Pre-commercial lines for production of surface nanostructured antimicrobial and anti-biofilm textiles, medical devices and water treatment membranes
THE GLOBAL CHALLENGE for

- High incidence of hospital-acquired infections.
  - 3.000.000 people/year infected in the EU
  - 50.000 people die
  - €7 billion/year financial loss

- Health care associated infections
- Antibiotic resistant bacteria
- Microbial biofilms
- Unsafe water

- 80 % of all infections treated in hospitals are due to biofilms on indwelling medical devices

- Antibiotics overuse
- Multidrug-resistant bacteria in the EU cause €1.5 billion/year financial loss

- Waterborne diseases - among the major causes of preventable morbidity and mortality
- 3.000.000 people/year infected in the EU
- 50.000 people die
- €7 billion/year financial loss
CUSTOMERS
manufacturers of antimicrobial and anti-biofilm textiles, medical devices, and water treatment membranes

PROBLEM
The customers do not dispose with efficient technologies to manufacture these products with high-quality and durability

EXISTING ALTERNATIVES
High energy consuming and inefficient coating processes, resulting in low durability of the antimicrobial and anti-biofilm effect.
Cost effective, sustainable and reliable nano-coating production lines that enable customers to create high-quality anti-biofilm, antimicrobial and biocompatible nano-coated products with longer lifetime than competing products at a fraction of the price.
UNIQUE VALUE PROPOSITION

• Patent-protected technologies
• Versatile coating processes employing ultrasound adaptable for any active agent, coated material and product shape.
• A single step nano-functionalisation with novel efficient nano-antimicrobials
• In-situ synthesis and coating with nano-antimicrobials
• Integrated real-time monitoring tools for nanotechnology-based processes and products.
• Ease of integration of the new technologies in existing manufacturing facilities.
• Low manufacturing costs
ZnO-coated patients’ gowns

Lower level of bacterial infection in “antibacterial” patients than the “regular” ones. (Clinical study with 37 patients)

Hybrid NPs: ZnO/tannic acid/enzyme

Inorganic NPs: ZnO, CuO, Zn-CuO, MgF₂

70% biofilm inhibition \textit{in-vivo}
MARKETS

**Total Addressable Market** – manufacturers of functional materials used in textile and clothing industries, transportation, construction, healthcare, food packaging and water treatment.

**Serviced Available Market** – manufacturers of antimicrobial and anti-biofilm textiles, medical devices and water filters produced by conventional technologies

**Target Market** – manufacturers of antimicrobial and anti-biofilm hospital textiles, catheters and water treatment membranes
THE MARKET OF HOSPITAL BED LINEN

• About 2.000.000 hospital beds available in EU for acute diseases with an occupation rate of 75% and an average of 4 days hospitalisation.

• Need for about 3 millions sets of hospital bed sheets

• €15 millions/year market value for new bed sheets

• €3-4 billions/year bed sheets maintenance market

• 47 suppliers of hospital sheets in EU
A. The antimicrobial treatment as a service
Manufacturer of bed sheet buying the antibacterial treatment (service) from a partner with pilot unit through inter-partners agreements for exploitation

<table>
<thead>
<tr>
<th>Time period of forecast</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
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<tbody>
<tr>
<td>forecast sales</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Bed sheets (*) Quantities</td>
<td>4.168,02</td>
<td>10.420,04</td>
<td>20.840,09</td>
<td>31.260,13</td>
<td>37.512,16</td>
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<tr>
<td>Revenues (€)**</td>
<td>166.721</td>
<td>416.802</td>
<td>833.604</td>
<td>1.250.405</td>
<td>1.500.486</td>
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<tr>
<td>prototype unit</td>
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<td></td>
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<td></td>
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<tr>
<td>unit cost of finishing (****)</td>
<td>3,87</td>
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<td>3,55</td>
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<tr>
<td>total Manufacturing Direct Costs (€)</td>
<td>11.757</td>
<td>29.393</td>
<td>58.786</td>
<td>88.179</td>
<td>105.815</td>
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<tr>
<td>Cost for finishing (€)</td>
<td>16.127</td>
<td>38.639</td>
<td>73.917</td>
<td>84.243</td>
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<tr>
<td>Total Direct Costs (€)</td>
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<td>68.032</td>
<td>132.703</td>
<td>172.422</td>
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<td>Total Indirect costs(€)</td>
<td>5000</td>
<td>7.500</td>
<td>10000</td>
<td>12.500</td>
<td>15000</td>
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<tr>
<td>Gross Profit (€)</td>
<td>133.836</td>
<td>341.270</td>
<td>690.900</td>
<td>1.065.484</td>
<td>1.286.162</td>
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<tr>
<td>Investment in Fixed Assets (manufacturing) (€) ***</td>
<td>15.000</td>
<td>15.000</td>
<td>15.000</td>
<td>15.000</td>
<td>15.000</td>
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<tr>
<td>Net profit</td>
<td>118.836</td>
<td>326.270</td>
<td>675.900</td>
<td>1.050.484</td>
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</tr>
</tbody>
</table>

(*) high quality bed sheets with special design and colours, suitable for clinics and also for wellness centers
(**) Price per unit 40€
(*** Investments for improvement of looms productivity and confection capacity enhancement
(****) functionalisation is carried out by US R2R pilot by minimal charge according to project partner internal agreements for exploitation
## FINANCIAL PLAN

### B. Internalisation, verticalisation and total control of the value chain by one entity purchasing a pilot manufacturing unit producing and selling bed sheets

**Preliminary financial plan for high quality bed sheets 5 years after the end of PROTECT project**

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<td>prototype unit</td>
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<tr>
<td>unit cost of finishing</td>
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<td>29.393</td>
<td>58.786</td>
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<td>Cost for finishing (€)</td>
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<td>Total Indirect costs(€)</td>
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<td>10000</td>
<td>12.500</td>
<td>15000</td>
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<tr>
<td>Gross Profit (€)</td>
<td>110.738</td>
<td>333.446</td>
<td>709.460</td>
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<td>1.307.547</td>
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<tr>
<td>Investment in Fixed Assets (manufacturing) (€) ***</td>
<td>40.000</td>
<td>40.000</td>
<td>40.000</td>
<td>40.000</td>
<td>40.000</td>
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<tr>
<td>Net profit</td>
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(*) high quality bed sheets with special design and colours, suitable for clinics and also for wellness centers

(**) Price per unit 40€

(***) Investments for internalisation of the process by acquiring a functionalisation unit with estimated value of 200k€
• 8 % total market share in 5 years by addressing clinics, hospitals and wellness centres with **high quality low-medium production volume**.

• 30 % market share in 5 years by **large volumes production**. Investments to acquire 8 pilots or to intensify the existing ones.

• Expand the business model to **hotels and elderly care centres**.
70 % industry participation + highly innovative technology providers = commitment for success
STATE-OF-THE-ART AND FUTURE ACTIVITIES

Validated technologies:
• Three nano-particle coating pilots operating in real conditions

Future activities:
• Scale-up of the pilots to industrial production standards
• Integration in the pilots of real time process and product monitoring tools
Potential users of the nano-coating sonochemical technology are invited to **test the coating lines for specific products**.

The manufacturers will be assisted to **evaluate both the technology and the functionality of the end products**.

**Different business scenarios** will be suggested - acquisition of the nano-coating machines or their use as an external service.