

## EIT Digital – Industrial PhD position proposal

### PhD thesis information

PhD Thesis – Title	<b>City Enabler for Digital Urban Services (II)</b>
PhD Thesis – Short summary	This thesis will concentrate on developing a data-driven computational framework to predict and enable the so-called <i>urban vitality</i> . Urban vitality is referred to as the synergy arising from a variety of commercial and entertainment opportunities, and a dense, socially heterogeneous, pedestrian population. More precisely, the goal of the thesis is to: i) identify the urban conditions (e.g. land use mix, mobility, safety perception) that magnify and influence urban life; ii) study their relationship with cities’ outcomes like innovation, vitality, quality of life, and social cohesion, etc.; and iii) envision data-driven guidelines and tools (dashboards, simulation tools) responsive to the real-time demands of citizens and policy-makers.
Rationale/challenge	<p>Cities are essential crucibles for innovation, tolerance, novelty, and economic prosperity, but they also face challenges in terms of, for example, traffic, pollution, segregation, isolation, etc.</p> <p>A fundamental research question that policy makers, urban planners, sociologists and economists are investigating is “what creates a vital urban life?”</p> <p>Nowadays, urban data can be leveraged to build a computational framework able to understand and predict urban vitality. However, these data are often closed within silos and therefore it is extremely hard for policy makers and urban service providers to get access to available and valuable knowledge. There is a strong need for novel approaches that help opening up, analysing and exploiting all these scattered urban data, covering a wide range of data from different sources (e.g. open, sensor, free, closed, linked data).</p>
Innovation	<p>As a solution the thesis will provide a computational framework to describe, predict and replicate the underlying mechanisms of cities using data mining and machine learning techniques, but also heterogeneous data automatically sensed from the environment. Specifically, the thesis plans to leverage data from public (e.g., national census, household survey, cadastral data) and commercial entities (e.g., Foursquare, telcos, etc.) to infer how the city is vital, livable and how this influences the behavior of people.</p> <p>The main novelties of the intended solution will be both on the analytics side, where a multi-source integration of urban data will enrich predictive models of urban outcomes (e.g. traffic, livability of an urban area, etc.), and on the application side, where our approach has the ultimate goal of providing a tool (e.g. a dashboard) for policy makers for visualising daily urban dynamics and to test and to simulate the effects of their decisions. These insights will be the basis for interventions in the Autonomous Province of Trento and in other municipalities in Italy, Europe and worldwide that FBK and Engineering are currently working with (e.g. Rimini in Italy, the cities of the FIWARE and OASC network in Europe, the city of Andorra, Bogotá in Colombia,</p>

	etc.). In general, the proposed framework can easily be extended and applied by different municipalities.
Research focus/topics	The focus of the thesis will be the development of urban analytics methods to describe, predict, and simulate the underlying mechanisms of cities. These approaches will make use of data mining and machine learning techniques leveraging heterogeneous data automatically sensed from the urban environment. More precisely, we plan to leverage data from public actors (e.g., national census, household surveys, cadastral data, public transportation data, etc.) and from private entities (from social media such as Twitter, Foursquare's Point of Interests, data from telecommunication companies, etc.) to infer how the city and its neighborhoods are vital, safe, the role they play to drive innovations and to enforce the sense of community, etc; and how these characteristics influence the behaviors of people (e.g., mobility, spending, interaction patterns, etc.). Given the multitude of aspects to explore in cities, we will focus on a sub-sample: i) the urban conditions (e.g. land use mix, mobility) that influence urban life; ii) to study their relationship with cities' outcomes like innovation, livability, sense of community; and iii) to envision data-driven guidelines/services responsive to the real-time demands of citizens and policy-makers.
Expected outcome	<p>This thesis provides a twofold contribution. First, it designs a framework to understand cities by computational tools and new sources of data able to describe urban life with an unprecedented breadth, scale and depth. Second, it shows the many potential policy applications of our approach, by building tools and data-driven services for the municipality and the citizens.</p> <p>A concrete byproduct of the thesis work will be a dashboard to visualise and simulate the effects of municipality decisions that can be used to enforce a discussion between administration and citizens.</p>
EIT Digital Action Line	Digital Cities

## Partnership

Industrial partner	<a href="#">Engineering Ingegneria Informatica S.p.A. - ENG (Italy)</a>
Research partner	<a href="#">Fondazione Bruno Kessler - FBK (Italy)</a>
HEI granting the title	<a href="#">ICT International Doctoral School – University of Trento</a>
DTC location	Trento
PhD duration	3 years