

UK Manufacturing Symbiosis NetworkPlus Call for Sectoral-Specific Studies

Invitation for horizon scanning research

Key Dates	
Application submission deadline	27 February 2020
Funding decision communicated	25 March 2020
Project start date	By the end of April 2020

The UK Manufacturing Symbiosis NetworkPlus (UKMSN+) was set up to address the circular economy priority area in the EPSRC Manufacturing the Future programme. This is the first round of call for studies supported by UKMSN. For this first round, £80k has been allocated to fund short-term exploratory studies no longer than 8 months. Each study will conduct horizon scanning research targeted to specific manufacturing sectors of the UK economy. Altogether, the studies will generate relevant knowledge that, first, identify business, digital technology and/or materials science challenges hindering the implementation of industrial collaboration practices by manufacturing firms and, second, identify manufacturing synergies opportunities, gaps and potential solutions for the identified challenges in the light of circular economy practices.

Background

The manufacturing industry in the UK is facing growing productivity challenges due to supply and price volatility of raw materials. Manufacturing firms are consequently embracing the opportunities of circular economy approaches as a means to save costs, prevent disruptions in materials input and generate additional revenue from waste streams.

The development of circular economy capabilities requires an industrial symbiosis approach. Industrial symbiosis is a fundamental building block of the circular economy. It provides a means to build industrial competitiveness through the creation of manufacturing ecosystems involving networks of organisations that generate new economic value through the continuous exchange of resources.

The development of manufacturing symbiosis capabilities aimed at enabling industrial transformations toward the circular economy calls for scientific advancements and innovations in three knowledge areas: **Business models, Digital technologies and systems, and Materials science and engineering**. These three domains represent key enablers of the circular economy, as they respectively refer to production, technological and material capabilities that have direct impact on the modus operandi of manufacturing organisations. Structural factors such as sustainable logistics and transport systems, collaborative business relationships, policy frameworks and guidelines are also critical elements to enable circular economy capabilities.

Some enabling aspects linking the knowledge areas above with effective transitions to the circular economy via industrial symbiosis are:

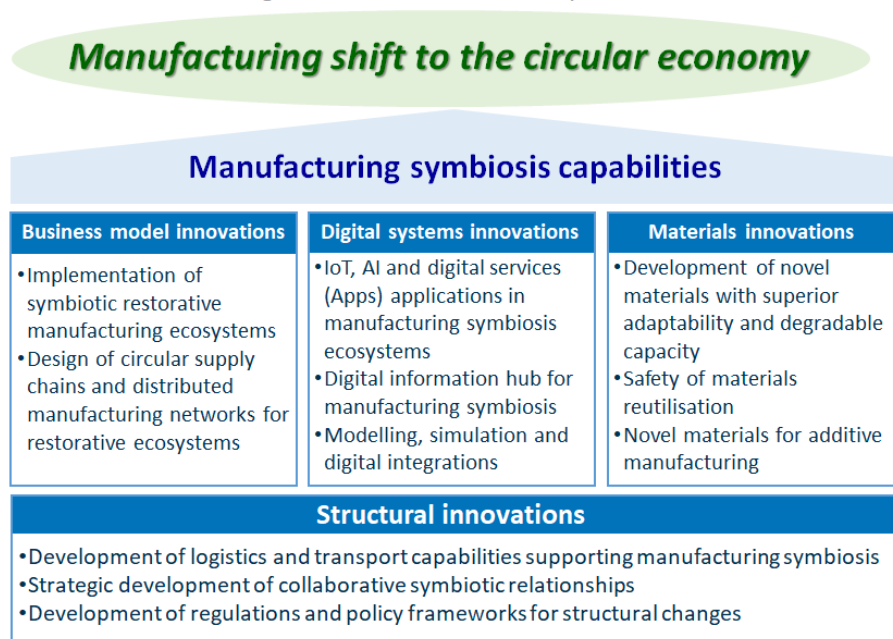
- **Business models:** Business model and supply chain innovations based on restorative and regenerative production systems from a manufacturing symbiosis perspective offer a coherent basis for the articulation of restorative/regenerative manufacturing ecosystems for the circular economy. The implementation of restorative/regenerative manufacturing systems requires the

design of circular supply chains supporting closed-loop flows of materials across a network of manufacturing facilities that can develop symbiosis synergies supported by smart logistics systems. The practical application of scientific advancements on digital technologies and materials engineering is usually implemented through

- **Digital technologies and systems:** A major challenge for companies to develop manufacturing symbiosis initiatives is the lack of a dedicated information platform or hub that enables access to information about available products, components, by-products and waste that can be used in exchange transactions. Information about the geographical location, utility and provenance of these resources is also critical. Specific digital technology developments are paving the way to more advanced information hubs enabling industrial synergies. Some examples are: Use of IoT devices to capture real-time information about materials for exchange; AI application for the creation of proactive, rather than passive, smart systems able to identify potential manufacturing symbiosis linkages; Digital services (Apps) associated with smart systems or cloud platforms supporting symbiotic synergies; Digital modelling and simulation of manufacturing symbiosis ecosystems' behaviour in terms of scalability and adaptability for circular synergies; and so forth.
- **Materials science and engineering:** Scientific innovations on materials and composites are of prime importance for the creation of manufacturing symbiosis capabilities. Studies to explore innovations concerning the development of novel materials with properties more suitable for industrial symbiosis processes are of critical relevance. The reusability capacity of materials in this context, the development of more sustainable materials for additive manufacturing processes, as well as innovations of materials that posit critical environmental challenges, e.g. plastics, are of critical importance. The development of plastics and other polymer-based materials with properties more suitable for safe reutilisation and multi-purpose transformations for use in different manufacturing sectors are encouraged by the UKMSN network.

The areas above are instrumental to enable significant advancements on manufacturing symbiosis capabilities. However, a step change in the industry also calls for **structural developments**. To this end, UKMSN encourages studies that also explore advancements in logistics and transport capabilities for symbiotic ecosystems, development of strategic collaborative symbiotic relationships to enable manufacturing symbiosis ecosystems, as well as policy making and regulatory developments to support business models, technology and materials innovations. Fig. 1 provides a structured view of the UKMSN+ research scope, with its key innovation domains and related knowledge areas and topics the network seeks to explore.

Fig 1. UKMSN+ research scope



Sectoral-specific studies

This call is for *exploratory sectoral-specific studies*. Hence, studies are expected to focus on sustainability initiatives within a specific manufacturing sector. The strategic importance of the sector for the UK economy should be justified.

The investigation of sustainability initiatives should take into account *existing and potential material (products, by-products and waste) exchanges in the sector considered*. Key implementation challenges and opportunities for materials exchange should be *related to circular economy practices* and associated to existing or potential industrial symbiosis initiatives.

Specifically, studies should *identify opportunities and barriers* for the creation of innovative manufacturing symbiosis ecosystems enabled by digital technologies, novel materials, sustainable business models and related circular supply chains that empower industrial symbiosis synergies in the sector being investigated. Studies should also clearly specify the main products, by-products and waste flows in the supply chain and sectoral context being analysed.

Methodological aspects

The sectoral-specific studies should adopt a ‘horizon-scanning’ approach to characterising current scenarios of manufacturing symbiosis business models, enabling technologies and types of materials exchanged between the organisations considered.

Typically, horizon scanning is a research method aimed at detecting early signs of potentially important developments through a systematic examination of potential threats and opportunities, with emphasis on new technologies and their potential effects on the subject of interest. The method is usually applied to explore novel and unexpected issues as well as persistent problems and trends, including issues at the margin of current thinking that may posit challenges to past assumptions.

Horizon scanning normally involves desk research, which helps to develop a more comprehensive understanding of the wider sectoral context surrounding the sustainability issues and practices being investigated. It often involves a wide variety of sources such as academic and industry publications, datasets/databases, and relevant internet sources. We welcome studies that complement desk research with primary data collection initiative(s) such as focus groups, Delphi Study, LCA or MFA, industrial clusters mapping, etc.

We expect horizon scanning findings to provide valuable insights on the manufacturing sector analysed, offering critical explanation of the current (existing) and future (potential) scenario of industrial synergies (symbiosis) capabilities in the sector. More specifically, the research findings should identify critical challenges and opportunities for the implementation of manufacturing symbiosis practices (existing and potential) in the sector analysed.

Studies can focus on a single area of knowledge, e.g. investigation of business model innovations; adoption and role of digital technologies in enabling industrial symbiosis practices; materials science, use and developments taking place in the sector studied; or structural systems (logistics, policies, strategies) concerning the implementation of manufacturing industrial symbiosis initiatives in the sector. We welcome studies with a multi-disciplinary approach that takes into account more than one knowledge area.

Key requisites

- Individual projects can request up to £20,000 of total funding (FEC 80% funding). Thus, successful applicants will be awarded 80% of the full cost of their projects. For example, projects with a total cost of £25k will be funded £20k. When invoices are submitted, they should

be for 80% of the value and a statement should also be submitted showing the full cost.

- Projects are expected to be no longer than 8 months.
- **Funding is for academic research teams led by UK Universities and only UK-based academic salary costs will be covered.**
- Projects can involve more than one institution or organisation, including businesses. They should preferably, not necessarily, involve more than one of the core knowledge areas of the UKMSN (see Background section).
- Applications must be made on the UKMSN application form, which can be downloaded from the www.ukmsn.ac.uk. They must be accompanied by a Gantt chart of the project plan.
- Applicants must be eligible for EPSRC funding. A list of eligible organisations to apply to EPSRC is provided at <https://www.ukri.org/funding/how-to-apply/eligibility/>. As this call is a targeted funding opportunity provided via EPSRC funding, higher education institutions, and some research council institutes and independent research organisations are eligible to apply. For funding rules, guidelines and guidance on the type of support that may be sought please see <https://epsrc.ukri.org/funding/applicationprocess/fundingguide/>.
- We do agree GDPR compliant policies and Data Processing Agreements between the applying institution and Aston University. If these cannot be agreed within a certain timeframe, we reserve the right to abandon the contract process and select another application.

Assessment

Proposals will be assessed according to the assessment criteria set out below. Decisions will be made by the UKMSN leadership team. Members of the UKMSN Advisory Board will also conduct reviews dependent on their expertise. Each application will have 2 or 3 reviews and marks will be allocated to proposals based on the degree to which they meet the assessment criteria. Marks will be amalgamated to form a prioritised list with the highest ranked projects funded subject to available funds. Unsuccessful applicants may request feedback if they wish.

Assessment Criteria

- Suitability for the call: Is it research? Does it have the potential to inform essential research challenges for the UKMSN NetworkPlus? How will the project help grow and sustain the UKMSN community?
- Does the project address circular economy and related industrial symbiosis aspects concerning a specific manufacturing sector?
- Standard EPSRC assessment criteria will also be applied: quality; importance; impact and the applicant's ability to deliver the proposed project within budget and in time.
- Suitable evidence of a planning and management process for the duration of the project.

Contacts

For further information on the UKMSN+ (www.ukmsn.ac.uk) and the application process, please contact Ammara Masood (a.masood10@aston.ac.uk) with any queries.