Quick Reference

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

Future Manufacturing Systems: Discovery Stream

Call type: Invitation for outlines

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 Discovery Stream, the subject of this call document, and the Exploratory Stream, explained in the related call document.

How to apply: Discovery stream – Applicants must complete an Intent to Submit form via the EPSRC call website before submitting outline proposals.

Assessment Process: Discovery stream – Outline proposals will be considered by an expert panel, shortlisted proposals will be invited to a ‘Big Pitch’ style interview panel, resulting in a rank ordered list.

Key Dates:

<table>
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<th>Activity</th>
<th>Date</th>
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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>
</tr>
<tr>
<td>Intent to Submit deadline</td>
<td>16.00 on 10 September 2019</td>
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<tr>
<td>Deadline for Outline proposal submission</td>
<td>16.00 on 24 September 2019</td>
</tr>
<tr>
<td>Shortlisting Panel</td>
<td>November 2019</td>
</tr>
<tr>
<td>Big Pitch 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>
</tbody>
</table>

Additional information: This call will follow a non-standard format for submissions and assessment, therefore please read this guidance documentation carefully. 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](mailto:ManufacturingPeerReview@epsrc.ukri.org) (Manufacturing the Future Theme central email inbox)
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Future Manufacturing Systems:
Discovery 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 (this call document) 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 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/](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 (this call document) 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 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.

**Discovery Stream**

Applicants can apply for up to £500K (Research Council contribution) in total. Applications can be for up to 24 months in duration.

The funding for each project is available to support a cluster of related activities built around a central research idea, 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.
- **Outreach and impact funding**, supporting:
  - 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/impactguidance/)
Due to the speculative nature of the projects, 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.

We encourage business modelling and/or systems analysis to form part of each Discovery 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, to enable disruptive, industrially relevant opportunities. This call also seeks to stimulate innovative approaches to collaboration between disciplines and users. Tackling research of this nature 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 multidisciplinary, 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 Discovery call and the related Exploratory 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/.

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/ 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/.

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/.

Eligibility to submit to the call will be checked by EPSRC following the submission of the Intent to Submit form.

**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 ‘Outline Proposal’
- Scheme ‘Outline’
- On the Project Details page you should select the ‘Future Manufacturing Systems - Discovery Stream Outlines’ 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 Discovery Stream. Do not upload any other attachments than those mentioned, as they will not be put forward for peer review.
Case for Support (maximum four pages)

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

- Track record of the applicants that demonstrates the team involved in the proposal has the appropriate mix of expertise and experience to conduct the research.
- Outline the research idea, introduce the research areas involved and explain their context.
- Why is this potentially transformative? Describe in what ways the proposed research could enable disruptive, industrially relevant opportunities.
- What will be the key achievement at the end of the project? Explain who will benefit from the research and how they will benefit.

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/.

This will only be assessed at Stage 2.

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/.

This will only be assessed at Stage 2.

Please note: Letters of support should not be added at the Outline stage. Letters of support can be added at the Final Proposal stage.

Ethical Information

At the Outline stage, applicants should use the documents submitted to highlight any relevant ethical information 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

Further guidance on completing the Je-S form can be found at https://je-s.rcuk.ac.uk/Handbook/pages/GuidanceonCompletingaStandardG/EthicalInformation.htm. Other relevant guidance includes: EPSRC’s policy on animal use in research (https://epsrc.ukri.org/about/standards/animalresearchpolicy/) and the
Assessment

Assessment Process

Applications will be assessed via a two-stage process, the Outline and the Pitch. The purpose of the Intent to Submit is 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.

**Stage 1: Outline Proposal**

Any outline proposals not within remit will be rejected prior to the shortlisting panel meeting.

The closing date for outline proposals is **16:00 on 24 September 2019**. Applicants will be informed of their selection for the Pitch by **29 November 2019**. There will be no postal peer review of applications submitted against this call.

There will be no feedback given on the applications at the Outline stage.

**Stage 2: The Pitch (for those invited from stage 1)**

Applicants, who are successful at the stage 1 of the call, will be invited to Pitch at some point in the **two weeks commencing 13 January 2020**. Those applicants that are invited to Pitch will receive further details on the process directly from EPSRC.

The Pitch panel will use the outline proposal as their initial source of reference, particularly with respect to any technical aspects of the proposed research. The panel will also have access to the Pathways to Impact and Justification of Resources submitted with the original application. The panel have leave to ask the applicants during the Pitch for additional information and clarification, concentrating primarily on the fit to the assessment criteria. The panel will be asked to make funding recommendations to EPSRC.

A funding decision will be made by EPSRC by **07 February 2020**. The Pitch panel will offer feedback and advice to applicants who are not successful at stage 2 to aid building on their ideas.
Assessment Criteria

Stage 1: Outline Proposal
The criteria for assessment of outline proposals will be:

- Scientific quality of the proposed research including novelty, ambition and transformative nature (primary criterion)
- National importance and how the research underpins or contributes to EPSRC’s strategic priorities (secondary criterion).

Stage 2: The Pitch (for those invited from stage 1)
The panel’s assessment will be based on the written documentation already submitted and will incorporate any new information from the interview performance, focused on the following criteria:

- Scientific quality of the proposed research including novelty, ambition and transformative nature (primary criterion)
- National importance and how the research underpins or contributes to EPSRC’s strategic priorities (secondary major criterion)
- Pathways to impact and the effectiveness of the activities identified to help realise these impacts (secondary criterion)
- Applicant’s ability to deliver the proposed research (secondary criterion)
- Cost-effectiveness and justification of resources requested (secondary criterion).
- The alignment of the research programme to the call scope.

Moving Forward
Applicants to the Discovery Stream who are not funded will not have submitted a Full Proposal and therefore this will not count as a reject towards the Repeatedly Unsuccessful Applicants Policy. Further information about the policy can be found at: https://epsrc.ukri.org/funding/howtoapply/basics/resubpol/rua/.

Applicants to the Discovery Stream who are funded will have their grant counted as a success in terms of the policy.

Successful applicants to the Discovery Stream will be required to submit a full proposal following the pitch stage. The full proposal submission will consist of resubmission of the outline documentation with appropriate Project Partner Letters of Support and Ethical Information (if required). Guidance will be provided by EPSRC to successful applicants at this stage. Deadline for submission of the full proposals will be 21 February 2020.

Key Dates

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<td>Invitation to submit proposals issued</td>
<td>14 June 2019</td>
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<td>November 2019</td>
</tr>
</tbody>
</table>
Big Pitch Panel | January 2020
---|---
Funding decision | Early Feb 2020
Grant start date (earliest) | From April 2020

*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**

**Discovery Outline proposals**

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<thead>
<tr>
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<th>Mandatory/Optional</th>
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<td>Pathways to Impact</td>
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<td></td>
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<tr>
<td>Justification for Resources</td>
<td>Two pages</td>
<td>Mandatory</td>
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</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?