



SMART, MORE EFFICIENT & SUSTAINABLE WASTE PROCESSES

Circular Economy in the Smart City

/ Company: Zolitron - The Internet of Things Company GmbH



- University Spin-off in 2016 from within Ruhr-University Bochum
- Areas of expertise:
 - Hardware
 - Embedded System
 - Cloud/Mobile
 - Data Science (Artificial Intelligence)
 - Research Projects/Cooperations with multiple research institutions

- Products:



Z-Node

&

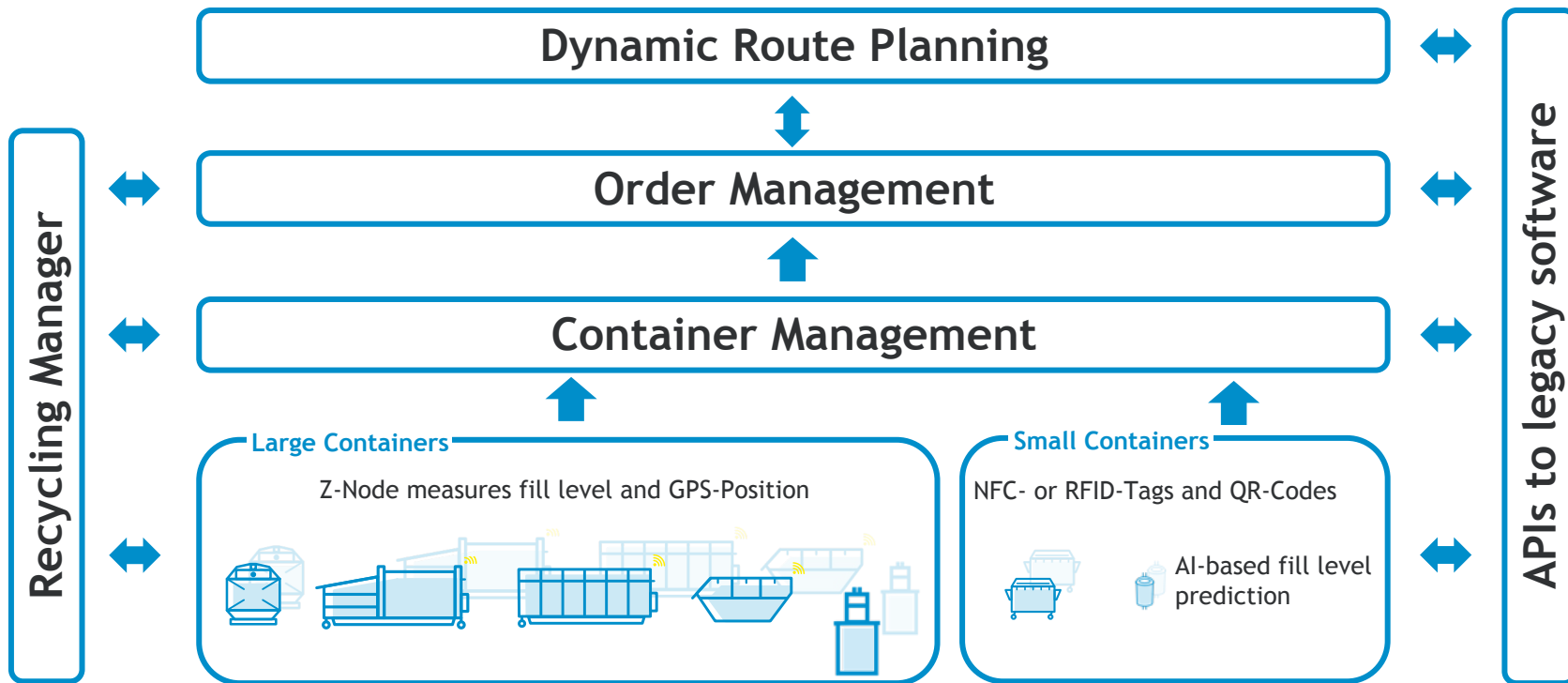


Z-Cloud



Universitätsstraße 136, 44799 Bochum, Germany

/ Overview of Z-Cloud & Z-Node



/ Overview of Contents

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Fill Level Measurement

- ✓ *Reducing unnecessary emptying*
- ✓ *Fewer emissions*
- ✓ *Perfect service for the customers*
- ✓ *Cleaner city*



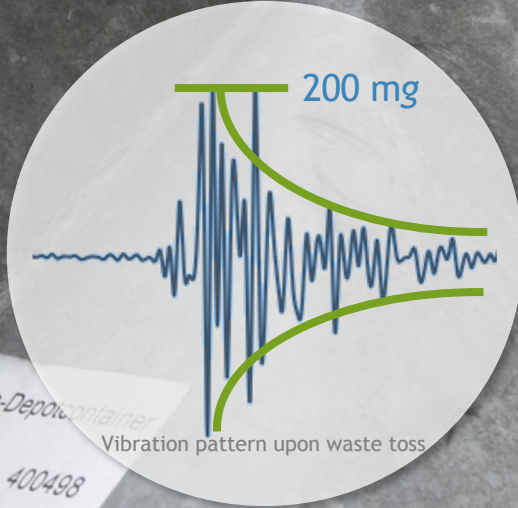
Glas-Depotcontainer

400498

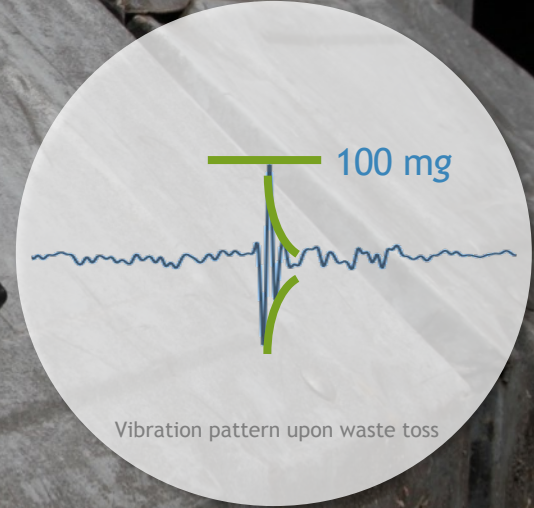


A revolutionary way of measuring: Smart containers finally affordable and scalable

Empty



80% full



/ Why Zolitron? Here's the competition:



Costs	Z-Node	Ultrasonic
Installation	7.950 USD 1 Min. per Z-Node	19.000 USD 2 people 15 Min. + Truck to lift 10 €
Maintenance	0	76.000 USD Every 18 Months
Batteries	0	12.000 USD 3 USD per Battery
Total Costs	7.950 USD	107.000 USD

Assumption:
1000 Sensors
Employee hourly wage 18 USD
Runtime 6 Years

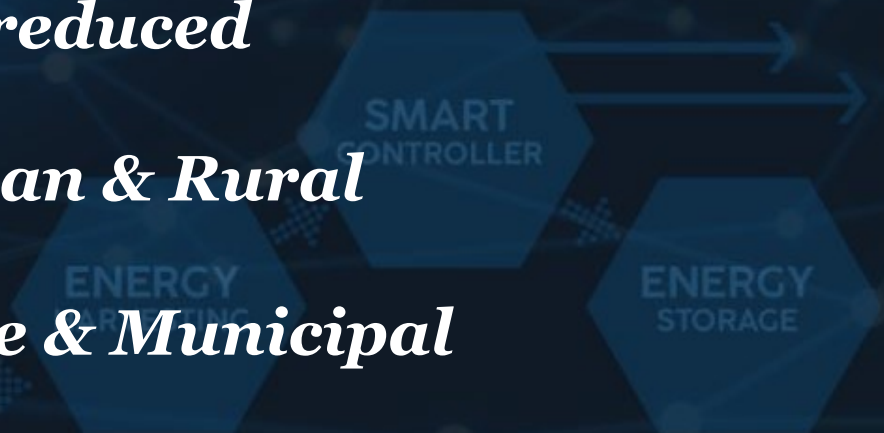
Battery replacement: 15 Min.
Costs per Battery: 3 USD

Energy	Solar	Battery
Reception	✓	✓
GPS	✓	--

*Approx. every third
pick-up can be
reduced*

Urban & Rural

Private & Municipal



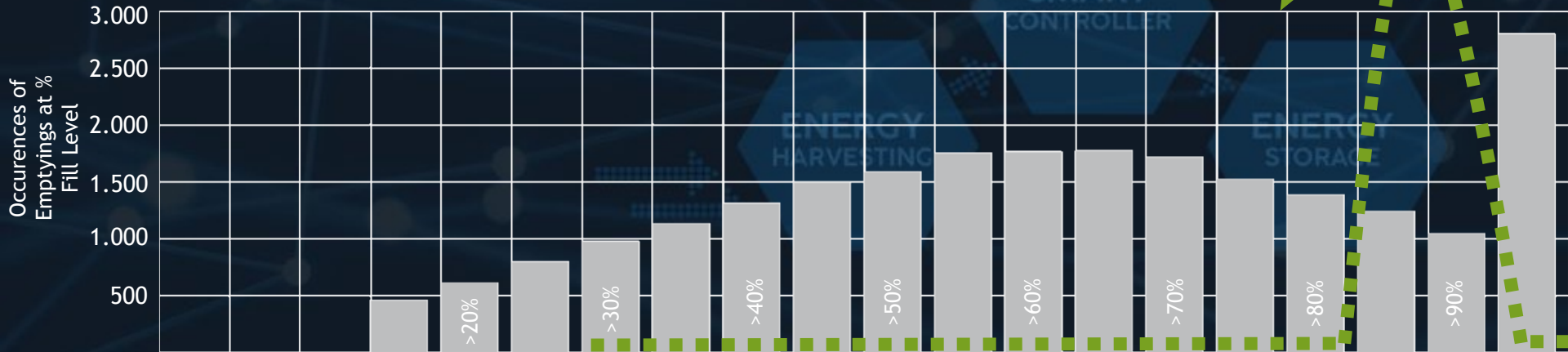
Fill level upon emptying of ALL glass containers in Z-Cloud in 2021

23.370
Emptyings detected in 2021

Ø 59,7 %
Fill level upon emptying

7.011
Emptyings superfluous

2.791
Emptyings too late



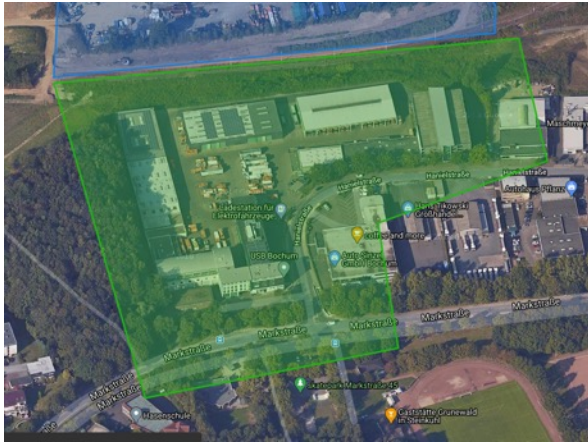


Smart Containers for your
Container Service

/ Total Transparency of all your Containers and Sites

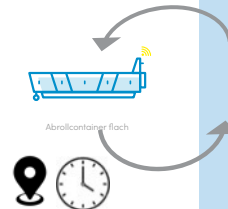


Often the manual tracking of containers entering or leaving a site is time consuming and prone to human error. Furthermore if the transport is conducted through subcontractors, there is even more error when trying to keep track of your containers. This leads to a constant loss of containers and inefficient use of your container fleet. With Z-Node & Z-Cloud for Container Tracking & Management, you have an automated overview of your fleet.



- / Z-Nodes sends one position per day and at high frequency upon movement (configurable)
- / Sites and areas are labeled with geofences (virtual fences)
- / If a container enters a site, it will be assigned to it automatically. Each movement is documented.

Entering/Leaving



Geofence

- Storage
- Construction sites
- Customers
- Depot
- Landfill
- Workshop
- ...

/ Know when your containers are forgotten or no longer used

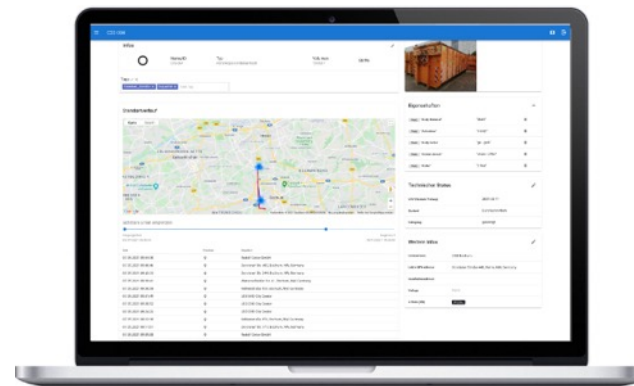


Waste Containers are commonly used in a wide area and are sometimes being forgotten or used in an inefficient way. This unnecessarily leads to buying new containers, while the existing ones could be used at their full potential.

Such KPIs like the turnover rate or revenue generated through individual containers can be directly measured within Z-Cloud. Low performing containers can be identified and be put to better use.

Example: „Container AR 30 N 6652 was not moved within the past 90 days“

Example: „Container AR 30 N 6652 was moved without authorization or stolen“



/ Smart Compactors



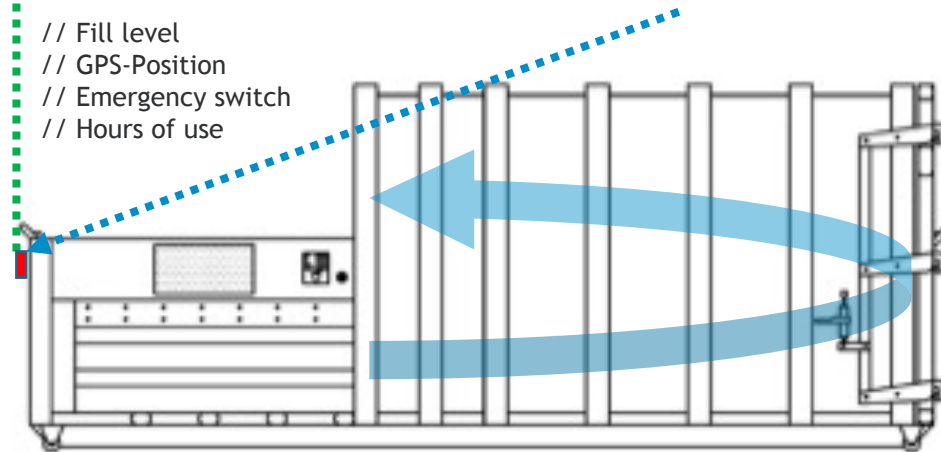
/ Smart Compactors

Manufacturer-agnostic



The fill level of the compactors control circuitry is forwarded by Z-Node or measured through analysis of the compactors vibration patterns.

- // Fill level
- // GPS-Position
- // Emergency switch
- // Hours of use



Tracking:

- / 1 GPS-Position per Day
- / GPS-Position upon movement (Roll-on/Roll-off)

Fill-level:

- / 4 Fill levels per day (Vibration analysis)
- / Z-Node reports the compactors internal filling alarm

Container Management (AvaL) incl. UVV and APIs to existing IT infrastructure

The goal is to have a solution with minimal installation and maintenance cost

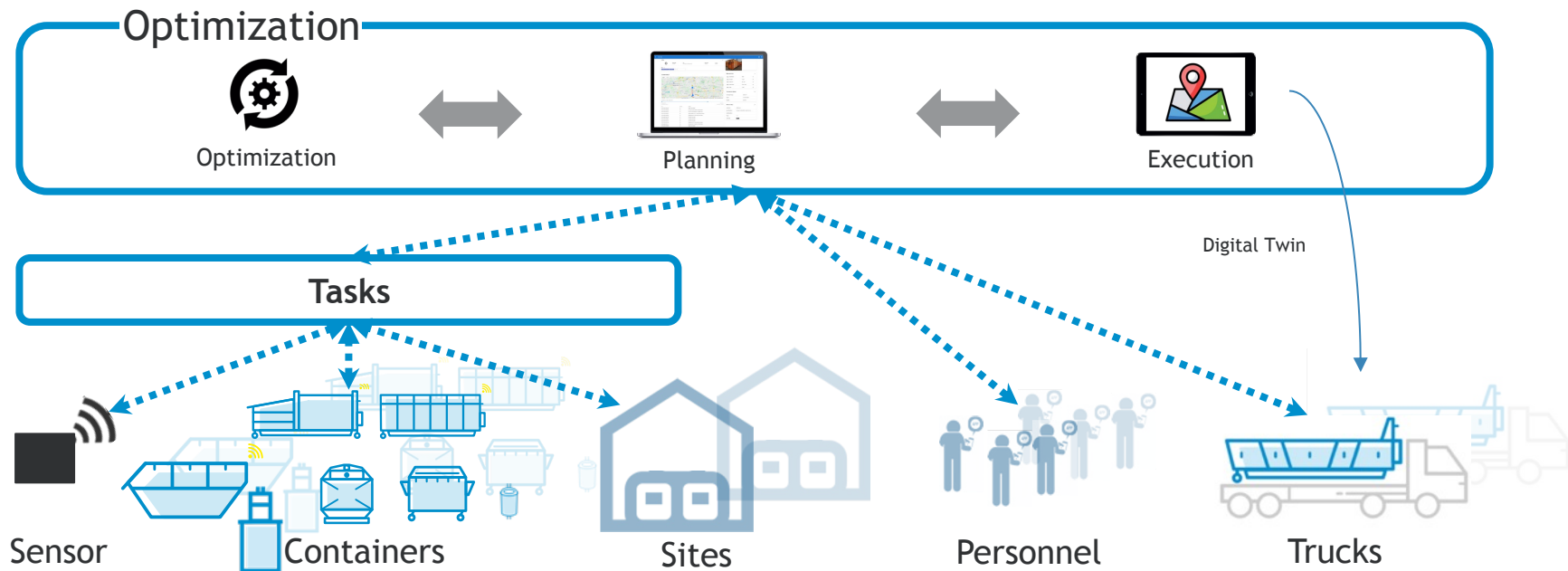


Dynamic Route Planning

/ Dynamic Route Planning



All pick-ups are being scheduled through their predicted optimal emptying date, sometimes weeks into the future, taking into consideration not only topographic factors but also your corporate resources like truck and personnel utilization.



/ Automated Task Management



Automatic: Z-Node

- Live fill level
- Fill level prediction
- Threshold
- Time frame
- Priority

Automatic: AI-based prediction

- Fill level prediction
- Time frame
- Priority



AvaL- Interface
incl. partner
access

Manual: Using Z-Cloud Frontend or App

- Time frame
- Priority

Manual: Through Recycling Manager or App

- Time frame
- Priority

Cyclical: Using NFC/QR-Codes

- Fixed cycles
- Time frame
- Priority

/ > 14.000 Containers digitized!



We cordially invite you for a visit!



uvm.





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/ Thank You

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