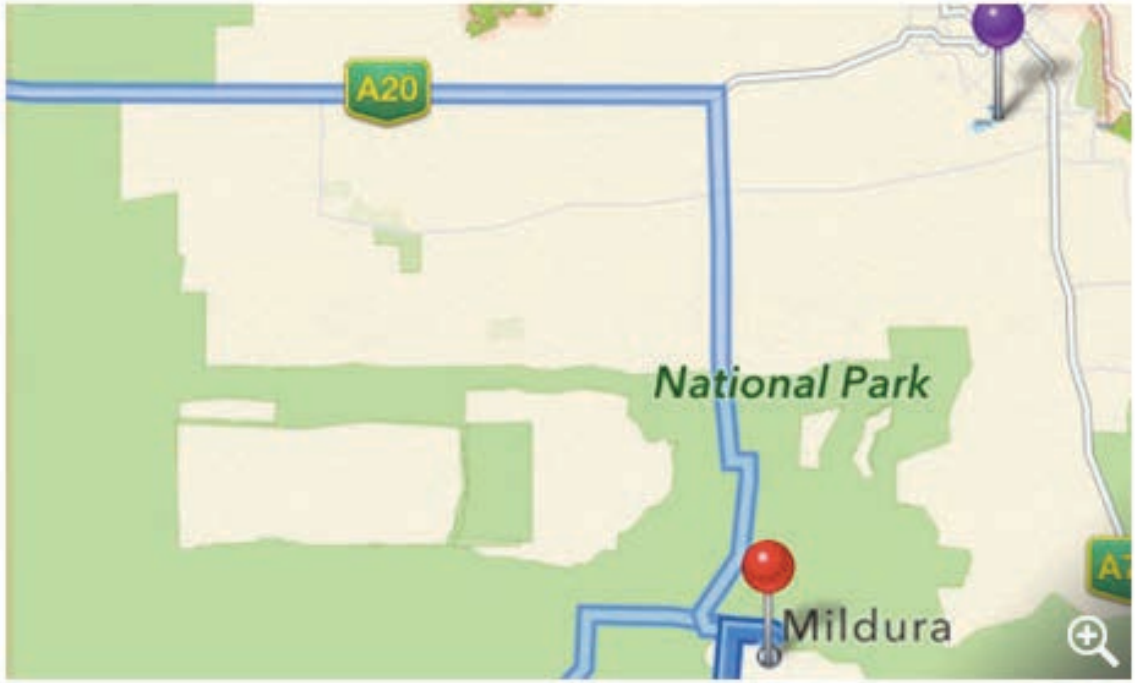
# Apple redraws maps after Australian drivers led astray in the bush

## Mildura police issue warning after motorists lose way in scorching temperatures because town misplaced on Apple Maps

**Charles Arthur**

guardian.co.uk, Monday 10 December 2012 08.02 GMT

Jump to comments (157)




Apple Maps: the red pin shows where the map service has marked Mildura. The purple pin shows the actual location of the town. Photograph: Google Maps

# Can GIS can be “dangerous” ?

- A famous court decision in the US described charts as **dangerous products** as they are not only used for simple reading but could also lead to action - "product in a defective condition unreasonably dangerous to the user" (Brocklesby v. United States & Jeppesen and Co., 1985)

# Dangerous products





?

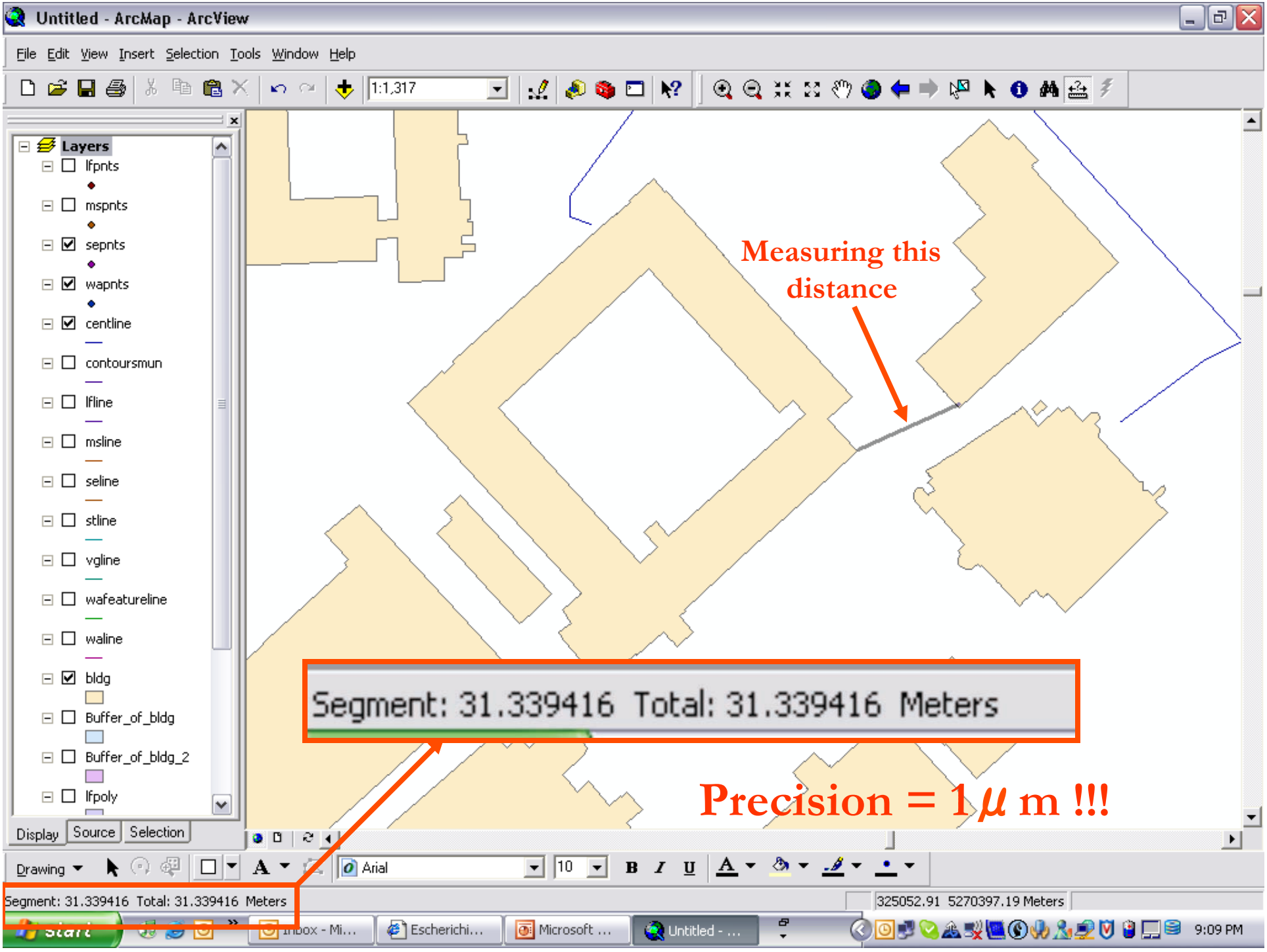
# Safe products can also be dangerous in some contexts

# Experts know how to safely handle dangerous products

Should this be the geospatial (r)evolution?

# Simple geospatial applications have hidden complexities

- "The power and imperfections of emerging GIS technology invite misuse" (Goodchild and Kemp, 1992)
  - Reinforced with more recent geospatial applications
- Modern geospatial applications have an underlying complexity that can require an expert understanding to be used properly
- Even simple geospatial applications (e.g. Google Map) can require understanding complex concepts to be used without risk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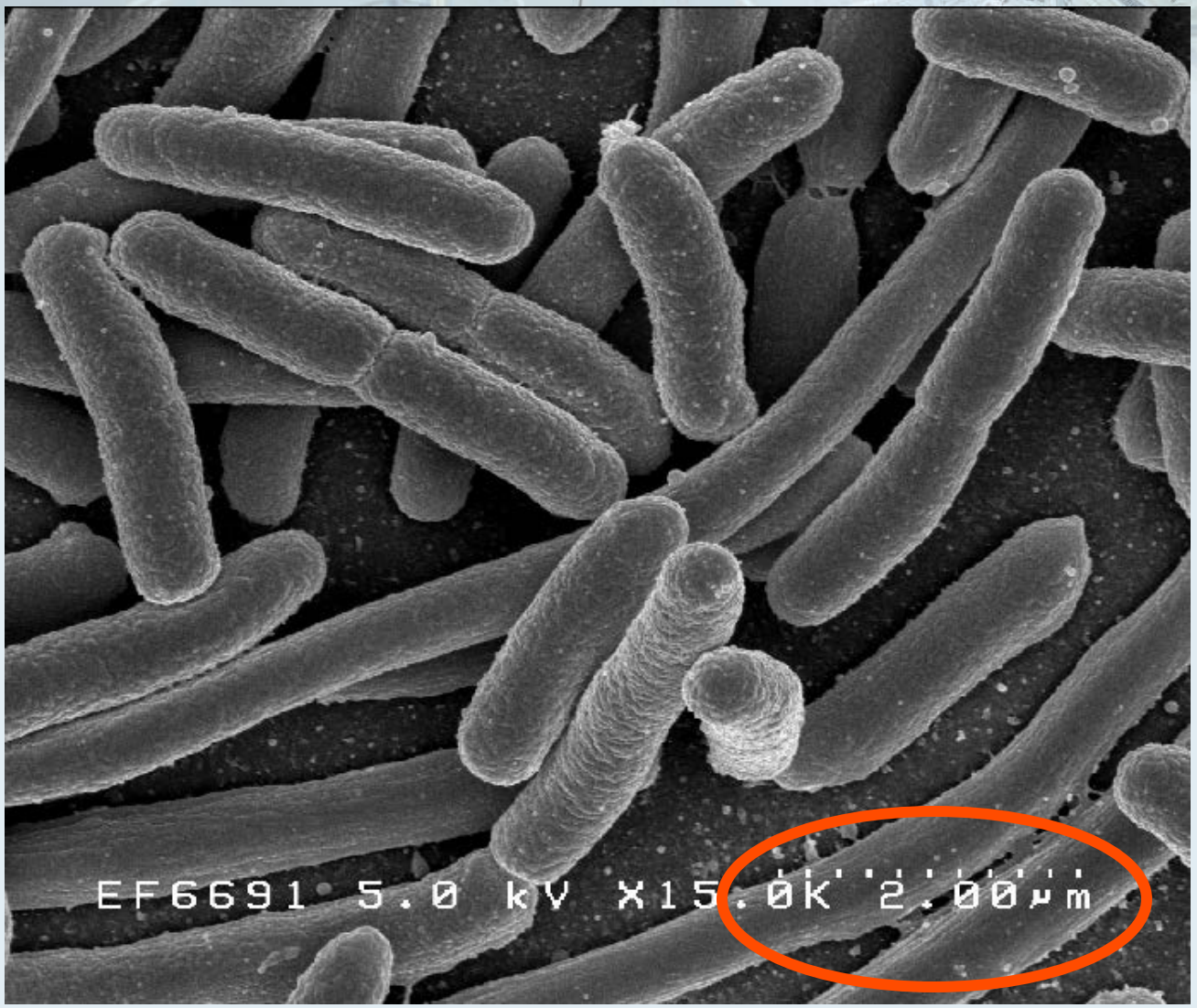
# Are we misleading users on the results they can expect ?




*Escherichia coli*

# How did data producers and software vendors adapt?

While well-established methods exist for data producers to measure the quality of the data…

… producers too rarely do it (expensive, time consuming)

While international standards exist for describing and storing metadata that could inform users…

… only few geospatial applications allow this or looked for alternatives to metadata

While a large literature proposed methods to visualize/communicate data quality in GIS…

… software vendors do not use any (not a priority)

# What users do not always understand

- Accident implying geographic information indicate that map/GIS users often do not understand that:
  - Data can be **out of date** (e.g. Canadian topographic maps are on average 30 years old)
  - Data can be **incomplete** (by accident, or by design)
  - Data can be **inaccurate** (e.g. topographic maps often around 10-20 meters accuracy and generalized)
  - Data may not **represent** the world as they would like to see it (different abstractions/models)
  - **Analysis** (e.g. shortest route) based on imperfect data can in turn be imperfect
  - Etc.

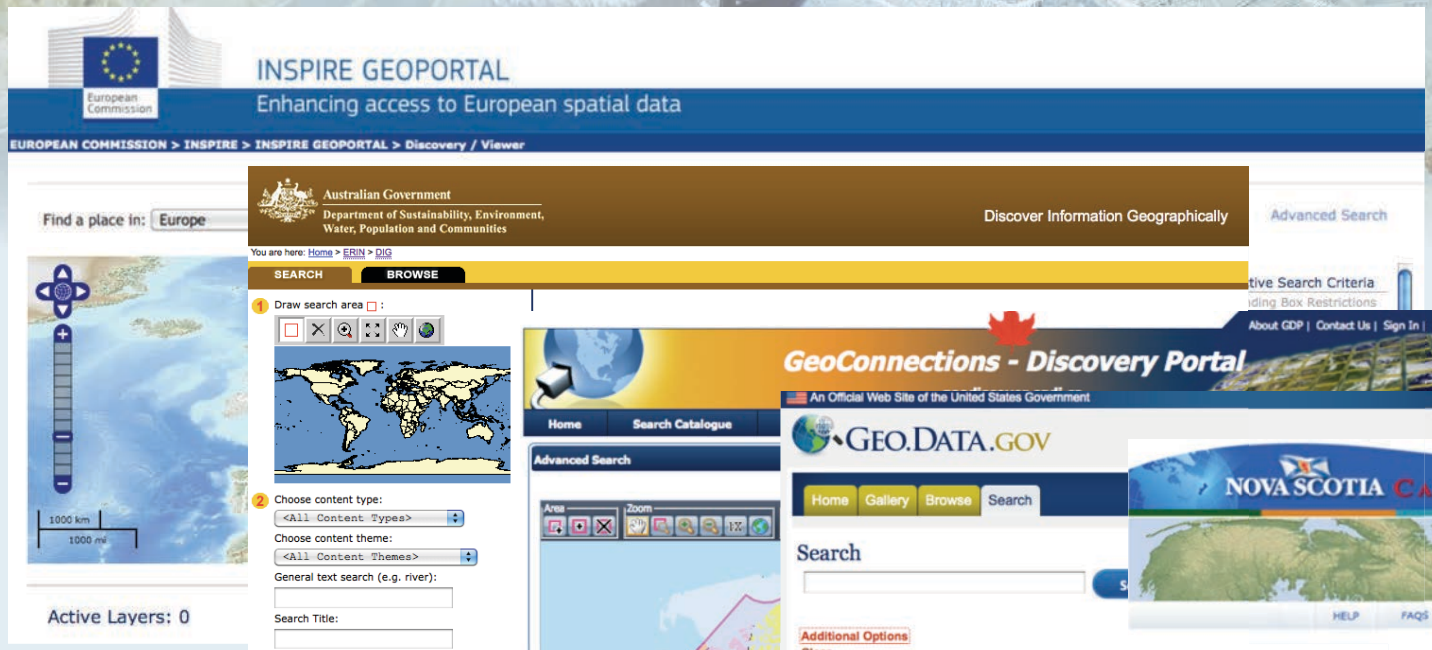
# We need new ways of protecting the public!

- We should increase our efforts to:
  - **help users access** the right **data** for the task at hand
  - **inform users of the quality** of the data **and** potential **risks** of misuse
  - **avoid misleading users** by providing precise (but inaccurate) measurements
  - **act like professionals** with the duty to protect our clients (e.g. codes of ethics of engineers, doctors, lawyers)
  - Etc.

# Being more explicit in GIS Codes of ethics?

- GIS Certification Institute (GISCI) code of ethics
  - Obligations to Society
    - Do the best work possible
    - Contribute to the community
    - Speak out about issues
  - Obligations to Employers and Funders
  - Obligations to Colleagues and the Profession
  - Obligation in Individuals in Society
- No clear statement/mandate to protect customers

# Geospatial clearinghouses / Geoportals




Europe

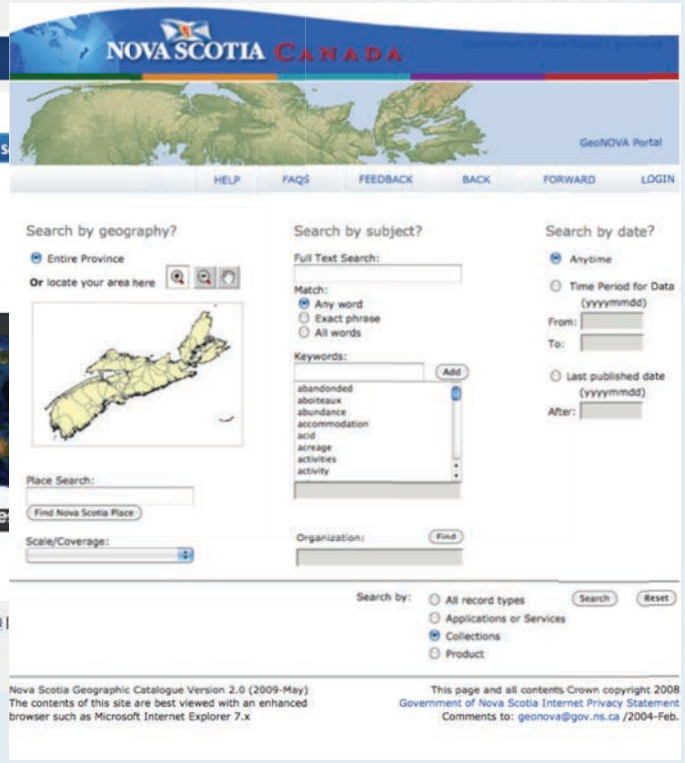



Australia


Canada

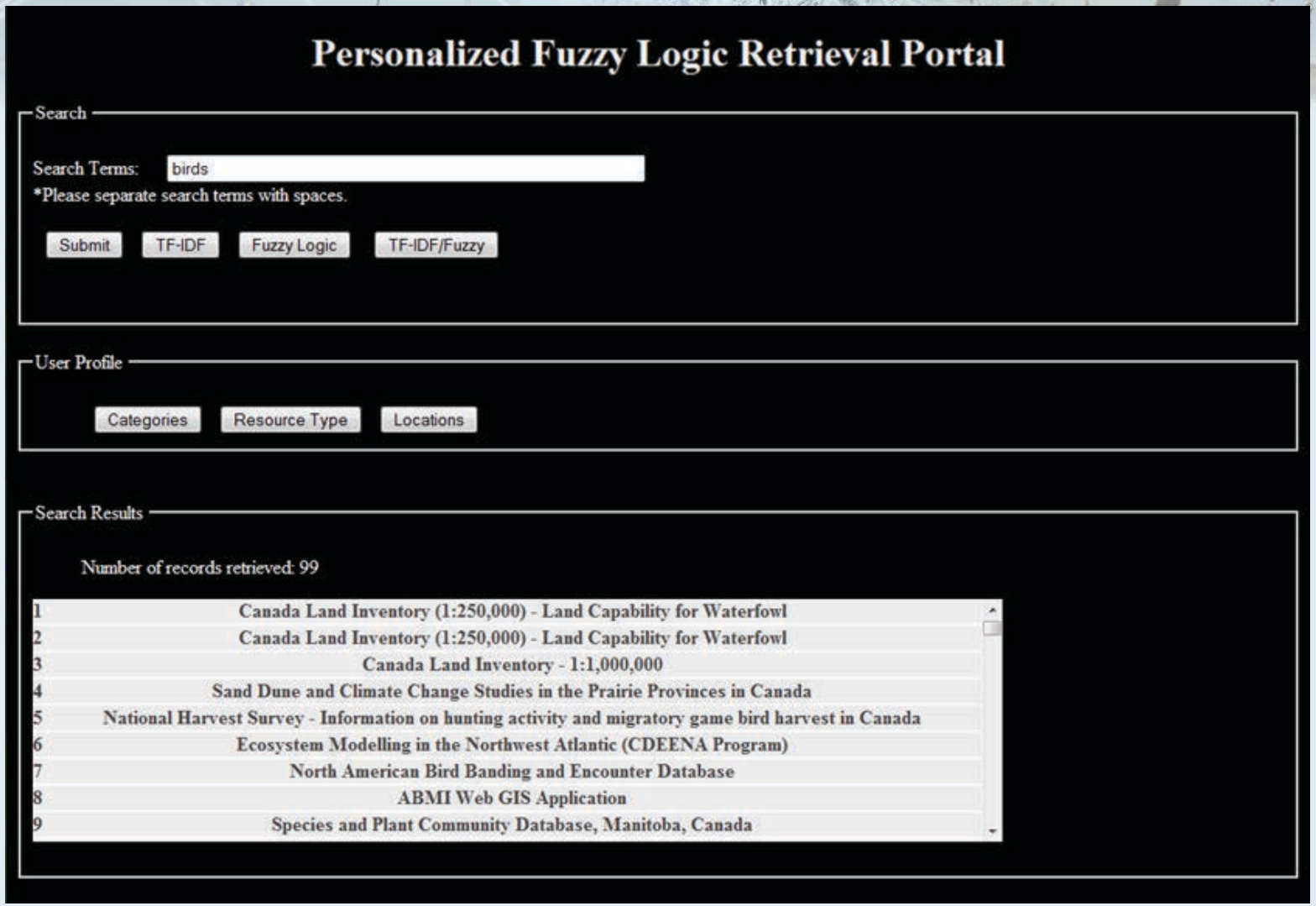



USA




Nova Scotia (Canada)

# Tested ways to help users select more suitable geospatial data



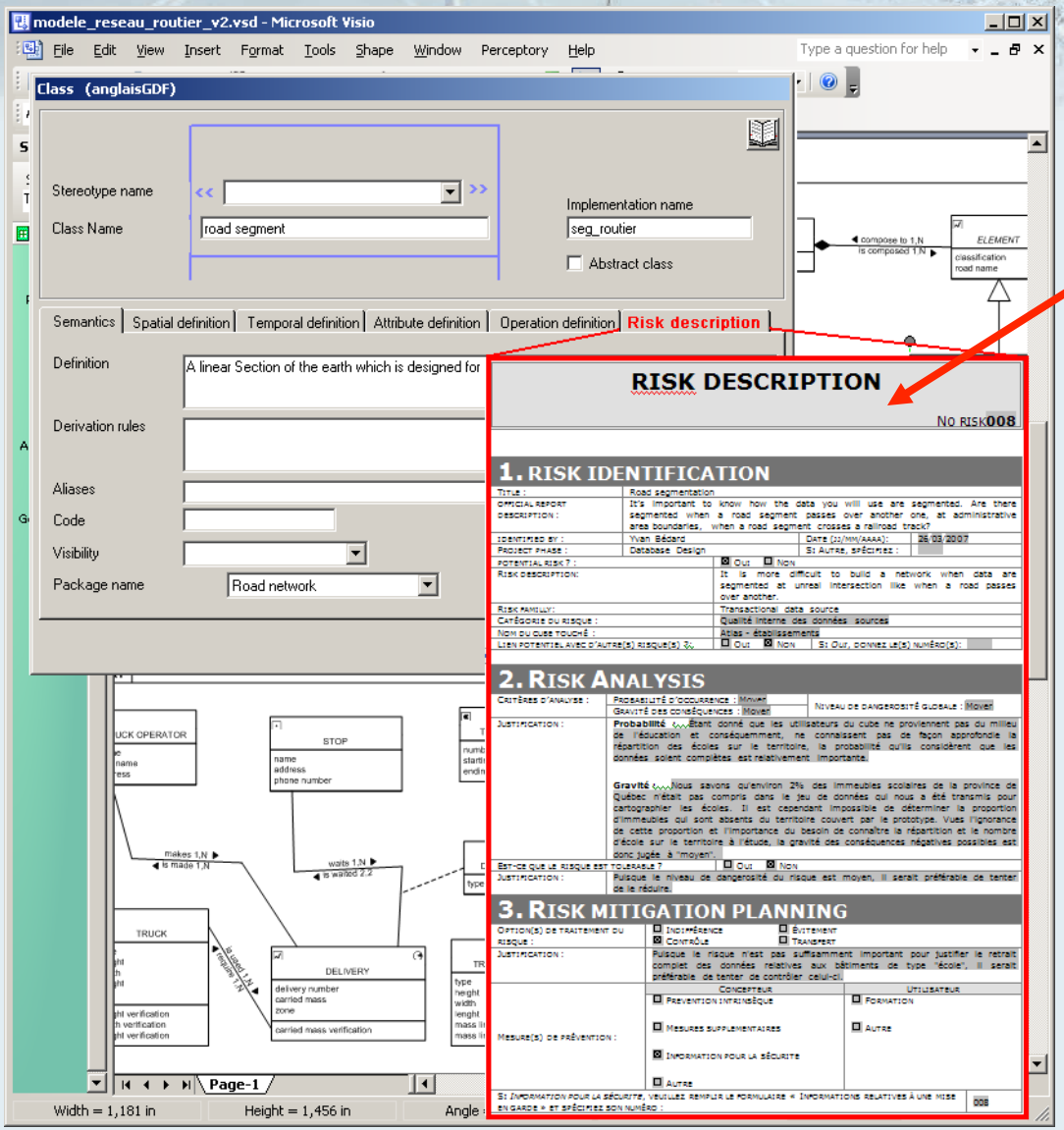

Search criteria

**User profile**

Search results

(Wilson *et al.*, 2013)

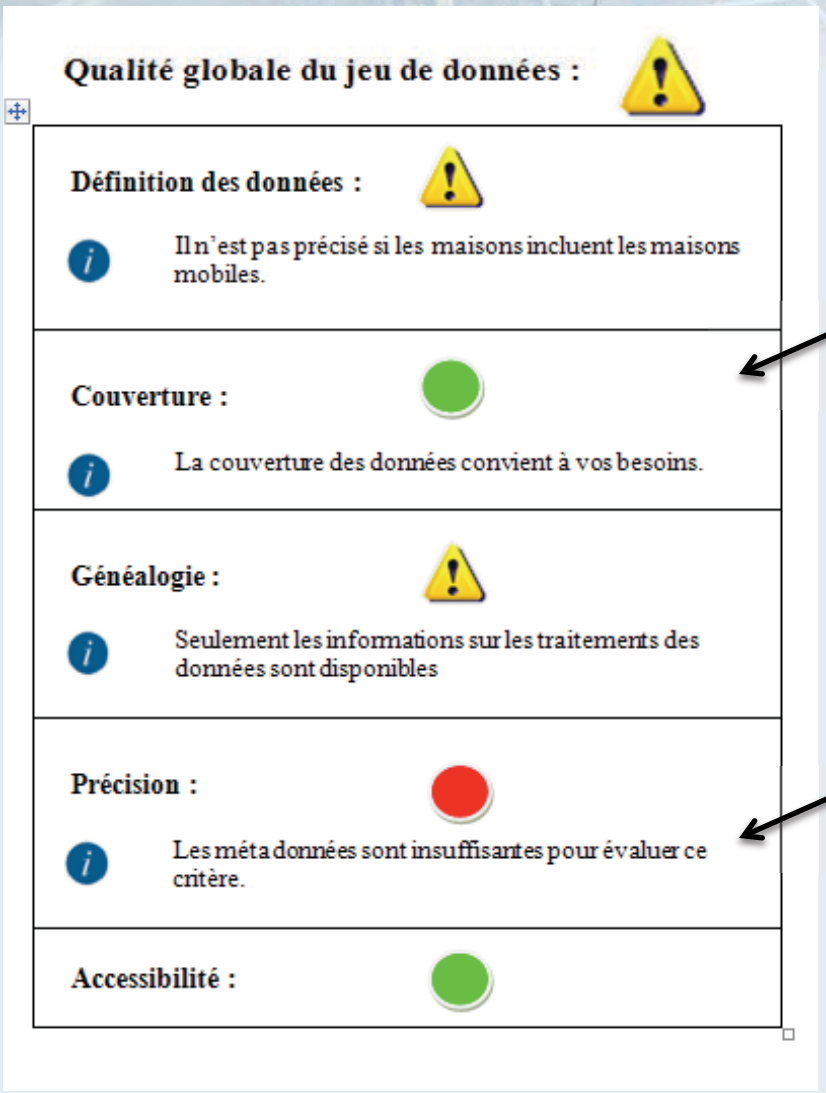
# Starting at the data production stage…




Adding metadata on possible risks in database modeling tools

(Levesque *et al.*, 2007)

# … to provide users with recommendations

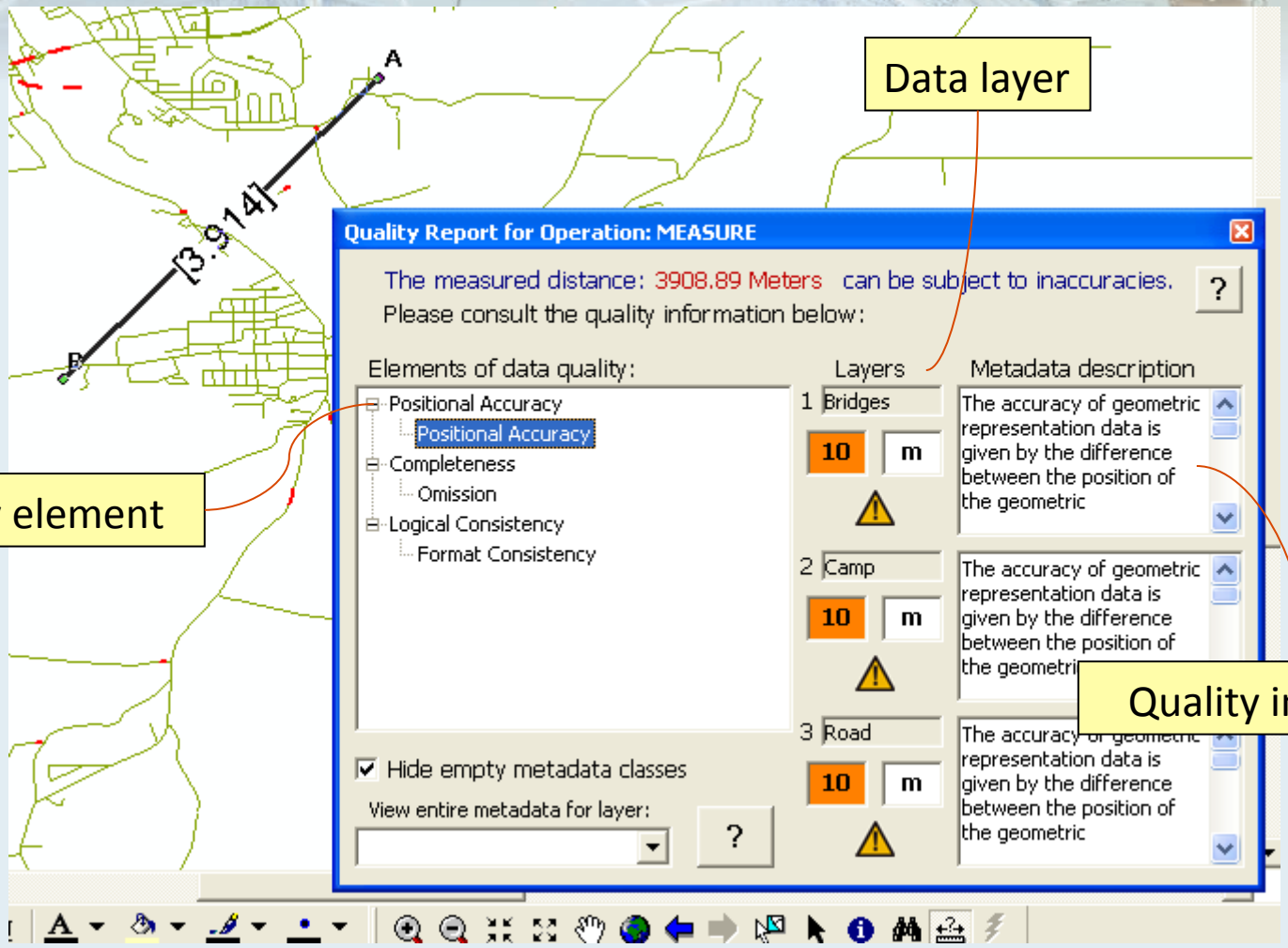



Data coverage fits users' needs

Metadata are not sufficient to assess spatial accuracy

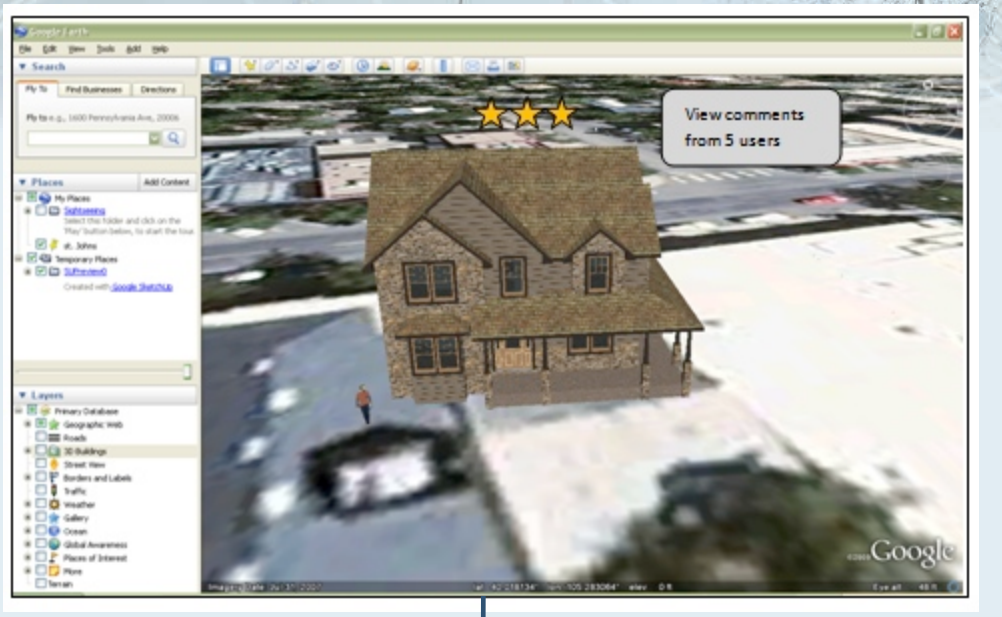
(Bédard *et al.*, 2012)

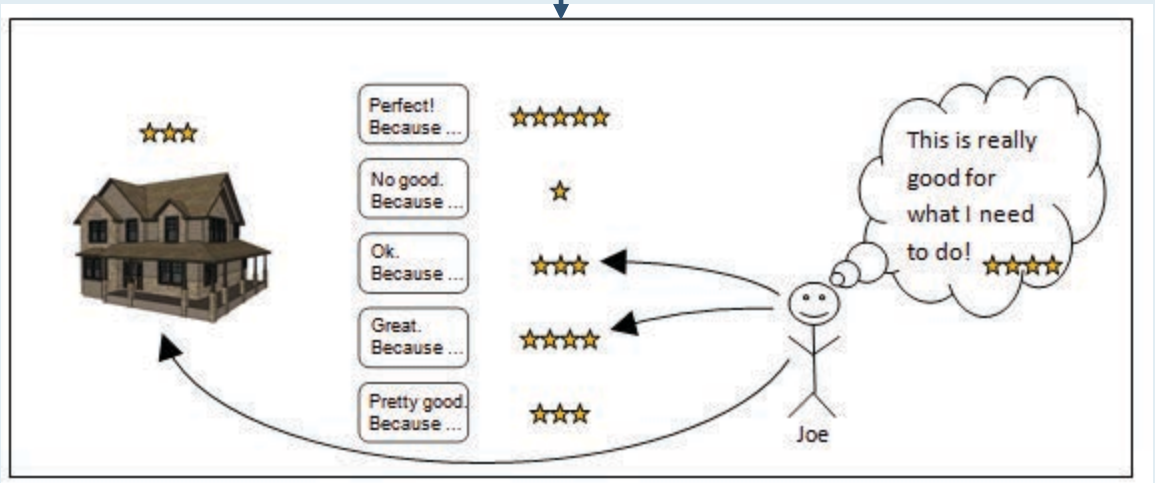
# Aiming for Quality-Aware GIS




(Zargar *et al.*, 2009)

# Better communicating the quality of user-generated geographic information




(Jones *et al.*, 2013)

# Conclusions / Recommendations

- GIS software and data producers should:
  - Feel more concerned about their **ethical responsibility** to protect the users of their products
  - Adopt more **consumer protection** approaches
  - **Help users** find the best available data
  - **Provide tools** to document and communicate potential risks that could arise from using their products/data
- The professional and academic communities should more clearly include the **protection of customers** in their codes of ethics/conduct

# Thank you – questions?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