



Origin Destination Matrices

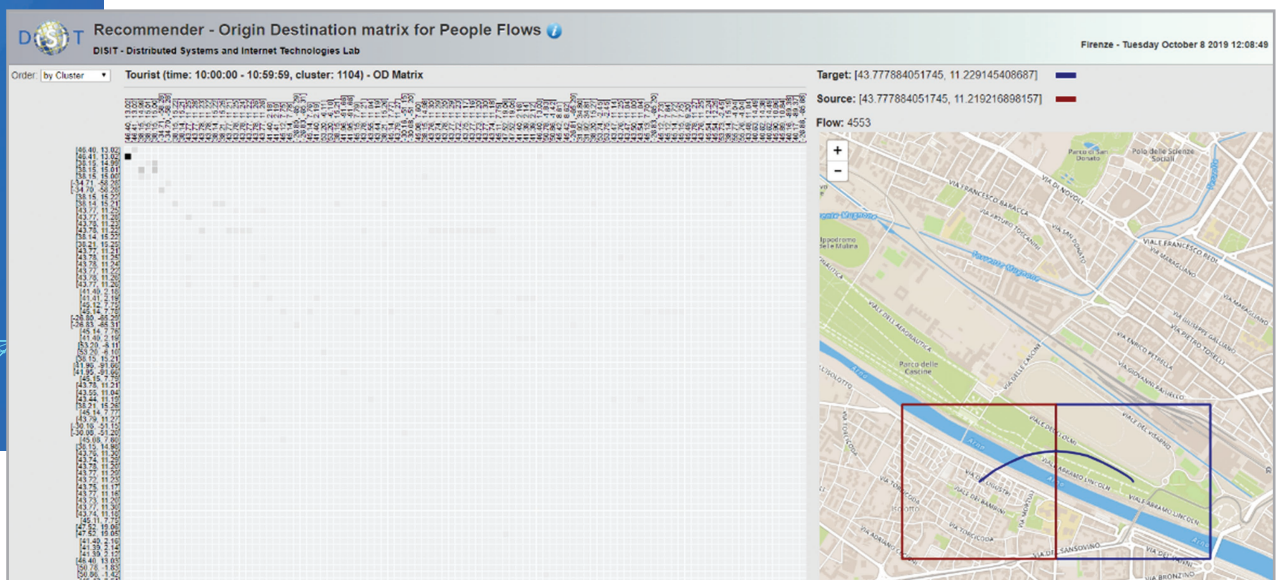
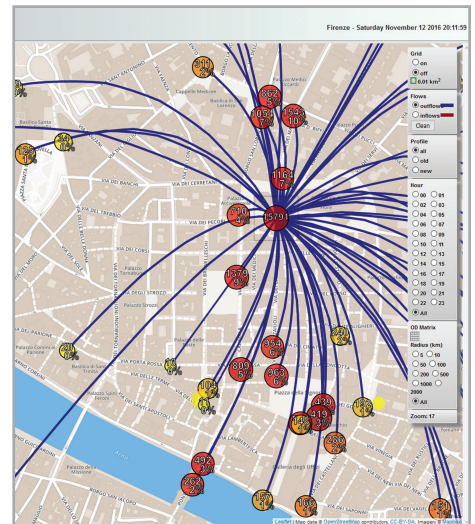
The City Operators and Strategists on mobility and transport, on tourism and economic develop need to have precise view about the city users are moving. From where they arrive, which kind of travel means are using, how they move in the city and in which time slots, etc., and their profile. Most of these answers are provided in terms of Origin Destination Matrices, ODM. These can be computed from several different data sources, thus providing different views of the city flows:

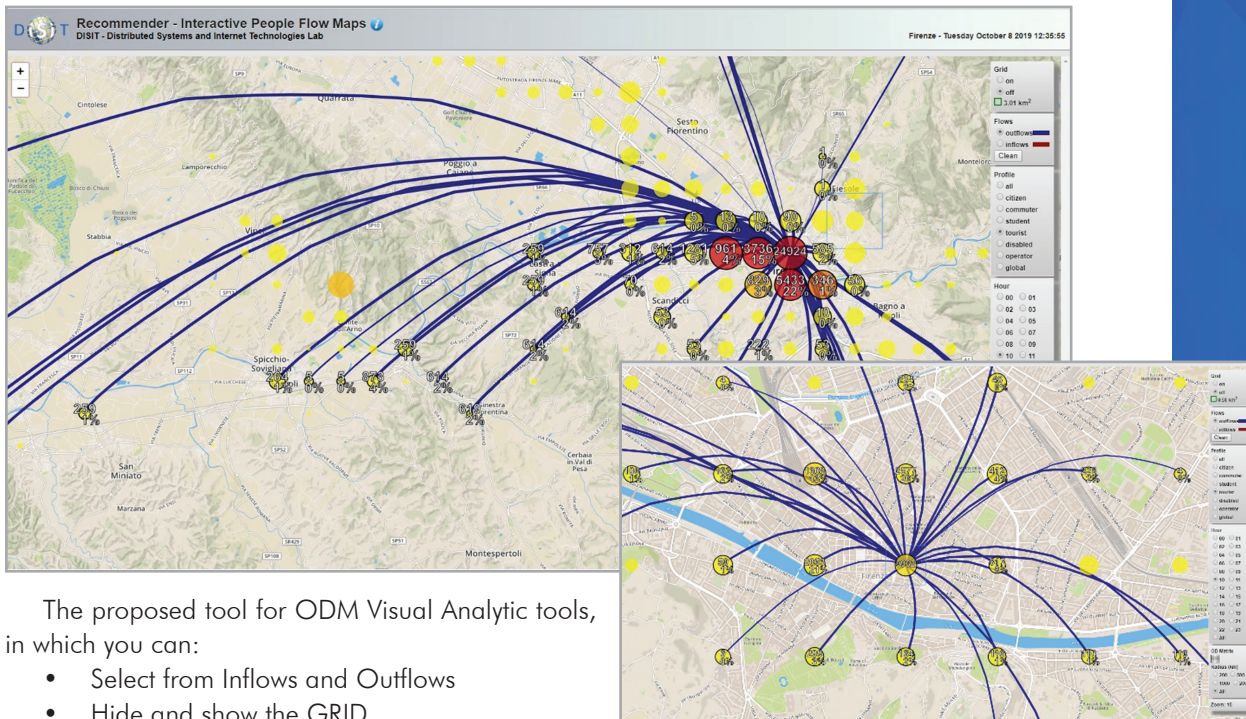
- **Traffic flow sensors:** reporting the private traffic flow and eventually traffic from touristic busses, and not in the areas close to traffic.
- **Mobile Apps:** reporting the movement of the people, in the city and among the cities, inflow and outflow.
- **On board units:** for example, coming from taxis, from insurance black boxes, bus OBU, etc. Also, in this case a partial view of the flow is produced according to the different kind of sources and the number of trajectories.
- **Census data:** data collected from the periodic census in which also some questions related to the commuters: workers, students; which is asked to describe their day travel means to go and return for studying and working.
- **People tracking** tools, for example using Wi-Fi and/or Bluetooth sniffing devices, TV cameras, etc.
- **Cellular network data**, coming from the Telecom Operators, referring to cells or clustered areas.

Due to the introduction of GDPR some of the above data are becoming harder or practically impossible to be obtained. All these kinds of ODMs can be used for simulation and analysis tools, for direct visualization, define new strategies. Tools for the simulation and analysis may derive suggestion for public transportation, city consumption, city cleaning, service tuning, etc. Direct visualization on a visual analytic tool allows to perceive the critical aspects in a glance.

For ODM visualization, the classical matrix representation is not very effective since the matrices tends to the very sparse. See for example the figures.

An alternative, directly invented by DISIT lab is the Spider Representation. The Visual Analytics tool for OD Matrix representation of DISIT Lab is rendering OD matrices as Spiders is much more powerful for the direct understanding of the flows in the city.



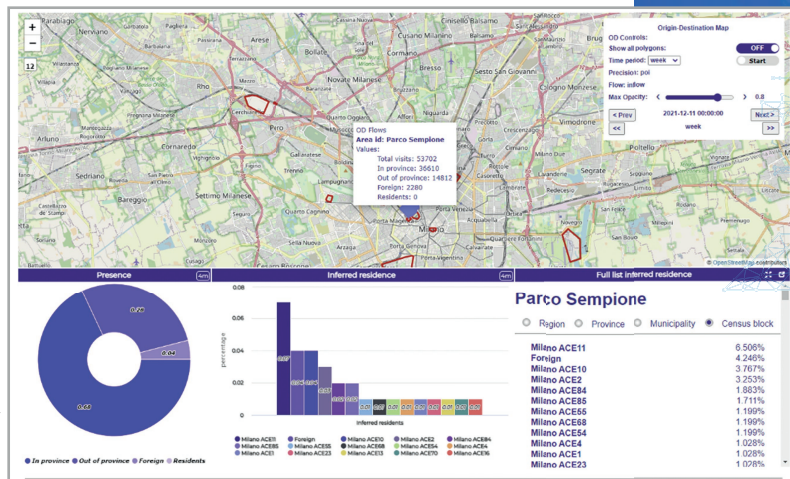


The proposed tool for ODM Visual Analytic tools, in which you can:

- Select from Inflows and Outflows
- Hide and show the GRID
- Select the user profiles among: citizens, commuters, students, tourists, etc.
- Change the resolution and thus see the ODM at different level of resolution, that means addressing different size of the areas. The areas can be squared as in the above case (with data coming from mobile Apps, OBU, etc.) or non-squared as those coming from Wi-Fi, or cellular data, etc. For example, in the figure the ODM computed from Wi-Fi data is reported.
- Define the time slot or see the whole 24 hours
- Show the distribution on barseries, Pie, and histograms
- Work on different areas: region, province, city, MGRS, ACE, etc.
- Show animations for showing the evolution of the ODM
- See the evolution over time of the ODM sequence.

The computation of the scalable ODM is time consuming and it is typically updated daily taking into account data of the last months, years, or weeks.

Simplified version of the tools could be used for communicating with the citizens and business operators of the city, for example, see the Dashboards produced for Life in Antwerp, Life in Helsinki in which a view of ODM as spider is proposed. And those produced for ENEL-X presented here in the last figure.



- TC1.18: Origin Destination Matrix: <https://www.snap4city.org/459>
- Dashboard Life in Helsinki with OD matrix: <https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTc1Mg==>
- Dashboard Life in Antwerp with OD matrix: <https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTcwNg==>
- Dashboard Life in Toscana with Origin Destination matrices: <https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTc3NA==>

Extended version accessible from: <https://www.snap4city.org/544>

Contact: <https://www.snap4city.org>

Partners: Snap4, ENEL X