

Appendix VI: Online Survey Results

As part of the review, three online surveys were launched aimed at, respectively, the UK academic, UK industrial and international academic communities. They were open between 12 September 2009 and 31 October 2009. Links to the surveys were advertised on the EPSRC website, sent directly to members of the EPSRC College and sent to all Category A staff in Civil Engineering listed in the 2008 RAE. They were also distributed through a number of organisations including the Institution of Civil Engineers, IStructE, ASCE and the Modern Built Environment KTN.

159 responses were received from UK academics, 67 from UK industry, and 35 from international academics.

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1. Questions and Quantitative Results of the Academic Survey

Section 1: Contact details





1. If you would like to be sent a link to the results of this questionnaire, and the review itself, when they are published please enter your email address in the box below. Please note that the information given in this survey will be used anonymously.

Section 2: Your Expertise

2. What is your academic position?

Lecturer:		27.0%	43
Senior lecturer:		25.2%	40
Reader:		10.1%	16
Professor:		32.7%	52
Other (please specify):		5.0%	8

3. In which area would you say your primary expertise lies? Please tick only one box. The research areas given are based on the sub-programmes used by EPSRC in its 2009 EPSRC landscaping exercise. Full definitions of the sub-programmes can be found at: <http://www.epsrc.ac.uk/AboutEPSRC/landscapes/default.htm>

Ground and Structural Engineering (including construction materials; structural engineering; geotechnical engineering; pavement engineering):		78.0%	124
Built Environment (including building design; design of the urban environment; construction operations and management; IT in construction):		3.8%	6
Transportation Operations and Management (including traffic scheduling, control and monitoring; telematics and vehicle locationing; transport safety; reducing the undesirable effects of transport on the environment; accessibility):		2.5%	4
Water and Coastal Engineering (including design and optimisation of technologies relating to water resource management, water		6.9%	11

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treatment and water distribution systems; coastal engineering; waterway engineering):			
Waste and Pollution (including engineering aspects of assessment and remediation of contaminated land and groundwater; waste management, treatment and disposal; waste minimisation):	<input checked="" type="checkbox"/>	0.6%	1
Other (please specify):	<input checked="" type="checkbox"/>	8.2%	13

Section 3: Academic Collaborations

4. With researchers from which disciplines, apart from your own, have you collaborated on research projects in the past 10 years? Please tick as many boxes as relevant. Notes: (a) These disciplines are based on the sub-programmes specified in the 2009 EPSRC landscaping exercise. Full definitions of each sub-programme can be found at <http://www.epsrc.ac.uk/AboutEPSRC/landscapes/default.htm> (b) For disciplines outside the remit of the EPSRC Process, Environment and Sustainability Programme, please indicate which EPSRC Programme primarily supports that discipline. Programme remits can be found at <http://www.epsrc.ac.uk/ResearchFunding/Programmes/default.htm> (c) Where the discipline lies outside the remit of EPSRC, please indicate which research council has primary support for that discipline.




Ground and Structural Engineering (a):	<input checked="" type="checkbox"/>	n/a	98
Built Environment (a):	<input checked="" type="checkbox"/>	n/a	70
Electrical and Power Systems Engineering (a):	<input checked="" type="checkbox"/>	n/a	15
Transportation Operations and Management (a):	<input checked="" type="checkbox"/>	n/a	23
Process Engineering (a):	<input checked="" type="checkbox"/>	n/a	18
Water and Coastal Engineering (a):	<input checked="" type="checkbox"/>	n/a	38
Waste and Pollution (a):	<input checked="" type="checkbox"/>	n/a	30
Energy (b):	<input checked="" type="checkbox"/>	n/a	41
Information and Communications Technology (b):	<input checked="" type="checkbox"/>	n/a	26
Research Infrastructure (including high performance computing) (b):	<input checked="" type="checkbox"/>	n/a	20
Materials, Mechanical and Medical Engineering (b):	<input checked="" type="checkbox"/>	n/a	74

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Mathematical Sciences (b):		n/a	31
Physical Sciences (b):		n/a	37
Economic and Social Research Council (c):		n/a	15
Arts and Humanities Research Council (c):		n/a	12
Biotechnology and Biological Sciences Research Council (c):		n/a	13
Medical Research Council (c):		n/a	8
Science and Technology Facilities Council (c):		n/a	2
Other (please specify):		n/a	26




5. What would you consider to be the barriers to undertaking research in collaboration with researchers from other disciplines, or undertaking research in multidisciplinary areas?

5.a. Traditional academic career paths: Gaining recognition and reputation within academia is usually centred around traditional disciplines. Multidisciplinary working is risky in terms of future career progression. -- In your opinion, this is:

Not a barrier:		37.7%	60
A minor barrier:		44.7%	71
A major barrier:		17.6%	28




5.a.i. Comments (optional)

5.b. Emerging disciplines: It can be difficult for multi-disciplinary fields to gain recognition because multi-disciplinary work is not promoted in the RAE assessment or by mainstream academic conferences and journals. -- In your opinion, this is:

Not a barrier:		28.9%	46
A minor barrier:		42.8%	68
A major barrier:		28.3%	45




5.b.i. Comments (optional)





















5.c. Recruitment and training: Finding and retaining interdisciplinary researchers with the required mix of skills is difficult. Training is predominantly single discipline based. -- In your opinion, this is:

Not a barrier:		22.0%	35
A minor barrier:		47.2%	75
A major barrier:		30.8%	49

5.c.i. Comments (optional)

5.d. Working with other disciplines: Multi-disciplinary working requires long start-up times and costs, especially if there is no prior history of working together. Obstacles include language barriers, differing research methodologies, and the need to build trust. -- In your opinion, this is:

Not a barrier:		18.2%	29
A minor barrier:		44.7%	71
A major barrier:		37.1%	59

5.d.i. Comments (optional)			
5.e. Research methodology: There are difficulties in identifying and using the correct research methodologies from various disciplines. -- In your opinion, this is:			
Not a barrier:		37.7%	60
A minor barrier:		53.5%	85
A major barrier:		8.8%	14
5.e.i. Comments (optional)			
5.f. Funding and peer review: For example, there is a tendency for silos between individual research councils and their peer review communities. Writing and reviewing multi-disciplinary proposals is difficult. -- In your opinion, this is:			
Not a barrier:		4.4%	7
A minor barrier:		23.9%	38
A major barrier:		71.7%	114
5.f.i. Comments (optional)			
5.g. Cost: Multi-disciplinary working tends to be expensive, e.g., because multiple partners are often required, travel and logistical costs are higher, and problems can be intrinsically more complex. -- In your opinion, this is:			
Not a barrier:		22.6%	36
A minor barrier:		46.5%	74
A major barrier:		30.8%	49
5.g.i. Comments (optional)			
5.h. Other (please specify) -- In your opinion, this is:			
Not a barrier:		69.2%	110
A minor barrier:		11.9%	19
A major barrier:		18.9%	30
5.h.i. Comments (optional)			
6. From question 5 above, which would you say is the most significant barrier to multidisciplinary working?			
a. Traditional academic career paths:		11.3%	18
b. Emerging disciplines:		6.3%	10
c. Recruitment and training:		5.0%	8
d. Working with other disciplines:		15.1%	24
e. Research methodology:		3.8%	6
f. Funding and peer review:		50.9%	81
g. Cost:		3.8%	6
h. Other:		3.8%	6

Section 4: International Collaboration

7. Have you undertaken collaborative research in partnership with academic researchers overseas within the last 10 years?

Yes:		80.5%	128
No:		19.5%	31

8. What would you consider to be the main barriers to undertaking research in collaboration with academic researchers overseas?

8.a. There is a lack of incentives for undertaking collaborative research with institutions overseas. -- In your opinion, is this:

Not a barrier:		37.7%	60
A minor barrier:		42.8%	68
A major barrier:		19.5%	31

8.a.i. Comments (optional)

8.b. There is a lack of external funding and support mechanisms for collaborative research with institutions overseas. -- In your opinion, is this:

Not a barrier:		11.3%	18
A minor barrier:		32.1%	51
A major barrier:		56.6%	90

8.b.i. Comments (optional)

8.c. There are language and cultural barriers to undertaking overseas collaborations. -- In your opinion, is this:

Not a barrier:		52.8%	84
A minor barrier:		39.0%	62
A major barrier:		8.2%	13

8.c.i. Comments (optional)

8.d. There is lack of support for overseas collaboration within academic institutions in the UK. -- In your opinion, is this:

Not a barrier:		30.2%	48
A minor barrier:		40.9%	65
A major barrier:		28.9%	46

8.d.i. There is lack of support for overseas collaboration within academic institutions in the UK. -- Comments (optional)

8.e. There is a lack of time available for overseas collaboration. -- In your opinion, is this:

Not a barrier:		31.4%	50
A minor barrier:		35.2%	56
A major barrier:		33.3%	53

8.e.i. Comments (optional)

8.f. There is a lack of information about opportunities to collaborate with overseas institutions. -- In your opinion, is this:

Not a barrier:		32.1%	51
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A minor barrier:		43.4%	69
A major barrier:		24.5%	39
8.f.i. Comments (optional)			
8.g. Personal and family situations are a barrier to spending time overseas. -- In your opinion, is this:			
Not a barrier:		31.4%	50
A minor barrier:		38.4%	61
A major barrier:		30.2%	48
8.g.i. Comments (optional)			
8.h. Other (please specify) -- In your opinion, is this:			
Not a barrier:		69.8%	111
A minor barrier:		13.2%	21
A major barrier:		17.0%	27
8.h.i. Comments (optional)			











9. From question 8 above, what would you say is the most significant barrier to overseas collaboration?			
a. Lack of incentives:		3.1%	5
b. Lack of funding mechanisms:		44.7%	71
c. Language and cultural barriers:		1.3%	2
d. Lack of support within academic institutions:		7.5%	12
e. Lack of time:		13.8%	22
f. Lack of information about opportunities:		6.3%	10
g. Personal situation:		15.7%	25
h. Other:		7.5%	12

Section 5: Non-academic Collaborations

10. Have you undertaken research supported by, or in collaboration with, non-academic organisations within the last 10 years?			
Yes:		89.3%	142
No:		10.7%	17




11. If you answered "yes" to question 10, which types of non-academic organisations were they? Please tick as many boxes as relevant.			
Engineering consultancy:		n/a	107
Architects' practice:		n/a	14

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Contractor:		n/a	48
House builder:		n/a	14
Component supplier:		n/a	38
Other technical service supplier:		n/a	24
Membership organisation, professional or trade body:		n/a	36
Research organisation:		n/a	54
Charity:		n/a	15
Government department or agency:		n/a	58
Local Authority:		n/a	20
Other:		n/a	24




12. What would you consider to be the main barriers to undertaking research in collaboration with, or supported by, companies in the construction sector?

12.a. The construction sector has limited budgets for R&D projects. -- In your opinion, is this:

Not a barrier:		0.6%	1
A minor barrier:		10.1%	16
A major barrier:		89.3%	142




12.a.i. Comments (optional)

12.b. The construction sector has strict time constraints for R&D projects. -- In your opinion, is this:

Not a barrier:		6.3%	10
A minor barrier:		48.4%	77
A major barrier:		45.3%	72




12.b.i. Comments (optional)

12.c. There are cultural barriers to innovation within the construction sector. The sector has governance procedures concerned with robustness, reliability, insureability and compliance with regulation, and therefore tends to be conservative and slow to change. -- In your opinion, is this:

Not a barrier:		13.2%	21
A minor barrier:		42.8%	68
A major barrier:		44.0%	70

12.c.i. Comments (optional)

12.d. The requirements of academia to produce publishable results and industry's need for immediate relevance to practice and/or confidentiality can be difficult for collaborating partners to balance. -- In your opinion, is this:

Not a barrier:		10.1%	16
A minor barrier:		51.6%	82
A major barrier:		38.4%	61

12.d.i. Comments (optional)





12.e. Academic researchers can have a lack of practical experience and knowledge of how industry works in practice. -- In your opinion, is this:			
Not a barrier:		27.7%	44
A minor barrier:		56.0%	89
A major barrier:		16.4%	26
12.e.i. Comments (optional)			
12.f. There is significant time and effort involved in making, developing and sustaining contact between the collaborating partners. -- In your opinion, is this:			
Not a barrier:		15.7%	25
A minor barrier:		54.7%	87
A major barrier:		29.6%	47
12.f.i. Comments (optional)			
12.g. Agreement around the ownership of any intellectual property generated by shared research activity can be difficult to reach. -- In your opinion, is this:			
Not a barrier:		27.0%	43
A minor barrier:		57.2%	91
A major barrier:		15.7%	25
12.g.i. Comments (optional)			
12.h. Other (please specify) -- In your opinion, is this:			
Not a barrier:		73.6%	117
A minor barrier:		11.3%	18
A major barrier:		15.1%	24
12.h.i. Comments (optional)			
13. From question 12 above, what would you say is the most significant barrier to collaboration with industry?			
a. Limited budgets:		59.7%	95
b. Strict time constraints:		5.7%	9
c. Cultural barriers to innovation:		15.7%	25
d. Conflicting requirements:		8.8%	14
e. Lack of industrial awareness:		2.5%	4
f. Making and developing contacts:		3.1%	5
g. Agreement over IP:		2.5%	4
h. Other:		1.9%	3

Section 6: Feedback on EPSRC Programme Landscapes

14. In the recently published landscape review






(<http://www.epsrc.ac.uk/AboutEPSRC/landscapes/default.htm>), EPSRC included the following perceptions of the ground and structural engineering research portfolio it supports. We are grateful for your feedback on this document. Please state whether you agree or disagree with the statements made in the landscape document. Please give any clarifying statements in the boxes provided.

14.a. "The UK traditionally has a strong international reputation in [ground and structural engineering research]" -- Do you:

Disagree strongly:		0.0%	0
Disagree:		3.1%	5
Neither agree nor disagree:		19.5%	31
Agree:		45.3%	72
Agree strongly:		32.1%	51






14.a.i. Clarifying comments

14.b. "[This reputation] is enhanced by a number of UK-based civil engineering companies and their involvement in flagship building projects worldwide." -- Do you:

Disagree strongly:		1.3%	2
Disagree:		6.3%	10
Neither agree nor disagree:		18.2%	29
Agree:		45.3%	72
Agree strongly:		28.9%	46






14.b.i. Clarifying comments

14.c. "[Ground and structural engineering research] is well-linked to industry." -- Do you:

Disagree strongly:		1.9%	3
Disagree:		22.6%	36
Neither agree nor disagree:		31.4%	50
Agree:		35.2%	56
Agree strongly:		8.8%	14

14.c.i. Clarifying comments























14.d. "There is very little connectivity with other disciplines [outside of ground and structural engineering] as demonstrated by almost negligible co-funding across EPSRC programmes." -- Do you:

Disagree strongly:		3.1%	5
Disagree:		11.3%	18
Neither agree nor disagree:		22.6%	36
Agree:		45.9%	73
Agree strongly:		17.0%	27

14.d.i. Clarifying comments




























14.e. "The vast majority of grants in this area are small (£100k-500k). There is potential for larger, more ambitious projects in this area." -- Do you:

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Disagree strongly:		2.5%	4
Disagree:		10.1%	16
Neither agree nor disagree:		21.4%	34
Agree:		36.5%	58
Agree strongly:		29.6%	47
14.e.i. Clarifying comments			
14.f. "Research in this area tends to be incremental and conservative, concerned mainly with finding practical solutions to immediate problems." -- Do you:			
Disagree strongly:		5.0%	8
Disagree:		11.3%	18
Neither agree nor disagree:		26.4%	42
Agree:		36.5%	58
Agree strongly:		20.8%	33
14.f.i. Clarifying comments			
14.g. "There is a wide scope for more ambitious and creative, far-reaching, cross-disciplinary work in this area." -- Do you:			
Disagree strongly:		3.8%	6
Disagree:		5.0%	8
Neither agree nor disagree:		14.5%	23
Agree:		37.1%	59
Agree strongly:		39.6%	63
14.g.i. Clarifying comments			
14.h. "Civil engineering has a large role to play in finding solutions to the problems brought about by a changing climate... Sustainability and climate change agendas present a wealth of grand challenges." -- Do you:			
Disagree strongly:		1.3%	2
Disagree:		1.3%	2
Neither agree nor disagree:		6.3%	10
Agree:		23.3%	37
Agree strongly:		67.9%	108
14.h.i. Clarifying comments			
15. A working group of UK engineering researchers and practitioners, assembled by EPSRC to guide this review, identified a number of characteristics that they felt the UK ground and structural engineering research community should have.			
15.a. Is recognised and highly perceived by the public -- Do you:			
Disagree strongly:		15.1%	24
Disagree:		43.4%	69

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Neither agree or disagree:		17.6%	28
Agree:		20.1%	32
Agree strongly:		3.8%	6
15.b. Is recognised and highly perceived by Government -- Do you:			
Disagree strongly:		14.5%	23
Disagree:		42.8%	68
Neither agree or disagree:		25.2%	40
Agree:		8.8%	14
Agree strongly:		8.8%	14
15.c. Is extravert -- Do you:			
Disagree strongly:		10.7%	17
Disagree:		42.1%	67
Neither agree or disagree:		34.6%	55
Agree:		8.2%	13
Agree strongly:		4.4%	7
15.d. Is leading the debate in issues where civil engineering has a key role to play -- Do you:			
Disagree strongly:		6.9%	11
Disagree:		35.8%	57
Neither agree or disagree:		27.7%	44
Agree:		22.6%	36
Agree strongly:		6.9%	11
15.e. Collaborates and is well connected internationally -- Do you:			
Disagree strongly:		1.3%	2
Disagree:		11.9%	19
Neither agree or disagree:		27.0%	43
Agree:		46.5%	74
Agree strongly:		13.2%	21
15.f. Is attractive to industry -- Do you:			
Disagree strongly:		3.1%	5
Disagree:		20.1%	32
Neither agree or disagree:		35.2%	56
Agree:		34.0%	54
Agree strongly:		7.5%	12
15.g. Has a portfolio that has the appropriate balance between incremental and transformative			

research -- Do you:			
Disagree strongly:		6.3%	10
Disagree:		29.6%	47
Neither agree or disagree:		30.8%	49
Agree:		27.0%	43
Agree strongly:		6.3%	10
15.h. Is undertaking research that is exciting and stimulating -- Do you:			
Disagree strongly:		4.4%	7
Disagree:		15.1%	24
Neither agree or disagree:		26.4%	42
Agree:		41.5%	66
Agree strongly:		12.6%	20
15.i. Is undertaking research that is relevant to the socio-economic needs of the UK and worldwide -- Do you:			
Disagree strongly:		1.9%	3
Disagree:		13.8%	22
Neither agree or disagree:		26.4%	42
Agree:		34.0%	54
Agree strongly:		23.9%	38
15.j. Is interdisciplinary and working across silos -- Do you:			
Disagree strongly:		6.9%	11
Disagree:		23.9%	38
Neither agree or disagree:		35.8%	57
Agree:		26.4%	42
Agree strongly:		6.9%	11
15.k. Is making a real socio-economic impact -- Do you:			
Disagree strongly:		3.1%	5
Disagree:		20.1%	32
Neither agree or disagree:		36.5%	58
Agree:		28.9%	46
Agree strongly:		11.3%	18
15.l. Is adapting to tackle the key socio-economic challenges faced by the UK and worldwide -- Do you:			
Disagree strongly:		1.9%	3
Disagree:		22.0%	35

Neither agree or disagree:		31.4%	50
Agree:		32.7%	52
Agree strongly:		11.9%	19
15.m. Has a strong sense of community -- Do you:			
Disagree strongly:		5.0%	8
Disagree:		22.0%	35
Neither agree or disagree:		25.2%	40
Agree:		36.5%	58
Agree strongly:		11.3%	18

Section 7: Key Research Challenges in Ground and Structural Engineering

16. What research areas or challenges do you feel are currently the most important ones that ground and structural engineering researchers should be working on? For example, these might be areas of particular socio-economic need. Please list concisely as many areas as you can (maximum of 3).

Section 8: Request for Case Studies

17. As part of this review, EPSRC is looking for examples where research in civil engineering (particularly that supported by EPSRC) has had a significant impact on the UK society or economy. An example is the introduction into practice of geogrid ground reinforcement technology following an EPSRC-supported programme of research in the early 1980s (see: <http://www.jubilee-symposium.co.uk>). Do you have an example of where research in ground and structural engineering has significantly transformed civil engineering practice? Please give details here and, if possible, references or contact details that could be used to find out more.

2. Questions and Quantitative Results of the Industry Survey

Section 1: Contact details

1. If you would like to be sent a link to the results of this questionnaire, and the review itself, when they are published please enter your email address in the box below.

Section 2: Your Expertise



2. In which area would you say your primary expertise lies? Please tick only one box.

Ground and Geotechnical Engineering (including soil and rock mechanics, ground reinforcements, tunnelling, slopes and embankments, pavement engineering):	<input checked="" type="checkbox"/>	31.3%	21
Structural Engineering (including structural design, construction materials, load and impact assessments, structural dynamics, health monitoring, fire and blast engineering):	<input checked="" type="checkbox"/>	49.3%	33
Other (<i>please specify</i>):	<input type="checkbox"/>	19.4%	13

3. Which type of organisation do you work in?











Engineering consultancy:	<input checked="" type="checkbox"/>	50.7%	34
Architects' practice:	<input type="checkbox"/>	1.5%	1
Contractor:	<input type="checkbox"/>	10.4%	7
House builder:	<input type="checkbox"/>	0.0%	0
Component supplier:	<input type="checkbox"/>	7.5%	5
Other technical service supplier:	<input type="checkbox"/>	7.5%	5
Membership organisation, professional or trade body:	<input type="checkbox"/>	1.5%	1
Research organisation:	<input type="checkbox"/>	4.5%	3
Charity:	<input type="checkbox"/>	0.0%	0
Government department or agency:	<input type="checkbox"/>	9.0%	6
Local Authority:	<input type="checkbox"/>	0.0%	0
Other (<i>please specify</i>):	<input type="checkbox"/>	7.5%	5

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4. What is the size of the organisation you work for?			
Small (<250 employees):		20.9%	14
Large (>250 employees):		79.1%	53

Section 3: Academic Collaborations

5. Have you or your colleagues collaborated with, or supported research done by, UK academic researchers in the last 10 years? Please indicate which disciplines the researchers belonged to. Please tick as many boxes as apply. Note: the disciplines are based on the programme and sub-programme classifications used by EPSRC. Full definitions can be found at: http://www.epsrc.ac.uk/CMSWeb/Downloads/Other/PES_Combine.pdf and <http://www.epsrc.ac.uk/AboutEPSRC/landscapes/default.htm>




Ground and Structural Engineering:		n/a	46
Built Environment (including urban, building and building service design, construction management and processes):		n/a	19
Electrical and Power Systems Engineering:		n/a	7
Transportation Operations and Management (including traffic monitoring and scheduling):		n/a	8
Process Engineering (including chemical engineering):		n/a	7
Water and Coastal Engineering (including water resource management and treatment, waterway engineering and coastal defences):		n/a	10
Waste and Pollution (including assessment and remediation of contaminated land and groundwater, waste management and waste treatment):		n/a	15
Energy (technologies for renewable energy generation):		n/a	16
Information and Communications Technology:		n/a	8
Research Infrastructure		n/a	4

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(including high performance computing):			
Materials, Mechanical and Medical Engineering:		n/a	24
Mathematical Sciences:		n/a	3
Physical Sciences (fundamental chemistry and physics):		n/a	3
Other (please specify):		n/a	8




6. What would you consider to be the main barriers to industry undertaking research in collaboration with, or supporting research within, academia?

6.a. The construction sector has limited budgets for R&D projects. -- In your opinion, this is:

Not a barrier:		7.5%	5
A minor barrier:		32.8%	22
A major barrier:		59.7%	40




6.a.i. Comments (optional)

6.b. The construction sector has strict time constraints for R&D projects. -- In your opinion, this is:

Not a barrier:		11.9%	8
A minor barrier:		44.8%	30
A major barrier:		43.3%	29




6.b.i. Comments (optional)

6.c. There are cultural barriers to innovation within the construction sector. The sector has governance procedures concerned with robustness, reliability, insureability and compliance with regulation, and therefore tends to be conservative and slow to change. -- In your opinion, this is:

Not a barrier:		16.4%	11
A minor barrier:		34.3%	23
A major barrier:		49.3%	33




6.c.i. Comments (optional)





















6.d. The requirements of academia to produce publishable results and industry's need for immediate relevance to practice and/or confidentiality can be difficult for collaborating partners to balance. -- In your opinion, this is:

Not a barrier:		13.4%	9
A minor barrier:		59.7%	40
A major barrier:		26.9%	18

6.d.i. Comments (optional)

6.e. Academic researchers can have a lack of practical experience and knowledge of how industry works in practice. -- In your opinion, this is:





Not a barrier:		16.4%	11
A minor barrier:		61.2%	41
A major barrier:		22.4%	15

6.e.i. Comments (optional)			
6.f. There is significant time and effort involved in making, developing and sustaining contact between the collaborating partners. -- In your opinion, this is:			
Not a barrier:		22.4%	15
A minor barrier:		53.7%	36
A major barrier:		23.9%	16
6.f.i. Comments (optional)			
6.g. Agreement around the ownership of any intellectual property generated by shared research activity can be difficult to reach. -- In your opinion, this is:			
Not a barrier:		22.4%	15
A minor barrier:		62.7%	42
A major barrier:		14.9%	10
6.g.i. Comments (optional)			
6.h. Industry can lack awareness of appropriate academics and academic centres of excellence for collaboration. -- In your opinion, this is:			
Not a barrier:		23.9%	16
A minor barrier:		53.7%	36
A major barrier:		22.4%	15
6.h.i. Comments (optional)			
6.i. Other (please specify) -- In your opinion, this is:			
Not a barrier:		64.2%	43
A minor barrier:		22.4%	15
A major barrier:		13.4%	9
6.i.i. Comments (optional)			
7. From question 6 above, which would you say is the most significant barrier to industry supporting or collaborating with academic research?			
a. Limited budgets:		43.3%	29
b. Strict time constraints:		14.9%	10
c. Cultural barriers to innovation:		13.4%	9
d. Conflicting requirements:		7.5%	5
e. Lack of industrial awareness:		9.0%	6
f. Making and developing contacts:		4.5%	3
g. Agreement over IP:		0.0%	0
h. Lack of awareness of academia:		4.5%	3
i. Other:		3.0%	2

Section 4: The Need for Academic Research in Ground and Structural Engineering






8. From an industrial perspective, what would you say is the need for academic research in ground and structural engineering? Please state to what degree you agree with the statements below.

8.a. Academic research is needed to fully understand the principles involved in new technologies, practices and innovations developed and pioneered by industry, e.g., whether they have performed as expected and what is their range of applicability. -- Do you:

Disagree strongly:		0.0%	0
Disagree:		6.0%	4
Neither agree or disagree:		11.9%	8
Agree:		52.2%	35
Agree strongly:		29.9%	20






8.a.i. Clarifying comments (optional)

8.b. Academic research involving PhD or Masters students is important to the training of future employees of industry. -- Do you:

Disagree strongly:		1.5%	1
Disagree:		11.9%	8
Neither agree or disagree:		17.9%	12
Agree:		50.7%	34
Agree strongly:		17.9%	12






8.b.i. Clarifying comments (optional)

8.c. Academic research is required to develop new technologies, materials or methods that may or may not eventually be used in practice. -- Do you:

Disagree strongly:		1.5%	1
Disagree:		3.0%	2
Neither agree or disagree:		9.0%	6
Agree:		40.3%	27
Agree strongly:		46.3%	31

8.c.i. Clarifying comments (optional)




















8.d. Academic research is required to address the long-term challenges facing the UK and beyond (e.g. climate change) that are outside the short-term focus of a competitive industry. -- Do you:

Disagree strongly:		1.5%	1
Disagree:		1.5%	1
Neither agree or disagree:		9.0%	6
Agree:		32.8%	22
Agree strongly:		55.2%	37






8.d.i. Clarifying comments (optional)

8.e. Academic research is required to develop understanding of the fundamental engineering principles employed in practice by industry. -- Do you:

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Disagree strongly:		0.0%	0
Disagree:		13.4%	9
Neither agree or disagree:		16.4%	11
Agree:		35.8%	24
Agree strongly:		34.3%	23
8.e.i. Clarifying comments (optional)			
8.f. Academic research is needed in specific research areas as and when dictated by the needs of the industry. -- Do you:			
Disagree strongly:		1.5%	1
Disagree:		9.0%	6
Neither agree or disagree:		23.9%	16
Agree:		37.3%	25
Agree strongly:		28.4%	19
8.f.i. Clarifying comments (optional)			
8.g. Academic research is needed to contribute to the development of new and existing design codes and regulations. -- Do you:			
Disagree strongly:		0.0%	0
Disagree:		9.0%	6
Neither agree or disagree:		20.9%	14
Agree:		40.3%	27
Agree strongly:		29.9%	20
8.g.i. Clarifying comments (optional)			
8.h. Other (please specify) -- Do you:			
Disagree strongly:		9.0%	6
Disagree:		0.0%	0
Neither agree or disagree:		73.1%	49
Agree:		4.5%	3
Agree strongly:		13.4%	9
8.h.i. Clarifying comments (optional)			
9. From question 8 above, from an industrial perspective, what would you say constitutes the primary requirement for academic research in ground and structural engineering?			
a. To fully understand the principles behind new technologies developed by industry:		6.0%	4
b. As training for future employees:		6.0%	4






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c. To develop new technologies and methods:		38.8%	26
d. To address longer term challenges:		11.9%	8
e. To develop fundamental understanding:		22.4%	15
f. To undertake research dictated by industry:		11.9%	8
g. To contribute to the development of codes and regulations:		3.0%	2
h. Other:		0.0%	0






Section 5: Ground and Structural Engineering Research in the UK

10. A working group of UK engineering researchers and practitioners, assembled by EPSRC to guide this review, identified a number of characteristics that they felt the UK ground and structural engineering research community should have.






10.a. Is recognised and highly perceived by the public -- Do you:

Disagree strongly:		20.9%	14
Disagree:		47.8%	32
Neither agree or disagree:		17.9%	12
Agree:		9.0%	6
Agree strongly:		4.5%	3


10.b. Is recognised and highly perceived by Government -- Do you:

Disagree strongly:		10.4%	7
Disagree:		32.8%	22
Neither agree or disagree:		31.3%	21
Agree:		20.9%	14
Agree strongly:		4.5%	3



























10.c. Is extravert -- Do you:






















Disagree strongly:		14.9%	10
Disagree:		34.3%	23
Neither agree or disagree:		40.3%	27
Agree:		9.0%	6
Agree strongly:		1.5%	1

10.d. Is leading the debate in issues where civil engineering has a key role to play -- Do you:

Disagree strongly:		7.5%	5
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Disagree:		31.3%	21
Neither agree or disagree:		32.8%	22
Agree:		20.9%	14
Agree strongly:		7.5%	5
10.e. Collaborates and is well connected internationally -- Do you:			
Disagree strongly:		1.5%	1
Disagree:		1.5%	1
Neither agree or disagree:		31.3%	21
Agree:		49.3%	33
Agree strongly:		16.4%	11
10.f. Is attractive to industry -- Do you:			
Disagree strongly:		1.5%	1
Disagree:		14.9%	10
Neither agree or disagree:		43.3%	29
Agree:		29.9%	20
Agree strongly:		10.4%	7
10.g. Is undertaking research that has the appropriate balance between incremental and more creative, adventurous and potentially transformative research -- Do you:			
Disagree strongly:		0.0%	0
Disagree:		13.4%	9
Neither agree or disagree:		50.7%	34
Agree:		23.9%	16
Agree strongly:		11.9%	8
10.h. Is undertaking research that is exciting and stimulating -- Do you:			
Disagree strongly:		1.5%	1
Disagree:		14.9%	10
Neither agree or disagree:		41.8%	28
Agree:		34.3%	23
Agree strongly:		7.5%	5
10.i. Is undertaking research that is relevant to the socio-economic needs of the UK and worldwide -- Do you:			
Disagree strongly:		0.0%	0
Disagree:		6.0%	4
Neither agree or disagree:		46.3%	31
Agree:		38.8%	26

Agree strongly:		9.0%	6
10.j. Is interdisciplinary and working across traditional discipline boundaries -- Do you:			
Disagree strongly:		1.5%	1
Disagree:		19.4%	13
Neither agree or disagree:		35.8%	24
Agree:		37.3%	25
Agree strongly:		6.0%	4
10.k. Is making a real impact on society and the economy -- Do you:			
Disagree strongly:		4.5%	3
Disagree:		16.4%	11
Neither agree or disagree:		50.7%	34
Agree:		25.4%	17
Agree strongly:		3.0%	2
10.l. Is adapting to tackle the key socio-economic challenges faced by the UK and worldwide -- Do you:			
Disagree strongly:		4.5%	3
Disagree:		19.4%	13
Neither agree or disagree:		38.8%	26
Agree:		34.3%	23
Agree strongly:		3.0%	2
10.m. Has a strong sense of community -- Do you:			
Disagree strongly:		1.5%	1
Disagree:		11.9%	8
Neither agree or disagree:		40.3%	27
Agree:		44.8%	30
Agree strongly:		1.5%	1

Section 6: Key Research Challenges in Ground and Structural Engineering

11. What research areas or challenges do you feel are currently the most important ones that UK academic ground and structural engineering researchers should be working on? For example, these might be areas of particular socio-economic need. Please list concisely as many areas as you can (maximum of 3).

Section 7: Request for Case Studies

12. As part of this review, EPSRC is looking for examples where research in civil engineering (particularly that supported by EPSRC) has had a significant impact on the UK society or

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economy. An example is the introduction into practice of geogrid ground reinforcement technology following an EPSRC-supported programme of research in the early 1980s (see: <http://www.jubilee-symposium.co.uk>). Do you have an example of where academic research in ground and structural engineering has significantly transformed civil engineering practice? Please give details here and, if you can, references or contact details that could be used to find out more.




3. Questions and Quantitative Results of the International Survey

Section 1: Contact details





1. If you would like to be sent a link to the results of this questionnaire, and the review itself, when they are published please enter your email address in the box below.

Section 2: Your Expertise




2. In which area would you say your primary expertise lies?

Ground and Geotechnical Engineering (including soil and rock mechanics, ground reinforcements, tunnelling, slopes and embankments, pavement engineering):		68.6%	24
Structural Engineering (including structural design, construction materials, load and impact assessments, structural dynamics, fire and blast engineering):		25.7%	9
Other (<i>please specify</i>):		5.7%	2

3. Where are you based?

North America:		65.7%	23
South America:		0.0%	0
Europe:		14.3%	5
Asia:		17.1%	6
Africa:		0.0%	0
Australia:		2.9%	1

4. How would you rate your awareness of UK academic research in ground and structural engineering research?

Unaware:		2.9%	1
Relatively low:		37.1%	13
Relatively high:		60.0%	21

Section 3: Your Perceptions of Ground and Structural Engineering Research in the UK

5. In your opinion, how does UK academic research in the area of ground and structural engineering compare to the rest of the world?

Lower than average:		2.9%	1
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About average:		17.1%	6
Higher than average:		54.3%	19
Internationally leading:		25.7%	9

6. How does the international standing of the UK university research in the area of ground and structural engineering compare with the situation 10 years ago?

Much worse:		0.0%	0
Worse:		20.0%	7
About the same:		65.7%	23
Better:		11.4%	4
Much better:		2.9%	1

7. If you were to imagine the most prestigious, international conference in the area of ground and structural engineering as a whole, and were to nominate 5 keynote speakers for the event, how many would be based at UK academic institutions?

None:		11.4%	4
One:		60.0%	21
Two:		25.7%	9
Three:		2.9%	1
Four:		0.0%	0
Five:		0.0%	0

8. A working group of UK engineering researchers and practitioners, assembled by EPSRC to guide this review, identified a number of characteristics that they felt the UK ground and structural engineering research community should have.

8.a. Is recognised and highly perceived by the UK public -- Do you:

Disagree strongly:		5.7%	2
Disagree:		17.1%	6
Neither agree or disagree:		62.9%	22
Agree:		14.3%	5
Agree strongly:		0.0%	0


























8.b. Is recognised and highly perceived by the UK Government -- Do you:

Disagree strongly:		2.9%	1
Disagree:		11.4%	4
Neither agree or disagree:		60.0%	21
Agree:		25.7%	9
Agree strongly:		0.0%	0
























8.c. Is extravert -- Do you:

Disagree strongly:		0.0%	0
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Disagree:		17.1%	6
Neither agree or disagree:		65.7%	23
Agree:		14.3%	5
Agree strongly:		2.9%	1
8.d. Is leading the debate in issues where civil engineering has a key role to play -- Do you:			
Disagree strongly:		0.0%	0
Disagree:		22.9%	8
Neither agree or disagree:		45.7%	16
Agree:		25.7%	9
Agree strongly:		5.7%	2
8.e. Collaborates and is well connected internationally -- Do you:			
Disagree strongly:		2.9%	1
Disagree:		17.1%	6
Neither agree or disagree:		20.0%	7
Agree:		37.1%	13
Agree strongly:		22.9%	8
8.f. Is attractive to industry -- Do you:			
Disagree strongly:		0.0%	0
Disagree:		5.7%	2
Neither agree or disagree:		40.0%	14
Agree:		31.4%	11
Agree strongly:		22.9%	8
8.g. Has a portfolio that has the appropriate balance between incremental and more adventurous, creative, "transformative" research -- Do you:			
Disagree strongly:		2.9%	1
Disagree:		14.3%	5
Neither agree or disagree:		37.1%	13
Agree:		34.3%	12
Agree strongly:		11.4%	4
8.h. Is undertaking research that is exciting and stimulating -- Do you:			
Disagree strongly:		0.0%	0
Disagree:		17.1%	6
Neither agree or disagree:		20.0%	7
Agree:		51.4%	18

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Agree strongly:		11.4%	4
8.i. Is undertaking research that is relevant to the needs of society and the economy in the UK and abroad -- Do you:			
Disagree strongly:		0.0%	0
Disagree:		11.4%	4
Neither agree or disagree:		25.7%	9
Agree:		48.6%	17
Agree strongly:		14.3%	5
8.j. Is interdisciplinary and working across traditional discipline boundaries -- Do you:			
Disagree strongly:		0.0%	0
Disagree:		20.0%	7
Neither agree or disagree:		37.1%	13
Agree:		34.3%	12
Agree strongly:		8.6%	3
8.k. Is making a real impact on society and the economy -- Do you:			
Disagree strongly:		0.0%	0
Disagree:		17.1%	6
Neither agree or disagree:		34.3%	12
Agree:		45.7%	16
Agree strongly:		2.9%	1
8.l. Is adapting to tackle the key challenges faced by society and the economy worldwide -- Do you:			
Disagree strongly:		2.9%	1
Disagree:		17.1%	6
Neither agree or disagree:		40.0%	14
Agree:		37.1%	13
Agree strongly:		2.9%	1
8.m. Has a strong sense of community -- Do you:			
Disagree strongly:		5.7%	2
Disagree:		2.9%	1
Neither agree or disagree:		51.4%	18
Agree:		34.3%	12
Agree strongly:		5.7%	2

9. In the space below, please give any clarifying comments about your answers to questions 5 to 8 above.

Section 4: International Collaboration

10. Have you undertaken collaborative research in partnership with academic researchers overseas within the last 10 years?




Yes:		71.4%	25
No:		28.6%	10

11. Have you undertaken collaborative research in partnership with academic researchers in the UK within the last 10 years?

Yes:		45.7%	16
No:		54.3%	19




12. What would you consider to be the main barriers to undertaking research in collaboration with academic researchers overseas?

12.a. There is a lack of incentives for undertaking collaborative research with institutions overseas. -- In your opinion, is this:

Not a barrier:		34.3%	12
A minor barrier:		51.4%	18
A major barrier:		14.3%	5




12.a.i. Comments (optional)

12.b. There is a lack of external funding and support mechanisms for collaborative research with institutions overseas. -- In your opinion, is this:

Not a barrier:		2.9%	1
A minor barrier:		20.0%	7
A major barrier:		77.1%	27




12.b.i. Comments (optional)

12.c. There are language and cultural barriers to undertaking overseas collaborations. -- In your opinion, is this:

Not a barrier:		65.7%	23
A minor barrier:		31.4%	11
A major barrier:		2.9%	1


12.c.i. Comments (optional)

12.d. There is lack of support for overseas collaboration within academic institutions. -- In your opinion, is this:












Not a barrier:		25.7%	9
A minor barrier:		28.6%	10
A major barrier:		45.7%	16







12.d.i. Comments (optional)

12.e. There is a lack of time available for overseas collaboration. -- In your opinion, is this:


Not a barrier:		25.7%	9
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A minor barrier:		54.3%	19
A major barrier:		20.0%	7
12.e.i. Comments (optional)			
12.f. There is a lack of information about opportunities to collaborate with overseas institutions. -- In your opinion, is this:			
Not a barrier:		17.1%	6
A minor barrier:		28.6%	10
A major barrier:		54.3%	19
12.f.i. Comments (optional)			
12.g. Personal and family situations are a barrier to spending time overseas. -- In your opinion, is this:			
Not a barrier:		31.4%	11
A minor barrier:		51.4%	18
A major barrier:		17.1%	6
12.g.i. Comments (optional)			
12.h. Other (please specify) -- In your opinion, is this:			
Not a barrier:		71.4%	25
A minor barrier:		14.3%	5
A major barrier:		14.3%	5
12.h.i. Comments (optional)			

13. From question 12 above, what would you say is the most significant barrier to overseas collaboration?			
a. Lack of incentives:		8.6%	3
b. Lack of funding mechanisms:		62.9%	22
c. Language and cultural barriers:		0.0%	0
d. Lack of support within academic institutions:		0.0%	0
e. Lack of time:		5.7%	2
f. Lack of information about opportunities:		17.1%	6
g. Personal situation:		2.9%	1
h. Other:		2.9%	1

Section 5: Industrial Collaboration

14. Have you undertaken research supported by, or in collaboration with, non-academic organisations within the last 10 years?			
Yes:		68.6%	24

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No:		31.4%	11
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15. If you answered "yes" to question 14, which types of non-academic organisations were they? Please tick as many boxes as relevant.

Engineering consultancy:		n/a	18
Architects' practice:		n/a	0
Contractor:		n/a	9
House builder:		n/a	1
Component supplier:		n/a	4
Other technical service supplier:		n/a	3
Membership organisation, professional or trade body:		n/a	7
Research organisation:		n/a	12
Charity:		n/a	2
Government department or agency:		n/a	17
Local Authority:		n/a	8
Other:		n/a	0

16. What would you consider to be the main barriers to undertaking research in collaboration with, or supported by, companies in the construction sector?

16.a. The construction sector has limited budgets for R&D projects. -- In your opinion, is this:

Not a barrier:		5.7%	2
A minor barrier:		22.9%	8
A major barrier:		71.4%	25

16.a.i. Comments (optional)

16.b. The construction sector has strict time constraints for R&D projects. -- In your opinion, is this:

Not a barrier:		8.6%	3
A minor barrier:		54.3%	19
A major barrier:		37.1%	13






















16.b.i. Comments (optional)

16.c. There are cultural barriers to innovation within the construction sector. The sector has governance procedures concerned with robustness, reliability, insureability and compliance with regulation, and therefore tends to be conservative and slow to change. -- In your opinion, is this:

Not a barrier:		20.0%	7
A minor barrier:		28.6%	10
A major barrier:		51.4%	18

16.c.i. Comments (optional)

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16.d. The requirements of academia to produce publishable results and industry's need for immediate relevance to practice and/or confidentiality can be difficult for collaborating partners to balance. -- In your opinion, is this:			
Not a barrier:		11.4%	4
A minor barrier:		45.7%	16
A major barrier:		42.9%	15
16.d.i. Comments (optional)			
16.e. Academic researchers can have a lack of practical experience and knowledge of how industry works in practice. -- In your opinion, is this:			
Not a barrier:		20.0%	7
A minor barrier:		48.6%	17
A major barrier:		31.4%	11
16.e.i. Comments (optional)			
16.f. There is significant time and effort involved in making, developing and sustaining contact between the collaborating partners. -- In your opinion, is this:			
Not a barrier:		17.1%	6
A minor barrier:		45.7%	16
A major barrier:		37.1%	13
16.f.i. Comments (optional)			
16.g. Agreement around the ownership of any intellectual property generated by shared research activity can be difficult to reach. -- In your opinion, is this:			
Not a barrier:		11.4%	4
A minor barrier:		65.7%	23
A major barrier:		22.9%	8
16.g.i. Comments (optional)			
16.h. Other (please specify) -- In your opinion, is this:			
Not a barrier:		77.1%	27
A minor barrier:		11.4%	4
A major barrier:		11.4%	4
16.h.i. Comments (optional)			
17. From question 16 above, what would you say is the most significant barrier to collaboration with industry?			
a. Limited budgets:		42.9%	15
b. Strict time constraints:		8.6%	3
c. Cultural barriers to innovation:		22.9%	8
d. Conflicting requirements:		14.3%	5
e. Lack of industrial awareness:		5.7%	2
f. Making and		5.7%	2

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developing contacts:			
g. Agreement over IP:		0.0%	0
h. Other:		0.0%	0

Section 6: Key Research Challenges in Ground and Structural Engineering

18. What research areas or challenges do you feel are currently the most important ones that ground and structural engineering researchers should be working on? For example, these might be areas of particular socio-economic need. Please list concisely as many areas as you can (maximum of 3).

4. Text box responses to Academic Survey

Section 2: Your Expertise

2. What is your academic position?

Other (please specify):

Associate Professor
Emeritus Professor
Emeritus Professor
Emeritus Professor
Principal Research Fellow
Research fellow - 5yr post to Academic
Researcher (permanent contract)
Senior Research Fellow. Emeritus Prof.

3. In which area would you say your primary expertise lies? Please tick only one box.

Other (please specify):

analytical chemistry
Computer Aided Engineering
earthquakes, seismic hazard and risk, soil amplification
Engineering Geology
engineering surveying / deformation monitoring
Geoinformatics
Geomatics
Geomatics/land surveying
marine structures and materials
mechanical engineering
Road Asset Management
Surveying
Wastewater Treatment,

Section 3: Academic Collaborations

4. With researchers from which disciplines, apart from your own, have you collaborated on research projects in the past 10 years? Please tick as many boxes as relevant.

Other (please specify):

architecture

Architecture and Planning
Automatic Control and Systems Engineering
biomechanics
British Army
Depends upon what you mean - a lot of collaboration occurs at an informal or management level, rather than within individual research projects.
DFID
Earth Science
Earth Sciences (NERC)
engineering geology, eng seismology, safety to NPPs etc
Fire Engineering
Food engineering
Forestry
Geography, ESRC
Geology
marine ecology
Natural Environment Research Council
NERC
NERC - ecologists; human geographers; sociologists working in the SUE Programme; designers; planners
Never collaborated
No research - new to academia from practice.
NSF NEES
Psychology
Social Sciences
soil scientists, Geographers
UKERC

5. What would you consider to be the barriers to undertaking research in collaboration with researchers from other disciplines, or undertaking research in multidisciplinary areas?

5.a.i. Traditional academic career paths: Gaining recognition and reputation within academia is usually centred around traditional disciplines. Multidisciplinary working is risky in terms of future career progression. -- Comments (optional)

Essential for progress
I do not really see it as a major barrier, but a factor that does not encourage me to look for multidisciplinary projects. It is in my opinion not always desirable, as to become an expert in one specialist field requires a lot of dedicated research to that field.
I don't think this is an issue any more, we have been encouraging multidisciplinary work for years
Interdisciplinary research outputs (i.e. physical geography) have not always been perceived as

being important/beneficial within a civil engineering department
It is getting better, but one really needs both depth and breadth - it is easier for an established researcher to work across disciplines.
Multi-disciplinary work is encouraged by research funding bodies, and in my opinion is the way forward to advance science. Yet...when professorships are advertised at Universities, they are normally in one specific area, and if one has an excellent range of publications and funding in multi-disciplinary work, but not specialised in an area, it is looked upon negatively by most University employers as one is thought of as a jack-of-all-trades, master-of none !
Must be able to deliver evidence of excellence from collaborations
Not a barrier to me, but may be seen this way by others (see point h below)
Provided the right individuals are involved
Research-led Unis are acutely aware of the need for multidisciplinary work
Researcher can be too focused
Sometimes academics who involve themselves outside their own field are seen as "spreading themselves too thinly"
There is a greater expectation of multidisciplinary work from younger colleagues therefore this is not likely to present a big hurdle
This depends on the attitude of the employer . At the start of a career it could be a major barrier; it should become less as researchers become more established.

**5.b.i. Emerging disciplines: It can be difficult for multi-disciplinary fields to gain recognition because multi-disciplinary work is not promoted in the RAE assessment or by mainstream academic conferences and journals. --
Comments (optional)**

Again, great care in providing evidence of impact is needed
Although the option existed to refer to other UoA's in the RAE 2008 truly multi-disciplinary work does not fit easily into the assessment structure
EPSRC themselves are guilty of pigeonholing research into narrow themes. I'm a chemist working on civil engineering materials. There is scant mention of materials even within the Ground and Structural Engineering theme, and no mention at all of construction within the MMME programme.
For the same reasons as above this is not a major barrier
I certainly faced this initially with my work
I don't think we should conduct our research based on what RAE wants
It is harder to make an impact
Lots of work is published in journals of related disciplines, and RAE is never the sole driver
Not true
papers in emerging discipline journals don't have a high impact factor because there are not so many citations
Research at interfaces is often difficult to assess partly because of the need to have REF Panels that focus on the majority of the core subjects within a discipline. Further, the incoming REF could make it worse for engineering as it will be treated as one subject.
This is a major problem given the aggressive attitude of many universities to regular publication in relevant areas.
We managed to place multidisciplinary work successfully in our RAE case

5.c.i. Recruitment and training: Finding and retaining interdisciplinary researchers with the required mix of skills is difficult. Training is predominantly single discipline based. -- Comments (optional)

Careful team selection is essential
Finding post-doctoral level researchers exactly in the area of your research is near impossible, best way is increased funding for PhD positions so that young graduates can be trained appropriately
It is a declining problem
Maybe our research group has been lucky, but we have been able to recruit very string researchers from other disciplines, particularly Mathematics
Not true
Researchers are primarily from one field. Typically, there'll be 2 researchers working on such projects.
There does not seem to be a desire to recruit such persons
This is true, but there are people who find the challenge of working outside a single discipline exciting and challenging, and these people are less set in their ways than those making their way up an academic ladder.
This is very difficult - you need access to non-traditional recruiting areas.
We employ a large number of our own graduates who have been educated to have a broad outlook, not the traditional 'scientific' blinkers. IT's communication between disciplines that counts, not mutiple training of individuals
We have a multidisciplinary culture and are used to training people from single disciplinary backgrounds. They just need to have the right attitude.
Well if you are going to do interdisciplinary work you want to make sure the other person knows what they are doing, not a someone who is a jack of all trades and master of none

5.d.i. Working with other disciplines: Multi-disciplinary working requires long start-up times and costs, especially if there is no prior history of working together. Obstacles include language barriers, differing research methodologies, and the need to build trust. -- Comments (optional)

Absolutely - one really needs to invest one's time and energies. Very rewarding when done, but it is a barrier ... or an exciting opportunity
Academics no longer have the time to carry out exploratory discussions with researchers in other disciplines - the best results come from this sort of discussion rather than 'managed' discussions that often lead to 'managed' incremental results
Difficuties overstated
I haven't found this a problem
If your research strategy is basedd on promotion of this type of work these obstacles can be reduced.
In today's academia it is diffiuctl to get enough time to engage with researchers from other fields fully. This is mainly due to pressure for producing quick outputs and lack of recognision that for exploting multi-displinary collaboration fully a lot of up-front work is required, if the aim is to produce good quality outputs. Instead, a lot of superficial papers/collaborations are going on, since there is no enough time for anything better than that. This is not good use of resources and fundings currently provided to the profession.
It is a barrier but can be overcome if there is a will

language can be a problem but mostly it comes down to personalities and a willingness to collaborate
Long start up time is a problem with all research council funded work as the entire system is such a horrendously inefficient way of supporting cutting-edge research - it is so slow it is an international laughing-stock.
Not a barrier if you have experience of handling these issues and recognise that it is part of building a m-d team.
This depends very much on personalities involved and their commitment to the cause
this is more time consuming than single discipline collaboration and other opportunities are less troublesome and therefore more attractive
This is no different to working with anybody else. It takes time to develop a relationship.
This is, however, not specific to multi-disciplinary work. Building trust *always* takes time.
This simply takes longer, but is very rewarding

5.e.i. Research methodology: There are difficulties in identifying and using the correct research methodologies from various disciplines. -- Comments (optional)

A challenge not a barrier
ditto
If research methodologies can be made part of the research programme or worked on in pilot projects this barrier can be minor
One has to rely on the expertise of one's partners, and understanding their methods. It should not be a question of defining methodologies from outside one's sphere of expertise ... which means that all of the necessary disciplines must be represented in the team.
Part of the fun of doing m-d, learning new methods and perspectives
Some centres are prescriptive of their needs and can cause dispute, hence delay.
This is one of the major advantages of working across groups - the different methodologies should fertilise an area.
This would only reveal a problem within a discipline, Engineering is more pragmatic than pure science, and I do not regard this as a problem.

5.f.i. Funding and peer review: For example, there is a tendency for silos between individual research councils and their peer review communities. Writing and reviewing multi-disciplinary proposals is difficult. -- Comments (optional)

A major problem, peer review across disciplines is difficult. REviewers may not understand the research properly, they may be conservative in their outlook.
Agree, research silos are rarely eager to support work from outsiders
experience shows that each community tends to give priority to funding for the pure discipline and look with suspicion on interdisciplinary attempts to access *their* funding
I don't understand what you mean by 'silo'. Plain English would be appreciated.
I have a good track record in grant applications to EPSRC and others (provided that a near-miss is regarded as "better" than a bad miss). In the case of multidisciplinary applications, however, I have never seen a reviewer's report that looked as though it was based on anything other than a single

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discipline mindset.. I could expand on this if required.
I think it must vbe hard to find reviewers for some multi-disciplinary work
In addition to the e.g. given in the question, EPSRC's multi-disciplinary calls tend to be very specific (Energy / Climate / etc.) so other remaining funds are under a lot of competition from those who want to work on single disciplinary topics.
In my experience this is the main challenge with inter-disciplinary research, proposals end up going to referees who are very silo centered
Money only seems to follow those who have had money before and have links to the funding councils via board membership. I view it very much as a cleique and you ahve to be in with the right people to be in the club
Outline proposals are particularly vulnerable
Peer review kills all multidisciplinary proposals as the synergy is never recognised: it is always assessed by 'single discipline' reviewers who are too narrow and focus only on 'their' bit. Since this - by definition - is not the totality of the proposal, it gets binned. Obvious, really - I've been telling you this for 10 years but no-one ever listens.
Sadly, this is a barrier. Suitably minded and articulate peer reviewers need to be selected, especially on the panels.
That is true I have just had problems with publishing a paper on corruption in the Hlghways sector and clearly the reviewer could not see why this was important!
The funding situation is a disaster. When the slightest excuse is used as a reason not to fund, multi-disciplinary proposals give more hostages to fortune.
The main problem is that the 'academic level' of the work being pursued does not necessarily need to be very high in each discipline (the main value with multidisciplinary working is that the results is more than the sum of its parts). However academic reviewers, who thrive on complexity, may often not appreciate this.
The major barrier is the reviewers of the grant application may obe only an expert in one of displines, and he/she may not recognise the values of the proposal
The need to gain glowing reviews from all three referees for a proposal to proceed to panel makes funding for multidisciplinary research very difficult to obtain. Invariably a multidisciplinary proposal goes to one referee who does not have a grounding in all aspects of a project, and since all that is required for a proposal to fail is the slightest doubt in a referee's comments, such multidisciplinary proposals face a huge hurdle.
The peerr review process is tricky. If a larger number of referees is drawn upon, there is scope for proposals to be marked down if a reviewer cannot appreciate the 'whole'. EPSRC is good at identifying the right reviewers, in general, but then they must rely on these people to respond. If they do not, then reviews can be unbalanced.
The skills of the reviewer need to be clearly identified by the applicant.
The transfer of techniques across disciplines is often not recognised by reviewers: Reviewers in one "silo" may criticise a technique as "old hat", when the innovation is that it is being applied to a new "silo".
There is natural suspicion from experts in an area about others coming in: they might, for instance, describe the research as 'naive'
This indeed is a big difficulty, reviews let's say are never fully objective and the more reviewers there are that don't really know the proposers well the poorer will be the reviews. I think the only fair way is to have paid international reviewers who donot have a stake in cake, so to speak
This is a long standing problem. The RC's have never been clear on how to handle research across different councils and how to select appropriate reviewers. The quality of the proposed research should be established first and who funds what proportion decided afterwards.
This is a major problem - the poor level of technical expertise shown by some of the reviewers
Too focused

true
While multi-disciplinarity is advocated by the research council, too often such proposals are not reviewed by people with multi-disciplinary skills/experience
Writing a good proposal in a single area is also difficult. There is a danger though that a joint proposal satisfies neither half's specialists and so gets shot down - the silo argument is powerful.

5.g.i. Cost: Multi-disciplinary working tends to be expensive, e.g., because multiple partners are often required, travel and logistical costs are higher, and problems can be intrinsically more complex. -- Comments (optional)

Again, I don't see that this is any different from one discipline projects with different partners.
But the benefits far outweigh the additional costs.
cost in extra (personal) time involved can be a major barrier
If the vision is good and the costs justified, then it should be no barrier.
If the work is considered good the marginal increase in cost is worth the greater investment. However, if each partner wants their cut the whole proposal might be very large and hog a large chunk of one panel's resources.
Not sure that is true
overstated
Particularly the cost of many PI/CI on a project in order to reflect the team balance
Start up/ exploratory money and, hence, time is almost non-existent.
The more "expensive" nature of multi-disciplinary work tends to reduce its chances of funding in a competitive market but there is also the issue of continuity for a research unit establishing a multi-disciplinary range of skills which make take considerable time and "internal" expense having no formal bridging funding mechanism
These can be obstacles but with careful planning can be overcome
This is not necessarily true, often good multidisciplinary projects can be developed within a single institution, and travel costs etc are quite low compared to overall grants
This should not be an issue, most of these points apply to any collaboration, not just multidisciplinary, and collaboration always makes sense.

5.h.i. Other (please specify) -- Comments (optional)

Administration costs
Being seen as parochial when those researchers in different disciplines happen to be from the same university, when it is easier to talk and work together often when co-located
Blue Skies research which is vital to the success of the UK is difficult to comply with the criteria tending to be followed by the RC's. Secondly in a fragmented sector like civil engineering (which accounts for about 11% GDP) it is hard to compete for the volume of funding with subjects like big science.
Calls for Proposals are very restrictive and don't easily lend themselves to structural engineering research.
community does not think "outside the box"
Competition between institutions for RAE recognition
Difficulties working across faculties in universities
Difficulty in finding good reviewers for papers/proposals

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EPSRC's deficient funds and fixations
finding appropriate partners
Finding someone who is open to collaboration with you, who you can trust and whose skills and interest complement your own is not easy. This is the biggest barrier.
Finding suitable researchers
Finding those capable people in other disciplines who are prepared to forsake tracks in which they have developed a good record (and in which continued success is relatively easy to secure) for tracks tangential or remote from their existing successes.
Getting Started having entered academia from a practice background.
I work in the field of cement and concrete research. This is an incredibly multidisciplinary field, quite separate from civil engineering, but necessarily working in conjunction with engineers. The community has always seen itself as sitting at the crossroads of a number of fields (materials, chemistry, physics, geology, environmental science, waste management, architecture, civil engineering, etc). However, the recent landscaping documents have given us the impression that, rather than being at a crossroads, we have fallen between the gaps.
Initiating collaboration
It is hard to establish reputation in multi-disciplinary research
It is worth saying that good multidisciplinary projects must develop organically rather than be forced.
lack of funding from government
lack of money and larger centres of excellence
lack of perceived need for multi-disciplinary research
lack of reserch momentum within University
lack of urgency in dealing with the coming together of impact of climate change, development of low carbon economy and shift in energy
Mindset of the individual researchers
Multi-disciplinary applications take more effort. When the odds against success are so high, and 'conventional' or 'fashionable' or 'politically favoured' work is seen as a safer bet, there is a strong disincentive to make the effort.
n/a
na
no other
No other comment
None
none
none
None - you have captured them well.
One needs to develop a track record for funding
Personal contacts and a willingness 'to think outside the box' are prerequisites for multi-disciplinary research.
Poor EPSRC refereeing procedures
Professoinal mind set and attitute of dis-respect to others
Proposals fall BETWEEN research councils and are reviewed by single-disciplinarians
Proposals shall be reviewed by international referees, rather than UK based.

Publishing multi-disciplinary work is difficult, right from writing the paper to finding a suitable journal and getting through review process
Publishing multidisciplinary papers is difficult due to 'silo' mentality of editors and established journals which are usually established for particular non-multidisciplinary areas; the more reputable journal, the longer it is in existence and the more likely is that it's editors and reviewers will not like intruders from other disciplines.
qwerty
should explain that my collaboration work is often not in field of "ground or structures" but eg as an informatics researcher
Sustaining funding from one project to the next
The consolidation of most money to a few institutions
The demand that you demonstrate value for money makes it difficult to invest effort into areas where the outcomes are uncertain
This question seems to presuppose that multidisciplinary working is a "good thing". It is true that there are some problems for which a multidisciplinary approach is sensible, but this can only occur if the core discipline has strength. The problem in the Civil area is that the core has been neglected.
time
Time needed to learn about other areas to a sufficient degree to be able to make a contribution
time spent on setting collaborations is the big issue
Time: finding time to get up to speed in a different area
Too much emphasis on getting large numbers of collaborators from different institutions rather than the "best" people in clearly complementary areas to work together. Too large a collaboration won't work - they need to focus on being small with matching skills.

Section 4: International Collaboration

8. What would you consider to be the main barriers to undertaking research in collaboration with academic researchers overseas?

8.a.i. There is a lack of incentives for undertaking collaborative research with institutions overseas. -- Comments (optional)

Different funding models means that it is research on the cheap.
I am interpreting incentives as being "non-economic" incentives
International collaboration is always perceived as being positive
It simply is not encouraged with the loading of the young lecturer these days
Motivation comes from personal goals, not from financial incentives or 'targets'
My multidisciplinary field of research is earthquake engineering, where collaboration overseas is absolutely essential, and I have coordinated the EU programme in this field during 1992-2006.
The majority of our funding has come from the EU
The time spent organising funding and arrangements can often be used to better short term advantage
This has changed for the better over the past 10 years

8.b.i. There is a lack of external funding and support mechanisms for collaborative research with institutions overseas. -- Comments (optional)

Apart from the EU Framework the funding mechanisms are few and far between
But with FRS and FReNG this is declining
Exchange rate risks (EU funding)
Funding (except EU) seldom crosses borders. So co-ordinating local funding contemporaneously in more than one country is almost bound to fail
funding tends to be for travelling only
Just applicable to South America and Africa
Not if you know where to look for it
practical support to cover sustained time away is often difficult
RAEng, for example, provides huge support for this, and travel for this purpose sits appropriately within EPSRC projects.
several mechanisms for travel but not so easy to fund actual research
support can be available but is often specific to certain countries
There are various opportunities for short visits, but funding for substantial research projects is much more limited.
There is a whole raft of EU schemes. NSF also has some.
There is no obvious route to access EPSRC funding with overseas partners.
Trying to raise funding from two countries as a joint grant is highly problematic.
You end up selecting partners according to the countries that are supported by programmes (China, India...) rather than selecting partners for their knowledge and expertise.

8.c.i. There are language and cultural barriers to undertaking overseas collaborations. -- Comments (optional)

more cultural rather than language
Most people abroad who want to get on speak English - so not a barrier for us.
Not much effort required.
Only some countries, but it can be a serious barrier in these countries.
Part of the fun and benefits of international collaboration - seeing things from new perspectives

8.d.i. There is lack of support for overseas collaboration within academic institutions in the UK. -- Comments (optional)

Depends what you want to do. Local policies can mean that academic visitors are under resourced in their host departments and can not work as effectively as they would if they had some access to experimental facilities.
Some people might mean that they find colleagues object to them abandoning other people to do the rest of the work of a department while they take extended periods overseas. However, I do not believe that genuine collaboration is ever a problem.
This can be overcome
Time working overseas can be time lost from career development at home institution

8.e.i. There is a lack of time available for overseas collaboration. -- Comments (optional)

Especially if you have to travel frequently.
FP7 call do not fit with the academic year! But you have to accept and work around this.
heavy teaching load
International collaborations are initiated and fostered through connections made at international conferences. My own department considers that a Conference paper take 20 hours of academic effort. It usually takes more time than this simply to travel to an international conference. Better to sit in one's office writing high quality journal papers (which are valued by RAE, and which are valued at 100 hours of effort by our Dept) than waste time in airport departure lounges. (NB: this is not MY opinion, but it ought to be the opinion of an ambitious young academic as a response to the internal and external drivers)
Not true, unless you imagine that university vacations are to be taken as holidays - which I know some people do!
see b
such time spent are not counted in RAE or REF

8.f.i. There is a lack of information about opportunities to collaborate with overseas institutions. -- Comments (optional)

All anyone has to do is ask - this would be a very feeble excuse!
EU funding is available for some projects, but the information is inaccessible.
You just have to look - might be an idea for EPSRC to hold a register of opportunities.

8.g.i. Personal and family situations are a barrier to spending time overseas. -- Comments (optional)

As a mother of 3 children i don't want to be away from them for more than a few days
For me this is a major concern
I have turned down invitations to take sabbaticals with research colleagues in USA, Singapore and South Africa over the last 5 years, due to having a young family, well settled in UK
It is for some team members
Obviously true for some individuals at some stages in their lives, but it does not take very much time at all to set up a collaboration. Extended visits to other institutions are only sometimes necessary.
This is a real problem. Partners have jobs so cannot come with you so you cannot go away for extended periods of time

8.h.i. Other (please specify) -- Comments (optional)

Again, well captured
Bilateral or multilateral schemes covering important traditional (Nth America/Japan) and emerging centres (China/India) focus on travel and exchange funding and not actual research projects
Bureaucracy and administrative time
Costs to Institution of running multi-partner projects in Europe

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Differences in motivation for research collaboration can make a common target difficult - some see research as activity to solve a problem, to others this is the antithesis of research which must be unclouded by worldly concerns if it is to have high quality. Some see it as a training activity.
different working hours
Difficult to get joint funding across national boundaries other than via EU which is overly bureaucratic and political.
EU funding generally recovers lower overheads (not attractive for Universities) and requires greater management/organisation than EPSRC projects
EU project bureaucracy
FEC - when we are bound to FEC but many other institutions aren't UK universities can never compete in terms of cost.
finding appropriate partners
finding opportunities
forming relationships with overseas researchers takes time and significant effort
funds, time, contacts and family situation
IP issues
It all depends on funding
It is difficult to get ones foot on the ladder
It is very necessary to support local overseas conferences and local publication in addition to international journals, this is particularly true for work in central and SE Asia and far east.
lack of funding and time
Lack of funding is the major obstacle
Lack of incentive / backing from university
Lack of understanding by institutions how the finances work in different countries.
More expensive
na
na
No comment
no other
none
none
None
None
none
Organisational capacity of overseas partners and lack of experience
overseas construction issues are often different from the UK. There is a limit to the number of processes and products that can be exported.
Poorly defined career development path and no time allocation for same.
Pressure of teaching commitments
qwerty
Robust communication systems and the effective management of information
small amounts of travel money that is easy to obtain just to establish links

The appears to be a bias towards working with academics in high income nations (i.e. USA) when much can be learnt from collaborations with scientists in low income nations; however to achieve this the focus of the research should not be purely on the benefits to UK plc!!
the finance support is the main barrier
The main funding body for European collaborations is absurdly bureaucratic and does not pay the full cost of the research
The perception that all collaborators must be funded from the same source, esp EU which is a pain. The reality is we get our funding, they get their funding, and we collaborate.
There is no sabbatical scheme in my institution. Again you need to find the person to work with. I have identified two people I want to work with - getting funding not straightforward
Time to meet up and address the research issues
UK funding cannot generally support overseas collaborators
Very difficult for UK researchers to work abroad or undertake long-term research which is collaborative with international partners, especially those outside Europe
We all need to travel less and reduce our carbon footprints
workload issues make spending time overseas difficult

Section 5: Non-academic Collaborations

12. What would you consider to be the main barriers to undertaking research in collaboration with, or supported by, companies in the construction sector?

12.a.i. The construction sector has limited budgets for R&D projects. -- Comments (optional)

Certainly a problem, whether you look at the fragmented nature of individual companies, the industry-facing trade organisations, or construction sector government funding.
Civil engineering contractors and consultants all have limited budgets for R&D. It is more surprising that contractors have limited budgets.
Companies within the Geomatics industry are generally too small to develop useful collaborations with
especially under a FEC model
If they want something and the universities can do it then the money gets found.
It is not a profitable industry and it is too much at the mercy of government spending cuts
Might change is the green economy is work.
Much of the construction sector is very conservative and has little interest in research (even where it could benefit them) and certainly no money they are willing to invest in it. The companies with the most interest in research tend to be specialist consultants, who have very small budgets. The structure of the industry and procurement processes tends to lead to tight margins, and a division between high turnover contractors, who often have little interest in research, and consultants who are sometimes more interested but have lower turnover.
My research is more relevant for aeronautics and defense sector. I feel, in particular, structural engineering should not exclusively on the construction sector.
particularly in the present economic climate the construction industry has been particularly hard and with many redundancies there seems ot be a reluctance for some to fund research
Short term attitude of industry is out of tune with long term research.

The construction industry is innovative by necessity (excluding house building where innovation is driven by regulation and suppliers). However, it is a risk averse industry which means poor take up of academic output in the short term. Therefore there is little to gain from investing in academic research. Hence much of academic research is used to explain why construction industry output works. This is supported by the industry through steering groups, data, and access to sites.
There is virtually no industrial money to support research at Universities.
True
With a few exceptions, the industry does not have significant research funds. Hence our development of links with Japanese contractors who are required to invest in R&D

12.b.i. The construction sector has strict time constraints for R&D projects. -- Comments (optional)

A major barrier in terms of joint funding with EPSRC - it takes FAR, FAR TOO LONG to get the ball rolling. Industry just gets on with it.
as above
Can be managed if projects are properly resourced. Don't take on projects that can be met within an academic environment.
Careful planning means that you can usually set milestones that satisfy industry's short term needs and provides the research goals of a longer project.
Have to be able to respond quickly to project-specific demands
R&D needs are often linked to a major project having technical challenges (e.g. Cross Rail)
The industry has limited a limited horizon though there are bodies within the industry that are forward looking (e.g. Zero Carbon Hub)
The time horizons of companies are far shorter than a normal R&D project carried out at University and this can lead to unrealistic demands
There is a major difference in time constants for universities and industry.
This very variable
Time is crucial to industry and often they cannot wait for the full research and will adopt a "best practice" solution.
True

12.c.i. There are cultural barriers to innovation within the construction sector. The sector has governance procedures concerned with robustness, reliability, insurability and compliance with regulation, and therefore tends to be conservative and slow to change. -- Comments (optional)

A very conservative industry because of its competitive tendering system.
Consulting Engineers are not usually slow to change
I agree that implementation is hampered by these barriers, but the construction sector is supportive of exploring new ideas.
In highways consultants are willing to collaborate and innovate with academics but contractors are hopeless
In my short experience, the industry recognises the need for development but it is tied by regulations.
Not a barrier for drug companies is it? One off nature of construction is a driver for short term thinking.

The construction industry has a low opinion of academic research, especially theoretical work.
The industry is risk averse because by nature the construction industry is high risk
There are enlightened players who make things happen quickly - seek these out and leave the others
There have been some improvements in recent years, but this is still a major barrier.
Yes, but this is as much a problem of bad government and protection of established interests from the threat of the new.

12.d.i. The requirements of academia to produce publishable results and industry's need for immediate relevance to practice and/or confidentiality can be difficult for collaborating partners to balance. -- Comments (optional)

A common cause can become disparate.
Both can be satisfied - confidentiality should cost more & be time limited.
If companies want to keep research to themselves they should form their wn R+D departments, not expect public funding and public institutions to do it for them. Public money demands results available for all.
In my experience, the need of the construction sector is more development type work and less research. This somehow clashes with the mission of a research university.
it depends on the nature of the funding
It is possible to overcome this. It is more of a myth than a fact.
Needs to be agreed at initial project negotiation
Not in my experience - we manage both needs
These are not difficult to balance. But they are pointing in opposite directions - so see point h below
This requires caerful discussion and planning, but I have not found this to be a problem.

12.e.i. Academic researchers can have a lack of practical experience and knowledge of how industry works in practice. -- Comments (optional)

A partnership should have blend of skills, including pragmatic approach from experience.
Exposure to the environment rapidly removes any inexperience.
For me this was no obstacle, but then I have worked in consultancy.
I agree. However, as someone who spent time in industry before joining academia, I would also point out that the time spent in industry has hampered my career dur to the lack of publciations and research outputs during that time.
I don't find this a problem personally, but many other academics that I work with are totally naive when I introduce them to companies etc. For example, they are far too technical in discussions with MDs and CEOs, which then affects my credibilty
Increasingly academics do not have any industrial experience and are not engineers.
Less true than it was
may be a barrier for some but those of us with industrial experience it is not
Not a barrier in my case as I work in close collaboration with industry; academics soom learn teh ways of industry.
Only some can do it well. I have industrial experience , so this perhaps made it easier.
Shouldn't be needed - if industry is coming to the universities. The sector is probably better at this than is generally acknowledged, but ee c above - they have their own constraints.

Some do and some do not - there is no single answer
The statement is true but if both parties understand their roles and communicate effectively then it need not be a barrier
There are academics recruited from industry but it is very hard to establish a research profile!
This should not be relevant and anyway te RAEng offers bridging immersion training these days which helps here.
We have an experienced team and make a point of involving new or younger staff to help them learn

12.f.i. There is significant time and effort involved in making, developing and sustaining contact between the collaborating partners. -- Comments (optional)

As there is with any collaboration - not just with industry. If it is what you want to do then this is the cost.
Correct it has taken years to build up such relationships.
Investing time in any partnership (academic or practitioner) is essential for success, and pays back in the long term
My experiene is that this is a major barrier, not least because to few construcion companies (SMEs) understand how to work with academics
Often the contact moves onto another company or to a different job in the same company
Should not be a problem in professional disciplines, but many colleagues do not wish to develop contacts or participate in engineering practice.
Such time and effort are often unfruitful, due to the budget limitations, which makes academics less inclined to pursue such contacts.
The heavy academic work load and timetablins restrictions present organisational difficulties.
This is built up over the years.
Well of course their, is, but it is stimulating and everyone benefits, unless you're talking about bottom-rung companies and researchers.
Yes -but it is essential
Yes, you need to invest the time, but this isn't unique to construction.

12.g.i. Agreement around the ownership of any intellectual property generated by shared research activity can be difficult to reach. -- Comments (optional)

Again, for me it wasn't a problem, but I think it could be.
as for d
I have never found this to be true
In some cases it can be a major barrier. One must manage expectations.
IP exploitation needs to be discussed at the start of the project, not the end.
Most with-it universities are quite realistic about this these days. They may still have absurd positions formulated by university legal departments, but the people on the ground are usually much more sensible.
My experience is that this issue is easily resolved.
Needs planning, but I have not found this to be a problem.
Needs to be done and managed. Everyone benefits in the end. Just part of the collaboration process

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This can be a significant hurdle and is also related to the publishing of results in journal papers
This is less of a problem as universities are becoming aware of the cost of development
Universities are notorious in complicating IP. Over the past few years universities seem to think that every trivial bit of IP is worth millions. This badly affects collaboration, to such an extent that one almost wants to give up working with industry, and not because industry is to blame.
With some very aggressive companies this requires eternal vigilance which comes with a greatly increased overhead in preparatio/negotiation time.

12.h.i. Other (please specify)

"Profit" motive can look to squeeze the last drop of effort out of a contracted item of research
-
A lack of understanding on the part of certain industries of how research can help future competitiveness
A poor perception of many companies of the benefits of research
academic perception of work load associated with teaching and increasing number of students following civil engineering programmes; lack of UK PhD students; lack of funding for UK PhD students
Again, companies balk at FEC
allocation of commercial rewards for the innovation.
Companies are not always receptive to approaches from academia, but can be very demanding when they need assistance. This is a problem for industry to address.
companies are not interested in fundamental research - which we can understand
Companies need to wake up to the advantages of engaging with university-based research
Compared with other sectors of industry the construction industry is notoriously reluctant to fund research and commits very little funding to it.
Difficulty of contractual arrangements when universities are worried about their insurance covering infrastructure.
EPSRC processes - TOO SLOW!
Establishing Industry contacts at an appropriate level.
Finding (again) the right person to work with
funding
Industry does not value research
Industry is not interested in research and has no money
Initiating collaboration
na
na
Near market research equates to development and is frowned upon in some academic circles.
No comment
no other
none
none
none

none
None
none
PhD generally undervalued by industry
qwerty
Seed corn funding to progress innovative ideas with industry
The Construction industry prefers to get ideas for free rather than invest.
The RAE rewards high quality academic outputs, therefore the arcane, theory and cleverness are lauded much more than usefulness, which is what industry wants
The small industry budgets are exacerbated by the high costs of lab based research in structural engineering areas
the willingness of industry to invest
They dont have funds to support research
Time availability for developing networks in industry (Both academics and industrial partner)
Time: Once industrial collaboration has been agreed the practitioners are keen to start immediately but the RC funding process will often take a further 6 to 12 months.
Timescales and confidentiality agreements can conflict with Academic requirements.
UK consultants have no interests in doing research
When industry gets short of cash it pulls out of research projects leaving the university with staff and students in place and no funding

Section 6: Feedback on EPSRC Programme Landscapes

14. In the recently published landscape review (<http://www.epsrc.ac.uk/AboutEPSRC/landscapes/default.htm>), EPSRC included the following perceptions of the ground and structural engineering research portfolio it supports. We are grateful for your feedback on this document. Please state whether you agree or disagree with the statements made in the landscape document. Please give any clarifying statements in the boxes provided.

14.a.i. "The UK traditionally has a strong international reputation in [ground and structural engineering research]" -- Clarifying comments

Based on its past reputation only!
But this reputation is declining very fast because of a lack of funding leading to low quality researchers!!
Geotechnique, published by Institution of Civil Engineers, is regarded as the premier international journal. Many research technologies (Finite Element Analysis, geotechnical centrifuge modelling, Discrete Element Modelling, etc) were first envisioned in the UK, with UK research groups leading their international research development, and their ultimate transfer into industry.
However, this reputation relies on past strengths - there has been a dramatic decline of work in this area in the last 10 years.
I came from abroad to work here partially because of the strength of the UK research community
I know that the UK did have a strong reputation in cement and concrete materials research, but this pre-eminence is disappearing fast since it is so hard to obtain funding.
I would say the UK research in ground and structural engineering is internationally not visible.

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not my field of expertise
Not so much more than colleagues in, say, Germany.
Questions are meaningless, as "ground and structural engineering research" has been used as a dustbin for 'stuff we couldn't categorise anywhere else' e.g. construction materials, which should be in a different section (e.g. PES, MMME)
The word "traditional" is key here, the poor funding in civil/structural engineering is eroding excellence and reputations compared to comparator and even emerging economies. Structural engineering labs are expensive and they are diminishing rapidly in the UK alongwith researchers.
This is a historical reputation which, without more substantial funding, will fast disappear.
UK academics were prominent in the writing of the structural Eurocodes that will inform the design of most civil engineering works from 2010.
UK pioneered computational structural engineering - now being used extensively by other disciplines. But I believe due to lack of funding we are as strong as we used to be.

14.b.i. "[This reputation] is enhanced by a number of UK-based civil engineering companies and their involvement in flagship building projects worldwide." -- Clarifying comments

Companies are rarely involved in research
In what way?
The decline of UK research community will have a detrimental effect on the UK industry.
The UK engineering companies have probably a better reputation than the ground and structural engineering research.
UK consultants such as Arup and Atkins are highly visible on the world stage, and are active in supporting research as well as promoting or designing flagship schemes.
Yes but if research does not continue to feed into this then the reputation will be lost to mainland Universities and consultancy firms.

14.c.i. "[Ground and structural engineering research] is well-linked to industry." -- Clarifying comments

In general there are good links but typically short term and problem specific
Industry simply does not play its part in this area - their contribution to research is miniscule
It would be true if rephrased as '[Ground and structural engineering research] is well-linked to very small segments of the industry, with the research undertaken been seen as irrelevant (often with some justification) by most industrialists.'
Much funded research is on "sexy" topics rather than what is what the industry wants or what benefits the UK economy
Tends to be on a needs-must basis rather than proactive.
The research is often close to industrial applications, and there are good links with certain companies, but other companies are very conservative and funding from industry is very difficult to obtain.
There are also more 'academic' strands which may provide benefits in the longer term - this is appropriate.
There is very little money flowing through from industry to universities to support research (whether to support research students or fund research projects)
This was the case some years ago, but EPSRC peer review now encourages "good science", so application-oriented research tends to go unfunded - seee point 13 h above

You need strong support from industry to get funded.

14.d.i. "There is very little connectivity with other disciplines [outside of ground and structural engineering] as demonstrated by almost negligible co-funding across EPSRC programmes." -- Clarifying comments

Because the peer review process, as it is currently implemented, bins all x-sector proposals!
Connections do exist
EU funding better for cross discipline research
Focused groups with little industrial experience.
I am surprised at this finding - I do not think it accurate for ground engineering, though it might well be for structural engineering
In my experience there are very good links with other engineering and maths disciplines, and some links with broader subjects such as social science, economics and biomechanics. Perhaps the potential links do not fit well into current EPSRC programmes?
In my field people have almost given up trying to secure EPSRC funding, precisely because of being pigeonholed, e.g. being included within structural and ground engineering whilst being ignored by the materials community.
Perhaps taking the area overall, but there are pockets of successful connectivity which need to be nurtured and used as exemplars
The question suggests there need to be such connectivity, and from I know no case has been made for this to necessary.
There are a number of research links with medical schools (e.g. FEA), earth science (e.g. carbon sequestration), mathematics (e.g. risk, systems), electrical and electronic engineering (e.g. sensors), etc. But these are often undertaken as blue skies endeavours without EPSRC support, due to beaurocratic barriers.
There are other funding opportunities other than EPSRC.
There is actually not that much connectivity between ground engineering and structural engineering researchers, nor between groups of researchers working within individual sub-disciplines within e.g. structural engineering!
There is connectivity, but many areas in structural engineering need research for economic impact.
This is an EPSRC problem. More serious is the lack of connection with other research councils, and the politically-driven faith in 'programmes'.
this may be a reflection of funding mechanisms
What EPSRC funds is totally disconnected with what researchers excell.

14.e.i. "The vast majority of grants in this area are small (£100k-500k). There is potential for larger, more ambitious projects in this area." -- Clarifying comments

100K would be large to me struggling to develop a flood barrier on regional grants of 10K and 15K!.
But one conservative or nit-picking or jealous reviewer can more easily scotch the project.
Don't ignore the value of relatively modest grants! The latest fashion may be for larger grants, but it is merely a fashion
Good research does not have to be expensive or too ambitious. It is the output/input ratio that should be looked at.
I think that having a more smaller grants is better than having only small number of big ones. The

big grants tend to go to well established centers, and therefore leave small room for new centers to emerge, compromising the fairness of the system.
in my 20 years in the field I have seen very little of the blue skys research funded by EPSRC find its way into main stream use. Many projects tend to be so focused that frequently they have little benefit to industry once completed. and many new methods are left to industry to sort out itself.
It's true about the majority of grants being small, but with so little funding this is as it should be!
Many projects in this area require large funding.
Not necessary larger projects are more cost effective than small projects. Expensive and ambitious projects do not really apply widely in this discipline. EPSRC's strategy of pursuing high-risk high impact projects may work in some disciplines but not in this area.
the potential is there but the question is whether funding for larger projects will be forthcoming
There are a number of larger scale projects that should be supported in this area related to infrastructure and energy.
There are many worthwhile problems in structural engineering in need of larger grants, especially those involving heavy and destructive testing. This would typically require large scale testing and control equipment linked to high capacity networks and HPC hardware and possibly also to similar international networks that already exist (such as Nees in USA or e-Defence in Japan)
There should be more funding for projects with more science based disciplines, such as physics, computers science, mechanical engineering, etc..
This area is at the heart of sustainable development, and need proper investment to ensure that it has disproportionate impact. It often required full or large scale testing, which is expensive but essential.
What is important is value for money and the impact of the deliverable. It is not proven that small grants are less relevant than big ones.
Yes, thinking is too much limited to PhD-sized projects. It's inevitable that some important work will require much greater efforts. It is inevitable that the huge shortfall in funding of good ideas is leaving the UK further and further behind.

14.f.i. "Research in this area tends to be incremental and conservative, concerned mainly with finding practical solutions to immediate problems." -- Clarifying comments

Again more for structural than geotechnical, though soil mechanics verges on the incremental.
And concerned with explaining the underlying science to industry led solutions
Boring in other words, but worthy. What else is to be expected if applications need to be backed up by an ever-increasing number of letters of support? And if a single adverse comment from a misguided, ignorant or prejudiced referee can sink a proposal?
But is this such a bad thing?
Funded research may be so. But I know of a number of adventurous projects which haven't been funded.
I agree that research is incremental and perhaps conservative but I completely disagree with the research, being concerned with finding practical solutions, especially in my area.
In my experience, the more fundamental problems tend not to be funded, because they do not always have direct practical application.
In my field, advanced composites, this is definitely not the case. The research is innovative while being relevant to industry.
It is important not to lose sight of the UK's urgent need to have new techniques and processes to achieve sustainable construction. Important to this driver is the choice of construction material and how structures are designed to minimise embodied energy, etc. Future academic research must

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not only be for innovation of product or procedures. It is just as essential that we critically assess what we know, and don't know, so that gaps in knowledge against us achieving sustainable construction in the timeframe imposed can be addressed and implemented.
It ought not to be conservative, BUT it should be about finding practical solutions - after all it's Engineering Research, not Science Research!!
It usually takes a long time (often decades) for the construction industry to take up new technologies. Research projects can be well ahead of current practice.
It varies - the statement definitely does not apply to my most recent EPSRC project! (but then I would say that...)
my industry links tell me that research published in journals seems to have little relevance to solutions that industry can readily use - and yet academics are "measured" by their publications
No sure I fully agree as some projects may not be defined as being "in this area" when their results will be useful.
Only because the finding is relatively small.
Research is often incremental, but I don't think it is conservative. There is nothing wrong with incremental research if it is well designed.
Small increments in this field can mean huge gross savings in resource use, CO2 emissions, reduction of waste etc.
some is incremental but not necessarily conservative
Some research is indeed incremental, but this should not be decried. What is the point in starting off lots of new initiatives, and then abandoning them as soon as they are up and running and the work becomes "incremental"!
The "incremental" nature makes it very difficult to obtain funding.
The prevalent strong link to the industry is probably one of the reasons why research in this area is incremental and conservative.
The whole range of research is required, incremental and small scale and innovative and large scale. The latter two have practically been choked off unfortunately and the discipline stereotyped!
There are a number of problems in energy that require innovative ground and structural engineering solutions which have more far-reaching consequences than is indicated by this statement.
There are many examples of exciting projects. There are also many pre-commercial research project proposals that should be funded, even though they are incremental, because the pay-off to UK plc would be very high.
There is some ground breaking work, though the definition of incremental depends on how relevant and needed the research is to the end user
This is a direct consequence of points (a) and (b) in Q12.
This is because of the restricted funding mechanisms available at present.
This is not a bad thing
Though much of this can be extremely beneficial in the economic sense. However, this is not perceived as trendy!
While true to a certain extent, the implied negativity of finding "practical solutions" is misguided, very short-sighted, and deeply troubling given UK society's strong reliance on built infrastructure.
With a proviso that this is nothing bad in the context of civil structural engineering; incremental research is a necessity for this sector as otherwise we would end up with an endless stream of inconclusive pilot projects; the nature of civil structural engineering fundamental research is to make small and steady steps forward as otherwise people can easily get killed which is the key reason for the perceived 'conservativeness' which is nothing bad; it would be quite bad if it was otherwise, actually.

14.g.i. "There is a wide scope for more ambitious and creative, far-reaching, cross-disciplinary work in this area." -- Clarifying comments

Absolutely as explained above.
Absolutely! The key to sustainable development is in recognising that we have to integrate all aspects of the systems we are looking at. This needs real vision and lateral thinking, as well as appropriate resource.
But funding mechanisms must be available to allow this
Civil Engineers have, in the past, been at the forefront of proposing and delivering practical solutions to the problems faced by UK. Today, Civil Engineers, in collaboration with other Engineers, Mathematicians and scientist are equally well placed to answer the tough questions posed by current societal needs. The expertise here is far greater than is appreciated by policy makers. Increased, sustained and directed funding here will prove extremely valuable (cost effective) to UK plc.
EPSRC often fund fancy & high profile projects which have very poor output and impact.
It is the cross disciplinary work that is most relevant here.
it's not all about cross-disciplinary work. EPSRC in last few years frequently funds low quality research just because it's multidisciplinary!
Management Speak - means nothing
Some scope yes.
There is scope but will there be funding mechanisms available. TSB requests 50% funding from industry for industrial collaborative projects. This extremely difficult to achieve in the middle of a recession that is hitting the Building Industry particularly badly.
There is a scope for cross-disciplinary work. This is possible through stimulation of long-term links between researchers in different areas, and through recognition of this activity as valuable.
There is also scope for more collaboration WITHIN the discipline, between ground and structural researchers.
There is certainly scope for this, but it should not come at the expense of solving the problems we, as a society, are facing today.
There may be a scope for some, but to the risk of losing track of real, mono-discipline, science. This is what should be better supported today when all that seems to get funded requires some multi-disciplinary component.
YES
Yes, EPSRC needs to support applications where the success cannot be guaranteed, and the route through to the end is made up as it goes along. The present climate makes ambitious creative work very difficult.

14.h.i. "Civil engineering has a large role to play in finding solutions to the problems brought about by a changing climate... Sustainability and climate change agendas present a wealth of grand challenges." -- Clarifying comments

A comment that applies to all of this question is that yes, there is scope for larger cross-disciplinary research projects, but our experience is that these are unsuccessful due to a peer review culture that is overly negative, rather than being supportive.
A pivotal role, as living sustainably and with climate change will require to civil/structural engineers to foresee and design new and innovative solutions often by harnessing the most up-to-date IT, sensing and communication technologies.
Absolutely. Not one of the challenges facing society can be met without the development of new materials or the novel application of existing materials. However, this didn't appear in any part of

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the landscaping documents.
Absolutely. Geographers ain't going to solve it without engineers, despite the high profile of the former.
Add to that the issue of energy security, calling for ground and structural engineers not only to research for offshore wind turbines, but for deep-water oil exploitation. We will continue to depend on fossil fuels for a generation or two, but we must capture and store carbon dioxide.
But sustainability should not be the only aim of all research in this area.
But we shouldn't just fund grand challenges!
Civil and structural engineering have a major role to play but as part of multidisciplinary teams. How are zero emission buildings going to be built? Who is going to design/build alternative energy source infrastructure cost effectively?
Civil engineering is absolutely pivotal in this area. The neglect of investment in (for instance) offshore technology development is hampering our development of new energy technologies
Flavour of the month and that's where the funding is.
I agree with the opening statement but not the last
I couldn't agree more strongly. Engineering in this area is the only way that we will meet the challenges of delivering renewable energies such as wind/wave/tidal and to address the issue of sustainability.
I'm not from this field, so my answers reflect this.
If there was a 'couldn't possible agree more strongly button', i would click that. *ALL* the solutions to sustainability issues will ultimately have to delivered by Civil Engineers. Shame you let social scientists set your agenda in so many of these areas then.
It does but EPSRC does not seem to want to fund multi-disciplinary structural engineering projects with industry.
It is arguably the most important, given the vast energy losses from housing and the built environment.
Refer to comment to part 14f.
This is important but we should not allow it to completely dominate the research funding agenda. There are many other important priorities.
This is increasingly evident creating new research directions. The difficulty amongst academics is aligning their reseach skills and knowledge to the emerging areas.
we had enough already of that too!
We need to shoot down all the nonsense about electric cars, windmills, road pricing,etc etc, but while these remain nice earners for a lot of people the big impact that civil engineering can have gets overlooked by the media, by politicians, and by funding bodies.

5. Text box responses to Industry Survey

Section 2: Your Expertise

2. In which area would you say your primary expertise lies? Please tick only one box.

Other (please specify):

all aspects which relate to use of natural stone
Buildings made from soil (mud bricks)
Composite materials
corrosion engineering
Earthquake geotechnical Engineering
environmental impact assessment
Manufacture of structural tubes
Maritime Engineering
Materials (glass specifically - including structural)
Materials Science
offshore structural engineer
Rail track engineering
Water, wastewater and sustainability

3. Which type of organisation do you work in?

Other (please specify):

Infrastructure owner
Multi-disciplinary consultancy
Railway infrastructure management
Transport infrastructure owner
Utility

Section 3: Academic Collaborations

5. Have you or your colleagues collaborated with, or supported research done by, UK academic researchers in the last 10 years? Please indicate which disciplines the researchers belonged to. Please tick as many boxes as apply.

Other (please specify):

Civil Engineering & Geography
composite materials
No collaboration with UK academics
None that I am aware of
offshore industry

RF Engineering
Structural dynamics analysis
These are the ones I am aware of but there are probably more

6. What would you consider to be the main barriers to industry undertaking research in collaboration with, or supporting research within, academia?

6.a.i. The construction sector has limited budgets for R&D projects. -- Comments (optional)

compare with 60/70's
Composites not recognised as a sector
I can ususally find money
I have no experience of budgetary constraints
Major factor in present economic climate, the biggest issue being the cost of staff time rather than direct funding to a project.
Note that R&D is often used with different meaning in the construction sector than it is used in academia
Projects would need to be identified and assessed through value cost analysis well in advance of planning and sanction with select academic institution
These responses apply to the sector in general, not necessarily to Arup

6.b.i. The construction sector has strict time constraints for R&D projects. -- Comments (optional)

Composites not recognised as a sector
Highly dependant on the personalities involved.
Often academia is not geared to the faster pace required by industry
People are very busy
Yes, project delivery is often required well within typical R&D timescales, but with advance planning this might be mitigated

6.c.i. There are cultural barriers to innovation within the construction sector. The sector has governance procedures concerned with robustness, reliability, insureability and compliance with regulation, and therefore tends to be conservative and slow to change. -- Comments (optional)

Certainly lead times to accpetability are long
Changes are rarely other than incremental
Clients want innovation but do not appropriately recognise this in bids or fail to implement it due to perceived novelty risks
Fiduciary duty to shareholders
Greater issue can be a sectors call for cost-effective innovative solutions on one hand while its natural conservatism suppresses it on the other - see current discussion between Screwfast & Network Rail in NCE.
Where innovation can be demonstrated to save money or time there should be no barrier provided the work can be delivered in appropriate timeframes

6.d.i. The requirements of academia to produce publishable results and industry's need for immediate relevance to practice and/or confidentiality can be difficult for collaborating partners to balance. -- Comments (optional)

Possible issue but both sides need to be realistic as to the outcomes from the research
These can and should be managed
this is a major barrier - academics have little regard for the requirements of professional practice

6.e.i. Academic researchers can have a lack of practical experience and knowledge of how industry works in practice. -- Comments (optional)

Academics with the correct industry understanding are normally chosen as collaborative partners
can be overcome with partnering
Difficult to generalise with this one but it is certainly true that academics with little or no experience of industry can soon go 'off-message'
In general although schemes such as the EngD can break down this barrier
Indeed they can, but it's a question of communication between academics and their industrial collaborators?
It is not their job to understand our industry, it is our job to explain how they can help us and see the mutual benefits of collaboration.
Many researchers have a fairly good understanding of industry and practicalities
Not hard to put right
The whole point of having industry involvement is surely to balance this. Maybe more industry placements being made available to academics would help?
Use of industrially-experienced assistance can give benefits to both sides.

6.f.i. There is significant time and effort involved in making, developing and sustaining contact between the collaborating partners. -- Comments (optional)

Can be managed
The few opportunities available make this a real barrier as many collaborations are one-off or the client gets the same teamings every time which stifles innovation

6.g.i. Agreement around the ownership of any intellectual property generated by shared research activity can be difficult to reach. -- Comments (optional)

To the detriment of industrial partners in some cases

6.h.i. Industry can lack awareness of appropriate academics and academic centres of excellence for collaboration. -- Comments (optional)

Geotechnical world small and active
I don't believe that the statement is correct.
In specialist areas this is unlikely to be the case; management of promotional material and perceptions

Universities tend to claim they can do anything, but in reality true expertise in a particular field is generally limited to a small number of institutions

6.i.i. Other (please specify) -- Comments (optional)

Academics understanding the needs and burning platforms of industry. Also Industry thinking long term.
agreement with industry
Can need manpower of 2-3 that does not seem compatible with normal research applications for 1 person.
Collaborative R&D can be a long term investment and the construction sector can be too focused on short term return
For SMEs, lack of absorptive capacity
I have no knowledge of other types of barrier.
Lack of commercial awareness
N/A
None
None
None.
Not enough roadmapping or foresighting of needs undertaken and lack of joined up thinking across different sectors, or awareness of other appropriate research already undertaken.
Pre-competitive collaborative research is not embraced by industry leaders
Shortage of experienced staff time and budgets to participate
the industry is fragmented, the products and services diverse and have very specific requirements in terms of product/services related research - research needs are thus very specific and often related to a project so are time bound the needs
Universities are too expensive. In on TSB projects they take all the income from the TSB and expect industry to provide resource for free.

Section 4: The Need for Academic Research in Ground and Structural Engineering

8. From an industrial perspective, what would you say is the need for academic research in ground and structural engineering? Please state to what degree you agree with the statements below.

8.a.i. Academic research is needed to fully understand the principles involved in new technologies, practices and innovations developed and pioneered by industry, e.g., whether they have performed as expected and what is their range of applicability. -- Clarifying comments (optional)

Certainly my experience in developing earth brick construction for the UK market, we need to understand the principles, and this can only be done by academics
I agree but much research is 'poorly' focused/validated, e.g., repeated computer models of the same thing but with no experimental validation.
Industry can collect and review performance data and often has direct contact with clients who hold the data; in contrast academia tends to get bogged down in data analysis (due to focus on

producing learned papers) and complicates the lessons learned from past performance (due to perceived need to understand everything before recommending a solution, and wish to develop future research proposals).

Without adequate background knowledge bringing a technology to market is high risk

8.b.i. Academic research involving PhD or Masters students is important to the training of future employees of industry. -- Clarifying comments (optional)

Agree but for higher degrees we prefer EngDs

But make sure people expect and are happy to go get their boots muddy - not live in research for ever

Depends on the research topic for a PhD - some are more relevant to industrial practices than others! I think experience is equally, or possibly more, important.

Joint projects with industry are valuable training opportunities

Most Masters level courses / research will enhance suitability for industry. PhD research without previous industrial experience may be taken to indicate an academic career track rather than an industrial one.

My Business Unit carries out and manages research projects; so staff with a research background are important. This may not be the case for all sectors of the industry.

Sound research is critical to maintain UK academic skills transferred to graduates and industry

We need good people with the requisite skills to do their job. These skills are generally much broader than the training employees arrive with

Will probably become more important over time, but it is the act of doing the postgrad work which may be more important than the work

8.c.i. Academic research is required to develop new technologies, materials or methods that may or may not eventually be used in practice. -- Clarifying comments (optional)

Few companies have the necessary in-house facilities to 'go alone'

It is just as useful to prove something doesn't work, and aspects of the work always prove useful, have definitely found this with mud bricks

Make sure the need is clear and agreed or that speculation is appropriate.

There is a degree of find and see with all R&D some of which may have a bigger or lesser impact in the commercial sector

8.d.i. Academic research is required to address the long-term challenges facing the UK and beyond (e.g. climate change) that are outside the short-term focus of a competitive industry. -- Clarifying comments (optional)

I play a role in trying to direct climate change research for the water industry

Industry is responding already, due to client driven requirements. general view is that existing knowledge, if implemented, can make a large difference. Waiting for some new technology that may evolve is not an answer but an excuse.

Our clients in industry are concerned about the longer term impacts of ? on projects and will invest where there is a justifiable and value:cost basis for doing so.

This may be true in other areas (e.g. energy), but not in ground and structural engineering

Which means EPSRC should fund that research, because its difficult for industry to

8.e.i. Academic research is required to develop understanding of the fundamental engineering principles employed in practice by industry. -- Clarifying comments (optional)

Fundamental principles should be fairly well understood as they are.
I agree with the statement but see no real evidence of this from academia.
Most of the fundamental principals in structural engineering are well understood (perhaps less so in ground engineering)
Probably most are well understood but always room to improve

8.f.i. Academic research is needed in specific research areas as and when dictated by the needs of the industry. -- Clarifying comments (optional)

For shorter term applicability, industry input int research topics is vital, but there should also be a place for some "blue-sky" research with longer term objectives.
Not sure what this means - neither engineering practice nor academia are particularly prone to fads so topics in need of research don't tend to change?
research must be directed but sounding industry but must also be guided by government in terms of long term stategic objectives and should give clear direction
Two options, either industry asks and academia provides, or academia develops and informs industry.

8.h.i. Other (please specify)

academic institutions should change the way they assess adn value research output and give high points to working with industry
Academic research confirmation is a huge marketing tool for UK Plc. Even in what is essentially an Industry that moves incrementally, academic backing is a powerful tool
Academic research needs to start with a business process perspective and not from a pure technical agenda
agreement with industry
I have no knowledge of other aspects.
N/A
Need to understand long term ground implication of changing climate and effect on dams and buried infrastructure such as pipes
None
None
None.
Off-site construction
Post-doctoral research linked to industry is vital as it is at this stage (i.e., on completion of a PhD) that the researcher starts to understand thier field.
The industry is often revolved around profit. Although I do not personally agree with the extent this occurs, from an industrial perspective academic research would be needed to enhance competitiveness
To be ahead of the game
Universities should not be used as commodity consultancy 'jobbing shops'

EPSRC Review of Ground and Structural Engineering (2009)

Well covered by the above
Work is needed to convert existing academic knowledge into guidelines (not just codes and regulations) suitable for use in industry

6. Text box responses to International Survey

9. In the space below, please give any clarifying comments about your answers to questions 5 to 8 above.

A general lack of interest in earthquake engineering , structural dynamics and control. leading in the area of fire protection.
Academia has to be careful about reacting to the needs of society, as these needs can be fleeting.
After considering your questions, it strikes me that I really am not all that up to speed on research activities in the UK.
I am not much familiar with what is going on in the UK
I have no information to form an opinion on 8a-c.
I think there is still a general perception that engineering jobs are low paid jobs with heavy responsibilities. Although the salaries of Academics have increased gradually over the years, the UK government has neglected the educational sector for so long. There have been a series of brain drains to other Western countries or even to Asia. There is a very serious shortage of research funding in structural engineering field, which leads to a steady decline of this area over the last 40 years or so. The UK was once recognised as the leading country of structural engineering.
It needs to be understood that there are levels of "Transformation" that can be undertaken. In a well-established field such as Structural Engineering, the "Laws of Physics/Mechanics" CANNOT be transformed. However, the methods and approaches to solve the new problems facing our world, do need transformation.
Most research being conducted in the UK now is for academic interest, with little or even no practical significance. Moreover, it can be observed most researchers' professional qualifications were obtained through their academic accomplishments, not through practice of engineering.
My opinions are based on being a graduate from mechanical engineering, structural engineering, survey/geomatics engineering, computer science, construction management and education.
Q3 I am based in New Zealand but Australia is the closest region!
Since the request was aimed at international community, questions regarding internal UK issues make no sense ...
The main problem is that UK researchers repeatedly solicit help. When help is given acknowledgements are not forthcoming.
The UK based research has lost visibility in the USA and other international forum. In the 60's and 70's UK research was more prominent.

Section 4: International Collaboration

12. What would you consider to be the main barriers to undertaking research in collaboration with academic researchers overseas?

12.h.i. Other (please specify)

Finding the research partner
Importance placed on research by university admin
Lack of interest
none
Other University commitments e.g. teaching and postgraduate supervision

The major barrier is that there is no incentive to collaborate with overseas researchers.
there is a lack of agreements between international institutions on acceptance of credit for courses taken at the foreign institution
UK research objectives

Section 5: Industrial Collaboration

16. What would you consider to be the main barriers to undertaking research in collaboration with, or supported by, companies in the construction sector?

16.h.i. Other (please specify)

Clients often have objections to research being conducted in connection with their problem.
Conflicting Interests
Funding
Importance placed on research by university admin
Industry is driven – very naturally - by a profit motive and the value of investment in research is not valued universally (or the possible disruption to project timelines frequently tolerated).
none
none