Life is in the air

The disruptive technology inactivating viruses in the air

July 2025

The starting point

An impressive number of viruses circulate among animals.

Approximately 300,000 species of animal viruses have been recognized. How many have not yet been recognized?

Every minute or so, an animal virus gains the ability to transmit to humans, an event known to science as a “zoonotic leap.”

Most new contagious diseases of any kind arose from animal viral infections, which then spread to humans.

- The Asian flu of 1957-58 and the Hong Kong flu of 1968 were both transmitted by animals.
- The 2009 swine flu passed through pigs, which acted as mixing vessels where swine, avian and human flu came together.
- The virus that caused the 2002-4 SARS epidemic, SARS-CoV-1, and the virus underlying the COVID-19 pandemic, SARS-CoV-2, probably originated from bats, as did the Ebola.
- MERS comes from camels. HIV is also said to have its origins in chimpanzees

Now, let's ask ourselves: will the medicines be enough, vaccines and post-infection treatments?

According to many, no.

E4life uses biotechnology to generate a new barrier, an innovative technology based on safe electromagnetic waves to inactivate airborne pathogens

This approach provides a non-chemical, non-invasive solution to reduce the risk of respiratory viruses in various environments (ie homes, hospitals, hotels, offices, farms).

01.
Introduction

From the discovery of the phenomenon to e4life

01.1 e4life patented technology

e4life patented technology (pct/it 2021/00036 20/07/2021 and pct/ib 2023/051661 23/02/2023) is based on a phenomenology discovered by a group of Taiwanese physicians and related technology development

DISCOVERY OF THE PHENOMENON

The **phenomenon** was first discovered and theorized by a Taiwanese medical equipe, then published on **Nature**:

- testing on spherical viruses, they showed effective structured-resonant energy transfers from microwaves to acoustic vibration modes of particles;
- particles' frequency is indeed capable of entering into resonance with electromagnetic fields through dipolar coupling of waves with its dipolar vibration modes;
- periodic mechanical deformation is exercised on the particle by means of the Lorentz Force at the same frequency of the electromagnetic signal, amplifying the effect when calibrated with Resonant Frequencies;
- resonant microwave absorption process (RMA) phenomenon is able to break the capsid (outer shell) of the viroid, fully inhibiting its vira load; rupture of the capsid means that the virion is unable to infect despite genetic material (RNA) remains.

e4life TECHNOLOGY

e4life leverages this phenomenology as a physical principle for its technology given the effectiveness of inactivation mechanisms by electromagnetic signal for aerosol treatment

Main enablers and investments:

- More than 2 years of R&D
- Patents achievement
- POC with tests in third parties laboratories
- Set Up test development and building
- Product industrialization
- NewCo foundation

01.2 about e4life

Elettronica and Lendlease established e4life with the aim of developing and marketing devices based on the innovative “e4shield” technology, revolutionizing the biodefense sector

SHAREHOLDERS

ELTGROUP — 51%

- Expertise in the electro-magnetic spectrum
- Ability to develop innovation

lendlease — 49%

- Many years of experience in real estate investments Extensive experience in new business development

e4life was founded as a JV between Elettronica and Lendlease in May 2023 with an initial capital of 3.5 million euros.

Objective of the JV: exploit and develop the technology patented by Elettronica to launch new products

ACTUAL MARKET OFFERING

e4life devices **inactivate aerosolized respiratory viruses** through electromagnetic waves:

- It works in real time
- Unique in the world
- Harmless to humans
- CE and SAR certified
- Based on military technology
- Upgradeable and expandable in the future
- **Two devices for human viruses**
- **One product for animal viruses**

eulife ambient
Your spaces safely

eulife personal
Always with you

eulife farm
Protect your Farm

THE EFFECTIVENESS OF THE TECHNOLOGY

HUMAN VIRUSES

- H1N1 (flu) - 95% inactivation rate (confirmed on 2024/2025 influenza strain)
- H3N2 (Covid) - inactivation rate above 90% (including latest KP3 variant)
- RSV (respiratory syncytial virus) - 95% inactivation rate

ANIMAL VIRUSES

- H5N1 – Avian: Inactivation rate greater than 95%
- H1N1/A – Swine Flu: Inactivation rate of approximately 90%

Tests are currently underway on African Swine Fever (ASF).

BACTERIA

Tests on Pneumococcus, Legionella and TBC are currently underway in collaboration with the University of Sassari.

02. Biotechnological solution

02.1 how it works - the electromagnetic field

- The electromagnetic field is able to neutralize the viral load in aerosol. Resonant microwave absorption process (RMA) phenomenon is able to break the capsid (outer shell) of the viroid, fully inhibiting its viral load

PARTICLES COMPOSITION

- Particles are electrostatically schematized as having a **positive internal charge** and a **negative** external charge
- Particles' frequency is capable of **entering into resonance** with electromagnetic fields through dipolar coupling of waves with its dipolar vibration modes

ELECTROMAGNETIC FIELD PROPAGATION

- Particles' charge distribution **deforms their physical structure** when frequency is appropriately calibrated
- Periodic mechanical deformation is exercised on the particle by means of the Lorentz Force at the same frequency of the electromagnetic signal, amplifying the effect when calibrated with Resonant Frequencies

RESONANCE EFFECT ON PARTICLES

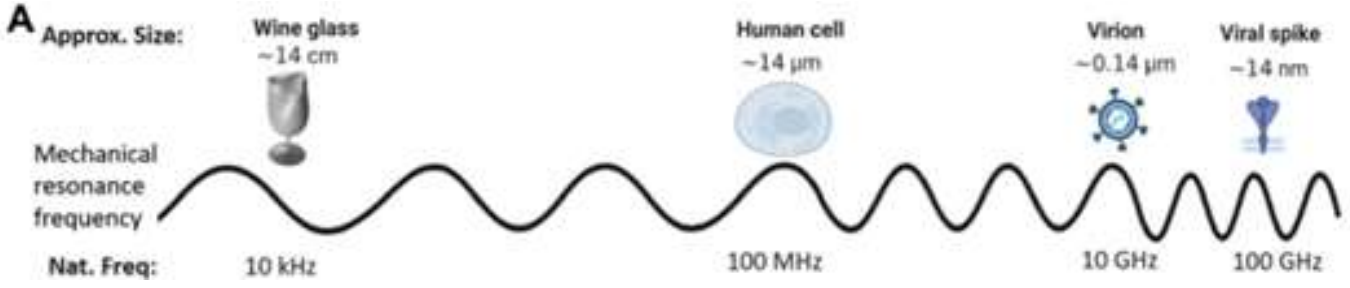
- **Inhibition of pathogens** happens at light speed through resonant microwave absorption, process able to break the capsid of the viroid making it non-infectious
- Rupture of the capsid means that the virion is unable to infect despite genetic material (RNA) remains.

SAFE AREA

- **Exposed environment** is sanitized instantaneously and without harmful effects thanks to almost real time activation and low irradiation power

Source:
"Applied Physics Reviews" – May 2024

Article title: *Virus inactivation by matching the vibrational resonance*



02.2 e4shield^{tm} technology distinguishing features

KEY FEATURES

- Electromagnetic radiation propagates instantaneously and without a medium of propagation
- Technology is non-invasive as it works real time and in presence of people. Developed from military technology
- Resonance frequency allows for high specification levels, calibrating the device for specific pathogens

e4life VS COMPETITIVE TECH

- ✓ Seconds vs. Minutes, Hours
- ✓ In presence activation vs. evacuated environment. No need to recirculate air
- ✓ Specific target vs. general intervention

02.3 scientific publications confirming technology efficacy

"Viruses"

Article title: SARS-CoV-2 Inactivation in Aerosol by Means of Radiated Microwaves

June 2023

Abstract:
Coronaviruses are a family of viruses that cause disease in mammals and birds. In humans, coronaviruses cause infections on the respiratory tract that can be fatal. These viruses can cause both mild illnesses such as the common cold and lethal illnesses such as SARS, MERS, and COVID-19. Air transmission represents the principal mode by which people become infected by SARS-CoV-2. **To reduce the risks of air transmission of this powerful pathogen, we devised a method of inactivation based on the propagation of electromagnetic waves in the area to be sanitized.** We optimized the conditions in a controlled laboratory environment mimicking a natural airborne virus transmission and consistently achieved a 90% (tenfold) reduction of infectivity after a short treatment using a Radio Frequency (RF) wave emission with a power level that is safe for people according to most regulatory agencies, including those in Europe, USA, and Japan. To the best of our knowledge, this is the first time that SARS-CoV-2 has been shown to be inactivated through RF wave emission under conditions compatible with the presence of human beings and animals.
Additional in-depth studies are warranted to extend the results to other viruses and to explore the potential implementation of this technology in different environmental conditions.

"European Society of Medicine"

Article title: Endemic respiratory virus inactivation in aerosol by means of radiated microwaves

November 2023

Abstract:
Background. Airborne transmission of endemic respiratory viruses, such as SARS-CoV-2 and influenza viruses, poses significant public health challenges.
Aims. This manuscript investigates the efficacy of electromagnetic waves as a novel approach for airborne virus inactivation in bioaerosol suspension, that is their natural route of transmission.
Methods. Using a bioaerosol system in a controlled laboratory environment, different variants of SARS-CoV-2 and the human influenza virus were exposed to resonant radiated microwaves
within safe power levels.
Results. Radiated microwaves exposure led to a substantial reduction in the infectivity of highly transmissible SARS-CoV-2 variants, including the delta and omicron variants, achieving 80-90% reduction in infectivity. These variants exhibited susceptibility to the resonant radiated microwaves similar to the original Wuhan variant of SARS-CoV-2, confirming the effectiveness of this approach against a range of SARS-CoV-2 strains. Furthermore, the H1N1 human influenza virus displayed a 90% reduction in infectivity when exposed to microwave waves [.....]
Conclusions: These findings highlight the potential of radiated microwaves as a strategy for inactivating SARS-CoV-2 and influenza viruses. Further, they contribute to determining the optimal frequencies, exposure times, and power levels required for effective virus inactivation. This innovative approach could provide valuable insights for developing sanitization strategies and public health interventions to mitigate the airborne transmission of respiratory viruses.

02.3 scientific publications confirming technology efficacy

''European Commissione- JRC''

Report title: Suppressing indoor pathogen transmission: A technology foresight study

January 2024

Commissione europea

Abstract:
E4shield was included and positively evaluated in the JRC technology prospective study. The Joint Research Center (JRC) of the European Commission provides scientific support to the European Union in defining future guidelines/rules with the aim of improving the quality of life, for example by supporting the development and implementation of innovative technologies. Specifically, the report "Suppressing indoor Pathogen transmission: A Technology Foresign study" includes e4shield among the innovative technologies that must be considered in the future of the EU to guarantee an increase in air quality in indoor environments.

https://publications.jrc.ec.europa.eu/repository/handle/JRC137325

''Applied Physics Reviews''

Article title: Virus inactivation by matching the vibrational resonance

May 2024

Abstract
Physical approaches based on irradiation provide advances for the prevention and treatment of viral infections, while recognizing that certain chemical inactivation techniques demonstrate significant effectiveness alongside physical methods. By generating resonant vibrations of complete virus particles, which are in the GHz range and quite high compared to that of human cells, viruses can be inactivated. Therefore, exposure to ultrasound waves or non-thermal microwaves with a suitable resonant frequency oscillating electric field holds the potential to neutralize the virus particle with no damage to human. The deactivation mechanism could be a result of the mechanical effect or oxidation stress, and in this article, we discuss the elucidation of these effects on the virus' structure. We also explore the current state and future pros- pects of the anti-viral methods based on acoustic cavitation via ultrasound and non-thermal microwave, addressing critical needs in virology

02.3 scientific publications confirming technology efficacy

Nature Scientific reports

Article Title: Selected microwave irradiation effectively inactivates airborne avian influenza A(H5N1) virus

January 2025

Abstract:

The highly pathogenic avian influenza A(H5N1) virus threatens animal and human health globally.
Innovative strategies are crucial for mitigating risks associated with airborne transmission and preventing outbreaks.
In this study, we sought to investigate the efficacy of microwave inactivation against aerosolized A(H5N1) virus by identifying the optimal frequency band for a 10-min exposure and evaluating the impact of varying exposure times on virus inactivation. A(H5N1) was aerosolized and exposed to various microwave frequencies ranging from 8 to 16GHz. Viral titers were quantified using TCID50, and inactivation was assessed by comparing irradiated samples to controls. The 11–13 GHz band yielded the highest inactivation, with an average 89% mean reduction in A(H5N1) titer. Based on the overall results, the optimal frequency band (8–12GHz) was further tested with exposure durations of 1, 3, and 5 min. Inactivation was time-dependent, with a 5-minute exposure resulting in a 94% mean reduction, compared to 58% and 48% for 3- and 1-minute exposures, respectively. We conclude that optimized microwave emitters in high-risk environments like poultry farms and veterinary clinics **could offer a novel, non-chemical approach to mitigating avian influenza spread and outbreaks.**

Journal of Infection

Article Title: Microwave irradiation for airborne virus inactivation: evidence and future perspectives

June 2025

Abstract:

Non-thermal microwave (MW) irradiation has emerged as a promising approach for inactivating airborne viruses by exploiting their vibrational properties through resonant energy transfer (SRET). In this narrative review, we synthesize current evidence on the antiviral efficacy of non-thermal microwave (MW) technologies, evaluate their feasibility for indoor infection control, and highlight existing limitations as well as future research directions. The evidence was organized into three key themes: mechanistic foundations of the technology, effectiveness against airborne viruses, and regulatory and safety considerations. The available data indicate that MW irradiation disrupts viral structures through vibrational resonance mechanisms, with effectiveness varying by viral type and depending on optimized frequency and exposure duration. Regulatory authorities recently acknowledged its potential to reduce airborne transmission, contingent on meeting stringent safety standards for electromagnetic compatibility, specific absorption rates, and power density. In summary, non-thermal MW irradiation offers a scalable solution for reducing airborne respiratory virus transmission. Integrating this technology into public health strategies offers a promising approach to strengthen infection prevention and control in both healthcare settings and indoor environments, effectively targeting both human and zoonotic infections.

02.4 scientific validation (example)

Collaboration with Milan University – Output Report

TECHNICAL SCIENTIFIC REPORT: SANITIZATION OF BIOAEROSOLS CONTAINING RESPIRATORY VIRUSES (SARS-COV-2 & H1N1) BY SRET PHENOMENOLOGY

The University of Milan undertakes to prepare a descriptive report of the procedure and results obtained as a result of the experimental validation tests of the MRA sanitizer provided by Elettronica S.p.A. These tests are aimed at studying the inactivation of respiratory viruses, such as SARS-CoV-2 and H1N1, in aerosols by SRET phenomenology.

The following are the parts of the contract:

- Client: ELETTRONICA S.p.A (ELT).
- Supplier: University of Milan, Department of Biomedical and Clinical Sciences (DIBIC).
- Third-party consultant: ViroStatics Ltd.

State of the art and objective of the study

- The present study aims to verify the potential of SRET (Structure Resonant Energy Transfer1) phenomenology in the inactivation of respiratory viruses such as SARS-CoV-2 and H1N1, in bioaerosols.
- Indeed, in 2013, it was shown that it is possible to perform inactivation of viral particles by means of a specific energy transfer between a radiofrequency signal and the acoustic resonant modes associated precisely with the physical structure of the viral particle1. Maximization of this transfer occurs around a given frequency of the Electromagnetic signal, which varies for different types of viruses depending on their characteristics (i.e., in first order with respect to its electrostatic signature, physical size, and particle shape). It is therefore possible to think of employing an electromagnetic signal at the right frequency (i.e., the dipolar resonance frequency described in the study of Szu- ChiYang et al.1) and transferring the right amount of energy to inactivate the particles of a particular viral agent. It has been shown that by using an appropriate setting of the irradiated microwave signal, it is possible to achieve a reduction close to 1 Log in the viral titer of an aerosolized solution containing SARS-CoV-2 or H1N12.
- The objective of the present testing campaign is to replicate the viral reduction results obtained in a previous testing campaign conducted in a different scientific laboratory. Thus, the aim is to reproduce and validate these inactivation measurements in a different laboratory, specifically in the Immuno-Biology laboratories of the Department of Biomedical and Clinical Sciences (DIBIC) at the University of Milan.

02.5 partnership

Continuous involvement of new partners to enrich skills and capabilities

- New York University – ongoing collaboration for the development of an air sensor;
- UK HSA (Health Security Agency) - focus on the implementation of e4shield technology for public health;
- Manchester University - recent collaboration for new efficacy trials (to be planned);
- University of Genoa - inactivation test for Covid KP3 variant and electron microscope photography of the effects of the waves on the virus capsid;
- University of Sassari - focus on the configuration of the bacterial aerosol to test the inactivation of bacteria;
- University of Milan - to strengthen test results on Covid and extend tests on other viruses;
- University of Turin - development of a risk prediction model in relation to the characteristics of the environment, through the use of an air fluid dynamics model;
- Maugeri Foundation – possible collaboration to carry out inactivation tests on bacteria;
- IZS Umbria and Marche – ongoing collaboration to verify the effectiveness of inactivation against ASF;
- IZS of Lombardy and Emilia Romagna – ongoing collaboration to verify the effectiveness of electromagnetic waves against Arboviruses;
- Virostatics - focus on running recurring tests on different viruses;

02.6 certifications achieved so far

EUROPE

EU DECLARATION OF CONFORMITY

ELETTRONICA S.p.A. declares under its sole responsibility that the product:

PRODUCT: Virus inactivation device
TYPE: E4Shield 50
YEAR OF MANUFACTURE: 2022

14/06/2022, Rome (Italy) — ELETTRONICA S.p.A. HSE Manager

KSA

TDRA

شهادة تسجيل أجهزة الإتصالات

TELECOM EQUIPMENT REGISTRATION CERTIFICATE

Authorization Number: ER31711/24

Name of Registered Dealer: ELETTRONICA - SOCIETA PER AZIONI

Country: Italy

Certification Scheme Reference: TIC-D01-CS01

Certification Scheme: Declaration of Conformity

Product Details

Equipment Name (Marketing Name): Virus Inactivation Device

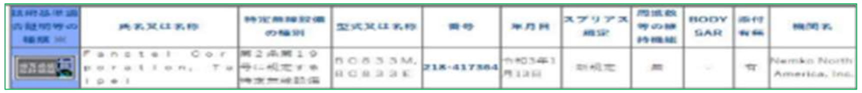
Model Name: E4Shield 50

Manufacturer: ELETTRONICA S.p.A

Manufacturer Country: Italy

Date of Issue: 15-May-2024 — Date of Expiry: 14-May-2027

JAPAN



UAE

شهادة مطابقة للمنتجات الخاضعة للوائح

Certificate of conformity for regulated products

TÜV SÜD Middle East

Certificate Number: 67660-063-24-1397075 — Issue Date: 15/05/2024 — Expire Date: 15/05/2025

Model type: E4Shield — Trade Mark: e4life

Product Name: Virus inactivation device

Country of origin: Italy

EGYPT

NTRA

TYPE APPROVAL CERTIFICATE

SINGAPORE

EQUIPMENT REGISTRATION UNDER TELECOMMUNICATIONS (DEALERS) REGULATIONS

Registration Number: N2761-24

Brand/Trade Name: e4life

Model Name/No.: E4Shield 50

Equipment Description: Virus inactivation device

Date of Registration: 10 May 2024

Date of Expiry: 30 April 2029

AUSTRALIA

Supplier's Declaration of Conformity

N136 Pty. Ltd. — ABN: 81 145 810 206

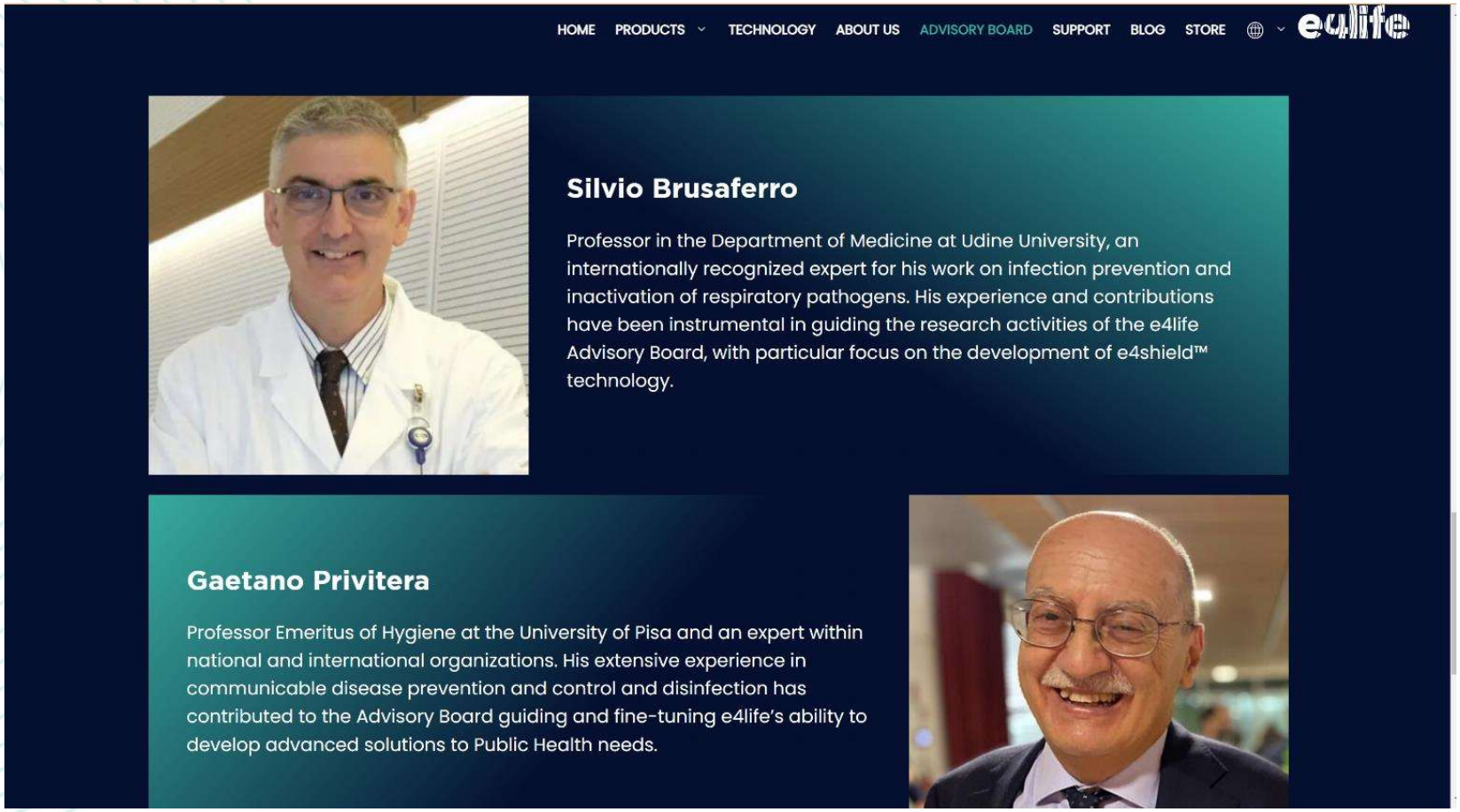
Trade Name: e4life — Model Number: E4Shields 50 — Description: Virus Inactivation Device

Gordon Slimmon, Director, 18 April 2024

MOROCCO

anrt

02.7 The Advisory Board



03.
Our current offering

An invisible shield against respiratory viruses.

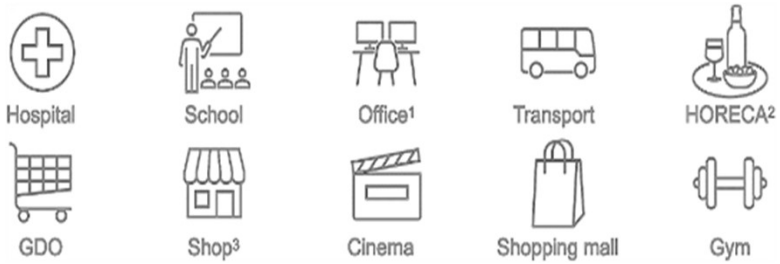
03.1 our current market solutions to defend our lifestyle
Device against Human Viruses (today Covid, Sesonal Flu and RSV)

e4shield^{tm} is actually deployed in two devices against Human viruses, one portable and one for wall installations. Possibility to update the devices (firmware and library) remotely to make them capable of being effective against additional pathogens without replacing the device

eulife personal

eulife ambient

EXAMPLES OF B2B TARGET SEGMENTS



1. Public and private offices;

2. Hotel, restaurants and cafés;

3. Shops and minimarkets

03.2 Device against Human Viruses – products features

personal

- Safe, wherever you are
- A “very personal device” effective in the living space
- Stationary or in motion the device generates an effective inactivation of the virus up to 3 meters around the individual
- It’s simple and compact but with a technologically advanced processor to manage frequencies, times and battery status

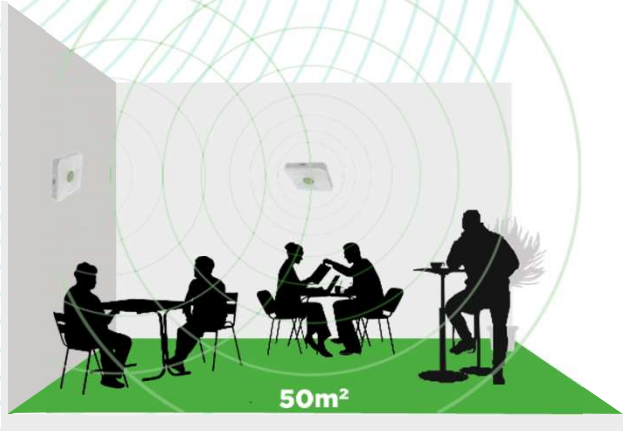
HOW IT WORKS

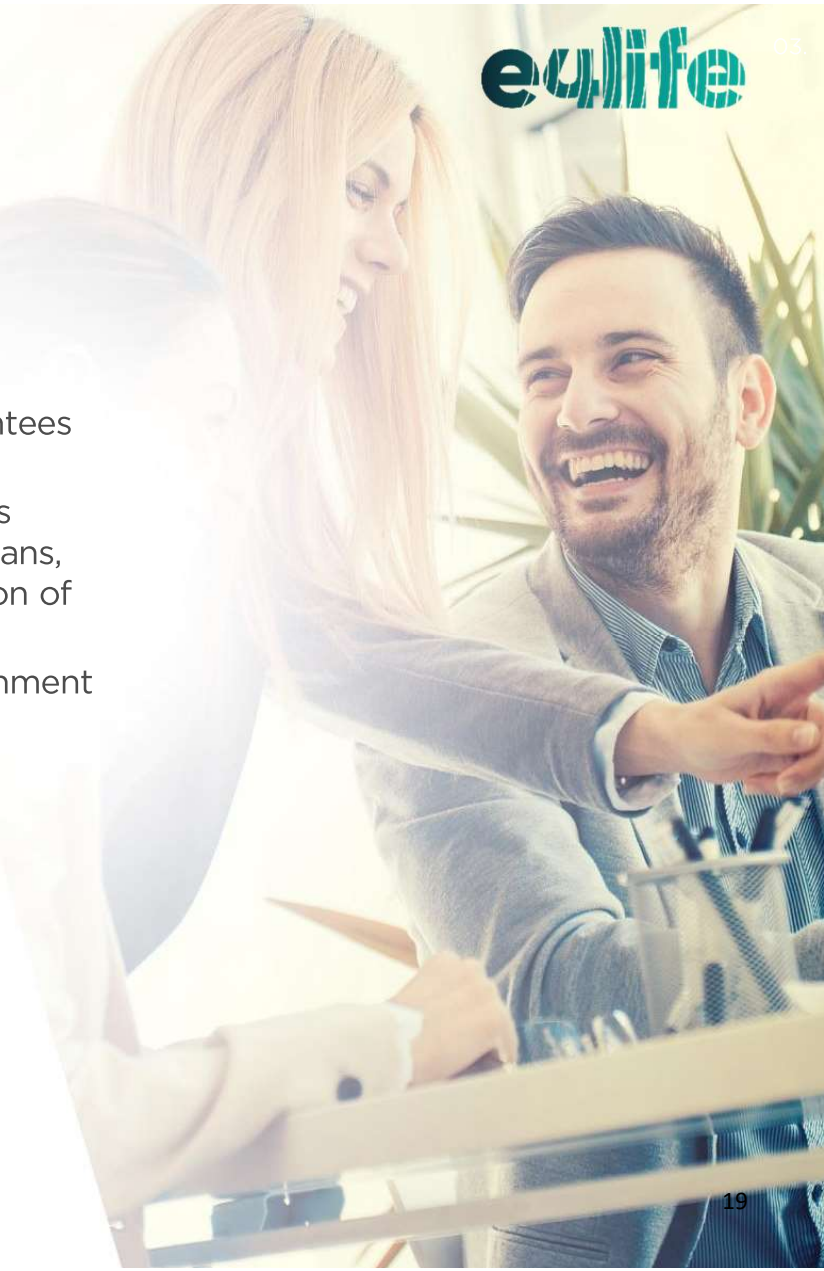
- The electromagnetic signal, synthesized and amplified is emitted in all directions through an internal antenna with a specific shape, able to create a “defending bubble” all around the giver
- The electromagnetic wave instantly destroys the external shell of viruses
- Viruses are inactivated

03.2 Device against Human Viruses products features

eulife ambient

- Inactivation of the virus in every environment. Antenna shape in this case guarantees the front coverage
- Easily wall – fixable, plug and play utilization, removable if necessary, it generates broad coverage waves through indoor environments A device harmless for humans, which neither require people to leave while the device is active, nor the ventilation of the premises
- By placing several devices side by side it's possible to utilize it within any environment





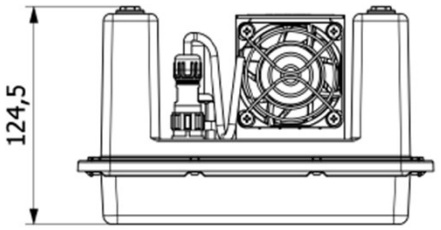
03.3 our current market solutions to defend our lifestyle
Device against Animal Viruses (today Avian Flu and Swine Flu)

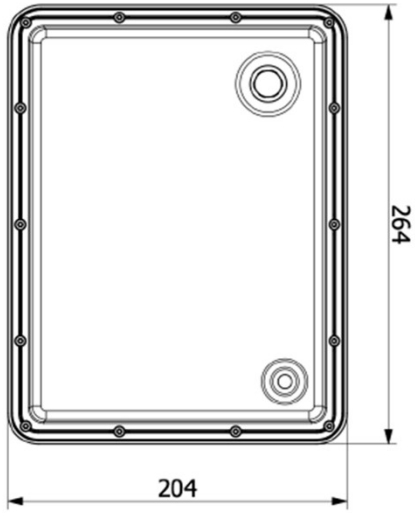
The production of the new specific device against animal viruses (designed to be installed in farms) will start in October

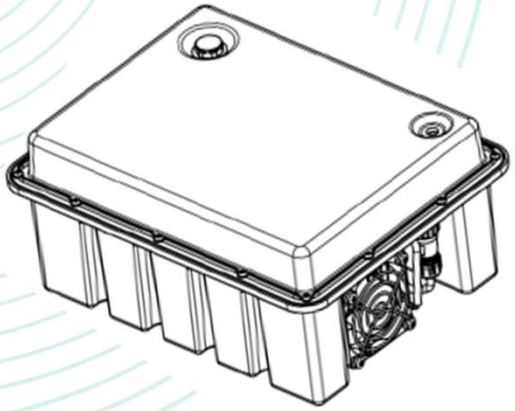
- Device, specifically designed and created against the Avian Flu and Swine Flu viruses (research running on additional viruses)
- It offers coverage of 50 sqm at floor level
- It is “an industrial device”, with an “IP 66 protection class” and it can be exposed to water and dust
- It is equipped with both Bluetooth and Wi-Fi. It is not supplied with an internal battery
- It can be programmed and updated for new viruses (e.g. PSA) through a specific digital platform
- A Led indicator provides immediate feedback regarding the correct functioning of the device

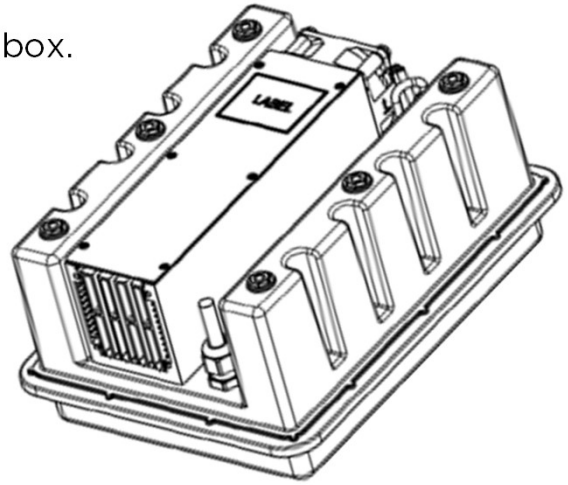
03.3 Device against Animal Viruses - product features

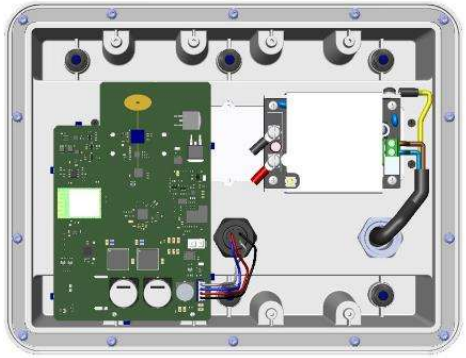
- Dimensions **264x204x125mm** (10.4x8x4.9in)
- The plastic box is **sealed** and the cooling system is positioned outside combining a high efficiency **fan** and aluminium **heat sink.**
- A **valve** on the front side will keep pressure under control in the box.
- 6 holes **6MA** permit multiple ways of fixing the product in optimal position.
- Operating voltage is **100-240V 50/50Hz**.
- The **power cord** can be connected to a wall box.









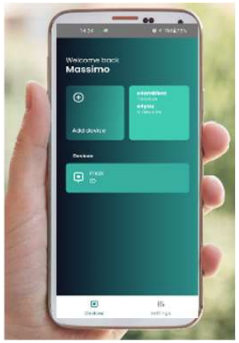


03.4 e4life accessories – APP and Dashboard

Possibility to control and update the devices through a remote control

APP (IOS & Android) - to control your devices easily (mainly e4life personal)

- Designed to easily interact with your devices
- Uses Bluetooth for fast and easy pairing
- It works with e4you and e4ambient
- Provides information related to devices: Name, serial number, Firmware version, battery status, …
- Firmware update: it's possible to update Firmware version
- It is possible to suspend the sanification and to re-activate it.



DASHBOARD - to control a large number of devices (mainly e4life ambient and farm)

- Designed to control a large number of devices
- Can be connected using an existing WiFi
- 3 profiles: Administrator, Installer, User
- Allows to create Sites and Groups and to operate on many devices simultaneously
- Provides info related to devices: Name, serial number, Firmware version, battery status, ….
- Firmware update: it's possible to update devices Firmware
- You can program the duration of sanification cycles

Thank you