



AMR in the Indoor and Built Environment

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II. Introduction

Antimicrobial resistance (AMR) is a term used to describe disease-causing organisms that have evolved to survive medicines that have been designed to kill them or stop their growth.

AMR is recognised as one of the most important global issues for human and animal health. While AMR is a concern for all types of pathogenic organisms, including viruses and fungal organisms, it is the increase in the numbers of bacteria that are becoming resistant to antibiotics that is a global

priority for AMR research. Many modern medical advances are reliant on antibiotics – organ transplants and chemotherapy for example. If antibiotics are no longer effective, minor infections and even small cuts and scrapes could be fatal. It is estimated that, globally, at least 700,000 people each year die as a result of drug resistant infection and that, without immediate action, that number will rise to 10,000,000 by 2050.

There has been little investment in the development of new antibiotics in the past few decades and while new initiatives are aiming to improve the supply line, alternative approaches must be found to help preserve the efficacy of existing antibiotics.

It is clear that AMR is a hugely complex problem with a range of influences, driven by human activity as much as by biological mechanisms. Biomedical and clinical and veterinary expertise alone cannot tackle AMR and collaborative and innovative interdisciplinary approaches are needed to tackle the challenge.

III. Context

Background and scope

This call will address Theme 3 of the cross-Research Council Initiative on AMR: ‘Understanding the Real World Interactions’. This Theme is in two parts, with this current call, focussing on the indoor and built environment forming the second part. A funding call addressing the role of the outdoor and host environments has already taken place and was led on behalf of the funders by the Natural Environment Research Council (NERC), details of which can be found at <http://www.nerc.ac.uk/research/funded/programmes/amr/news/>. Theme 3 also complements the recent ESRC-led cross-Council call on [behaviour within and beyond the healthcare setting \(Theme 4\)](#).

This current call will enable a specific focus on interactions of humans and animals with, and within, physical spaces, places and environments. It is an AHRC-led call that will address the role of the indoor and built environment in the proliferation, transmission and prevention of AMR. It has a primary focus on the human aspects and experiences – people both in their everyday lives and in their roles as professionals, patients, carers, consumers, workers, users of different spaces and places (including for healthcare and travel) and pet owners.

The call covers four key areas:

- Places, Spaces, Cultures and Practices: Interactions with and within the Indoor and Built Environment
- Pathways and Journeys through the Built Environment and the Dynamics of Change
- Creative, Collaborative and Disruptive Innovation, Experiments and Design in Indoor/ Built Environments
- Reflection, Learning, Data and Valuing Impacts from Changes to the Indoor/ Built Environment

Potential beneficiaries of the work which will be supported through the call may include the general public, policy makers, clinicians and practitioners (including, for example, vets and dentists, architects and designers).

In line with the cross-Council initiative, and supporting the five year UK Antimicrobial Resistance Strategy (<https://www.gov.uk/government/publications/uk-5-year-antimicrobial-resistance-strategy-2013-to-2018>), this call will focus on resistant human and animal bacteria. Proposals may include other classes of pathogen, but the primary focus must be bacteria.

Summary

The AHRC, working with partners under the cross-Research Council AMR initiative is pleased to invite applications for novel, cross disciplinary proposals that increase our understanding of the role that human and animal interactions with, and within, the indoor and built environment play in contributing to, or preventing, the evolution of AMR. Also, to explore the potential for culturally informed, creative and design-led approaches to generate innovative ways to address the challenges of AMR in indoor and built environment.

This call aims to develop new perspectives and creative thinking on the challenges of AMR through bringing distinctive arts and humanities and design research approaches more centrally into cross-disciplinary research and practice relating to AMR in the indoor and built environment. We wish to encourage boundary-crossing collaborations and dialogue between arts and humanities researchers and other disciplines, professionals and practitioners, including those that cross Research Council boundaries. All proposals should be highly collaborative and have a strong focus on real world interactions in indoor / built environments either in the UK or internationally. Proposals which involve *co-design* or *participatory* approaches engaging with relevant professional, practitioner, or public communities are encouraged. Proposals involving arts and humanities researchers who may not have previously engaged with AMR will be welcomed. We will also welcome collaborative proposals which explore AMR in indoor / built environment in Low or Middle Income Country contexts to complement other work under the Global Challenges Research Fund.

These grants will take the form of small scale pump-priming grants, with a maximum cost of £250,000 at 100 per cent fEC and a duration of up to 36 months. We are keen to support the development of inter-disciplinary research capabilities and wider collaborations through this call and, subject to quality and innovation, hope to fund a cluster of approximately 8 to 12 diverse proposals. Depending on the outcomes of this call we may wish to support some networking activity between the projects funded.

Proposals may build on or complement existing projects where the aim is to create collaborations that take the research in innovative new directions and involve researchers who may not have previously engaged with AMR research. It is possible to include a networking element in the application with the purpose of developing new collaborations and partnerships, but networking cannot be the sole focus. Projects will be expected to produce substantive research outputs that may be either stand alone, scalable, or form the foundations of further research and/or seek to reflect and learn from the processes adopted. Beyond this, projects could lead to a wide variety of other forms of outcome, from new partnerships and collaboration, improved communications, education of stakeholders, new technologies, redesigned 'touchpoints', new procedures, polices,

protocols and so on. Projects may be exploratory in nature and can focus on laying the research foundations for generating and exploring potential responses in the future and/or on research-informed processes for co-creating, co-designing and/or prototyping new solutions to specific challenges, as well as proof of concept or pilot projects around ideas / responses/ solutions which have already been identified as worthy of future exploration.

Projects can explore potential interventions and mitigation strategies which contribute to identifying or minimising the emergence, transmission, and/or exposure risk of resistance in the indoor and built environment.

Proposals are expected to be cross-disciplinary and collaborative. They should build on strong foundations in research and expertise on the challenges and dynamics of AMR and combine this with research expertise relevant to understanding real world contexts and diverse cultural factors and practices (including professional practices). They should seek to draw on relevant disciplines to produce robust evidence on the potential for change and impact provided by different approaches in real world contexts. Where appropriate, proposals could develop multi-method or participatory approaches to co-design interventions with diverse communities or use visualisation, narrative and/or creative arts approaches to engage users, or propose to undertake pilot, feasibility, experimental or proof of concept studies.

Proposals that include early career researchers as a part of the team, either as principal or co-investigators, or as research assistants with relevant post-doctoral (or equivalent) research experience would be especially welcomed.

IV. Aims of the Call

Spaces

This call will focus on the indoor and built environment in the UK and overseas. This includes, but is not limited to public spaces and buildings, or clinical/veterinary spaces, private homes, workspaces, public transport, agricultural and animal housing but also extends to the wider built environment and urban spaces– such as parks, shopping centres or cultural sites / venues. Where appropriate, proposals could focus on types of indoor space that cut across such types of building (e.g. toilets, kitchens, entrances, etc.). It also includes transitions and mobility into, out of and between different indoor or built environments.

All research must focus on AMR issues in humans or animals as they specifically relate to interactions with indoor / built environments.

The development of new technologies and surfaces is in scope, as is research on objects within indoor environments (e.g. taps, handles etc.) where there is particular focus on their place / interactions with the wider indoor / built environment context. The further development and novel application of existing technologies and surfaces is also within the scope of the call. There is scope for the application of frugal technology and design, particularly in international contexts.

Spaces out of scope

The following are out of scope of the call:

- The human and animal microbiome
- Rural spaces and outdoor farm environments
- Industrial food processing, including abattoirs, factories, polytunnels/industrial greenhouses

Subject Discipline scope

As with other Research Council calls under this initiative, we wish to encourage cross-disciplinary applications which cross the remits of more than one Research Council. However, for this call it is a **requirement** that arts and humanities research literatures / methods/ approaches plays a **core role** in projects, but that projects combine this with sustained engagement with experts on AMR from outside the arts and humanities to support the development of innovative, collaborative and cross-disciplinary research approaches. Applicants should clearly explain in their proposals the distinctive added value that arts and humanities research is bringing to the proposed research. Proposals involving creative practice are welcomed but should also engage with academic research expertise or practice-based research in the arts and humanities. Beyond this core requirement there are no limits on what other research disciplines and fields of expertise can be involved in proposals, the research methods which can be deployed or the roles that different forms of expertise can play in research teams. Proposals that bring together diverse research literatures and combine different expertise or approaches are particularly encouraged.

The AHRC will assess whether proposals contain sufficient arts and humanities research contribution. Applications which fail to demonstrate that they meet the requirement above will be ineligible under this call and will not be processed further or sent out for further peer review. In assessing the arts and humanities contribution, the AHRC will use the description of the subject domain found in §7 of the AHRC research funding guide - <http://www.ahrc.ac.uk/documents/guides/research-funding-guide/> and clarified in other documents such as the AHRC-ESRC remit statement.

Within the above remit, we consider the research area of Design to have significant potential to contribute to projects in this Theme. Design, in its broadest definition, as a methodological approach/a way of thinking/a discipline and cross-disciplinary research field, can provide real-world solutions, new ways of thinking and innovative approaches to tackle important challenges in an applicable, direct and focused way.

We anticipate that Design can make crucial contributions to tackling AMR challenges. Some examples include, but are not limited to: design-led solutions for the built environment, architecture, design processes, service design, policy design and design for social benefit.

Whilst Design is not a required element of this call, it is considered likely that the integration of design methodologies and approaches with inputs from another discipline or disciplines, will contribute significantly to meeting the challenges posed by AMR. Within these parameters, we welcome proposals that offer innovative solutions to AMR challenges, including novel or speculative approaches where it is made clear how the approach has the potential to make a demonstrable difference to tackling AMR

Further information on design disciplines can be found in annex 1.

In addition to opportunities relating to AHRC's Design priority area, we recognise that other research fields within the arts and humanities, including the continued development of the cross-disciplinary fields of medical and health humanities, may provide foundations for work in this field. There are also potential connections to various AHRC themes including (but not limited to) Science in Culture, Connected Communities and Digital Transformations.

We wish to encourage collaborative / co-designed / participatory approaches which involve relevant research, professional and practice-based expertise and which investigate and evidence the potential value and impact of the research in 'real world' contexts. We recognise that for specific proposals this could involve diverse or specialised collaborations across a wide range of areas, for example: clinical practice; engineering and technology; epidemiology; public health; infection control; informatics; microbiology; statistics; surface science; veterinary practice; architecture; professional education; data science (amongst many). It will be for applicants to demonstrate that they bring together the most appropriate range of collaborations and participants to meet the aims of their project.

If you are unsure if the remit of your proposed project is an appropriate fit, you should contact AHRC using the details at the end of this document.

Sub themes

Proposals should address one or more of the following sub themes. As we wish to encourage innovation in this field these themes are intended to be interpreted broadly and the areas discussed within them to be indicative rather than comprehensive. We would welcome proposals which explore different approaches or research foci to those mentioned but, which would contribute to these broad themes or which explore cross-cutting or underpinning issues or themes, provided that they also fall within the overall scope of this call as outlined in this document.

1. Places, Spaces, Cultures and Practices: Interactions with and within the Indoor and Built Environment

Research addressing this theme should consider the way in which humans and animals physically interact with the indoor environment in different cultural contexts and how those interactions may contribute to or prevent the transmission of bacterial infections and/or contribute more broadly to addressing the challenges of Antimicrobial Resistance.

Understanding the potential of the indoor/built environment and interiors to act as a focal point for efforts to address the challenges of AMR is a key theme for research under this heading. This includes the potential to design or change environments in ways which would reduce risks of bacterial infection or transmission or which would promote or support changes in practice or behaviour which would make a contribution towards addressing the challenges posed by AMR. This could include identifying reservoirs or hubs of infection and human or animal interactions with interior environments that might contribute to or prevent the spread of AMR. As well as more formal healthcare and veterinary settings we would also welcome proposals looking at a wide range of other built environment contexts where AMR is a potentially significant issue including the domestic/home environment. In addition to considering changes in the environment, proposals

could look at changes in situated cultures and practices, the behaviours and ways that indoor / built environments are used and the intersections, inter-relationships and interactions between built / indoor environment and uses of them/ practices within them.

Representations, understandings, traditions, narratives, norms and beliefs about cleanliness and hygiene, as they apply to different settings and built environment contexts, and the cultural, every day and professional practices, roles and 'performances' around cleaning, hygiene and the use of space, open up important areas for research. Similarly cultures and practices around, for example, contact, touch, look and feel, use of tactile materials, signage, sensory experience and associations (e.g. with smells), cultural identity, etc. in indoor environments could provide useful lines of enquiry. Perceptions of 'safe' exposure, risk or hygiene may not align with research evidence or standards and there may be issues around the (in)visibility of, 'unseen' or 'hidden' risks or practices in indoor environments or out-of-sight, backroom or 'hidden' spaces. There may be opportunities to change environments to 'design in', 'signpost' or affect certain behaviours or make it easier to tackle the spread of bacterial infections through the environment but their success will depend upon their interaction with existing cultural practices and norms.

Considerations around cultural diversity and associated differences in the use and practices within the indoor built environment could be addressed by research under this theme. There may be consideration of issues of inclusion and those whose risks, views, cultural values or needs may not be adequately taken into account in efforts to address AMR in the built environment. Particular indoor environments may have specific cultural, heritage or symbolic value attached to them which may need to be considered as a part of any plans for change. Issues around differences in language and communication may lead to differences in the reception of, and responses to, changes to the environment raising issues around how the design, layout and use of signs and symbols might need to reflect cultural differences. How cultural and contextual differences may affect the transferability and translation of approaches to the built environment around the globe is another potential area of research.

Whilst it is unlikely that the scale of this call will allow for the development of significant new antimicrobial surfaces, materials or buildings, projects can address the design of novel applications of existing materials or spaces that break infection pathways and the ways in which architectural design can contribute to tackling AMR. Design and technology in this space should consider both the feasibility of the technologies and the human behaviours and practices that affect the implementation and adoption of new technologies or approaches. Examinations of the ability to learn from past failed technology and interventions are also potentially in scope.

2. Pathways and Journeys through the Built Environment and the Dynamics of Change

Rather than considering places/ spaces or environments as static or fixed, this theme seeks to encourage research which examines how people and animals move and flow through, within and between changing built environments, the materials that they carry with them on such journeys, and the role of different reservoirs, vectors and methods of transmission through, within and between indoor / built environments. This provides an opportunity to explore indoor / built environments as porous and fluid and not always clearly delineated and/or as meeting places and sites for contact and cultural exchange. It also gives a chance to explore the different challenges associated with built spaces, which are designed to be open, public and to encourage flows, use and exchange and those

where mobility is controlled, contained or limited (e.g. prisons), including those specifically designed to control movement in order to reduce the spread of infection (e.g. quarantine centres, isolation wards etc.).

Research in this area could consider the role of hidden components (for example, water pipes, air ducts and underfloor spaces) in contributing to AMR. It could consider how different groups of people move between different kinds of environment with different risk profiles for AMR or between familiar and unfamiliar spaces and places. It could focus on the important roles that can be played by transport systems, public, intermediate or transition spaces (e.g. reception areas, corridors, waiting rooms, cafes, etc.), boundaries, gateways and entry or exit points. It could examine the journeys which people (patients, visitors, carers, professionals) take through different health, care and other relevant settings and spaces and the associated exposures and vectors and/or the potential impacts of proximity, distance and/or co-location of those spaces (e.g. GP surgeries, pharmacies, care homes, hospitals, etc.). Proposals involving data collection and analysis could be in scope for mapping and visualising such pathways, where appropriate, whilst narratives and creative representations of these journeys could provide input to strategies for communicating changes in behaviours and the use of indoor spaces.

As well as movement between spaces / spatial dimension, research under this theme might also explore temporal dynamics and processes of change through time. Issues of different temporal horizons and spatial scales are potentially important considerations. For example, whilst in some cases there may be opportunities to think about the design of new spaces or environments (e.g. new build homes or hospitals or veterinary practices), other environments may be slow to change or have characteristics which limit change (e.g. conservation protection) and issues around adaptation, retrofit, renovation or changes in use may need to be considered. Where new environments are created, or changes made to existing environments, initial responses and impacts may not persist in the longer terms as practices of use evolve or re-establish.

In addition, over time there may be changes in use of built environments and their importance / risk profile for AMR. For example, homes and other environments may become settings for delivery of health and care, or preparation for – or recovery from – medical treatment and the risks associated with use of particular environments may change due to changes in individual circumstances (e.g. infection, illness or injury). In addition, as noted above, sustainability and longevity of changes may be an issue, For example, awareness raising, new initiatives, media coverage or public health scares may temporally change the ways people use or manage environments but these changes may not always be sustained in the longer term.

There may also be important perspectives in terms of lifecourse, learning journeys or career development. For example, cultural practices may differ for environments where infants or older people or at risk groups are present or concentrated (both domestic contexts and specific built environments such as nurseries, schools, care homes etc.) and cultural and professional practices may vary over time as a result of changes in career stage or of personal experience (e.g. of resistant bacterial infection or of caring / bereavement linked to AMR).

Changes to patterns of mobility may also have important implications for the design of indoor environments and the transmission of infections within built environments. For example, migrants and visitors may use unfamiliar indoor spaces differently from those more familiar with them and

particular issues challenges could arise in terms of tackling AMR in built environments associated with mobility such as transport hubs (e.g. airports, underground stations), refugee camps, animal reception / quarantine centres, passenger ships, tourist attractions, universities, and so on...

3. Creative, Collaborative and Disruptive Innovation, Experiments and Design in Indoor/ Built Environments

This theme seeks to open up opportunities for a range of research-based experimental, design, creative and/or practice-based innovation or interventions, including prototyping, imagining, piloting, scenario testing, simulating, etc. We would welcome proposals which seek to explore the potential to make changes to the built environment which disrupt routine or cultural practices in ways which could contribute to addressing the challenges of AMR.

Under this theme proposals could also explore the potential to stimulate innovation offered by new ways of working, for example, across different professions and fields of expertise and practice and between those who build / shape or manage different environments and those who work in them or use them to deliver services and those who visit them to use services or as a part of everyday life. This could include innovative approaches to the co-creation or co-design of interventions or for exploring theories of change or for testing the transferability of ideas and concepts into cultural practice in real world built environment contexts. Proposals exploring the use of virtual or digital environments, simulations, play/gaming or alternative reality approaches could be considered where the aim is to inform understanding of potential interactions with cultural practices in real world contexts. Proposals could also consider issues of service design where new ways of delivering services may, for example, open up different ways in which environments are used (for example shifts between clinical, care, home or workplace service delivery) which may in turn impact on the role of those environments in tackling AMR.

We welcome proposals which look to, learn from, or are inspired by, the past, or which look at different civilisations, built environments and uses of space globally. Interventions and designs aimed at changing or using the indoor / built environment to address different challenges from AMR may provide another source of ideas and research could explore the transferability, applicability, re-invention and adaptability of such ideas to addressing the challenges of AMR. For example might there be learning from heritage and conservation approaches to managing built environments, opportunities to better understand cultural practices in places from a creative performance perspective or to utilise insights from the cultural sector and experience economy e.g. in relation to visitors management and experience?

4. Reflection, Learning, Data and Valuing Impacts from Changes to the Indoor/ Built Environment

Indoor and built environments deliver multiple forms of value and services for those who inhabit or use them. Typically they are complex, multi-dimensional and multi-functional environments which generate many diverse forms of cultural and social value and contribute to health and wellbeing in multiple ways. Interventions in these environments to address the challenges of AMR may impact on the diverse values and services that they provide. There is a need to take these wider potential

impacts into account when considering such interventions, recognising that there may be trade-offs, co-benefits or unanticipated consequences which go beyond their effectiveness in addressing the challenges of AMR. For example issues such as 'sterility', homeliness, personalisation of space, comfort, aesthetics, beauty, welcoming etc. and their wider impacts on health, wellbeing and cultural value may need to be taken into account in assessing the overall impacts and appropriateness of different measures aimed at tackling AMR. Unintended consequences could include, for example, providing a false sense of hygiene, cleanliness and the need for precautionary action, increased fear of or reluctance to visit particular places, or misdirected attention from high to low risk environments or activities. Benefits from interventions may not be sustained as behaviours and practices of use change, adapt or re-establish over time.

Better use, integration and understanding of data and evidence on AMR is likely to be important both in informing and identifying where in the indoor/built environment resistance emerges, in better targeting interventions and in helping track the impact of changes to the environment and predict potential impacts on risks of transmission and exposure. Proposals under this theme could explore the various ways in which different forms of data and evidence can contribute to tackling AMR, as a key source of information and provision of indicators and/or in interrogating the implications and effectiveness of interventions in the built environment. There may be potential to connect with advances in the digital humanities and data analytics in the arts and humanities.

There may be opportunities to explore public and individual understandings of data relating to AMR in the indoor/ built environment, for example, through data visualisations or the usage of predictive data sets and exploring the implications of using these in medical contexts and built environment contexts. The role of data analytics and subsequent conclusions drawn could also be examined from an arts and humanities perspective, for example, looking at how data patterns have been used to create historical, media and geographical narratives. Issues of data understanding will also be linked to the question of the requirements of audiences and users (e.g. architects, building managers, educators), and topics here could include data meeting requirements of different stakeholders through the use of various methodologies, processes and standardisation for data collection.

There are opportunities to develop techniques that map, detect and quantify risks relating to AMR in the environment and support the wider communication and use of such risk analyses. There are also issues around prioritising what data to map and where, for example, identifying high risk environments for data mapping. The interrogation and re-use of data is another key area, and could include methods of streamlining data and establishing data benchmarks. Other possible topics on which arts and humanities approaches and methods on data analysis could contribute include the subject of link up data, where data creating connections spans the private and public medical worlds, and the linkage of experiential and qualitative data relating to the use of built environments with data on health outcomes or the spread of infection.

There are also research questions linked to the ethics, bioethics and legal implications around data, critically reflecting on the potential uses and implications of using data in regard to AMR and the built environment, including issues around monitoring behaviours in different spaces, privacy and consent. The development of the 'Internet of Things' raises further issues and opportunities in this area, in the connecting of the domestic (indoor) environment via objects, with data collection and creation. Projects examining the design of technologies to collect data could also be within scope.

International elements

Costs for international investigators are permissible in line with the AHRC policy for research grants.

Proposals under this call may examine built environments in the UK or overseas and or adopt comparative or cross-national approaches. We will be pleased to consider proposals which are internationally collaborative and/or seek to share learning, expertise and experience across boundaries. We will welcome collaborative proposals which are focused on built indoor environments in Low or Middle Income (LMIC) country contexts and seek to explore ways in which LMICs may respond to the challenges of AMR; where applicable additional funding may be available from AHRC's Global Challenges Research Fund (GCRF) allocation to support any Official Development Assistance (ODA) -compliant proposals (if this is of potential relevance to your proposal further information on ODA compliance is available from the [RCUK GCRF pages](#)).

V. Eligibility

Unless otherwise stated, the eligibility criteria for applicants and participants as published in the AHRC Research Funding Guide will apply.

VI. Guidance on Costs and Project Timescales

Costs of up to **£250,000** at 100 per cent fEC for projects lasting up to **36** months may be claimed.

If successful, AHRC will meet 80 per cent of the full Economic Costs on proposals submitted and the host research organisations are expected to support the remaining 20 per cent.

Exceptions to this rule will apply to certain international costs that can be charged at 100%. For details of these costs, please refer to the AHRC funding guide.

VII. Funding Available

Subject to the overall quality of, and levels of innovation within, the proposals submitted we anticipate funding in the region of 8-12 proposals under this call. Additional funding could be secured if proposals contain sufficient research in other Councils remits for AHRC to secure further co-funding and/or if some proposals are ODA-compliant and eligible for GCRF funding.

Subject to the outcomes of the call some funding may be available to support networking amongst projects or other activities in support of capability development in this field.

VIII. Application Process and Format

Unless otherwise stated, the application process and format as published in the AHRC Research Funding Guide will apply.

Applications should be submitted through the Je-S system at the latest by **4pm on 28th February 2017**, and will need to go through the appropriate institution submission process. You should submit your proposal using the Research Councils' Joint electronic Submission (Je-S) System (<https://je-s.rcuk.ac.uk/>).

To prepare a proposal form in Je-S:

- log-in to your account and choose 'Documents' from the menu;
- then select 'New Document';
- 'AHRC' as the Council, 'Standard Proposal' as the Document Type;
- 'Development Grants' as the Scheme;
- 'AMR indoor and Built Environment Pump Priming February 2017' as the Call/Type/Mode and
- 'Create Document'.

Je-S will then create a proposal form, displaying the relevant section headings. Using the 'Help' link at the top of each section will provide guidance relevant to that section of the form.

Note that selecting 'Submit document' on your proposal form in Je-S initially submits the proposal to your host organisation's administration, not to AHRC. ***Please remember to allow sufficient time for your organisation's submission process between submitting your proposal to them and the Call closing date.***

Applications should address the aims of the Call as listed above.

The following are a list of attachments that are permitted for this Call. Please see Section 4 of the Research Funding Guide for further information about these attachments, including sub headings to be included in the Case for Support. The guidance relating to standard research grants applies.

<http://www.ahrc.ac.uk/documents/guides/research-funding-guide/>

Attachment	Usual Requirement and page limits (sides of A4)
Case for Support	Mandatory, seven sides A4
Curriculum Vitae	Mandatory for all named project members
Publication Lists	For all named project members, where appropriate
Justification of Resources	Mandatory, maximum two sides of A4
Pathways to Impact	Mandatory, maximum two sides of A4
Letter of Support	Mandatory for project partners
Technical Plan	If applicable – Technical Plans should only be submitted if you have identified that there will be technical outputs (these should be identified in the technical summary section – please see section 4 of the AHRC funding guide)

Animal Usage Form	Proposals involving the use of animals must include an animal usage form as an additional attachment. Please email amr@ahrc.ac.uk for further information and a copy of the relevant form.
Visual Evidence	Optional
ODA Compliance Statement	Only mandatory if research is ODA relevant, one page of A4 Maximum.

Further information on submitting a proposal and on submission rules as well as confidentiality and use of information supplied can also be found in Section 4 of the Research Funding Guide.

IX. Assessment Process and Criteria

Proposals will be subject to expert peer review and be considered by a moderating panel comprised of experts from a range of disciplines as well as non-academics if appropriate.

- Fit to the scope of the call
- Research excellence – the quality of the research process outlined, including appropriateness of research agenda, design, approach and methods and intended outcomes and potential contribution to the development of relevant research fields;
- Innovation - the degree of innovation within the field, recognising the additional risks that may be associated with such innovation but also the potential to generate new knowledge and learning from exploring or experimenting with novel approaches or methods
- Inter-disciplinary and collaborative approach – does the proposal bring together a range of expertise, insights and approaches from across research disciplines that are appropriate to the research questions posed? Are an appropriate range of stakeholders involved? Are effective arrangements outlined in the proposal for supporting inter-disciplinary and collaborative working across boundaries and for integrating diverse inputs to, and components of, the project?
- Potential for impact – does the proposed research have the *potential* to lead to significant real-world difference to AMR? Is an appropriate ‘pathways to impact’ strategy provided which would enable the project to realise its longer term vision for making a real world difference to AMR?
- Management – does the proposal include effective plans for management of the activities and the monitoring of progress? Is a realistic timetable and feasible resourcing plan for achieving the aims and objectives of the proposal provided? Has appropriate consideration been given to ethical issues and to securing any agreements which may be needed to undertake the research? Where applicable, are arrangements included for supporting the development of any early career researchers/ research staff involved in the project?
- Value for money

In addition, applications identified as being ODA relevant will also be assessed for their potential to impact on issues relevant to the economic development of LMICs.

Call timetable

Activity	Date
Call launched	18 th November 2016
Launch event/town meeting/workshop	30 th November 2016
Deadline for applications	4pm on 28 th February 2017
Panel meeting	May 2017
Outcomes	June 2017
Grants start	October 2017- January 2018

X. Scheme Requirements and Post Award Reporting

Unless otherwise stated, the scheme requirements and post award reporting as stated in the AHRC Research Funding Guide will apply.

Award holders will be required to submit outputs, outcomes and impacts that arise from AHRC's funding through the Researchfish system. Information can be added to Researchfish at any point once the award has started but award holders will also be required to 'submit' this information to AHRC at one 'Submission Period' each year. Award holders will receive an email with log-in details shortly after their award has started. More details on Researchfish are available on the RCUK website here: <http://www.rcuk.ac.uk/research/researchoutcomes/>.

XI. Further Information and Resources

Presentations and contacts from the November 2016 AHRC networking event (AHRC website call page)

<http://www.ahrc.ac.uk/funding/opportunities/current/amr-in-the-real-world>

World Health Organisation Factsheet on Antimicrobial resistance –
<http://www.who.int/mediacentre/factsheets/fs194/en/>

ESRC AMR and behaviour workshop report -

<http://www.esrc.ac.uk/files/funding/funding-opportunities/amr/anti-microbial-resistance-behaviour-within-and-beyond-the-healthcare-setting/>

National Electronic Library for Health (NeLH) antimicrobial resistance Website

<http://www.antibioticresistance.org.uk/>

Review on Antimicrobial Resistance, Chaired by Jim O’Neill

<http://amr-review.org/>

UK government AMR Resources

<https://www.gov.uk/government/collections/antimicrobial-resistance-amr-information-and-resources>

Sloan Program (USA) funded Microbiology of the Built Environment Network

<http://microbe.net/>

XII. Contact Information

AHRC Enquiries: AMR@ahrc.ac.uk

For queries in creating and submitting the application form please contact the Je-S Helpdesk on 01793 44 4164 who are available 9-5 Monday to Friday.

Annex 1

Design

Design covers a wide range of sub disciplines that move beyond the more common perception of design as a way of creating physical objects and buildings. It can usefully be defined as:

‘Combining creativity and analysis via iterative cycles to explore issues and generate solutions, viewed through the lenses of how people experience things and what resources are involved in order to achieve outcomes’¹ While this call will allow for a very wide application of design and other methodologies, and there is no prescriptive approach, some areas of the call that design might potentially be applied to are listed below. Note that this is not an exhaustive or definitive list and is intended to illustrate a small range of potential applications of design to an audience not familiar with design disciplines.

- Applications of design to make sense of and visualise AMR related data relating to indoor / built environment in meaningful ways to specific audiences.
- Design research on the current pathways of individuals (human and animal) through the indoor environment with a view to redesigning pathways to prevent the rise of AMR.
- Design approaches to novel applications of technologies, including surfaces
- Design and architecture of the built and interior environment, including affordance design² of interior spaces to shape behaviours and encourage or discourage interactions across different indoor environments.
- Design applied to policy making, practice and professional development. How design methods can be applied to, engage the relevant users/stakeholders and influence policy/practice as it might apply to AMR in the indoor and built environment.

Service design and social design are emerging areas of design research disciplines that could potentially be applied across the sub themes of this call.

Service design is, essentially, a form of user-centred design that focuses on the design of services and is applied to both the public and private sector. The Design Council has produced a short video ‘what is service design?’ which can be found alongside collated resources on the Design Council website -<http://www.designcouncil.org.uk/news-opinion/video-what-service-design>. The AHRC funded Service Design Network has produced a report ‘Mapping and Developing Service Design in

¹ Lucy Kimbell [Applying Design Approaches to Policy Making: Discovering Policy Lab](#)

² * design that communicates how an object can be used without instructions – like the shape of a door knob indicating that it can be pushed, twisted or pulled

the UK' <http://ualresearchonline.arts.ac.uk/7712/1/Mapping-and-Developing-SDR-in-the-UK.pdf>
which outlines emerging areas of UK service design.

Social design, as a discipline, is primarily concerned with participatory approaches that have social goals rather than commercial aims. The AHRC commissioned report 'Social Design Futures' offers an outline of Social Design research in the UK -

<https://mappingsocialdesign.files.wordpress.com/2014/10/social-design-report.pdf>

Annex 2

In order to create this funding call, AHRC held a small scoping workshop including experts from a range of disciplines across the Research Council remits and from policy and practice.

Some questions and ideas raised by the group during the scoping are included here as an illustration of some of the potential challenges of AMR in the indoor environment. **NOTE: this is for general background information and not intended as an exhaustive list, or to be taken as eligibility requirement for research under this call.**

- Do we know the high risk environments beyond clinical/hospital environments?
- Which interiors contribute to AMR?
- What environments should we focus on e.g. those of greatest risk or quick wins?
- How can we plan or design improved or safer spaces in relation to AMR?
- Can the design of places and spaces work more effectively in tandem with improving health literacy to make a difference on AMR?
- Can collaborative or participatory or user-led approaches lead to more effective design of indoor spaces to tackle AMR?
- Visualisations – would it make any difference to make things more visible?
- Different pathways in different environments – where are those that contribute to transmission replicated elsewhere? How do we factor in diversity and cultural differences in understanding these pathways?
- Environments are multifunctional and designed to do different things, not just control infection. What trade-offs and conflicts do we face in reconfiguring these and how do we address them?
- What are the key inter-actions and inter-relationships between the indoor environment and human behaviour in relation to AMR (e.g. environments signalling risk, and shaping environments, behaviours which change or disrupt the use or designed intent for a space)?
- What can we learn from failed practices (e.g. public health initiatives and failed technologies, etc.)?
- To what extent do indoor environments and cultures of use differ significantly enough internationally to make it almost impossible to identify transferable solutions or are their transferable ‘user-led’ or context-adaptable approaches that can translate between diverse cultural and built environment contexts?
- What can historical perspectives tell us about emerging and developing trends? How did we conceptualise disease before microbes were ‘invented’?
- How can you design any preventative approach/environments without ethnographic work to find out what people currently do first?
- How can design make sense of data and interactions regarding AMR and engage stakeholders in using this to shape change?
- How can we synthesise data-driven and human-centred approaches to indoor environments and AMR?
- Environments are multifunctional and designed to do different things, not just control infection. What trade-offs and conflicts do we face and how do we address these?
- What conditions/factors influence transmission? Pathways, people etc?

- How do human/animal (including pets) interactions in the indoors contribute to AMR environments
- Can we consider humans and animals separately?
- What tools and techniques can we use to detect, qualify and target AMR?
- How do the environmental conditions (temperature, light humidity airflow) interact with human experience such as comfort, ambiance and beauty to shape what might be possible to achieve in indoor settings?
- Who are highest risk groups – and where do they go, what are they exposed to?