White paper

Redefining waste collection for the modern era

Explore how an IIoT solution, transforms waste management by optimizing routes, reducing costs, and enhancing sustainability

sensoworks

SUMMARY

1. Acknowledgements

Cities are the places where the concept of civilization takes shape. They are the birthplace of creativity and innovation and play a fundamental role in the global economy. In fact, 54% of the world population lives in urban areas and is responsible for 85% of the global GDP.

Modern cities produce over 70% of global anthropogenic emissions and 75% of the total consumption of natural resources, besides being the cause of 50% of global waste production and 80% of greenhouse gas emissions. Between 1950 and 2005, the level of urbanization grew from 29% to 49%, while global carbon emissions from fossil fuels increased by 500%. This highlights how resource consumption and environmental impact follow exponential trends associated with unmanaged forms of urbanization, construction inefficiency and poor infrastructure use (read more on this topic, here).

For these reasons, cities represent a great opportunity for the development of a new vision of a circular economy. They have primary economic drivers and, therefore, they represent the chief physical and political engine for the transition to models of circular economy.

The goal of this white paper is to show how an IoT platform integrates with the founding principles of the circular economy to provide an excellent all-round solution for strategic drivers. Sensoworks' IoT platform in particular, not only can communicate with smart devices across the installed network, but it can also trace all the incoming and circulating information back to the "City System", so as to optimize all its outputs.

Hence, this white paper works into a broader business strategy and will be followed by other similar resources and activities, all aimed at informing our readers about a case study on waste management project and technological advancements on strategic industries and markets.

If this work of ours helps you and your company better understand what your organization needs and where to direct your efforts, we will have achieved our key goal.

Hold fast,

Niccolò De Carlo
CEO and co-founder of Sensoworks

2. What is Sensoworks

Sensoworks is the **IIoT solution** that integrates IoT devices with company systems and cloud infrastructures. It's a ready-to-use, "made in Italy" platform for the remote management and control of complex infrastructure systems.

Waste management and collection are critical aspects of urban infrastructure. Inefficient waste collection can lead to increased operational costs, environmental concerns, and inconvenience for residents. Sensoworks, an Internet of Things (IoT) solution, combines a versatile platform and edge computing software to revolutionize the waste collection and picking process. Sensoworks is designed to address these issues by leveraging IoT technology, providing real-time monitoring, and enabling data-driven decision-making.

3. Our vision

As technology advances, devices and systems will become more advanced and sophisticated, with the ability to gather and analyze data, understand and respond to human behavior, and even predict and take actions to meet human needs. This can lead to more personalized and tailored experiences for users, and a more efficient and effective relationship between humans and technology.

The ability for humans to empathize with objects through the use of technology can have a significant impact on society by creating more efficient, reliable, and sustainable infrastructures and systems. For example, by using sensors and monitoring waste bins to gather data on the condition, garbage levels and maintenance, engineers can decrease operational costs, environmental concerns, and inconvenience for residents. This can help to reduce the environmental impact of infrastructures and lower costs for occupants, leading to a more sustainable built environment. Sensoworks allow humans to gather data from a variety of sensors and devices. This data can be analyzed and interpreted in real-time, providing humans with a more comprehensive understanding of the object's condition and performance, and enabling them to make more informed decisions about the object's maintenance and repair.

4. Cities of tomorrow

A) A lesson from sci-fi

In the world of science fiction, many authors envisioned all kinds of future as social and technological evolution. This evolution, this kind of future, never overlooks the places where society blossomed and how these developed the civil structures to integrate technology and living habits in the best possible way. Isaac Asimov is regarded as the father of science fiction. He is the first author to have elevated science fiction to a high level of literature.

In his works, we find future and reality merged together with a touch of "plausibility", which gives us the impression that his writings could become reality in the near future. In The Caves of Steel and The Naked Sun, Isaac Asimov writes about a series of thrillers taking place in cities that inherit the urban and social ideals the architects of the past envisioned. In The Caves of Steel, Earth is overpopulated and technology rules the human lifestyle in all its forms. Cities are "caves of steel", they are covered and develop below the surface of earth. Humanity took cover underground and became agoraphobic. Everything is guided by technology: communication is ensured through conveyor belts that allow transportation from a place to another, food production is on an industrial scale, there are only public toilets and having a personal space is a luxury.

City culture meant optimum distribution of food, increasing utilization of yeasts and hydroponics. New York City spread over two thousand square miles and at the last census its population was well over twenty million. There were some eight hundred Cities on Earth, average population, ten million. Each City became a semi autonomous unit, economically all but self-sufficient. It could roof itself in, gird itself about, borrow itself under. It became a steel cave, a tremendous, self-contained cave of steel and concrete. (Isaac Asimov, The Caves of Steel)

Earthpeople (as opposed to Spacers, who conquered the galaxy and moved away from their mother Earth) do not approve of robots, namely machines with anthropomorphic features, and think that opposing them means defending the last remnants of humanity left. In order to support this kind of society machines are at the base of production. If this had to stop for even one day only, society would fall.

As opposed to this kind of city model, in Asimov's novels we also have Planet Solaria, mostly populated by anthropomorphic robots. Robots are the basis of Solarian civilization. For each human there are millions of robots at their service dealing with whatever they need and much more. Solarians don't meet in person. They "see each other from a distance". They live in mansions so large that the mere thought of human contact became horrifying. That's why they now only meet remotely through holographic projections - in a similar fashion to our life during the pandemic. Humans hide in full isolation while machines rule their existence. Their social life is minimal, almost to the point of non-existence.

However, men are well aware of the danger constituted by robots. Thus, they create the "antibodies" to technology, the so-called Three Laws of Robotics:

- «A robot may not injure a human being or, through inaction, allow a human being to come to harm.
- A robot must obey any orders given to it by human beings, except where such orders would conflict with the First Law.
- A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.»

These are the laws governing technology and can be applied to all human contexts.

Only with these laws humans can follow technological progress without incurring in the danger of technology overthrowing humanity. It's an incredibly topical argument we should all pay attention to.

Now, we should stop a moment and ask ourselves: what is the best compromise between the two city models? Asimov answers us always considering the Three Laws:

«We have labored to produce a planet which, taken as a whole, would obey the Three Laws of Robotics. It does nothing to harm human beings, either by commission or omission. It does what we want it to do, as long as we do not ask it to harm human beings. And it protects itself, except at times and in places where it must serve us or save us even at the price of harm to itself. Nowhere else, neither on Earth nor in the other Spacer worlds, is this so nearly true as here on Aurora.»

(Isaac Asimov, The Robots of Dawn.)

How to achieve this is still a subject of debate

B) Where we are today

Today, many of the machines we find in old sci-fi movies are no fiction. We all remember the feeling of awe thinking about a potential future when we could control machines just with our voice - and they would even reply to us! Well, we don't need to remark how vocal assistants are real and in the house of many of us.

However, some of these technologies, applied to public services and utilities, can even amplify technological adoption to the whole community, rather than progressing individually according to pre-existing market conditions and philosophies. When this happens, we are in front of a new frontier: that of smart cities, a place where specific devices are able to detect and measure external stimuli and act accordingly.

Hence, a smart city could not exist without connectivity and data analysis. Fortunately, though, with technological progress, sensors became increasingly capable of collecting and generating incredible amounts of data, encouraging the market to further produce

faster and more innovative solutions related to connectivity, file storage and software platforms. For instance, devices can now not only connect among themselves, but they can also withdraw and deposit information from a secure virtual storage, namely the cloud. Humans and machines can securely upload and store files as they'd do with physical goods.

The same data are then analyzed by an advanced, central "brain" able to filter important information and even to learn from its own mistakes - thus further improving its performance through machine learning algorithms. This "brain", the data processing terminal, translates data into readable information for human operators, so that men still have full control over the algorithmic work of the machine, which notifies and alerts maintenance and security teams of everything that's going on.

Plus, these technologies are incredibly simple to use. Everyone can make the best out of it and start interacting with intelligent objects.

C) A connected network

Everything is connected. Everything generates information, communicates. This kind of network-shaped infrastructure allows the entire infrastructure to be sustainable (and not depending on a few scattered points) and secure (distributed information is the base of the blockchain theory). However, it requires worldwide broadband connectivity.

Given the strong technological advancement, we feel the need to unlock the potential of existing and future technologies for our societies and communities. We think this is the reason that pushed us into talking about Circular Cities, a new concept of city, where things are not only improved and more efficient, but they are also connected to provide better services.

5. Economic model

A) Linear cities

In brief, the linear model of consumption is a type of economic system that follows the so-called “take-make-waste” pattern. That is, raw materials are extracted (take) to produce materials or goods (make) only to dispose of them when these end their lifecycle (waste).

The linear model’s main goal, hence, is profit making. This channels the maket’s efforts into mass production and, at the same time, into selling products at the lowest possible cost.

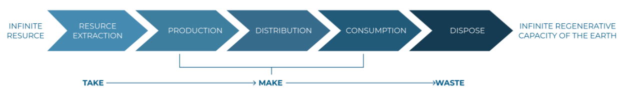
The key elements of this model are based on an input-output pattern, where the necessary inputs feed the production process (capital, labor, raw materials and energy) to produce the outputs to be sold on the market.

Thus, the main steps a linear model of consumption follows are:

- TAKE: extraction of raw materials
- MAKE: transformation of raw materials into finished products
- WASTE: disposal of the finished products (and production of waste)

A central role in the linear economy is played by the market and its strong competitiveness, which dictates the rules of both production and trade. The relation between supply and demand foresees an infinite linear model in that products in a linear economy soon become obsolete (planned obsolescence). This means that consumers will find it more convenient to buy new products - often according to transitional trends - rather than recycling or repairing old ones.

The linear economic system involves a series of consequences that are not always taken into consideration, such as the environmental impact and the limited supply of natural resources used for production.



B) Circular cities

According to the Ellen MacArthur Foundation a circular economy is:

“A generic term to define an economy regenerative by design. In a circular economy, there are two flows of materials types: biological ones, able to be put back in the biosphere, and technical ones, destined to be re-used without entering the biosphere”

The circular economy is therefore an economic system designed to reuse finished materials in subsequent production cycles and to minimize waste. The circular city is a strongly integrated concept that touches on many aspects of everyday life. This model cannot be applied to a single sector without involving others.

The principles of this model are:

- Sustainability
- Sharing
- Extension of service life
- Recycling

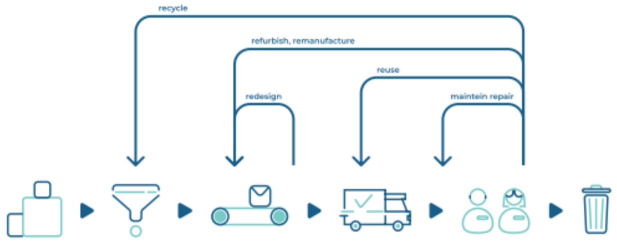
These principles can be applied to every organization or entity.

Sustainability refers to the ability of a system to self-feed, as shown in the Grassman diagram below where you can see how the output is reused and reverts into the system. This way, the system becomes totally sustainable. Here, we can also apply fundamental industries and concepts such as renewable energy and energy efficiency.

Sharing means that each product is intended as a service. A clear example is car sharing, an already widespread phenomenon in the main European and global cities. Sharing a service means that the life of each asset is extended and spread proportionately, guaranteeing greater sustainability to the whole system and production chain.

Extension of the service life aims at the optimization of consumption so that products can have a longer life than usual. Here, we find all the monitoring and tracking systems designed to improve the durability of products.

Recycling is the foundation of the circular economy. It involves the re-use of raw materials into a new production cycle at the end of the product's life. What was mere waste in a linear economy, in a circular model becomes new raw material to give life to new products. Recycling also involves concepts such as waste separation and management, limiting waste production and making scraps and trash a new resource for a whole new - circular - design of the production chain.



This way, we can move away from all the principles of linear economy - that is the maximization of profits, the minimization of production costs and the exploitation of (limited) available resources to introduce an ecological transformation in all the production stages with an eye to resource, energy and waste management.

In a circular model of consumption, everyone has a role: from consumers who will have to dispose of waste in a way suitable for recycling, to those who manage waste and to companies, called to invest in and carry out a process of innovation and technological development - with high margins of margins in the long run too.

6. Technology enabler

The great tech developments at the IT (new software programs for data processing, incredible speed for internet data transfer) and technical levels (data storage, manufacturing of miniaturized sensors to be installed in the most peculiar contexts) allowed for the development of technological solutions we could not even imagine just 10 years ago. Sensoworks is an IoT solution entirely developed by us which can monitor and communicate with any smart device and quickly process the collected data through advanced algorithms increasingly depending on machine learning to train independently. Moreover, the platform provides our customers with extremely precise answers, pointing out the exact point in need of attention and maintenance.

Sensoworks allows for the definition of classes of devices, empowering the users with global monitoring capabilities and to define their KPIs to measure the main parameters of their ecosystems. Adding new modules or classes is as flexible as it gets. The scalable design of Sensoworks' IoT Platform allows users to always add new settings at a later time.

However, going back to our main argument: what is Sensoworks' position in the transition scenario? What is the added value it can bring to this economic-cultural transformation?
Sensoworks' platform can be applied in both the economic models (linear and circular). We see this as our chance to prove that a circular model of consumption is more sustainable than a linear economic system and that companies would benefit from the former in terms of money as well.

Sensoworks has a key important feature in today's technological landscape: it acts as a systems integrator. It allows a large number of different tech systems and devices to collaborate, scaling up the whole ecosystem and making it universal.

A) Smart devices

Smart devices are all those electronic instruments capable of bidirectional communication with Sensoworks' platform. Bidirectionality consists in the device's capability to receive and transmit information.

Under this definition, everything can become "smart" by means of appropriate sensors and a PLC (Programmable Logic Controller). The PLC must be able to process and send raw data to the platform.

Data transfer exploits connectivity technologies since data is sent to the cloud system where Sensoworks works.
A trash bin can become a smart device in an IoT ecosystem. With sensors we can always know, for example, its location or weight and send all these necessary data to the process terminal.

B) Connectivity

Connectivity is essential in urban areas connected to an IoT system. The connection between devices and the cloud is divided into two main types:

- Cable, where the data travels inside a physical cable (copper coaxial cable, optical fiber, etc.);
- Wireless, where data travels in the shape of electromagnetic waves.

These two kinds of data transmission are not mutually exclusive. The signal can be converted without loss of information, for instance with FWA technology (Fixed Wireless Access).
In recent years, many cities adopted optical fiber connectivity, allowing a greater amount of data to travel at a higher speed through cables. At the same time, wireless technology such as FWA is common in digitized environments. With these technologies, we'll be able to exploit 4G and 5G connectivity very soon.

When 5G will be fully available, we'll also be able to stretch the IoT concept to the extreme. The amount and speed of transmissible data will allow the automation of many daily actions such as autonomous driving or smart parking, together with many other applications we will entrust to artificial intelligence, all supported by Sensoworks.

C) Benefits

Why use Sensoworks in the transformation from a linear to a circular city?

First of all, to change the greater we need to start from the smaller. Communal services, domestic or office utilities, all the way to more complex activities regarding schools, buildings, the public administration and collective communities and neighborhoods.

People want to see the potential benefits of a change before this happens. That's why we think it's necessary to provide our community with a platform that simulates the behavior of the new economic system and compares it to the current situation. To do so, we need to analyze the current circumstances of the system, such as energy consumption, sustainability and technological adoption.

Sensoworks does this and more. It takes a snapshot of the system before designing an alternative and compares it with a before-and-after approach.

Furthermore, Sensoworks can also integrate different technologies and platforms that speak different languages. Meaning that Sensoworks can retrofit every system with its built-in tools.

7. Case Study: Waste Management

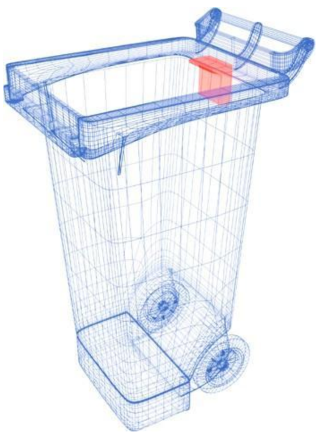
Sensoworks comprises a central platform that facilitates data aggregation, analytics, and management. This platform acts as a hub for collecting and processing data from various IoT sensors deployed throughout the waste management infrastructure. It ensures the security and reliability of data, providing a unified interface for waste collection and picking process management.

To enhance real-time data processing, Sensoworks incorporates edge computing. This means that data processing and analysis can occur directly on the sensors or edge devices, reducing latency and ensuring critical decisions can be made rapidly, even in areas with limited network connectivity.

Waste management consists of all those actions aimed at waste collection and segregation. This case study is addressed to all the organizations dealing with such activities.

Sensoworks Waste Management solution employs a series of sensors that allows the waste management company to monitor in real-time the status of the bin and its content. Below, a rendering of the smart device installed inside a waste container.

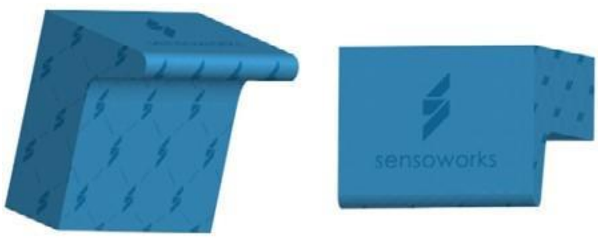
The device is installed on the inside of the container's lid so that Sensoworks can detect:
Volume of contained waste;
GPS position;
Potential overturning;
Shock, fire and damages of different nature.



Data is sent to Sensoworks' platform in real time where it is elaborated and shown on a dashboard the end users can configure as they prefer. When received the data, Sensoworks provides the following services:

- It shows the volume of contained waste;
- It notifies the user of potential overturning;
- It notifies the user the presence of fire;
- It calculates the best collection route for garbage trucks;
- It notifies the user of potential overturning;
- It generates statistics of produced waste per area

The services proposed by Sensoworks work in line with the principles of a circular economy. It guarantees waste collection efficiency and cuts the cost of energy and effort needed to ensure the service, besides tackling vandalism with immediate alerts on fires and damage to the containers.



This system can be upgraded with tracking and monitoring solutions for street sweepers and garbage trucks with the following services:

- Monitoring of vehicle consumption;
- Calculation of the best route to follow;
- Monitoring of the volume of waste contained in the truck;
- Statistical analysis and calculation to optimize the costs of the waste collection service.

Being an all-round, end-to-end solution, Sensoworks touches on the many aspects of an IoT solution, not

only from a technical point of view, but also with an eye on cost saving and energy efficiency.
That is why we can't see the end of the Sensoworks' possibilities in its many applications.

A) Key Features and Components

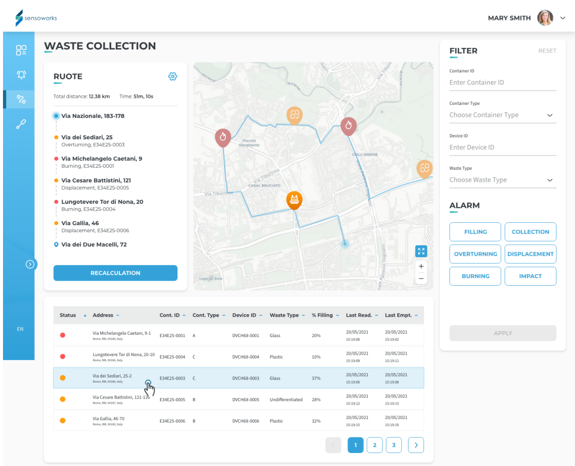
Sensoworks has been implemented in the city of Rome with remarkable success. In one case, with a reduced waste collection costs by 20% and lowered CO2 emissions by 15% within a year of deployment. In another, a small city near Parma, reported a 30% decrease in overflowing bins and a 25% increase in recycling rates.

Real-time Data Acquisition

Sensoworks uses IoT sensors to collect real-time data on waste bin fill levels, vehicle location, and personnel activities. This data is continuously transmitted to the central platform for analysis. Bins are monitored by a smart device as shown before.

Predictive Analytics and Smart Routing

Sensoworks employs advanced analytics to predict waste bin fill levels, enabling proactive scheduling of collections. This reduces unnecessary trips and minimizes operational costs. With data-driven insights, Sensoworks optimizes waste collection routes in real time, adapting to changing conditions. This leads to fuel savings and reduced carbon emissions.

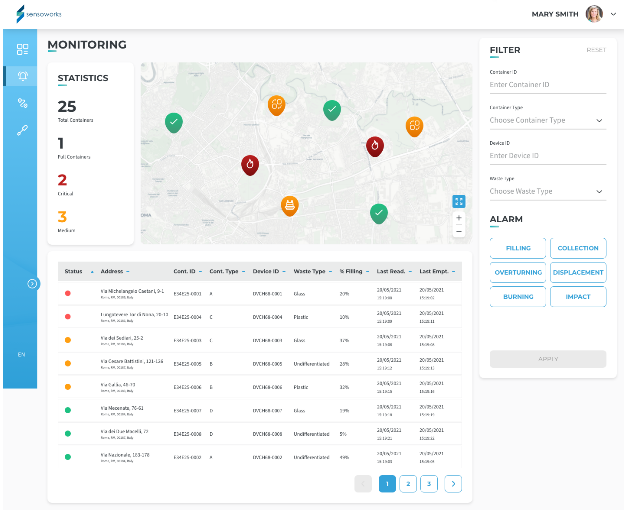


Environmental Sensing

Sensoworks monitor environmental parameters like air quality and temperature. This data helps identify and mitigate pollution or health risks associated with waste management.

Reporting and Analytics

Users can access detailed reports and analytics through the Sensoworks platform, aiding in decision-making, resource allocation, and performance evaluation.



8. Benefits

Sensoworks is not merely an IoT solution; it is a transformative tool for waste collection and picking, delivering financial savings, environmental benefits, enhanced service quality, and strategic advantages for municipalities and waste management companies. It reflects a shift toward more sustainable and efficient waste management practices while ensuring public satisfaction and a reduced environmental footprint.

Cost Reduction: Sensoworks optimizes waste collection routes, reducing fuel consumption and labor costs. With predictive analytics and real-time data, operational efficiency improves, leading to significant cost savings for waste management companies and municipalities.

Environmental Impact Mitigation: By minimizing unnecessary vehicle trips and reducing overflowing bins, Sensoworks contributes to a significant reduction in carbon emissions. This sustainability benefit aligns with global efforts to combat climate change and promote a greener future.

Enhanced Service Quality: Timely waste collection ensures that bins do not overflow, improving the overall quality of service for residents and businesses. This enhances the reputation of waste management organizations and minimizes public complaints and environmental concerns.

Informed Decision-Making: Sensoworks provides detailed reports and analytics that empower managers to make informed decisions. With real-time data, they can respond quickly to changing conditions and make strategic adjustments to optimize waste collection processes continually.

Proactive Maintenance: The sensors used in Sensoworks not only monitor waste levels but also the health of collection vehicles and equipment. This data enables proactive maintenance, reducing downtime, extending the lifespan of assets, and preventing costly breakdowns.

Resource Optimization: Sensoworks assists in the efficient allocation of resources such as personnel and vehicles. By knowing the real-time status of collection points, managers can assign resources where they are needed most, reducing inefficiencies.

Data-Driven Growth: The data collected by Sensoworks can be leveraged for long-term planning and growth. Municipalities and waste management companies can use historical data to identify trends, forecast future requirements, and make strategic investments.

Public Health Benefits: Sensoworks' environmental sensors also monitor air quality and other environmental factors. By identifying pollution hotspots or health risks, it contributes to public health by enabling timely interventions and improvements in waste handling practices.

Regulatory Compliance: For organizations operating in areas with strict waste management regulations, Sensoworks helps maintain compliance by providing accurate data on waste collection activities and environmental impact.

Customer Satisfaction: With Sensoworks, customers, including residents and businesses, experience fewer disruptions in their daily lives due to waste collection. This leads to increased satisfaction and positive feedback, strengthening the reputation of waste management services.

9. Project timeline

The implementation typically involves several distinct phases to ensure a successful deployment. These phases are essential for planning, designing, implementing, and maintaining a waste management system. Here's an overview of each phase:

Project initiation:

- Objective Definition: we define the goals and objectives of the project, including what the customer aims to achieve, such as reducing congestion, optimizing waste picking routes, or decreasing maintenance costs.
- Feasibility Study: Assess the feasibility of the project, considering factors like budget, resources, technology, and regulatory requirements.
- Stakeholder Identification: Identify all stakeholders, including city authorities, environmental operators, technology vendors, and end-users.

Planning and requirements gathering

- Scope Definition: Clearly define the scope of the project, including the number of waste collection areas, locations, and the expected user base.
- Requirements Gathering: Collect detailed requirements for the waste management system, including hardware, software, sensors, cloud infrastructure.
- Budget and Resource Planning: Develop a budget and allocate necessary resources for the project.

Design and System Architecture

- System Architecture: Develop a detailed system architecture that outlines the components, connectivity, and data flow within the waste management system.
- Hardware and Sensor Selection: Choose the appropriate hardware components, such as sensors, cameras, based on project requirements.
- Software Development: Develop or customize the software for the waste management platform, including the user interface, data processing, and reporting modules.
- Integration Planning: Determine how the waste management system will integrate with existing infrastructure, such as ERP and city traffic management systems.

Deployment and Installation

- Physical Installation: Deploy sensors, cameras, signage, and other hardware components in the identified areas according to the design plan.
- Software Implementation: Install and configure the software components, including the central management system, edge computing devices, and user interfaces.
- Testing and Quality Assurance: Conduct thorough testing to ensure that all components of the system function correctly and are integrated seamlessly.

Monitoring and Optimization

- Real-Time Monitoring: Continuously monitor the system's performance, including waste level, bin status and system health.
- Optimization: Use the data collected to optimize picking activities and maintenance.

Maintenance and Support

- Routine Maintenance: Implement a maintenance schedule to ensure the ongoing functionality of hardware and software components.

Data Analysis and Reporting

- Data Analytics: Analyze data collected from the system to gain insights into waste collection patterns, trends, and usage.
- Reporting: Generate regular reports to assess the performance of the waste management system and make informed decisions.

Scaling and Expansion

- Scalability: Plan for the system's scalability to accommodate future growth in terms of additional areas or new features.
- Expansion: Consider expanding the waste management system to cover more areas or integrate with other smart city initiatives.

Continuous Improvement

- Feedback Loop: Establish a feedback mechanism to gather input from users and stakeholders, allowing for continuous improvement and adaptation to changing needs.

These project phases ensure a systematic approach to implementing a waste management system, from initial planning and design to ongoing maintenance and enhancement. Successful execution of these phases leads to improved waste management, enhanced user experiences, and optimized maintenance activities.

A) TYPICAL PROJECT COSTS

The monitoring systems consist of different components, from the purchase of sensors and their installation to licensed platforms and softwares. Plus any kind of system integration activities related to the integration of the waste management system with other IT elements.

Some costs are relatively simple to quantify and can be measured on the basis of the data available on the market or on site.

Others are not so easily measurable, (eg.. final labor costs associated with inspections and data processing time). For these, an in-depth analysis of the specific case is indispensable to estimate the market costs of the necessary technologies.

A final cost database is, thus, strictly depending on the specific project and the data about hypothetical costs in the field, enquiries with the suppliers and further research.

In general, the elements weighing on the potential, final cost can be listed as follows:

- Supply of sensors, devices and data logger (HW for data acquisition);
- On-site installation of the tools;
- Acquisition software development and integration;
- Operating expenses (design/engineering costs);
- Third-party expenses (Cloud storage/HW connectivity).

These project phases ensure a systematic approach to implementing a waste management system, from initial planning and design to ongoing maintenance and enhancement. Successful execution of these phases leads to improved waste management, enhanced user experiences, and optimized maintenance costs.

10. Conclusion

This white paper wants to introduce the opposing concepts of linear and circular cities and economies, stressing on the reasons why circular cities are the only way to reach a truly sustainable world.
Just a few years ago, circular cities were abstract, utopical, something we could only write books and comics about. With the advent of new data transmission technologies, such as wi-fi and the optical fiber, the speed of data transmission increased exponentially and favored the development of 3G, 4G and, soon, 5G technologies. In these conditions, Sensoworks' IoT Platform finds fertile ground.

Before illustrating the applications of the Sensoworks platform, linear and circular consumption and economic models were described:
Linear cities represent the old economic model based on the exploitation of resources for mass production and production of massive quantities of waste.
This model must be replaced by the new circular model, based on sharing, optimization of consumption and recycling of waste. Sensoworks can play an important role for the organizations involved in this transformation.

How does a tech company like Sensoworks support this scenario?

Today, people want to know the benefits of a transformation of an investment. Otherwise, why should they change the model they're accustomed to? Public opinion has become increasingly sensitive to the problem of climate change precisely because the effects are increasingly evident.

Sensoworks makes the benefits of this economic and cultural transformation tangible, both in economic and environmental terms. Using appropriate sensors and through simulations and real time graphs, Sensoworks shows the convenience of this change.

Sensoworks works as a magnifying glass for every organization that follows a linear economic model but wants to convert to a circular model. It not only shows the final results, but constantly monitors the KPIs of every organization, so as to adapt to every environment and take corrective action when needed.

The modularity and flexibility that distinguishes Sensoworks makes it an ever evolving platform. Indeed, Sensoworks can act as a system integrator with a wide range of technologies, architectures and devices, and as an enabler for new, innovative city services.

Today, we still don't know the limit of its applications.

sensoworks

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