

## D2.1 Use Case Specification

PROSE

Proximity Services Framework

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**ITEA3 – Project PROSE**

## Document Properties

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## Executive summary

This document presents the description of the Spanish Use Case for the ProSe project. The information included in the document will be used for the development of the D2.2 deliverable.

## 1 Introduction

The document describes the identified and targeted use cases of the ProSe Consortiums:

- Hospitality / Hotels Environment – Spain
- HealthCare / Hospitals Environment – Canada
- Financial / Banking Environment - Turkey

## 2. Spanish Use Case: Hospitality / Hotels

### 2.1. Use Case Description

The hotel that will be used as demonstrator in the Spanish use case is located in Murcia. In this hotel, the ProSe system will be used to carry out the check-in / out management, offer services to the tenants based on location (restaurant, gym, spa, etc.), opening of room doors thanks to the use of smart devices, presence or location sensors, etc.

#### Energy Saving Scenario

Energy saving is one of the key issues to consider in this project. Through proximity services, you can determine the position of the guest as well as estimate (through behavior analysis) its potential trajectory, thus marking the points of light to activate and adapting the position of the blinds according to needs of natural and / or artificial lighting and climate comfort degree.

Likewise, the smart system developed in ProSe will also be able to be controlled by the user. ProSe must show a manual management interface to interact with the equipment if necessary.

#### Thermal Control Scenario

The heating and air conditioning systems can also be managed by intelligent systems that, once integrated into the ProSe system, allow them to be activated, deactivated and modified according to climatic needs. If a room is planned to be occupied, it can be previously acclimated to specific needs according to the calendar and general recommendations appropriate for health.

#### Lighting Control Scenario

Similarly, to the thermal control, the lighting of the rooms can be adapted according to the user preferences.

#### Access Control Scenario

For access control, ProSe will develop a proximity service to unlock smart devices in case the user has permission to do it and to interact with the gadget by opening the lock of the room, for example.

The app must therefore detect its proximity, interact with the centralized service and request access permission and, if authorized, present the user with the possibility of opening the lock. The authorization will depend on whether the final user has access to a concrete area.

## Advertising Scenario

Depending on the user's location, the ProSe system shows a different advertising according to the services that are nearby restaurant menu, promotions in stores, entrance to the spa, gym, etc.

## Check-in / Check-out Scenario

Depending on different events like date or position, the Prose system will enable a service for check-in/out. The system will integrate into the PMS of the hotel and validate billing for the user, enabling a quicker solution on his leaving.

## Parking Access Control Scenario

Access to common places as Lounge or Parking will be control by a Prose Service for unlock doors. In this case, Parking access gates can be managed by previously check the PMS for existing/actives guests in the hotel.

## 2.2. Elements and Devices

- **Property Management System (PMS).** Software for managing the data for guests and rooms. In the Check-in/Check-out service, an integration will be required in order to keep all data updated.
- **Automated door locks systems (SALTO).** Software for managing smart locks in the hotel. In the Access control service, an integration will be required in order to grant access guests to their rooms.
- **PARKING DOOR HUB PLC.** Hardware to open the gate for the parking. In the Parking access control, an integration will be required in order to grant access guests to the parking.
- **SMART PLUG.** Hardware to turn lights on.
- **SMART TV.** Digital signal system for advertising. In the Advertising service, an integration will be required for showing up the ads.
- **Bluetooth Low Energy (BLE) BEACONS.** Beacons using BLE Technology for enabling venues at indoor locations.



### 3. Canadian Use Case: HealthCare / Hospitals

#### 3.1. Use Case Scenario Description

This use case involves using ProSe technology to track and manage movements of healthcare cleaning staff while they are cleaning a room. The objective is to determine patterns of movement that result in higher quality cleaning outcomes. We plan to record the housekeeper's cleaning movements and store that data in a proprietary database. This database is a key component of our Walsh Integrated proprietary technology and will be used to store information on a variety of quality assessments from that facility.

Our existing proprietary technology is currently being used for managing several Quality Assessment programs in healthcare including visual cleaning assessments from Walsh QA Inspector and safety performance assessments with Walsh Rounds Tracker. We also collect data from Infection Control staff who track the incidence of specific infections across the hospital. Because all this information is captured in a single system with a highly structured geographic mapping, every piece of information is linked to each other in time and space. In addition, the Walsh technology maintains records on all the personnel, from housekeepers to supervisors, department heads and management. This allows us to identify trends not just across time and space, but across personnel as well.

The larger plan is to create a software system that can easily integrate data streams from numerous technologies. This is a flexible framework that virtually any technology can plug into using easy to manage web services.

The Prose technology will stream a unique data set into this database. In capturing movement data in a specific room and at a specific time for a specific worker, we can compare that data to all the cleaning evaluations performed in that room. This means we will be able to determine which cleaning movements result in a higher quality outcome and we can then build a knowledge base of which movements are considered more effective. In addition to capturing visual analysis of cleanliness, we also capture information on the protein burden on surfaces, typically called ATP testing. This is a test where the user swabs a surface and measures the amount of bio-burden on that surface; a lower bioburden indicates a cleaner surface. With these ATP test results, we can see the relationship between cleaning methods and bioburden.

Another app in the Walsh technology suite is used to capture Infection Control information, including Hospital Acquired Infection (HAI) data. Our system helps to track when a patient acquired an infection, where the infection was acquired and what type of infection it is. By combining all these data streams, we will be able to look for relationships between cleaning actions, cleaning assessments, and HAIs. Our goal is to correlate specific cleaning movements or patterns against the incidence of hospital acquired infections. For example, if a worker wipes a surface twice, does that have a greater reduction in bioburden than if they only wipe it once? Now, if he wipes that same surface 10 times, what is the corresponding reduction in bioburden? This is an important question because hospitals are constantly working with limited resources: limited number of cleaning staff, limited time to clean a room,

and a limited amount of management to oversee all the above. One of our goals is to calculate the optimal cleaning methods within a hospital. These optimized methods would then be used to create cleaning performance and management standards in healthcare designed to minimize infection risk. This is the first technology that will correlate actual cleaning techniques and tools against discrete measurements of cleanliness, and infection outcomes.

WALSH Update: our initial intent was to work with NXP on this project, utilizing their Ultra-sound proximity technology. As NXP has left the project, we are looking at the possibility of simply working with NXP as a vendor. We are also investigating alternative technologies that might meet our requirements. One of the early issues is the accuracy of the proximity sensors and the speed of a reading in 3 dimensional space.

The typical scenario we plan to cover is when a housekeeper cleans a patient room. Their movements will be tracked and digitized using three ultrasound modules placed strategically within each room. The three data streams will be compiled to create 3-dimensional model of the movements of that worker in that room and the data will be stored to build a library of movements. This library will be compared against specific outcomes or measurements such as:

- The type and frequency of infections contracted by patients in that room
- The visual scores of cleaning efforts in that room

Other data streams pertaining to that room and rooms close by; safety evaluations, Nursing, Rounds, etc.

### 3.2. Tracking Hospital Room Privacy Curtains Scenario

In a hospital, there are privacy curtains around each patient bed. These curtains are touched continually by Patients, Doctors, Nurses, family, housekeepers and more. This constant interaction with people's hands, gloved and un-gloved, washed and unwashed leads to the accumulation of potentially infectious materials, on the curtain. The leading edge is particularly prone to collecting this material as this is where people grasp the curtain.

We want to determine the optimal schedule for exchanging or replacing these curtains in order to minimize risk.

We will sew or glue NFC tags onto reusable and disposable curtains to allow us to easily collect data on usage, condition, etc.

We will calculate the costs of changing curtains; It can take anywhere from 5 minutes to 1 hour to change a single curtain. Washing a curtain can cost up to \$1.50 (US) per wash. Replacing disposable curtains can cost up to \$7.50 per curtain. We plan to create an algorithm that will calculate all these costs.

In addition we plan to measure the bio-burden on strategic parts of curtains as they are taken down. This will be done using an ATP reader which measures the quantity of proteins on a surface; the more protein, the dirtier the surface.

We intend to correlate the bio-burden against a number of external readings in order to predict an optimal schedule for changing curtains.

#### ATP Score vs. days in service

It is logical to assume that a curtain in active use will gather more infectious material the longer it is in use. We will measure the bioburden of curtains and compare that to “days in service” for the individual curtain. Our hypothesis is that there will be a linear growth in bio-burden, up to a maximum point, when that curve will flatten out.

#### HAIs (Hospital Acquired Infection) VS. days in service

It is also logical to assume that as a curtain collects more infectious materials over time, it is more likely to transmit an infection to the patient in that room.

We intend to calculate the incidence of HAIs, which is the data captured through our Infection Control apps. We plan to compare these HAI results to the “days in service” value. Our hypothesis is that there will be a linear growth in HAIs the longer the curtain is in service.

#### Cost of Curtain Change Vs Cost of infection

Changing curtains takes time and costs money. A patient who contracts an HAI is injured or killed due to, in some cases, that dirty curtain. While we are able to calculate the total cost of curtain changes, we can also calculate the cost of a patient contracting an HAI; this cost includes the cost of medications and treatment, lawsuits, lost time, lost quality of life, etc. We intend to create an algorithm that will help facility managers to decide when to change the curtains while minimizing both cost and risk.

In order to carry out this effort we will sew or glue NFC tags to both disposable and washable curtains. We will capture data including the name of the operator, time and data stamp, condition and type of curtain and more. This data will reside within our ecosystem and allow us to carry out the various calculations and modelling described.

### 3.3. Use Case - Integrating 3rd party data into the Walsh ecosystem

This use case focuses on integrating data from existing hospital’s Work Order Systems directly into the Walsh system. In this case a Housekeeping Supervisor would perform his daily cleaning inspections. Traditionally, when he finds an issue that necessitates a Work Order, he notes it on a paper and creates the WO when he returns to his desktop. In addition he must enter into the Walsh system. In this use case the user is able to enter the data into the Walsh system and our system will automatically push a WO ticket to the WO system. In addition our system will monitor the progress of the WO ticket toward completion, comparing status against expected completion dates, etc. This use case will result in a user being able to communicate effortlessly with the WO system and see accurate timely updates of progress.

We are pursuing this use case in order to start the process of developing the generic API layer that will be required as part of our Work packages. We are developing the methods and resources needed.

These methods will be integrated into a self managed API bridge that will be used by our ProSe partners in order to post their data into the system.

As a Director of Environmental Service, I want to collect Work Order data in the Walsh Ecosystem and have it flow seamlessly to the 3rd party Work Order System that my facility uses. This reduces the need for and risk of re-entering W/O data in the 3rd party system. W/O are now created automatically from within the Walsh App.

As a 3rd party integrator, I can create and automate custom messages, emails and distribution patterns, based upon limits or conditions of my data. This allows an integrator to designate specific emails and messages to be distributed, with custom content, based upon readings or events in their system. These messages can be autonomously triggered by the system.

## 4. Turkish Use Case: Financials / Banking

IBTECH and ARDIC is going to use their ProSe platform for the banking use-case.

### 4.1. Customer Greeting

The customer enters a branch of the bank with his smartphone with the ProSe application installed. When the application realizes that it is at the branch in the background, it reports the customer's presence through the ProSe platform to the bank system in accordance with the customer's permissions in the application. If it is possible to question who this customer is in the bank system, a welcome method suitable for the customer category is selected. A warning is sent to the smart device of the bank officer who will meet the customer together with the customer information. If the customer is in front of the tablet or kiosk-like smart device that will perform the first steps in the branch, a greeting message containing the customer's name is sent to this smart device.

#### Prerequisites

- ProSe application is installed on the customer's smartphone.
- The customer has made adjustments to make transactions for positions related to the bank in the application.
- In order to recognize the bank branch, a beacon or similar location-indicating subsystem was installed at the branch. The identification information of the location marker is marked as a location of that bank on the ProSe platform.
- The customer's virtual identity number on the ProSe platform and the customer number in the bank system are matched to the bank's system.

#### Scenario Steps

1. Customer Perception
  - a. The customer enters a branch of the bank with his smartphone with the ProSe application installed.
  - b. The application detects the presence of the location marker while running in the background.
  - c. The application learns the location of the customer by querying from the ProSe platform with the identity of the Location identifier and the virtual identity number of the customer in the ProSe system.
2. Notifying the Bank's system: the virtual identity number of the customer in the ProSe system is reported to the bank system with location information.
3. Welcoming Preparations
  - a. Customer identity on the bank system is queried.
  - b. Welcome method based on customer category is selected: a bank officer or the nearest smart device meets the customer.
4. Welcoming the Customer

- a. Bank officer meets the customer
  - i. To inform the bank officer, a notification is sent to the computer or device of the officer.
  - ii. Seeing the notification, the bank official meets the customer by name.
- b. Smart device meets the customer
  - i. A request to welcome the customer is sent to the nearest smart device like a tablet or kiosk.
  - ii. The device receiving the request runs the appropriate application and displays a greeting message containing the customer's name.

## 4.2. Queue Management

Today in banks, customers usually get a number based on what they will do at a kiosk. They introduce themselves to the kiosk either by their customer number and password or by using their bank or credit card. Then they choose the category of transaction they will take and get a queue number.

In a bank branch supported by the ProSe platform, this scenario will be operated as follows: In the previous scenario flow, it was perceived that the customer is in the branch. The bank system, which sets out what the customer frequently performs, generates a suitable queue number for these transactions, and transmits this number to the ProSe application or to the bank application if the bank has an application on the customer's smartphone. As an additional feature, a warning message can be sent to the customer's smartphone or the phone may be vibrated.

### Prerequisites

- ProSe application and bank's application are installed on the customer's smartphone.
- The previous scenario was realized.

### Scenario Steps

1. Transaction Prediction: The bank system detects the transactions of the perceived customer frequently.
2. Generating Queue Number:
  - a. Based on the frequent transactions of the customer, the system generates a suitable queue number for these transactions without the customer's request.
  - b. The bank system transmits the queue number to the ProSe application over ProSe platform to its own application on the customer's smartphone from its own systems.
  - c. Applications that receive the number, alert the user with a visual message and vibration.
3. Notification of Queue Number to Customer
  - a. A notification or a vibration is sent to the smartphone of the customer when it's his turn.

- b. The bank system notifies the computer of the bank officer who will serve the next customer. perform the transaction of the customer which order. The customer basic information is displayed on the bank officer's computer for both to help authenticate and to welcome the customer.

### 4.3. Informing

Banks inform their customers about general or customer-specific campaigns through television, web ads, their own mobile or web applications and ATM screens.

The ProSe platform will also enable the bank to make such notifications based on location. While the customer passes through a branch or cash machine, the presence of the customer will be determined, and this will be reported to the bank system through the ProSe platform. The Bank will be able to send an information message to its customer about a campaign it deems appropriate, considering the preferences of its customers.

#### Prerequisites

- ProSe application is installed on the customer's smartphone.
- The customer has made adjustments to make transactions for positions related to the bank in the application.
- In order to recognize the bank branch, a beacon or similar location-indicating subsystem was installed at the branch. The identification information of the location marker is marked as a location of that bank on the ProSe platform.
- The customer's virtual identity number on the ProSe platform and the customer number in the bank system are matched to the bank's system.

#### Scenario Steps

1. Customer Perception: Prediction:
  - a. With the smartphone installed on the ProSe application, the customer approaches the bank branch or ATM.
  - b. The application detects the presence of the location marker while running in the background.
  - c. It learns the location of the location identifier and the client's virtual identity number in the ProSe system by querying it from the ProSe platform.
2. Notifying the Bank's System:
  - a. The virtual identity number in the ProSe system of the customer and the location is notified to the bank's system over ProSe platform.
3. Sending the Informative Text
  - a. Customer information is queried in the bank system.
  - b. The campaign or transaction suitable for the customer is determined by the bank's system, and an informative text is prepared including the place where the transaction can be performed along with the person information.
  - c. This message is sent to both ProSe and the bank application.
  - d. When applications receive the message, they will vibrate the device and/or make a sound alert and display the message on the screen.

## 4.4. Mobile Payment

Mobile payment is becoming more common day by day. In addition to the special payment applications like mobile wallets; banks also offer the opportunity to pay through their own applications.

Assume a gas station pump as a mobile payment place. In Turkey it is compulsory to keep a separate cash register for each pump. The location of a customer (on his vehicle) who comes to buy gas is shared with the bank by ProSe. If the bank has a payment agreement with that gas station; the amount of the completed transaction is learned from the system. When the transaction is completed, a message is sent to the customer's smartphone over ProSe platform, and the payment confirmation screen is displayed on the customer's device and the payment is received through the bank application. This information is also shared with the station, for the receipt is automatically printed.

### Prerequisites

- ProSe application is installed on the customer's smartphone.
- The customer has made adjustments to make transactions for locations related to the gas station in the application.
- In order to recognize pump, a beacon or similar location-indicating subsystem was installed at the gas station. The identification information of the location marker is marked as a location of that gas station on the ProSe platform.
- Integration is made between the bank and gas station systems. The information of the amount of payment made from which pump of the station is shared with the bank by the station.
- The customer's virtual identity number on the ProSe platform and the customer number in the bank system are matched to the bank's system.

### Scenario Steps

1. Location info sharing:
  - a. The ProSe application on the smartphone of the customer who comes to buy gas sends the location to the platform.
  - b. Information of whereabouts of the customer is transmitted to bank systems.
  - c. In case customer leaves the location, Prose application sends notification to platform and to bank's system.
2. Learning the transaction status and amount
  - a. Bank's system checks if the gas filling is completed over the gas station's system.
  - b. If completed, station system transmits the transaction info to bank's system.
3. Mobile Payment
  - a. Bank's system notifies the bank application on customer's smart phone about the transaction.
  - b. Customer receives notification by vibration, sound, and payment screen visuals.



- c. Customer approves of the payment on the screen.
  - d. Bank receives the payment from the channel customer previously defined (bank account, credit card, etc.)
4. Automatic Receipt
    - a. Bank shares the payment info with the station's system.
    - b. Receipt is automatically printed from the pump's cash register.

#### Use Case Scenario - ATM

- In this use case, ProSe or similar location enabler devices can be installed near the ATMs
- When a customer with ProSe enabled banking application installed on her/his mobile device comes in front of this ATM, mobile application detects ProSe beacon and sends a requests to ProSe platform. Request indicates the location ID, an ID of the mobile user.
- ProSe platform handles this request and diverts a request to IBTECH services
- IBTECH services process this request in terms of customer, location, security. It returns a response that includes a one-time password (OTP) that is only valid for that ATM for a short period of time
- ATM screen informs user to enter OTP displayed in the mobile application
- Customer enters OTP

#### 4.5. Other Use Case Possibilities

Usage scenarios have been evaluated and targeted for banking. We also evaluated additional scenarios on how to use ProSe outcomes for ARDIC's other projects such as smart city and safe driving. We plan to use the ProSe framework for these types of scenarios as well.