

**Industry 4.0 Enhanced Digital Product Passports and Circular Economy**

**Dataspaces for Sustainable Bio-Based Industries**

**Deliverable 7.6**

**Exploitation Plan Draft**

Actual Submission Date: 30/06/2025

**Deliverable Factsheet**

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| **Grant Agreement No.** | 101182453 |
| **Project Acronym** | bi0SpaCE |
| **Project Title** | Industry 4.0 Enhanced Digital Product Passports and Circular Economy  Dataspaces for Sustainable Bio-Based Industries |
| **Start date** | 01/01/2025 |
| **Duration** | 36 months |

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| **Deliverable Name** | D7.6 Exploitation Plan Draft |
| **Related WP** | WP7 Technical, Business, and Societal Impact Creation |
| **Due Date** | 30/06/2025 |
| **Dissemination Level** | SEN (Sensitive) |

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**Revision History**

| **Version** | **Date** | **Author(s)** | **Organisation** | **Description** |
| --- | --- | --- | --- | --- |
| 0.1 | 15/06/2025 | Nenad Stojanovic | NISSA | ToC |
| 0.2 | 17/06/2025 | All partners | All partners | Workshop and contributions from all partners |
| 0.3 | 25/06/2025 | Nenad Stojanovic | NISSA | First draft of all sections |
| 0.4 | 26/06/2025 | Ina Steinmetz, Cristina Dimaria, Devarajan Ramanujan, George Siaterlis | FhG, UNI, AU, SSF | Additional contributions |
| 0.5 | 27/06/2025 | Nenad Stojanovic | NISSA | Final contribution |
| 0.6 | 30/06/2025 | Name Surname | CARTIF, FhG | Internal review |
| 1.0 | 30/06/2025 | Nenad Stojanovic | NISSA | Integration of comments from internal review  Final version ready for submission |

# Executive Summary

The objectives of WP7 are to disseminate and communicate the results of the bi0SpaCE project across industrial, scientific, and technical communities; foster cluster collaboration and cross-pollination; develop an exploitation strategy, including transferability to other sectors; and advance standardization activities.

An important objective of WP7 concerns exploitation, which is the subject of task “T7.3: Exploitation, transferable business models & industrial strategies, and IPR”. This task deals with the development of individual and joint exploitation plans and the management of intellectual property rights within bi0SpaCE and beyond.

The deliverable “D7.6: Draft exploitation plan” is the first result of task T7.3. It defines an initial plan for the exploitation of all partners regarding the key exploitable assets of bi0SpaCE. Considering that the exploitation task T7.3 started in 01 June 2025, it should be noted that the consortium has had only one month to work on exploitation-related activities, including the writing of the deliverable. Therefore, this deliverable only reports on the activities and results of the first exploitation workshop, which was conducted with all partners. The first exploitation workshop was conducted as a part of the 2nd bi0SpaCE general assembly meeting and was limited to collecting and aligning preliminary expectations from the bi0SpaCE consortium partners regarding their planned exploitation activities.

The exploitation activities will continue until the end of the project. An update on the exploitation activities will be provided for the first periodic report to cover the results of the first 18 months of the bi0SpaCE project. All results of the exploitation activities will be reported in the result ‘D7.3: Exploitation Plan’ in M36.

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Acronyms and Abbreviations

| **Acronym** | **Description** |
| --- | --- |
| **CE** | Circular Economy |
| **CWA** | CEN Workshop Agreement |
| **DoA** | Description of Action |
| **DPP** | Digital Product Passport |
| **DT** | Digital Twin |
| **KER** | Key Exploitable Result |
| **KPI** | Key Performance Indicators |

# Introduction

## Purpose and Scope

The primary goal of WP7 is to create technical, business, and societal impact based on the bi0SpaCE results. This deliverable reports on task T7.3 “Exploitation, transferable business models & industrial strategies, and IPR”. It officially began in project month 6 and will continue until the end of the project. It is led by NISSA, with input from all partners.

Since this deliverable is scheduled for submission in month 6, we effectively had only one month to initiate exploitation activities. In that time, we had to (1) gather input from partners; (2) identify key assets to exploit; (3) outline early business paths; (4) do a basic IP review. Considering the limited timeframe, our focus was limited to gathering and aligning preliminary expectations from partners on their planned exploitation activities and there was little room for in-depth analysis or multiple review rounds.

Consequently, this initial exploitation draft only includes elements identified from our first exploitation workshop. More detailed contributions and strategy development will be added in later T7.3 deliverables at the end of the project.

## Relation with other deliverables

This deliverable is the first exploitation deliverable and sets out the plan for exploitation activities during project implementation. All results of the exploitation activities will be reported in the deliverable ‘D7.3: Exploitation Plan’ in M36.

## Structure of the document

The deliverable is structured as follows:

* Section 1 clarifies the context of the deliverable and presents the goals.
* In section 2 we define the bi0SpaCE exploitation strategies of all partners.
* Section 3 summarizes the results and defines the next steps.

# bi0SpaCE Exploitation Plan

## Introduction

According to the bi0SpaCE Description of Action (DoA), an initial exploitation plan should be submitted at the end of the sixth month of the project. However, the corresponding task T7.3 began in the sixth month of the project (according to the Gantt chart, page 133 of the DoA[[1]](#footnote-1)). This posed a challenge for the bi0SpaCE project, as we only had one month to organize exploitation activities and report them from the start of the task.

Additional constraints include the fact that the task on architecture "T2.5: Technical Specification and System Architecture of bi0SpaCE” has not yet started and therefore the components/assets that could be exploited are yet to be identified. Finally, the WP on pilots “WP6: Technology Validation in Relevant Industrial Environments" has not yet started, making it difficult for end users to decide on the details regarding exploitability of the expected results in their pilot projects.

To address the above challenges, we analyzed several alternatives for preparing and reporting a draft exploitation plan within the time constraints for delivering D7. The consortium agreed on conducting an exploitation workshop with all partners to gather preliminary information about their exploitation intentions and discuss the alignment with the exploitation ambitions of the bi0SpaCE project. The workshop took place on 18 June 2025 in an online setting as part of the 2nd general assembly meeting for the bi0SpaCE project.

The workshop was organized in the following way:

1. Deliverable leader (NISSA) explained the goal of the workshop and provided a template for gathering the input from all partners

2. Time period of 30 min was dedicated to provide the required content. During this period, the deliverable leader was answering on questions from partners

3. Thereafter the provided content was briefly analyzed on completeness

4. Additional time period of 3 days was given for completing / fine tuning provided content

Regarding the first step: the partners were asked to provide short information (max. ½ page) according to the following template:

Table 1: bi0SpaCE template for exploitation plans

|  |  |
| --- | --- |
| **Exploitation template** | |
| Name | A short list of the project’s key exploitable items identified during the June workshop (e.g., a novel method, software module, or dataset). |
| Description | A brief summary of each item (what it is, TRL, intended use), based on partner-provided example descriptions from the first workshop. |
| Exploitation strategy | High-level exploitation routes initially considered for each item (e.g., licensing, pilot deployment, standardization steps), as suggested by partners. |
| Background IP | Identification of any existing IP relevant to each exploitable item—patents, proprietary know-how or data already held by consortium members. |

The Name and Description were required to be populated with initial key exploitable results (KERs) and their characterization to identify and assess project results. The Exploitation strategy was required to reflect early-stage considerations of how each KER can be taken forward. For Background IP, partners were required to flag any existing intellectual property (IP) that they would bring into the bi0SpaCE project to clarify ownership and freedom-to-operate.

In the rest of this section, we present the collected content.

## AU

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| **Preliminary exploitation plan for AU** | |
| Name | Simulation tools for circularity and sustainability advancement in bio-based industries |
| Description | As a research university, Aarhus University (AU) plans to develop combined physics-based and data-driven frameworks that can enable linking of manufacturing process to sustainability and circularity indicators. In this process, we will extend state-of-the-art simulation methodologies developed previously developed by AU that map process inventory flows to life cycle assessment and circular economy indicators. AU will also advance in-house software for machine-learning based tracking of process flows and integrate them with physics-driven approaches, developing hybrid models with high level of generalization and interpretability. |
| Exploitation strategy | AU will exploit research results through publication and dissemination in leading international venues. Further we will engage with local industries in Denmark including large companies and SMEs through our connections with TechCircle EDIH and MADE Denmark to disseminate these results into industry. These results will enable extending the currently used industrial methods for sustainability and circularity assessment, process optimization, and machine learning model deployment. Furthermore, research results will be exploited through future projects aiming at scaling-up and commercialization research results |
| Background IP | The simulation methods that have been previously developed by AU have been published in open-access research venues.  **Foreground IP:** Any IP produced from the bi0SpaCE project, will be jointly exploited by the Danish partners with the help of the respective technology transfer offices & incubator. |

## FhG

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| **Preliminary exploitation plan for FhG** | |
| Name | An end-to-end toolset for creating, managing, and sharing Asset Administration Shell–compliant digital twins (DTs) and digital product passports (DPPs) |
| Description | The FA³ST ecosystem is a Java-based toolkit developed by Fraunhofer IOSB, now hosted under the Eclipse FA³ST project. It simplifies the creation, validation, management, use, and sharing of Asset Administration Shells (AAS)–compliant digital twins (DTs). It is also used for digital product passports (DPPs), which can be realized through AAS.  As part of the bi0SpaCE project, this FA³ST ecosystem will be extended to address the specificities of bio-based industries and the requirements of pilot projects. For digital twins in bio-based processes, the extensions will include (i) support for data collection from relevant sources such as hardware systems, software systems, and sensors and (ii) enhancement of DTs with services pertinent to circularity such as life-cycle assessment. For DPPs, the extension will cover (i) inclusion of technical data for bio-based materials and products and (ii) integration of real-time data for product carbon footprint monitoring. At the data-space level, the extension will also support the user-friendly sharing and use of DPPs within a data space. |
| Exploitation strategy | FhG, in its role as a research institute, aims to develop and extend emerging technologies to create innovative industry solutions and achieve impact through standardization and technology transfer. The results from the bi0SpaCE project will not only enhance our portfolio (e.g., the FA³ST ecosystem) and open up a new application domain in bio-based industries, but more importantly position us as a key player for standard-compliant DPPs, which will be of great importance in the context of the European Commission's Ecodesign Regulation for sustainable products.  Additionally, FhG will support German industry in achieving their digitalization and circular-economy goals through hands-on formats such as consulting, workshops, trainings, proof-of-concept development, demonstrators, and by making our code available as open source. This support ranges from conceptual Industrie 4.0 solutions to developing DTs for their processes or assets, creating and managing DPPs for their products, and facilitating the sharing of these DTs/DPPs to enhance circularity and sustainability. Industry partners will be engaged via our Research Factory in Karlsruhe, through the Industrial Digital Twin Association, in which we play an active role, or through direct contacts.  Finally, the most natural exploitation opportunity for a research institute is the development of follow-up research projects that further build on the ideas and applications explored in bi0SpaCE. |
| Background IP | Some tools of the FA³ST ecosystem, such as the FA³ST service, have been released as open source as part of the Eclipse Digital Twin project under the Apache 2.0 license. Components of the FA³ST ecosystem that include a user interface, such as FA³ST CreAItor, will be provided as a service. |

## CAR

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| **Preliminary exploitation plan for CAR** | |
| Name | Digital tagging of bio-based products |
| Description | Digital tagging creates a digital summary of relevant physical processes and products across their lifecycle, utilizing unique identifiers to track raw materials, intermediates, and final products through each manufacturing step. This system enables real-time updates and integrates data from various sources, enhancing traceability, quality and optimization in the bio-based product supply chain. |
| Exploitation strategy | CARTIF, as a research institution, aims to increase the technological maturity of the result after the end of the project. The goal is to pursue a technological demonstration of the digital tagging approach in additional bio-based sectors beyond the bi0SpaCE use cases, enabling cross-sector replication and innovation-driven adoption. |
| Background IP | Based on CARTIF’s expertise in industrial process monitoring, data integration, and circular manufacturing systems. The exploitation builds on prior developments in sensor-based tracking and data-driven cognitive solutions. |

## NISSA

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| **Preliminary exploitation plan for NISSA** | |
| Name | Data Quality Management for bio-based product manufacturing |
| Description | In order to provide a holistic view on the data collection process in the bio-based product manufacturing, we will develop a new data collection framework D2Port (TRL5). Main advantage is the system collects real time characteristics of the industry process, providing a global context for data understanding. this information is coming from MES and ERP system. Additionally, the system is treating the quality of data as first-class citizen. It means that we manage information about the sensing system (sensors). However, since the quality of data depends very much on data collection system/pipelines, which applies various methods for cleaning the data and improving its quality (e.g. filling missing values). The main goal is to determine the stability of the data collection process, which will ensure the collection of high-quality data. |
| Exploitation strategy | The D2Port is a framework for self-adaptive Data Quality Assurance, which uses autonomic computing (MAPE-K) model for observing Data Collection process, esp. in harsh condition, to ensure high characteristics in all data quality dimensions (Completeness, Consistency, Conformity, Accuracy, Integrity and Timeliness).  We will offer free trials for lowering barriers for the exploitation. |
| Background IP | Proprietary software |

## UNI

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| **Exploitation plan for UNI** | |
| Name | Standardization Roadmap and CWA project plan |
| Description | The Standardisation Roadmap, and the project plan of a CEN Workshop Agreement (CWA), outlines strategic guidance for European standardisation organisations (CEN/CENELEC), aiming to ensure that research-based innovations contribute to shaping future standardization frameworks. A mechanism for continuous updates may be proposed to incorporate stakeholder input, enabling the roadmap to adapt to evolving policies and market demands.  The increasing regulatory focus on circular economy principles has led to a strong demand for tools that support compliance and standardisation efforts. Nonetheless, achieving widespread adoption remains a challenge, particularly among small and medium-sized enterprises (SMEs), which may require additional support in implementing standardisation practices. Engaging with regulators, industry bodies, policymakers and standardization experts will be essential to establish the Standardization roadmap as a trusted reference in the context of circular economy standardisation. |
| Exploitation strategy | The document will be publicly available, and a strong dissemination will be encouraged |
| Background IP | UNI / CEN copyright |

## SSF

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| **Preliminary exploitation plan for SSF** | |
| Name | DPP digital platform |
| Description | SSF as a research institution will develop a Digital Product Passport (DPP) for the bio-based pilot of the project. Especially, it will be exploited the final solution that will be related to the digitalization of the production process as well as the entire value chain. The solution will include also connectors for data retrieving form existing solution supporting different communication protocols. The exploitable solution will be related to a web application that can be provided either via once time license either via SaaS including restricted and fully access license packages. |
| Exploitation strategy | The solution will be communicated within the customers and collaborators of SSF. The targeted audience will be related to SME(s) as well as large companies. Also, the solution will be communicated through technological summits that take place in SSF premises. |
| Background IP | Digital platform infrastructure as well as the core development of the platform including DPP generator and UIs are proprietary to SSF |

## FISKEBY

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| **Preliminary exploitation plan for FISKEBY** | |
| Name | Technologies for Reusing Process Water in Recycled Paperboard Production |
| Description | In the bi0SpaCE project, Fiskeby will work on a pilot study examining the possibilities and required conditions for reusing process water in 100% recycled paperboard production. Through this process, they will generate knowledge on the process variables, measurement methods, and requirements for productive reuse of process water. Furthermore, cost-effective solutions for circular transition are explored through benchmarking the best possible solution(s) for process water reuse. The resulting study will also generate recommendations on how to deploy digital solutions, including process monitoring and tracking, towards cost-effective process water reuse. |
| Exploitation strategy | The identified technological solutions for process water reuse will be subsequently implemented in Fiskeby’s facility, if deemed viable. By reducing the consumption of water, Fiskeby can gain potential benefits from an environmental as well as economic standpoint. While solutions are expected to be plant-specific, the digital template produced in the bi0SpaCE project can be adapted to 8 paper mills operated by the RDM group, the parent concern of Fiskeby. |
| Background IP | The production recipes, parameters, and techniques are proprietary to Fiskeby. |

## NATURAE

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| **Preliminary exploitation plan for NATURAE** | |
| Name | Digitalization and Sharing of Key Data in Aloe Vera Production |
| Description | Naturae is taking a pilot role in the bi0spaCE project to explore the digitalization of critical data throughout the aloe vera juice production process. The aim is to generate actionable knowledge by identifying key process variables and refining data measurement and collection methods. |
| Exploitation strategy | The pilot phase will involve the installation and integration of various sensors to monitor parameters such as temperature, aloin concentration, pH levels, and harvest date... This integrated approach will optimize resource use, ensure consistent product quality, and enable consumer-facing transparency through the implementation of a digital product passport.  The digitalization of production data will not only support internal process optimization and environmental sustainability but also improve Naturae’s market competitiveness by offering real-time, verifiable product information to consumers. |
| Background IP | Naturae owns proprietary production recipes, process parameters, and techniques related to aloe vera juice manufacturing.  **Foreground IP:** Naturae will assess and potentially exploit any new intellectual property generated during the bi0spaCE project |

## GREENLAB

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| **Preliminary exploitation plan for GREENLAB** | |
| Name | Extension of SymbiosisNet™ platform for Digital Product Passport generation |
| Description | As an eco-industrial park manager, Greenlab manages utilities supplied within the park (e.g. electricity) and seeks to expand its role in providing hydrogen, heat, and other commodities to companies located within the park. Greenlab is developing the SymbiosisNet™ platform to enable matching renewable energies to bio-based products. In bi0Space, the plan is to augment SymbiosisNet™ with the capabilities for dynamic estimation of CO2 intensity of the energy supply, for use in digital product passports of bio-based products produced in the park. In addition, Greenlab aims to demonstrate capabilities for tracking material flow data and help companies in the park with early adaption to sustainability reporting requirements. |
| Exploitation strategy | By extending theSymbiosisNet™ platform, Greenlab aims to create a unique selling point for their customers and help improve the quality of data tracked/reported in industrial parks, while also ensuring early adaption and compliance with any future regulatory requirements. Greenlab will exploit the results by demonstrating the potential benefits of the SymbiosisNet™ platform in the above cases and for computing metrics for tracking energy usages in production of bio-based products (from traditional, renewable, and alternative sources). GreenLab will build on the learnings from the bi0SpaCE project, and help disseminate the work, engaging in research both within the project and our wider network to create knowledge sharing. It will also invest in future projects, on further scaling the results from this project with a specific view on developing solutions for industrial symbiosis clusters. |
| Background IP | To be defined in collaboration with Greenlab’s automation manager |

## NOR

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| **Preliminary exploitation plan for noriware** | |
| Name | TBD |
| Description | TBD |
| Exploitation strategy | TBD |
| Background IP | TBD |

# Conclusion

This deliverable describes a preliminary exploitation plan for partners in the bi0SpaCE project. The plans will be reviewed and significantly extended throughout the project’s life to maximize impact and ensure uptake of project results. In line with best practice for Horizon Europe exploitation planning the initial draft concentrates on:

* clearly identifying key exploitable results from the June workshop (e.g., novel methods, software modules, datasets)
* providing a concise description of each, summarizing what it is, its TRL, and intended use
* outlining a basic exploitation strategy for each item (e.g., licensing, pilot deployment, standardization) as initially suggested by partners
* documenting background IP, including existing patents, know‑how, and obligations held by consortium members.

The final results of the exploitation effort will be reported in “D7.3: Exploitation Plan” at month 36, with progress updates in the first periodic report at month 18 and again at month 36. This phased process echoes Horizon best practices: beginning with asset identification and light business planning, then progressing to market analysis, IP management, and comprehensive exploitation strategies.

1. Please note that on page 13 of the DoA it is written that T7.3 begins in month 9. [↑](#footnote-ref-1)