

Geovisual Analytics and Storytelling Applied to a Flood Scenario

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Geoviz Hamburg 2013

Introduction

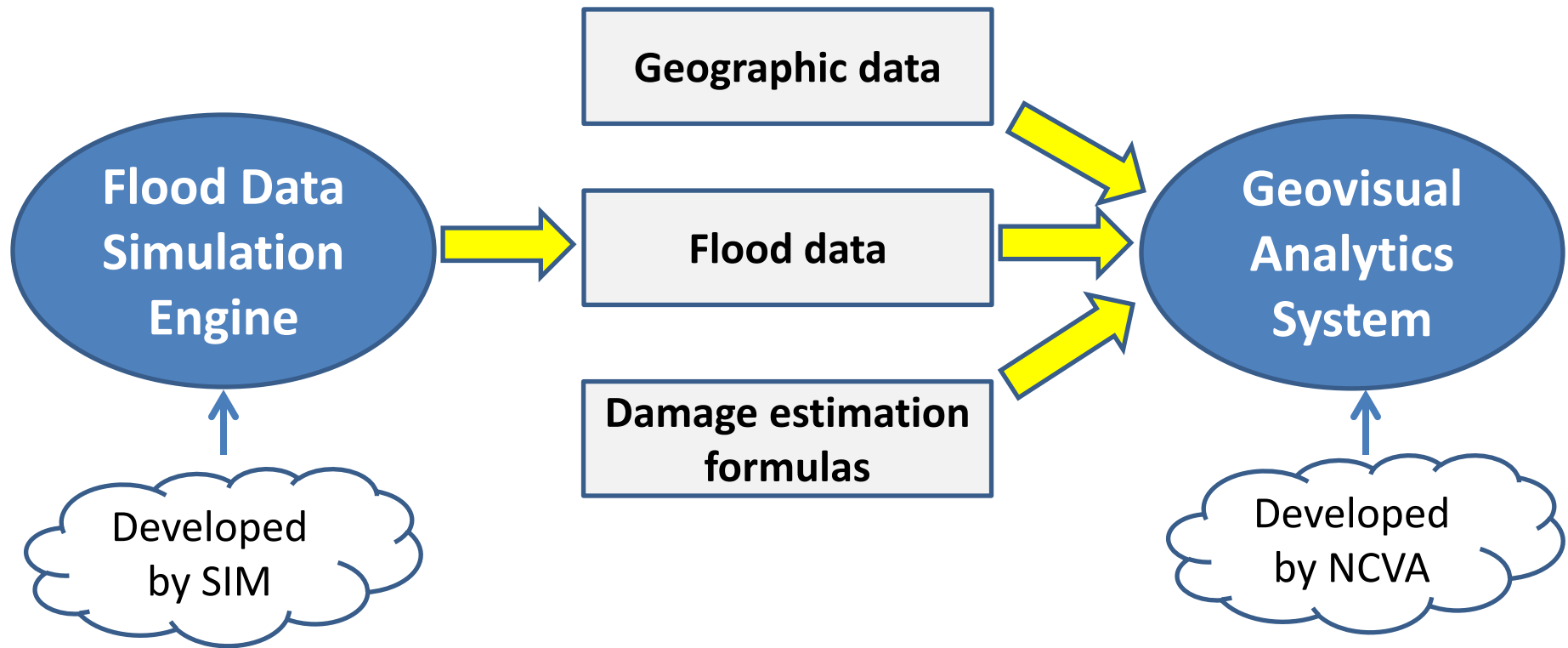
- [A serious flood event](#) in Lisbon on 29 October 2010 caused a lot of damage on buildings



Introduction

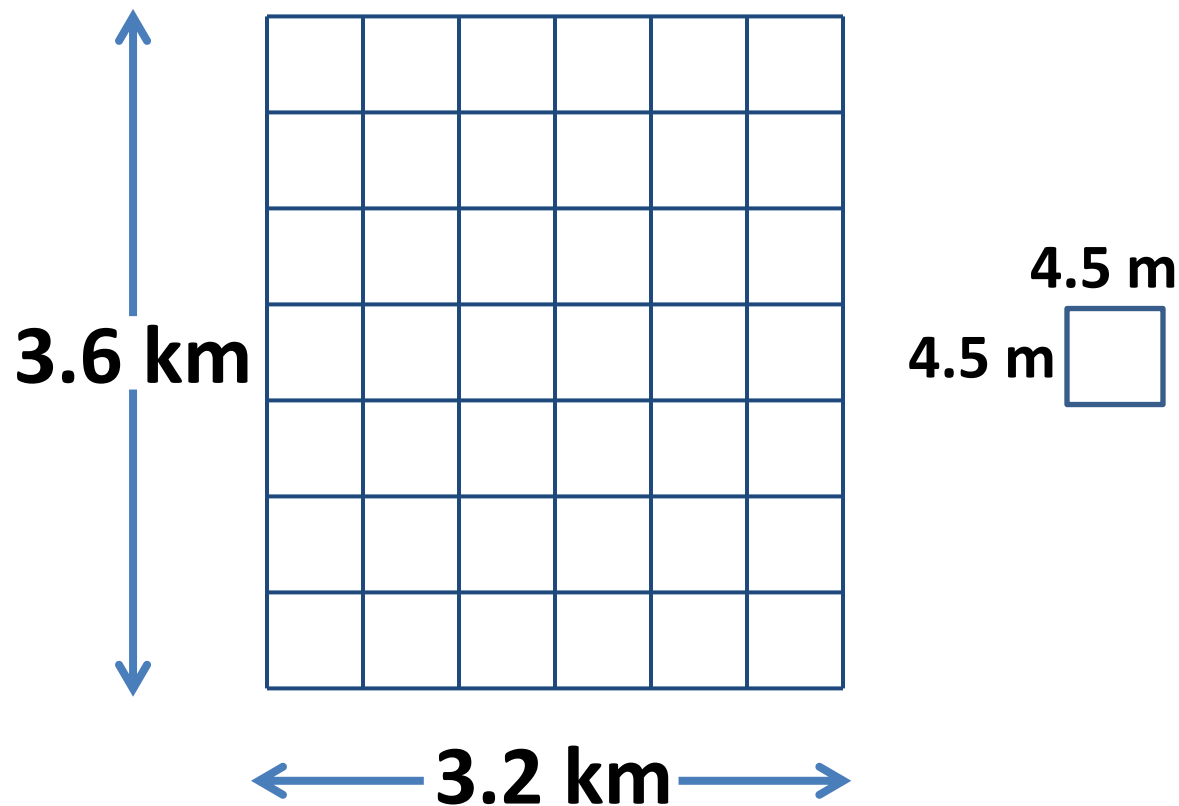
- Planners, policy makers and insurance companies would like to have a tool to
 - explore flood data,
 - estimate the damage, and
 - support making plan for rescuing or evacuating people
 - support presentation and dissemination
- Research is done in close collaboration with Uninova and SIM in Lisbon.

Data Input



Data Input – Flood Simulation Data

- Simulation for **Lisbon down town**
- Data of **4 hours**, time resolution of **10 minutes**



Data Input - Geographic Data

- Buildings in Lisbon downtown



Data Input - Formulas

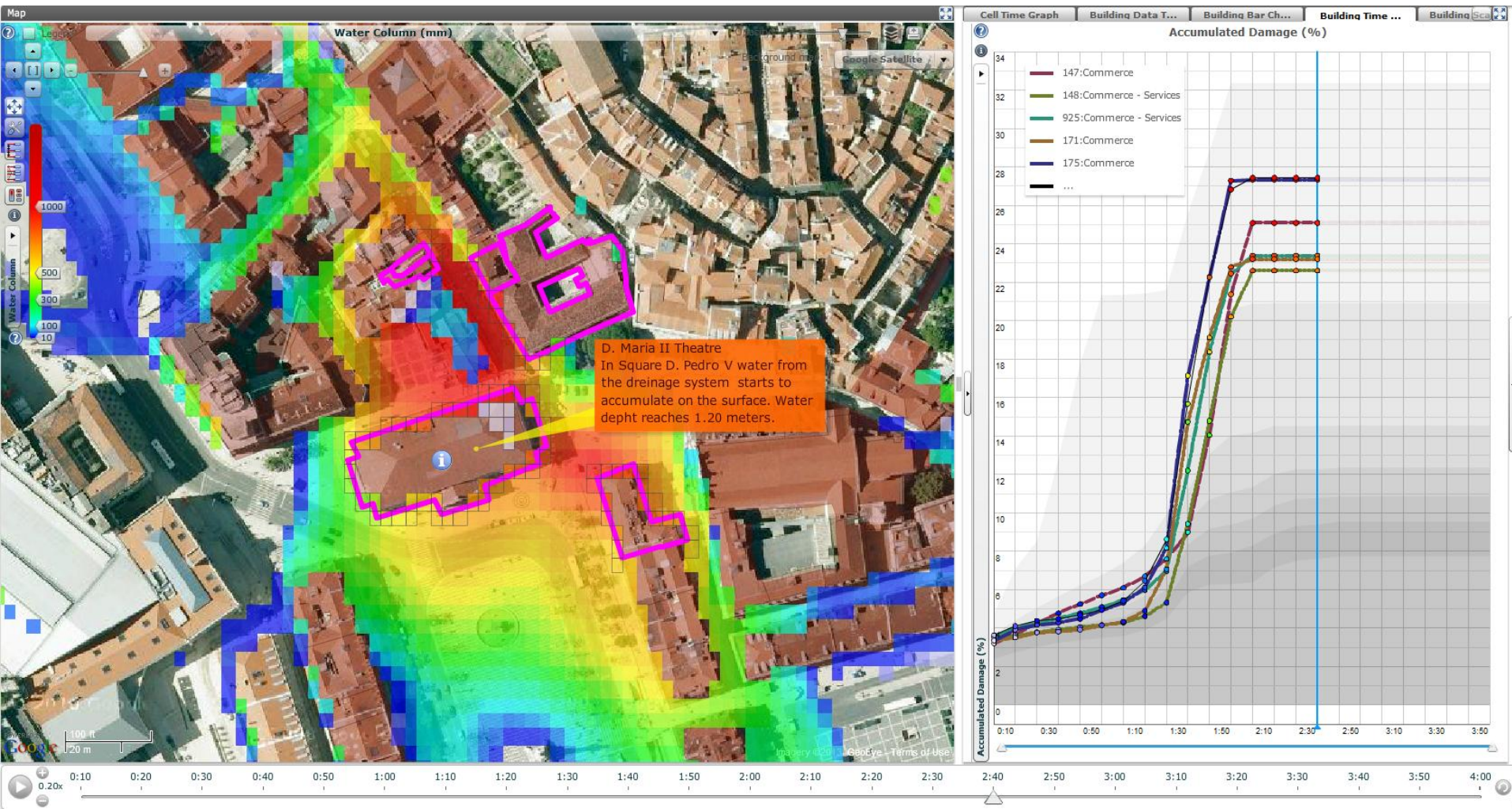
- Damage estimation (x: water-column in meter)

Building Function		Formula
A	Buildings (structure)	$Y = 3 + 5x$
B	Dwelling (fixed assets)	$Y = 60\sqrt{x}$
C	Commerce or Services or others (fixed assets)	$Y = 57\sqrt{x}+5$
D	Industry (fixed assets)	$Y = 20x$
E	Commerce or Services or Industry (stock)	$Y = 5 + 38x$
P1	Weight or normalization to have the results in % according to the damage importance	0.1
P2		0.3
P3		0.2
P4		0.2
P5		0.2

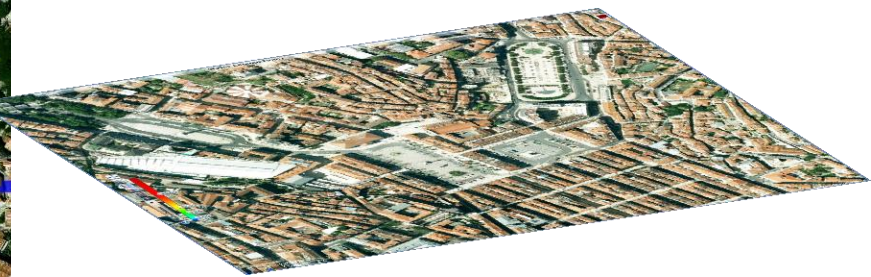
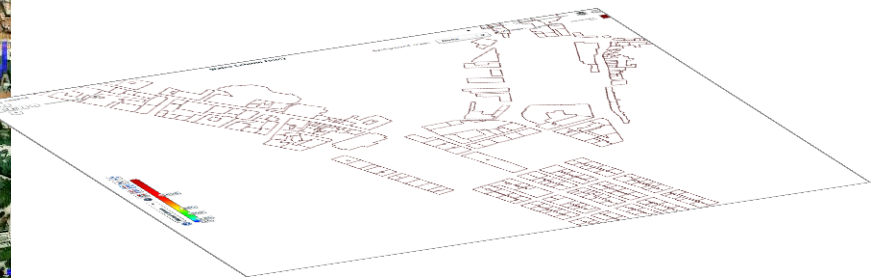
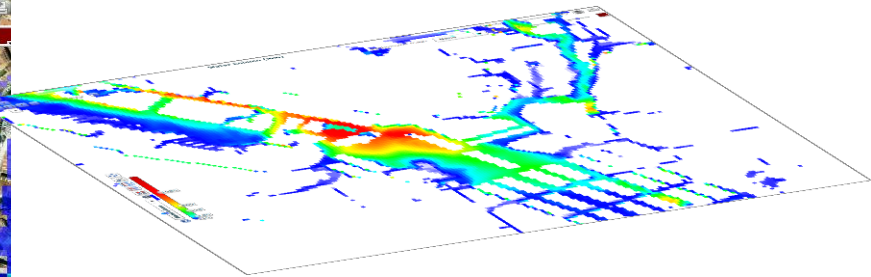
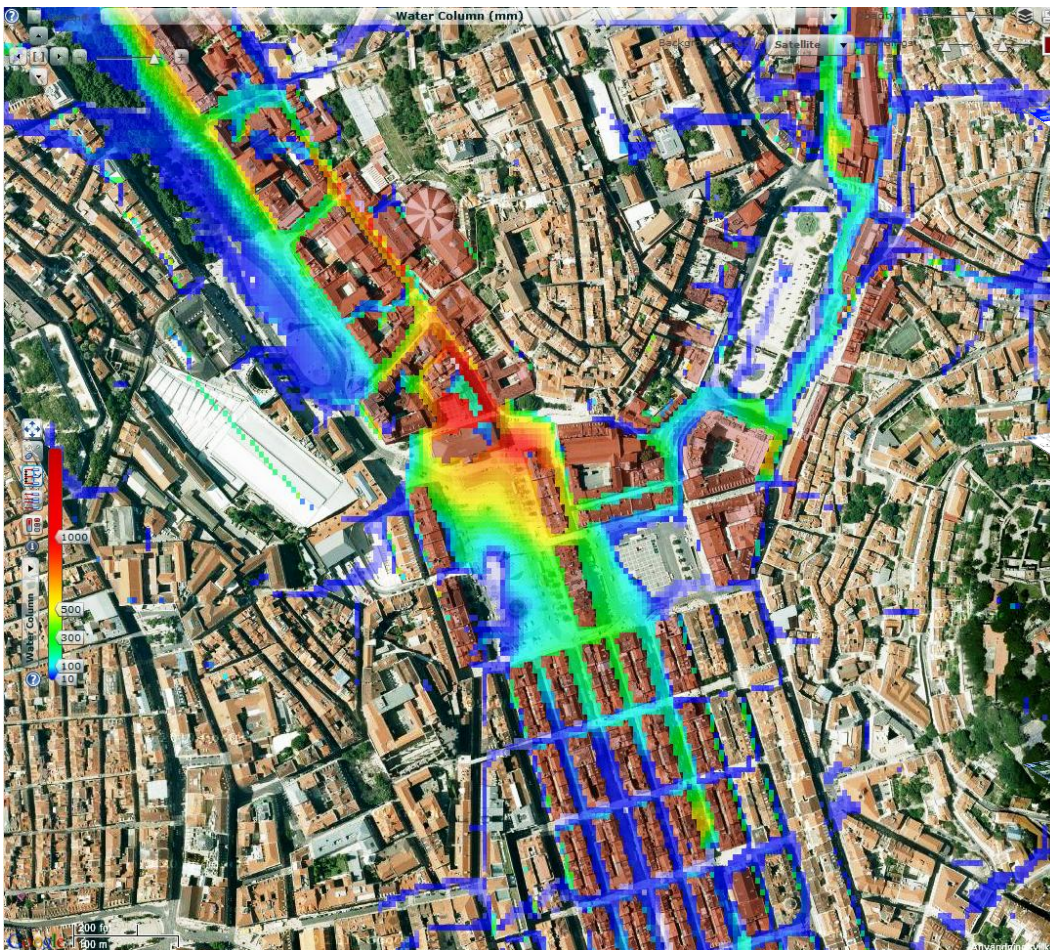
Building Function 1	Building Function 2	Formula
Commerce	NA	$A * P1 + C * P2 + E * P3$
Commerce	Services	$A * P1 + C * P2 + E * P3$
Commerce	Commerce	$A * P1 + C * P2 + E * P3$
Commerce	Dwelling	$A * P1 + B * P4 + C * P2 + E * P3$
Commerce	Industry	$A * P1 + C * P2 + D * P5 + E * P3$
Dwelling	NA	$A * P1 + B * P4$
Dwelling	Commerce	$A * P1 + B * P4 + C * P2 + E * P3$
Industry	NA	$A * P1 + D * P5 + E * P3$
Others	NA	$A * P1 + C * P2$
Others	Commerce	$A * P1 + C * P2 + E * P3$
Others	Dwelling	$A * P1 + B * P4 + C * P2$
Others	Services	$A * P1 + C * P2 + E * P3$
Services	NA	$A * P1 + C * P2 + E * P3$
Services	Commerce	$A * P1 + C * P2 + E * P3$
Services	Dwelling	$A * P1 + B * P4 + C * P2 + E * P3$
Services	Industry	$A * P1 + C * P2 + D * P5 + E * P3$

GeoVisual Analytics Approach

- Multiple linked views



Interactive Map with Dynamic Layers



Interactive Map with Dynamic Layers

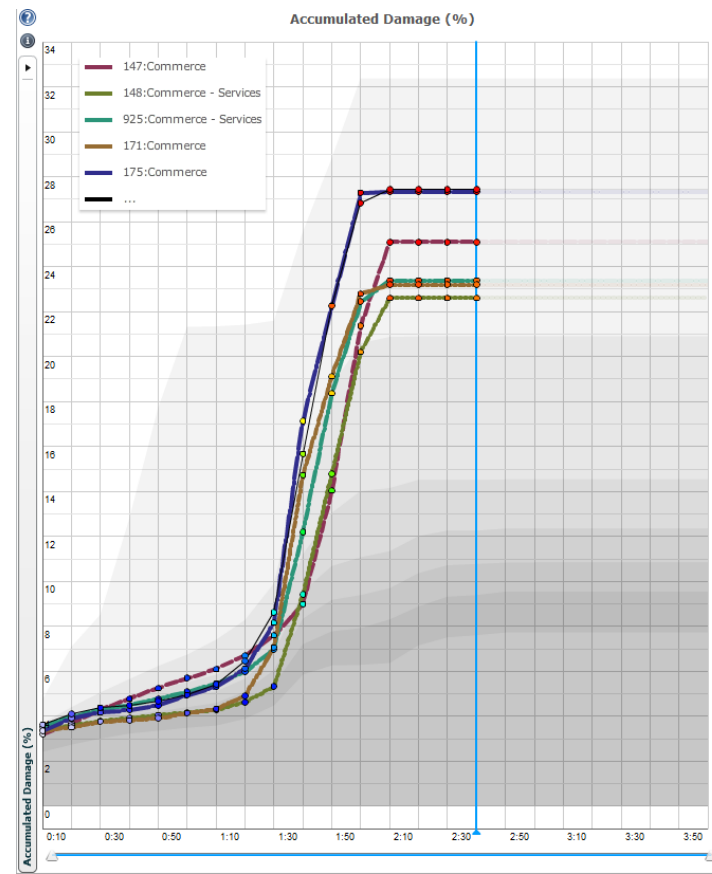
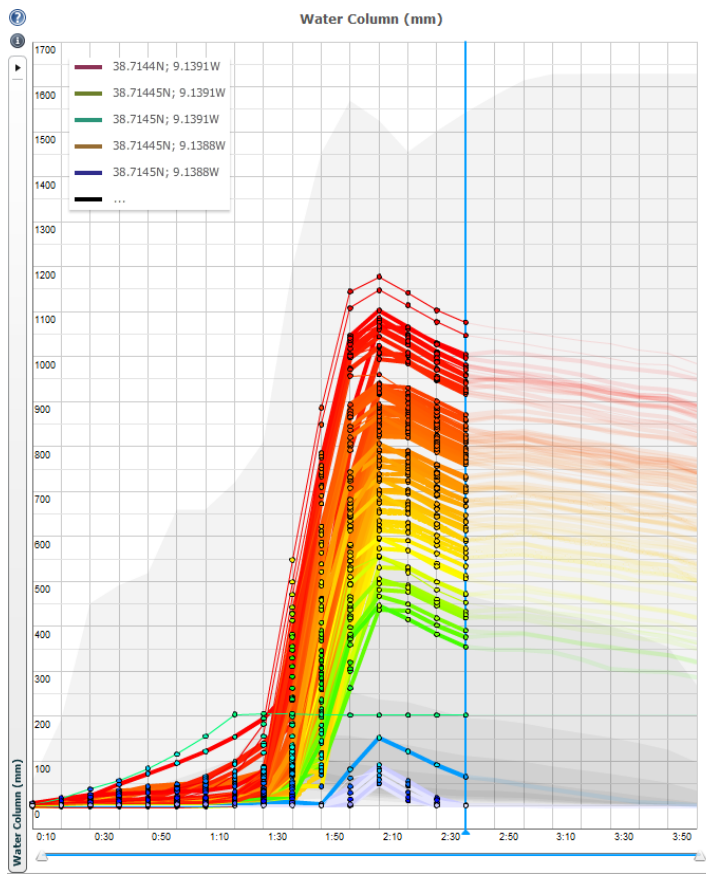
- Rich interaction techniques
 - Selection, hovering
 - zooming, panning
 - Auto focusing
 - Marker placing
 - Annotation
 - Route creating, distance measuring
 - Path finding

Interactive Map - Analysis Features

- Calculate water depth average level around the buildings
- Calculate damage on buildings based on given formulas
- Find buildings in danger
- Add annotation for collaboration
- Create routes for evacuating people

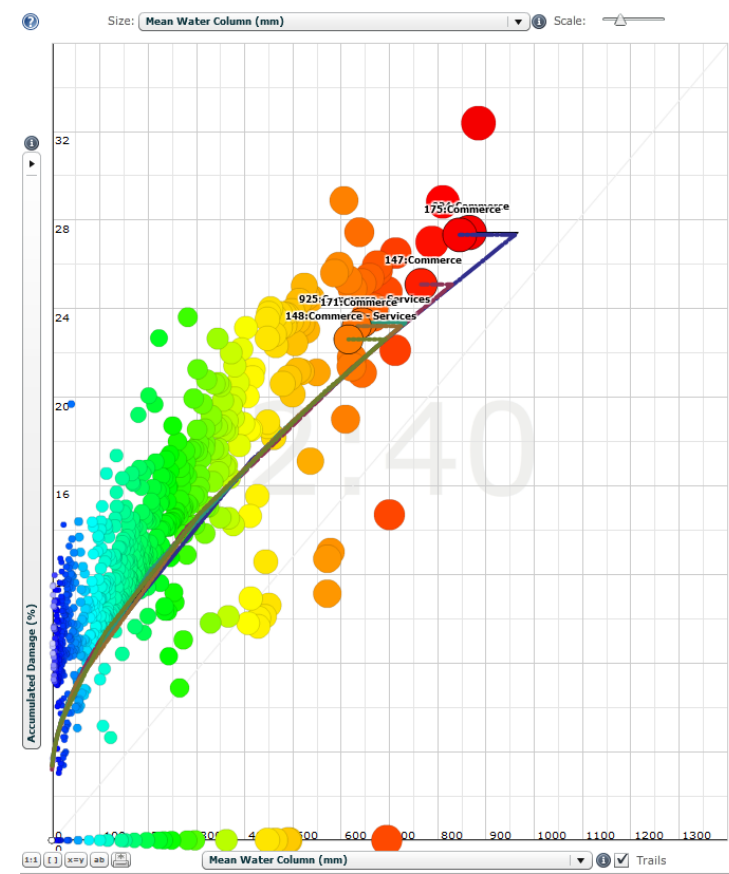
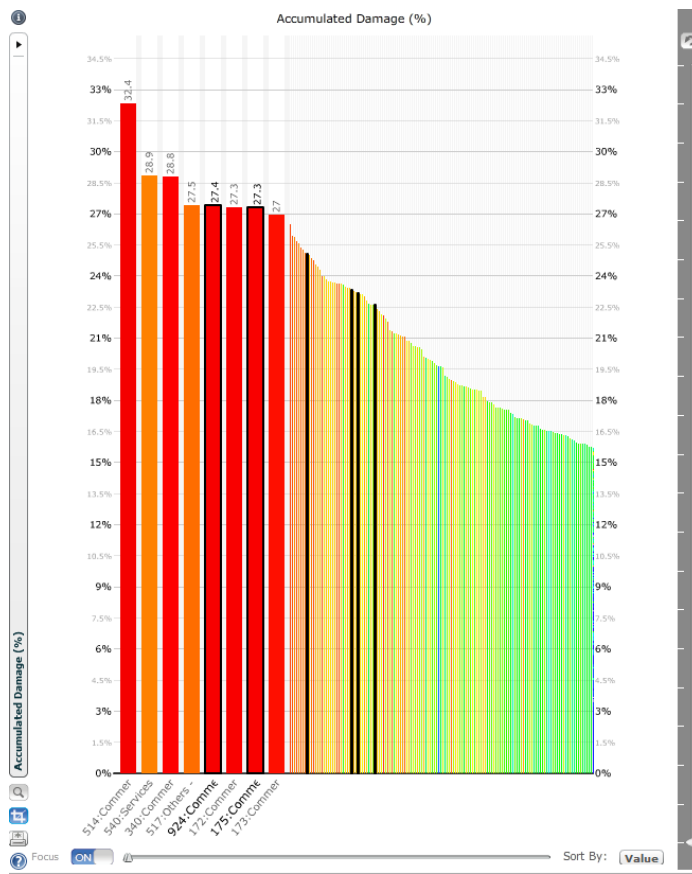
Other Interactive Visualizations

- Interactive time graphs for exploration and analysis of flood cells and buildings



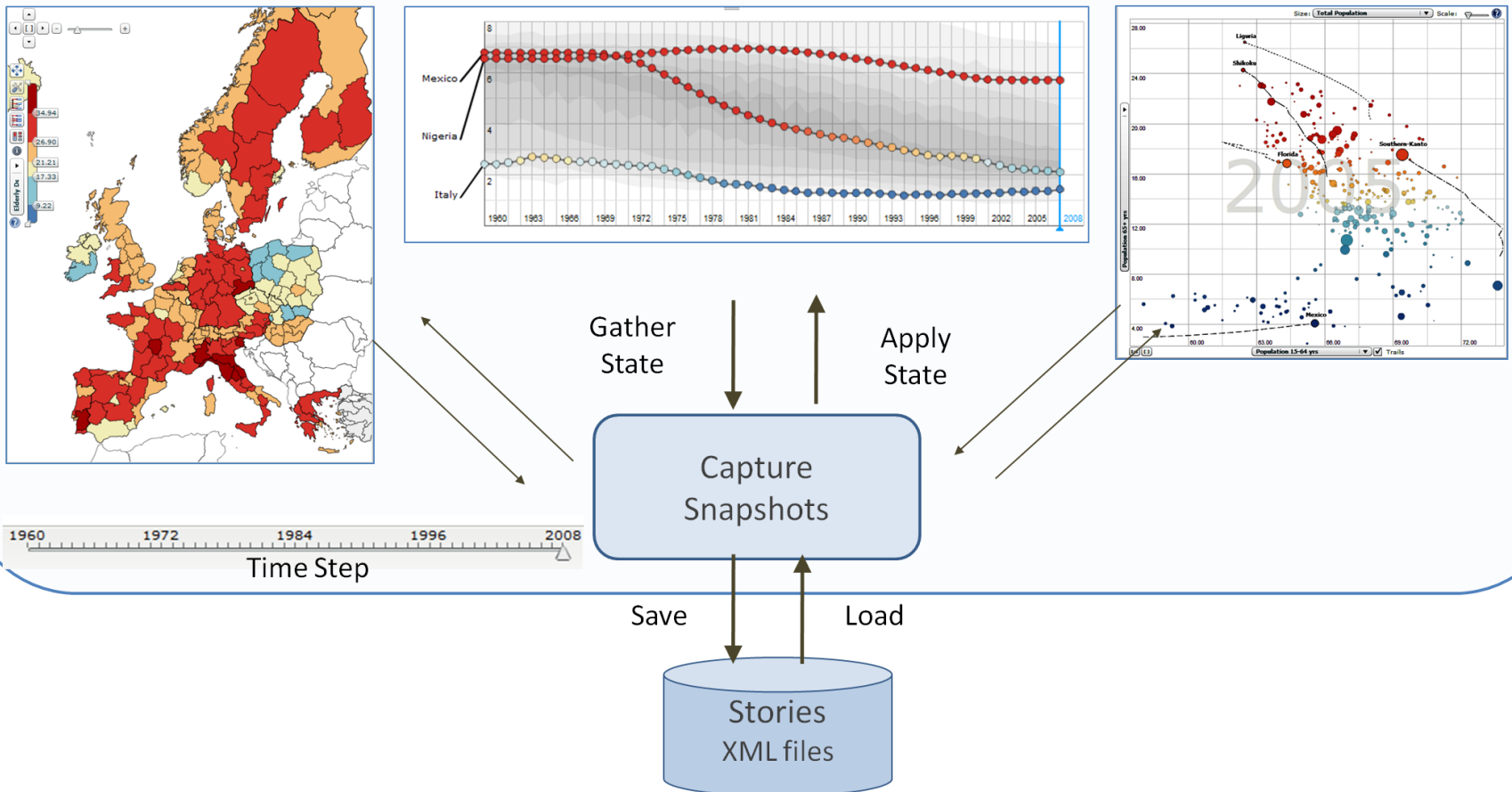
Other Interactive Visualizations

- Interactive bar chart and interactive scatter plot for exploration and analysis of buildings

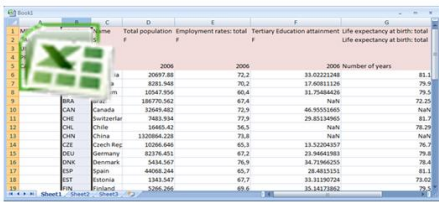


Snapshot and Storytelling

GAV Flash Visualization Components



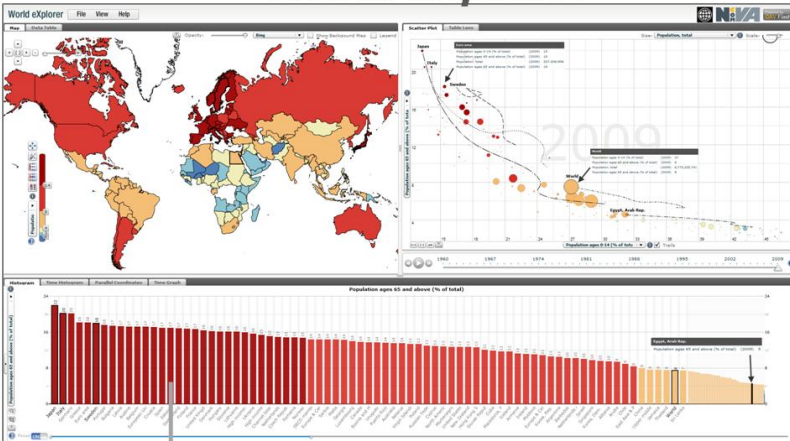
Statistical data



	Total population	Employment rates: total	Tertiary Education attainment	Life expectancy at birth: total	Life expectancy at birth: total
2006	2006	2006	2006	Number of years	81.1
2007	2007	2007	2007	Number of years	81.1
2008	2008	2008	2008	Number of years	81.1
2009	2009	2009	2009	Number of years	81.1
2010	2010	2010	2010	Number of years	81.1
2011	2011	2011	2011	Number of years	81.1
2012	2012	2012	2012	Number of years	81.1
2013	2013	2013	2013	Number of years	81.1
2014	2014	2014	2014	Number of years	81.1
2015	2015	2015	2015	Number of years	81.1
2016	2016	2016	2016	Number of years	81.1
2017	2017	2017	2017	Number of years	81.1
2018	2018	2018	2018	Number of years	81.1
2019	2019	2019	2019	Number of years	81.1
2020	2020	2020	2020	Number of years	81.1



World eXplorer



Story Editor metadata & hyperlinks

Story Editor

Story Title
Ageing population in EU 1990-2008

Author
Name: Mikael Jern
Organisation: NCVA

Chapters
elderly dependency ra

Chapter Title
elderly dependency rate population

Chapter Text
B I Link

New Capture: ☐ External URL:

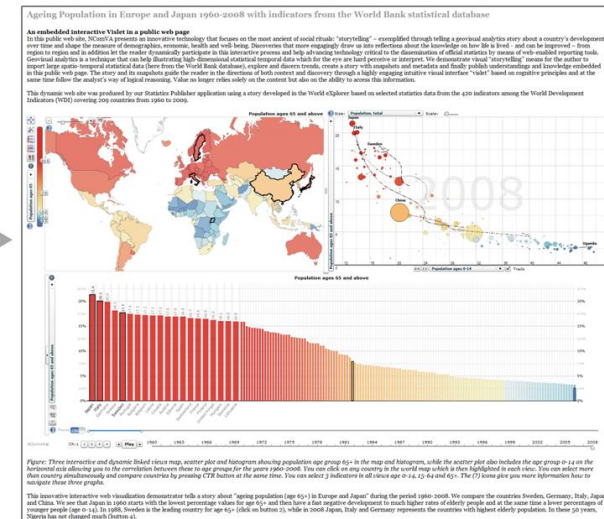
Capture

The Elderly Dependency Rate population (ratio between population aged 65 years and population age 15-64 %) in European countries increased almost three times faster than total population between 1990 and 2007. In Italian regions **Toscana** and **Liguria** the elderly population was more than 40% of total population in 2008. On the other extreme, in **London** the elderly population represented only 15% of the total population. In 2007, 35% of the elderly population lived in only 10% of

New Remove Reset Capture Embed data

Close

Statistics Publisher Blogs and Web pages



Select Statistical data and explore

Gain insight

Create a story
Snapshots and Metadata

Get feedback
reach consensus, trust



Share stories with colleagues

HTML code

Demo

- <http://vitagate.itn.liu.se/GAV/flood/>
- <http://vitagate.itn.liu.se/GAV/flood/story/>

Conclusion

- Multiple linked views system
- Interactive map with dynamic layers
- Other interactive visualizations
- Features for visual analysis
- Snapshot mechanism and storytelling for collaboration and dissemination

Future work

- Feedbacks from real users
- Dynamic formulas
- More layers to the map based on users' needs.
- Online scenario in which data comes every 10 minutes
- Performance for larger datasets

Thank you for your attention!

Online demo:

<http://vitagate.itn.liu.se/GAV/flood/>
<http://vitagate.itn.liu.se/GAV/flood/story/>

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