



DELIVERABLE DT1.3.3

Comprehensive I4.0 competence pack and
toolbox for BSO capacity building

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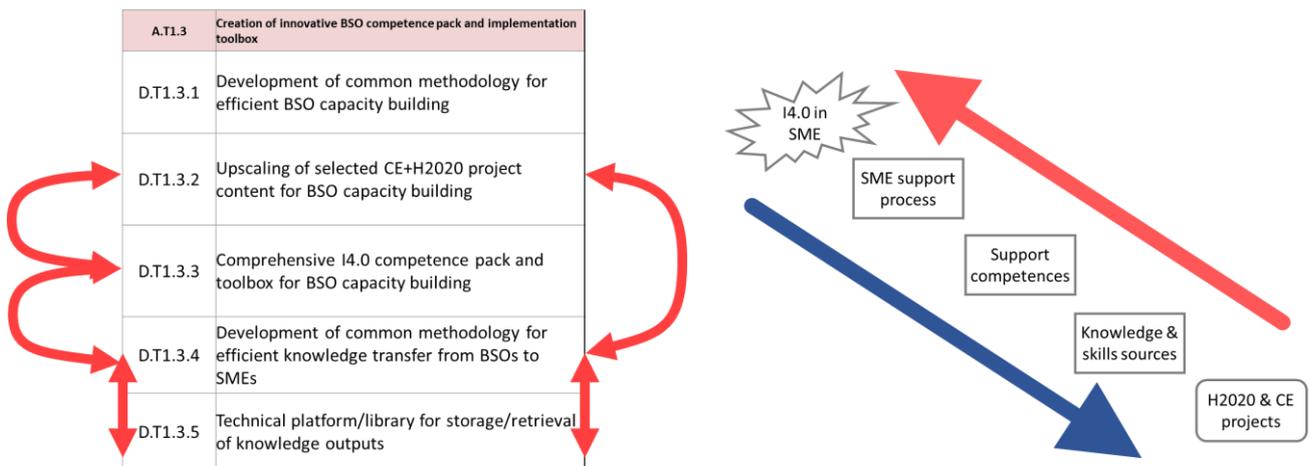


1. Introduction

Boost4BSO application form defines understanding of competence pack and toolbox: PPs jointly develop overall BSO competence pack and toolbox for promoting I4.0 topics and supporting SMEs in understanding challenges, opportunities and benefits, and developing strategies for transformation towards I4.0 implementation

Deliverable DT1.3.3 Comprehensive I4.0 competence pack and toolbox for BSO capacity building (as deliverable which identifies BSOs competences for supporting I4.0 implementations in SMEs) is built on BSO competences requirements identified in DT1.3.4 Development of common methodology for efficient knowledge transfer from BSOs to SMEs (as deliverable which defines process of supporting SMEs by BSOs during I4.0 implementation) and builds upon deliverable DT1.3.2 Upscaling of selected CE+H2020 project content for BSO capacity building (as deliverable which identifies valuable and useful deliverables and results of previous H2020 and Interreg CE projects).

Mentioned deliverables are interrelated and developed in parallel in close collaboration with PPs of Interreg CE+H2020 base projects and discussed and agreed with all PPs during iterative process.



The main assumption (and ambition) is that BSOs that integrate comprehensive I4.0 competence pack and toolbox in their overall organisational competences will be able to promote I4.0 technologies and relevant innovations as main driver of competitiveness in manufacturing companies. It is also assumed that they will be able to support SMEs when identifying opportunities for improvement, during implementation of new technologies and their leverage and market validation.

Identified competences are comprehensive but non-exhaustive list of critical knowledge, skills and approaches, and should be adapted and improved during and after the project in order to assure sustainable platform and reference guide for business support organisations that want to participate in I4.0 induced transformations of European manufacturing industry.



2. Overall concept of comprehensive competence pack and toolbox for BSO capacity building/enabling support for I4.0 initiatives in SMEs

Comprehensive competence pack and toolbox

Following the simplest definition of competence as “the ability to do something successfully or efficiently”, competence pack and toolbox ambition is to include all critical elements BSOs need in order to enable effective SMEs support during I4.0 relevant transformations.

As formulated in the project application form, competence pack and toolbox are supposed to enable BSOs in promoting I4.0 topics and supporting SMEs in understanding challenges, opportunities and benefits, and developing strategies for transformation towards I4.0 implementation. It is structured description of what BSOs need in order to be able to support SMEs during all I4.0 implementation relevant steps - from awareness raising and basic understanding of what I4.0 is; envisioning change and its implementation to management and leverage of fully employed I4.0 solutions.

As a result, our goal was to create comprehensive and structured list which would include I4.0 knowledge essentials, relevant SME support components and tools.

Overall, competence pack combined with trainings and knowledge exchange platform should enable BSOs to upgrade their abilities of being either comprehensive “I4.0 one stop shop” or specialised “customized solutions provider”, depending on BSO working environment needs and overall operating strategy.

Project results and beyond

If some of the critical competences as defined by the Boost4BSO consortium are not appropriately or satisfactory supported by CE+H2020 selected project results, additional knowledge sources could be employed, like:

- Existing public and proprietary sources, with assured rights to use and distribute
- Joint trainings and pilot activities of Boost4BSO project during which additional tools, frameworks, best practices etc. could be developed or adapted
- Reading lists based on books and other documents available for use or access

Since I4.0 is a broad and emerging topic, key competences specific content will change and evolve, too. Reasons for that are numerous:

- I4.0 is an overarching topic involving various technologies and different respective fields of application;
- with different technology readiness levels (some already existing and some in development or even non created yet), some already as industry standards and some emerging
- with different implementation and expertise availability level (widely implemented or existing in very narrow and specific niches, depending on particular industry or market & technology maturity)
- with different geographic or industry implementation scope and availability.

In order to address heterogenic and emerging aspects of I4.0, additional elements defined in the common methodology for efficient BSO capacity building (D.T1.3.1) are envisioned:

- Focused knowledge exchange

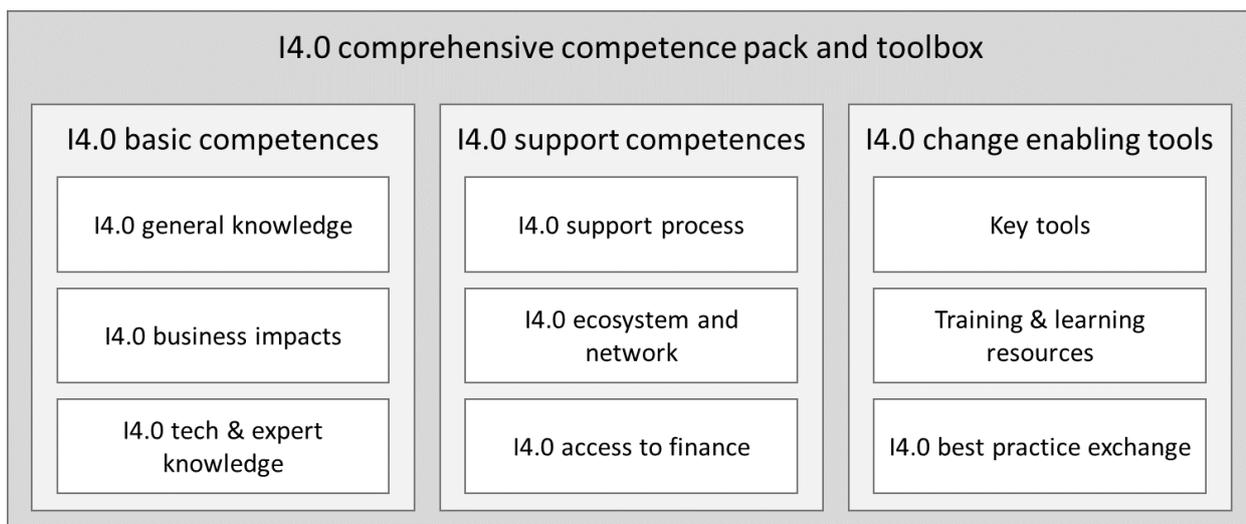


- I4.0 based keynotes - TED format¹ (periodical exchanges of knowledge, ideas, practices, online and offline)
- Peer2peer follow up support/mentorship
 - Mentorship events (as webmeetings), structured topic - 1on1 or open

I4.0 competences and relevant components

Business support organisation that aims to become Industry 4.0 support center should master all elements of the comprehensive competence pack and toolbox, either as internal capabilities or external partnerships. Although competences are not just knowledge and skills (as relatively transferable components) but also organisational values and attitudes, Boost4BSO is focused on Industry 4.0 key relevant competences and respective components that are transferable and repeatable in BSO context:

1. Industry 4.0 basic competences
 - a. General knowledge about I4.0 technologies
 - b. Business implications and organisational impacts of I4.0 solutions
 - c. I4.0 technologies, solutions and applications specific expertise (optional)
2. Industry 4.0 support competences
 - a. I4.0 support process
 - b. I4.0 relevant network and ecosystem management
 - c. I4.0 access to finance (private and public) support
3. Industry 4.0 change enabling tools
 - a. Key tools - basic and advanced use
 - b. Training and learning resources
 - c. Best practice exchange



¹ <https://www.ted.com/>



3. Competence pack segments and toolbox - detailed description

3.1. I4.0 basic competences

I4.0 basic competences aim is to enable BSOs to become knowledgeable about what I4.0 is, what are the implications of I4.0 introduction on industries, respective markets and overall society and how I4.0 transforms various industries - long term opportunities and short term downsides, if any.

By acquiring basic competences, BSOs should understand which technologies (existing and emerging) are included under I4.0 umbrella, which regions and industries are leading in I4.0 applications, how to look and where to find potential I4.0 technologies and solutions suppliers, implementation integrators, consultants and experts.

In a nutshell, basic competences should transform participating BSOs into awareness building, initial support and information point for all I4.0 implementation activities in their regions.

General knowledge about I4.0

This module includes comprehensive information which enables basic understanding of what Industry 4.0 is, which technologies are under I4.0 umbrella, general development stages in which particular technologies are and state of the art examples.

Also includes information about implementation prerequisites and current practices like I4.0 maturity levels in specific industries, countries and regions, main implementation prerequisites like standards, enabling infrastructure or technologies (public or proprietary), barriers for implementation in general, respective industry or expert associations.

General I4.0 knowledge should enable BSOs promotional activities or events and it's prerequisite for understanding and supporting the I4.0 introduction on the regional industry and innovation ecosystem.

General knowledge about I4.0 competence relevant content from previous projects (D.T1.3.2):

- *InnoPeer AVM - D.T3.2.6 Basic Training concept*
- *InnoPeer AVM - D.T3.2.7 Advanced Courses*
- *InnoPeer AVM - Handbook 2020*
- *IoT4 Industry - D1.4 Identification and analysis of focus sectors for collaboration support*
- *IoT4Industry - webinar*
- *IoT4 Industry - Anonymized use cases*
- *EACN for joint Industrial Modernisation Investments - D2.1 Drivers and Motivators for Industrial Modernization*
- *Things+ - D.T3.1.3 E-catalogue 1; D.T3.3.3 E-catalogue 2*

Business implications and organisational impacts of I4.0 solutions

I4.0 has tremendous transformational power on numerous aspects which define organisational competitiveness like organisational performance and productivity, effectiveness, value proposition, supply chain management, decision making processes, overall quality, flexibility and adaptability... Understanding of how I4.0 affects company performance is prerequisite and key enabler of I4.0 take-off, especially when it comes to implementation of new technologies in SMEs and public sector.

Insights are usually available as case studies or white papers describing how I4.0 impacts SME business models, organisational strategy, market position and go-to-market strategies, revenue streams, costs structure, operations and other relevant aspects of "doing business" within specific industry or SME settings.



Understanding business implications, benefits and challenges are crucial knowledge that will enable BSOs to establish dialogue about I4.0 with SMEs, promote I4.0 and convince SMEs that introduction of new technologies and change is not just inevitable but also a rational and smart business decision.

Business implications and organisational impacts of I4.0 solutions competence relevant content from previous projects (D.T1.3.2):

- *InnoPeer AVM - D.T3.2.6 Basic Training concept*
- *InnoPeer AVM - D.T3.2.7 Advanced Courses*
- *InnoPeer AVM -D.T3.2.9 Strategy Camps*
- *InnoPeer AVM - D.T3.2.2 Living labs*
- *InnoPeer AVM - Handbook 2020*
- *Mittelstand 4.0 - 2020 Fragebogen Potenzialanalyse v1*
- *EACN for joint Industrial Modernisation Investments - D2.1 Drivers and Motivators for Industrial Modernization*
- *EACN for joint Industrial Modernisation Investments - D2.2 EACN Strategy*
- *BMWi - Digital business models for I4.0*

I4.0 technologies, solutions and applications specific expertise

Apart from general information and awareness creation knowledge, specific expertise and knowledge regarding particular technology - from development, deployment or implementation perspective is critical not only during implementation activities but also during initial activities. Access to industry or technology specific expertise is equally important during awareness phase as it is during implementation phase. For most BSOs, it is not likely to expect that specific expertise competences will reside internally, due to human resource, financial or organisational constraints. Nevertheless, I4.0 expert knowledge is important competence and if not available as a BSO resource, partnership with other individuals and organisations, public or private, research or commercial, can assure availability.

I4.0 technologies, solutions and applications specific expertise competence relevant content from previous projects (D.T1.3.2):

- *IoT4Industry - webinar*
- *IoT4 Industry - Anonymized use cases*



3.2. I4.0 support competences

I4.0 support competences aim is to enable specific support actions relevant to particular SME or group of SMEs with same I4.0 implementation agenda. Support competences are based on both knowledge and skills that should enable efficient and effective knowledge transfer from BSOs to SMEs.

By acquiring I4.0 support competences, BSOs should be able to execute I4.0 support process, by themselves or through established partnerships and networks of I4.0 experts and solution suppliers.

I4.0 support process integrates all steps, from initial identification of opportunities for I4.0 implementation in particular SME to support during solving implementation challenges regarding funding, supplier selection, change management, leveraging new capabilities etc.

Therefore, I4.0 support competences include relevant knowledge and skills needed for consulting, mentoring and advising SMEs during I4.0 implementation activities. Due to specific operational circumstances of each BSO, BSOs can have those competences internally or through partnerships with other organisations and individuals by establishing I4.0 ecosystem and networks.

In a nutshell, I4.0 support competences enable BSOs to support individual SMEs during all phases of I4.0 induced transformations.

SME support process

As BSOs are expected to facilitate SMEs I4.0 implementation, some kind of structured SME support process is pivotal competence. Non exhaustive list of possible steps that could be part of the I4.0 initiative and implementation in particular SME:

- Information and awareness phase
- Opportunity and challenges assessment
- Initial concept development and transformation formulations (internal, up/downstream SME value chain change)
- Business model implications and transformations
- Financial and other resources requirements assessment
- Suppliers selection support
- Concept and change management / implementation support
- Project management support
- Human resource support
- Funding support
- Leveraging new capabilities (servitization, scale up, predictive maintenance...)

In order to enable common support process, which will be flexible and replicable, three phases are identified:

1. Enabling I4.0 idea (inception)
2. Designing I4.0 change
3. Supporting I4.0 implementation

SME common support and knowledge transfer process is described in more detail in deliverable DT1.3.4 Common methodology for efficient knowledge transfer from BSOs to SMEs

SME support process competence relevant content from previous projects (D.T1.3.2):

- *InnoPeer AVM - D.T3.2.7 Advanced Courses*
- *InnoPeer AVM -D. T3.2.9 Strategy Camps*
- *InnoPeer AVM - D.T3.2.2 Living labs*



- *Things+ - D.T3.2.4 Digital guidelines on SIM (phases 1-3); Guidelines for Internationalization (phases 4-5)*
- *Things+ - D.T3.2.5 Key tools portfolio*
- *Mittelstand 4.0 - 2020 Fragebogen Potenzialanalyse v1*
- *EACN for joint Industrial Modernisation Investments -*
- *Joint project 1-3*
- *BMWi - Digital business models for I4.0*

I4.0 relevant network and ecosystem management

This is a set of competences relevant to awareness and promotion of I4.0 but also to supporting SMEs during I4.0 relevant change and implementation activities. I4.0 relevant network and ecosystem should enable BSOs to acquire competences that are too specific, difficult to attain or not available within BSO e.g. specific technology expertise, I4.0 technical or technological knowledge, implementation details, suppliers capabilities knowledge etc. With this competence, BSOs should be able to establish partnerships with other sources of knowledge and competences like research organisations, commercial providers of I4.0 solutions, individual experts, technology hubs like (European) Digital Innovation Hubs (E)DIHs or EIT innovation communities etc.

I4.0 relevant network and ecosystem management competence relevant content from previous projects (D.T1.3.2):

- *InnoPeer AVM - Handbook 2020*
- *InnoPeer AVM - D.T3.2.2 Living labs*
- *IoT4Industry - webinar*
- *IoT4 Industry - D1.4 Identification and analysis of focus sectors for collaboration support*
- *EACN for joint Industrial Modernisation Investments - D2.1 Drivers and Motivators for Industrial Modernization*
- *EACN for joint Industrial Modernisation Investments - D2.2 EACN Strategy*

Access to finance (private and public) support

Although access to finance support is usual and standard BSO service, I4.0 funding might need specific knowledge regarding public or private sources. Furthermore, some I4.0 technology suppliers are introducing non-traditional funding schemes (like servitized or pay-per-use models) which can substantially reduce barriers of I4.0 technology adoption within SMEs. Access to finance (private and public) support competence should enable BSOs to assess funding needs and guide SMEs toward available financial support during I4.0 selection, implementation and leverage process.

Access to finance (private and public) support competence relevant content from previous projects (D.T1.3.2):

- *IoT4 Industry - D1.4 Identification and analysis of focus sectors for collaboration support*
- *IoT4 Industry - Anonymized use cases*



3.3. I4.0 change enabling tools

I4.0 change tools are enabling and complementing I4.0 basic and support competences. I4.0 change tools are either universal management consulting tools (I4.0 unrelated but important for successful implementation of I4.0 relevant actions in SMEs) or resources enabling BSOs to acquire relevant important knowledge and skills, when needed.

In a nutshell, I4.0 change tools enable BSOs to support SMEs as management consulting organisations and to have access to relevant specific I4.0 support knowledge and skills when needed.

Key tools - basic and advanced use

Since I4.0 transformations are about increasing company capabilities and competitiveness, inducing organisational change which will affect its resources, processes, business model, strategy and all aspects of SME performance including company culture and value - relevant management tools and knowledge should be employed. That includes traditional “corporate” management consulting knowledge (strategy formulation, performance management, process mapping and reengineering, human resources management, indicators and performance management frameworks etc.) and non-traditional, innovation and startup management consulting (business models creation and innovation, design thinking, assumptions based planning, customer development process, testing and experimentation etc.)

Basic use of key tools assumes knowing how and under which circumstances they are used while advanced knowledge assumes practical knowledge, with previous experience and capability of giving structured feedback and suggestions for improvement.

Key tools - basic and advanced use competence relevant content from previous projects (D.T1.3.2):

- *InnoPeer AVM -D.T3.2.9 Strategy Camps*
- *Things+ - D.T3.2.4 Digital guidelines on SIM (phases 1-3); Guidelines for Internationalization (phases 4-5)*
- *Things+ - D.T3.2.5 Key tools portfolio*

Training and learning resources

Access to structured and verified knowledge sources is important competence that enables BSOs flexibility and adaptability in supporting SMEs from various industries and technology requests. This capability, if shared in efficient and practical manner can become main argument for BSOs integration into network and foster future collaboration and knowledge exchange. Initially, it will be based on previous projects results, publicly available training and learning resources and knowledge networks.

Training and learning resources competence relevant content from previous projects (D.T1.3.2):

- *InnoPeer AVM - D.T3.2.6 Basic Training concept*
- *InnoPeer AVM - D.T3.2.7 Advanced Courses*
- *InnoPeer AVM - D.T3.2.2 Living labs*

Best practice exchange

Skills based on experiences are important part of individual and organisational competences. Best practices and cases with descriptions of I4.0 transformations, challenges and achieved results are of extreme importance when it comes to creation of BSOs experience, situational knowledge and understanding of



opportunities and challenges related to I4.0 initiatives in specific industries, SME types (e.g. according to size, ownership structure, values, organisational structure), markets or “doing business” conditions.

Best practice exchange competence relevant content from previous projects (D.T1.3.2):

- *InnoPeer AVM - Handbook 2020*
- *IoT4Industry - webinar*
- *IoT4 Industry - Anonymized use cases*