

**PROJECT ACRONYM AND TITLE:** *FF-ITI - Future Farming Innovation Technology Infrastructure*

**FUNDING PROGRAMME:** *PNRR M4C2 Inv.3.1 ITEC - infrastrutture tecnologiche di innovazione*

**HOST DEPARTMENT or CENTER:** Dipartimento di Management

**SCIENTIFIC RESPONSIBLE:** Prof. Carlo Bagnoli – Dipartimento di Management

**FINANCIAL DATA:**

Project total costs	Overall funding assigned to UNIVE
€ 20.250.300	€ 9.922.647

**ABSTRACT:**

Mankind is now in a position to move away from exploiting nature by brute force, as in past industrial revolutions, and instead to start harnessing and mimicking its design principles and leveraging it as an engineering and manufacturing platform: this is Nature Co-design.

The aim of the initiative is to contribute to enabling this transition by overcoming some of the current technological and structural shortcomings of Nature Co-Design by blending it with Controlled Environment Agriculture and leveraging its core assets, through an Innovation Technology Infrastructure to support industrial research activities in these domains. The main purpose is to enable the creation of a fundamentally new industrial paradigm in the successful use of Nature, i.e. biology, to manufacture at scale and meet real industrial needs by manipulating matter at the atomic level leveraging computing and data science through sensing and actuation.

By focusing on farming, and growing matter, the idea at the core of this initiative is to bring the operational and scientific insights generated by “Controlled Environment Agriculture” (a technology and data driven farming form) to Nature Co-Design. Through hardware and software innovation it helps overcome the scaling up limitations of Nature Co-design (e.g. through new fermentation approaches). Conversely, the latest scientific and technological innovation of Nature Co-Design can be applied to “Controlled Environment Agriculture” (e.g. molecular farming, synthetic biology, and CRISPR).

The intersection between Nature Co-Design and Controlled Environment Agriculture originates the idea of Future Farming, which represents a new domain on the edge between disciplines (life sciences, chemistry, engineering, computer science and design) and aims to identify industrial applications using nature as a manufacturing platform.

Future Farming focuses on the cross-industry impact of life forms, from microscopic to macroscopic: viruses, bacteria, algae, fungi, plants, insects. Life forms are farmed sustainably in controlled environments to achieve a specific purpose: they can become food, bio-molecules, bio-pharmaceuticals, bio-materials, etc.. Future Farming focuses on six topics: Coding, Breeding, Building, Growing, Transforming and Regenerating. The Future Farming Innovation Technology Infrastructure (FF-ITI) is a state-of-the-art laboratory equipped with an array of technologies enabling industrial research projects identified in a matrix resulting from the convergence of life form(s) and topic(s). Each project will be carried out in a different Lab. Future Farming has a cross-industry impact. In Italy, the estimated Total Addressable Market is more than € 700B

The FF-ITI relies heavily on the Deep Tech approach to innovation, as it is problem oriented, it works on the convergence of different disciplines and technologies and is build upon the DBTL cycle.

FF-ITI foresees the development of a new Open Innovation Model aimed at lowering the existing barriers to innovation, especially for SMEs. Future Farming implies, in fact, a radical shift: 1. in the approach to engineering and manufacturing. It replaces brute forcing with precision, reducing the importance of scale economies; 2. in the production equation. What is considered waste in one value chain can become a resource in another value chain; 3. in the energy equation. It allows to build materials from scratch atom by atom, and to manufacture products from inseparable mixtures of input materials, making processes affordable that were previously uneconomical due to their high energy demands. FF-ITI has the ambition

to become for farming what cloud computing is for computation, making the access to specific innovation technology infrastructures as well as to scientific knowledge easier and easier, and cheaper and cheaper. FF-ITI will be based in Venice, in the heart of North-east Italy. Since Venice wants to become the World Capital of Sustainability, it is the perfect place to lead a global green industrial revolution inspired by Nature.

### OBJECTIVES and EXPECTED RESULTS:

FF-ITI aims to experiment with a new effective way of technology transfer and setting-up new business. A partial amount of the activities developed by FF-ITI will be funded and addressed by the private partners with the aim to bring the research outcome to the market. They will play a pivotal role in FF-ITI acting as: technology provider companies; technology transfer companies; corporate venture capitalists. Private partner actions ensure the almost full exploitation of FF-ITI production capacity, leveraging technologies able to seamlessly scale to real industrial vertical applications, thus minimizing the time to market. The remaining FF-ITI production capacity will be available for independent university industrial research projects that will be supported in their exploitation pathways through the creation of start-up companies, which may originate from a worthy combination of the cutting-edge knowledge and the entrepreneurial spirit of some university researchers. The creation of the startups will be managed by a Start-up Studio set up leveraging the experience of VeniSIA, the University Ca' Foscari accelerator.

The expected outcomes of Industrial research projects conducted within FF-ITI can be distinguished in terms of both object and scope of the innovation. In terms of **object of the innovation**, they can enable the:

1. creation of innovative products and novel;
2. improvement of the performance of existing products or processes;
3. reduction of the costs or the increase the availability of scarce raw;
4. creation of products or raw materials that are more environmentally friendly;
5. catalyzation of resilient supply chains.

In terms of **scope of the innovation**, Future Farming has a cross-industry impact:

- Food;
- Well-being;
- Bio-Pharma;
- Bio-Materials;
- Environmental.

The economy impact of the **Future Farming technology** can be measured in terms of 2019 GDP values. Assuming that all non-service sectors will be subject to the impact of Nature Co-Design (WEF, *The Future of Nature and Business*, July 2020) and that Vertical Farming will contribute up to 10% of the overall agriculture sector (Berenberg, *Study on vertical farming*, Sep. 2020), the estimated Total Addressable Market of Future Farming based is more than €60B only in the Veneto Region and more than €700B in Italy.

The economic impact of the **Future Farming technology transfer activity** operated by private partners can be measured in terms of industrial scale-ups of vertical implementations identified in FF-ITI.

### PARTNERSHIP:

Università Ca' Foscari Venezia	Coordinator
Componente privata in via di definizione	Partner