

Open Data Access from the Public's Perspective

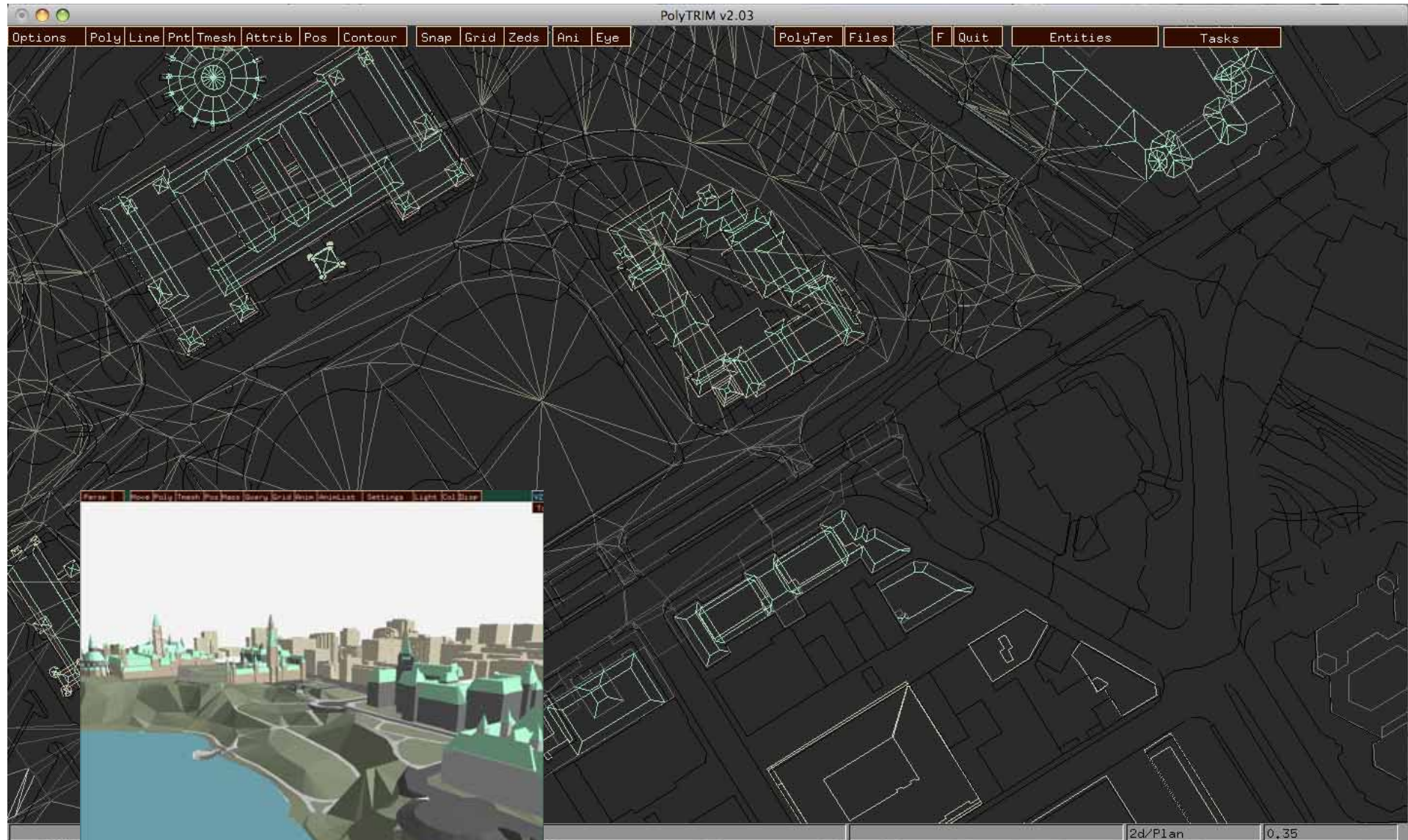
By Stephen Bohus

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Abstract

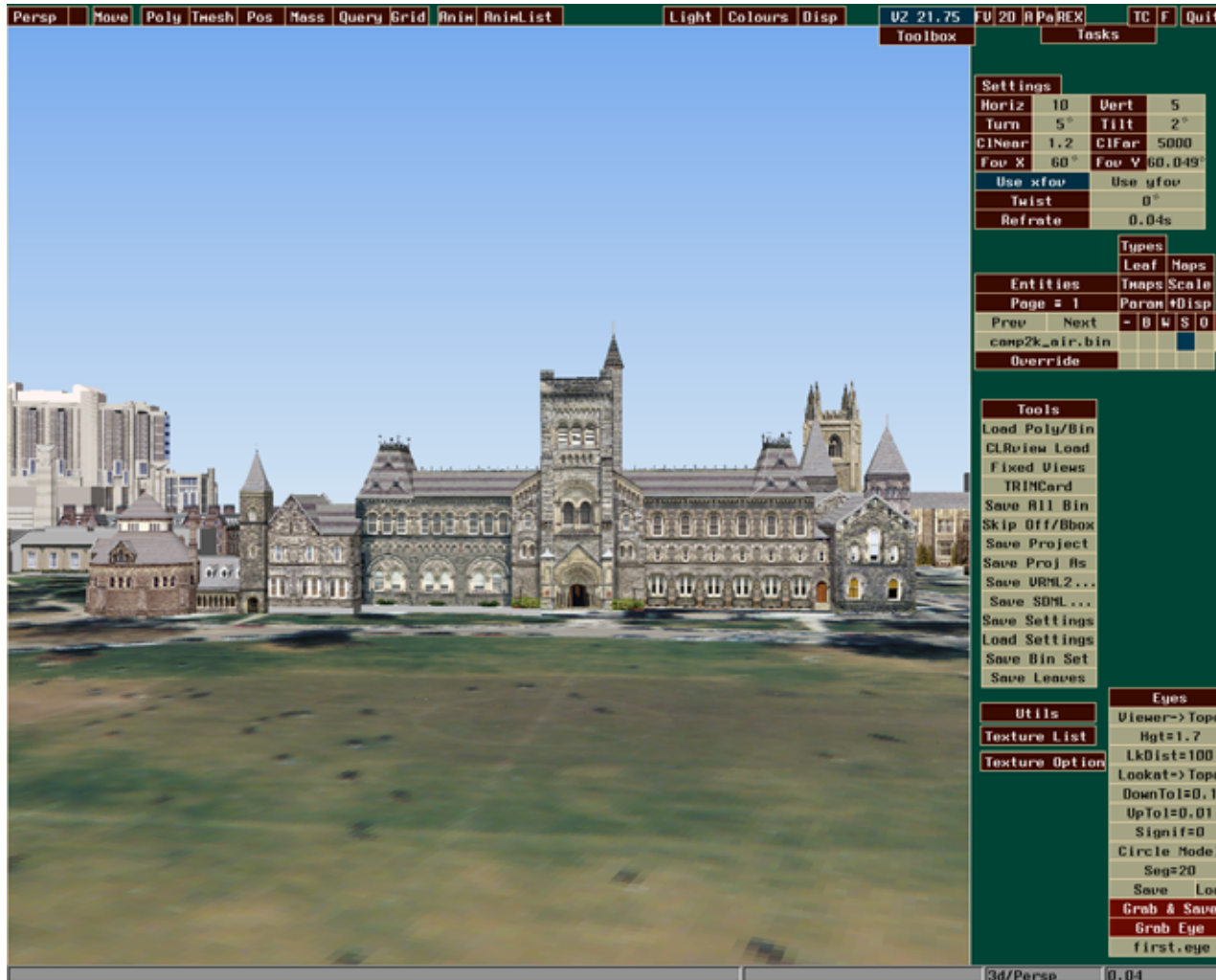
- The presenter recently created a 3D computer model of the West End using the City of Vancouver's Open Data Catalogue.
- The presentation will discuss the available data types, formats, accuracy, and comments will be made on the suitability and organization of this data for the tasks at hand.
- The author will also comment on the question "*is Open Data is truly 'Open' to all of the public, or to only knowledgeable professionals in the public?*"

'Data Rich' vs. 'Data Poor' environments



Early 1990s, quality data from NCC used in 3D model construction (downtown Ottawa), CLR [files send on multiple floppy disks, Net now taken for granted]

Textured models with high quality base data



Buildings modelled from original plans, sections and elevations, and texture mapped with rectified photos

1998 Centre for Landscape Research, University of Toronto

Access to data in privileged role as consultant / partner

'Free' or low cost Data Access Traditionally Limited to Public

- Models can still be constructed with 'limited data': digitizing traditional maps (UBC Map Library) – limited accuracy
- No budget to purchase commercial grade data
- Open Data to the rescue!
- Provides much higher quality data as a base for model construction and analysis

Goals, now as member of public

- (1) **Use Open Data** in model construction (City of Vancouver, DNV, NASA Aster), photos and measurements, Archives, UBC Map Library
- (2) Use **free**, open source **software packages** when and where possible (or *write* software as needed). There are a number of reasons for this (sharing with public, no additional cost burden, cross platform)

Open Data in Vancouver (download)

Open data home

Get the data

[Data catalogue](#)

[City web feeds](#)

About the data

[Data formats](#)

[Data updates](#)

[Terms of use](#)

[Feedback](#)



Take our survey

Which data items would you still like to see added to the City's Open Data site?

Data updates

Receive updates on developments related to this site:

- [Subscribe to the RSS feed](#)
- [Subscribe to the mailing list](#)

Connect with the Community

Community developers have created a wiki and discussion group to share application ideas and discuss datasets.

[Vancouver Open Data Wiki](#)

[Discussion Group](#)

Please note: These community sites are not affiliated with the City of Vancouver.

Background

[City Council Motion: Open Data, Open Standards and Open Source \(PDF\) 22 KB](#)

Park polygon features

March 19, 2010

The City has just added park polygon features. Park polygon features show a filled-in green area representing the boundaries of the park. This may add significantly to the look of the map and make it easier to recognize and use.

Please feel free to provide us with [feedback](#) on this or any other aspect of the Open Data website on our [feedback page](#). As always, your use of the data available from this site is governed by the City's [Terms of Use](#) and by downloading the data, you are agreeing to be bound by these [Terms of Use](#).

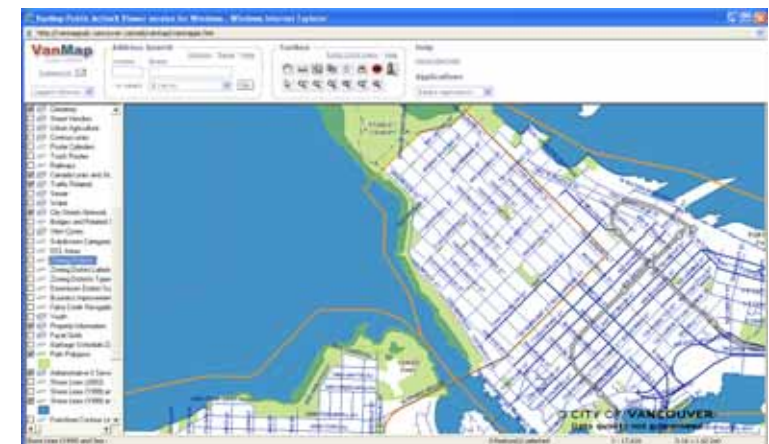
Vancouver adds shoreline and building footprints to Open Data Catalogue

March 10, 2010

The City has just added three new layers to the Open Data catalogue in response to requests. They are [Shorelines](#), [Building Footprints](#), and [Web Cams](#). The shoreline

VanMap viewer notes

- VanMap has its audience and uses
- Data download needed for some applications (focus of this presentation)



- Suggestion: turn on required layers, select an area; S/W packages data into download

Download data formats

CITY OF VANCOUVER Open Data Catalogue Beta v2 City of Vancouver ■
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Open data home

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Data catalogue
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Name & Information about Data	CSV	XLS	DWG	KML	SHP	ECW	Mr SID	*Google Maps	*Bing Map
A									
Address labels for map display			✓DWG	✓KML	✓SHP				
Alleyways			✓DWG	✓KML	✓SHP			G	b
Apartment recycling schedule zones			✓DWG						
Art									
B									
Bikeways			✓DWG	✓KML	✓SHP			G	b
Block numbers			✓DWG	✓KML	✓SHP			G	b
Block outlines			✓DWG	✓KML	✓SHP				
Building Footprints 1999			✓DWG	✓KML	✓SHP			G	b
Business improvement areas (BIA)			✓DWG	✓KML	✓SHP			G	b
C									
Contour package				✓KML	✓SHP				
Contour 1 metre				✓KML	✓SHP				
Contour 2 metre				✓KML	✓SHP				
Contour 10 metre				✓KML	✓SHP				

Most data is available in many popular formats, most of the time, some exceptions for example contour lines

Free converter utilities can go between shape & dwg formats (after download)

Model construction

- Started model construction in February 2010, one of the sites with a development proposal (see links), 22 storey tower and townhouses along Beach Avenue (beachtowers.ca)
- Grateful for OpenData site (majority of Data)



Downloaded Data Types

- Address Labels
- Block Outlines
- Boundary
- Building Footprints
- City Owned Properties
- City Streets Package
- Contour Lines
- Contour Package
- Easements
- Greenways
- Heritage Properties
- Intersections
- Non-City Streets
- Orthophoto2008_ECW
- Orthophoto2008_MrSID
- Parcel Polygons
- Property
- Public Streets
- Shorelines
- Storm Manholes
- Street Lighting
- Streets

Data Types Not Yet Available

- building footprints ⁽¹⁾ initially (later added 1999 downtown)
- rooflines, 'eaves' lines
- spot elevations
- road and sidewalk boundaries
- TIN
- tree inventory
- 3D models of buildings

**Is any of this data internal to the city but
not ready yet for Open Data access?**

Data acquisition and transformation

- Local coordinate grid; may distribute among citizens (-490 000 , -5 460 000)
- UBC map library also consulted – hand digitized maps (no digitizing desk and puck, flatbed scanner & photocopies)
- Site photos, context, views



Building footprints

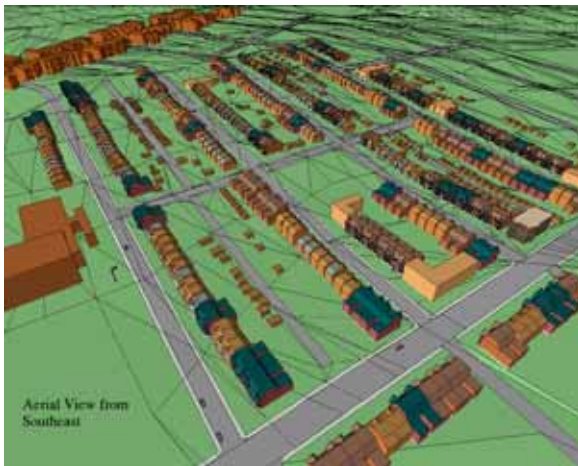
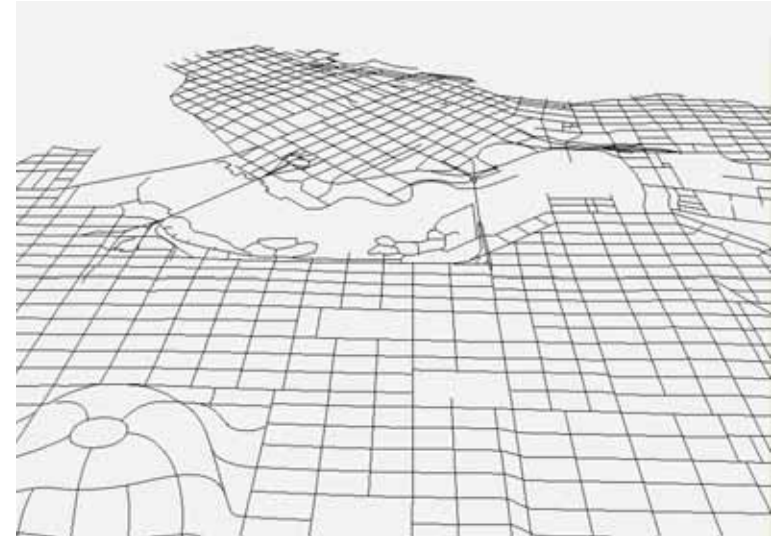
- 1999 building footprints made available March 10th for downtown peninsula (replaced digitized map), still used scanned data for Kits



- Great to see OpenData site being updated regularly

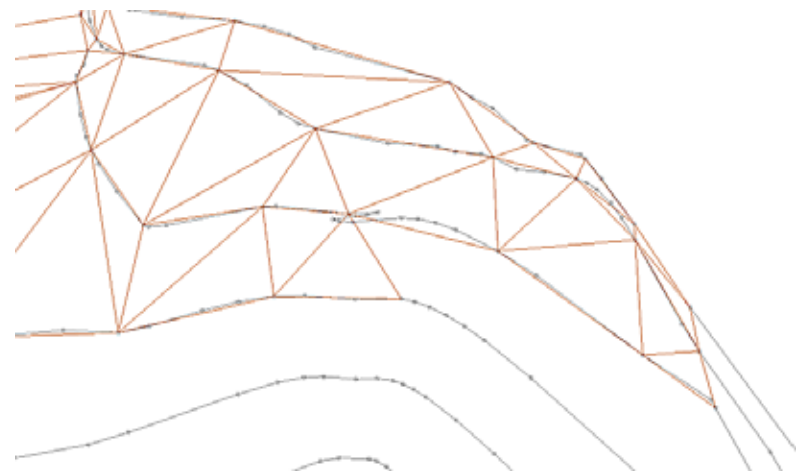
Roads and Sidewalks

- Roads - show roads in 3D (not of use), hence can't cut road into tin, dropped, with curb - no sidewalks either
- decision made to use only TIN, with airphoto draped on TIN (scales involved), extruded buildings (flat shaded or texture mapped)



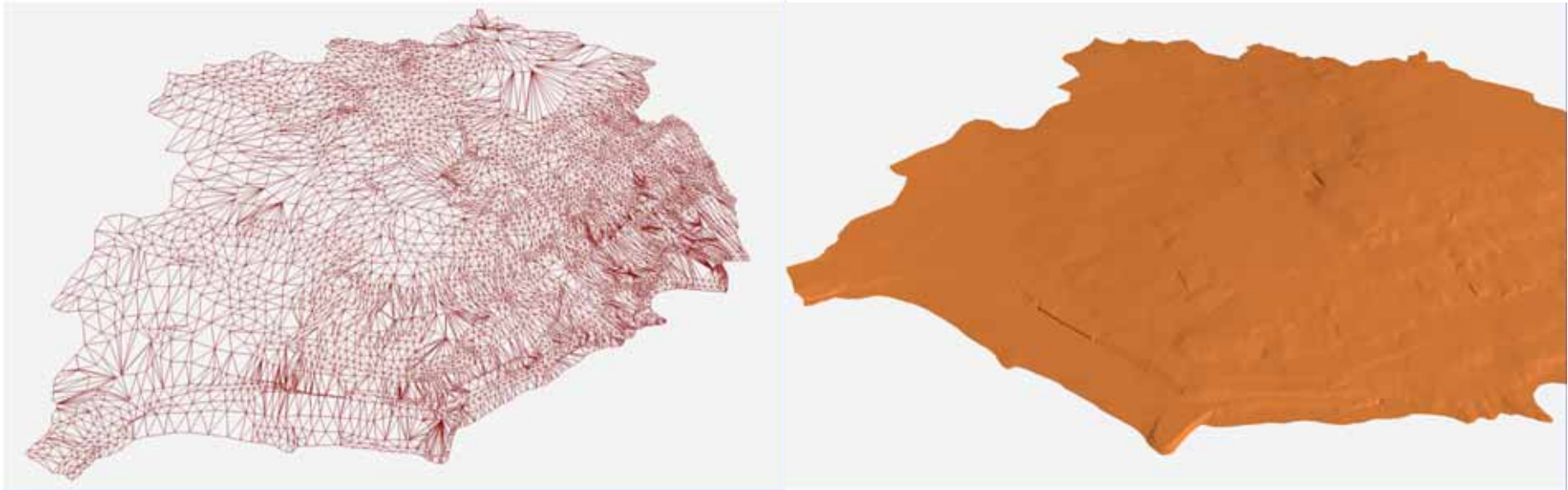
Contour lines

- Really great data
 - Data is 'all or nothing' deal, not divided into sections (must cut up yourself)
 - no DWG format (I converted to DXF)
 - no spot elevations (sometimes helpful)
 - urban conditions, challenges
 - hand create TIN, over 11,000 polygons, snap to points on 1m contour for West End
 - spreadsheet to figure out polygons locations to map to, where to line up and cut into TIN



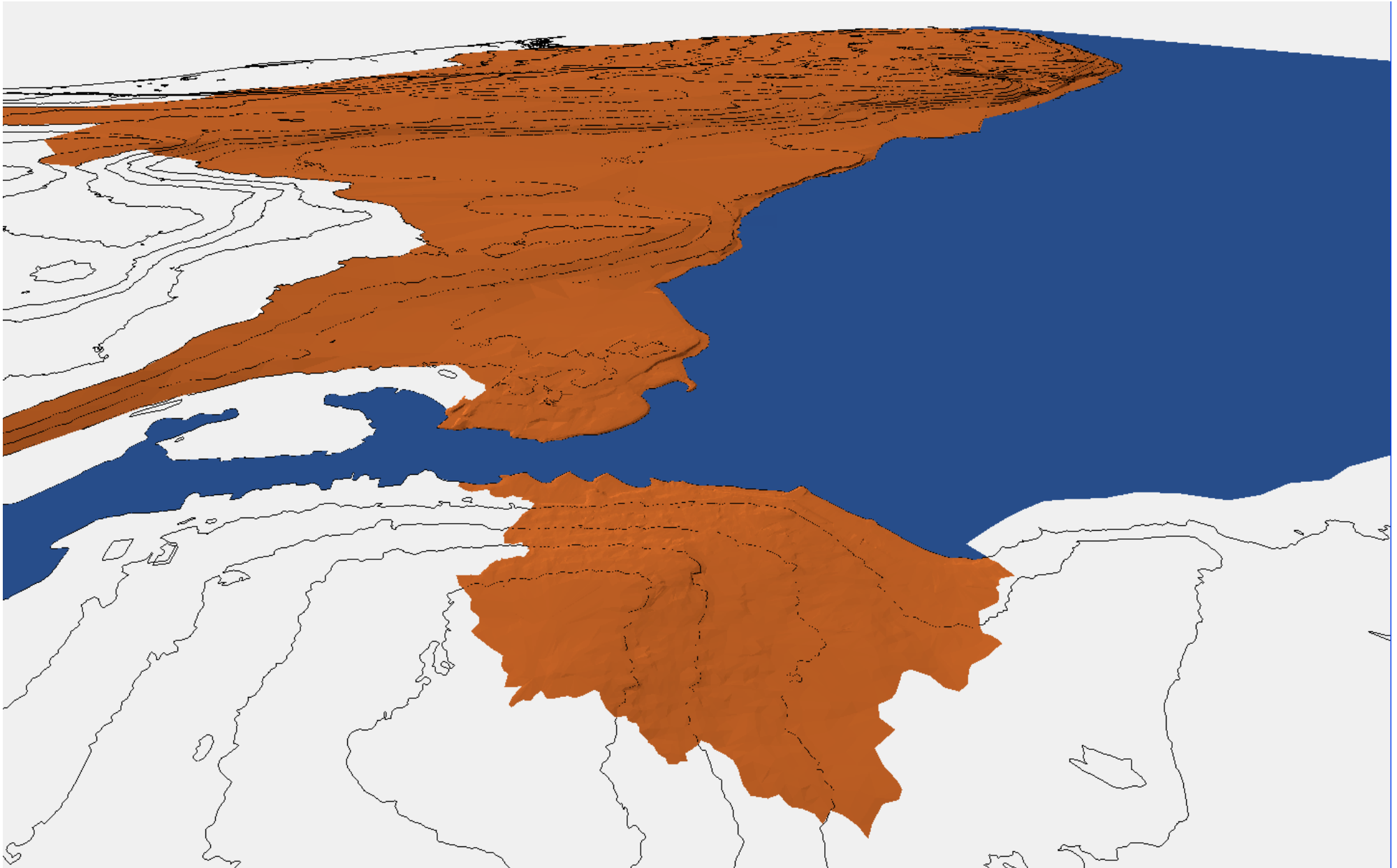
Contour lines

1m, 2m, and 10m data all the same (no simplification on 10m)



Hand create 11,000 polygon plus TIN

Contour line points for TIN context



Contour line points for TIN context



Air Photos (MrSid)

- Great Data!



Air Photos (MrSid)

- Airphotos – MrSid, 10cm data

Steps:

- coordinate file (edge of pixel vs. middle of pixel)
- GeoTiff conversion
- download all tiles (by hand row at a time, or JAVA application)
- write program to generate Batch file to make GeoTiffs
- use Photoshop batch to resample to 10cm to 40cm data, save as Adobe RAW & tiff
- combine all 40cm data into a single file (assemble, original software, combines based on name)
- downsample entire image to 2m (or cut out any section at 40cm as needed)
- make a few 2k x 2k textures
- cut airphotos into a TIN (now we have our context)

Download All AirPhoto Tiles

```
mrSIDftp.java
mrSIDftp.java:29  main(String args[])
import java.net.URL;
import java.net.URLConnection;

class mrSIDftp {
    public static void main(String args[]) {

        for (int i = 3; i < 9; i++) {
            String strURL;
            URL myURL;
            URLConnection myConnection;
            String myVal = "G08" + i;

            try {
                // make URL, connection & send request
                // ftp://webftp.vancouver.ca/opendata/2008sid/G06.zip
                strURL = "ftp://webftp.vancouver.ca/opendata/2008sid/" + myVal +

                myURL = new URL(strURL);
                myConnection = myURL.openConnection();

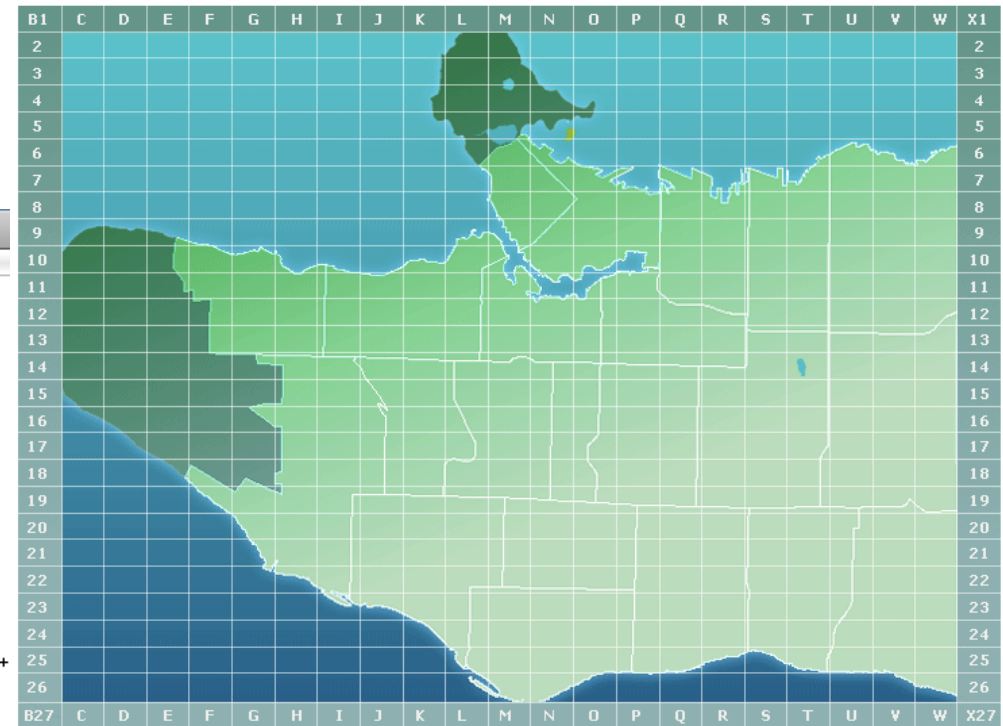
                FileOutputStream outFile = new FileOutputStream(myVal + ".zip");

                // read in response
                DataInputStream myBufReader = new DataInputStream(
                    myConnection.getInputStream());

                int maxlen = 4096;
                int len;
                byte cbuf[] = new byte[maxlen];
                while ( (len = myBufReader.read(cbuf, 0, maxlen)) != -1) {
                    outFile.write(cbuf,0,len);
                }
                myBufReader.close();
            }
        }
    }
}
```

2008 Orthophoto imagery package (MrSID format)

Download instructions: Click on any square (facet) to download 1 MrSID file (zipped). There are a total of 621 zipped files available for download. **Please note, each file ranges in size roughly from 6 to 7 MB in size.**



Simple JAVA Application
written to download any
number of tiles from
Open Data site
(original code)

Combine & Calibrate AirPhoto Tiles

C code written to generate batch file:

```
mrsidgeocode.exe -i B01.sid -o B01.tif -of tifg  
mrsidgeocode.exe -i B02.sid -o B02.tif -of tifg  
...  
mrsidgeocode.exe -i X27.sid -o X27.tif -of tifg
```

For GeoTiff conversion, minus coordinate files
MrSid is proprietary and not in Public
Domain converters (paying license)

Command line converter is free (DOS / Linux)

Adobe Photoshop – batch convert GeoTiffs to
raw format, downsample to 40 cm tiles



Assemble program written
to combine tiles (based on
name of tiles and size)
from Adobe RAW files

Air Photo Context & Challenges

- Revisions & history (might any data disappear from site in the future? overwritten/updated?)
- downloaded everything just to be safe (2008 MrSid format airphotos)
- Only 10cm data; I also wanted context (2m); however, downsampling worked just fine



Heights information (3D model)

- no roofline; other municipalities project down from rooflines (Toronto late 90s, Zurich)
 - actually need footprints (elevator penthouse, outlines for different levels of buildings), eaves-line, rooflines (see image)
 - only one building, residents had plans of their building, thus I have an accurate benchmark for 7 storeys
 - then used photographs proportional estimates
 - texture map some of the buildings (correct in Photoshop), or use rectification module



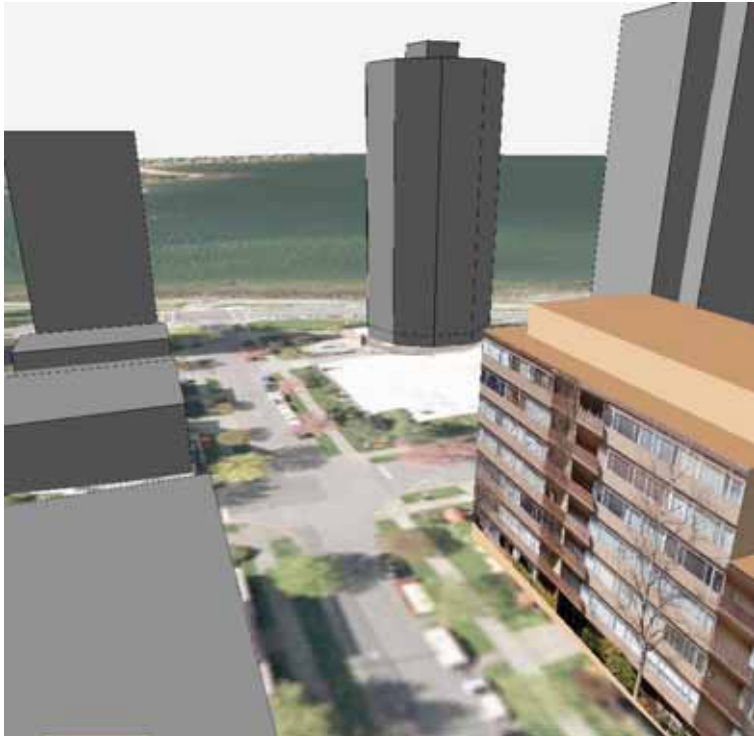
“3D for free”

- - move building footprints up to TIN (lowest corner)
 - extrude footprints for building massing
 - on building by building basis (highrises, around site), extrude on a building by building basis
 - suggestions (use Bing Maps – Van), GoogleEarth, photos (proportion based on known widths)

building footprints – accuracy (sources city data, aerial photos, developer’s plan, hand digitized map) -> and it does matter (photo alignment)



Site and context



Air photos are draped over TIN, extruded buildings are placed on top of this TIN to complete the model. Extended model reveals context.

Photo Calibration

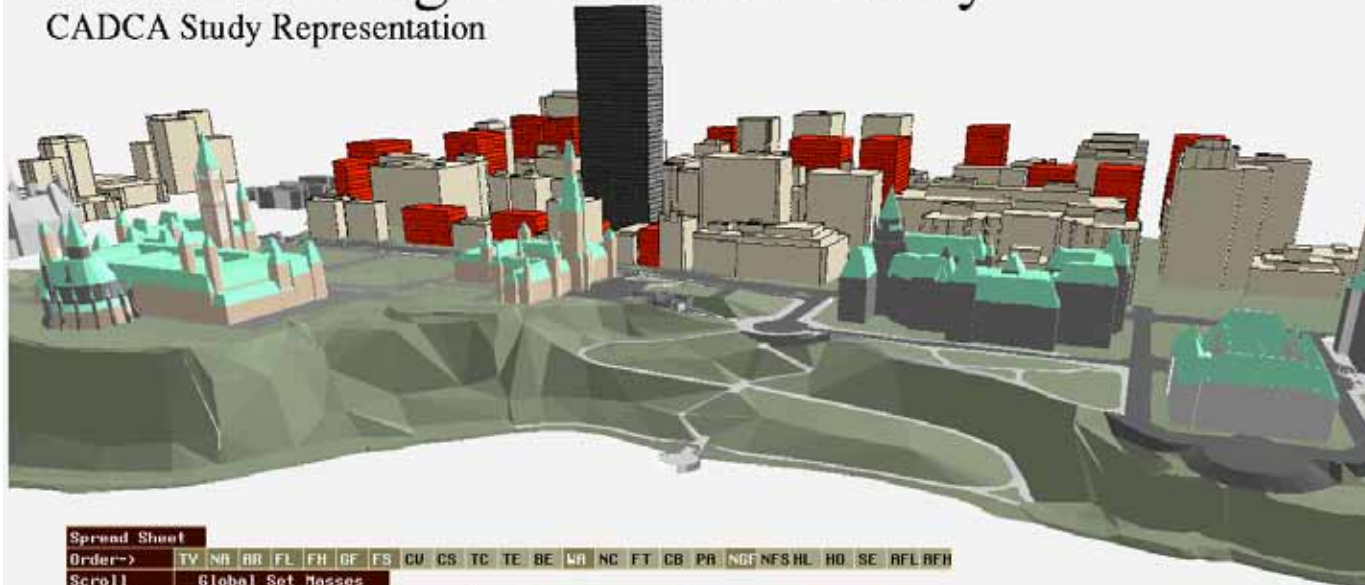


Outlines of buildings, shorelines matched to allow for photo calibration with of rough model (example Ottawa).

Calculate Proposed Density

Ottawa Height Control Study

CADCA Study Representation



Building area is tied to real time spreadsheet

Development Proposal density and costs can be quickly determined

Spread Sheet																								
Order->	TV	NB	RR	FL	FH	GF	FS	CV	CS	TC	TE	BE	WR	NC	FT	CB	PR	NGF	NFS	HL	HO	SE	RFL	RFH
Scroll	Global Set Masses																							
Up	Dn	Bill																						
Page	Select																							
Up	Dn	Type	Name	Area	Firs	FirHt	G.F.A.	F.S.I.	Waste	NetGFA														
Size=12		City		331596			420473	1.292		376901														
Data Base		CBlock	Block 32	14040			0	0.000		0														
Save Load		CBlock	Block 33	10257			0	0.000		0														
Save->Excel		CBlock	Block 34	10177			0	0.000		0														
RECALC		CBlock	Block 35	10090			02202	0.140		71695														
Edit Recalc		Mass	Mass 46	460	3	6.00	1301		0.000	1301														
Imperial		Mass	Tower	1796	45	4.00	00021		0.130	70314														
Set Policy		CBlock	Block 36	10360			0	0.000		0														
Whole Firs		Mass	Infill Dev	1015	7	4.00	7102		0.000	7102														
Chk Sitson		Mass	Infill Dev	905	7	4.00	6095		0.000	6095														
Update NSS		CBlock	Block 37	6421			0	0.000		0														
		CBlock	Block 38	9091			12448	1.369		10830														
		Mass	Infill	950	13	4.00	12440		0.130	10830														

Polytrim Software/Silicon Graphics Workstation

Centre for Landscape Research
University of Toronto

Open Data to enable dialogue

- What's at stake?
- Leveling the playing field



Developer proposal (site infill, rezoning)



West End residents at Visioning workshop, Jan31, 2010

Closing Notes

- Context – different scales – site data (high resolution)
 - medium resolution (immediately around site)
 - low resolution (context, English Bay, Kits / Point Grey), North Shore Mountains
 - views do not stop at municipal boundariesFAQ, tips
 - forums & discussions on how to use Open Data
 - upload derived information
 - errors noted (input), corrections, missing buildingsArchives / revisions / version history and access to data in future
- PWLABS.com – free OrbisRT engine, Open Source, builds on OpenSceneGraph engine, Norway Map, simulation (Open Data should use Open Source), CLR, CALP see rockheim.no for further details
- Could a member of the public with ‘general’ computer knowledge have replicated this model? A good number of challenges were encountered (MrSid to GeoTiff conversion, calibration), TIN creations, extrusion tools, texture rectification, coordinate systems.
- Open Data bridges ‘digital divide’