

STOSAG standard

STuurgroep Open Standaarden Afval en Grondstoffen – www.stosag.nl

Part 0 – Overview

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Table of Contents

1	Introduction.....	5
1.1	Standardization	5
1.2	Scope & reading guide.....	5
1.3	Structure of the standard	5
1.4	Conformance.....	7
1.5	Version history.....	7
1.6	List of changes.....	7
2	Terms and definitions.....	9
3	Model based approach.....	11
4	Model	13
4.1	Structure.....	13
4.1.1	Overview of the systems	13
4.1.2	Systems and roles.....	14
4.1.3	Domain objects	15
4.1.4	Context.....	17
4.1.5	Activity diagrams.....	19

1 Introduction

STOSAG is the Dutch acronym for ‘Stuurgroep Open Standaarden Afval en Grondstoffen’, which translates to ‘Steering committee for Open Standards for Waste and Base Material’. To develop this standard a working group was formed. Please visit our website for an up-to-date list of all members of the STOSAG steering committee and working group (<http://www.stosag.nl>).

This document gives an overview of the processes for which the interfaces are standardized in the STOSAG standard.

1.1 Standardization

The waste processing industry has been exchanging digital information for quite some years now. Next to that the use of chips to recognize cards and containers also has a history in this industry. The waste processing companies are experiencing the advantages of exchanging information electronically and recognizing containers and cards, but are also experiencing that exchanging information, or recognizing containers and cards based on different specifications is not optimal: it requires quite some work, time and money to exchange or receive information from other parties.

To change the current situation to a flexible situation in which the identification of cards and containers can be used with different systems and different suppliers, and to make it possible to exchange information between the different systems it is necessary to define standards. With these standards interoperability in the industry can be achieved, leading to easier coupling of systems and increased interoperability between different systems.

1.2 Scope & reading guide

The STOSAG standard is targeted at two processes in the waste processing industry:

- The processing of relevant information, for the deposit of waste, between cards with chips, collection container systems and the back office systems.
- The processing of relevant information for the emptying of wheelie bins with garbage trucks between containers with chips, ident systems and the back office systems

This standard is not targeted at other processes in the waste processing industry.

This document consists of four chapters. Chapter 1 contains the introduction. Chapter 2 contains terms and definitions used throughout the standard. In chapter 3 the model based approach that is used to develop and document the standard is presented. The final chapter, chapter 4, presents an overview of the involved systems, the models of the different interfaces, the interactions that the standard supports and defines the semantics of the information that is exchanged.

1.3 Structure of the standard

The STOSAG standard consists of six parts, as presented in Figure 1:

- Part 0 - Overview (this document)
- Part 1 - Card Identification

- Part 2 - Wheelie Bin Identification
- Part 3 - Collection Container Information
- Part 4 - Wheelie Bin Information
- Transmission

These six parts are the starting point of the standard. New parts may be added at a later stage.

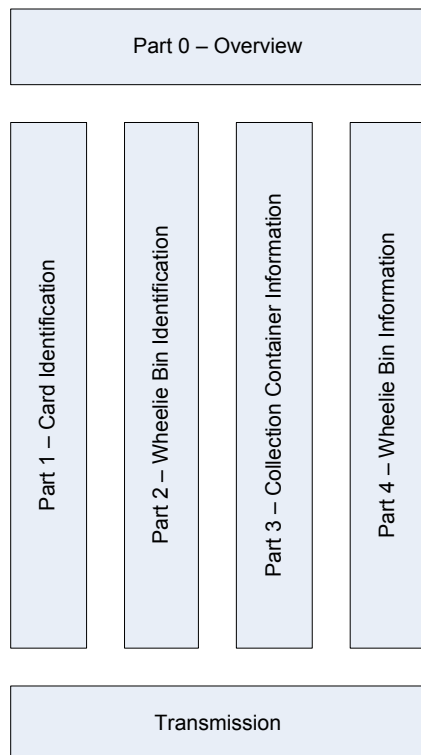


Figure 1: Structure of the standard

1.4 Conformance

This document, together with the other five parts of the standard, serves as a formal and strict specification for the implementation of the STOSAG standard. Any implementation that conforms to this standard shall use the guidelines provided in the ‘STOSAG – Part 0 – Overview’ part and the interface specific part. It is not necessary to implement all parts to be conformant to the standard.

1.5 Version history

Table 1: Version history

Version	Date	Description
1.0	2010-12-03	First release of the STOSAG – Part 0 – Overview standard
2.0	2015-09-25	v2.0 release of the STOSAG – Part 0 – Overview standard
2.1	2016-12-19	Increased version number because of changes in STOSAG Parts 3 and 4.

1.6 List of changes

Table 2: List of changes

Section	Description
1. Introduction	Removed overview of working group members. Added reference to overview on STOSAG website.

2 Terms and definitions

For the purpose of this standard, the following terms and definitions apply.

Chipreader

Dutch: Chiplezer

Device, placed on a garbage truck, capable of reading the information contained on a chip in a wheelie bin.

Cardreader

Dutch: Paslezer

Device, placed on a collection container, capable of reading the information contained on a chip in a card.

Controller

Dutch: Controller

Device capable of interaction with a reader and transferring the information from a chip to reusable information

Chip

Dutch: Chip

Device carrying data which can be recognized by a reading device

Card

Dutch: Pas

Device (like a credit card) capable of carrying a chip.

Wheelie bin with chip

Dutch: Rolcontainer (of mini-container)

Reservoir with wheels and a lid, intended for containing waste of one household or building that contains a chip to identify the wheelie bin.

Collection container

Dutch: Verzamelcontainer

Reservoir capable of containing waste for more than one household or building.

Board computer

Dutch: Boordcomputer

Device on board of a garbage truck to store and process driving times, locations and assignments. Is for instance responsible for communication between the truck and the office.

Antenna

Dutch: Antenne

Device connected to the reader capable of transmitting and receiving signals.

Other systems (in or on garbage truck)

Dutch: Andere systemen

All other systems on the garbage truck, for instance the board computer, weighing systems and camera systems

Black list

Dutch: Black list

Authorization list that contains identification numbers that when read should be refused by the system using the register.

White list

Dutch: White list

Authorization list that contains identification numbers that when read should be handled by the system using the register.

Authorization list

Dutch: Autorisatielijst

Register containing identification numbers that should be refused or handled by the system using the register.

Tooth

Dutch: Kam

Part of a grabber (looking like a comb) that can be used to lift the container.

Management and configuration system

Dutch: Management en configuratie systeem

System provided by the supplier of a system to manage and configure the collection container system or the ident system.

Communication management system

Dutch: Communicatie management systeem

Specific part of the Management and configuration system that is responsible for the communication between the back-office systems and the system in the field.

Waste processing back office

Dutch: Back office afvalverwerking

The systems that the waste processing companies use to manage the collection of waste, containers and all other relevant internal processes.

Collection container system

Dutch: Verzamelcontainer systeem

Reservoir capable of containing waste for more than one household or building together with all its electronics to manage the system.

Ident system garbage trucks

Dutch: Identificatie systeem

System on the garbage truck that handles everything regarding the collection of waste with wheelie bins.

3 Model based approach

This paragraph describes the different models and their relations that are used to develop and document the standard. The definition of the standard consists of six models that are subdivided into four categories:

Category	Model
Structure	Systems and roles
	Domain Objects (UML Class diagram)
Interaction and behaviour	Context diagram (UML UseCase diagram)
	Activity diagram (UML Activity diagram)
Messages	Message definitions
	Technical mapping

The category ‘Structure’ consists of models that provide an overview of the systems that are involved in the standard and their roles, the model furthermore describes the domain of the standard. The models in the category ‘Interaction and behaviour’ describe how the standard operates in the real world and which interactions are possible. The category ‘Messages’ defines the structure of the messages that are exchanged and describes the mapping of these messages to an exchange format. The relations between the different models are presented in Figure 2, an explanation of the relations can be found in the paragraph following the figure.

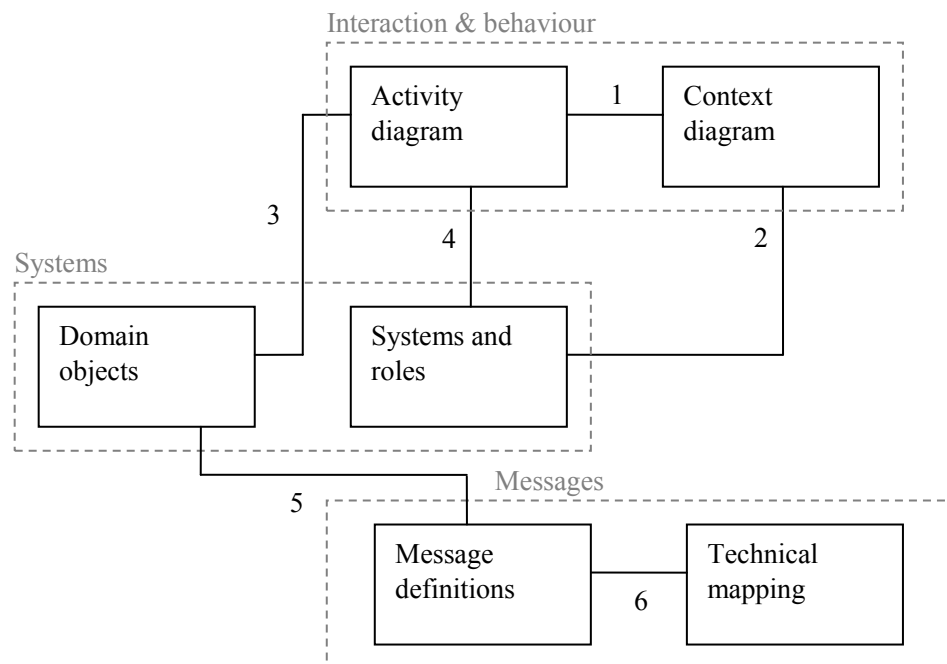


Figure 2: Models and their relations

1. The *Context diagram* has to specify the exchange of information between two swimlanes in one of the *Activity diagrams*.
2. The actors in the *Context diagram* have to match with the systems as presented in the *Systems and roles* model
3. The *Activity diagram* cannot contain concepts that are not defined in the *Domain objects* model.
4. The actors in the *Systems en roles* model have to match with the swimlanes of the *Activity diagrams*.
5. The attributes in the *Message definitions* that are related to the entities in the *Domain objects* model have to be equal to the attributes in the *Domain objects* model.
6. For each *Message definition* a *Technical mapping* has to be defined.

4 Model

This chapter describes the models on which the STOSAG standard is based. Section 4.1 describes an overview of the systems, the systems and roles model, the domain objects model and the objects & attributes. Section 4.2 describes the context diagram and the activity diagrams.

4.1 Structure

This section first presents an overview picture of the situations in which this standard can be used. After that the relevant systems and their roles, the domain objects and the objects and their attributes are described.

4.1.1 Overview of the systems

This paragraph gives an overview of the relevant systems and the situation in which they interact in Figure 3. The paragraphs following the figure describe the situation.

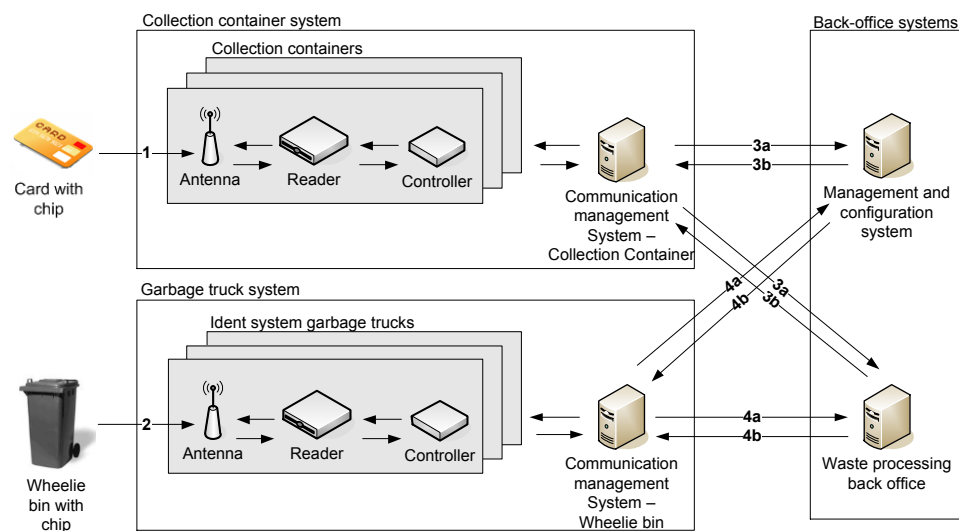


Figure 3: Overview of the systems

The picture of the systems as presented should not be regarded as a 1-on-1 mapping of the real-life situation, it is merely an overview of how the systems interact. It is therefore possible that multiple collection container systems use the same communication management system for collection containers. Furthermore it is not necessary for the communication management system for collection containers to be located at the same location as the collection container. Next to that is it possible that multiple ident systems for garbage trucks use the same communication management system for wheelie bin and this system also does not need to be at the same location of the ident system.

The current version of the standard only defines the interfaces 1, 2, 3a, 3b, 4a and 4b. The interfaces in the box 'Collection container system' are regarded as a black box, just like the interfaces in the box 'Garbage truck system'.

4.1.2 Systems and roles

Figure 4 presents the systems that are relevant for the STOSAG standard. The yellow ovals represent the activities the systems can be involved in. The activities in the upper oval are related to the collection of waste with wheelie bins, the activities in the lower oval are related to the collection of waste with collection containers. Table 3 gives a description for each of the parties; the activities are defined in section 4.2.

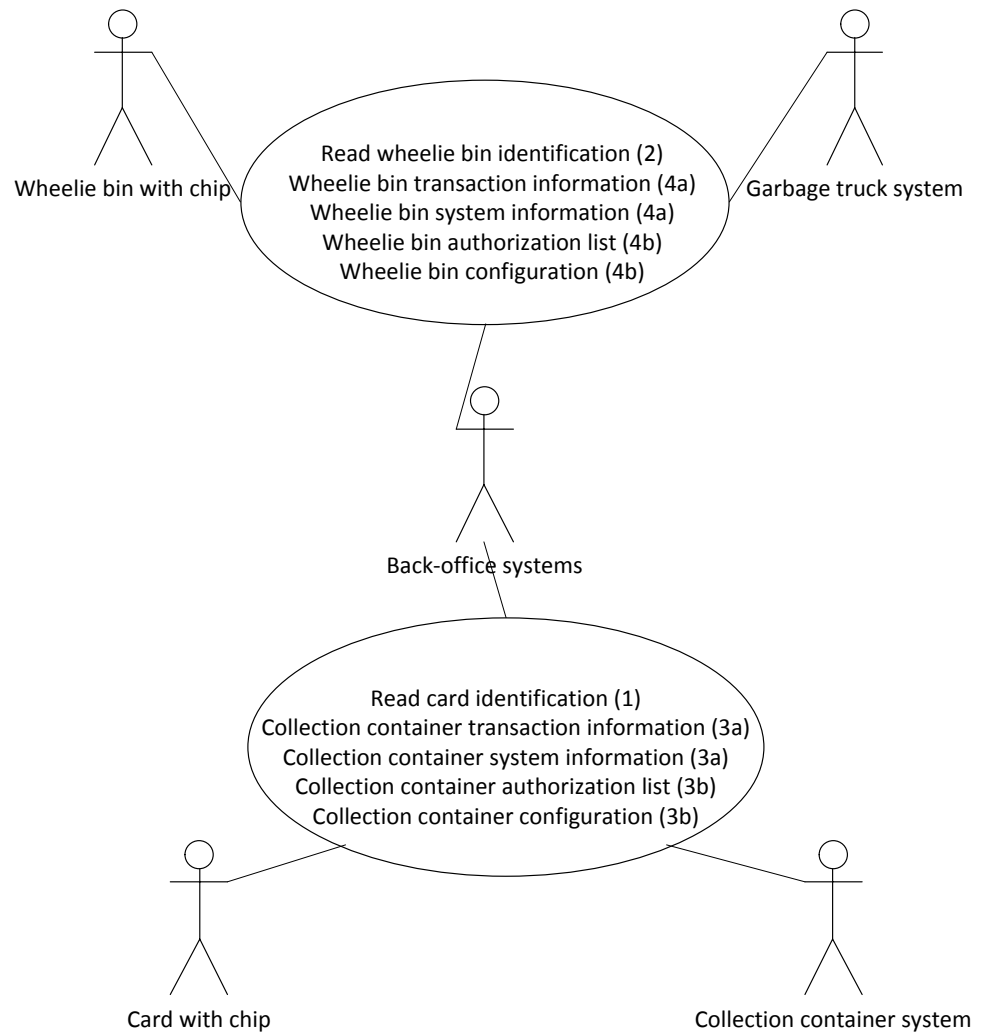


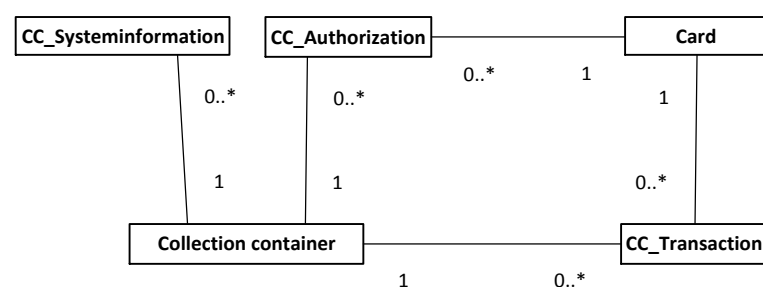
Figure 4: Systems

Table 3: Descriptions systems

System	Description
Wheelie bin with chip	The wheelie bin with chip is located at households to deposit waste.
Garbage truck system	The garbage truck system is located on the garbage truck and is responsible for identifying the wheelie bin and transmitting emptying information to the back-office systems. The Communication management system is part of the garbage truck system. This system has the responsibility to provide all transaction and system information to the back-office systems.
Card with chip	The card with chip is located at households and can be used to access the collection containers.
Collection container system	The collection container system is located at the collection container and is responsible for identifying the card with chip and transmitting deposit information to the back office systems. The Communication management system is part of the collection container system. This system has the responsibility to provide all transaction and system information to the back-office systems.
Back-office systems	The back-office systems receive, store and make available the information of the garbage truck systems and/or the collection containers systems.

4.1.3 Domain objects

The entities that are relevant for the STOSAG standard are represented in the domain model. The entities represented in this model take part in, or are part of the activities that are described in the STOSAG standard. The domain model represents the entities and their (static) relations, as a representation of their real world counterparts. The domain model for the STOSAG standard can be found in Figure 5, the description of each object can be found in Table 4.



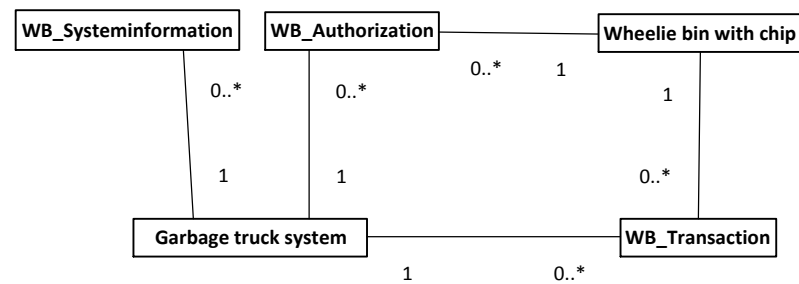


Figure 5: Domain model

Table 4: Descriptions domain model objects

Object	Definition
Wheelie bin with chip	The representation of the can used by households to collect waste.
Collection container	An (underground) container that can be used by multiple households to collect waste.
Card	Card with a chip that contains a unique number that can be used to gain access to a collection container.
CC_Transaction	The registration of the deposit of waste in the collection container.
CC_Authorization	Relation between the collection container and the card describing whether or not the card can be used to perform a transaction on the collection container.
CC_SystemInformation	The registration of system information in the collection container.
Ident system	The system on a garbage truck that can be used to register the emptying of wheelie bins.
WB_Transaction	The registration of the emptying of a wheelie bin in the container on the garbage truck.
WB_Authorization	Relation between the ident system and the wheelie bin with card describing whether or not the wheelie bin may be emptied.
WB_SystemInformation	The registration of system information in the ident system.

4.1.4 Context

The context diagram in Figure 6 presents an overview of the activities that are supported by the standard and defines which systems are involved in an interaction. A description of each of the activities can be found in Table 5.

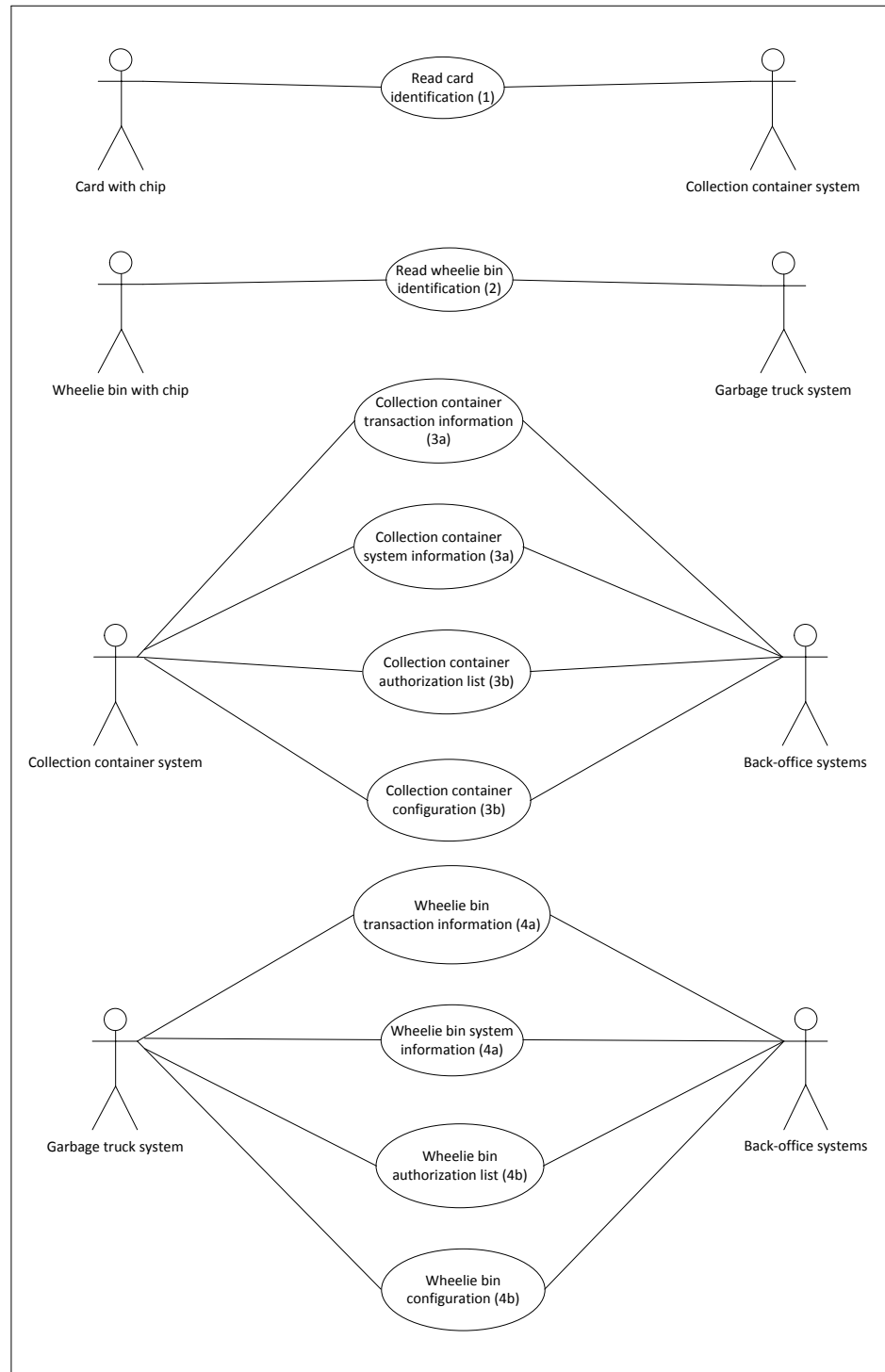


Figure 6: Context diagram

Table 5: Use case descriptions

Role	Use case
Card with chip	<i>Read card identification (1)</i> The collection container system reads the unique number of the card with chip.
Wheelie bin with chip	<i>Read wheelie bin identification (2)</i> The garbage truck system reads the unique number of the wheelie bin with chip.
Garbage truck system	<i>Read wheelie bin identification (2)</i> The garbage truck system reads the unique number of the wheelie bin with chip. <i>Wheelie bin transaction information (4a)</i> The garbage truck system sends transaction information to the back-office systems. <i>Wheelie bin system information (4a)</i> The garbage truck system sends system information to the back-office systems. <i>Wheelie bin authorization list (4b)</i> The garbage truck system receives an authorization list from the back-office systems. <i>Wheelie bin configuration (4b)</i> The garbage truck system receives a configuration from the back-office systems.
Collection container system	<i>Read card identification (1)</i> The collection container system reads the unique number of the card with chip. <i>Collection container transaction information (3a)</i> The collection container system sends transaction information to the back-office systems. <i>Collection container system information (3a)</i> The collection container system sends system information to the back-office systems. <i>Collection container authorization list (3b)</i> The collection container system receives an authorization list from the back-office systems. <i>Collection container configuration (3b)</i> The collection container system receives a configuration from the back-office systems.
Back-office systems	<i>Collection container transaction information (3a)</i> The back-office systems receive transaction information from the collection container system. <i>Collection container system information (3a)</i> The back-office systems receive system information from the collection container system. <i>Collection container authorization list (3b)</i> The back-office systems send an authorization list to the collection container. <i>Collection container configuration (3b)</i> The back-office systems send a configuration list to the collection container.

	<i>Wheelie bin transaction information (4a)</i> The back-office systems receive transaction information from the garbage truck system. <i>Wheelie bin system information (4a)</i> The back-office systems receive system information from the garbage truck system. <i>Wheelie bin authorization list (4b)</i> The back-office systems send an authorization list to the garbage truck system. <i>Wheelie bin configuration (4b)</i> The back-office systems send a configuration list to the garbage truck system.
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4.1.5 Activity diagrams

This section describes ten activity diagrams that define the processes in which the standard can be used.

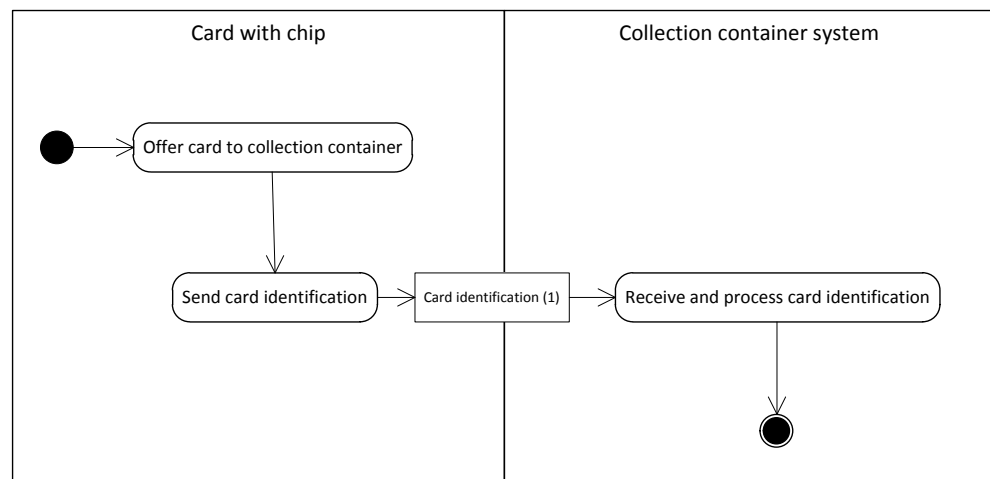


Figure 7: Activity diagram interaction 1

Figure 7 presents the process in which the unique number of the card with chip is read by the collection container system.

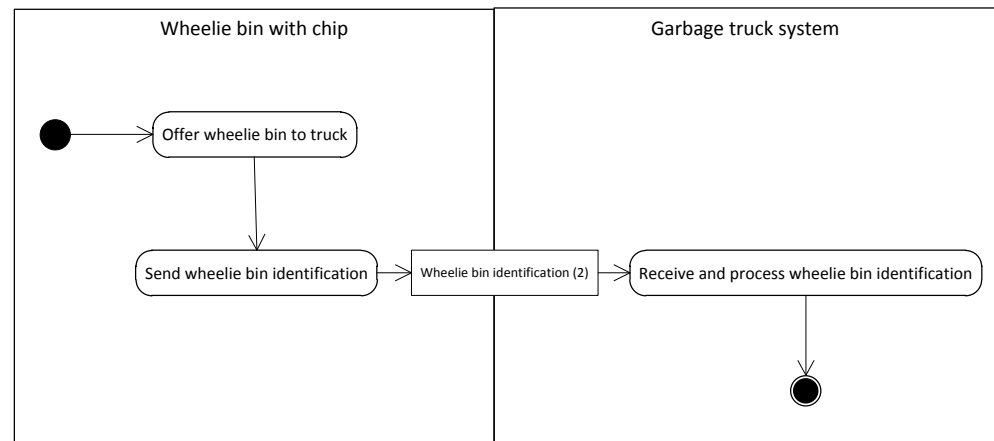


Figure 8: Activity diagram interaction 2

Figure 8 presents the process in which the unique number of the wheelie bin with chip is read by the garbage truck system.

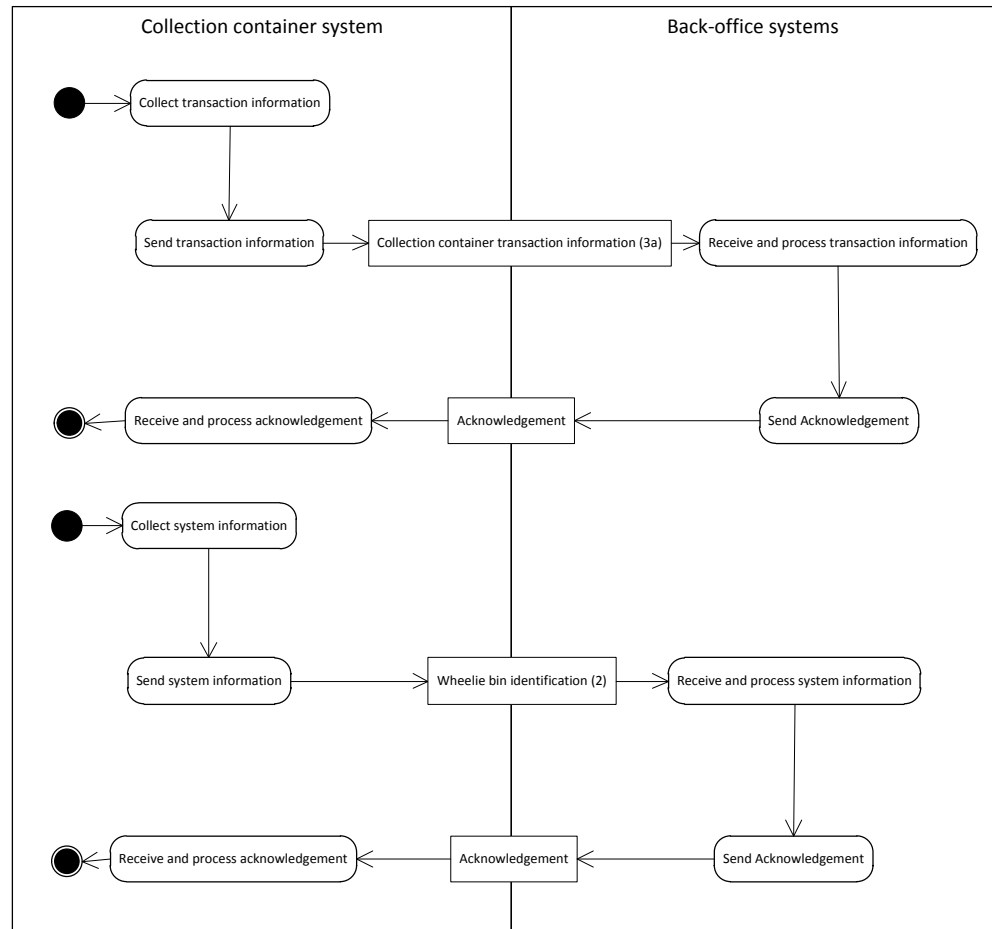


Figure 9: Activity diagrams interaction 3a

Figure 9 presents the exchange of deposit information from the collection container system to the back-office systems.

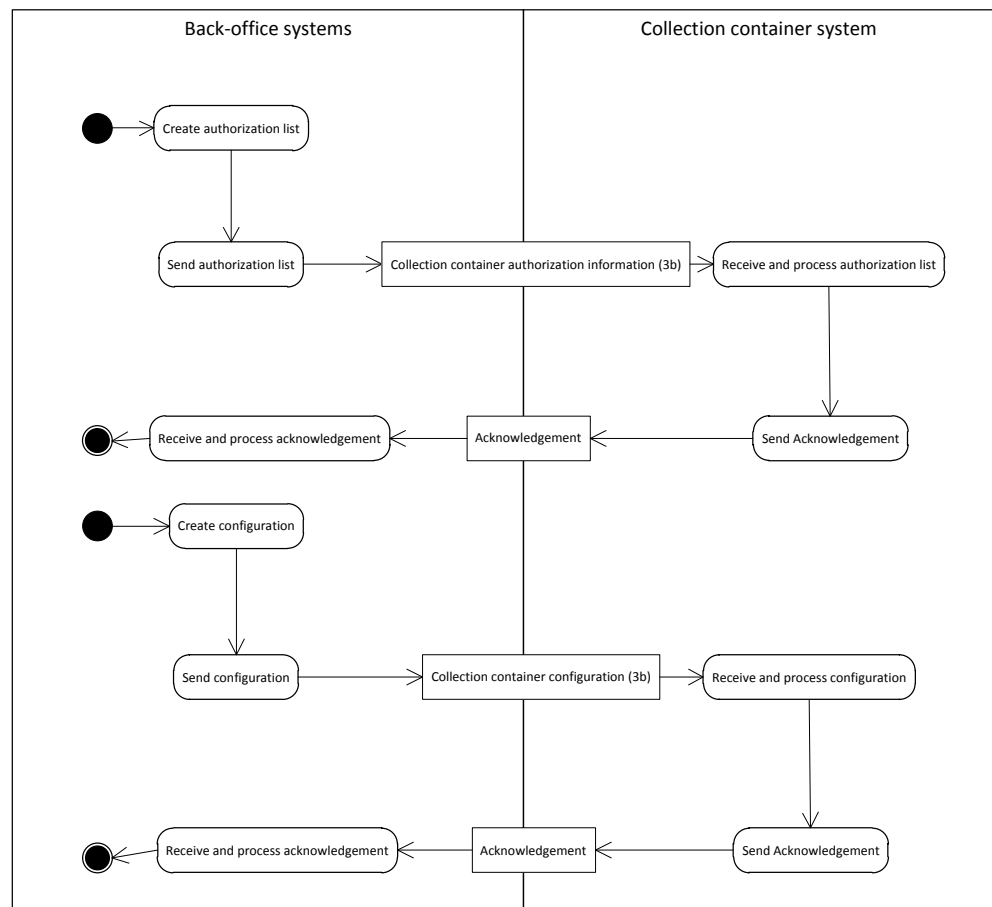


Figure 10: Activity diagrams interaction 3b

Figure 10 presents the exchange of authorization lists from the back-office systems to the collection container system.

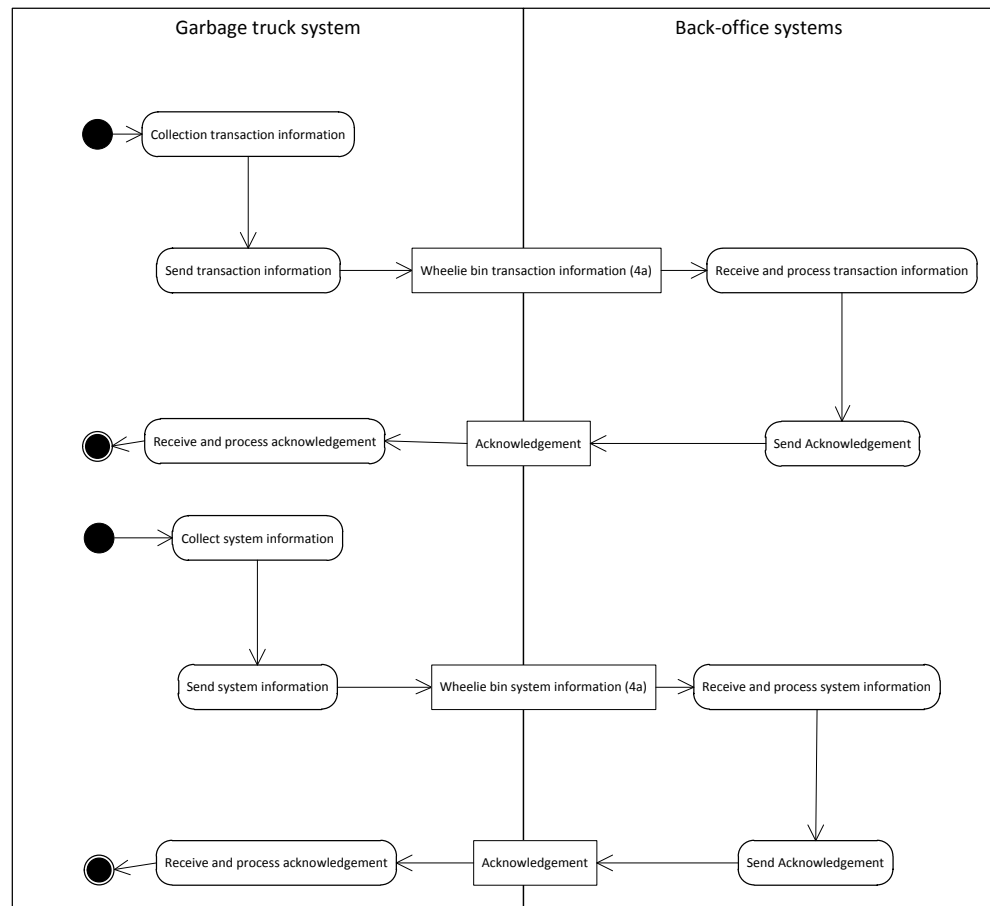


Figure 11: Activity diagram interaction 4a

Figure 11 presents the exchange of emptying information from the garbage truck system to the back-office systems.

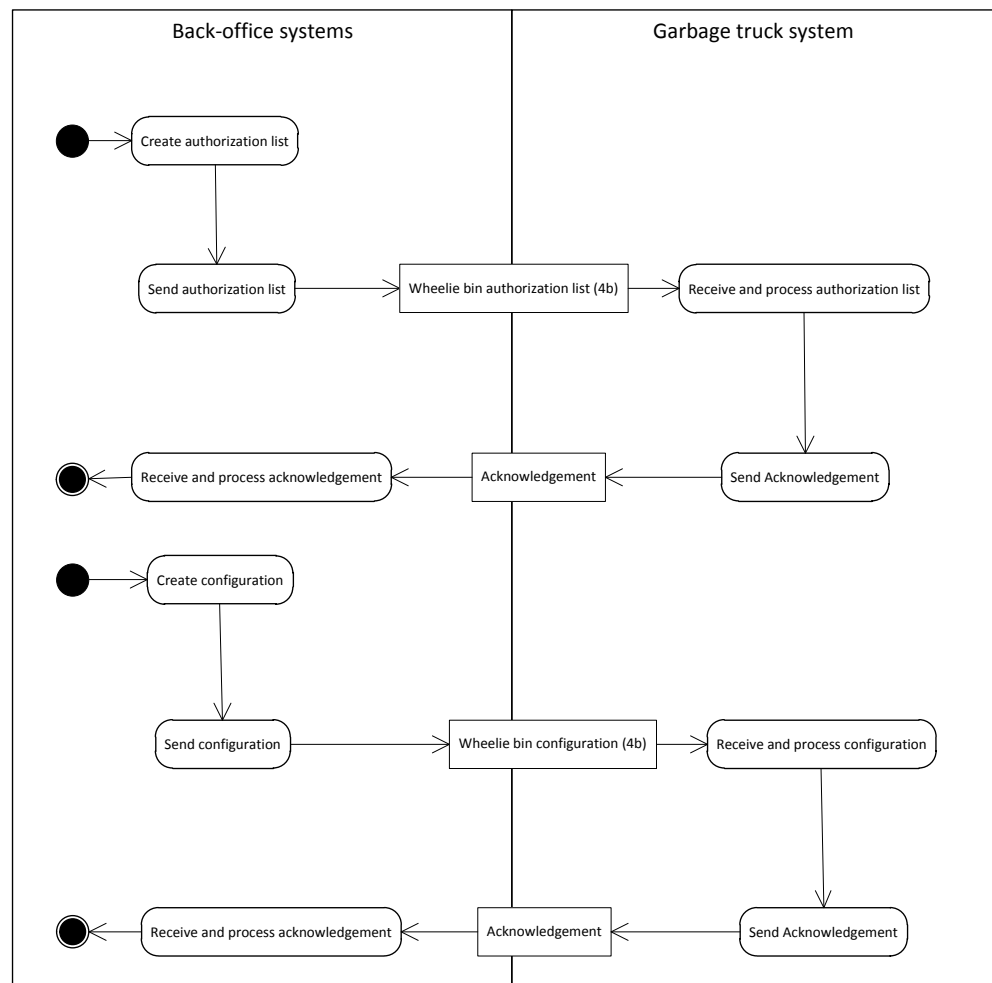


Figure 12: Activity diagram interaction 4b

Figure 12 presents the exchange of authorization lists from the back-office systems to the garbage truck system.