CBRN protective system

Press Kit

2020

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Cover page picture ©Ouvry: training at Paris fire fighters with Polycombi©

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EDITORIAL

« They risk their lives to protect ours, Ouvry provides them with the most innovative CBRN equipment»

Textile engineer, with a specialty in chemistry, it's a first experience in the manufacturing of technical textiles for the space industry which convinced me to create my own company in the CBRN personal protection and develop solutions based on innovative technological bricks experienced in this high tech industry.

Fifteen years later, Ouvry has specialized in personal and respiratory protection systems. Our innovative products are intended for all operators of defence, safety and security interventions, those who risk their lives to defend ours. Our field of expertise is perfectly dual. Our equipment and systems are also appreciated in case of health crisis, in case of industrial disaster as for a more frequent use of preventive personal protection for the industry, agriculture and critical infrastructure.

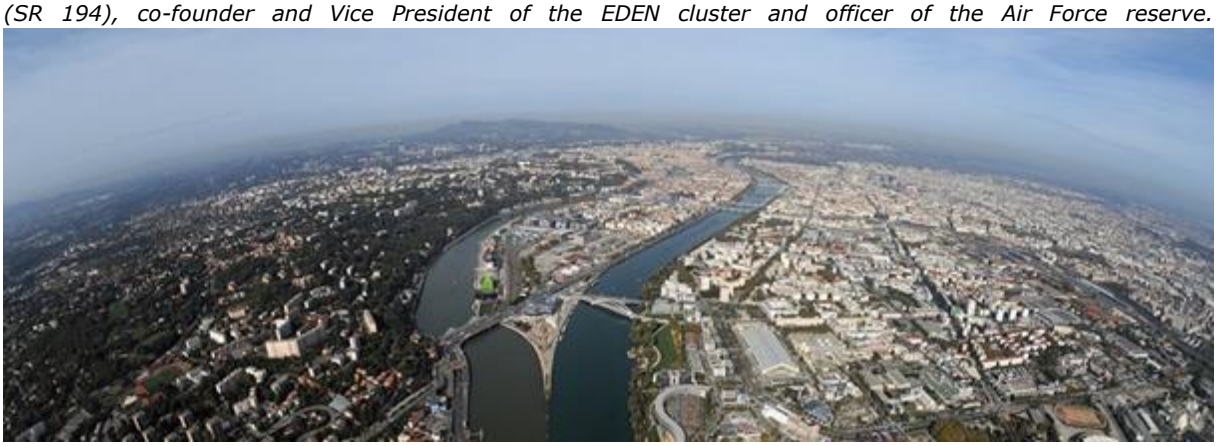
Head office is located in Lyon (France), a major industrial and technological centre whose history is strongly marked by textiles and chemistry, particularly in the Vaise district, in the former spinning mills of Rhodiacéta ... exactly where our offices and production facilities are today.

We are at the heart of a true industrial and technological ecosystem: weavers, finishers and suppliers of chemical products, garment manufacturers, technical centres and laboratories, research centres, centre of excellence clusters, universities... This fits perfectly with our DNA.

Today, Ouvry is more than ever a creator, knowing how to integrate innovative technological bricks designed with the partners of this ecosystem. Most of our production is located in France which gives us the necessary agility to adapt to the large variety of customers.

Ludovic Ouvry

Founder and director of Ouvry SAS, Ludovic Ouvry is auditor of the Institute of Higher Studies of National Defence (SR 194), co-founder and Vice President of the EDEN cluster and officer of the Air Force reserve.



1. COMPANY

Brand new CBRN products, developed and manufactured by Ouvry

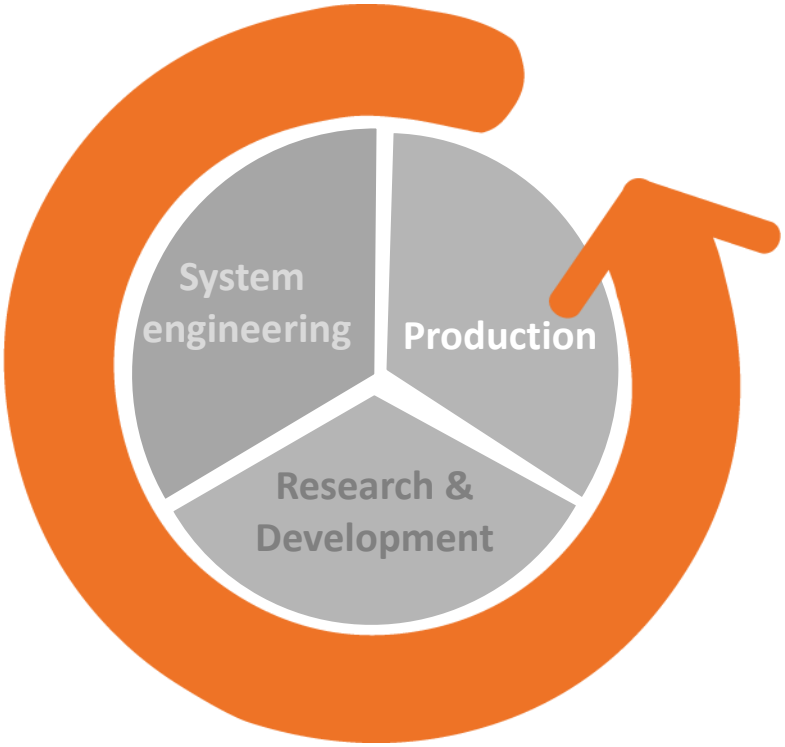
Created in 2003, Ouvry specializes in CBRN personal protection systems and is located in LYON. The product portfolio covers both body and respiratory protection, as well as innovative products intended for a wide range of operators: soldiers and law enforcement staff, firefighters and rescue operators, first-responders, the public security, civil defence, ministry of health, industry, critical infrastructures and public transportation.

The two main product ranges of the portfolio are CBRN air permeable protective suits and O'C50® respiratory mask. Ouvry completes this offer with decontamination and disinfection solutions for both CWA issues (Chemical warfare agents) or for small equipment and polluted confined spaces.

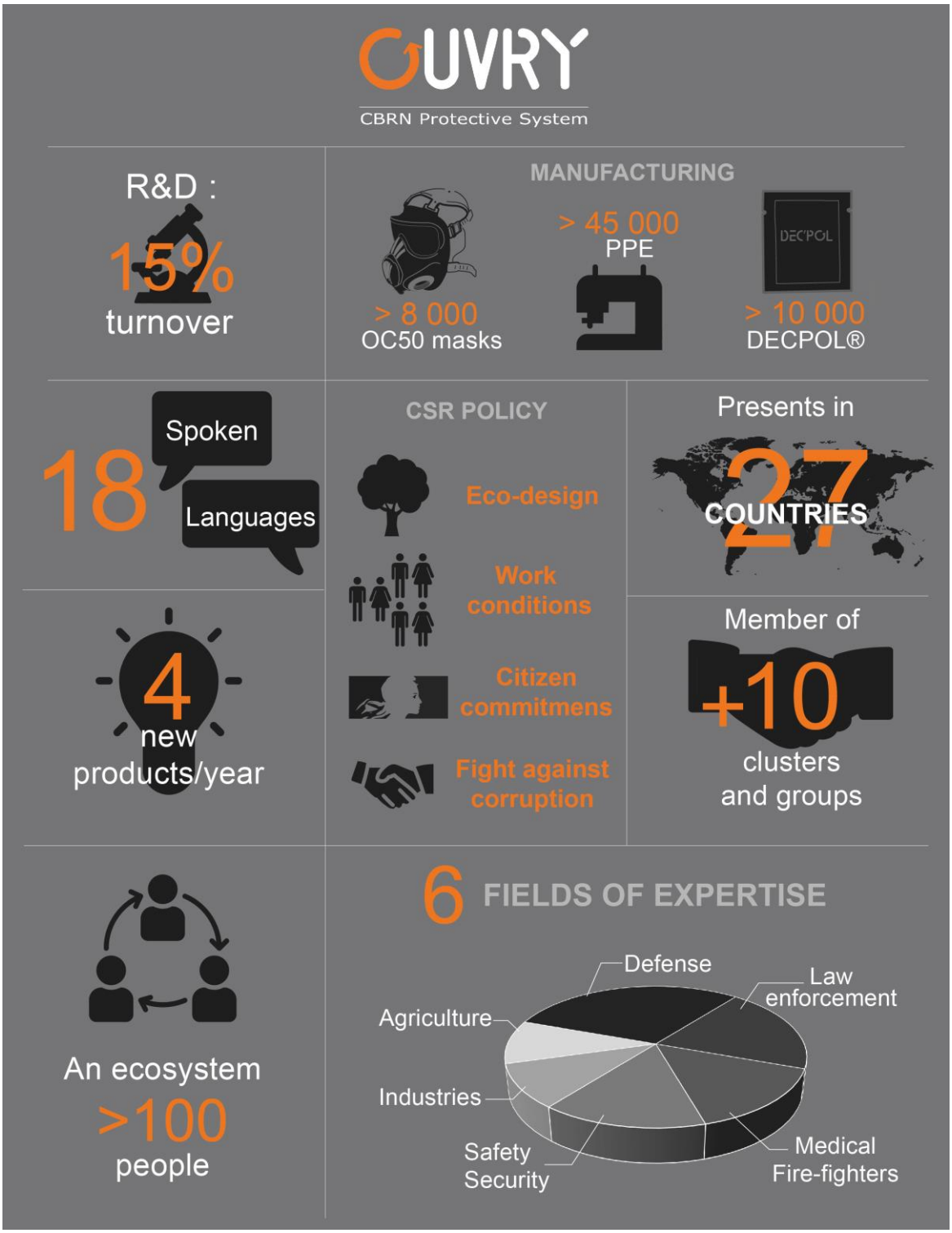
Ouvry designs and manufactures in France all the product portfolio that meet ever-changing requirements. Being a creator rather than a follower, integrating innovative components designed with the partners of his "ecosystem", is part of the DNA of the company in less than 20 years.

It is no coincidence that Ouvry chose Lyon to set up and grow. The city has history in the silk field and there are many companies which create innovative textiles. Ouvry has settled in buildings with the typical industrial architecture of the 20th century in the Vaise district that formerly were Rhodia's spinning mills of cellulose triacetate.

Ouvry is a founding member of the EDEN Cluster, member of GICAT, the DGA RAPID club of Innovative SMEs (DGA : Directorate General of Armament, Ministry of the Armed Forces) and the competitiveness cluster SAFE Cluster. Ouvry is a partner of the French Society of Disaster Medicine (SFMC) and the European CBRN Institute of Charleroi (ICI).

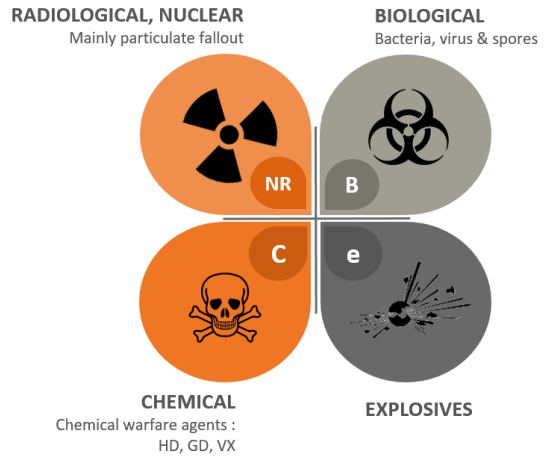


A few benchmarks…

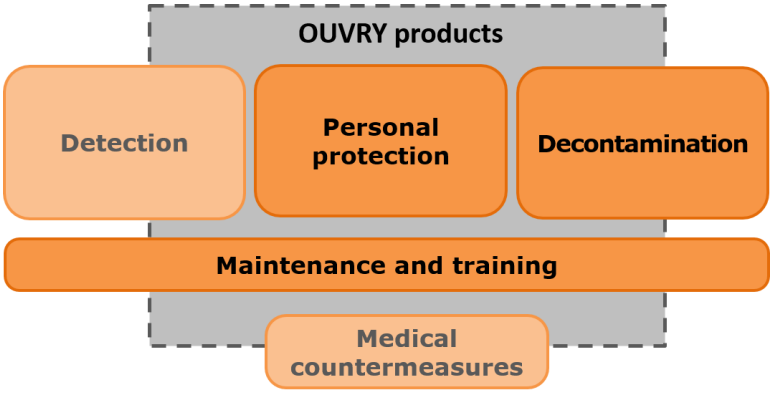


Ouvry, core business

CBRN or CBRNe personal protective systems:



Specialized in CBRN protective systems design and manufacturing, as well as decontamination solutions, for both military and civilian applications, OUVRY covers partly the 3 pillars of the NATO CBRN triptych.



French domestic references

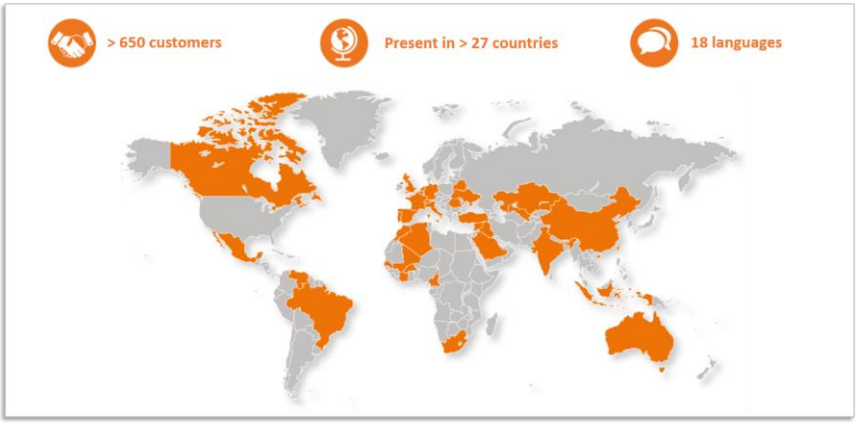
- Ministry of the Armed Forces - Directorate General of Armaments
- Ministry of the Interior - Directorate of Civil Security (DGSCGC) and Police (RAID, BRI)
- National Gendarmerie (GIGN, PSPG ...)
- Critical Infrastructure Security Services, Public Transport (RATP ...)
- Industry operators operating in a chemically hostile environment
- Firefighter brigade and Rescue Services
- Ministry of Health: SAMU, CHU, SMUR
- European innovation projects for AED (European Defence Agency)
- UGAP.

Partners and consortium

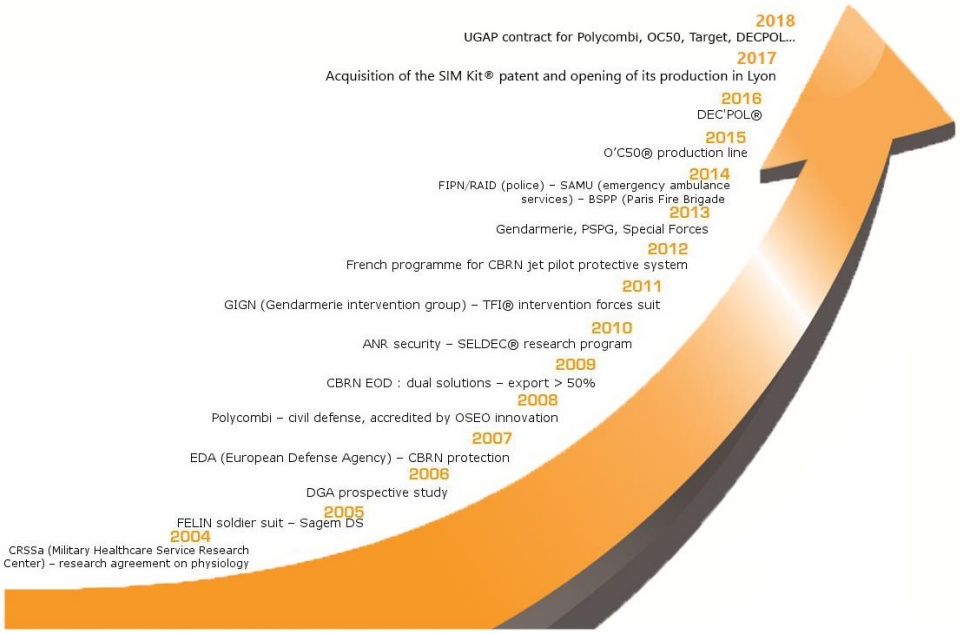
Ouvry is member of : Cercle de l'Arbalète, EDEN Cluster, GICAT, ICI - International CRNBE Institute, La French Fab, Nuclear Valley, SAFE Cluster, et la SFMC (Société française de médecine de catastrophe).

Export OUVRY

Thanks to their intrenational profil, all Ouvry's collaborators master 18 languages. Nowadays, the society is present in approximately thrity countries.



A continuous growth



In 2015, Ouvry strengthened its position of CBRN new generation equipment leader enlarging the existing textile CBRN PPEs portfolio with respiratory products in order to commercialize a whole system especially with the investment in a new generation flexible mask manufacturing facility which is now in order.

22,000 FELIN CBRN PPEs, 15,000 Polycombi® for Civil Defence, more than 10 000 gloves DECPOL®, and more than 8000 OC50® masks, made in Lyon since 2016, were sold in France and in international.

Ouvry supply chain: innovation and quality to meet operational requirements

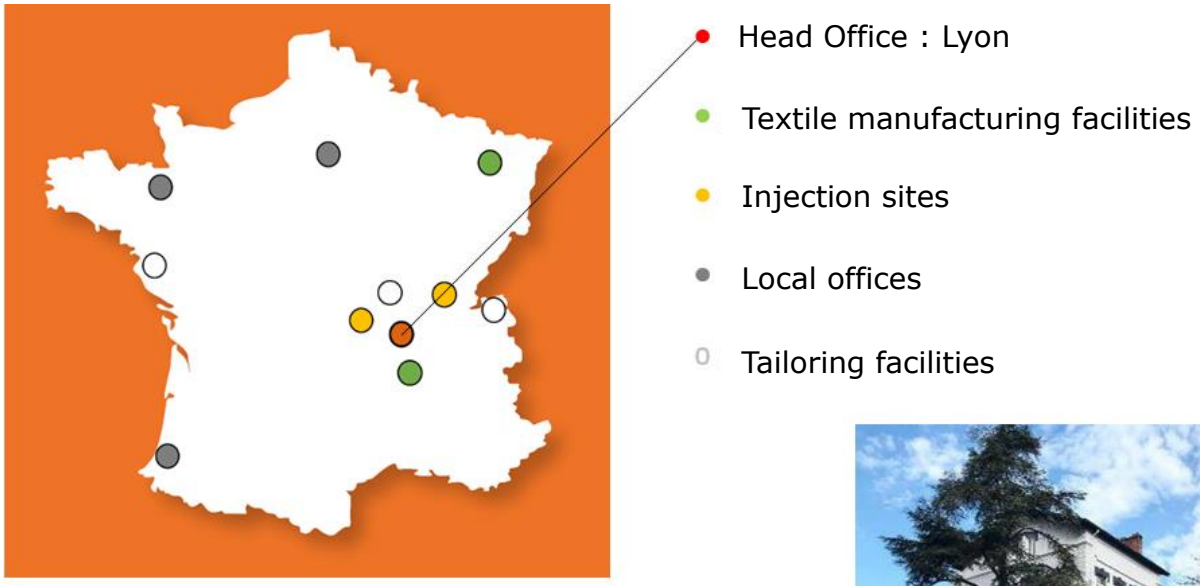
From the origin, Ouvry has constantly updated its process and manufacturing tools, controlling the entire supply chain in order to build a reactive, resilient and robust industrial organization.

Body personal protective equipment, controlled know–how and resilient production, mainly french

Ouvry controls its *supply chain* which is mainly French, with an industrial tool able to meet both small and middle size productions, built in a resilient way:

- Weaving, dyeing and finishing activities are located in Lyon region.
- Filter materials based on a unique European source, and manufactured with very large capacity machines. Ouvry develops a new generation of filter material, MFE®.
- Ouvry manufactures components with specific properties.
- Tailoring and final assembly is performed either with a network of commission finishers or by Ouvry directly.

Ouvry textile industrial organization



Head Office OUVRY in Lyon

RSE (Social, Societal, Compagnies Responsability)

Ouvry activity run company personnel, collectively and individually, to look a bit more at all matters pertaining to protection of the environment and of the sustainable development. The company build it industrial and economic development with energy transition in mind.

In this way, the RSE policy is lofty and organized, supported on a charter of commitment. This policy is reflected in:

- Internals procedures relating to hygiene and safety at work, social dialogue and formation, the energy savings and recycling…
- Eco-design of products, go by selection of raw materials, manufacturing process, transport and logistic, recycling and end of life of products.
- The fight against corruption: Sapin law, RGPD, export regulation…
- Citizen involvements: partnership with the National Guard, citizen reserve of defence and security, socials actions (financial support give to different army community services), meetings with schools and universities…

Quality management: an integrated system, flow-downed to sub-contractors and partners

Ouvry is fully responsible for the quality management system and actively collaborates with its suppliers, sub-contractors and industrial partners to flow down the requirements. Test plan and quality audits are defined and recorded at all steps of the supply chain. First article reviews in factories are systematically performed, as well as quality control before shipment at the end of the manufacturing process.

R&D: High internal capabilities and a large academic network

In order to permanently innovate, Ouvry invests in various R&D activities and programs in the field of its core business, CBRN PPEs and decontamination. The main activities are:

- Technical textiles (flame resistant, anti-trauma, self-detoxifying …) ;
- Human factors with its 3 pillars: ergonomics, physiology and sensorial tolerance.
- Body and respiratory CBRN personal protective equipment
- Decontamination technologies (active, absorption, neutralisation) for chemical and biological agents.

Since its founding, Ouvry has created R&D capacity focused on several technological bricks depending on its internal knowledge completed with collaborations with its network of private scientific partners, institutional partners, centres of excellence and clusters.

Human resources: multidisciplinary competences

Technical teams are specialized in many domains such as materials, technical textiles, chemistry, microbiology, ergonomics, plastics, design, standard activities …
These competencies are mainly distributed between: R&D department, technical department, logistics and quality control, as well as domestic or export sales … The R&D staff is supported by post doc, scientific advisor and university professors.

2. CBRN PRODUCTS & SERVICES

How Ouvry meets defence, security and safety requirements

A complete offer

Our mission: define with our clients the most adapted CBRN protection system for their environments and constraints. That's why Ouvry developed a large wardrobe for extremes situations, for all CBRN risks, adapted to military or civilians needs.

A large portfolio for individual CBRN protection

Respiratory protection

Masks

- **OC50®** CBRN mask and related accessories
- **ST53** respiratory protection system
- **NH15** escape hood
- Law Enforcement Helmet Interface

Canisters and airflow systems

- CBRN filter canisters
- **EZAIR®** new generation airflow system Mono/Bi-cartouche

Maintenance

- Respiratory protection equipment maintenance : NTI1 and NTI2 control , sealing test, periodic maintenance mask, bottle periodic inspection, requalification...
- Control and traceability
- NTi1 and NTi2 maintenance training

Development, certification and fabrication of OC50®, protection system easily adaptable, ergonomic and reliable.

Decontamination: innovative, simple and safe pathways

Immediate dry decontamination

- **DECPOL®** decontamination mitt
- **DECPOL®** decontamination wipes

Available in training version

Skin

- RSDL® decontamination lotion

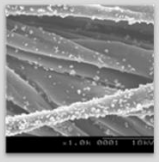
Available in training version

Thorough decontamination

- Nebulizer, Foamer, Sprayer

Available in decontamination
- formulation kit **DESDEC®**

Self decontamination



- SELDEC
- SAFECOAT

Medical transport

CBRN body bag

- Containment and evacuation of contaminated bodies
- No cross-contamination
- Light and ultra-compact, quick and easy to use.

Extraction bag for contaminated victims

- Transport of CBRN contaminated casualties, from the field to the hospital
- Allow the realization of emergency medical procedures.
- Fast and easy deployment
- No maintenance, no consumables.
- Ensures self-decontamination of the victim inside the bag

Patient transport stretcher

- Transport of CBRN contaminated patient into zone of medicalization
- Allow the realization of emergency medical procedures
- Guarantee the containment of contaminants
- Quick and easy deployment

Medical countermeasures

In partnership with DECON

- **Nerve agents** treatment
- **Anthrax** : vaccine and antiserum
- Smallpox : vaccine and antiserum
- Botulinum Toxin: antiserum
- Ricin Antidote
- **MEDIC'OPS®** Bag for medical material transport.
  Liquid and vapor CBRN protection

Services and support

Training

« Live Agent Test », training on risks and equipment use, train of trainee's sessions, expert and tutor training, specific training of operators on Ouvry's equipment and systems and maintenance training.
Ouvry has a training official homologation.

Training

- **SimKit®** CWA simulants - HD (yperite) VX and GB (sarin)
- Suits and decontamination products available in training version

Courses

- Audit
- General CBRN training
- Training on how to use CBRN PPE
- Train the trainer
- NTi1 and NTi2 masks maintenance training
- Customized training

Training tools

- SIM KIT®: p.19 "Innovations"
- PPE (personal protective equipment) adapted to training and tutoring, educational media and help (posters…)

Maintenance & services

- Maintenance and repair of CBRN masks, annual controls…
- Technical documentation
- Buffer stock (POLYCOMBI®, O'CPU®)
- Waste repurposing procedure support…

Personal protective systems, respiratory protection and immediate decontamination

CBRN protective systems (suits, gloves, masks …)

Ouvry equipment and systems of body protection, respiratory protection or decontamination benefit from peculiar efforts made on ergonomics and user comfort. The filtering materials we use allow air exchange and water vapor evacuation. The protection of the user is increased while the physiological burden of our CBRN is significantly decreased. These characteristics considerably improve the operators' work conditions.

These are all the reasons why our products equip army, law enforcement (RAID, GIGN, BRI …) and first responders (Paris fire brigade, Marseille marine fire fighters…) and critical infrastructures (nuclear plants, RATP Paris subway …).

Army FELIN program was the first major reference as leading provider for Sagem DS. More than 22,000 FELIN CBRN kits were delivered and are today in service. 20,000 Polycombi® were delivered within the last 2 years.

CBRN respiratory protection: a new challenge

Jet pilot CBRN masks

Ouvry is prime contractor to develop an individual respiratory protection system for fighter aircraft fly pilot, for French army, system who begin to be industrialize.
On top of it, OUVRY is responsible for maintenance, logistical support and training. The supply chain is 100% local, and most of the production is located at the production facility in Lyon. The system is divided into two subsystems, which provide comfort in extremes conditions, reliability and adaptability.

Thanks to lead this major DGA French program, for jet pilot, Ouvry saw the result of several years of investing and study, carried in EDA (European Defence Agency) contracts, as well as internal assessment which permit to cement it skills, humans and inductrials ressources.

O'C50®, adapted to Firefighters, Army and critical infrastructures

O'C50® is manufactured by Ouvry in France and was developed based on research and innovations carried out by listening to the users and operators. This mask equips firefighters and military, security or intervention public, private or civil operators (RATP, SAMU…) in France and several other countries. More than 4000 masks already are operational.

In order to meet the challenging requirements, Ouvry manufactures components with its partners and subcontractors, and then assembles the final product with quality controls at every step before shipment. The company also provides periodical maintenance and revisions.

In 2013, Ouvry hired masks experts, invested in new facilities and launched the technical activities to develop and certify the new mask, and finally obtained the CE certification in September 2015. Ouvry has also conceived and produced equipment for tests and controls. The production line is located in Lyon, 50 meters away from the headquarters, with a full capacity of 3,000 masks per month since March 2016.

Ouvry wanted to render the best out of its research and studies about ergonomics, its technical innovations and also its discussions with operators. Ouvry could adapt O'C50® to customer requirements and to the entire Ouvry PPEs guaranteeing an optimal interface management, and therefore an improved protection factor.

DECPOL®: The latest innovation for immediate or emergency decontamination to avoid cross contamination

DECPOL® gloves an emergency CBRN decontamination device that is a self-evident extension pf CBRN personal protection. It was developed from 2016 for RAPID-DGA (the French defence) program. DEC'POL® was developed in partnership with Institut des sciences Pharmaceutiques et Biologiques de l'Université Claude Bernard Lyon 1 (pharmaceutical faculty) and CEA (The French Atomic Energy and Alternative Energy Commission) of Grenoble. The numerous research and studies on the degradation of CWAs and pathogen biological agents helped developing the active agents of DEC'POL® that target chemical and biological contaminants

DEC'POL® is made of an ultra-absorbent material containing catalysts that target chemical and biological toxics. The DEC'POL mitt can absorb a wide variety of contaminants and then destroy them. It is not in powder form and thus prevents cross contamination risks.

DEC'POL® mitt is designed to be used by military, SWAT and first-responders, particularly firefighters, who can be confronted with a chemical or biological attack or exposure.

Emergency decontamination is critical because it prevents risk of cross contamination by limiting the spread of toxics to other people, equipment or in the environment.

DEC'POL® is also designed for use in industries, laboratories or critical facilities that can be confronted to chemical or biological contamination.

Extraction bag for contaminated victims

A tailor-made product made to transport CBRN contaminated victims from field to PMA, while allowing emergency medical diagnosis. This bag ensure containment of contamination in order to avoid to contaminate medical and transport staff, the vehicle or aircraft used to extract victim. This extraction bag is light, simple to use, unobtrusive and especially robust.
The bag is composed by an activated absorbent textile and a absorbing filters based on activated carbon, which contain and destroy contaminated agents and allow initial extraction in rear area of alls contaminated victims, in condition allowing a pre-decontamination. This emergency isolation and containment avoid cross contaminations in used vehicles or helicopters.

Ouvry made also a CBRN body bag with same qualities of containment to evacuation of containment body. It designed to avoid cross contaminations Il a été conçu pour éviter les contaminations croisées throughout extraction and storage of the body.

SIM-KIT: three simulants with the same physical and chemical characteristics than the three real chemicals war agents

Adapt for instruction, formation and secure CBRN training, SIM KIT® contain 3 simulants with the same physical and chemical characteristics than real chemicals war agents, resilience, colour, viscosity, volatility.
Simulants are recognizable with all systems: screening device, paper detectors. On contact with papers detectors, theirs colours change in the way than real chemicals war agents. It is easy to identify it thanks to the fluorescent tracer it contains.

3. SIX COMPLEMENTARIES FIELDS OF ACTIVITY

Large wardrobe for military and civilians CBRN risks

Ouvry's offer is adapt to operational constraints

Defence


Ouvry has been innovating for more than 15 years alongside Special Forces and all the Defence stakeholders. CBRN equipment with a low logistic footprint, which offers the best protection, comfort and robustness in all environmental conditions, has established its reputation.

French references:

- French MoD – The French defence procurement agency
- National Gendarmerie (GIGN, PSPG …)
- Ouvry participated to innovated projects with AED (European Defence Agency).

Law enforcement


"A protective system that allows us to serve quickly and for a long time".
Like their colleagues of the armed forces, law enforcement operators appreciate mechanical strength, ergonomics, fast and intuitive dressing, and even more the optimal protection conferred by the OUVRY PPEs. "Equipment and training products allow us to better understand our missions and better prepare ourselves," testify the users.

French References:

- The Ministry of Interior – The Civil Security Division (DGSCGC) and Police (RAID, BRI)

Health & Rescue

OUVRY equipment is particularly adapted to the needs of health professionals evolving in a health crisis situation. Facilitating rapid care of victims waiting for decontamination showers, this equipment saves lives. "*The rise of the crisis management system is easier, with less rotation, fewer outfits and fewer staff*," says a user.

French References:

- The Ministry of Health: SAMU, CHU, SMUR
- The Departmental Fire and Emergency Services (SDIS)

Safety Security - Critical infrastructures

The OUVRY protective equipment provides a protective system specially adapted against a wide spectrum of threats, including for nuclear power plants (liquid or vapor chemicals, radioactive particles, asbestos, liquids and biological particles, etc.). With an intuitive and powerful material, adapted even to non-specialist staff, it is possible for rescue and assistance teams to intervene faster. Moreover, the interoperability between the different actors is guaranteed.

French references:

- Security services of critical infrastructure protection, Public transports (RATP, SCNF, EDF…)
- Private Security Services

Agriculture

Ouvry offers products for body and respiratory protection and for decontamination, efficient against a wide range of biological and chemical products.

With the same features than products for industrial field, Ouvry has specially designed products and services for agricultural activities, including the PolyAgri® suit, an equipment with a unique technology for protection against biological and chemical toxics protection, which meets the requirements of the new version of the ISO 27065 standard. Thanks to it filtering internal layer made of activated carbon microbeads, and to it water-repellent extern fabric, it ensure a better thermoregulation of the wearer and maximal protection against liquids and vapours. It is particularly appropriate to prevent emanation risks during:

- Chronic exposures of biological and chemical toxics fumes and projections
- Application pesticides products without collective protection, especially viticulture, arboriculture, market gardening, greenhouses, with spears, tractors without cabin, spray, and during sprayer's maintenance and cleaning.
- Physical activity, warm and high humidity environments, activities during more than 30minutes.

Industry

PolyIndus® suit has been developed specifically for management activities of biological and chemical toxics, for decontamination and treatment of contaminated waste. PolyIndus® allows to answer to operators' unmet needs (traditional PPEs do not protect enough, are to warm and do not allows long time work).
PolyIndus® is particularly appropriate to:

- Transport, handing, emptying
- Sampling
- Maintenance and cleaning
- Storage, waste collection and treatment.

« I am less hot in this suit, I do not have any compression mark on my face, and I do not smell sulphur when I come back home », testify the operational staff wearing OUVRY suits. Doing a long job, even in confined and hot spaces, is now possible.
Our clients observe that their construction sites grow up faster and staffs work longer, with less switch constraints. Finally, thanks to this 90 uses, there are less destroy suits, so less DASRI wastes, so we reduce the environmental impact.

References:

- Industry operators advances in hostile chemical area

ANNEX

Learn more on CBRN challenges
(Chemical, Biological, Radiological and Nuclear)

Biological agents

Biological agents used in weapons against humans, animals or crops are produced from pathogenic microorganisms or their toxins. Living microorganisms can replicate themselves and so they can act at low concentrations: 1 gram of *Bacillus anthracis*, if properly and efficiently spread, could infect and kill one third of the USA's population.
As for toxins, they cannot replicate themselves and so have closer properties to chemical agents, but are far more toxic: the LD50 (lethal dose, 50%) of the botulinum toxin is 0.001 micrograms per kg and is only 15 micrograms per kg for the VX.

They are divided into 3 categories.

Categorie A agents, most dangerous, that could create mass destruction on population. High-protection measures are implemented to counter them. Common bacteria are Bacillus anthracis (anthrax), Yersinia pestis, Francisella tularensis or viruses like smallpox or Lassa & Marburg; finally toxins like Clostridium botulinum (botulism).

Categorie B agents can be used at a wide scale but are usually less potent. Bacteria are Brucella, Burkholderia mallei, B. pseudomalllei, Salmonella sp. Shigella or toxins like ricin. The efficiency is better when deployed in aerosol form. As the incubation time can be long, the tactical interest is low, but terrorist could consider that as an advantage, which confirms the threat scenario.

Categorie C agents are not very dangerous. But genetic modifications could lead to weaponized dangerous versions

TFI© SWAT team ©Ouvry

CBRN training exercise in Nîmes (France) with Polycombi ©Ouvry

Chemical agents

Chemical warfare agents are liquid, solid or vapor that can be used for their toxic effects on human, animals or plants.
Any toxic chemical can potentially be used in an attack, however the risk is mostly present for those with high toxicity (minimal lethal doses). Chemical weapons (known as CBRNs or NRBCe) can have an incapacitating effect on humans and even, in some cases, be fatal.
The main chemical agents of the CBRN threat are neurotoxic organophosphorus (soman, sarin, tabun, VX) or vesicants (lewisite, yperite), followed by gaseous agents such as phosgene or hydrocyanic acid.

Two categories of chemical agents:

Chemical weapons, developed with a military purpose, to cause disorganization and major mortality in the opposing ranks. The collapse of the former USSR is likely to have fed parallel markets, but the production of CBRN chemical agents by competent chemists is also possible.

Industrial products are stored in fixed storage or transport container/tank (rail, road). They can be divided in two classes: those involving respiratory toxicity (chlorine, phosgene...) and those involving systemic toxicity (hydrocyanic acid...). Some chemicals such as thallium, cyanide or mercury salts could be ingested.

Classification of CRBN chemical weapons

Depending on the application:

Neutralizing agents - They quickly cause a disability that does not extend beyond exposure. In the context of a terrorist threat, they could be used for disorganization.

Disabling agents - Temporarily cause a mental or physical illness or disability that exceeds the exposure period. They can be used by terrorists.

Lethal agents - They cause death when the man is exposed to it in military or terrorist operations.

Depending on the mode of action:

Asphyxiating or Suffocating Gases - These are highly volatile liquids that, when inhaled as gases, attack the alveolar mucosa (chlorine and phosgene). They are not often used.

Vesicants - These are oily liquids that cause burns on the skin. The best known is yperite (mustard gas). Synthesized in 1822, yperite was used for the first time as toxic war-gas in July 1917 in Ypres in Belgium, which gave it its name of yperite. Colourless, odourless in the liquid state, it becomes gaseous when added to solvents. It can give off a smell of garlic or mustard and causes blisters on the skin, eyes and lungs. It can be responsible for blindness or cancer. Lewisite is also among the vesicants

Hemotoxic (toxic of oxygenation) – toxic against blood. When inhaled, they disrupt the use of oxygens in tissues (cyanhydric acid, cyanogen chloride).

Organophosphate neurotoxic agents (inactive agents) – It is the most powerful CWA category. These agents are colorless, odorless, tasteless, more or less viscous and volatile. They can be absorbed by inhalation or through the skin. They affect the nervous system and disrupt vital functions: sight darkening, breathing difficulties, important sweating, vomiting, confusion and death. A simple 1 to 2 minutes absorption through the skin can be lethal.

Main nerve agents :

Tabun - Discovered in 1937 by Gerhard Schader in Germany, tabun was first industrially produced in 1942. The tabun was used by Iraq during the Iran-Iraq war. When it is pure, the tabun is a colourless liquid with a fruity odor

Sarin - Discovered in Germany in 1939, sarin was used during the Second World War and during the war between Iraq and Iran. It is a colourless, non-persistent liquid, which emits no odor when vaporized. The steam is colourless. It evaporates 36 times faster than tabun and can be made more persistent by the addition of certain oils or petroleum products. Symptoms include nausea, coughing, diarrhoea, breathing difficulties, vomiting, muscle weakness, convulsions and death by choking in ten minutes.

VX - This is an "improved" version of the sarin. The symptoms and the mode of absorption are the same as for sarin but it can spread in the air and in the water and the fatal dose is 10 milligrams compared to 100 for the sarin

Soman - Discovered in 1944, it was never used in combat, but after the Second World War, the Soman was produced in large quantities by the Soviet Union. The soman is colorless when it is pure, but brown-yellow when it is produced industrially. This liquid substance has a fruity odour when vaporized, but the industrial product contains many impurities, which gives it a strong odour and a very high viscosity. The vapor is colourless.

The fatal dose on inhalation is about half that of sarin. It is, moreover, a much more persistent agent than sarin, so that it can remain several days in a particular zone.

French regulation

Circular n ° 800 / SGDSN / PSE / PPS of 18/02/2011, on the national doctrine of the use of the means of rescue and care in the face of a terrorist action involving radioactive materials.

Circular n ° 750 / SGDSN / PSE / PPS of 18/02/2011, concerning the discovery of folds, packages, containers and substances suspected of containing dangerous radiological, biological or chemical agents.

Circular n° 700 / SGDN / PSE / PPS of 7 November 2008, together with its annexes, on the national doctrine for the use of means of relief and care in the face of terrorist acts involving chemical materials.

Inter-ministerial Circular n° 007 / SGDN / PES / PPS of 8 October 2009 on the inter-ministerial response to the threat or execution of terrorist acts NRBC

Doctrine of the NRBC-E State of Prevention and Combating Terrorism (Prime Minister's Circular n° 747 / SGDN / PSE / PPS of 30 October 2009)