

home  
based

Technologies  
for  
independent living



soline

# SOLINE Mobile – an environmental control system mounted on a trolley

## 1. General description

Soline is above all an environmental control platform, i.e. it allows people with a loss of autonomy to control their equipment using an interaction mode adapted to their abilities.

Initially developed to be integrated into an existing home, Soline is now available in a mobile version, to enable it to provide its services in an institution: it is a trolley that carries all the components necessary to control the equipment in a room in a hospital, nursing home or care institution for dependent persons, in a way adapted to the situation of its occupant.

Soline Mobile can thus natively control 9 different functionalities, using 4 distinct interaction modes. However, there is nothing to prevent the addition of optional functionalities or additional interaction modes: Soline remains Soline, a modular and scalable environment control platform.

Soline Mobile controls phone, television, nurse call, music, radio, audio books, its visual interface, its communication aid module and voice surfing on the internet.

As these functions and modes of interaction can be combined on a trolley without the need for cumbersome equipment, they are available directly and permanently. However, it is possible to take control of Soline by means of specific devices, such as the joystick of a wheelchair, a telethesis, the mouse of a personal computer, or even specialized communication aid software.

The fixed equipment of an institution's room, such as lighting, shutters, a motorized door or a medical bed, can also be controlled.

This is the main advantage of having Soline in a mobile version: the institution can offer its services when it needs them, depending on the situation of the room's occupant. It is therefore no longer necessary to fully equip each room to be able to use it.



Soline's interaction modes are available 24 hours a day, 7 days a week, and can also be used at the same time. This allows redundancy, making it possible to cope not only with a variety of disabilities, but also with the variation in patients' abilities throughout the day. For example, a bedridden person may not speak in the same way when sitting or standing. He may be able to use the switch or touchscreen in bed, but the voice in the chair.

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## 2. Soline - what are its advantages for the institution ?

Soline puts cutting-edge technology at the service of people in loss of autonomy. Its presence within an institution facilitates the management of complex situations, whether temporary or not.

A patient leaves the operating room with large bandages everywhere. How does he manage to call the nurses? Can a person suffering from multiple sclerosis be admitted to a nursing home if he no longer knows how to communicate with the staff? How would a blind person manage to catch the pear of the sick call system? Soline can help the institution to offer solutions for these common situations, or even to reduce the number of people who are impossible to be admitted. Heavy disabilities can be taken care of, even though they may represent an insurmountable obstacle for the institution without Soline's help.

Giving patients or residents a measure of autonomy has the advantage of freeing them from the feeling of guilt about their situation: the embarrassment of representing a burden for the staff, who have to move around for every benign act, disappears. The feeling of being able to carry out some actions by oneself again is also highly rewarding, and promotes the return of self-confidence.

What the patient or resident can accomplish by himself, has the staff of the institution no longer to do. He can thus devote himself to the tasks for which he is trained, free himself from the small acts of everyday life and devote his time to listening to the patients and caring for them. Soline is thus one of the possible responses to the chronic lack of staff in institutions.

In these times of health crisis caused by the coronavirus, Soline also allows the institution to save resources in terms of time and hardware: Soline can stay at the bedside of a sick patient, allowing him to do what it is designed to do, and the staff can avoid having to equip themselves, enter the room, dis-equip and disinfect themselves for these acts.

For institutions where stays are essentially temporary (hospitals and revalidation centres), Soline makes it possible to prepare the return home or to a permanent institution. In fact, having Soline available when the patient is rebuilding, after a trauma or a severe illness crisis, will enable him to train in its use in a privileged environment, where the support team is present to help, advise, call back, etc. With the guarantee that similar equipment will be available at home, these efforts are an investment for the future. They are not of one-off use, but are beneficial in the long term.

Finally, Soline is a great working tool for teams of occupational therapists in institutions: It allows them to try out different ways of interacting with their patients, by making them available to them on a single platform. This makes it easier for multidisciplinary teams (occupational therapists, speech therapists, psychologists) to find the right combination of interaction modes by trial and error. Soline also provides a motivating goal and objectives for patients, who understand why they need to make efforts in object grasping, speaking, etc. : it is to gain autonomy, and eventually be able to live without depending on a close caregiver.

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### 3. Presentation of Soline

Soline is a virtual assistant that allows you to control the environment, i.e. the electrical equipment that surrounds a person in his daily life.

Soline has been designed in such a way that it can be addressed in a natural way, as if a **human** helper were actually in the room next to the user. Soline responds to the voice: you speak to her, you give her an order, she understands you, responds and carries it out. The user does not therefore have to remember a series of fixed orders: all he has to do is ask Soline what he wants her to do. Thus «Soline, I want to look at the BBC», «Soline, switch to BBC», «Soline, I'd like to look at the BBC» or «Soline, could you please put the BBC on the television» are just a few examples of sentences that allow the user to zap to BBC.

In certain special cases (problems with concentration, speech, etc.), the orders that Soline has to recognize can be specifically adapted, in consultation with the patient but also, if necessary, with additional expert help (occupational therapist, speech therapist, etc.). These orders are therefore fully configurable.

Soline can turn on lights, manage the heating, control the television, dial phone numbers, read emails, play music and even surf on the internet, to identify just a few of her faculties.

Soline is a platform specially designed for people with reduced mobility or who have a disability that could be overcome (in whole or in part) by voice (visually impaired, senior citizens, etc.), or by other modes of interaction.

Soline is able to recognize orders in any voice (male/female, high/low, etc.) without any special settings or training.

Orders that are given to Soline generally begin with her first name, so as to create a recognizable catchphrase and avoid a sentence in a conversation being considered as an order to Soline. However, this is not an obligation.

In addition, if the first name Soline is not suitable, the user can choose another one, can have her change gender and give her a masculine voice/personality.

Some examples of orders :

- Soline, turn on the bedside lamp
- Soline, turn off all the floor
- Soline, I want to watch BBC
- Soline, turn the heating to 21°C until 11pm
- Soline, put the radio on BBC news
- Soline, call John on the phone
- Soline, I want to listen to the Beatles
- Soline, who's ringing the doorbell?
- Etc.

As announced, two versions of Soline exist for institutions: the fixed version (Soline Cube) and the mobile version (Soline Mobile). The fixed version comes in the form of a cube, with 30 cm sides. It is to be placed in the room, and is delivered with a wall bracket (shelf with brackets to be screwed to the wall). The mobile version is mounted on a trolley, which allows the institution's staff to move the system from room to room as required. It has a storage space for storing unused accessories under lock and key.



In order for Soline to understand its user, one or more microphones, wired or wireless, are used.

For Soline to answer or transmit a distant conversation, it must be connected to speakers.

Home Based makes it a point of honour to select the technological components that are best suited to the needs, the person and the environment. Soline has a range of different and complementary interaction modes.

What it controls can be controlled :

- by voice
- tactile and visual: an interface available for tablets, smartphones and computers to control and view the various equipment on a screen
- in a tactile, visual and vocal way: Soline then allows you to navigate through the interface's visual menus by voice
- via additional contactors or push buttons (wireless or not) that control either the visual interface or a series of voice menus
- via an adapted telethesis
- via the joystick of a wheelchair (just connect this joystick by bluetooth to the Soline tablet)
- through the eyes, because Soline can integrate an eye control device
- by the pointing device of a personal computer
- by gesture, by means of a specific movement sensor
- by a communication aid software, which allows people who cannot express themselves to compose sentences using icons
- in the traditional way (wall switch, TV remote control, etc.)

Each interaction mode can be used simultaneously. This means that a light can be switched on by voice, switched off with a tablet, switched on again with the eye, and switched off again with a switch. Thus, the notion of combinations of interaction modes appears: it is possible and even strongly recommended to deploy Soline with several interaction modes, in order to ensure redundancy and continuity in the use of Soline, regardless of the time of the day or the state of the user.



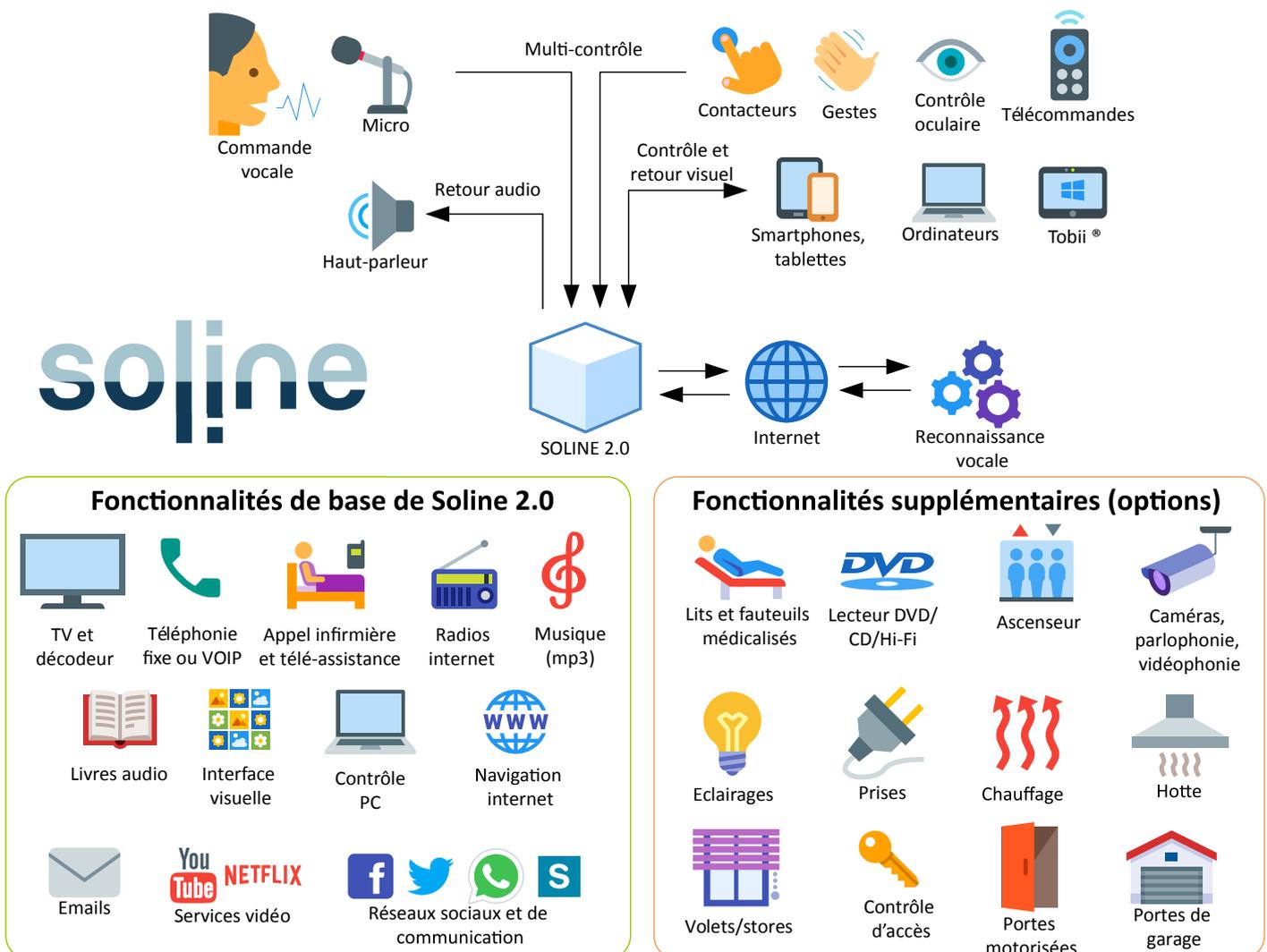
## 4. General principle of operation

Soline is waiting to receive a command via an interaction mode. The interaction modes are not exclusive: Soline can be vocal, have a visual interface on a tablet and be controlled by a remote control for example.

Soline centralizes received orders and distributes them to the equipment to be controlled, possibly via a gateway (this is the case for home automation, for example).

The equipment controlled by Soline retains its normal operating mode: Soline is an additional way of to control it and is not a substitute for traditional/manual control.

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# 5. The basic components and functions of Soline

## 5.1. Voice commands

Soline uses voice recognition (coupled with artificial intelligence) as its main mode of interaction. To control a piece of equipment, all you need to do is contact Soline.

There are two ways to order Soline. The first requires that the order be started with the name of Soline<sup>1</sup>: for example, «Soline, turn on the television».

The second requires the use of a key word or phrase<sup>2</sup> so that Soline considers that everything she hears during a given period of time is intended for her. Each command recognized during this period of time causes the counter to be restarted. And so on until the time has elapsed or until Soline is told the output key phrase.

For example :

- «Ok, Soline» (the counter counts down 45 seconds)
- «Turn on the TV» (the counter is reset for 15 seconds)
- «Set the BBC» (idem)
- «I love this show!» (this sentence was heard by Soline but does not constitute an order and therefore the time counter continues to run without resetting)
- «Increase the sound» (the counter is reset to zero for 15 seconds)
- «Once again» (idem)
- «Again» (idem)
- «Thank you Soline» (this is the key phrase to exit, from now on you will have to either say «Ok Soline» again or start an order with «Soline»)

Soline does not require you to learn an order by heart. You can therefore address Soline as you would address a person, which is much more intuitive.

As an example, the following orders are equivalent :

- «Soline, I'd like to watch the BBC»
- «Soline, set the BBC»
- «Soline, switch to BBC
- «Soline, will you change on BBC ?»
- «Soline, I want to look at the BBC»
- «Soline, BBC»
- «Soline, my friend and I would like to watch BBC»
- «Soline, please go on to BBC»
- «Soline, what's on BBC at the moment ?»
- Etc.

Everyone is therefore free to use the most natural or most suitable way according to his abilities.

1. The (first) name of Soline can be modified according to the user's choice. It can also be given a male voice.

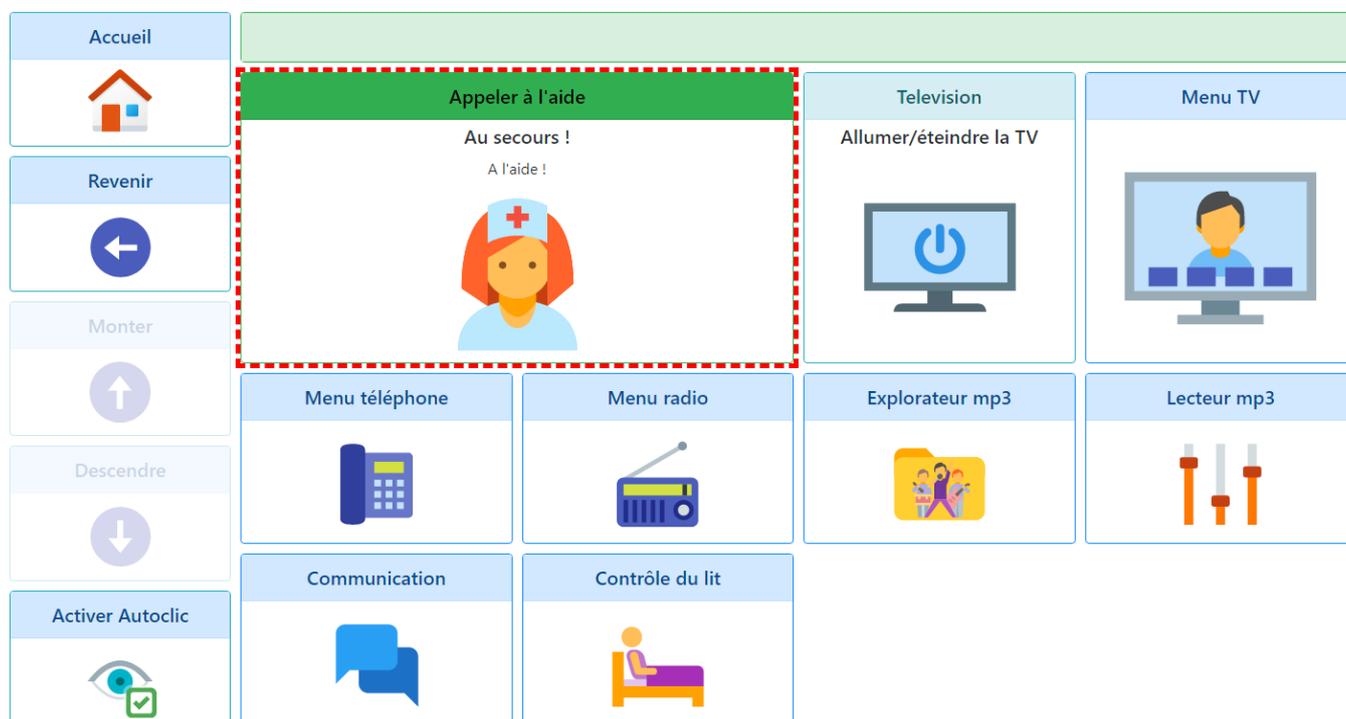
2. By default, the key phrase is «Ok Soline». This phrase can be changed at will like most system settings.

## 5.2. Visual interface

In order to facilitate some commands, Soline can also control a visual interface that represents the equipment controlled by Soline in the form of icons. This will be displayed on Soline's tablet. It can also be displayed on any device with a screen and an internet browser (smartphone, tablet, PC, etc.). Soline can be supplied with a device that allows the tablet's screen to be duplicated on any screen with an HDMI port, which is generally the case with television. Sets this makes it possible to enjoy a larger screen.

The visual interface can also be controlled by touch on touch-sensitive devices, or by means of the pointers that these devices may be equipped with.

Soline can be equipped with contactors that can also control the visual interface. Finally, the visual interface, displayed on the shelf, can be controlled by eye control.



## 5.3. Microphones

Soline can be equipped with wired (connected by a USB cable to the trolley) and wireless microphones. These microphones are essential tools for communicating with Soline.

### 5.3.1. USB wired microphones

These microphones are table microphones, placed on a bedside table to be close to the patient's bed, and placed in the bathroom if necessary to allow the continuity of the voice tele-assistance call.



### 5.3.2. Wireless microphones

The professional-quality tie mike that's provided is composed of a transceiver system that works with UHF radio waves. Each set of transceivers is paired and uses different channels to avoid interference between the different sets. The transmitter can be plugged into an electric wheelchair, so you don't have to worry about recharging the batteries.



### 5.4. Audio feedback

Soline responds via loudspeakers but also uses them to broadcast the sound of music, a door phone or a telephone.

The ideal is to broadcast the sound of Soline through a fixed audio installation. This is how the trolley is connected to a wired loudspeaker.



Alternatively, it is also possible to broadcast the sound of Soline through a small Bluetooth speaker, which can then be moved at will and follow the user. This loudspeaker can be mounted on an electric wheelchair, so that you don't have to worry about recharging the battery.



## 5.5. Nurse call

The user can call the nurses through the system present in the institution, by voice command («Soline! Call the nurses») or via Soline's visual interface, and therefore by means of the different usable modes of interaction.

Depending on the model and brand of the nurse call system, it will be connected to Soline's option box, in order to facilitate the deployment of the trolley in the concerned room. If this is the only fixed functionality present in the room, it is possible to provide the connection cable to the nurse call system directly on the trolley.

## 5.6. Television control



To control infrared equipment, Soline uses a universal remote control that can be controlled via the computer network. Such a remote control can control all the equipment that is in its field of vision or up to six different pieces of equipment if the module is «hidden» in a wardrobe. The user can control it with simple commands such as «Soline, I want to watch BBC» or «Soline, next channel».

Soline has everything you need to record the learning of any infrared television remote control. If a user has a television unknown by Soline, it is possible to teach her the remote control of the television in question.

As Soline controls the decoder, the user has access to all the functionalities integrated into it: video on demand, third-party services (e.g. Netflix, YouTube, etc.), games, etc.

## 5.7. Phone management

Soline allows you to make and receive phone calls. Either Soline is connected to the institution's landline and acts as an additional handset, or Soline is configured as an internet telephone<sup>1</sup> («VoIP»).

In both cases, Soline detects incoming calls and asks whether to pick up. If the answer is yes, the caller is connected. The call is made through Soline's microphone and loudspeaker.

Outgoing calls are very easy, as you only need to ask Soline to call the correspondent whose name and number(s) have been configured beforehand.

For example :

- « Soline, call John « (John's default number will be called)
- «Soline, call Mark at work» (the number linked to Mark's «work» will be called)
- « Soline, phone Mary on her mobile « (Mary's mobile number will be called)
- Etc.



To manage the phone, a small device is installed, which is called analogue - digital interface. It connects to the landline and allows Soline to manage all the functionalities of a conventional phone.

The phone ringing will be heard through the system's loudspeakers: Soline indicates that someone is calling and asks the user if he wishes to pick up. Once the call has been established, the conversation takes place through Soline's microphone and the system's loudspeakers.

<sup>1</sup> NB: Additional subscription and communication charges may apply.

## 5.8. Management of music and audio books

Soline is delivered with a USB key so that the user can host his music in MP3 format as well as his audio books, and can then ask Soline to listen to a particular book, album or artist. The visual interface is also available to make it easier to choose the music and books to listen to.

## 5.9. Management of internet radios

Soline allows you to listen to internet radio stations, or mp3 streams from official radio stations, via the internet.

Once again, the orders are very natural. For example:

- Soline, I want to listen to BBC radio »
- « Soline, BBC radio »
- « Soline, put BBC radio on »
- «Soline, please, can you put BBC radio on ? »
- Etc.

## 5.10. Surfing on the internet

Soline allows its user to surf the Internet, in the true sense of the word. He can choose the link he wants to follow, and is not limited to trivial questions such as «What will the weather be like tomorrow? ».

Browsing the internet with Soline is based on a totally new technology that consists of displaying a number next to each internet link. All you have to do is ask Soline to click on the number of the link to which you wish to navigate («Soline, click on link n°18»).

This internet surfing functionality gives access to all current internet services, such as news sites, Netflix, Spotify, Facebook, YouTube, ...

It also allows you to consult and write e-mails, through the web interface of the provider of this service.

## 5.11. Communication module

Soline has a communication module, which allows users who have difficulty expressing themselves to indicate their wishes or feelings using icons.

This communication module is fully customisable and can be adapted to the situation of each user.

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## 6. Optional additional features

### 6.1. Light and sockets

The lighting can be controlled by switching (On/Off) or dimming (Dimmer), single or toggle control, by remote switch and/or timer. All types of lighting can be controlled (filament bulbs, halogens, LEDs, neon tubes, ...).

Power sockets (and associated electrical circuits) can be controlled (On/Off), and even supervised by measuring current consumption. An hourly security can be introduced: checking consumption at a certain time and switching off (after questioning or automatically).

As far as possible, Soline takes control of this equipment by means of devices included in its own Wifi network. This avoids the need to add an additional home automation controller, certainly when only a few such items need to be controlled.

### 6.2. Motorized beds and armchairs

Soline can control beds and armchairs in two different ways :

- Either by infra-red if the device to be controlled allows it and is already equipped with an IR receiver.
- Either in addition to the wired remote control of the device<sup>1</sup>.

Simple and intuitive controls are then used to operate the device.

For example :

- «Soline, raise the backrest»
- «Soline, get the feet up»
- «Soline, lower the backrest for 5 seconds»
- Etc.

### 6.3. Motorized shutters, blinds, curtains, doors and windows

The opening and closing of shutters, blinds, curtains, motorized doors (internal or external, swinging or sliding), garage doors, gates or motorized windows can be operated through the Soline system and the associated strikes and electric locks.

Once again, Soline takes control of this equipment, as far as possible, by means of devices included in its own Wifi network.

### 6.4. Lift

Soline can call a lift at a given level, or send it back to a storage location, superimposing itself on the controls of these devices.

1. In this case, as in the case of the nurse call bulb, it is necessary to provide us with the model brand of the remote control, and if necessary, a remote control that will be «sacrificed» in order to understand how it works.

## 7. Partners

### 7.1. Belgium

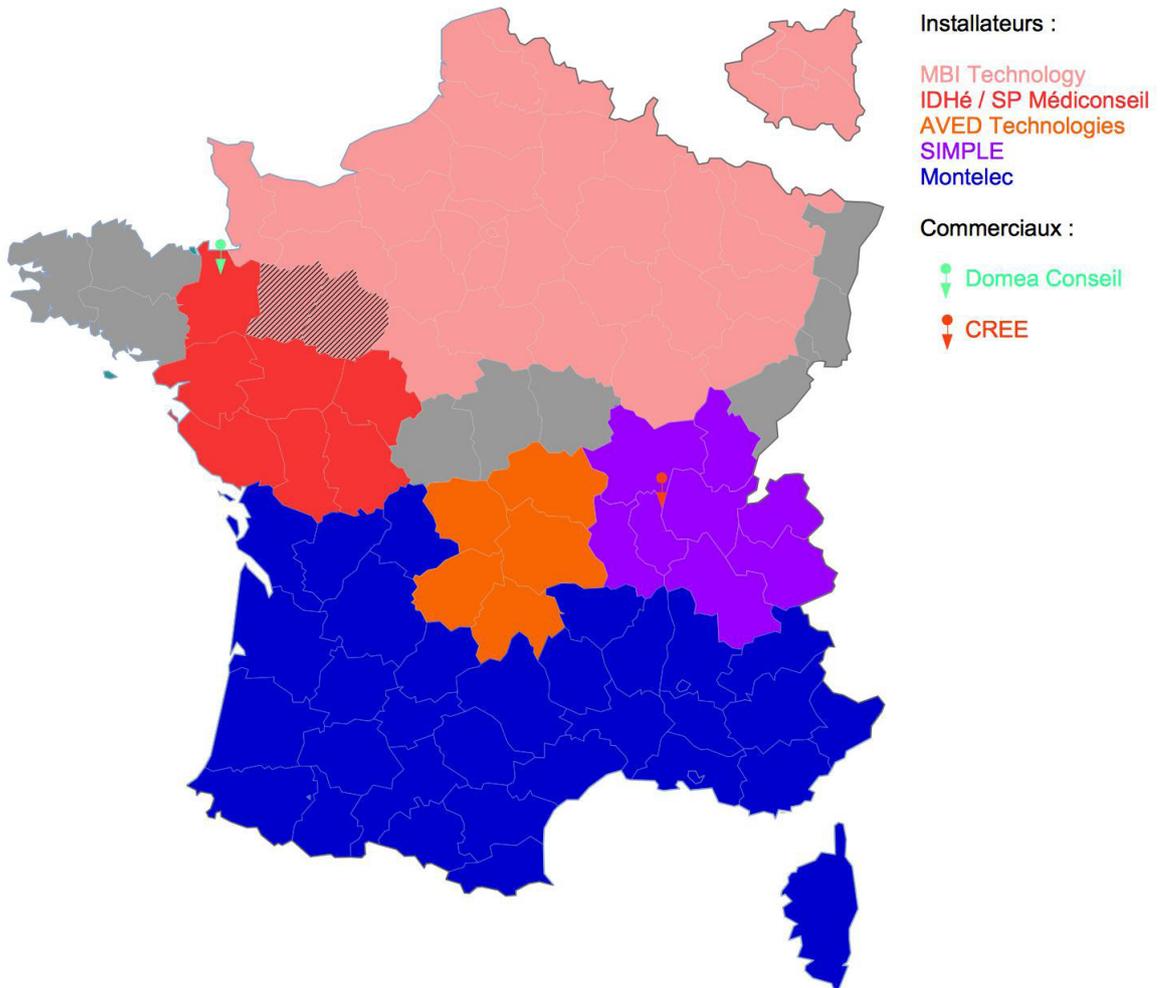
#### DISTRAC Group

Bleyveldstraat 14  
3320 Hoegaarden  
0032 16 76 82 82  
www.distrac.com

**DISTRACGROUP**  
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FR: Mme Myriam JACQUEMIN (0032 471 64 28 24 - myriam.jacquemin@distracgroup.com)  
NL: M. Geert HAEKENS (0032 489 40 75 29 - geert.haekens@distracgroup.com)

### 7.2. France



## Sales partners and installers :

### **MBI Technology (M. Christian OLIVIER)**

Rue Voltaire 61bis  
92250 La Garenne – Colombes  
0033175848570  
<https://www.installation-electrique-informatique.fr>  
[christian.olivier@mbi-technology.fr](mailto:christian.olivier@mbi-technology.fr)

### **IDHé – Konéo (M. Tony RAITIERE)**

Rue du Docteur Paul Chevallier 16  
49500 Segré en Anjou  
0033680820432  
<http://www.idhe.eu>  
[administratif@idhe.eu](mailto:administratif@idhe.eu)

### **AVED Technologies (M. Rémy JACQUEMIN)**

Route de Contournat 23  
63800 Saint Georges sur Allier  
0033682958009  
<https://aved-alarme.fr>  
[contact@aved-alarme.fr](mailto:contact@aved-alarme.fr)

### **MONTELEC (M. Charles CRUCIANI)**

Rue Benjamin Franklin 12  
82000 Montauban  
0033652395171  
<http://www.montelec-82.com>  
[cruciani.charles@gmail.com](mailto:cruciani.charles@gmail.com)

### **SIMPLE (M. Jonathan PETIT)**

Rue du 52ème Régiment d'aviation 32  
69500 Lyon  
0033658705627  
<https://simple-16.websself.net/accueil>  
[jonathanpetit90@gmail.com](mailto:jonathanpetit90@gmail.com)

## Sales partners :

### **Domea Conseil (M. Didier MARSOLLIER)**

Rue de la Rigourdière 30  
35510 Cesson Sévigné  
0033768225983  
[contact@domeaconseil.fr](mailto:contact@domeaconseil.fr)

### **CREE (M. Jean-Luc MARCELIN)**

Avenue de Champlevvert  
69520 Grigny  
0033472240899  
[cree@cree.fr](mailto:cree@cree.fr)

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