

GIS-based Time model. Gothenburg, 1960-2015

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Associated documentation

Gothenburg Time model_Final report_UPD.pdf (99.25 MB)

Gothenburg Time model_Technical Documentation_UPD.pdf (841.38 KB)

Citation

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Description

The GIS-based Time model of Gothenburg aims to map the process of urban development in Gothenburg since 1960 and in particular to document the changes in the spatial form of the city - streets, buildings and plots - through time. Major steps have in recent decades been taken when it comes to understanding how cities work. Essential is the change from understanding cities as locations to understanding them as flows (Batty 2013)¹. In principle this means that we need to understand locations (or places) as defined by flows (or different forms of traffic), rather than locations only served by flows. This implies that we need to understand the built form and spatial structure of cities as a system, that by shaping flows creates a series of places with very specific relations to all other places in the city, which also give them very specific performative potentials. It also implies the rather fascinating notion that what happens in one place is dependent on its relation to all other places (Hillier 1996)². Hence, to understand the individual place, we need a model of the city as a whole.

Extensive research in this direction has taken place in recent years, that has also spilled over to urban design practice, not least in Sweden, where the idea that to understand the part you need to understand the whole is starting to be established. With the GIS-based Time model for Gothenburg that we present here, we address the next challenge. Place is not only something defined by its spatial relation to all other places in its system, but also by its history, or its evolution over time. Since the built form of the city changes over time, often by cities growing but at times also by cities

shrinking, the spatial relation between places changes over time. If cities tend to grow, and most often by extending their periphery, it means that most places get a more central location over time. If this is a general tendency, it does not mean that all places increase their centrality to an equal degree. Depending on the structure of the individual city's spatial form, different places become more centrally located to different degrees as well as their relative distance to other places changes to different degrees. The even more fascinating notion then becomes apparent; places move over time! To capture, study and understand this, we need a "time model".

The GIS-based time model of Gothenburg consists of:

- 12 GIS-layers of the street network, from 1960 to 2015, in 5-year intervals
- 12 GIS-layers of the buildings from 1960 to 2015, in 5-year intervals - Please note that this dataset has been moved to a separate catalog post (<https://doi.org/10.5878/t8s9-6y15>) and unpublished due to licensing restrictions on its source dataset.
- 12 GIS- layers of the plots from 1960 to 2015, in 5-year intervals

In the GIS-based Time model, for every time-frame, the combination of the three fundamental components of spatial form, that is streets, plots and buildings, provides a consistent description of the built environment at that particular time. The evolution of three components can be studied individually, where one could for example analyze the changing patterns of street centrality over time by focusing on the street network; or, the densification processes by focusing on the buildings; or, the expansion of the city by way of occupying more buildable land, by focusing on plots. The combined snapshots of street centrality, density and land division can provide insightful observations about the spatial form of the city at each time-frame; for example, the patterns of spatial segregation, the distribution of urban density or the patterns of sprawl. The observation of how the interrelated layers of spatial form together evolved and transformed through time can provide a more complete image of the patterns of urban growth in the city.

The Time model was created following the principles of the model of spatial form of the city, as developed by the Spatial Morphology Group (SMoG) at Chalmers University of Technology, within the three-year research project 'International Spatial Morphology Lab (SMoL)'.

The project is funded by Älvstranden Utveckling AB in the framework of a larger cooperation project called Fusion Point Gothenburg. The data is shared via SND to create a research infrastructure that is open to new study initiatives.

1. Batty, M. (2013), The New Science of Cities, Cambridge: MIT Press.
2. Hillier, B., (1996), Space Is the Machine. Cambridge: University of Cambridge

12 GIS-layers of the street network in Gothenburg, from 1960 to 2015, in 5-year intervals. File format: shapefile (.shp), MapinfoTAB (.TAB). The coordinate system used is SWEREF 99TM, EPSG:3006.

See the attached Technical Documentation for the description and further details on the production of the datasets.

See the attached Report for the description of the related research project.

Data contains personal data

No

Language

[English](#)

Time period(s) investigated

1960-01-01 – 2015-01-01

Data format / data structure

[Geospatial](#)

Geographic spread

Geographic location: [Sweden](#), [Västra Götaland County](#), [Göteborg Municipality](#)

Responsible department/unit

Department of Architecture and Civil Engineering

Funding

- Funding agency: Älvstranden Utveckling AB, Fusion Point Gothenburg

Research area

[Engineering and technology](#) (Standard för svensk indelning av forskningsämnen 2011)

[Earth and related environmental sciences](#) (Standard för svensk indelning av forskningsämnen 2011)

[Natural sciences](#) (Standard för svensk indelning av forskningsämnen 2011)

[Civil engineering](#) (Standard för svensk indelning av forskningsämnen 2011)

[Architectural engineering](#) (Standard för svensk indelning av forskningsämnen 2011)

[Social and economic geography](#) (Standard för svensk indelning av forskningsämnen 2011)

[History and archaeology](#) (Standard för svensk indelning av forskningsämnen 2011)

[History](#) (Standard för svensk indelning av forskningsämnen 2011)

[History of technology](#) (Standard för svensk indelning av forskningsämnen 2011)

[Boundaries](#) (INSPIRE topic categories)

[Imagery / base maps / earth cover](#) (INSPIRE topic categories)

[Structure](#) (INSPIRE topic categories)

[Economy](#) (INSPIRE topic categories)

[Planning / cadastre](#) (INSPIRE topic categories)

[Geoscientific information](#) (INSPIRE topic categories)

[Environment](#) (INSPIRE topic categories)

[Location](#) (INSPIRE topic categories)

[Society](#) (INSPIRE topic categories)

[Utilities / communication](#) (INSPIRE topic categories)

[Transportation](#) (INSPIRE topic categories)

Keywords

[Buildings](#), [Urban development](#), [Urban areas](#), [Spatial analysis](#), [Spatial distribution](#), [Environmental history](#), [Historical evolution](#), [Land cover](#), [Land use](#), [Planned urban development](#), [Spatial mobility](#), [Spatial data file \(gis\)](#), [Spatial database \(gis\)](#), [Spatial configuration](#), [Spatial pattern](#), [Cadastral parcels](#),

[Coordinate reference systems](#), [Transport networks](#), [20th century](#), [Geospatial](#)

Publications

Stavroulaki I., Marcus L., Berghauser Pont M., (2019), GIS-based Time model. Urban development in Gothenburg, 1960 to present, Research report, Fusion Point Gothenburg, Älvstranden Utveckling AB

DOI: <https://doi.org/10.13140/RG.2.2.18909.97760>

Polygon (Lon/Lat)

11.56464077262, 57.846212735914

11.56464077262, 57.495165651829

12.349360976108, 57.495165651829

12.349360976108, 57.846212735914

11.56464077262, 57.846212735914

Accessibility level

Access to data through SND

Access to data is restricted

Use of data

[Things to consider when using data shared through SND](#)

License

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Versions

Version 1.0. 2020-06-03

Homepage

<https://www.smog.chalmers.se/time-model>

<https://www.chalmers.se/en/projects/Pages/GIS-based-Time-modelQ.aspx>

Related research data in SND's catalogue

[Spatial Morphology Lab 01. International laboratory for comparative research in urban form. Street networks, Sweden - Non-Motorised network of Gothenburg](#)

[Spatial Morphology Lab 01. International laboratory for comparative research in urban form. Street networks, Sweden - Motorised network of Gothenburg](#)

[Spatial Morphology Lab 01. International laboratory for comparative research in urban form. Street networks, Sweden - Non-Motorised network of Stockholm](#)

[Spatial Morphology Lab 01. International laboratory for comparative research in urban form. Street networks, Sweden - Motorised network of Stockholm](#)

[Spatial Morphology Lab 01. International laboratory for comparative research in urban form. Street networks, Sweden - Non-Motorised network of Eskilstuna](#)

[Spatial Morphology Lab 01. International laboratory for comparative research in urban form. Street networks, Sweden - Motorised network of Eskilstuna](#)

[Spatial Morphology Lab 01. International laboratory for comparative research in urban form. Street](#)

[networks, Sweden - Motorised network of Västra Götaland
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GIS-based Time model. Gothenburg, 1960-2016_2](#)

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