FinEst Centre
for Smart Cities

SMART CITY CHALLENGE 2025

City Challenge

Max 3 pages

send to smartcity@taltech.ee by Sept 30, 2025

Challenge Title – (max 5 words, no acronyms)

Digital Twin for Disaster Management

City/county and country

Bağcılar, Istanbul, Turkey

Main contact from your city/county – name, organization, job title, e-mail, phone

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1. What is the future urban challenge that would need a solution to?

- **Please describe the challenge of your city / county neighboring a city?**
  As one of Istanbul's most densely populated districts, Bağcılar is highly vulnerable to disasters such as potential earthquakes, floods, or industrial accidents. Our current disaster response plans are largely static and reactive, meaning they are activated after a disaster occurs. However, the chaos that would ensue during a disaster (collapsed roads, communication breakdowns, instant population movements) could quickly render these static plans ineffective. Our fundamental challenge is the inability to manage our limited resources (fire brigades, ambulances, search-and-rescue teams, construction equipment) in the most efficient way during and immediately after a disaster, and to provide our citizens with instant, accurate, and life-saving information.
- Which category your challenge is primarily in: safe city, happy city, and climate resilient city?
  Our challenge is primarily in the **Safe City** category, as it directly targets the protection of our citizens' lives and urban infrastructure. Concurrently, it is also strongly related to the **Climate Resilient City** category, as it involves preparing for sudden events like flash floods and storms linked to climate change.
- Why is it important for your city to solve it? How big priority it is for you and why?
  Solving this challenge is of vital importance, as it pertains to our municipality's most fundamental responsibility: protecting the lives of our citizens. It is our **highest priority**. Minimizing the loss of life and property in a potential disaster is not just an infrastructural issue but also a social and administrative imperative. Effective disaster management will accelerate our city's recovery process and prevent social panic.
- Is this a unique challenge/problem of your city, why or is this by your knowledge a challenge/problem that many cities have – which kind of other cities?
  This problem is not unique to Bağcılar. It is a common and global challenge for all densely populated cities with complex infrastructure, especially megacities with high seismic risk such as Tokyo, San Francisco, and Mexico City. Furthermore, coastal and river cities with increasing risks of floods and storms due to climate change are in urgent need of similar proactive management systems.

2. Innovation.

- How have you solved that issue so far? Why aren't the present solutions good enough? Are there legal obstacles, which ones?

Until now, we have tried to address this issue through static disaster response plans, designated assembly areas, and paper-based scenarios prepared in coordination with AFAD (Disaster and Emergency Management Authority). However, these solutions cannot reflect the dynamic and chaotic nature of a disaster. The closure of a single road or the collapse of a bridge can invalidate the entire plan. Current systems cannot integrate data from different institutions (fire department, health services, police) in real-time and cannot dynamically calculate the best intervention routes. Legally, regulations concerning real-time data sharing between different institutions and the use of personal data (such as anonymized location data) under the Turkish Personal Data Protection Law (KVKK) are potential obstacles to establishing an integrated system.

- What should be the main features, characteristics of the future solution to be potentially best for that challenge or problem?

  The ideal future solution must be a **Dynamic Decision Support System**. Its core features should be:

  - It must integrate our Municipality's Digital Twin infrastructure, IoT sensors (building damage, water levels, etc.), and anonymized population density data from mobile operators into a single platform.
  - It should process incoming data to simulate possible scenarios (e.g., "If this building collapses, which roads will be blocked?") within seconds and recommend the most optimal resource (ambulance, fire truck) allocation using artificial intelligence algorithms.
  - It must provide citizens with instant mobile notifications about the nearest assembly points, safe routes, and emergency information based on their location.

3. Expected impact of your pilot solution.

- What is the expected impact to your city environment you expect to see if the challenge gets solved?
  Faster detection and intervention for critical post-disaster infrastructure damage (gas leaks, water pipe bursts, fires) are expected. This will prevent secondary disasters and ensure less damage to the city's physical environment, thereby increasing urban resilience.
- What is the expected impact to your citizens you expect to see if the challenge gets solved?
  The most significant impact will be the **reduction in the loss of life**. By receiving accurate and timely information, citizens will be able to move to safe areas without panicking. The response time for injuries will be shortened as emergency teams reach those in need more quickly.
- What is the expected impact to your city governance you expect to see if the challenge gets solved?
  Our city governance will shift from reactive and estimation-based decision-making in a crisis to a **proactive and data-driven decision-making model**. Full coordination and real-time information flow between different departments (Fire, Police, Public Works, Health) will be established, which will fundamentally transform our municipality's crisis management capacity.

4. Piloting

- Why would you be interested to become a piloting partner of a proposed solution to the challenge you are describing here? Describe shortly your capability to participate.

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As Bağcılar Municipality, we are highly interested in becoming a piloting partner for this solution because this is not just a technology project; it is an opportunity to fulfill our most fundamental responsibility to our citizens. Our capacity to participate is significant:

1. We have an ongoing **Digital Twin project** that we are currently developing, which includes all infrastructure, building, and geographical data of our city. This means the pilot project will not start from scratch but will be built upon an existing and rich dataset.
2. Our IT Department has an experienced team in big data, GIS (Geographic Information Systems), and smart city technologies.
3. Bağcılar's dense population, complex urban fabric, and urban transformation areas offer a perfect environment to test the developed solution under the most challenging and realistic conditions.