

NATURAL ENVIRONMENT RESEARCH COUNCIL

EVALUATION PANEL REPORT

**Evaluation of progress with delivering
NERC's Technologies Theme**

May 2011

*This document reports the conclusions of a Panel of experts.
The views expressed are entirely those of the Panel.*

INTRODUCTION

1. This evaluation was commissioned by NERC's Director, Science Delivery (DSD), to meet a high priority need for evidence on progress with implementing the science themes set out in NERC's strategy. The Technologies theme is the fifth theme to be evaluated; the intention is to evaluate each theme every two years via a rolling programme.
2. The Technologies theme is one of seven science themes set out in NERC's strategy Next Generation Science for Planet Earth¹. The strategic objective of the theme is '*to develop the tools and technologies needed for cutting-edge environmental sciences*'. To achieve this objective, NERC has defined four challenges:

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| <ol style="list-style-type: none">1. Earth observation and remote sensing2. Field sensors & networks of sensors3. Novel laboratory instrumentation4. Models, informatics & data |
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3. The evaluation was designed to meet the evidence needs of DSD (the main customer for the evaluation) and other key stakeholders, including the Science and Innovation Strategy Board (SISB) and the Head of Strategic Management. The design incorporated lessons learned from the preceding theme evaluations.
4. The customer and stakeholders requested evidence that will:
 - Provide information to SISB and Council on progress with delivering the Technologies theme;
 - Inform strategy and investment planning, including future Theme Action Plans (TAPs) and refreshes of NERC strategy, and decisions on management of current investments;
 - Provide evidence of achievements and highlights for publicising to external audiences, including government, the research community, and research users.
5. The evaluation was conducted by a Panel comprising representatives from key stakeholder groups (**Annex A**) and met for one day, in May 2011. The Theme Leader (TL) and Science and Innovation Manager (SIM) attended *ex officio*. The Panel's objective was:

To undertake a high-level overview of progress with delivering the Technologies theme at this stage, nearly 3 years into implementing the strategy.

6. The Panel's Terms of Reference are attached as **Annex B**. They covered:
 - Inputs: the extent to which each challenge and the whole theme is being addressed;
 - Outputs: the extent to which each challenge and the whole theme has been achieved; and
 - Performance: the extent to which investments are being effective in meeting theme challenges and delivering outcomes.
7. The scope was limited to investments current at, or planned since, July 2008, when implementation of the strategy commenced, with the approval of the first TAPs. The Panel were provided with information on NERC's major investments relevant to the theme², listed in **Annex C**. Key facts about the major investments contributing to this theme are included at **Annex D**.

¹ <http://www.nerc.ac.uk/publications/strategicplan/nextgeneration.asp>

² Including Research Programmes managed by Swindon Office, Research Programmes managed by NERC Research Centres, and Responsive Mode grants.

8. This report summarises the Panel's findings against their ToR, with proposals for ways in which delivery of the theme might be strengthened. The report will be considered by SISB, and copied to Council along with a management response setting out any actions in response to the Panel's proposals. Both report and response will be published on NERC's website.

TOR 1: INPUTS

9. The Panel was asked to evaluate the extent to which the theme is being covered by current and planned investments, in the three ways presented below. The Panel felt that the comprehensive use of technology throughout NERC's activities made an evaluation of all technology activities impractical in the time available. Accordingly, the Panel focussed its assessments mostly on the theme's recent Research Programme investments (TAP actions).
10. The Technologies theme has made good progress against its challenges through well targeted and implemented investments. The Panel strongly commend the move towards more cross-theme actions, in which the technology development is incorporated as a core component of the delivery of strategic research.

1.a The extent to which each challenge is being addressed by relevant investments

Challenge	Panel comments (<i>acronyms – Annex E</i>)
1. Earth observation & remote sensing	<p><i>The theme's responses to this challenge have made good progress in filling gaps in the funding landscape in the area of environmental EO and remote sensing.</i></p> <p>The EO Technology cluster is well placed to add value to environmental EO investments and activities, and is enthusiastically supported by its community. However, a slow start due to the loss and replacement of key personnel makes it imperative that the cluster makes rapid progress to build on this goodwill.</p> <p>The Technology proof of concept (TPOC) programme is playing a vital role in supporting low technology-readiness level (TRL) concepts which might struggle to receive support through other NERC funding streams. The Panel also endorse the early interventions by the theme to encourage technology-led proposals to RM (including changes to the NERC Research Handbook and the establishment of a Pool of Technology Reviewers³). Momentum gained from the early rounds of TPOC funding should not be lost; it is not clear that RM alone could maintain the existing level of community engagement and support for future technology development (across all challenges).</p> <p>Proposal 1: To capture the value created by the TPOC programme, NERC should ensure that it has a robust system in place for supporting technology and instrument development across all TRLs. Although RM is an appropriate funding mechanism in most cases, there remains a perception that the process is hostile to technology development. Given the clear value and unique contribution of the TPOC programme, NERC should therefore consider the value of extending the programme on a four year cycle.</p> <p>The Technologies theme's investment in the Macronutrient cycles programme (led by the Sustainable Use of Natural Resources theme) includes a specific remote sensing techniques opportunity. This is a good example of a cross-theme strategic partnership, of the type now encouraged through the theme-based strategy.</p> <p>The Networks of sensors programme has targeted a priority gap in support for novel deployment of <i>in situ</i> demonstration sensor networks. The programme has</p>

³ <http://www.nerc.ac.uk/research/responsive/techpool.asp>

Challenge	Panel comments (<i>acronyms – Annex E</i>)
	<p>attracted STFC and DSTL co-investment and extensive in-kind support from a range of industrial partners, and promises to deliver high-impact outputs across a broad range of NERC’s science remit. The Panel noted that the funded projects focused on ground based sensors, and highlighted the potential complementary activities with Challenge 1 on EO and remote sensing.</p> <p>Proposal 2: Recognising the interdependencies between Earth observation, remote sensing and field sensors, the theme should attempt to link challenges 1 & 2 more clearly in any future Networks of sensors investments.</p> <p>The Observations and modelling of the tropical tropopause layer (UAV) action clearly required an RP investment, as the opportunity could not have been addressed through other NERC funding mechanisms. The NERC/NASA/STFC partnership that has been forged is particularly beneficial, and the shared use of resources represents very good value for money.</p> <p>The Panel noted that the Metrology of Climate Variables action failed to gain support from SISB in the recent TAP3 cycle. Data quality and interoperability is a cornerstone issue in environmental science. An action in this area could be of high impact, particularly to users such as the LWEC partners. The Panel noted that a recent workshop supported by NERC, STFC and NMIs had highlighted the need to more clearly articulate the priorities for NERC research.</p> <p>Proposal 3: The Theme Leader should continue to pursue metrology as a priority theme action, with a broader scope than climate metrology alone. The Panel support further scoping to more clearly identify priorities for NERC investment.</p>
2. Field sensors & networks of sensors	<p><i>The theme’s responses to this challenge have made good progress in encouraging the novel development and deployment of field sensors and networks of sensors, and although this has resulted in greater engagement with industry and other key communities (e.g. through the STFC Technology Partnership) it should now focus on drawing in new talent from other key research groups and stakeholders (e.g. EPSRC).</i></p> <p>No fundable application was received for a Technology cluster addressing this challenge. This could be seen as a clear gap in the delivery of the Technologies strategy. The Panel recognised that elements of the target community might also be catered for through other mechanisms, e.g. the TSB-sponsored Electronics, Sensors, Photonics KTN⁴.</p> <p>Proposal 4: NERC should explore potential alternative networking opportunities, including a demand analysis, for the challenges that do not have a Technology cluster (Challenges 2 and 3).</p> <p>The Expression of interest stage of the Networks of sensors action was helpful as a cost-effective planning tool and as a means of determining community needs for the subsequent investment.</p>

⁴ <https://ktn.innovateuk.org/web/espktn>

Challenge	Panel comments (<i>acronyms – Annex E</i>)
	<p>The Panel also noted the effective involvement of the ESP-KTN in generating interest from industry, and supported their continuing involvement in post award KE management.</p> <p>The Analytical science and technology (AST) studentships action, co-funded with the Royal Society of Chemistry, is an excellent capacity-building investment, especially in value for money and value-adding partnership.</p> <p>Proposal 5: The Panel advise NERC to explore additional opportunities for co-funding studentships with other learned societies and funding bodies.</p> <p>UAV, TPOC and Metrology of Climate Variables: see Challenge 1.</p>
3. Novel laboratory instrumentation	<p>TPOC and the AST are the primary TAP delivery mechanisms for this challenge, which is appropriate. There are many strong linkages between laboratory instrumentation development and wider NERC studies, and increased partnership activity between other themes and this challenge area should be developed. It is important that the theme emphasises that the adaptation of existing technologies to new fields and uses is as productive as innovation. The development of automation and robotics should be pursued through this challenge.</p> <p>The lack of a fundable Technology cluster application to address this challenge could be a gap in addressing this challenge (Proposal 4).</p> <p>The TPOC programme has been making significant progress in addressing this challenge. Macronutrient Cycles will also contribute to this challenge through its laboratory instrumentation development component.</p> <p>Metrology, New Data Tools, and MEMS, Microfluidics and Miniaturisation are proposed future TAP actions which would help to address this challenge.</p>
4. Models, informatics & data	<p>This challenge is being significantly addressed via later TAP cycles, principally through TAP3's Informatics and mathematics for 'omics programme. The programme focuses on people and skills development, which the Panel welcomes as the most appropriate, and long-term, investment for this challenge.</p> <p>The Technology cluster InformaTEC will concentrate on future technologies, ontologies and semantics, models and model fusion, and soils. It will be complemented by the cluster-type activities for the 'omics community, supported through the Mathematics and informatics for 'omics TAP3 action.</p> <p>The Next Generation Weather and Climate programme (led by the Climate Systems theme, and in collaboration with the Natural Hazards and Technologies themes) is being supported by NERC through provision of personnel and expertise. This is a sensible concentration on skills development, building capacity for NERC research in this challenge area.</p> <p>The TAP3 Mathematics and informatics for 'omics action, informed by key recommendations of the 2010 NERC Environmental 'Omics Strategy Report⁵, will strengthen the UK's environmental 'omics capability. It is a good example of how</p>

⁵ <http://www.nerc.ac.uk/research/themes/biodiversity/events/omics-report.asp>

Challenge	Panel comments (<i>acronyms – Annex E</i>)
	<p>a separate existing study commissioned by NERC, which included extensive community engagement, has helped to cost-effectively direct a theme action, and builds on the substantial community- and capacity-building achieved through NERC’s EG and PGP directed programmes. The eight advanced research positions are expected to act as the nuclei for the development of new research groupings, which should go some way to co-ordinating the ‘omics community, adding to the current Technology cluster support in this area.</p> <p>The proposed TAP 4 New Data Intercomparison Tools action is currently planned to focus on metadata consistency and general data inter-comparability, and the interoperability of models. NERC should ensure that preparatory work is conducted before a theme action is finalised for this area, which would include an analysis of required enabling technologies.</p> <p>Proposal 6: To optimise its delivery, NERC should consider the benefits of undertaking an ‘environmental data and model interoperability’ scoping action, including an analysis of prerequisite enabling technologies, as a precursor activity to a full New Data Intercomparison Tools theme action. This activity could include partner engagement, including EPSRC and other LWEC partners.</p>

1.b The extent to which the whole theme (sum of challenges) is being addressed

11. The theme’s investments have met strategic expectations, and implementation is on track, progressing well overall. It is the nature of the TAP process that some challenges must be addressed earlier than others, and the Panel have no concerns about the timetable of delivery that has been applied. It is too early to judge outcomes for the majority of the TAP actions; subsequent evaluations would be able to comment with greater insight on this. The Panel congratulates the TL on maintaining the profile of the theme, coverage of the challenges, and well structured delivery planning. The Panel also congratulates the SIM for successfully implementing a theme which is particularly diverse, and hence challenging, in remit.
12. The **Technology clusters** action was intended to address each challenge, establishing a dedicated network for each, but only succeeded in attracting fundable applications for two of the challenge areas. This apparent lack of interest might be because some target communities are already well served with analogous bodies.
13. The Panel identified the following current gaps in coverage of the theme:
 - Metrology is an important and timely issue; the accuracy of environmental measurements is a universal concern. Metrology activity could suffer from falling between the perceived remits of the Technologies theme and National Capability. There is a risk that the related **New Data Intercomparison Tools** could suffer similarly. A broadening of the proposed future Metrology action beyond climate variables would be valuable.
 - The opportunities for efficiency and upscaling offered by robotics and automation could be explored, e.g. as a component of the proposed **Technology for Efficiency** action.

Proposal 7: NERC should consider ways of addressing current gaps in delivery of the theme:

- **Metrology;**

- **New Data Intercomparison Tools;**
 - **Technology for Efficiency (robotics and automation).**
14. The theme sponsors priority technologies training and skills development, but the panel caution that, outwith the theme, there is a perception that technology fellowships fail to succeed through NERC's RM fellowships route as they can be considered to be lacking science focus by moderators and referees. This echoes concerns that RM alone may not be able to support the higher risk technology development, particularly of the kind seen in **TPOC (Proposal 1)**.
 15. Earlier theme actions have been weighted towards the marine and, especially, atmospheric sectors. Additionally, in open call actions such as **TPOC**, the atmospheric and marine communities have been disproportionately successful in receiving competitive funding. The Panel considered this to be a result of the experience and maturity of these communities in developing technology, coupled with a greater reliance on technology, particularly for the delivery of atmospheric science. NERC should not consider the successes of some communities to be a problem that requires intervention. Later actions, most notably **Informatics and mathematics for 'omics**, and Technologies theme support for other science theme actions, have broadened the scope and coverage of the theme and relevance to other key communities.

1.c The extent to which new investments are being effective in meeting theme challenges

16. The Panel could not identify any major areas of concern in the delivery of the TAP investments. As noted above, the absence of **Technology clusters** for two of the theme's challenge areas (field sensors and networks of sensors, and novel laboratory instrumentation) is a potential threat to delivery, but an analysis of these areas should determine whether sufficient networking activity is being undertaken for these communities through other routes (see **Proposal 4**). Given the applied nature of technology, the Panel strongly endorse the continued concentration on cross-theme actions, although care must be taken to ensure that the Technologies theme's interests in cross-theme actions are protected during implementation.

TOR 2: OUTPUTS

17. The Panel was asked to evaluate the extent to which the outputs of the relevant investments have achieved the theme objective. As the majority of TAP investments are immature, the Panel commented primarily on the quality of implementation against strategic intentions. It is possible to identify successes and threats to delivery in most cases.

2.a The extent to which each challenge has been achieved

Challenge(s)	Achievements (<i>acronyms – Annex E</i>)
1. Earth observation & remote sensing	<p>The Panel considered that despite the early stage of implementation, some evidence of success can be seen, notably as regards the scoping studies and TPOC projects.</p> <p>The EO Technology cluster has begun to make progress serving its community, but progress has been slower than anticipated owing to a delay in replacing the Project Manager for most of the first year. Although rapid delivery from such activity is unrealistic, focus on delivery from this cluster should be a priority.</p> <p>The success of the UAV Scoping study report⁶ and the subsequent NERC-NASA Community Meeting⁷ is demonstrated through its translation into the UAV action.</p>
2. Field sensors & networks of sensors	<p>The Demonstrator networks expression of interest took a different approach from Challenge 1's Scoping study, but has also worked very well. This enabled the Theme Leader to determine the level and type of community interest in developing the Networks of sensors action.</p> <p>The implementation of the Networks of sensors action has met the strategic intention. Substantial user engagement and private sector cash and in-kind support, together with KTN involvement from an early stage, should enhance the quality and utility of outputs.</p>
3. Novel laboratory instrumentation	See Cross-challenge, below.
4. Models, informatics & data	<p>The Panel are encouraged by the plan of action for the Mathematics and informatics for 'omics programme, which is inclusive, involving wide networking both within the community and with other funders and partner organisations. The Advisory Group should be encouraged to share responsibility with the community, to identify priorities on which to deliver.</p> <p>The panel noted that NEMO (Nucleus for European Modelling of the Ocean), a modelling framework for oceanographic research and operational oceanography, was a particularly high profile output of the eScience programme. However without additional information the panel were not able to comment further (see para. 20).</p>

⁶ <http://www.nerc.ac.uk/research/themes/technologies/events/documents/uav-study-report.pdf>

⁷ <http://www.nerc.ac.uk/events/nasa/>

Challenge(s)	Achievements (<i>acronyms – Annex E</i>)
Cross-challenge	<p>TPOC has delivered particularly well for the atmospheric science community, reflecting both demand and pre-existing support for technology development (e.g. marine sciences technology is well supported through NERC centres). Given these caveats, overall the spread of funded projects is well balanced across the theme’s challenges and the NERC remit. There is little evidence that the TPOC funding rounds have attracted proposals from significant numbers of technology developers previously unengaged with the environmental sciences and NERC. This is not necessarily a problem, as it is difficult to draw conclusions about the potential for additional recruitment. However, in any future calls, consideration could be given to attracting potential developers from new providers.</p> <p>The Analytical science and technology studentships action is progressing well, and has received high levels of interest from prospective students. Candidates from the atmospheric sciences have been notably successful, in particular in the first round, due to a relatively high quality of applications; the Panel do not, however, recommend prescriptive action to favour other science areas.</p> <p>The Macronutrient cycles action was the first major cross-theme activity which integrated technology. Although a junior partner in this programme, the Panel are confident that Technologies’ priorities can be protected.</p>

2.b The extent to which the whole theme (sum of challenges) has been achieved

18. Although it is too early to draw conclusions about whole theme achievement at this stage, the Panel noted that the TL considers that implementation has mostly been in accordance with the actions’ intentions, for both Technologies theme-only and cross-theme actions. The Panel are satisfied that a close partnership and frequent communication between the TL and SIM has helped to ensure a very good correspondence between strategic plan and outputs for this theme.

2.c The extent to which larger investments have been effective in delivering outcomes

19. The larger TAP actions are too immature for the Panel to have been able to assess the effectiveness of delivery of outcomes.
20. Although a very large investment, the Panel did not consider **eScience** to be of significant relevance for the evaluation of the theme, as the majority of the programme’s activities had ended when initiation of the theme began. Similarly, the **Post-genomics and Proteomics** directed programme had little overlap with the theme, but the Panel noted that its final funding round, providing small-scale opportunities to exploit advances in genome sequencing and data mining technology, was particularly cost-effective, and a model for future technology-exploitation programme spend.

The future of the Technologies theme

21. Although not explicitly part of their ToR, the Panel briefly discussed the future of the theme, and concluded that it is important for NERC to retain both the momentum that the theme has achieved, and the distinct identity for technology which the theme provides. It would be regrettable to make changes to the format of the theme before outcomes and impacts of the first projects have been realised.
22. The Panel noted that the theme is increasingly working in partnership with other NERC themes to help deliver their RPs. The Technologies theme has a role to play in developing and maintaining a larger, multidisciplinary, technology community than could be accessed by any other themes working in isolation with their respective communities; this is very valuable, as many future research challenges require the bringing together of diverse technologies and skills, often from outside the traditional NERC community. The Technologies theme provides the focus for this.

Proposal 8. The Panel strongly endorsed a continuation of the Technologies theme in its current format, both as one of the seven science themes, and as one of NERC's key strategic foci.

23. The Technologies theme frequently identifies important investment opportunities and requirements that often cross different funding streams within NERC (e.g. in the proposed Metrology action between RP and NC).

Proposal 9. NERC should consider developing a more systematic and sustainable mechanism through which investments that cross different funding streams, particularly NC and RP, can be brought to the attention of the appropriate investment bodies within the organisation.

PANEL MEMBERSHIP

Position	Name	Organisation
SISB member (Chair)	Stephen de Mora	Plymouth Marine Laboratory
Member of the original Strategy Development Panel	Rod Jones	University of Cambridge
NERC Centre representative	Stuart Marsh	BGS
HEI representative	William Bloss	University of Birmingham
HEI representative	Peter Kille	Cardiff University
User representative	Kevin Smith	Rutherford Appleton Laboratory

Attending *ex officio*

Ally Lewis, Technologies Theme Leader

Bill Eason, NERC Science and Innovation Manager for the Technologies theme

Panel secretary

Will Thomas, Evaluation Project Manager, NERC Swindon office

PANEL TERMS OF REFERENCE

Purpose

Based on the evidence presented, the Panel is asked to undertake a high-level overview of progress in delivering NERC's Technologies strategy theme at this stage, nearly three years into implementing the strategy.

Objectives

1. Inputs: Evaluate the extent to which the theme is being covered by current and planned investments
 - a) The extent to which each **challenge** is being addressed
 - b) The extent to which the **whole theme** (sum of challenges) is being addressed
 - c) The extent to which new investments are on track
2. Outputs: Evaluate the extent to which the outputs of the above investments have contributed to the theme objective
 - a) Progress made with each theme challenge
 - b) Progress made with the whole theme (sum of challenges)
 - c) The extent to which larger investments have been effective in delivering outcomes

EVIDENCE PROVIDED TO THE PANEL**Strategic Material**

- Next Generation Science for Planet Earth (NERC Strategy 2007 – 2012)
- NERC Technology Management Plan (2007)
- Technologies Theme Action Plan 1 (2008)
- Technologies Theme Action Plan 2 (2009)
- Verbal update on Theme Action Plan 3

Investments Information

Summary-level information (dates, % relevance to the theme, £ associated with theme, mapping to challenges) for the following, where relevant to the theme:

- TAP Actions (RPs)
- Directed Programmes active at July 2008 and onwards
- Research & collaborative centre programmes
- Consortia

Detailed information for the above, comprising

- PI (or equivalent) questionnaire response submissions to the evaluation process, including details of progress to date & outputs
- Relevant programme publications, AOs, business cases etc. as appropriate (one or two supporting documents per programme)

Number, and value of contribution towards theme, of non-Consortium RM grants active at July 2008 and onwards

Spend per challenge for RP, centres & Consortia

LWEC response to the following two questions: To what extent is the theme delivering LWEC's needs?; Could the delivery of the theme be improved in terms of contributing to LWEC's challenges?

SMT commentaries for progress with the Technologies theme, 08/09 to present

Technologies theme highlights from NERC Annual Reports, 08/09 & 09/1

TECHNOLOGIES THEME: MAJOR CURRENT INVESTMENTS

Tables 1-4 summarise the investments listed at Paragraph 2, which total **£41.7m** plus **£4.9m** in 0910 Research Programme spend at Centres, equating to **£24.5m** over 5 years (for broad comparison). Paper 5 contains more detailed information about each of these investments.

Table 1: TAP actions (RPs) relevant to the theme, and Directed Programmes managed by Swindon office with \geq £0.5m relevant to theme

Action	Start date	End date	% Tech ¹	Amount Tech (£m)
e-Science	2001	2009	100	15.0
Post-genomics & Proteomics	2003	2009	15	1.7
UK Integrated Ocean Drilling Programme (UKIODP)	2003	2013	8	0.5
Technology Proof of Concept (TPOC)	2008	2012	100	5.4
Technology Clusters	2009	2014	100	0.2
Analytical Science & Technology PhDs	2009	2014	100	1.3
Next Generation Weather & Climate Prediction Systems (NGWCP)	2010	2015	23	1.0
Networks of Sensors	2010	2014	100	5.0
Macronutrient Cycles	2011	2015	9	0.9
Observations and modelling of the tropical tropopause layer (UAVs)	2011	2016	75	3.3
Total				£34.3m

Table 2: Research Programmes managed by Centres

1. These programmes are mostly five years in duration, ending in 2012 or 2013.

Centre	0910 Tech spend (£m)	Major programmes (where 0910 spend \geq £0.1m) ²	% Tech	0910 spend Tech (£m)
British Antarctic Survey (BAS)	0.08			
British Geological Survey (BGS)	0.13			
Centre for Ecology and Hydrology (CEH)	0.07			
Marine Centres ³	3.98	5. Continental margins & deep ocean	12	0.31
		6. Sustainable marine resources	96	1.85
		7. Technology development	11	0.17
		8. Ocean prediction	65	1.65
National Centre for Atmospheric Science (NCAS)	0.64	Challenge 3 – Improving prediction for human exposure to air pollution	15	0.27
		Challenge 4 – Improving predictive capability for high impact weather	20	0.37
National Centre for Earth Observation	nil			

¹ As mapped by NERC's Portfolio Planning team in consultation with the Theme Leader or amended by programme managers.

² Equating to £0.5m over 5 years, to allow broad comparison with other funding modes.

³ National Oceanography Centre, Southampton (NOCS), Proudman Oceanographic Laboratory (POL), Plymouth Marine Laboratory (PML), Scottish Association for Marine Science (SAMS), Sea Mammal Research Unit (SMRU), Marine Biological Association (MBA) and Sir Alister Hardy Foundation for Ocean Sciences (SAHFOS)

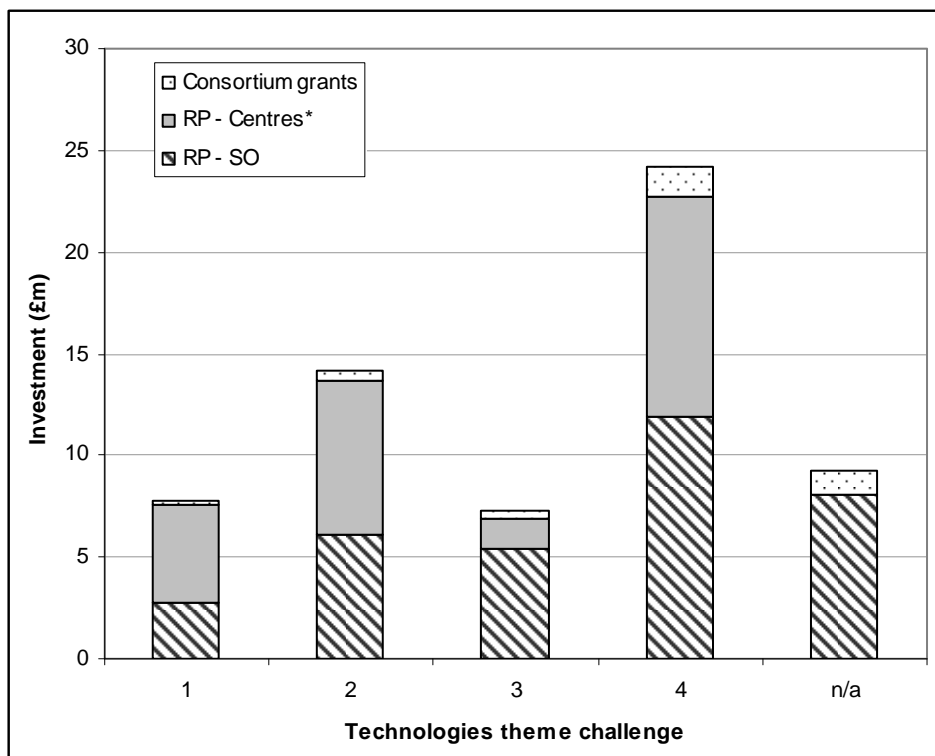
(NCEO)				
Total	£4.90m			

Table 3: Responsive Mode: summary of (non-Consortium) grants current at, or started since, July 08 classified as of relevance to technology for environmental applications

Grant scheme ⁴	No. grants ⁵ (%)	Amount Tech in £m (%)
Standard grants	14 (29)	1.86 (56)
Masters training grants	18 (37)	1.07 (32)
Small grants	9 (18)	0.19 (6)
New investigator grants	5 (10)	0.13 (4)
Advanced fellowships	1 (2)	0.07 (2)
Postdoctoral fellowships	2 (4)	0.04 (1)
Total	49	£3.36m

2. Figure 1 presents the investments divided by challenge (for the 80% of spend that has been mapped by challenge – this does not include the majority of responsive mode grants).

Figure 1: Distribution of investments that have been mapped by challenge



* 0910 spend by Research Centres multiplied by 5 years to be broadly comparable with the other investment categories.

⁴ Description of the schemes available at www.nerc.ac.uk/funding/available. Doctoral training grants are not included as they are not classified by topic. Grants not relevant to the Technologies theme were excluded.

⁵ Split grants are combined and treated as one.

LIST OF ABBREVIATIONS

DSD	(NERC) Director, Science Delivery
DSTL	Defence Science and Technology Laboratory
EG	Environmental Genomics
EO	Earth observation
EPSRC	Engineering and Physical Sciences Research Council
KE	Knowledge Exchange
KTN	Knowledge Transfer Network
LWEC	Living With Environmental Change (Research Programme)
MEMS	Microelectromechanical systems
NASA	National Aeronautics and Space Administration
NC	National Capability
NERC	Natural Environment Research Council
NMIs	National Metrology Institutes
PGP	Post-genomics and Proteomics
RM	Responsive Mode
RP	Research Programme
SISB	(NERC) Science and Innovation Strategy Board
SIM	Science and innovation Manager
STFC	Science and Technology Facilities Council
TAP	Theme Action Plan
TL	Theme Leader
TPOC	Technology Proof of Concept
TRL	Technology Readiness Level
TSB	Technology Strategy Board
UAV	Unmanned Aerial Vehicle

For further information on Research Programmes listed above, see www.nerc.ac.uk/research/programmes