Quick Reference

Please note that you must read the full Call document for guidance before submitting your proposal

Future Manufacturing Systems: Exploratory Stream

Call type: Invitation for proposals
Closing date: 16.00 on 24 September 2019

Funding Available: EPSRC will provide up to £12 million (Research Council contribution) to support a number of multidisciplinary research projects. This call has two streams of funding. The Exploratory Stream, the subject of this call document, and the Discovery Stream, explained in the related call document.

How to apply: Exploratory stream – Applicants must complete an Intent to Submit form via the EPSRC call website before submitting a full proposal.

Assessment Process: Exploratory stream – Full proposals will undergo postal peer review, followed a prioritisation panel, resulting in a rank ordered list.

Key Dates:

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<tr>
<td>Invitation to submit proposals issued</td>
<td>12 June 2019</td>
</tr>
<tr>
<td>Call open on Je-S</td>
<td>18 July 2019</td>
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<tr>
<td>Intent to submit deadline</td>
<td>16.00 on 10 September 2019</td>
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<tr>
<td>Deadline for proposal submission</td>
<td>16.00 on 24 September 2019</td>
</tr>
<tr>
<td>Prioritisation Panel</td>
<td>January 2020</td>
</tr>
<tr>
<td>Funding decision</td>
<td>Early Feb 2020</td>
</tr>
<tr>
<td>Grant start date (earliest)</td>
<td>From April 2020</td>
</tr>
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Additional information: Any applicant considering submitting a proposal to this call must complete the Intent to Submit form on the EPSRC call website to register their intent to submit before **16.00 on 10 September 2019**.

Contacts:

- ManufacturingPeerReview@epsrc.ukri.org (Manufacturing the Future Theme central email inbox)
- Dr Richard Bailey, Senior Portfolio Manager, Manufacturing the Future Theme - 01793 44 4423, richard.bailey@epsrc.ukri.org
- Dr Tracy Hanlon, Senior Portfolio Manager, Manufacturing the Future Theme - 01793 44 4514, tracy.hanlon@epsrc.ukri.org
Future Manufacturing Systems:
Exploratory Stream

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Summary

EPSRC aims to invest in excellent cross-disciplinary research and networking activities that will drive business innovation or trigger the development of new business models.

The EPSRC Manufacturing the Future Theme will provide up to £12M (Research Council contribution), spread over two streams of funding, to support a portfolio of Future Manufacturing Systems research projects.

- The **Discovery** stream is aimed at multidisciplinary research projects bringing together two (or more) disciplines, supporting new collaborations in the very early stages of a research idea.

- The **Exploratory** stream (this call document) is aimed at interdisciplinary research projects developing a deeper understanding of a research idea, supporting interdisciplinary research teams to push collaboration and fusion of the research approaches towards a transdisciplinary approach.

These research projects will concentrate on manufacturing-relevant opportunities from emerging research areas, which will enable the development of new, potentially disruptive manufacturing systems.

Background

The Manufacturing the Future theme (MtF) aims to create and capture the benefits of research for UK manufacturing industries, to support future growth in the UK economy. Part of this aim involves investing in potentially disruptive research that can drive business innovation or trigger development of new business models.

In May 2017 MtF held a Sandpit (entitled ‘New Industrial Systems’1) to understand how advances in engineering, ICT, mathematical and physical sciences research could transform the future of manufacturing. It looked at the interdependencies between resources, products and services, new enabling technologies, and digital capabilities. A number of projects were funded from the Sandpit, revealing a richness of potential research challenges that the theme could build on in the future.

In May 2018 MtF held a strategic retreat (entitled ‘Manufacturing Futures’2) that explored the future manufacturing research (and innovation) space, supporting the development of new research (and innovation) themes that might form the basis for future EPSRC activities. The outputs of the retreat showed how manufacturing is increasingly a system, with individual retreat themes being heavily interdependent. The topics were tested out at the MtF regional meetings and during the facilitated sessions there were significant overlaps between the discussions.

Subsequent discussions with the MtF Strategic Advisory Team (SAT) have highlighted the need for future manufacturing research to engage with a variety of other disciplines, using a real synthesis of approaches. Integrating knowledge and methods from these different disciplines with the more traditional themes in manufacturing research would be needed to develop the potentially disruptive research that the UK is seeking.

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1 https://epsrc.ukri.org/funding/calls/sandpitnewindustrialsystems/
Building on the above thinking, the aims of this Future Manufacturing Systems call are to:

- Discover potentially disruptive, manufacturing-relevant opportunities from emerging research areas
- Explore future manufacturing systems that might result from such disruptive opportunities
- Initiate new, long-term collaborations between researchers from EPS disciplines and beyond.

For more information about EPSRC’s portfolio and strategies, see our website: https://epsrc.ukri.org/research/ourportfolio/.

**Funding available**

The EPSRC Manufacturing the Future Theme will provide up to £12M (Research Council contribution) to support a portfolio of Future Manufacturing Systems projects, expected to be up to four years in duration. This funding will be spread over two streams:

- The **Discovery** stream is aimed at multidisciplinary research projects bringing together two (or more) disciplines, supporting new collaborations in the very early stages of a research idea
- The **Exploratory** stream (this call document) is aimed at interdisciplinary research projects developing a deeper understanding of a research idea, supporting interdisciplinary research teams to push collaboration and fusion of the research approaches towards a transdisciplinary approach.

A portfolio approach will be taken when assigning funding across the two streams, with an expectation of funding ~3-4 Exploratory projects and ~6-7 Discovery projects.

**Exploratory stream**

Applicants can apply for up to £2.75M (Research Council contribution) in total. Applications can be for up to 4 years in duration.

The funding for each project is available to support a cluster of related activities built around a central research challenge, with the balance of funding across the components to be determined by the applicants.

- Research funding, supporting:
  - Core research activities that are necessary or valuable to deliver the project aims
  - Any research activities that are conducted as part of the outreach programme.
- Integration, outreach and impact funding, supporting:
  - The Future Manufacturing Systems Integration events, an annual event bringing together the funded projects (one to be organised by each project in turn), to help strengthen interdisciplinary collaborations, develop new research activities and increase impact in this area
  - Project outreach and public engagement
Creativity@home funding to help take collaboration, creativity and radical idea generation to a higher level (see Annex 1)

Pathways to impact activities (https://epsrc.ukri.org/funding/applicationprocess/preparing/impact guidance/)

Project management.

Collaboration with companies is encouraged but not essential. We are keen to see SMEs involved in projects, as well as projects that involve manufacturing companies from different sectors.

Research Scope

Three of the main themes arising from the Manufacturing Futures retreat were:

- **Perpetual Transformable Products** - What if our products could renew, improve and transform themselves throughout their lives, e.g. self-strengthening wind turbines, clothes that use air pollution to evolve their aesthetic?

- **Invisible Manufacturing** - What if our manufacturing system could self-optimise to provide the product a consumer wanted, to their specifications, whilst the system remained to all intents and purposes invisible to the consumer?

- **Zero Loss System** - What if our manufacturing system was able to produce no waste? The whole system, as well as all materials, products and processes, would be designed to make maximum use of resources.

Following discussions around the retreat themes at the MtF regional meetings (see Annex 2), and at the MtF SAT, the first two themes can be regarded as two different viewpoints on the manufacturing system. Similar challenges arose in both themes such as the ability to predict demand, capability to model the product/process/system accurately, how regulation & standards would keep pace, responsible innovation and ethical considerations, how to manage data, understanding the dynamic nature of the value proposition, the balance of system autonomy and customer input, as well as the underlying engineering and physical science challenges in the manufacturing science.

In line with the third theme above, sustainability considerations should be embedded in all the projects. The research projects should produce manufacturing systems that are designed to make effective and efficient use of resources, leading to acceptable (even positive) environmental impacts from the system.

Business modelling and/or systems analysis should form an explicit part of each Exploratory proposal. Given the potential complexity of the manufacturing systems, understanding the various potential trade-offs e.g. optimisation vs flexibility, and their impact and disruption on the business model is key to enabling the success of the research. Projects that span the lifecycle of potential products/systems are encouraged.

This call seeks to support research that will bring these challenges together, in multidisciplinary ways that could enable disruptive, industrially relevant opportunities. This call also seeks to stimulate innovative approaches to collaboration between disciplines and users. Tackling research of this nature, especially at a systems level, requires integrating knowledge and methods from
different disciplines and viewpoints, using a real synthesis of approaches. To enable long-term, productive collaborations between researchers from EPS disciplines and beyond, a common understanding of the challenges and their potential solutions needs to be generated.

Your proposed research programme should be interdisciplinary, with the majority of activity within EPSRC’s remit. However, applicants are encouraged from diverse research areas across manufacturing technology, engineering, design, materials science, physical sciences, mathematics and computer science, economics and social sciences including business models, sustainability, life sciences and energy systems. The emphasis will be on working across disciplines to foster new collaborations and bring new thinking to the manufacturing system and its interdependencies.

A key feature of this initiative is the integration, through the Future Manufacturing Systems Integration events, of the research activities supported by this Exploratory call and the related Discovery call to share learning about approaches to collaboration. The annual events, organised by each Exploratory project in turn, will help strengthen interdisciplinary collaborations, develop new research activities and increase impact in this area.

**Equality, Diversity and Inclusion**

The long term strength of the UK research base depends on harnessing all the available talent and the Research Councils have together developed the ambitious UK Research and Innovation Equality, Diversity and Inclusion Action Plan [https://www.ukri.org/files/legacy/skills/action-plan-edi-2016/](https://www.ukri.org/files/legacy/skills/action-plan-edi-2016/).

In line with the UK Research and Innovation Diversity Principles, EPSRC expects that equality and diversity is embedded at all levels and in all aspects of research practice. We are committed to supporting the research community in the diverse ways a research career can be built with our investments. This includes career breaks, support for people with caring responsibilities, flexible working and alternative working patterns. With this in mind, we welcomes applications from academics who job share, have a part-time contract, need flexible working arrangements or those currently committed to other longer, large existing grants. Please see our Equality and Diversity webpages [https://epsrc.ukri.org/funding/equalitydiversity/](https://epsrc.ukri.org/funding/equalitydiversity/) for further information.

**Equipment**

Equipment over £10,000 in value (inc. vat) is not available through this call. Smaller items of equipment (individually under £10,000) should be in the Directly Incurred - Other Costs heading.

For more information on equipment funding, please see: [https://epsrc.ukri.org/research/facilities/equipment/](https://epsrc.ukri.org/research/facilities/equipment/).
Eligibility

All applications should have at least one Co-Investigator from a different discipline to the Principal Investigator.

Each applicant can only submit one proposal as a Principal Investigator to each stream, but can be a Co-Investigator on other proposals in either stream. Each proposal they are involved in should be identifiably distinct.

Please ensure sufficient time to create Je-S accounts for Investigators who do not currently have one.

For information on the eligibility of organisations and individuals to receive EPSRC funding, see the EPSRC Funding Guide: https://epsrc.ukri.org/funding/applicationprocess/fundingguide/.

A list of eligible organisations to apply to EPSRC is provided at: https://www.ukri.org/funding/how-to-apply/eligibility/.

How to apply

Intention to submit an application

EPSRC require all applicants (for either stream) to register their intention to submit a proposal to this call on the EPSRC call website before 16:00 on 10 September 2019, so we can plan for the demand generated by this call. This requires a title for the project and a confirmation that you are eligible to apply. The Intent to Submit form is available on the webpage for this call (https://epsrc.ukri.org/funding/calls/futuremanufacturingsystems/).

Submitting an application

Any multi-institutional bids should be submitted as a single, combined Je-S proposal form. Joint Je-S proposals will not be accepted.

You should prepare and submit your proposal using the Research Councils’ Joint electronic Submission (Je-S) System (https://je-s.rcuk.ac.uk/).

When adding a new proposal, you should select:

- Council ‘EPSRC’
- Document type ‘Standard Proposal’
- Scheme ‘Standard’
- On the Project Details page you should select the ‘Future Manufacturing Systems - Exploratory Stream Fulls’ call.

Note that clicking ‘submit document’ on your proposal form in Je-S initially submits the proposal to your host organisation’s administration, not to EPSRC. Please allow sufficient time for your organisation’s submission process between submitting your proposal to them and the call closing date. EPSRC must receive your application by 16.00 on 24 September 2019.

Guidance on the types of support that may be sought and advice on the completion of the research proposal forms are given on the EPSRC website (https://epsrc.ukri.org/funding/applicationprocess/) which should be consulted when preparing all proposals.
Please also note that it is the responsibility of the lead organisation to ensure all the documentation required is submitted with the proposal form.

You should consult your Research Administration at the earliest opportunity when preparing your outline proposal, specifically with regard to costing your outline proposal and any internal procedures you need to follow.

**Guidance on writing an application**

Please see Appendix for the Je-S attachments checklist for the Exploratory Stream. Do not upload any other attachments than those mentioned, as they will not be put forward for peer review.

**Case for Support (maximum eight pages)**

The case for support should include the following information, keeping to the number of pages indicated.

- Track record of the applicants (up to 2 pages) that demonstrates the team involved in the proposal has the appropriate mix of expertise and experience to conduct the research.
- The research scope of the proposed project, the research areas involved and their context to the manufacturing system.
- Why is this potentially transformative in terms of National Importance? Describe in what ways the proposed research could enable disruptive, industrially relevant opportunities for UK businesses.
- Describe the programme of research and related activities that will be carried out through the grant. Outline the methodology to be used in the research and justify this choice.
- What are your proposals for the Integration event? What aspects of the project and interdisciplinary working you would want to highlight? (It is suggested that applicants budget for an event bringing together all the Exploratory and Discovery project teams.)
- Explain how the grant will be managed.

**Pathways to Impact (maximum two pages)**

Describe potential beneficiaries and how your research may impact them and how you will facilitate this. More information on preparing the impact plan and on impact can be found on the EPSRC website at: https://epsrc.ukri.org/funding/applicationprocess/preparing/impactguidance/.

**Justification of Resources (maximum two pages)**

Explain the necessity of your requested resources to your research project, including implementing the Impact Plan. More information on preparing the Justification of Resources can be found on the EPSRC website at: https://epsrc.ukri.org/funding/applicationprocess/preparing/writing/jor/.

**Workplan (maximum one page)**

The work programme should be illustrated with a simple diagrammatic work plan, such as a PERT or Gantt chart.
Project Partner Letters of Support

Letters should be project relevant, written by project partners when the proposal is being prepared, and dated within six months of the proposal submission date. More information on Letters of Support can be found on the EPSRC website at: https://epsrc.ukri.org/funding/applicationprocess/preparing/writing/lettersofs upport/.

Ethical Information

Applicants should use the Ethical Information section on the Je-S form to demonstrate to peer reviewers that they have fully considered any ethical issues concerning the material they intend to use, the nature and choice, current public perceptions and attitudes towards the subject matter or research area. EPSRC will not fund a project if it believes that there are ethical concerns that have been overlooked or not appropriately accounted for. All relevant parts of the Ethical Information section must be completed. If the research will involve human participation or the use of animals covered by the Animals (Scientific Procedures) Act 1986 it is recommended that applicants pay particular attention to the guidance highlighted below. EPSRC reserves the right to reject applications prior to peer review if the Ethical Information sections are not completed correctly.

Je-S completion guidance


Please note that on submission to EPSRC all non-PDF documents uploaded onto Je-S are converted to PDF, the use of non-standard fonts may result in errors or font conversion, which could affect the overall length of the document. We therefore recommend that where a document contains any non-standard fonts (scientific notation, diagrams etc.), the document is converted to PDF prior to attaching it to the proposal.

For advice on writing proposals see: https://epsrc.ukri.org/funding/howtoapply/preparing/.

Assessment

Assessment process

A one-stage assessment process will be used. The purpose of the Intent to Submit is to establish the number of applications and the eligibility of applicants.

In the event of this call being substantially oversubscribed as to be unmanageable, EPSRC reserve the right to modify the assessment process.

Full proposals will be sent to independent peer reviewers, including at least one nominated by the applicant. Applicants will be invited to respond to the reviewers’ comments.

Full proposals that receive sufficiently supportive reviewer comments will then be taken forward to a prioritisation panel.
Feedback is received in the form of reviewer forms and the rank order list information published on EPSRC’s Grants on the Web (GoW) system shortly after the panel meeting. Further feedback will only be provided if requested by the panel.

**Assessment criteria**

The criteria for assessment of full proposals will be:

- **Quality (primary criterion)**
  - The novelty, interdisciplinarity, timeliness and relationship to the manufacturing context
  - The ambition, adventure, and transformative aspects identified
  - The appropriateness of the proposed activity

- **National Importance (secondary major criterion)**
  - Meets national needs by establishing a unique world leading activity
  - The complementarity to other UK activity in the area
  - Potential for transformative impact on the research community, society and the UK economy including emerging industries

- **Impact (secondary criterion)**
  - The relevance and appropriateness to any beneficiaries or collaborators
  - The appropriateness of engagement plans to accelerate impact via information dissemination and knowledge exchange.

- **Applicants’ ability to deliver the proposed research (secondary criterion)**
  - Appropriateness and the track record of the applicants
  - The balance of skills of the project team, including academic and non-academic partners.

- **Resources and management (secondary criterion)**
  - The effectiveness of the proposed planning and management structure
  - The appropriateness and justification of the requested resources

- **Fit to call (secondary criterion)**
  - The alignment of the research programme to the call scope.

**Additional grant conditions (AGCs)**

Grants will be subject to the standard UK Research and Innovation grant conditions, however an additional grant condition will be added concerning the integration events.

**Moving forward**

Submissions to the Exploratory Stream will count towards the Repeatedly Unsuccessful Applicants Policy. Further information about the policy can be found at: [https://epsrc.ukri.org/funding/howtoapply/basics/resubpol/rua/](https://epsrc.ukri.org/funding/howtoapply/basics/resubpol/rua/).
**Key dates**

<table>
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<td>Grant start date (earliest)</td>
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</tr>
</tbody>
</table>

*EPSRC aims to adhere to the key dates as published, however there may be exceptions where the sift, prioritisation or interview meeting may have to change due to panel member availability.

**Contacts**

For further information, advice or queries regarding the application procedure please contact:

Future Manufacturing Research Hubs central email
ManufacturingPeerReview@epsrc.ac.uk

Dr Richard Bailey  
Senior Portfolio Manager – Manufacturing the Future Theme  
01793 44 4423, richard.bailey@epsrc.ac.uk

Dr Tracy Hanlon  
Senior Portfolio Manager, Manufacturing the Future Theme  
01793 44 4514, tracy.hanlon@epsrc.ukri.org

If you have any questions about preparing and submitting your proposal using Je-S, please contact the Je-S helpdesk (JeSHelp@rcuk.ac.uk, 01793 444164). Your Research Administration should also be able to offer advice about costing and writing your proposal and the Je-S system. Please allow enough time before the closing date for your organisation’s submission process.

**Change log**

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## Appendix: Je-S attachments Checklist

### Exploratory full proposals

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<td>Pathways to Impact</td>
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<td>Workplan</td>
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<td>Justification for Resources</td>
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</tr>
<tr>
<td>Proposal Cover Letter</td>
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<td>Optional</td>
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</tbody>
</table>

Please ensure you adhere to the above attachment requirements when submitting your proposal. Any missing, over length or unnecessary attachments may result in your proposal being rejected.
Annex 1: Creativity@home

EPSRC, working with professional facilitators, has set up an initiative to support project investigators, researchers and teams to help generate and nurture creative thinking and galvanise team dynamics that paves the way for individuals and teams to take creativity and radical idea generation to a higher level – the initiative is known as creativity@home (https://epsrc.ukri.org/funding/applicationprocess/routes/network/ideas/creativityathome/).

Objectives for creativity@home include:

- learning a range of creative problem solving tools and techniques and how this might aid creativity in research
- engaging researchers in blue skies idea generation
- learning how to work effectively in teams, understanding different styles of approaching problems and how to influence others
- exploring the future research vision and cross-disciplinary opportunities in the group using new facilitation tools and techniques
- developing a cohort of trained people that have learnt and are applying creative problem solving techniques so that the approaches and culture become embedded within the project team.

Activities that have taken place previously have included:

- training and subsequent support for project managers and students in creative facilitation techniques enabling them to run mini sandpits and cross-disciplinary idea generation workshops
- away days for multidisciplinary teams exploring how they might work better/more effectively together
- Creative Problem Solving training for groups of researchers that enhances their approach to problem solving in their research
- professionally facilitated idea generation workshops creating new research directions and people connections.

For creativity@home, you and the research programme team are the key resource. Your group will be given access to professional facilitators and the aims and objectives are left up to you and your group to decide. The professional facilitators will work in partnership with you throughout the initiative – the timescale and all facilitation activities will be planned in consultation with you. The facilitators will focus on the process enabling your group to think freely and explore new tools and exciting research directions.

Funding for creativity@home will be accessible via your grant award and is to pay for facilitator time, travel & subsistence and basic facilitator materials.

Creativity@home is a flexible resource. How best to use the resource is up to you to decide when exploring options with your chosen facilitators. There is no maximum value that you may apply for, however you will need to justify the resource that you request.

If your application is successful EPSRC will provide you with a list of facilitation companies that you may contact. Of course, you may already work with a facilitator; in this case, EPSRC is pleased for you to continue your engagement.
**How do I include funding for creativity@home?**

If you are interested in working with professional facilitators to enhance your Hub research programme then you should request resource to cover this in the outline application stage. At the full proposal stage, applications will need to include:

- **Je-S form** – applicants should include appropriate resource to cover the creativity@home activity under the heading Other Directly Incurred Costs

**Justification of Resources** – justify why you believe that the creativity@home initiative will enhance the experience of the researchers and strengthen your research programme. Broadly outline what type of activities you are interested in pursuing and the associated need for the resource.

The assessment process will assess the benefit of the creativity@home activity to maximising the potential of your Hub research programme.
Annex 2: Manufacturing the Future Regional Meetings 2018/19

The outputs of the Manufacturing Futures Retreat sessions at the Manufacturing the Future Regional Meetings 2018/19 are shown below in a series of mind maps. These are a record of the participants’ discussions, captured during the facilitated sessions, around three of the retreat themes.

The questions posed during the session were:

- What are the key challenges in this area?
- What is the manufacturing specific focus?