

Summary of Agile Pilot

Company name	Incoretex GmbH
Company location	Aachen, Germany
Domain	Digital Services and Communication
Municipality	Kirchenlamitz, Germany
Project period	July 2025 - March 2026, 9 months
Solution	The pilot tested a retrofit smart-waste-bin solution for standard public waste bins. The system measures fill level in centimeters, detects lid opening, and records temperature. Sensor data is transmitted via LoRaWAN to the GuardianAid dashboard, where municipal users can monitor current status values, battery condition, last opening events, and alerts. The intended use of the solution is to improve transparency of bin usage and to reduce unnecessary emptying trips through more demand-oriented waste collection.
Stakeholders	City of Kirchenlamitz and ZDE as the relevant municipal pilot partners and users.
Lessons learned	Retrofit integration into standard waste bins is technically feasible, but the specific bin geometry and installation environment matter. Battery life is a decisive practical factor and must be balanced against the desired update frequency of dashboard data. Small technical PoCs can demonstrate functionality and value clearly, but their scope and optimization limits should be communicated realistically from the outset.
KPI 1 Fill level of the waste bin	The PoC reliably provides the fill level of the standard waste bin in centimeters, and the sensor-measured fill height matched the manually measured fill height.
KPI 2 Reliable transmission of measured fill levels to a dashboard and their display there	Reliable transmission of measured fill levels to a dashboard and their display there: Every measured fill level was transmitted and displayed within the defined transmission intervals.
KPI 3 Timely dashboard update of fill-level information.	The system updates the fill-level measurement every 15 minutes and transmits the data to the dashboard server. The 3 DRP0200367 PilotInnCities Pilot-based Innovation Ecosystems for Smart Cities dashboard continuously refreshes the displayed values in real time. As a result, the requirement to provide an up-to-date fill-level status in a dashboard within 24 hours was more than fulfilled.
KPI 4 Reduction of unnecessary emptying trips and overflowing waste bins	The fill-level information provided by the system is intended to enable the municipality to reduce emptying trips by at least 10%, thereby improving the efficiency of personnel deployment. At the same time, the system is intended to help reduce the number of overflowing waste bins within the municipal area. Based on the pilot experience, the Mayor of Kirchenlamitz estimated that, at some individual locations, the reduction potential for emptying trips could be as high as 30%.
Evaluation of the business model focusing on its viability and potential for growth	<p>The core business model addressed municipalities, municipal waste-management operators, companies with larger built environments, facility-management organizations, operators of public markets, and similar public or semi-public infrastructure operators. The main target markets were the DACH region and the EU. Revenue was expected from the sale of sensor kits, possible installation fees depending on the requested dashboard integration and configuration, and recurring fees depending on the required local data-transmission setup. Recurring software or dashboard-related fees could be structured according to the number of users, the number of waste bins, or the number of SIM cards required where no LoRaWAN network was available. Prior to the pilot, the solution concept already combined hardware, gateway technology and dashboard / SaaS elements.</p> <p>Validated strengths of the business model:</p> <ul style="list-style-type: none"> ▫ Provider of a manufacturer-specific, sensor-based retrofit solution for existing products. ▫ Provider of gateway technology for transmitting sensor information. ▫ Provider of dashboard / SaaS-based monitoring and visualization. <p>Identified barriers or potential weaknesses of the business model</p> <ul style="list-style-type: none"> ▫ No structural business-model weaknesses were identified during the pilot.

	<ul style="list-style-type: none"> ▫ Technical optimization topics identified during the pilot are considered part of further product development rather than fundamental barriers of the business model. <p>Implemented / planned adjustments to the business model based on project results:</p> <ul style="list-style-type: none"> ▫ Incoretex is seeking a partner from the waste-bin manufacturing sector who is willing to integrate the sensor kit into its products. ▫ Incoretex is seeking a partner among the public and private sector who is willing to install smart bins <p>The main areas requiring external support are sales and marketing.</p>
Impacts	<p>A functional smart waste-bin system was successfully developed for the pilot in Kirchenlamitz. The most suitable sensing technology was identified and validated. LoRaWAN was selected as the preferred communication technology for the municipal use case. A retrofit installation concept for standard waste bins was developed and validated in realistic tests. A dashboard-based monitoring workflow was implemented, including alerting and multi-bin supervision. Thus, the municipality was provided with its first functioning IoT application based on an actual challenge identified by the administration itself. For the solution provider, the technological concept has been validated and brought valuable insight for future product development and sales potentials. The project enabled Incoretex to demonstrate that the smart waste-bin concept works in practice. It also showed that the solution creates tangible added value for municipal end users.</p>
Suggestions for future actions, especially focusing on sustainability and replication	<p>Priority areas of agile piloting recommended for improvement and further development</p> <ol style="list-style-type: none"> 1. Expectation management should be strengthened, because technical developments can create high expectations very quickly. 2. Even small PoCs can trigger many ideas and follow-up expectations, so their opportunities and limitations should be communicated clearly from the outset. 3. A realistic shared understanding of what a small pilot can and cannot optimize would further improve the program.
Next steps	<p>Incoretex aims to use the pilot results to establish a partnership with a waste-bin manufacturer that is willing to integrate the sensor kit into its products and to support the further market rollout of the solution.</p> <p>A key next step is to prepare a larger follow-up project in which multiple smart waste bins can be deployed in parallel.</p> <p>A suitable municipal company would be a promising partner for such a follow-up implementation.</p> <p>Main target markets remain the DACH region and the EU. The main user groups are municipalities, municipal waste-management operators, companies with larger built environments, facility-management organizations, operators of public markets, and similar public or semi-public infrastructure operators. This focus is aligned with the assumptions made before and during the pilot. The EU is considered the relevant international target market. An indicative expansion timeline has not yet been fixed and will depend on partnerships and follow-up project opportunities. In 2026, Incoretex expects to continue regular visits to relevant trade fairs and professional events. A priority need for scaling is a larger follow-up project in which multiple smart waste bins can be deployed.</p>
Provider's Reflection	<p>The project setting largely matched the originally defined project objective. In particular, the agile development approach allowed the team to make necessary adaptations during the PoC phase. At the same time, the project revealed technical hurdles related to the installation environment of public waste bins. Battery-optimized development, digital connectivity and dashboard interface management could be demonstrated functionally within the project framework, but were not yet fully optimized. The agile piloting model was perceived very positively, as it allowed a practical adjustment between budget, time and technical feasibility during project implementation.</p>
Municipality's Reflection	<p>Mayor Jens Buettner was able to set up the smart waste bin independently and access the dashboard without external assistance. This practical usability indicates clear potential benefits for local operations and for municipal staff working with the solution. No formal statement on commercial continuation is included in this report. The pilot nevertheless demonstrated that the solution can be introduced and understood in a municipal setting. According to the mayor's assessment, emptying costs could be reduced by up to 30% if smart systems of this kind were deployed at many locations across the municipality.</p>
Expert's Reflection	<p>External independent experts did not participate in the pilot project.</p>

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