DATA SHARING COALITION

FacilityApps
ready for the future

AMdEX

Report on findings use case "Smart Cleaning"

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Management Summary

1. Sensor data in buildings is increasingly used for the development of smart products and services to optimise operations in buildings

2. Using sensor data can enable more effective and efficient cleaning & facility services in an increasingly competitive market

3. In this delimited use case, sensor data from dispensers and people counters is shared to develop smart cleaning services to improve hygiene and efficiency

4. Data sharing context is characterised by data streaming and differing views on who is entitled to control the data

5. Data streaming infrastructure and clarity on data control are key elements of the use case design

6. Expanding the use case scope to more actors, data sources and new applications may create new value

7. To support an expanded scope, agreements around access control, governance and standardised data services are needed

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Building sensor data is increasingly used for the development of smart products and services to optimise operations in buildings

Uptake of IoT devices is growing, also in buildings

- It is projected that the worldwide number of IoT-connected devices will triple from 2018 to 2023 to 43 billion
- IoT devices have already given rise to several applications in sectors such as smart cities, connected cars and e-health
- The use of IoT devices in buildings is also increasing. According to a report by Fortune Business Insights, the smart building market size (in revenue) is expected to grow by 12% annually in the coming years

New initiatives on sharing building sensor data lead to optimisations of building operations

- In a smart building, data from sensors is shared with service providers that develop products and services to optimise operations in the buildings
- Such optimisations include lowering the operational costs and increasing the productivity of (facility) staff through services such as cleaning alerts for cleaning companies and automatic climate control based on workspace occupancy
- Besides economical benefits, the end-user of a building benefits from these smart products and services, e.g. through insights in available workspaces
- Initiatives such as the Facility Data Standard (development of global open standards for secure data sharing in the Cleaning and Facility Services Industry) emerge that aim to facilitate data sharing for smart buildings

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Using sensor data can enable more effective and efficient cleaning & facility services in an increasingly competitive market

A view on the European Cleaning and Facility Services industry

*270.000 organisations*

3.800.000 employed people

€106.000 Million turnover

Explanation

- Cleaning and Facility Services are essential in households, business buildings, mobility and public spaces for cleaning and a healthier living environment (e.g. measures for COVID)

- According to a report of the European Cleaning and Facility Services industry, this industry is the largest sectoral employer in Europe and in last decades the industry has professionalised into a healthy competitive landscape

- The industry envisions to increase effectivity and efficiency of cleaning through the use of sensors that provide insights in various aspects of the building (e.g. occupation of rooms, maintenance of cleaning machines, check-in and check-out activity in mobility, etc.)

Source: Trend report European Cleaning and Facility Services 1995-2016, European Cleaning and Facility Services Industry

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In this delimited use case, sensor data from dispensers and people counters is shared to develop smart cleaning services

Use case interaction model
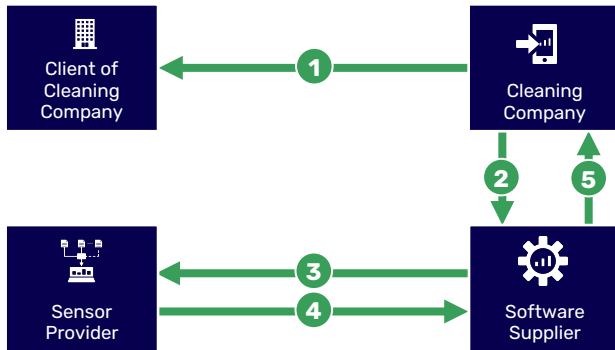
Client of Cleaning Company — ① → Cleaning Company

Cleaning Company ② ↓ / ⑤ ↑ Software Supplier

Sensor Provider ← ③ Software Supplier

Sensor Provider → ④ Software Supplier

Steps in process
1. Cleaning Company starts a service agreement with a Client to provide cleaning services that require sensor data
2. Cleaning Company requests insights from the Software Supplier on how full dispensers and how occupied areas are
3. Software supplier subscribes to the Data Service of the Sensor Provider
4. Sensor Provider (proactively) sends/streams data every 5 to 15 minutes in batches towards Software Supplier
5. Software Supplier translates the received sensor data to requested insights and shares this with Cleaning Company

Use case introduction

Explanation of use case:
- In this use case, a Cleaning Company uses data from sensors to determine whether soap dispensers need to be refilled and whether locations should be cleaned
- The Sensor Provider pushes data from sensors in dispensers and people counters in batches every 5 to 15 minutes (this depends on Sensor Provider) to a Software Supplier. Other sensor data (e.g. on floor cleaning) is currently out of scope
- The dispenser data gives information on how full a dispenser is, and the people counter shows the number of people that entered a room in the specified timeframe
- The Software Supplier translates raw data into insights (percentage of dispensers that need to be filled and number of people counted during a specified timeframe) and shares these in a dashboard with the Cleaning Company. The dashboard will provide alerts when refill is (almost) needed

Added value of use case:
- This use case leads to efficiency of cleaning services and increased hygiene as Cleaning Companies have insights in when and where to clean instead of cleaning everything on a fixed frequency. This might have impact on the business model of Cleaning Companies, e.g. Cleaning Companies can propose additional cleaning services through alerts on cleaning on top of traditional contracts, Cleaning Companies attract new clients by their competitive advantage through offering more efficient data-driven services in comparison to traditional cleaning services or Cleaning Companies need less hours for the same result through more efficient data-driven services

Use case approach

Parties involved in the use case:
- FacilityApps initiated this use case together with AMdEX. FacilityApps develops software to enhance operational processess in cleaning and facilities. AMdEX is an initiative with the goal to set up a data exchange infrastructure that operates as a public facility for all parties that want to exchange their data

Note: This use case has a limited scope as this creates focus for creating a use case design and a clear goal to work towards. This scope can be expanded in the future

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Data sharing context is characterised by data streaming and differing views on who is entitled to control the data

Key elements in data sharing context of this use case

The use case concerns continuous data streaming
The intensity of usage of certain areas of a building can differ every moment. A Cleaning Company wants to have continuous insights in usage patterns so that they can act upon them when necessary. To achieve this, data must be streamed continuously

Differing views on who is entitled to control the data
Various actors (e.g. Sensor Provider, Cleaning Company, Building Owner/Tenant) can be the owner of the sensors that generate the data in this use case. Besides this, all data concerns the owner or tenant of the building. Differing views in the market exist on what party is entitled to be in control over the data. Both the Sensor Provider and Building Owner/Tenant might have interests in being in control over the data, as in the future they foresee that the value and/or liability of this data might impact them.

Data sharing context
- Every data sharing use case has its own unique data sharing context. This context is determined by factors such as the nature of the data that is shared, the actors that are involved, who controls the data, et cetera.
- This data sharing context is very relevant, as it influences the requirements for the use case design

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Data streaming infrastructure and clarity on data control are key elements of use case design

Data sharing context

Key elements of use case design based on data sharing context

Data streaming

Differing views on who is entitled to control the data

Data streaming infrastructure
Given that in this use case Cleaning Companies should receive continuous insights, it is essential that the data sharing infrastructure within this use case ensures continuous availability of the connection and a continuous flow of data (out of which the insights can be created)

Clarity on who is entitled to control data
Relevant stakeholders in the market should aim to come to a common understanding on who is entitled to be in control over what data. A thorough (legal) analysis could provide relevant insights for creating this common understanding

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Expanding the use case scope to more actors, data sources and new applications may create new value

Expanding the use case scope can create new value

The current use case scope is limited in order to specifically enable the sharing of data from dispensers and people counters so that Cleaning Companies can determine whether they should refill dispensers in a specific area of the building. The current use case scope aims to support this use case in a Proof of Concept (PoC) setting with a limited number of actors.

To create more value with the use case in the future, its scope can be expanded in several different ways:

More actors: Currently, the use case design is created for a limited number of actors. The first live implementation will be initiated with FacilityApps, Succes, Haltian, Ophardt and H2O. In the future, this use case can be scaled to facilitate data sharing between a larger group of Sensor Providers, Software Suppliers and Cleaning Companies. This would allow more organisations to benefit from this use case

New applications of current data sources: Actors can create new value by applying the data in this use case (data from sensors in dispensers and people counters) for other purposes than smart cleaning, such as provision of occupation insights for COVID measures based on people counter data

More data sources: The existing scope of the use case only involves sharing data from sensors in dispensers and people counters. In the future, this use case could include other sensors as data sources, such as energy sensors, air quality sensors, machine maintenance sensors and security sensors. These additional data sources can unlock new insights and value

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To support an expanded scope, agreements around access control, standardised data services and governance are needed

Additional agreements are needed in future to support extended scope

When scaling this use case to more data sources, actors and applications of the data, agreements around additional topics become relevant in order to ensure trust and interoperability between actors:

Access control: In current use case scope, all data that a Sensor Supplier has available from a specific sensor is shared with the Software Supplier. With more actors, sensors and applications of data, a more granular restriction of access will be required, as not all actors should receive all data. Therefore, additional measures for access control are needed

Standardisation of data services: In PoC setting of this use case, (a limited amount of) actors can make bespoke agreements on what standards to use to enable data sharing between them. However in an expanded scope of this case, different service providers will make use of different specifications (e.g. different security specifications, standards and data quality). To ensure actors can share data with each other without the need for bespoke agreements for each new actor in the network, standardisation of different data services (e.g. security, data standards and data quality) is needed

Governance: To enable a scalable and interoperable playing field, agreements between actors need to be co-created, updated and actors' adherence to these agreements must be monitored. In a pilot setting with a limited number of actors and a limited scope of agreements, this governance of agreements is relatively simple and can be captured in basic operational processes between involved actors. In an expanded use case scope with an increased number of actors and a need for more extensive agreements between them, creation of agreements and oversight of adherence to agreements is complex. In many cases, a neutral governing body is installed that acts as a central body responsible for governance of the agreements on behalf of actors in the network

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There are four generic roles involved in the use case

Generic Role	Description	Examples	Role in use case
Data Subject	The subject of the collected sensor data	Companies renting an office space	Make agreement with Acting Party to enable (improved) services by the Acting Party for which sensor data is needed
Data Service Provider	Organisation that collects and distributes sensor data about the Data Subject for use by the Data Service Processor	Sensor Provider	Collect and share building sensor data on the Data Subject with Data Service Processor
Data Service Processor	Organisation that provides tooling and/or insights for the Acting Party based on data collected about the Data Subject	Software Supplier	Process and translate building sensor data of the Data Subject to provide relevant information requested by the Acting Party
Acting Party	An actor that performs actions based on data provided by the Data Service Processor	Cleaning Companies	Perform an action based on information received from the Data Service Processor

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Generic interaction model shows the interactions between the four main roles in the use case
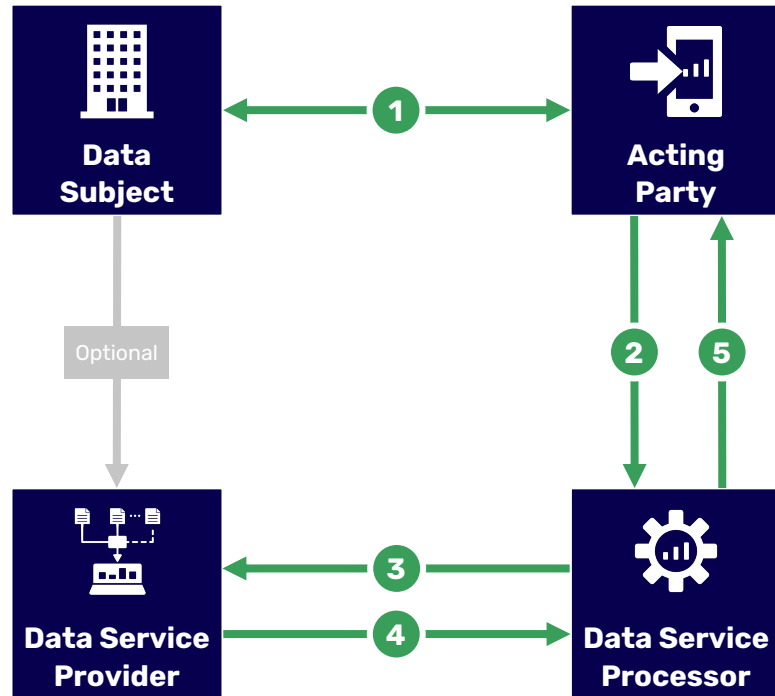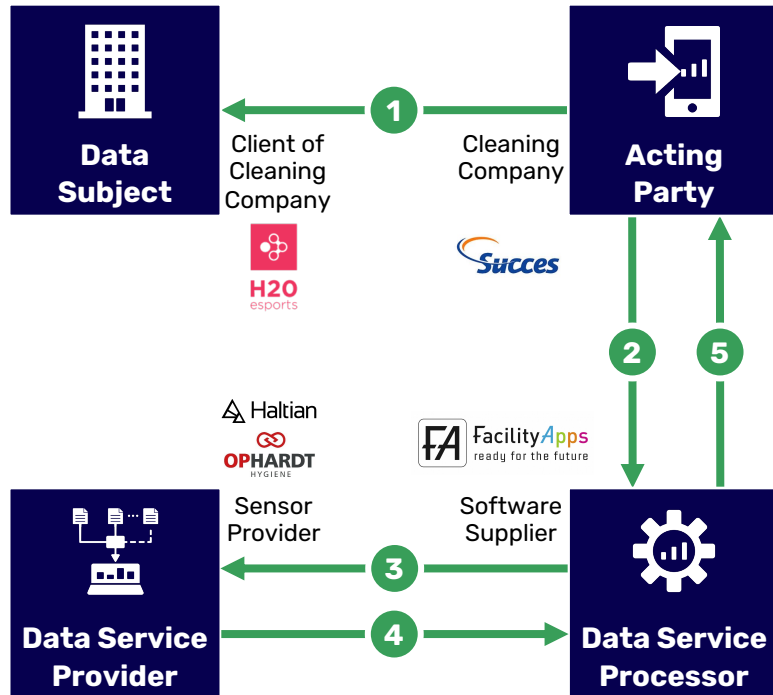

Indicative

Steps in process

1. Acting Party starts a service agreement with the Data Subject to provide services that will require sensor data on Data Subject
2. Acting Party requests certain insights from Data Service Processor
3. Data Service Processor subscribes to Data Service of Data Service Provider
4. Data Service Provider (proactively) sends/streams data towards Data Service Processor
5. Data Service Processor translates the requested data from the Data Subject to the information that is needed for the actions of the Acting Party

Optional: Data Subject authorises Data Service Provider to send data to specific Data Service Processor

Note:
Unless the optional interaction is in place, it is necessary that all required authorisation from Data Subject is covered in the service agreement between the Data Subject and Acting Party

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Data is shared with Cleaning Company to determine dispenser residual volume and area occupancy

Data Subject

Client of Cleaning Company

1

Cleaning Company

Acting Party

H2O esports

Succes

Haltian

OPHARDT HYGIENE

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Sensor Provider

Software Supplier

2 **5**

Data Service Provider

3

4

Data Service Processor

- **Objective of this case**: Cleaning Company is able to act on data that says whether dispensers are filled and areas are/were occupant
- **Value of this case**: More efficient cleaning service

Indicative

Steps in process

1. Cleaning Company starts a service agreement with a Client to provide cleaning services that require sensor data
2. Cleaning Company requests insights on how full a dispenser is and on how occupied areas are from the Software Supplier
3. Software supplier subscribes to the Data Service of the Sensor Provider
4. Sensor Provider (proactively) sends/streams data every 5 to 15 minutes in batches towards Software Supplier
5. Software Supplier translates the requested sensor data to requested insights and shares this with Cleaning Company

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Several requirements across nine building blocks need to be fulfilled to enable the interactions in the use case

Requirements entail what is needed to realise this use case and can include standards, tools and agreements

Non-exhaustive
For the full list of requirements for this use case, feel free to contact the Data Sharing Coalition

Highlights of requirements in this use case:

Business model
- It should be clear what services/products different actors offer (e.g. provision of sensors)
- Agreements are needed so that it is clear for all actors how and to whom the value in the case is distributed

Governance
- All involved parties that take part in the use case must conform and adhere to the agreements
- Roles and responsibilities should be clearly defined

Legal agreements
- There should be a signed contract between several parties in the case (e.g. between Building Owner/Tenant and Cleaning Company)
- All relevant regulations should be explicitly defined in all legal agreements (e.g. GDPR)

Operational agreements
- There should be clarity on why and how data is used and shared within the whole chain (from source data to generated data etc.)
- Service level agreements should be clear for all actors

Metadata
- Metadata should be made available that describes the data service

Security
- Suitable information security measures should be in place to protect data in storage and transit
- Security implementations should be based on the use of existing standards and consideration of best practices (e.g. FDS)

IAA
- There need to be common agreements between all actors on who needs to authorise what data transactions
- Data service providers (sensor providers) should communicate access rights

Exchange protocol
- Different types of protocols should be supported in the network (e.g HTTP, MQTT, WEBHOOKS)
- There needs to be an agreement in place on the frequency of data sharing (e.g. data service provider sends data each 15 minutes)

Data standards
- All parties must agree on the format of data (e.g. FDS)
- There should be a common understanding of minimum data quality that is defined in SLAs

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2. Appendix

    A. Use case design

    B. Organisations and process

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This use case was initiated by FacilityApps and AMdEX and several other parties are involved in live implementation

Use case initiators

- FacilityApps and AMdEX initiated the use case
- FacilityApps develops software to enhance operational processess in cleaning and facilities. They provide an App platform that helps professionals with operations such as quality management, work planning and asset management
- AMdEX is an initiative with the goal to set up a data exchange infrastructure that operates as an open public facility for all parties that want to exchange their data
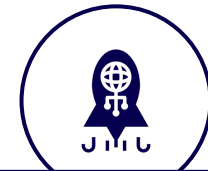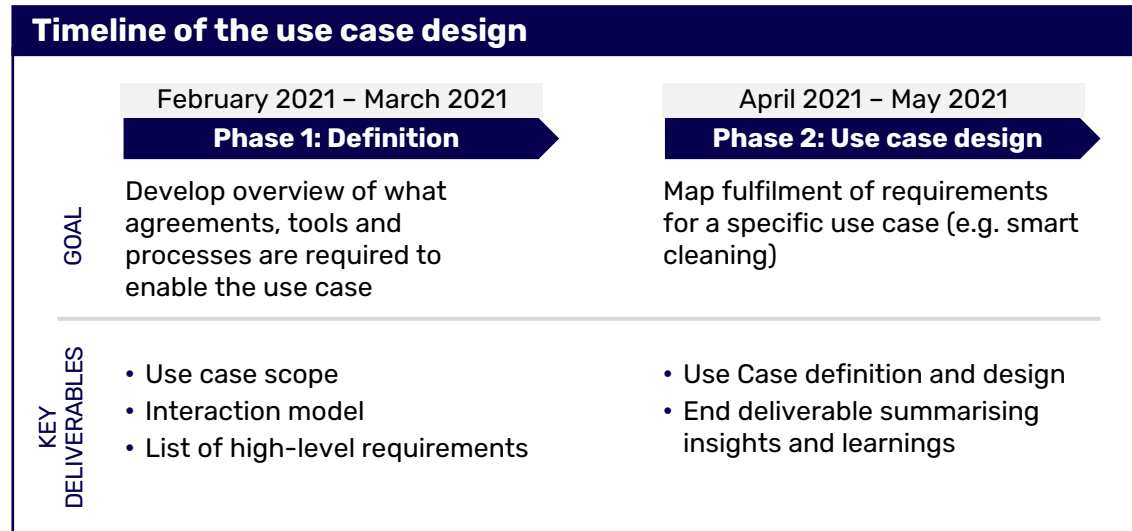
Involved parties in live implementation

- H20, Succes, Haltian, Ophardt and FacilityApps are involved in the live implementation of this use case
- H20 is the company that resides within a building
- Succes is the Cleaning Company that acts upon the data
- FacilityApps is the Software Provider (also initiator of this use case)
- Haltian and Ophardt are the Sensor Providers

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From February 2021 to May 2021, we worked towards use case scoping and use case design, next step is to create agreements

Timeline of the use case design

	February 2021 – March 2021	April 2021 – May 2021
	Phase 1: Definition	**Phase 2: Use case design**
GOAL	Develop overview of what agreements, tools and processes are required to enable the use case	Map fulfilment of requirements for a specific use case (e.g. smart cleaning)
KEY DELIVERABLES	• Use case scope • Interaction model • List of high-level requirements	• Use Case definition and design • End deliverable summarising insights and learnings

After the use case design

FacilityApps and other actors in use case may use the high-level use case design for drafting concrete agreements that actors in the use case can adhere to. These agreements will facilitate the trust required to share data amongst organisations

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