Description of the Challenge

The challenge put forward is titled: **"How can we guarantee the autonomy and well-being of the elderly at home, making the most of Segurma's capabilities, offering a non-intrusive solution, and acting in real time?"**

This challenge addresses the needs described below:

- How can we improve safety for the elderly at home?

- How can we improve the autonomy of the elderly?

- How can Segurma optimise the resources available in its current offer?

Background

Security devices became available for homes and businesses years ago. That said, the features they now offer us as a whole are infinitely superior to the possibilities offered at that time.

Although the technologies already existed, their functionalities were limited to specific devices without forming a joint ecosystem. Together with the development of new technologies and their management systems, a new paradigm has emerged in the security sector in which, thanks to technologies such as artificial intelligence, we can be aware of and even foresee future incidents, thereby offering a unique service.

Segurma is a **home and business security services company** that relies on alarm equipment installed in the customer's home with a smart control centre to which sensors, cameras, and detectors are connected, among other devices.[1] These devices provide constant information on what is happening inside and outside the home. Based on the resources and information available, the aim is to develop a **new support service for elderly people who want to remain at home**.

The home alarm centre digitally interprets the signals it receives and sends them via a dual connection (GPRS and ADSL) to an **Alarm Receiving Centre (ARC)**. The ARC is equipped with specific software that differentiates these signals and presents them as measurable events to operators responsible for interpreting them. These operators then take decisions following a defined action protocol. This **protocol** ranges from checking the remote equipment, through a call to the customer, to alerting the emergency services because a serious event or intrusion has occurred. The **protocol varies depending on the incident or the customer's requests[2].**

Taking into account the capabilities of both the devices and the ARC, the company can **take care of the people inside the home beyond aspects relating solely to security**. We are therefore talking about **homes with a certain level of sensorisation, which are connected and supervised** by people **24 hours a day, 365 days a year**.

As a starting point, Segurma seeks to **evolve and complement its business model** by relying on its **three pillars**: **home sensorisation, connectivity, and specialising in personal care** for members of the household **who are at risk**.

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[1] View Annex 1. Detail of Segurma's devices and capabilities
[2] View Annex 2. Protocols of the ARC - Alarm Receiving Centre

Until now, these risks related to aspects such as intrusion into the home, but this solution also aims to be able to cover events such as falls, absences, or a lack of movement by the user.

These capabilities enable Segurma, through innovation and the use of new technologies, to be a **significant player in the field of** home automation combined with services for the home.

Segurma believes that the use of the infrastructure already installed in the home and the data from sensors, detectors, as well as the sending and receiving of events, together with the innovative application of new technologies, should **facilitate the creation of awareness** in terms of what is happening in the **home and to its occupants**. The aim is to create support and accompaniment services for the elderly and their families, far removed from the traditional vision of security.

Interested parties

The set of stakeholders involved in this challenge, and which must therefore be taken into account when presenting the solution, are the following:

- The **users, elderly people** seeking to increase their peace of mind and safety in their homes.

- **Their relatives or caregivers** who would enjoy greater peace of mind knowing that there is a service to monitor the well-being of their elderly relatives or those they care for.

- **Social and health services** would have prior information both in less serious cases and in cases where urgent intervention is required.

- Behind the **alarm system**, the monitoring team would be the **ARC operators**, who would analyse each alert and if necessary, take action on it according to the protocol agreed with the customer. The team will be able to provide the necessary information to assist the elderly person with the data extracted from the server.

Needs

Segurma's aim is not only to develop a new service for the elderly, but **to provide an innovative and unique solution for society**.

Its vision for carrying out **Non-Intrusive Care for the Elderly (NICE),** focuses on **using signals from the wide variety of devices** that Segurma currently installs to provide the service and, if necessary, incorporating other non-intrusive external elements, even if this means an increase in sensorisation. The hope, therefore, is that the user **will not need to remember to carry or wear anything**, nor will it involve a change in the user's routine.

Objectives

Taking into account the starting point described above, the solution that Segurma seeks for **NICE – Non-Intrusive Care for the Elderly**, aims to cover, as a minimum, the functional needs included

in the following table, classified as a requirement or weighted according to their level of importance, with three being the lowest level and nine the highest:

Variable	Functional need	Weight
1. The NICE is not noticeable and increases autonomy	1.1 The solution must be non-intrusive in everyday life (no use of wearables, no need for recharging by users, etc.)	Requirement
	1.2 The NICE must minimise the need for additional hardware (sensors, etc.)	3
2. The NICE must comply with data protection and private security regulations[3]	2.1 The solution must comply with the Private Security Regulations and, in particular, with Articles 40, 43, and 45	Requirement
	2.2 The solution must comply with the Private Security Regulations and, in particular, with Articles 39 and 46	Requirement
3. The NICE must be operational 24 hours a day, every day of the year	3.1 The solution must be continuously connected to the ARC so that the operators can carry out the appropriate actions	Requirement
	3.2 The NICE must have a real-time connection so that when an event occurs that requires a warning/alarm to be triggered it is received directly by the ARC	Requirement
	3.3 The solution must be able to be integrated with the ARC The main communication paths between the ARC and the devices are the telephone network, GSM, and ethernet	Requirement
4. The NICE shall include features of self-testing and operational diagnostics	4.1 The ARC shall be able to be aware of the status of the solution (battery or connection status) remotely	Requirement

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[3] See Annex 3. Security legislation.

5. The NICE facilitates the balanced intervention of family members and health and safety social services	5.1 Depending on the seriousness of the type of warning, a pre-defined protocol shall be followed	6
6. The NICE shall assess data from inside and outside the home	6.1 The solution must collect information from the user in all areas of the home, both inside and outside (terraces, garden, etc.) and transmit it to the ARC	3
	6.2 The solution has to allow for the partial arming of the system (it should be possible to activate it for some areas of the home and not others, at the customer's discretion)	6
7. The NICE solution will identify different events occurring to those in the home	7.1 Leaving home: it shall detect if the user has left home and, depending on the user's dependency levels, it shall act accordingly to avoid possible incidents	6
	7.2 Change of routine: it shall detect whether abnormal events take place within the home and those that are not part of a usual routine, in order to be able to identify possible behaviours that may suggest that the user needs help	6
	7.3 Falls or other incidents: it shall detect if the user has suffered a fall or an incident that entails the activation of any of the defined protocols	6
	7.4 Lack of movement: during the user's usual hours of activity, it shall detect whether there is a prolonged absence of movement that requires confirmation that no incident has occurred.	6
	7.5 Other episodes: the incorporation of other proposals that help to offer a personalised service and/or identify events not previously listed will be assessed.	3

Scope

Through the pilot developed between Segurma and the winning entity, **the viability of the proposed solution will be tested in a simulated standard housing environment, under the supervision of the company's laboratory managers and technical management**.

Once the necessary tests have been carried out at Segurma's facilities and **the technical viability of the solution has been confirmed** in the pilot within the framework of this BIOK Challenge, the company will go on to study the solution's **economic viability** (cost, price, etc.).

Once the solution has been approved as viable, based on the composition of the installation and **the company's forecasts for registrations over the next two years**, Segurma estimates that the solution could be **offered in 25,000 homes**.

Example: use case

Margarita, aged 87, has been living alone for some time now because her husband has passed away, but she does not want to move to a nursing home:

- **Scenario 1 – Leaving home:** One day, the NICE detects that the door of the home has been opened and Margarita is not at home, and depending on her dependency levels, it reports this incident to the Alarm Receiving Centre.

- **Scenario 2 – Change of routine:** The NICE detects that Margarita has made movements outside her daily routine and notifies the Alarm Receiving Centre.

- **Scenario 3 – Falls or other incidents:** One day, when she wakes up, she falls and becomes disoriented. In a non-intrusive way, the NICE detects the fall and communicates with the Alarm Receiving Centre.

- **Scenario 4 – Lack of movement:** The NICE detects Margarita's presence throughout the day and it communicates this to the Alarm Receiving Centre.

These scenarios will vary depending on the capabilities offered by the NICE solution.

References

- **Remote Care – elderly care software (Telefónica)**
  It consists of providing assistance to the elderly without the use of devices, which only uses wireless signals, artificial intelligence, and contextual analysis

- **Essence smartcare**
  Advanced remote support for elderly care

- **RD 2364/1994, of 9 December, which approves the Private Security Regulation**

Annexes

Annex 1. Detail of Segurma's devices and capabilities

The list of Segurma devices and their corresponding functionalities is included:

Device	Functionality	Example
Panic button	Prevention of false alarms with a double press or long press.	AJ-BUTTON-B
Door/window magnetic contact	Opening/closing detection indicator. Vibration and tilt detector.	AJ-DOORPROTECTPLUS-W
Smoke detector and temperature sensor	Smoke and over-temperature detection indicator	AJ-FIREPROTECT-W
Flood detector		AJ-LEAKSPROTECT-W
Glass breakage detector	Breakage detection indicator.	AJ-GLASSPROTECT-W
Bi-directional PIR, pet immune photodetector	Motion detection indicator.	AJ-MOTIONCAM-W
PIR and glass breakage detector	Motion detection indicator.	AJ-COMBIPROTECT-W
Indoor siren	Alarm warning light and signal arming/disarming sound	AJ-HOMESIREN-W
White standalone keypad	Allows full arming/partial arming /disarming using a code	AJ-KEYPAD-W

Annex 2. Protocols of the ARC - Alarm Receiving Centre

The ARC software distinguishes between incoming alarms and classifies them by alarm type. In this way, the operator sees at a glance what kind of alarm it is and knows what protocol to follow. This protocol varies depending on the type of alert, but also by what has been agreed upon beforehand with the customer.

General protocol:
When an ADSL or GPRS fault message arrives, it tends to be due to a drop in signal, so we usually wait for an hour, as it often comes back on its own. Otherwise, the remote system is checked, and if it cannot be fixed, the customer is called to try to solve it using the physical device, and if the fault remains, an incident is filed and a technician is sent out.

With low battery warnings, the first thing to do is to check that it is a genuine warning and if so, an incident is filed, and a technician is sent to change the battery.
In response to warnings such as tampering or theft, the cameras are looked at and the individual is called. If the cameras show that it is a genuine robbery, the police are called directly. Otherwise, as the individual has been called at the same time, we wait for confirmation from them, as they may have entered the wrong password.

Protocol established with the customer:

The first thing that is established with the customer is the telephone numbers that are called when an alert is triggered. For example, with intrusion alerts, if the individual does not pick up the phone, the operator calls the second contact that appears in the customer's file.

There can be up to five numbers on file, and the operator calls one at a time in the established order until they answer. There are also cases in which the customer requests that if they do not answer, the police be called directly.

Annex 3. Security legislation

Private security law

Article 39. Method of provision. **1.** The means used by security companies when providing private security services must be approved by the Ministry of the Interior. In any case, the vehicles, uniforms, and badges used must not lead to confusion with those of the Security Forces and Corps, nor with those of the Armed Forces, and shall comply with the characteristics that are determined by the corresponding legislation. **2.** Uniformed private security personnel, made up of security and explosives officers and rural guards and their specialists, shall provide their services wearing the uniform and displaying the badge with their position, and bearing the regulatory means of defence, which shall not include firearms. Exceptions to the obligation to carry out their duties wearing a uniform and badge may be established by legislation. **3.** Subject to the granting of the corresponding licences, only the private security services referred to in article 40 and those that are determined by legislation shall be carried out with firearms. Weapons suitable for carrying out security services may only be carried while on duty, with the exceptions established by legislation. **4.** Except in the cases expressly provided for in this law and that which is determined by legislation in accordance with the special characteristics of certain private security services, security guards shall carry out their duties inside the buildings or properties they are responsible for guarding. **5.** Private security personnel, when providing private security services, shall carry a professional identity card and, where appropriate, the documentation corresponding to the firearm.

Article 46. Installation and maintenance services. **1.** The installation and maintenance services of security apparatus, equipment, devices, and systems connected to alarm receiving centres, control or video surveillance centres, shall consist of the carrying out, by accredited technicians, of all those installation and maintenance operations of said apparatus, equipment, devices, or systems, which are necessary for their effective operation and the proper fulfilment of their purpose, after the preparation by accredited engineers of the mandatory installation project, the characteristics of which shall be determined by legislation. **2.** These systems shall be subject to preventive inspections with the frequency and in the manner determined by legislation.

Private Security Regulations

Article 40. Approval of material. **1.** The material and technical means, alarm apparatus, and security devices installed and used by these companies shall be duly approved in accordance with the rules to be established, preventing the security systems installed from disturbing third parties or causing them harm. **2.** External devices, such as acoustic or optical warning boxes, must include a contact telephone number through which the appropriate decision can be taken, and the name and telephone number of the company that carries out its maintenance.

Article 43. Inspections. **1.** Contracts for the installation of security apparatus, devices, and systems, in cases where installation is obligatory or when connected to an alarm centre, shall include the maintenance of the installation while operational, with preventive inspections every three months, and in no case shall more than four months elapse between two successive inspections. At the time of signing the installation contract or at a later time, the entity that owns the installation may, however, undertake the maintenance service itself or outsource the maintenance service and the quarterly inspections to another security company. **2.** When the installations allow the status and functioning of each of the elements of the system to be checked from the alarm centre, the preventive inspections shall be carried out annually, and no more than fourteen months may elapse between two successive inspections. **3.** Preventive inspections may be carried out directly by the entities owning the installations, when they have the personnel with the required qualifications and the necessary technical means. **4.** The security companies dedicated to this activity and the owners of the installations shall keep inspection log books, the format of which shall comply with the regulations approved by the Ministry of Justice and the Interior, in such a way that it is possible to process and file them in a mechanised and computerised manner.

Article 45. System manuals. **1.** The companies shall provide the user with an installation manual describing, through diagrams and additional explanations, the distribution of conduits, wiring, equipment connections, electrical and alarm lines, as well as details of the elements and equipment installed and the supports used. **2.** They shall also provide a manual for the use of the system and its maintenance, including details of how each device works and how to use them separately or as a whole, as well as the preventive and corrective maintenance of the mechanical or electronic equipment or devices installed, with an assessment of their useful life, and a list of the most frequent breakdowns and the adjustments necessary for the proper functioning of the system. **3.** In the event that an installed security system undergoes any subsequent variation that substantially modifies the original system, in whole or in part, the installation company or, where appropriate, the maintenance company, shall be obliged to draw up new installation, use, and maintenance manuals. The installation company shall also notify the control centre and certify the result of the checks in the manner laid down in Article 42.