



## D6.1: Blueprint RESERVIST Network illustrated via the 'disinfection' case

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# EXECUTIVE SUMMARY

This document presents a series of guidelines and best practices to make the RESERVIST ecosystem more structured and in such a way that it can act in an emergency situation in a consolidated shape, that reduces errors and delays to a minimum.

The guidelines presented here cover different aspects:

- At the Network level, guidelines have been realized to manage the incorporation of a new entity within RESERVIST and guidelines on the creation of a cell in case of an emergency scenario.
- At the RESERVIST digital platform (RDP) level, the goal is to create an explanatory page that makes the guidelines of the previous point operational. In the platform, there will be three questionnaires that will allow the acquisition of basic information of the entities that want to join RESERVIST.
- At the Manufacturing level, a specific case study (NARDI case) has been analyzed to learn the strengths of their manufacturing chain model within the COVID-19 epidemic and translate them into best practices to be used and made available to other partners. The NARDI case was a virtuous example of manufacturing chain resilience in an emergency.

# TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	3
Table of contents .....	4
1. Introduction .....	5
2. Starting point and Methodology.....	7
2.1 Network Level.....	9
2.2.1 How to enter in RESERVIST ecosystem .....	9
2.2.2 Cell Creation .....	19
2.3 Manufacturing Level .....	23
CONCLUSIONS.....	26

# 1. INTRODUCTION

This document constitutes D6.1 in Task 6.1 "Blueprints for 'RESERVIST cells 'and application to' disinfection demo", which is part of WP6, aiming to create a sort of guide / best practices to amplify the RESERVIST concept, to allow the creation of new cells and therefore increase the portfolio of products that can be created with them.

This deliverable focuses on the establishment of a set of guidelines or best practices relative to following three levels:

- Network level;
- Digital platform (DP) level;
- Manufacturing level.

Taking a step back is useful to clarify the meaning of the RESERVIST cell. A RESERVIST cell consists of a group of companies, research centers, universities, or other entities that, when an emergency is detected, are activated, providing products or services able to contribute to the emergency.

At the network level, the aim is to create tools and procedures to **regulate access** to the RESERVIST network from other entities that want to join the ecosystem and the **creation of a cell**, making the procedure simpler, understandable, and as smooth as possible. The ultimate purpose is to improve the response of the RESERVIST ecosystem to possible emergency situations. In this scenario, increasing the number of cells or increasing the number of partners makes it possible to improve the product portfolio to face an emergency and improve the production response of the specific product and/or service requested.

The guidelines relating to the network level focus on what was analyzed in D1.1 "Definition of RESERVIST Network structure and organization" in which the network of manufacturing companies of the four cells initially identified was first analyzed. However, what has been said

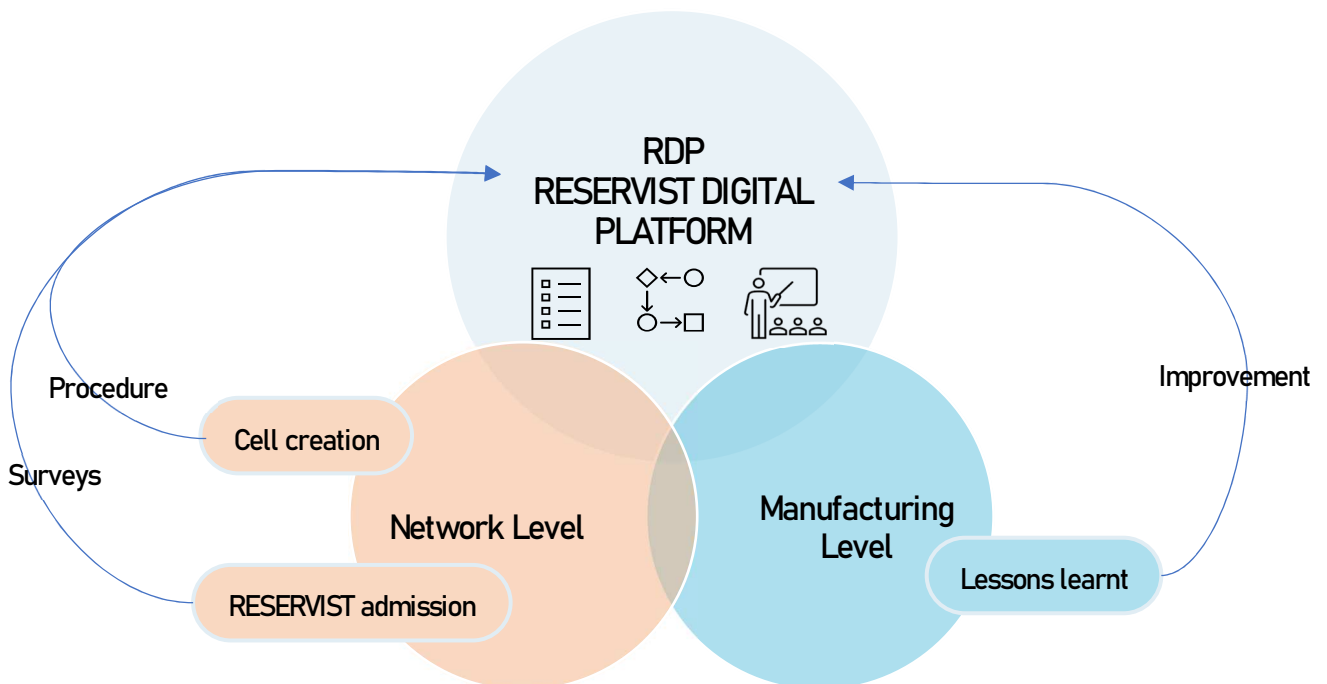


Figure 1 - Guidelines scheme

will be expanded to define a unique procedure for creating a new cell or adding to an existing one.

The digital platform level is linked to the network. The idea is to create a **set of guidelines for using the RDP** (Reservist Digital Platform) in terms of either joining one of the existing cells or creating a new one. For this reason, the RDP will contain a GUI of what has been described in the network level.

This guidelines regarding the Digital Platform will be created with the help of VTT.

The manufacturing level is focused on an analysis of a specific case (Nardi use case) to understand the lesson learned during COVID-19 and use them to create basic principles and best practices that can be used in the future.

For the preparation of this Deliverable, it was essential to take into consideration what was done for the drafting of Deliverable 5.1. Since the latter was considered the Contractual Agreement between the RESERVIST Partners and the customers as defined in the chosen Business Model, it was necessary to consider and regulate various situations and aspects for contractual purposes as well as the precise indication of the roles within RESERVIST itself during an emergency. Concepts have therefore been anticipated in D5.1, which will be taken up here, and detailed.

The task outcomes are, therefore:

- Guidelines to access in RESERVIST ecosystem for an external entity;
- Guidelines for the creation of a cell in case of emergency;
- Guidelines for registering a new entity on the RDP and other guidelines that explain how a cell creation work;
- At the manufacturing level, explain the basic principles, best practices, and quality control guidelines for the transfer of production from compressors to sanitizers.

## 2. STARTING POINT AND METHODOLOGY

The RESERVIST network comprises different entities (companies, RTOs, SMEs, clusters, associations, etc.) whose purpose is to collaborate to deal with unexpected product production to face an emergency scenario. To lay the foundations for the creation of the first cells starting from the partners present, it was necessary to carry out an analysis of the partners present within the network to understand their differences, strengths, and weaknesses, and in general, their various peculiarities; this analysis carried out during WP1 highlighted the need to create protocols/guidelines to be able to manage effectively and in a structured manner, above all emergency cases, but also to improve the normal operational situations.

Thanks to the information obtained during the implementation of Task 1.1, the analytical choices made in WP2 and exposed in D2.1 "Definition of RDP requirements", and finally the consideration realized for the creation of the grant agreement reported in D5.1, the business model of figures 2 and 3 have been identified and chosen.

Deliverable 5.1 contains the Contractual agreement; this document deals with the business model and regulates a series of situations that can occur from an administrative point of view. The way to manage these scenarios is well described and then put some constraints and limits to the guidelines in this document will be explained.

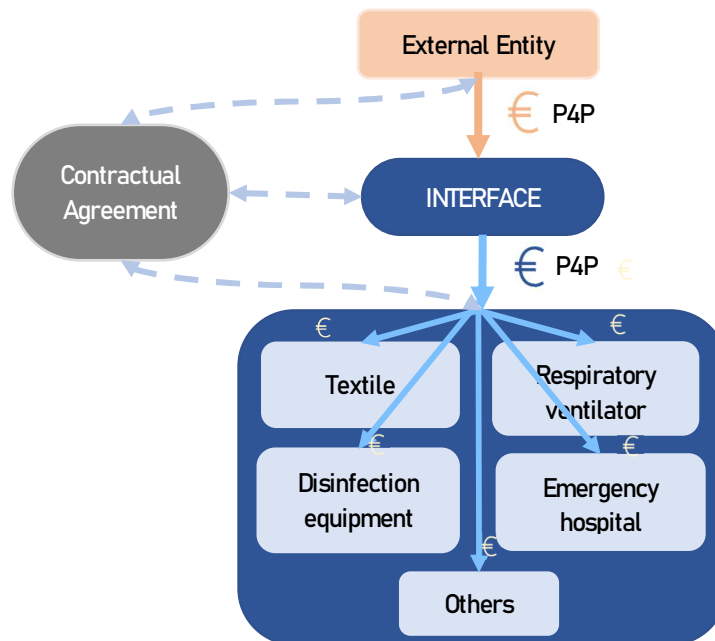


Figure 2 - Stand by mode

- **Figure 2** considers the normal working situation called “**Stand-by mode**” when no emergencies are detected. In this first case, a paying-for-preparedness economical schema is defined as a warranty for the end users.
- **Figure 33** is instead the “**Emergency mode**”, in which the External Entity asks for products.

In this business model, the External Entities are the ones who sign the contractual agreement with RESERVIST and then that can buy products from it; for instance, they can be national

Ministries for health/civil protection/defense, Inter(national)/regional Agencies for health, protection, aid/emergency response, Hospital or care facilities, Humanitarian organizations.

These two figures illustrate the operational asset of RESERVIST, which is very important because the guidelines in this deliverable are described and are truly connected to the operational structure. Furthermore, it is important to remember that during the emergency mode, a new partner can't be added to RESERVIST.

Since the entry procedure for manufacturing companies is a bit long (a company have to

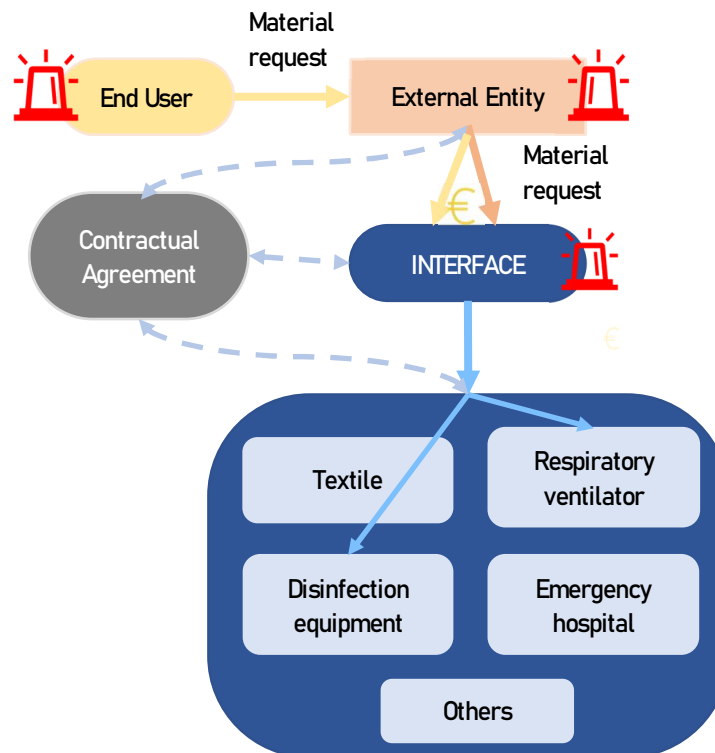


Figure 3 - Emergency mode

provide various data, they have to be checked, and they have to sign a contractual agreement with an economic offer) and there are some economical aspects and bureaucratic aspects to take into account it was thought of structuring it like this.

However, non-manufacturing companies (services, logistics, research organizations) can be added since they do not have all the economical and bureaucratic parts related to a product. In both cases, an INTERFACE that will act as the link between the outside world and the RESERVIST ecosystem has been defined. It will have filter functions for the entities that want to join the network, and therefore will have to analyze the characteristics and peculiarities of those companies that want to join it; finally, the INTERFACE will be able to coordinate and support the new cell creation phase in the event of the occurrence of new cells.

Four cells have been identified in the original consortium, containing different entities and each of them is related to a different product (protective masks, sanitizing equipment, mechanical respirators, and mobile hospitals) all in the medical and healthcare protection field.

These companies/entities were analyzed in terms of networks and sub-networks by collecting various information through surveys about their nature, their capabilities, and what they look for from other companies to optimize the supply chain of their products. Their data are available on D1.1 "Definition RESERVIST network".

It is important to have a complete picture of the products around which the cells will be built, to make the key concepts superimposable to create new cells through a defined methodology.



## 2.1 Network Level

At the network level, guidelines can be identified concerning two distinct situations:

- 1) Entry into the RESERVIST network;
- 2) Creation of an operational cell.

Both are essential. The first one allows the amplification of the RESERVIST concept, increasing the number of entities participating in the network. This increases resilience, and flexibility, and speeds up the production of the necessary product, allowing to avoid bottlenecks in production through precise procedures and cooperation. The second is quicker in creating a cell with guided procedures and not leaving a margin for errors. The idea would be that the cell is created operationally in case of an emergency since depending on the type of emergency, we know which material/product is needed. In the rest of the situations, the cell is not operationally active.

### 2.2.1 How to enter in RESERVIST ecosystem

To enter the RESERVIST ecosystem, a company needs to have minimum reliability and capacity requirements that will be verified by the "INTERFACE", based on defined criteria. In the event of an emergency, all the parties within RESERVIST must have the solidity to deal with it, both in economic terms and in terms of production capacity and repurposing of the production line.

The procedure for requesting admission to RESERVIST is therefore as follows:

1. The **entry request** must be done through the RDP web page. On the home page of the RDP, there is the "How to participate RESERVIST" button (figure 8), once clicked, inside there will be two pages, one explaining the procedure and one containing three questionnaires (Table 1, Table 2, and Table 3). These questionnaires will be completed online and allow RESERVIST to acquire general information and some data on the product of the entity requesting entry.
2. Once the three forms have been filled in with the correct information, they will be sent through email to the INTERFACE, which will analyze and evaluate the table's content.
3. If this assessment does not exceed the indicated threshold and no critical data are present, the institution moves on to the next stage. The last step is a formal interview to know the entity's people.
4. If this part is also successful, the new partner is invited to sign the Contractual agreement of D5.1. Furthermore, if the partner is a manufacturing company, it also needs to fill in Annex A of the contract relating to the RESERVIST product or service it would like to sell.

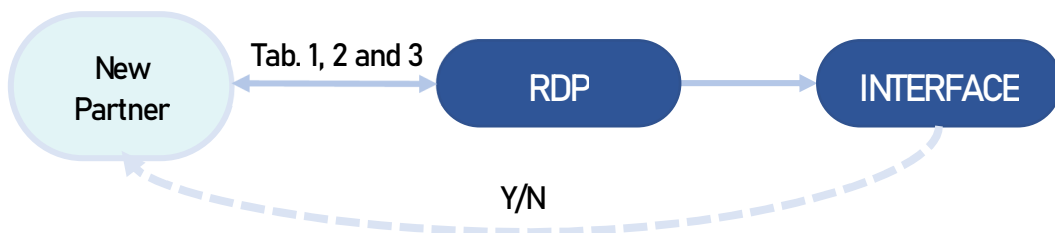


Figure 4 - The first three steps

The new entity is formally added on the RESERVIST website and on the other paper documents where there is a list of partners.

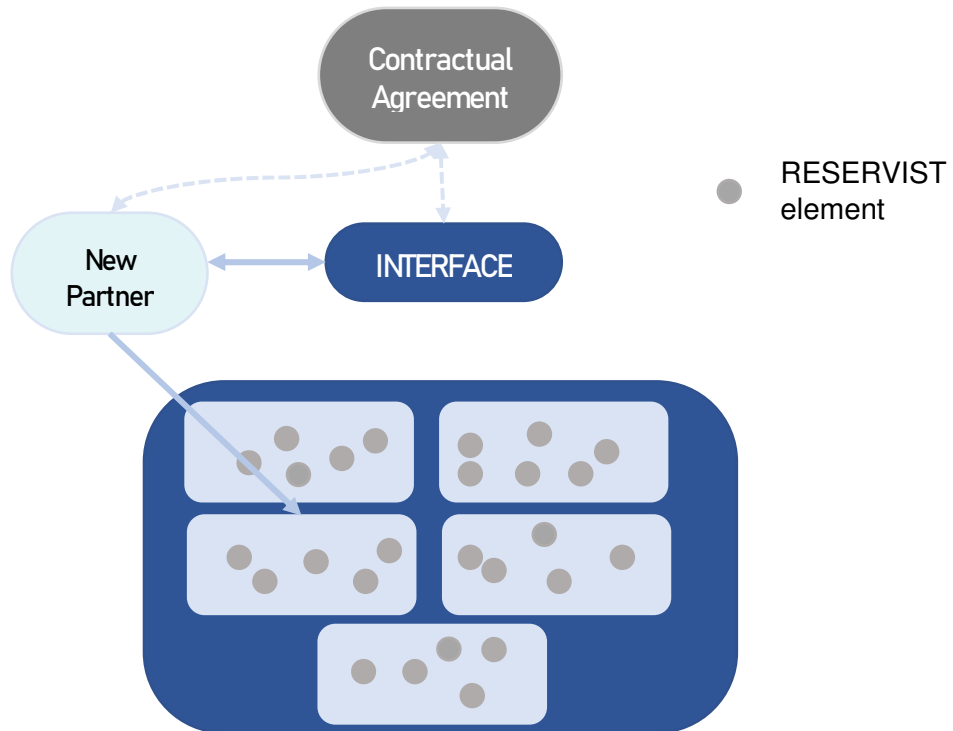


Figure 5 – The last two steps

Figure 4 and Figure 5 explain the interactions needed to enter in RESERVIST ecosystem.

The three questionnaires mentioned above are detailed in the following tables. Table 1 is created to collect some general information about the employee and his/her organization that wants to enter the ecosystem.

Table 2, presented below, can be considered a starting point for the evaluation of a manufacturing company that wants to add its products to the RESERVIST consortium, further requests to view product data sheets can be made depending on the product of interest. The Tables' aim is to have information about the company, its product, and its supply chain, and it is not related to the production capacity that must be provided in case of a request to sell a product inside RESERVIST (as described in D5.1).

Table 1 - General Information

<b>GENERAL INFORMATION</b>	
<b>Your contact details</b>	
<i>Title</i>	<input type="checkbox"/> Mr. <input type="checkbox"/> Mrs. <input type="checkbox"/> Dr. <input type="checkbox"/> Prof. <input type="checkbox"/> other, please specify _____

<i>Gender</i>	<input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Not declared
<i>First Name</i>	
<i>Family Name</i>	
<i>Email</i>	
<i>Main phone number</i>	
<b>Your organization</b>	
<i>Legal name</i>	
<i>Registration country</i>	
<i>City</i>	
<i>Address and CAP</i>	
<i>VAT Number</i>	
<i>Organization type</i>	<input type="checkbox"/> Industry <input type="checkbox"/> Research and technology organization <input type="checkbox"/> Higher education / University <input type="checkbox"/> Representative association (Sectorial Org., Trade Union, Cluster...) <input type="checkbox"/> Other: _____
<i>Organization dimensions</i>	<input type="checkbox"/> < 10 <input type="checkbox"/> 10 - 49 <input type="checkbox"/> 50 – 249 <input type="checkbox"/> > 249
<i>Field of experience (business sector)</i>	

<i>Describe the company activity</i>	
<i>Why would you like to be part of the ecosystem?</i>	

Table 2 - Overview of the Product

<b>OVERVIEW OF THE PRODUCT/SERVICE</b>	
<i>Product/Service Name</i>	
<i>Production Sites Location address / Service execution location</i>	
<i>Description of the products/service</i>	
<i>Who are the final customers of the product?</i>	<input type="checkbox"/> B2B (Business to Business) <input type="checkbox"/> BTC (Business to Consumer) <input type="checkbox"/> Service company BTC (Business to Consumer) <input type="checkbox"/> Other

<i>Pictures</i>	
<i>Certifications and compliance with norms</i>	
<i>Properties</i>	
<i>Risks</i>	
<i>Main components</i>	
<b>CAPACITY</b>	
STOCK AVAILABILITY (for <b>products</b> only)	
<i>Availability to keep items on stock for rapid supply</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No
<i>If yes, stock in a home warehouse or need to find another location</i>	
<i>Minimum and/or maximum quantity to keep in stock</i>	
<i>Due date</i>	
MANUFACTURING AVAILABILITY (for <b>products</b> only)	
<i>Cost for keeping capacity</i>	
PRODUCT/SERVICE ORDER REQUIREMENTS	

<i>Minimum quantity to be ordered</i>	
<i>Maximum quantity to be ordered (within a certain time)</i>	
<i>Other requirements</i>	
<b>PRODUCT/SERVICE ESTIMATED DELIVERY TIME</b>	
<i>Delivery time</i>	
<i>Delivery time Ex Works (the goods are finished in the factory and ready to be transported)</i>	
<b>TRANSPORTATION for products only)</b>	
<i>Transportation methodology (internal or external management, management in case of emergency, etc.)</i>	
<b>PRODUCT/SERVICE PRICE</b>	
<i>Price, price range</i>	
<i>Contact information</i>	

As far as the creation of a cell is concerned, it is followed what has been done for Task 1.1, in which the cell leader has been identified in the manufacturer. For each manufacturer, its sub-network has been identified in order to understand its needs, its strengths, and its weaknesses to use the RESERVIST network to make up for shortcomings.

From what has been learned in D1.1 with the four case studies, a RESERVIST cell is composed of some entities of the current ecosystem and then the manufacturing chain already existing, related to the manufacturing company and it is composed by:

- Company, which manufactures the product.
- Suppliers, who supply the key components and materials to produce the product.
- Logistic network, the logistics system that supports the delivery of the product.
- Customer's Side, understood as the sales strategy, places of sale, and sales methods.
- R & D organizations.
- Other.

These entities are the sub-network of the manufacturer, and they are not RESERVIST partners. However, these entities can join the ecosystem using the methods explained in chapter 2.2.1.

It is therefore essential to identify these points for a new entity that wants to join the consortium. From here comes another document to be filled in (Table 3) when accessing the RESERVIST network, like the one presented in D1.1 which will allow identifying the incoming manufacturer in its strengths and weaknesses. In this case, a score is given to each item; the score represents a value assigned to the company that can be used as a comparison between similar companies. The column "Factor" is just for RESERVIST purposes, in the form uploaded on the RDP that column will not be shown.

Table 3 - Questionnaire for RESERVIST access

<b><u>Questionnaire for RESERVIST access</u></b> <i>To be filled in by each participant</i>	<u>Score</u>	<u>Factor</u>
<b>Section 1 – Supply Chain</b>		
1. Please give a list of the products/components you look for in the supply chain in the pandemic emergency situations respecting the product you want to sell. Please rate them on the right column in order of importance (1 for the most important, X for the X <sup>th</sup> in terms of importance)		NA
2. On a scale of 1-10 how much are these services internally realized in the company? (With 1 being totally outside and 10 being totally inside)		
a. Mechanical design of customized components		0,5
b. Software development		0,1
c. Packaging		0,6
d. Distribution of final products		0,8
e. Design and integration of ad hoc production equipment (which kind of equipment?)		0,8

f. Shipment and delivery of production equipment		1
g. Testing, qualification, and certification consultancy		1
h. IPR consultancy		0,7
i. Business modelling		0,3
j. Innovation Management		0,3
k. Other (please specify) _____		1
3. Which kind of organizations do you look for in your supply chain to face emergency periods? Please rate your preference from 1 (most preferred) to 8 (less preferred)		
a. Small-Medium Enterprises		1
b. Large Enterprises		0,6
c. Research Centres and Universities		0,8
d. Consortia and Associations of Industries to get useful contacts		0,8
e. Online tools for e-commerce		0,9
f. Single Entry Points set up by R&I projects (such as Open Innovation Test Beds)		1
g. Procurers		0,7
h. Other (please specify)		
<b>Section 2 – Promptness and Logistics</b>		
4. Keeping in mind the target of the project (repurposing lines in 48 h), please rate the following selection criteria for the members of your supply chain (from 1 the most important one, to 6 the less important):		
a. Price		0,5
b. Quality of the product/service		0,8



c. Delivery time		1
d. Geographic location (please specify the area you look for suppliers)		1 National 0.5 EU 0 Outside EU
e. Type of organization (e.g.: Large, SME, non-profit, etc., please specify)		NA
f. Other (please specify)		NA
5. In case of demand peak for your products, do you go for temporary recruitment of workforce (Y/N)? a. If you do, please specify the choice criteria for the recruitment company _____ b. If you do, please specify the choice criteria for personnel _____		NA
6. Please rate the following transport methods/infrastructures (from 1 the most used to 5 the less used)		
a. Truck transportation on local roads		0,7
b. Truck transportation on highway		0,8
c. Railway		1
d. Airborne transportation		1
e. Naval transportation		0,8
7. What types of events trigger the operations of your network in case of an emergency? Please describe in a few lines (2-3 lines)		NA
<b>Section 3 – Distribution Chain</b>		
8. Do you aim to use selling agents to distribute your product (Y/N)?		NA
9. Keeping in mind the target of the project (repurposing lines in 48 h), please rate the following selection criteria for the agents (from 1 the most important one, to XX the less important):		
a. Personal relationship		0,6
b. Engagement time and method		0,8
c. Geographic distribution of commercial network		0,8

d. Delivery time		1
e. Geographic location (please specify the area you look for agents)		1
f. Size of commercial network		0,6
g. Other (please specify) _____		1
10. Please list the typology of your end-users:		NA
11. Would you like to extend the list of question #9? Please add here the typologies you aim at selling your product to:		NA
<b>Section 4 – Customization of your product - R&amp;D aspects</b>		
12. Have you developed your product with the support of Research Centres and/or Universities?		NA
13. Do you aim at improving your product thanks to the support and consultancies of R&D specialized organizations?		NA
14. How important is (on a scale from 1 to 10, 10 mostly important) customizing your product?		NA
15. Could external organizations help you in customizing your product during its development? Could this increase the efficiency of your internal processes (Y/N)?		NA
If the answer to #15 is Yes, please specify which activity could be done by an external organization to customize your product:		NA

A score is associated with some points of the survey, in which both the ability of a company to quickly change its production and its local supply chain will be rewarded. Another important aspect is the fact that if the entity under the survey brings other companies in its chain in RESERVIST, it is a plus to enlarge the network.

In the questionnaire, the scores tend to give higher value to companies that have a closer supply chain and that minimize relocation of production.

In case some answers highlight weaknesses or deficiencies, these must be resolved before entering RESERVIST. However, to solve them, it is possible to ask for help to the INTERFACE which, at its discretion, can provide solutions within the ecosystem (e.g., if an element is missing in the logistics chain, provide it) if these are obviously present, otherwise the entity will have to try to solve them by itself.

### 2.2.2 Cell Creation

The creation of a cell in case of emergency is a fundamental aspect to be regulated with a procedure. In fact, this phase must be as smooth and simple as possible to ensure the delivery times of the material. Furthermore, due to the emergency situation itself and the different products that may be needed, it must be managed clearly by a reference actor such as INTERFACE.

A RESERVIST Cell consists of a group of companies, research centers, universities, or other entities that, when an emergency is detected, are activated, providing products or services able to contribute to the emergency however, during the “**Standby mode**”, the cell is the group of companies, RTO, etc. dealing with the same product or related to a specific product among the RESERVIST ones.

The **emergency state** within RESERVIST occurs when an emergency status around the world is detected by the INTERFACE or reported by any other RESERVIST member.

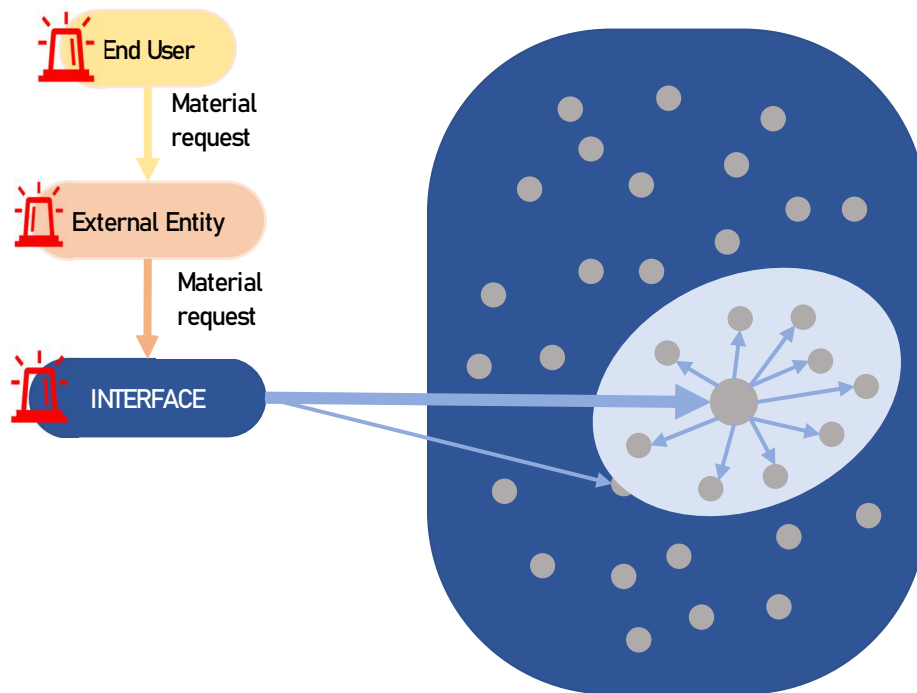
A state of emergency occurs also when a country or other authorities officially proclaim that status through an official public announcement.

Indeed, when a public emergency is officially proclaimed by a State, the RESERVIST ecosystem enters into action.

The **procedure** for activating RESERVIST and thus for activating a cell in case of an emergency leading to the production of the required products is defined as follows:

- a) An emergency anywhere in the world is the event that sets RESERVIST in motion. However, this emergency must be detected by the INTERFACE, or it can also be received by the INTERFACE or a member of RESERVIST as a formal written request.
- b) At this point, the INTERFACE informs all the RESERVIST partners of the characteristic of the emergency, in the figure of the reference person, through an official email sent during working days.
- c) Then, a first analysis from the INTERFACE defines the necessary materials/tools/products necessary for the emergency and available in RESERVIST, and finally, it contacts the specific manufacturer from the INTERFACE. This is done since the manufacturers must be ready when a material request arrives.
- d) When the INTERFACE receives the material request form (Annex III D5.1) from an External Entity, it sends the information to the manufacturing companies that are involved and that can start the production of the material/tool/product requested. Cost, delivery time, and product specification are indicated in part B of D5.1. The manufacturers together with the INTERFACE cooperate with the existing network to meet emergency requests.
- e) Production must meet the technical and production requirements defined in the contractual agreement D5.1.
- f) The request for the product ends with the explicit notification of the public authority or the end user, at the end of the emergency.

To be as straightforward as possible, there must be a direct relationship between the manufacturer involved and the INTERFACE, in such a way as to exploit the existing sub-network of the manufacturer enriching it with other entities present in the network. In order for this to happen as smoothly as possible, it is necessary to keep in mind the information on the company obtained with the previous questionnaires, which therefore allows the INTERFACE to already be aware of the **basic information** and also of the weaknesses of the company itself.



*Figure 6 - Information flow in case of emergency*

Through the previous questionnaires and the direct interaction between INTERFACE and the manufacturer, we try to understand from the outset what may be the weaknesses and limitations of the manufacturer's sub-network; be these weaknesses at the component level or at the logistical level. This is to ensure that, at the time of the trigger, the manufacturing company and the INTERFACE quickly act to fill any gaps through the ecosystem of RESERVIST companies.

In the case of a company or organization that provides services within RESERVIST, the procedure remains the same during cell activation. The INTERFACE, in fact, also alerts service supplier companies by defining the characteristics of the emergency. However, the service, like the products, will be provided upon request by the end users. Finally, to onboard possible future RESERVIST partners, work is being done in cooperation with Task 6.3 to better envision and expand RESERVIST cells.

## 2.2 Digital Platform Level

The RDP was developed on a technical level by VTT, with all the partners who were able to make their own contribution in designing the structure and logic of use and, finally, with the technical coordination of STAM.

The RDP platform represents the web interface for those who want to access RESERVIST but is also an important tool for the partners.

The platform web interface is the one in figure 8. However, a distinction is being developed between the web interface for RESERVIST partners who will access through their credentials (figure 7), and the interface for entities who want to enter RESERVIST. In any case, for those who wish to become members, there will be a specific page with information on how to become members and how the consortium works as the one highlighted in the red circle in Figure 8.

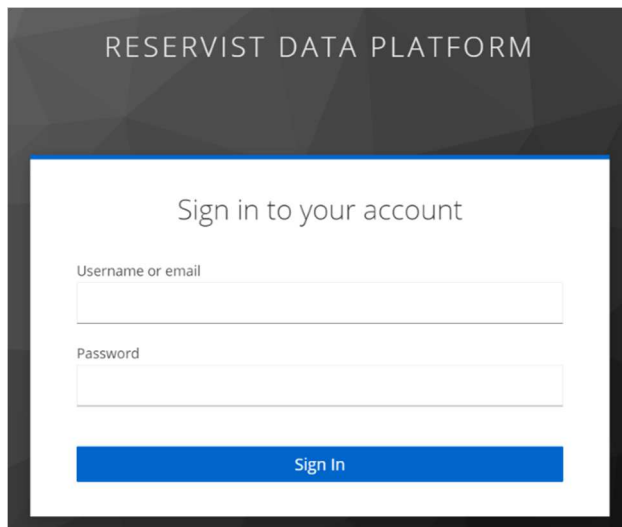


Figure 7 - Web interface for partners

The page has three buttons, respectively "Information about RESERVIST", "How to participate RESERVIST" and "Register to RESERVIST". The former contains a textual part that explains the procedures for entering the RESERVIST ecosystem such as the one described in cap 2.1, with a link that refers to the other page "Surveys". There the three previously presented

questionnaires will be available in an editable format.

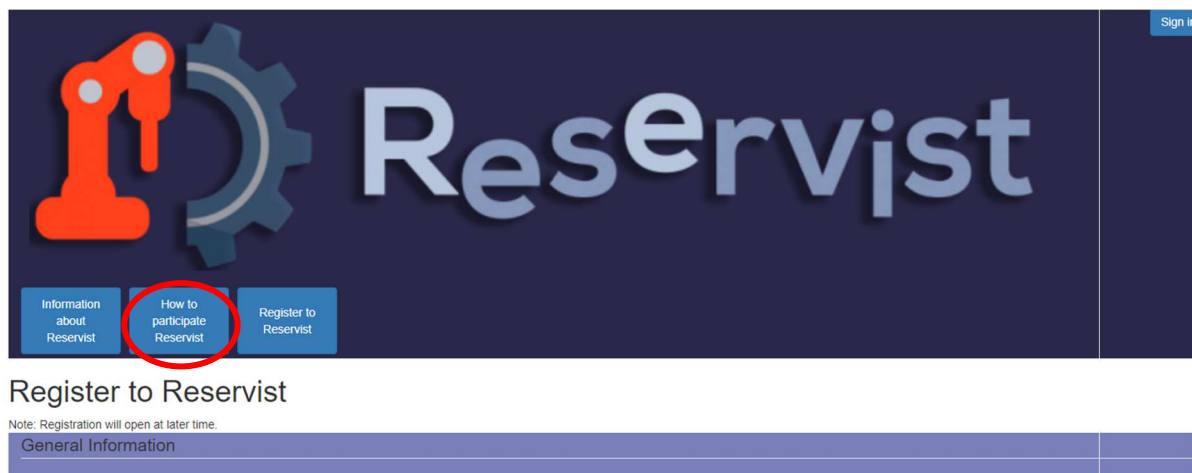


Figure 8 - The informative page on the RDP

Once completed, the questionnaires will be sent automatically by email to the INTERFACE, which will have the task of verifying the information and evaluating the candidate. An example of Table 1 in the form of a survey is provided in figure 9.

## Register to Reservist

Note: Registration will open at later time.

**General Information**

Please fill in your contact and organization details.

**Your contact details**

**Title**

**Gender**

**First Name**

**Last name**

Figure 9 – Registration page

Figure 10 below shows an example on the “How to participate” page. In it, there are explanations on how to join if you are a manufacturing company or another type of entity, what are the steps to join and an overview of the information to provide.

**Description:**

### How to join the RESERVIST ecosystem:

#### Are you a manufacturing company and do you want to add your product to the RESERVIST portfolio?

There are several steps to join the consortium.

1. You will have to fill in 3 forms to provide different information both technical and general about your company:
  - Information about your company (name, location, etc.) and the contact point between you and RESERVIST;
  - Different qualitative and quantitative information about the product you want to provide;
  - One last questionnaire to better understand your supply chain, logistics management, distribution chain, and R&D aspects.
2. These questionnaires must be filled in on the «Survey» page. Once completed by clicking on the «send» button, they will be sent to the RESERVIST contact person for evaluation. If the evaluation is positive, you will be contacted as soon as possible.
3. You will be contacted by RESERVIST for an informal and cognitive interview where the information provided in the questionnaires will be discussed.
4. If you have also passed this phase, you can move on to signing the contractual agreement in which you will have to provide technical and economic information on the sale of your product. More information about the information necessary for signing the contract will be provided during step 3.
5. If successful, the company will be formally added to RESERVIT and all the channels associated with it (RDP, websites, meetings, etc.)

Start your joining request now at this [LINK](#) !

#### Are you a service company, an RTO, or a University and you want to help RESERVIST?

The steps are just a few.

1. You will have to fill in 1 form to provide different information about your company and the contact point between you and RESERVIST.
2. This questionnaire must be filled in on the «Survey» page. Once completed by clicking on the «send» button, it will be sent to the RESERVIST contact person for evaluation. If the evaluation is positive, you will be contacted as soon as possible.
3. You will be contacted by RESERVIST for an informal interview where the information provided in the questionnaires will be discussed.
4. If successful, the company will be formally added to RESERVIT and all the channels associated with it (RDP, websites, meetings, etc.)

Start your joining request now at this [LINK](#) !

Figure 10 – General information page

## 2.3 Manufacturing Level

At the manufacturing level, the starting point is the methodology used during the COVID-19 pandemic for the transition of the assembly lines from the usual compressors produced by NARDI to **Sany+Air** devices. This is done to understand the strengths and weaknesses of their activity, which will be analyzed.

The advent of the pandemic has meant that many industries have had to reconvert production towards products more suitable for the market. Among these, Nardi Compressori, in a complicated context such as the Italian one in which the pandemic has caused considerable damages, has been able to distinguish itself by reacting and quickly starting the production of equipment for the sanitation of large surfaces.

The birth of the Sany+Air product, although developed during the severe difficulties of the pandemic, took place in a very short time thanks above all to the slenderness and simplicity of the production lines present in the NARDI assembly line. The pre-covid situation in the plant is summarized in the diagram in Figure 11 for the assembly of an oil-free compressor.

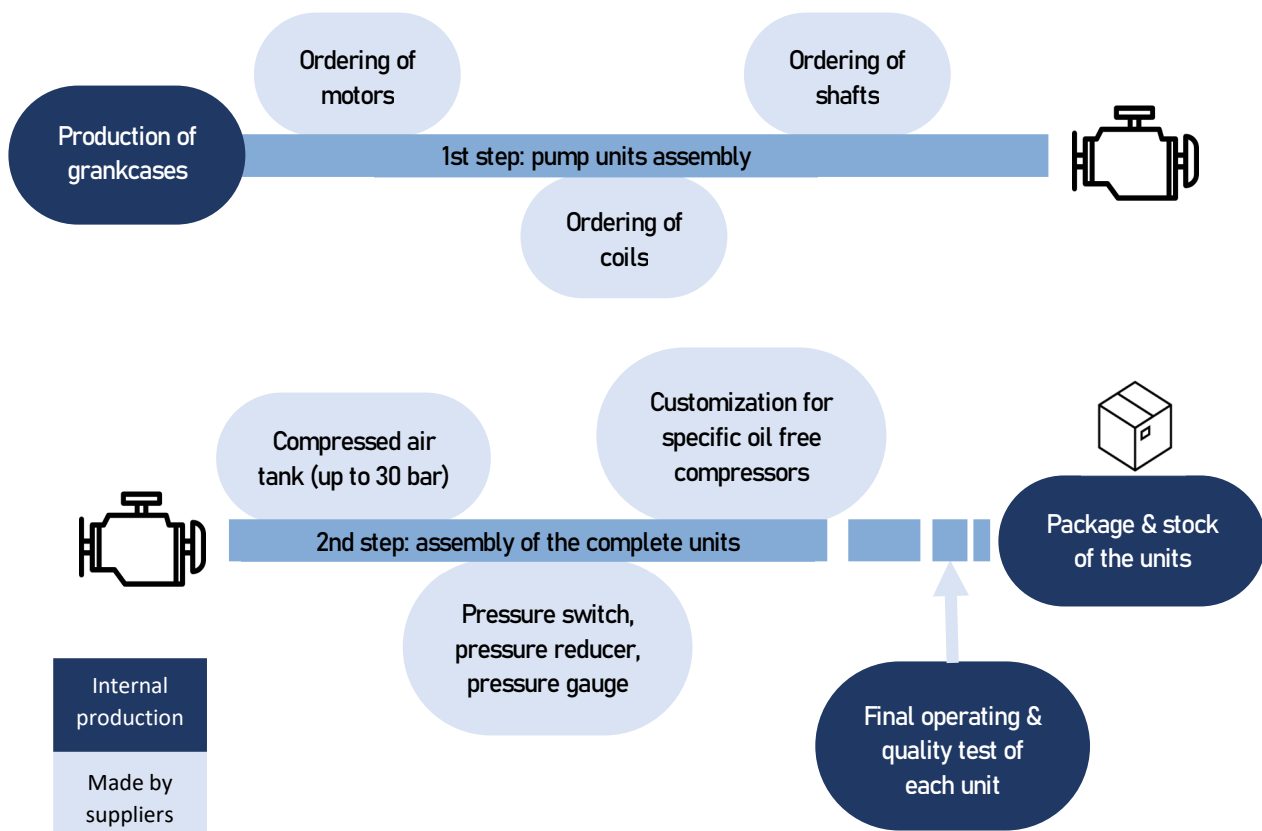


Figure 11 - Assembly line for oil free compressors

The total number of assembly lines, later converted to Sany+Air production, was six; two involved the assembly of pumping units (one for oil-free pumping units and one for oil-lubricated pumping units) plus four assembly lines of the complete unit; which originally were: two for the assembly of oil-free compressors, two for oil-lubricated compressors but for two different models.

Figure 12, on the other hand, shows the assembly line of the Sany+Air, which in the first step of the line is the same as the one of an oil-free compressor. It is then distinguished in the

second assembly ramp in which the various specific components are introduced: the spray gun and the spiral hose, the motor brackets and the painting phase, the electrical cables, the buttons, and finally the casing and the plastic supports.

At the bottom of the assembly line, there are quality controls with related tests. The compressor is tested continuously for thirty seconds (since there is no tank, there are no feasible pressure tests), for the gun a sample is taken and tested while the spiral tube is pressure tested.

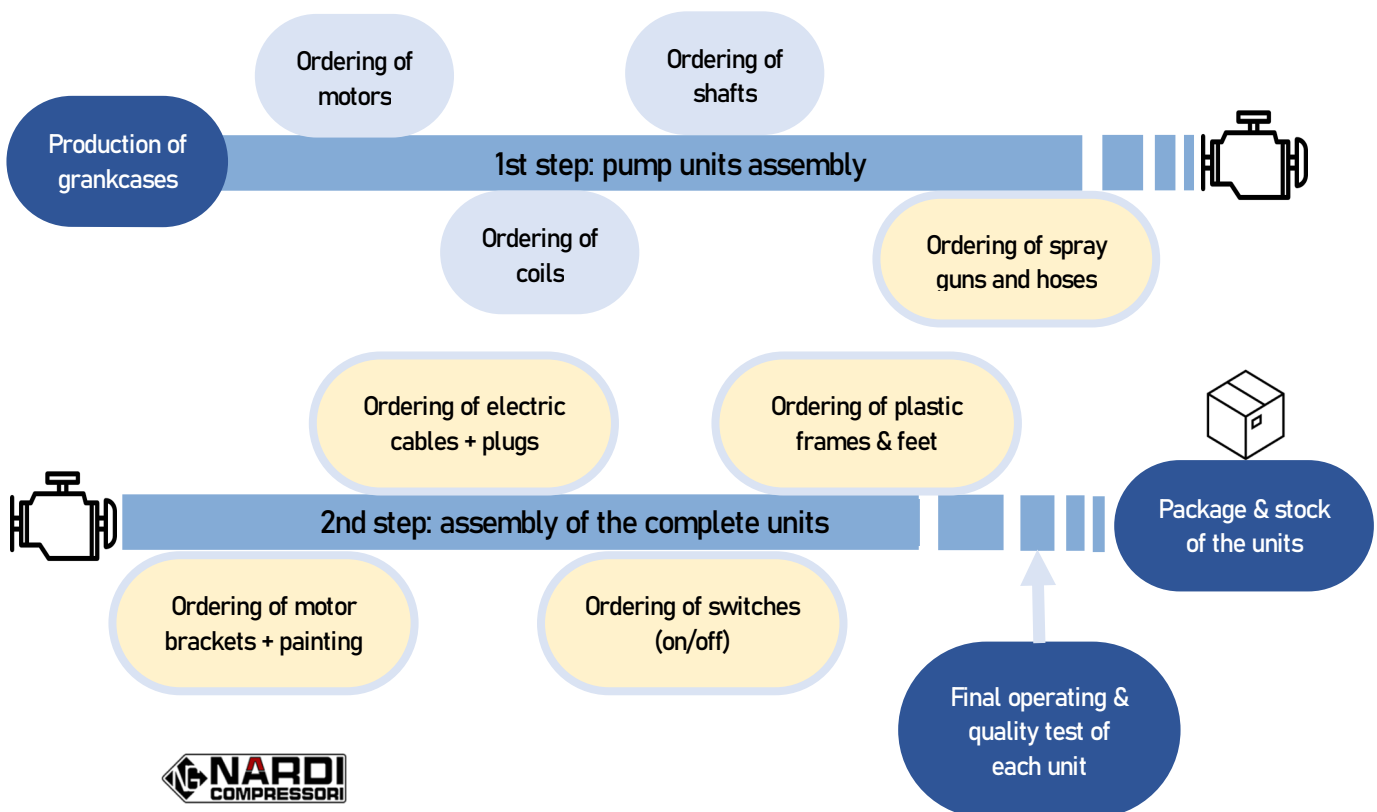


Figure 12 - Sany+Air assembly line

Production during the health emergency period guaranteed about 500-600 pieces assembled and ready to be shipped, and employed about 25 people. Its distribution took place in various forms: direct sales to individuals, sales to retail and wholesale resale distributors, and sales to the public administration. It is important to point out that Sany+Air was sold without the disinfectant liquid since the latter is decided directly by the end user.

Finally, it must be mentioned that the compressor in the case of an application for Sany+Air, is reduced from the maximum achievable pressure of 8 bar to 2-3 bar, through a lamination valve.



The product is CE marked since its main parts i.e. the compressor, gun, and spiral hose are certified. Then for quality checks, the product is tested: the compressor is tested for 30 seconds of work (having no tank there are no feasible resistance tests), a spray test is carried out for the gun on a sample gun, pressure seal tests are carried out for the spiral coil.

Further investigations have been made by Nardi to improve the first version of the Sany+Air:

- the first improvement made was to make the product mobile, avoiding the use of an electric socket to feed the compressor so as to make its use easier in very large places and/or in building with a huge number of rooms. To do this, a battery has been integrated inside a trolley equipped with wheels, which can therefore be moved very easily.
- The second step is being developed within RESERVIST itself and involves the possibility of using the benefits of distributed design and production by IAAC. In fact, the possibility of designing and producing some parts of the Sany+Air in Fab lab are under investigation. In particular, Fab Lab Barcelona is designing a new battery with lithium technology better sized for the engine of the compressor and the realization of the compressor enclosure through digital fabrication infrastructure.



Figure 13 – Sany+Air mobile version

Learning from the cooperation with Nardi and IAAC, it will be possible to understand the barriers, opportunities, and recommendations for integrated distributed places such as Fablabs inside the Reservist platform.

From what has been described in this chapter, one of the strengths of the Nardi Compressori case study was the strong ability to work quickly and leanly in a crisis context, to quickly cope with the changing needs of the market. Among Nardi's trump cards, which made it possible not only to resist the crisis but also to find opportunities within it, there was certainly the quality of the Management. This is accompanied by the technical skills, from the design of the new product, made in a very short time, to the assembly department which, thanks to the experience of its workers, has managed to go into production quickly despite a new product.

Finally, it was essential to have a good network of qualified and efficient suppliers, which made it possible to obtain the components for product assembly in a short time.

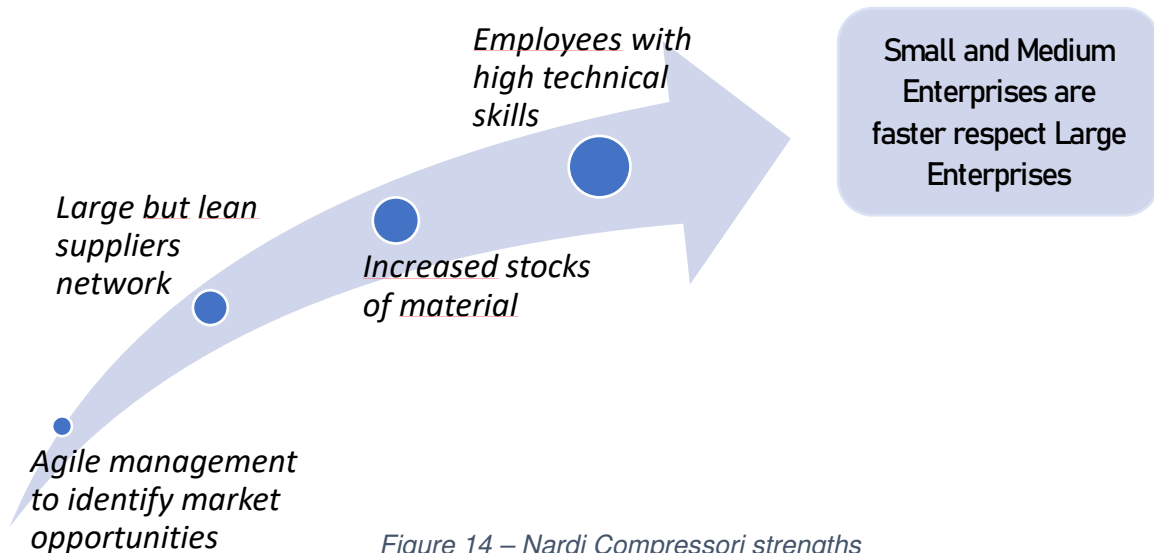


Figure 14 – Nardi Compressori strengths

## CONCLUSIONS

This document wants to act as a guiding element of the RESERVIST ecosystem concerning the procedures at the network, digital platform, and manufacturing levels with the goal of making RESERVIST smooth in all the procedures with specific guidelines to follow.

**At the network level**, various procedures have been defined aimed at regulating and making smoother both the creation of a cell following an emergency and the methods of accessing the RESERVIST network. For the first case, the procedure is entirely followed by a reference and managerial figure who is the INTERFACE, who has the fundamental role of calling into question the correct manufacturing companies for the emergency in progress according to the products requested, around which cells are built. The creation of the cell is assisted by the INTERFACE which helps the manufacturer to define any gaps in its supply chain and to resolve them with companies in the RESERVIST ecosystem.

To enter the network, however, the help of the RDP digital platform is essential, which through three questionnaires acts as a collector of information from the entities that want to enter RESERVIST.

The results of these questionnaires are analyzed by the INTERFACE, which can evaluate positively or negatively the entity entering the network. It should be emphasized that in the case of a manufacturing company or a services provider that it wants to sell within RESERVIST, there will be three questionnaires to be completed while for logistics companies, RTOs, and Universities that act as support elements, the information requests are fewer.

**At the RDP level**, an illustrative page has been created on the platform which contains the information of this Deliverable regarding both the process for creating a cell and the methods for accessing the RESERVIST ecosystem.

On the other hand, a guideline for adding an element to a cell during an emergency using the RDP is not covered; this is because although the cell is created following an emergency, during “standby mode”, the cell exists in an embryonic form but remains silent.

In fact, in this phase, the cell consists of all the companies, RTOs, etc. that deal with the same product. Only in the emergency phase is the cell analyzed to detect any gaps and go and fill them.

It has been realized that cell creation during an emergency must be managed through a managerial figure such as the INTERFACE, which has control of the cell situation. If the creation of the cell was not regulated by a manager, there could be the risk of having a confused state which would not help the necessary speed of intervention of the cell itself.

Finally, **the manufacturing level** has been analyzed. In this analysis, the case of Nardi Compressori was taken into consideration as to how this company reacted in the COVID-19 phase to overcome the most critical phases by repurposing compressors production to Sany+Air.

From this analysis, the best features have been highlighted for being able to react quickly to face an emergency and in the best possible way. A lesson learned and to be used and applied to the entire RESERVIST consortium also on other products.