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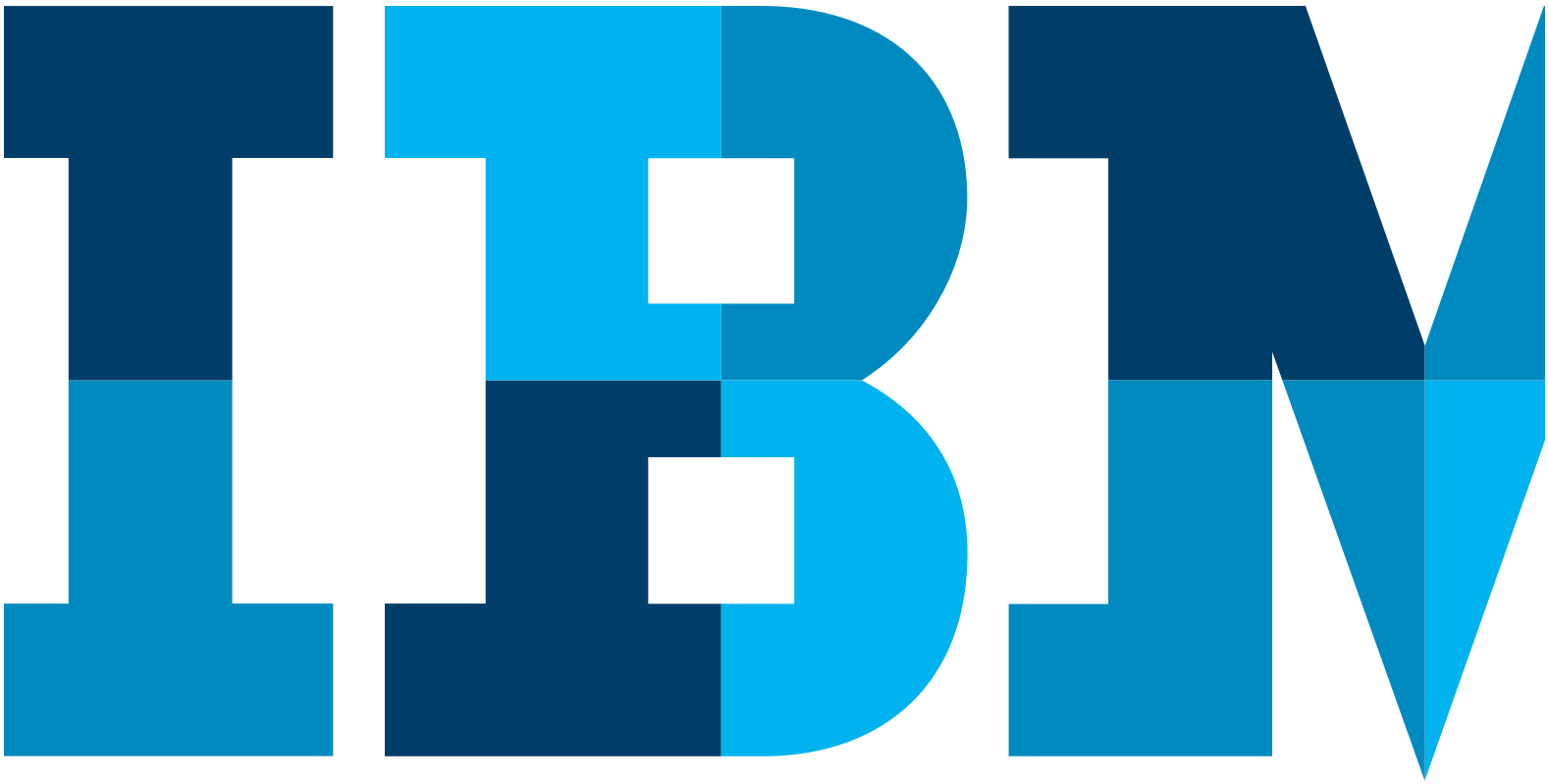
IBM Intelligent Waste Management Platform

Using the power of analytics to profit from the move to a circular economy



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Solid waste management is the one thing just about every city government provides for its residents. While service levels, environmental impacts and costs vary dramatically, solid waste management is arguably the most important municipal service and serves as a prerequisite for other municipal action.[1]

Executive summary

Cities are becoming smarter, however, many lack sophistication and intelligence in key parts of their current infrastructure. Surging population growth and urbanization are not the only challenges city leaders face in delivering a suite of mandated public services, such as water, energy, transportation, public safety and healthcare. This growth is also forcing them to deal with increasing amounts of garbage. The amount of garbage humans discard is quickly rising and will not peak this century without transformational changes in how we use and reuse materials. By 2100, it is estimated that the growing global urban population will be producing three times as much waste as it does today. That level of waste carries serious consequences—physical and fiscal—for cities around the world.[2]

Making improvements to a city's solid waste management system is, in part, dependent upon other city systems characterized by IBM and others as a "system of systems." Transportation systems, smart infrastructures, intelligent operations and strategic asset management all contribute heavily to developing and operating smarter waste management alternatives, as well as cloud, analytics, mobile and social computing platforms.

Robust transportation networks, for example, are necessary for the efficient collection and transport of debris to material and energy recovery facilities, as well as landfills. Computing resources such as geographic information systems are valuable for planning collection routes, siting processing facilities, as well as for choosing locations for transfer stations, landfills and recycling facilities.

However, notwithstanding these dependencies, there is an opportunity today to deliver insight across the waste supply chain while improving a city or county's discard profile, financial performance and environmental impact. The appropriate combination of technology, analytics and subject matter expertise can provide a solution with interactive stakeholder collaboration capabilities and improved operational insight and efficiency. With so much of our environment under significant stress in today's world, intelligent waste management is an area that can provide an immediate and significant impact to the environment and economy.

Treating waste as an asset

The pursuit of sustainability represents one shift in thinking around modern waste management. Another way to look at it is that waste represents a source of assets that cities, counties and other forms of regional government can recover as either material or energy. This emphasis on recovery departs from the traditional "reduce, reuse, recycle and dispose" mantra chanted by waste management gurus.

"The first message for municipalities considering best practices for waste management is to transition from seeing discarded materials as a waste, a liability, toward recognizing each scrap as a potential asset to be recovered and returned to the marketplace," says Michael Theroux, a resource recovery consultant and advocate for clean conversion of waste into renewable energy.[3]

Embarking on new waste management initiatives requires first getting to "know your garbage." Cities and municipalities must understand the nature of waste generation in their particular community, including what's in it, where it's coming from and how much of each type is present in order to pursue new opportunities for the government and for business.

IBM can help

The IBM Intelligent Waste Management Platform provides rich visual analytics that quickly turn complex data sets and disparate information into high-value, actionable and innovative business opportunities. The insights delivered by this solution help to optimize operational performance, reduce processing costs, enhance revenue streams and provide the base for educational community outreach programs—the result being the foundation for a true circular economy.

The IBM Intelligent Waste Management Platform has powerful analytic tools designed to accommodate a variety of functional areas and roles across waste management services and government agencies. It allows users to quickly and automatically collate waste collection, financial and demographic information, as well as other non-waste management data such as weather, traffic and population variance. All of this vital but disparate information can be presented in an easily understandable visual analytics environment.

Solution overview

The IBM Intelligent Waste Management Platform can help identify insights ranging from cities trying to increase diversion and reduce waste management costs to material recovery facility operators trying to maximize profits as part of an overarching circular economy approach.

How the solution works

Flexible data acquisition and integrity validation

The IBM Intelligent Waste Management Platform allows users to quickly and automatically import a wide range of waste management data using their own terminology and hierarchy. In addition, the platform provides many automated data integrity-checking features—all of which are important when importing discard data, as it is often transcribed manually.

Examples of the types of waste management data the solution can accept include:

- Route frequency and details, such as customer and bin locations
- Container details including size, type, ID tags, and sharing percentages
- Scale weights for either a bin or a truck
- Demographics such as income, age and building type
- Process methods
- Waste characterization details
- Various financial data, such as tipping fees, material value, income data, haul fees and rental fees
- User-defined non-waste data such as precipitation and population density

Every organization has a different quality and quantity of data. The IBM Intelligent Waste Management Platform allows the user to begin the analysis with whatever they have available today. They can expand the variety and volume of data over time, as needed, to perform more specific analyses.

Powerful analysis capabilities

The IBM Intelligent Waste Management Platform provides a wide range of analysis and visualization capabilities in a single environment to help the user better understand complex data sets in order to:

- Compare actual vs. expected results on a wide range of waste management data ranging from weights to waste characterization to financial data.
- Identify gaps where information may have not been reported.
- Assess if overall and site-based waste diversion goals are being met through the use of key performance indicators.
- Identify non-obvious connections and trends.

The analysis and visualization tools include:

- **Administrator overview** allows an overall understanding of the waste management financial data, setout rate or weight status, as well as key performance indicators with the status of waste diversion goals.
- **Interactive analysis and reporting tools** highlight trends in financials, weight and setout rates across the wide variety of data, providing real-time interactive filtering capabilities and trend analyses.
- **Supply chain analytics** allow drill downs into discard details comparing expected vs. forecasted collection weights and waste characterization (if the data is available). The user can also overlay other data to understand correlations that might not otherwise be apparent.
- **Outreach portal** provides a customer or the public access to a portal to understand their current waste management status.

Figure 1: IBM Intelligent Waste Management Platform: Administrator Overview

Sample use cases

The following examples show how the IBM Intelligent Waste Management Platform provides easy access for analyzing complex data sets, helping an organization make better business decisions.

Determining contract pricing and monitoring business goals

For waste processing companies to meet their financial goals, they must understand the expected makeup of the discard they are admitting. If the components of the discard received do not match what was expected, a significant financial shortfall can arise.

By using supply chain analytics with the interactive reporting tools to track the expected incoming components vs. what is actually being produced for feedstock, these companies can determine if their assumptions are valid and whether financial goals are being met. Historical information can also be fed back into future financial models for better forecasting and planning accuracy. The analytics capabilities of the IBM Intelligent Waste Management Platform can also provide insight on potential new opportunities.

Evaluating incentive program effectiveness and financial return

A city or a waste management company launches an incentive program to reduce the material going to landfills and to increase the material in the recycling bins. Currently, there is a monthly fee for trash disposal and no fee for recycle pickup. In addition, their bins and trucks have RFID tags. The city or waste management company announce a 15 percent credit for each week of the month that a customer does not set out trash. They expect the increased amount of recycled material will more than offset the billing credits they are issuing.

At the end of the incentive period, the following questions need to be answered to determine the program's effectiveness:

- Did we reduce the material going to landfill? By how much?
- Did we increase the material being recycled?
- Did we make or lose money by running this incentive?

The IBM Intelligent Waste Management Platform provides quick and easy access to the answers without the need for manual data manipulation or analysis.

Identifying opportunities for citizen education and outreach programs

The different views available in the interactive reporting and data analysis tools allow users to identify opportunities for education and outreach programs that may have otherwise been missed. For example, it may be well known that a given neighborhood or area of the city does not recycle as much material as other areas. By using the "setout rate" and the "average weight" analytic views, the user can gain insight into questions such as:

- Is the lower recycling rate because fewer customers set out recycle bins?
- When recycle bins are set out, how does the average weight of these bins compare to those in the areas with significantly higher recycling?

With this information, the user can consider the following:

- If setout rates are in line with other neighborhoods and average weights are low, the outreach program should focus on education on additional recyclable materials.
- If setout rates are lower than other neighborhoods and the average weight is higher or the same, then outreach programs should focus on providing easier access to recycling services.

The IBM Intelligent Waste Management Platform can also be used to determine the effectiveness of the outreach program.

Justifying investment into programs to increase waste diversion

Most cities or companies have waste diversion goals and are seeking ways to improve diversion. The interactive reporting and analytics tools of the IBM Intelligent Waste Management Platform provide financial views that allow cities to get a quick understanding of the value of recycled material being sent to landfills. An organization can also evaluate whether they have enough quantity of any given recyclable material to consider brokering it themselves in order to generate additional income and reduce waste management costs.

Conclusion

The IBM Intelligent Waste Management Platform enables the user whether a municipality or waste management company to drive greater efficiencies and financial opportunities using analytics to derive insight and visibility into operational processes.

This robust solution combines commonly collected waste management data with information such as demographics, discard process methods, precipitation, and waste audits to provide valuable insights across the waste supply chain.

Intuitive visual analysis, operating procedures, metrics and alerts can help reduce costs, increase income, and create outreach and educational programs—helping to enable the circular economy.

For further information

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1 "What a Waste: A Global Review of Solid Waste Management", World Bank, Urban Development Series—Knowledge Papers, 1999

2 "Global Waste on Pace to Triple by 2100", World Bank, October 2013, www.worldbank.org/en/news/feature/2013/10/30/global-waste-on-pace-to-triple

3 www.terutalk.com

Please Recycle

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