



Defence Scientific Advisory Council

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**2014-2015 ANNUAL REPORT OF THE DEFENCE SCIENTIFIC ADVISORY
COUNCIL**

(Communicated by: Professor David Delpy)

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This is a report by the Defence Scientific Advisory Council (DSAC). DSAC is established to provide independent advice to the Ministry of Defence in the fields of science, technology, engineering, analysis and mathematics. The report does not necessarily represent the final views of the MOD or its Agencies.

Summary

- S-1. DSAC provides advice to the Secretary of State, Ministers, senior military officers and civil servants across the whole of MOD on all matters relating to, or benefiting from, science, technology, engineering, analysis and mathematics (STEAM). DSAC is a source of informed, independent and impartial advice providing expertise, challenge, assessment, interpretation and alternative options to the issues facing MOD.
- S-2. DSAC aspires to be the Department's trusted source of advice and challenge and to be the benchmark for independent scientific and technical advice across Government. We believe that, as a matter of good governance and as a key element in risk identification and management, independent, impartial and informed science, technology, engineering, analysis and mathematics advice should be an integral part of major decisions in all areas.
- S-3. This year we have carried out a number of in-depth studies including:
- Defence Science Engagement with Academic Research;
 - Use of Synthetics in Royal Navy Training;
 - Royal Navy Operational Energy Management;
- S-4. And a short study:
- Effect of the National Quantum Technologies Programme on MOD;
- S-5. DSAC produced a short report following their 2014 Workshop at RAF Waddington.
- S-6. DSAC and ISTA members have been heavily involved in the GCSA Review of MOD's Science and Technology Capability, dated 30 March 2015.
- S-7. DSAC and ISTA members have also provided independent advice through a series of workshops considering emergent disruptive capabilities and their potential impact on future force structures.
- S-8. Professor Delpy is a member of HOSAC and is Chair of a HOSAC Working Group looking at the costs of Cyber Crime.

Chairman's Message

C1. I have now completed one year as Chair of DSAC during which time four long-serving members have retired and have been replaced by four new members, representing a turnover of a third of the independent membership. The fact that DSAC studies and involvement with the MOD have continued without any diminution in volume or quality is a testament to the quality of the DSAC membership and the support they have received from all elements of the MOD and especially the DSAC Office staff.

C2. The year has also seen an independent "Triennial Review" of DSAC carried out on behalf of the CSA by Professor Sir Alan Wilson. His review found there was a continuing need for DSAC and the services it provided. He also made some suggestions for changes and improvements in its ways of working which have been accepted by the CSA and which are being implemented by DSAC. Sir Alan is the Chair of HOSAC, the Home Office Science Advisory Council and to ensure a close engagement between the two organisations, the Chairs are invited members of each other's Councils.

C3. In addition to the studies which result in formal reports, DSAC has also tried to engage through other less formal (and hopefully more responsive) mechanisms and Council members have participated in a number of defence workshops and one-to-one meetings with members of MOD staff (particularly Dstl). DSAC members are also now automatically invited to the annual Dstl Symposium and this has been particularly useful in both gaining oversight of the broad range of Dstl activities and meeting research staff at all levels in the organisation.

C4. The Council is supported in its work by members of the Independent Scientific and Technical Advice (ISTA) Register and during the year Council has been reviewing the future makeup of this valuable source of advice. It has decided to undertake a major review and renewal of the Register, a process that will be completed during 2015/16. We have also agreed to share the Register with other government departments and in the first instance with the Home Office and the Government Office of Science. (This was one of the recommendations in the Triennial Review).

C5. Given the small size of DSAC and the fact that its members are part-time, it has often been a problem for members to have an appropriately detailed understanding of the breadth of MOD activities, and it is also true that the existence and role of DSAC has not always been as visible throughout the MOD as we might wish. To help remedy this, Council has agreed to put in place a "partnering/mentorship" scheme

between individual Council members and senior members of staff across all areas of the MOD. This scheme just been established and I hope that we will see the benefits over the coming year.

C6. Finally, it should be noted that the greatest workload on DSAC this year has arisen through the “Review of MOD’s Science & Technology Capability” that Sir Mark Walport, the Government Chief Scientific Adviser was asked to undertake on behalf of the MOD Permanent Secretary and the Vice Chief of the Defence Staff. Given the short timescale for this review and the wide range of areas to be covered, ten separate panels were set up to review different areas and DSAC members chaired eight of these (the other two being chaired by ISTA Register members). I was a member of the Steering Group for the review. The successful completion of this review was in large part down to the significant efforts and professionalism of these members and the experts they selected for their panels.

Professor David Delpy

Contents

Summary	1	
Chairman's Message	2	
Contents	4	
Organisational Overview	5	
Background		5
2014/15 Review	6	
Annual Workshop 2014	8	
Annual Workshop, RAF Waddington		8
2014/15 Other Business	9	
Recruitment		9
Other areas of MOD Support	10	
2015/16 Forward Work Programme	10	
DSAC Annual Workshop 2015		10
APPENDIX A: Council Membership		11

Organisational Overview

Background

1. DSAC is a UK advisory Non-Departmental Public Body (NDPB) reporting to the Secretary of State for Defence, with the Minister for Defence Equipment, Support and Technology exercising oversight on his behalf. DSAC is charged with providing the Secretary of State with independent advice on science and technology issues of interest to MOD. Advice is provided in a variety of forms, ranging from short notes being delivered in a matter of hours to in-depth studies taking several months to complete, in response to either specific requests from MOD or where Council considers an issue to be relevant to MOD.
2. The Council meetings provide a forum in which 11, including the Chair, independent, internationally renowned experts and senior MOD officials meet to discuss and tackle major issues facing Defence. This gives DSAC a unique collective insight and appreciation of Defence which greatly increases our usefulness and value. In order to further improve our capability, DSAC is supported by members of the Independent Scientific and Technical Advice (ISTA) Register. This provides rapid access to approximately 100 experts covering a very wide range of disciplines and capabilities.
3. External independent, informed and impartial scientific advice is a key element in good governance and effective evidence based decision making and we have been providing such advice for over 50 years.

2014/15 Review

4. **Council Meetings:** Formal meetings of the full Council were held on four occasions during the year including an independents-only meeting. The two-day annual workshop was held in September 2014 at RAF Waddington.
5. **DSAC Studies:** We completed 4 studies for a range of MOD sponsors and are preparing others for delivery later in the year.
6. **Science Capability Review:** DSAC and ISTA members have been heavily involved in the GCSA (Sir Mark Walport) Science Capability Review (SCR) of MOD's Science & Technology (S&T) Capability. The DSAC Chair sat on the 3 Star Steering Group and eight of the ten Capability Panel Chairs were DSAC members with the other two being ISTA Members.
7. **Triennial Review:** Prof Sir Alan Wilson made 13 recommendations in his 2014 Triennial Review of DSAC. These are being addressed jointly by CSA and DSAC. At the time of this report, 10 of the recommendations have been actioned and it is intended that Sir Alan be asked in the autumn to undertake in the autumn a short follow-up review to assess MOD progress in addressing his recommendations.
8. **Engagement:** We have given special attention to increasing and enhancing our engagement within the Department and improving our links with Head Office, the Commands, DE&S and Dstl. This included:
 - The DSAC Chair now sits on the R&D Board;
 - The DSAC Chair is a member of the Knowledge Innovation and Future Enterprise (KnIFE) Programme Board;
 - The Deputy Chair attends the S&T Customer Board which supports the R&D Board;
 - A Partnering scheme has been introduced, where DSAC members partner with senior (2/3 Star) officials across MOD;
 - DSAC members attended the 2014 Dstl Annual Symposium in Reading on 10th and 11th June, following the agreement for all members to be given a standing invitation to the event;
 - Professor Peter Johnson continues to represent DSAC on the Dstl Fellows and Senior Principals Committee;
 - DSAC's link with the Home Office Science Advisory Council has been consolidated with DSAC and the HOSAC Chairs attending each others Council meetings. Prof Alan Wilson, the new HOSAC Chair led the DSAC

Triennial Review and presented his findings at the May 2014 Council meeting;

- Professor Peter Fryer has been engaged in a series of meetings over the last twelve months both within DSAC and with colleagues in Dstl and elsewhere, to identify ways in which DSAC can take part in Horizon Scanning. He coordinated an Horizon Scanning DSAC workshop 18-19th September 2014;
- William Forrest was a member of the Dstl weapons review which reviewed the weapons team self-assessment and the customer perception of their performance. The team also spent time with key suppliers, QinetiQ, Thales and MBDA, reviewing industry self-assessments and benchmarking Dstl against suppliers. This took place between 3 and 7 November;
- John Ames conducted a "deep dive" into aspects of the technology support for Special Forces. The deep-dive itself took place in June 2014 but with preparation, write-up and reporting the timescale was from May to October; He also attended the LOSA Conference, 22-23 October 2014 and the Horizon Scanning workshop, 18-19 September 14 and attended an EOD and Search Review for Dstl, 5 March 2014.
- **Information Access:** To improve MOD's access to DSAC's work, DSAC's reports since 1996 are being placed in, and are available via, the Athena Document Library system. In addition, a number of DSAC's most recent reports have been placed on the DSAC internet webpage. <https://www.gov.uk/government/organisations/defence-scientific-advisory-council>.

9. **Retirements:** After many years of distinguished service, Professors Helga Drummond, Doug Greenhalgh, Peter Grindrod and John McDermid completed their terms of office on DSAC; we wish them well in their future endeavours.

10. **Honours and Awards:**

- Professor Dave Delpy was appointed CBE in the Birthday Honours 2014.
- Professor Sarah Spurgeon was appointed OBE in New Years Honours 2015.

Annual Workshop 2014

Annual Workshop, RAF Waddington

11. The 2014 DSAC workshop was hosted by RAF Waddington from 23rd – 25th September 2014. DSAC was exposed to the breadth of MOD's Air ISTAR assets and were made aware of the essential nature of these assets to current operations and, given the limited assets available, the strain this places on both aircrew and ground staff in sustaining these assets at operational readiness. DSAC also visited and was briefed on the role of the Air Warfare Centre (AWC).
12. DSAC considered issues such as: sustaining aging systems, both airframes and IT and also the potential impact of Remotely Piloted Air Systems (RPAS) operations on aircrew.
13. DSAC has produced a report of their workshop, which has been circulated to interested parties within Air Command.

2014/15 Other Business

Recruitment

14. Four new members of DSAC were appointed in 2014, replacing those who retired. The new members are: Dr Louise Bennett, Professor Paul Cannon, Professor Julian Jones, Mr William Forest. Short Biographies for the new members are provided at Annex B.

ISTA Register Review

15. During 2014-15 it became apparent when mapping members expertise to the SCR panels that the current register no-longer mapped readily to the Dstl Capabilities. It was also apparent that some members were no-longer active and of those active members only 25% were being utilised on a regular basis. Given this, a major review and refresh of the register was initiated.
16. The review and refresh including seeking new members will be completed by the end of July 2015. Also, in-line with Sir Alan Wilson's review recommendations the register will now be made available to OGD. Initially the Home Office and Go-Science.

Other areas of MOD Support

2015/16 Forward Work Programme

17. The DSAC work programme combines studies raised for inclusion at the beginning of the financial year, and ad-hoc tasks which are generated during the year. Topics for consideration in the DSAC study programme for 2015/2016 include a Review of Autonomous Systems, focused on the role of machine learning and a review of centres of Autonomy expertise both nationally and internationally

DSAC Annual Workshop 2015

18. The 2015 DSAC Annual Workshop is scheduled to take place at Dstl Porton Down, 30th June-2nd July. The workshop will focus on scientific and technical issues of concern to Dstl

APPENDIX B: NEW MEMBERS BIOGRAPHIES

Dr Louise Bennett FBCS

Dr Louise Bennett started her career as a scientist modelling weather patterns and forecasting locust plagues in Africa. She then moved into operations research and real time computing for aircraft systems in the Ministry of Defence. Over the last 25 years she has been an IT & R&D director (Thorn EMI, Logica, AEA Technology, Vivas). She currently does a portfolio of jobs. She is a Trustee of the Marine Society and Sea Cadets.

She chairs the BCS Security Community of Expertise and Identity Assurance Working Group. She also sits on: the CO Privacy and Consumer Advisory Group for the identity assurance programme, the ICO Technology Reference Panel, and is an expert advisor for the European Commission R&D programme. Her consulting focuses on: strategic and corporate governance, the exploitation and ethical use of new technology and risk management. Her latest work includes identity assurance and payments on the Internet, developing resilient organisations, from environmental, security and privacy perspectives (including information assurance and fraud prevention).

Prof Paul Cannon OBE, FREng

Paul is Professor of Radio Science and Systems at the University of Birmingham. Until 2013 Prof Paul Cannon was concurrently the part-time Director of the Poynting Institute at the University of Birmingham and a Senior Fellow at QinetiQ. Prior to this Paul served as Chief Scientist and Technical Director of the Communications Division of QinetiQ and as the University Partnerships Director of QinetiQ. Paul is currently the Editor-in-Chief of the US journal "Radio Science" and President of the International Union of Radio Science (URSI). He is a fellow of the Royal Academy of Engineering.

Paul has worked at the intersection of research and industry for the last 20 years and in his role as the first Director of the Poynting Institute at the University of Birmingham he led a partnership between industry and academia dealing with Autonomy and Space Engineering.

Paul is a leading figure in radio science and systems, being interested in a wide range of radio propagation and radio environment problems and how they impact communications, radar and navigation systems. He has made numerous personal and team leadership contributions to mitigating the impact of the environment on radio systems. Paul has published many scientific papers including those addressing ionospheric modification, high frequency communications and radars, meteor scatter communications and space radars.

Paul has served on the UK Cabinet Office, Space Weather Project Board, has been an expert witness to the House of Commons Science and Technology Select Committee and has supported the Prime Minister's Committee on Science and Technology.

Mr William Forrest, CEng, FIET, FRIN

William Forrest is Managing Director of William Forrest Consulting Ltd, a freelance business advisor / consultant providing support to technology based companies, institutions and government.

He is an experienced Business Development Director with a sound engineering, project management, marketing, and strategy background and has an outstanding track record in military and civil programs for domestic and international markets. William has extensive bid and project expertise with Thales and Raytheon ranging from collaborative Research and Technology and its commercialization, product development, through to multi £Bn complex systems bids and projects.

Prof Julian D C Jones OBE, FRSE, FInstP, FOSA

Professor Jones studied at the University of Wales, Aberystwyth before becoming a lecturer at the University of Kent at Canterbury. Since 1988, he has been at Heriot-Watt University, Edinburgh, establishing a research group in optical fibre sensors, optical instrumentation and laser-material interactions. In 2007, he became Deputy Principal for Strategy and Resources, in 2010 Vice-Principal, and additionally in 2013, Deputy Vice-Chancellor. He has over 500 publications

His interests have spanned the underlying physics and the engineering applications of fibre optics, of which a representative selection includes: monitoring techniques for laser welding; instrumentation for jet engine design experiments; pressure sensors used in experiments for mitigation of terrorist explosions; fluorescence techniques for detection of contamination in surgical instruments; quantitative measurements of wing shape in natural insect flight; and many more.

Julian is a director of OptoSci Ltd. In 2014 he was appointed to the Defence Science Advisory Council and from 2010 to 2014 he was a member of the Scottish Scientific Advisory Council. He is Treasurer of the Institute of Physics, a member of its Council and has chaired the Optics and Photonics Division, the Optical Group, the Institute in Scotland and the Education Committee in Scotland. He was editor of the IOP Journal of Measurement Science and Technology.

Julian is a Fellow of the Institute of Physics, the Royal Society of Edinburgh and the Optical Society of America (elected with the citation '... recognised for your world-leading track record in optical fibre sensors, optical instrumentation and laser-material interactions, and outstanding contributions to UK research strategy and planning'. He received an OBE in 2002 for services to science and engineering.

