



More than half of us live in cities. By 2050, two thirds of all humanity, which is 6.5 billion people, will be urban. Cities occupy just 3 percent of the Earth's land, but account for 60 to 80 percent of energy consumption and at least 70 percent of carbon emissions. Rapid growth of cities and the way we build and manage our urban spaces requires significant transformation in order to achieve sustainable development and to prevent irreversible damage to the planet. We need to act together and we need to act fast.

Technologies such as the Internet of Things (IoT), 3D printing, artificial intelligence, virtual reality, blockchain and other essential technologies as explained in our Demystifying

Tech module are powering the fifth industrial revolution and have the potential to help us solve environmental challenges and reach climate goals. Digital transformation is a process where these technologies are replacing traditional methods and enabling a higher level of performance, innovation and creativity. We need to use digital technology to engage and empower governments, companies and citizens to adopt environmentally sustainable practices, policies and business models.

When we speak about technology, what usually comes to our mind are "hard" technologies, such as equipment. However, we can also talk about very important "soft technologies", such as information, research, training and capacity-building.

USE CASE:

Genova | AMT mobile application

Country	Italy
Population	560.688 (2022)
Use case on	urban mobility

The AMT mobile application was launched in February 2019, with the aim of improving local public transport services and simplifying the travel journey of over thousands daily active users.

The AMT app's functionalities are multiple:

- It covers the entire AMT service in one touch: each line and service, in fact, have a dedicated page with full schedules and routes. Any service changes, delays or temporary service interruptions are always notified to the users in real time.
- It reduces - or even eliminates - the waiting time for buses, by monitoring in real time the expected waiting times on over 2000 stops.
- It enables digital ticketing and subscriptions, using credit cards or other cutting-edge payment technologies. In this way, passengers can use their smartphones as a travel document.

To facilitate multi-modal transportation, the AMT app manages 149 lines of urban and sub-urban buses, but also trains, elevators, funiculars, navebus, volabus, underground and school services.



Starting from the launch of the app, there have been over 230,000 active users (of which more than 45,000 daily) and over 20,000 digital subscriptions, with an average of about 4,000-day tickets purchased on the app.

For Genoa, having an important asset like this mobile application is important for several reasons that go beyond providing a useful tool to their customers:

- It enables them to monitor and evaluate the status and performance of public transportation, to improve it and provide users with increasingly better services;
- It helps them to better understand passengers' needs and expectations and strengthen customer satisfaction by offering them innovative functionalities;
- It represents a "piece of the jigsaw" in terms of the overall creation of a smart city with smart citizens.

Source: <https://www.interregeurope.eu/good-practices/amt-mobile-application>.

USE CASE:

Oslo's Traffic Agent app | Game to improve road safety

Country	Norway
Population	702,543 (2022)
Use case on	urban mobility

Oslo is keen for its 44.000 primary school children to walk or cycle to school, but parents were increasingly concerned about the speed of traffic and the safety of crossings. In order to make streets safer and walking to school more popular, Oslo's Agency of the Urban Environment decided for a comprehensive review of traffic security for children.

The city decided to create a crowdsourcing tool to capitalise on children's knowledge of problems, as they are some of the most active walkers in Oslo. Thus, the idea of a spy-based game for mobile phones and tablets was co-developed with children, teachers and parents.

Tracking children's movement by GPS, the app uses an "agent" voice and lively animations to guide them through the process of reporting dangerous spots on their way to and from school: where crossings need repairing, cars go too fast or overgrown bushes force them to step into the road.



The app allows children to input information anonymously and is integrated with Norway's school software platform which generates a code for each child to use as a login. The data generated can be filtered for analysis by area, date, class, school and mode of transport and processed by the Institute of Transport Economics and Geodata, part of Oslo's Agency for the Urban Environment. This helps prioritise road maintenance needs for the next year's budget. Acting quickly on the data collected is crucial for the app's success as it demonstrates to parents that there is immediate benefit to their child's safety.

The Traffic Agent engages young children through gamification, raising awareness on their role in the community. This early exposure to civic responsibility is an important spillover effect of the application.

Source: <https://use.metropolis.org/case-studies/the-traffic-agent>

USE CASE:

Aarhus | Waste Hero

Country	Denmark
Population	349,433 (2022, metropolitan area)
Use case on	Waste management

The City of Aarhus - Denmark's second-largest city - uses digital technologies to optimise their waste collection operations.

The main problem to be tackled was the large number of collections (approximately 152,000) per year across 3005 containers, on average only 40% full. This caused high costs, excess CO2 emissions and fuel consumption, as well as unnecessary traffic and high noise levels in the city.

In addition, there was no data collection system to enable dynamic route planning and fleet optimisation, as waste collection routes were carried out on fixed weekly intervals, and couldn't be changed by planners according to roadworks or events in the city.

The City's utility and environmental enterprise decided to digitalise the entire waste management operations and connect all team members in one central ecosystem. The main improvements were:

- WasteHero's smart bin sensors have been installed across the city to gather and analyse data on container fill levels. Collections were optimised to a more efficient schedule, when the bins are 90% full or above;
- Drivers are equipped with in-cab technology for navigation and documentation of collection events, which enables the tracking of vehicle and driver activity in real-time, as well as the flexibility to add or remove stops as needed;



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- An integrated, data-driven management system has been introduced. It works as a portal for centralised management of fleet and route operations, enabling improvements across operations.

In addition to the rationalisation of overall performance, other benefits include significant cost savings: the average number of collections can be reduced by 55%, providing a saving of DKK 8.3 million annually, and DKK 33 million over four years.

Also, the costs for fuel consumption, labour, and vehicle wear and tear have been reduced. This has empowered a cleaner and greener operation, with vehicles driving only when necessary, reducing traffic congestion and decreasing CO₂ emissions.

Source: <https://wastehero.io/?cases=aarhus-kommune-case-study>

USE CASE:

Smart Prague

Country	Czech Republic
Population	1.318.000 (2022)
Use case on	Energy efficiency

“Smart Buildings and Energy” is one of the key axes of the strategy “Smart Prague 2030”, implemented by the City of Prague to achieve a better quality of life thanks to the active use of modern technologies. Within this vision, the huge potential of energy savings in buildings will help to reach the goal of reducing CO₂ emissions by 45% by 2030.

To do this, the City has decided to take concrete actions in three main strategic areas:

- Building energy system - Initial building analysis using a proprietary methodology has been carried out on the city owned buildings, in order to rate the suitability of buildings for various energy measures and innovations.
- Energy management - In 21 buildings, electricity, gas, water and heat consumption was monitored, as well as air temperature, CO₂ and humidity levels using specially combined monitors. A special sensor for monitoring volatile air substances and odours was also installed. The City receives graphic displays of the consumption of commodities and measured levels from sensors of the indoor environment. Based on this data, energy management is able to discover potential water leaks, optimise heating and regulate electricity consumption, with significant savings in terms of costs and CO₂ emissions (1t/year of CO₂).



- Energy savings using the Energy Performance Contracting (EPC) Method which is a type of a contractual relationship in which the supplier guarantees to the customer the contracted savings; if the guaranteed savings are not achieved, the supplier compensates the difference by taking advantage of the overall energy savings guaranteed by the energy management of public buildings (e.g. the Municipal House, the Municipal Police Directorate, etc.). This process has been carried out through the application of standard measures, as well as special technologies, such as energy saver device which adjusts the voltage fluctuation of electricity, extending lifetime of electricity devices and saving 15% in consumption; photovoltaic panels; preheating of pool water with waste shower water using a heat pump; innovative technology for cleaning and reusing pool water (this technology saves 30% in water consumption)

The expectation is that these initiatives will save 50% of the energy used for lighting, 11% of heating and gas, and 20% of water consumption.

Sources:

- https://eu.eventcloud.com/file_uploads/41e1c677e91483679e5c9f14dd79a5ab_SP_Energetika_Presentation_finalbyJIRKAPETERKA.pdf
- <https://smartprague.eu/en>

USE CASE:

Guimarães | 5G Ready

Country	Portugal
Population	162.572 (2022)
Use case on	Energy efficiency

Guimarães is developing an integrated strategy to continue building itself as a smart and sustainable city. The basis for this strategy relies on the use of ICT to improve the quality of life, efficiency of urban operation and services and competitiveness, along with innovative digital solutions to foster local development, economic growth and citizens' engagement.

The city of Guimarães has recently introduced a pioneering project aimed at modernising public lighting networks using a remote management platform to collect consumers' consumption data to parameterise usage profiles and remotely control street lights (LED).

In particular, the project consists of the implementation of intelligent lamp posts which are equipped with a 5G network and electric vehicle charging systems. The



applied solution allows integration of almost every service that is being provided at street level, including smart light with dimming and safety-supporting controls, video surveillance for public security, GPS, Wi-Fi provision and Telecom antenna, EV (electric vehicle) charger, complemented with a remote management platform.

A smart, connected lighting system is part of a local, wireless, decentralised network with local or cloud-based intelligence. Data is collected from sensors or cameras on the lamp posts, around daylight, movements or noise detection. This data is then processed to derive optimal energy-efficient and safety-supporting operation of the public lighting.

Source: Sources: <https://www.mdpi.com/2304-6775/9/4/49/pdf>

USE CASE:

Bassa Romagna I Food app

Country	Italy
Population	101.500 (2020)
Use case on	Sustainable food chain

The Union comprises 9 municipalities in the Region of Emilia-Romagna.

As a partner of the URBACT Action Planning Network Food Corridor, the Union of Bassa Romagna Municipalities has worked on the topic of sustainable food systems in the framework of health, environment and climate change. The ULG has focused on the three dimensions of the UN sustainable development goals: economic, social and environmental challenges, reflecting the diverse composition of the local group.

In economic terms, the focus has been on the innovation processes that, among other things, has enabled the creation of food start-ups which rely also on tech to innovate the local value chain.

In social and environmental terms, proximity food that includes production of food from “farm to fork” has been a main strategic concept. The ULG has planned actions around “territorial marketing” to support responsible and healthy consumption of local food. Another significant aspect concerned solidarity and fight against poverty by redistributing excess food that would otherwise go to waste. The Emporio Solidale, a well-established NGO in the region, has been delivering food to vulnerable groups and families for decades.

If the pandemic has made it harder for the Bassa Romagna stakeholders to socialise and work together in real life, it has also made the group more aware of the potential of digital tools for their purposes. The network used the URBACT funding for ‘small scale actions’ to develop an app which brings together the three – interconnected – areas of the Integrated Action Plan:

1. Proximity food (KM 0)
2. Territorial marketing
3. Surplus food for solidarity purposes.

The first function collects a geolocated territorial map with the name of local producers and sellers, featuring the history of the companies, local markets and tourist-farms, the products and other information for citizens and consumers. The second function which collects typical food products is still being developed.

Two noteworthy lessons from this experience have been highlighted by the Union of Municipalities:

In this area, solidarity actions are still much “brick and mortar”, this is mainly due to the average age of volunteers and NGOs operating in this social field. Before developing the app as a tool for food redistribution (as seen in the example of Belgrade), it will be necessary to foster a digital culture for charity and social workers.

The app is available for the Android phones and not (yet) on IOS because of different views on the concept of “territorial marketing”. While the Apple platform reads “marketing” as a tool for increasing revenues, the municipalities consider this kind of marketing as a public service for territorial development.

USE CASE:

Ghent en Garde

Country	Belgium
Population	472,000 (2022)
Use case on	Sustainable food chain

The Belgian City of Ghent launched an all-encompassing, cooperative project called “Ghent en Garde”, aimed at making food production, consumption and waste management more sustainable, healthy, resilient and environmentally-friendly, as well as ensuring social access to provisions.

The project’s initiatives all come together under the direction of the Food Council, a body made up of farmers, entrepreneurs, civil society members and researchers who work in tandem with the municipality to transform the city’s food chains. By now, 20 initiatives have already been implemented in the framework of Ghent en Garde:

- An online platform has been created to connect farmers with restaurants and food stores, promoting a short sales chain for locally-grown products, allowing both farmers and buyers to lower costs by sharing expenses for transport, IT and promotion while making good quality food available to customers.
- With the aim of reshaping residents’ habits and fostering dietary changes, the initiative “Thursday Veggie Day” encourages residents to lower their meat consumption by eating vegetarian at least once a week. From schools and public services, the campaign has spread to shops and restaurants and includes vegetarian cooking workshops for both restaurants and residents.



© Bas Bogaerts

- The programme “Foodsavers” has been launched to stop leftovers from being wasted. It has so far managed to redistribute 1,000 tons of supermarket food surplus to poverty associations and soup kitchens, with positive impacts also in terms of carbon emissions and long-term unemployment.

The main results achieved so far include a reduction of food waste, better access to fresh meals for poorer people, a 7% increase in the number of vegetarians, and more sustainable and healthy meals available to thousands of students.

Source:

<https://eurocities.eu/stories/ghents-food-revolution/#:~:text=Ghent%20en%20Garde%20is%20the,clients%20in%20the%20Belgian%20city>

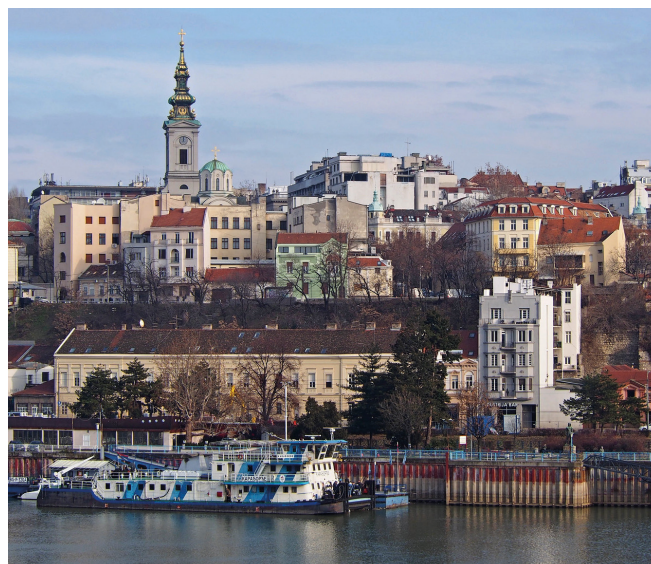
USE CASE:

Belgrade | FoodSHare

Country	Serbia
Population	1.405.000 (2022)
Use case on	Sustainable food chain

In Belgrade, Serbia, the web-based platform FoodSHare was launched in 2021. It connects food donors, recipients and volunteers to reduce food waste, aiming to streamline surplus food donations to socially disadvantaged groups by facilitating communication and logistic processes.

Donors in the form of shops, restaurants, hotels, and public institutions like hospitals and universities can post donations on both a regular and a one-time basis and can choose from an array of FoodSHare’s recipients. On the other hand, charities and community groups set up their preferences: potential recipients receive a notification telling them about items of interest and arrange to collect the food directly from the donor. If the food is suitable for composting or growing projects, then the groups that might be interested in it will also be alerted. Matches are based on donors’ and recipient organizations’ profiles, including the type and quantity of food they donate or need, their proximity and timing.



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FoodSHare platform is totally free of charge for the food industry, NGOs, local charities, voluntary organizations and foundations. It is supported by the local Food Bank, a key actor to enable and organize the collection of surplus food through networking of the different food-system actors.

Source: <https://wedocs.unep.org/bitstream/handle/20.500.11822/37352/RCFW.pdf>

USE CASE:

Alba Iulia | URADMonitor

Country	Romania
Population	66.085 (2022)
Use case on	Pollution control

In the framework of the pilot project “Alba Iulia Smart City 2018”, the municipality of Alba Iulia (Romania) has taken concrete actions to reduce air pollution using technology. Advanced air quality monitoring stations - uRADMonitor - have been installed on public transportation, to determine exactly which areas of the city have poor air quality, so that the administration can intervene. These detectors equip the smart city with sensors for various pollution factors: Particulate Matter (PM2.5, PM1, PM10), Ozone, Formaldehyde, Carbon Dioxide, Volatile Organic Compounds (VOC), as well as temperature, barometric pressure, air humidity and noise.

The sensors have been installed on 15 buses that are equipped with Internet connectivity (Ethernet, Wifi, GSM) or LoRaWAN access. The data collected offers information about pollution levels in the city and its periphery. The data is transmitted to the Smart City platform in real-time towards a dashboard that is accessible via any internet connection, offering updated information about pollution levels at different times and locations.



Based on the Alba Iulia experience, the same solution has been installed in other public transport vehicles in Bucharest, Cluj-Napoca, Iași and Timișoara. Today this kind of technology is present in over 40 countries in the world.

Source: <https://www.uradmonitor.com/alba-iulia-becomes-first-romanian-smartcity/>

USE CASE:

South-Eastern Bay of Biscay | FML-TRACK

Country	Spain /France
Population	N/A
Use case on	Pollution control

The «Floating Marine Litter Tracking» (FML-TRACK) solution aims to map floating waste in estuaries and along coasts, predict its movement and track its source by identifying how the waste reached the marine environment. Operating along the north-eastern Spanish and south-western French coasts since June 2020, it provides vital support in the fight against marine pollution. FML-TRACK uses a set of new technologies to monitor and track marine litter's origin and destination across the coastal ocean: it combines video monitoring, satellite imagery and metocean observation and modelling and offers both online and offline services, including:

- an online dashboard centralising in a simple way all the information related with day-to-day marine litter management in a certain region, including both real time monitoring and hotspot predictions for the next days;
- Real-time decision-aid alerts to promptly address any dangerous phenomenon;



- Offline reports on data statistics, analysis and diagnosis. All this information supports public administrations, cleaning companies, associations and scientists to better understand phenomena and optimise the decision-making process of marine litter management strategies. FML-TRACK is a downstream service of Copernicus Marine Service, which empowers the service by providing reliable in situ information, satellite imagery and ocean current fields to feed the monitoring solutions and predictive models supporting the service.

Source: : <https://marine.copernicus.eu/services/use-cases/fml-track-floating-marine-litter-tracking-coastal-areas-0>

USE CASE:

GreenQuays Breda

Country	Netherlands
Population	184.706 (2022)
Use case on	Biodiversity

Like many other cities in Europe, Breda is facing the consequences of intense urbanisation and non-inclusive urban planning, which have led to the deterioration of urban ecosystems and a lack of resilience to climate change.

To address these challenges and to provide citizens with healthy and liveable conditions through sustainable development and regeneration, local authorities promoted nature-based solutions as a tool to renature urban rivers in dense downtown areas, where there is insufficient space for developing natural riverbanks.

The solution chosen is centred around the Innovative Nature Inclusive Quay (NIQ) technology that is specifically designed to support the development of a complex vertical ecosystem, providing favourable conditions for flora and fauna. This solution matches with the other project goals of making the quays nature-inclusive and navigable to achieve the final design that provides cooler microclimates along the quays and in surrounding (green) public spaces.

For instance, the GreenQuay project focuses on four ways to provide cooling and relief from heat for people: shading and ventilation by green and gray elements, water



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vaporisation by fountains or nozzles, broad accessibility to waterways, and reducing long-wave radiation and increasing water infiltration through permeable surfaces and vegetation.

GreenQuays also builds on systemic innovation, integrating climate-responsive, spatially regenerative, restorative, biophilic and economically empowering approaches. The technical solution is supported by social innovation, through applying an intensive participatory co-design process, targeting the active engagement of external stakeholders and citizens.

Source: <https://uia-initiative.eu/en/news/making-bredas-natureinclusive-quays-also-climateresponsive>

