



Digitalization and smart Systems for Waste management

Virtual delegation visit to Germany

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Agenda



- Introduction c-trace
- Digitalization current status
- Digitalization tomorrow
- Outlook



facts

Development

- > **100 %**
in-house development

Experience

- > **15 Years**
Since 2005 active on the market



International
Bielefeld
UK, PL, NL

Customers

- > **710**
Realised projects

References

- > 5,300 Vehicles
- > 3,200 Software users
- > 9,400,000 Bin services
- > 24,300,000 RFID chips

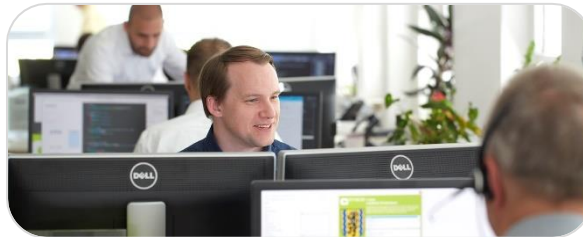
Staff



about 100

An ever increasing number

Products & Services



Software

c-ware: Software solutions for the waste management industry, street cleaning and winter road services.



Vehicle / Telematic Systems

Navigation, identification, weighing, communication - simple and effective



RFID Chips

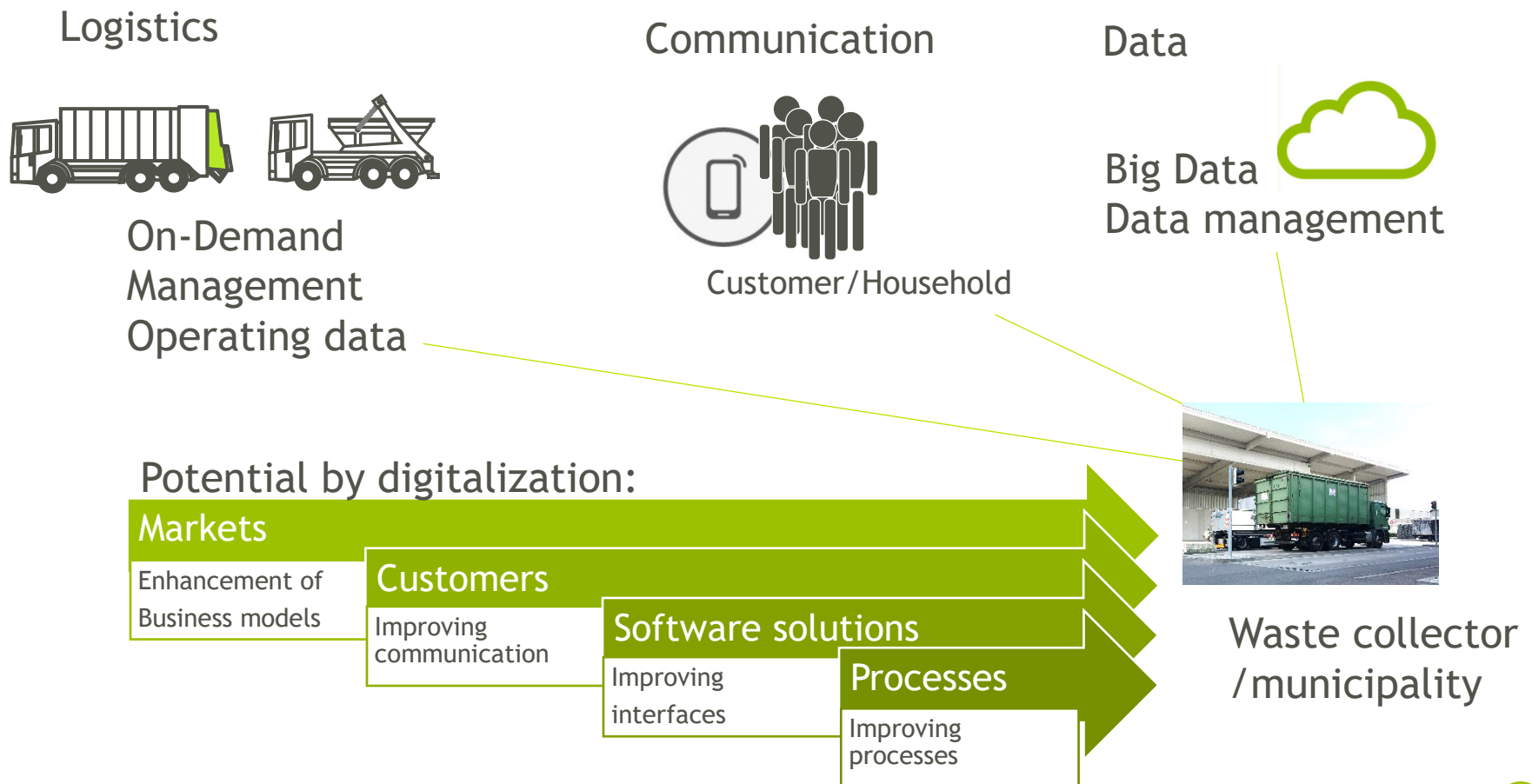
Our transponders identify waste bins - automatically with accuracy and reliability.



Digitalization

Chance or Risk

Digitalization in waste management industry



Why Digitalization for waste collection?

- › Drivers are in short supply and still need to have route knowledge
- › Improving the quality of service
- › Automated documentation of the service
- › Monitoring of bins and vehicles
- › Automatic processing and feedback of routes
- › Results of route planning is provided to driver quickly and efficiently
- › Increased efficiency through automated data processing
- › Collection and monitoring of KPIs

Digitalization - state of the art today

ID and weighing systems

- Logistic monitoring
- Bin monitoring
- Claim management
- Service recording



Collection on demand

- Bulky waste
- Commercial waste
- Bin management
- Service recording



- Underground systems
- Domestic routes
- Commercial routes



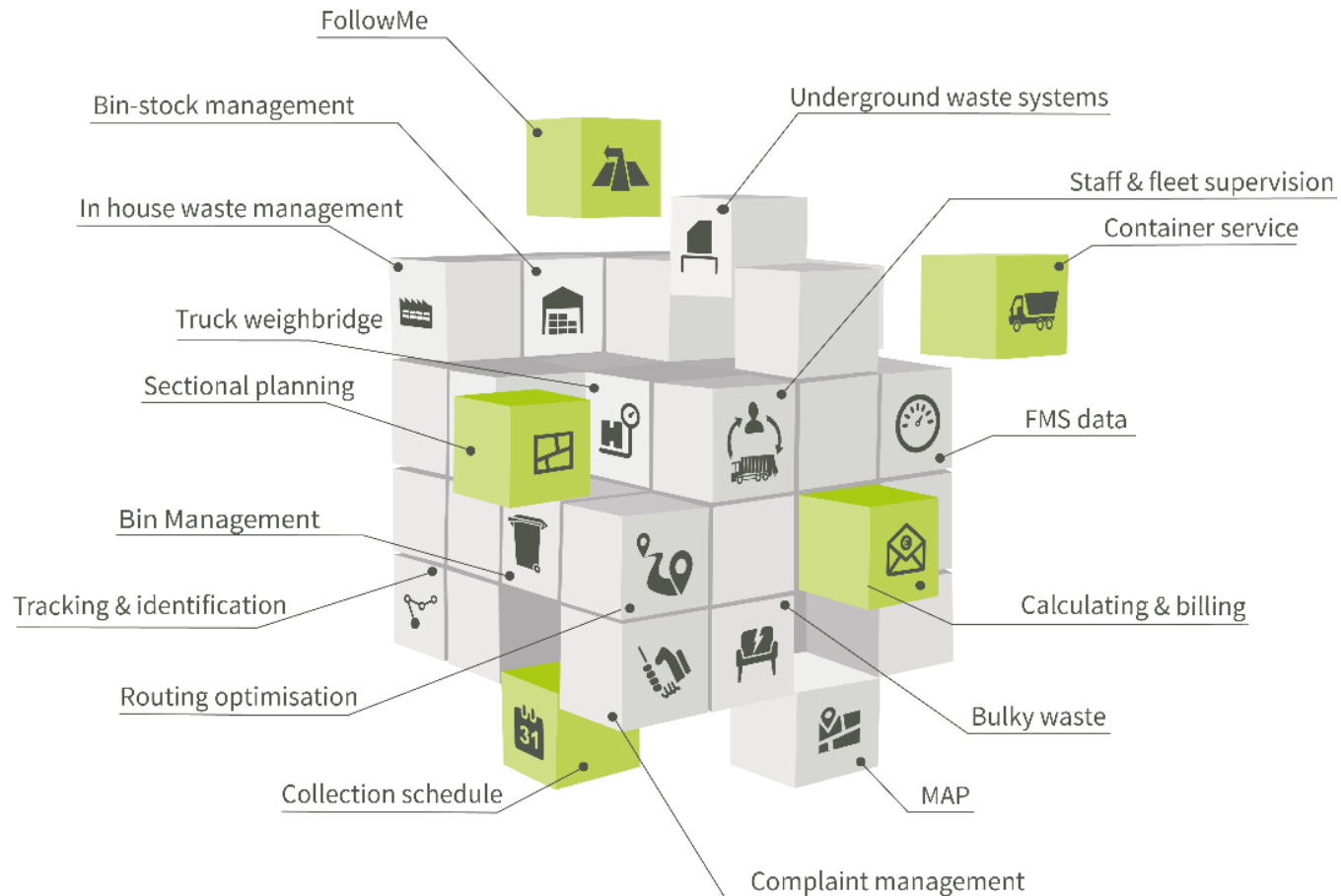
Route optimisation



- Collection on demand
- Collection dates
- Invoices
- Change management

Customer portals + Apps

c-ware Modules





Digitalization of tomorrow

Example:
On-Demand Collection

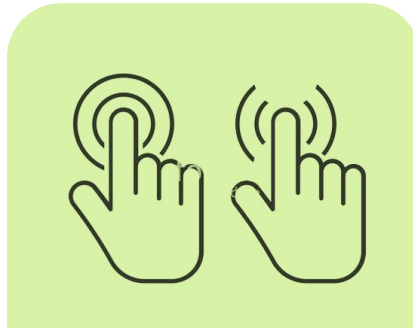
Example: On-Demand Collection

Objective:

- Containers are not always fully available for collection - especially with polluter-pays systems
 - > Collection of actually filled containers only
- Additional effect with polluter-pays collection:
approx. 50% provision rate
 - > Low collection efficiency: all roads must still be driven
- Reduced CO2 emissions

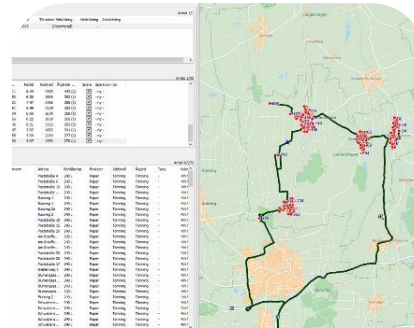
Implementation of an efficient collection with optimised CO2 carbon footprint

Process



1. Message by household

- Sensor
- Button
- ...



2. Automated route optimization tool for daily planning



3. Route guidance with order management



Outlook

Trend



- At the beginning: Small smart solutions
- Digital registration of bins, collections and data administration for all types of waste
- Artificial intelligence will enter waste management sector

Waste collection vehicles will become data collection vehicles



Thank you for your interest!

Questions?



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