Wargaming for Professionals

King's College London

September 6th – 8th 2016

Day 1: Tuesday 6 September 2016

Time	Event	Chair/Speakers	Remarks
0900 - 0930	Arrivals and coffee – KCL Great Hall and Entrance		
0930 - 0940	Welcome and introduction – Safra	Maj Tom Mouat, SO2 Modelling and Simulation UK Defence Academy	
0940 - 1300	**Megagame – Great Hall** **'War in Binni'** Drinks 1130 – Great Hall Entrance	Maj Tom Mouat and Jim Wallman, Past Perspectives	Active learning experience
1300 - 1400	Lunch – Terrace Cafe		Buffet
1400 - 1645	**Megagame – Great Hall** **'War in Binni'** Drinks 1645 – Great Hall Entrance	Jim Wallman	Active learning experience
1710 - 1800	**Megagame After Action Review** - Great Hall	Maj Tom Mouat and Jim Wallman	How the game could be improved
1800	Buffet supper – Terrace Cafe		Cash bar

Day 2: Wednesday 7 September 2016

Time	Event	Chair/Speakers	Remarks
0845 - 0915	Arrivals and coffee – Great Hall		Fire Alarm Test 0900
0920 - 0930	Welcome and introduction to Connections UK – Great Hall	Prof Phil Sabin, Tom Mouat and Graham Longley-Brown	
0930 - 1100	**Plenary 1: The psychology of successful wargames** Tea and coffee 1100-1130 – Great Hall Entrance	Chair: Ed McGrady Graham Longley-Brown – High engagement wargames Nick Hare – Creativity in games Stephen Downes-Martin - Designing wargames to deceive: why and how?	20 minutes per speaker then 10 minutes Q&A
1130 - 1200	**Games Fair brief:** 1-minute introduction to each game: *what it is and how it might help you*	**Games.** Coordinators: Phil Sabin & James Bennett 1. Swen Stoop – Modern Naval Wargame (1980s) and Teamwork BG Wargame 2. Current Ops – John Curry 3. Michael Lee – Wide Area Persistent Messaging (WAPM) 4. Andrew Sharpe and Ivor Gardiner – Camberley Kriegsspiel 5. Tom Mouat – Bomber Kriegsspiel 6. Charles Vasey – Rapid games 7. Andreas Haggman – Cyber Wargame 8. Mark Gould – CAEn 9. Jim Wallman – Wargame 2020 10. Mark Flanagan – Fire & Movement (computerised) 11. Sebastien de Peyret – Urban Ops 12. Pandora Emergency Services planning – Liz Bacon and Lachlan Mackinnon 13. Aaron Cooper – Messaging Wargame 14. Michael Young – Dilemma Analysis 15. Johan Elg – Bellum Baltica matrix wargame 16. TacCyber Wargame - Roke	
1200 - 1300	Lunch – Terrace Cafe	Set up games Basis for decision-making AORE, 1964 playing on a loop	Working Lunch Sign up for Games Fair session 1 *and* 2 games
1300 - 1415	**Plenary 2: Non-combat (non-map and counter) wargames** - Great Hall	Chair: Anja van der Hulst Russell King – NHS emergency planning exercises Mark Stoop – Scenario based policy discussion Michael Lee – Wide Area Persistent Messaging (WAPM)	20 minutes per speaker then 15 minutes Q&A
1430 - 1700	**Games Fair Session 1** Tea and coffee 1600 – Great Hall Entrance	Rooms K0.16, K0.18, K0.19 and K0.20. Games as above	Signed up to during lunch
1700 - 1800	**Key note address** – Great Hall	Prof Rex Brynen **Advancing and Expanding the Craft of Wargaming:** Ten (not entirely randomly-generated) reflections on wargaming	
1800 - 1900	Supper – Terrace Cafe		Buffet with cash bar (until 2000)
1900 - 2200	**Games Fair Session 2**	Games as above, with different players	Signed up to during lunch

Day 3: Thursday 8 September 2016

Time	Event	Chair/Speakers	Remarks
0845 - 0900	Arrivals and coffee – Great Hall Entrance		
0900 - 1000	**Plenary 3: Computer simulations and technology** – Great Hall	Chair: Éric Jacopin Dave Robson and Samantha Black – Technology in support of wargaming Mark Gould – The CAEn process	20 minutes per presentation then 20 minutes Q&A
1000 - 1045	**Plenary 4: Strategic Gaming** – Great Hall Drinks 1045 – Great Hall Entrance	Stacie Pettyjohn, RAND	40 minutes then 5 minutes Q&A
1115 - 1230	**Plenary 5: Successful real-world wargames** – Great Hall	Chair: Colin Marston Jeff Appleget and Rob Burks – DoD and Defense Partner Wargaming at the Naval Postgraduate School Roger Mason – Wargaming in the intelligence community Ivanka Barzashka – Ballistic Missile Defence	20 minutes per presentation then 15 minutes Q&A
1230 - 1315	Lunch – Terrace Cafe		Buffet
1315 - 1435	**Plenary 6: Wargaming Innovations** – Great Hall	Chair: Stephen Downes-Martin Paul Vebber – Wargaming for Innovation Ellie Bartles – Resolving hidden information in open adjudication Laura Hoffman – Designing wargames at KCL	20 minutes per speaker then 20 minutes Q&A
1440 - 1450	**Breakout introduction: How might we institutionalise wargaming and build the wargaming capacity?** Drinks 1450 - Great Hall Entrance	Chair: Cdr Phil Pournelle and Matt Caffrey Self-selecting groups organised into, and addressing the questions from the perspective of: • Serving 'front line' personnel (military, emergency service etc) – Ivor Gardiner and Russell King • Defence Science & Technology – Paul Pearce, Tony King and Stephen Shearer • Military education and Training – Johan Elg and Tom Mouat • Historical Analysis/Conflict Research – David Richardson and Stephen Ho • Academia – Phil Sabin and Rex Brynen • Industry – Judith Rawle, Chris Jordan and Andy Wrycraft • Hobby gamers – Rob Cooper and Charles Vasey	
1500 - 1545	**Breakout**	Facilitated syndicates	
1545 - 1630	**Breakout back briefs and discussion**	Chair: Cdr Phil Pournelle and Matt Caffrey	
1630 - 1645	Closing remarks	Prof Phil Sabin/Graham Longley-Brown	

Speaker Biographies

Dr. Jeff Appleget is a retired Army Colonel who served as an Army Operations Research analyst at the Center for Army Analysis (2 years) and the TRADOC Analysis Center (10 years, serving tours at TRAC-Monterey, TRAC-White Sands Missile Range, TRAC-Fort Leavenworth, and TRAC Headquarters). He teaches the Wargaming Analysis, Combat Modeling, and co-teaches Modeling and Simulation of Societies in Conflict courses at NPS. He also teaches week-long Basic Analytic Wargaming Mobile Training Team (MTT) course, with the most recent offering conducted in Adelaide, Australia for DST-Group (the Australian Government's Defence Science and Technology organization). He is the Joint Warfare Analysis Center (JWAC) Chair of Applied Operations Research at NPS. His research interests include Irregular Warfare and Stability Operations modeling, Amphibious Operations modeling, Wargaming, Combat Modeling, Survey Data modeling and analysis, Navy Recruiting, Verification, Validation, and Accreditation (VV&A) of DoD models and data, and Integer Programming. He was a member of the NATO SAS-091 Specialist Team (2012 Research and Technology Organization Scientific Achievement Award winner) that developed metrics to support decisions for the transition of responsibilities from ISAF to the Afghanistan Government. His other major awards include the Richard W. Hamming Faculty Award for Interdisciplinary Achievement (2016), Army Modeling and Simulation Office Analysis Award (2011), Dr. Wilbur B. Payne Memorial Award for Excellence in Analysis (1991 and 2003), Simulation and Modeling for Acquisition, Requirements, and Training (SMART) Award (2001 and 2003), and 1990 Concepts Analysis Agency Director's Award for Excellence. He served on the Military Operations Research Society (MORS) Board of Directors from 2000-2004.

Elizabeth (Ellie) Bartels is a doctoral candidate at the Pardee RAND Graduate School and an assistant policy analyst at RAND. She has an M.S. in political science from the Massachusetts Institute of Technology and a B.A. in political science with a minor in Near Eastern languages and civilization from the University of Chicago. Prior to joining Pardee RAND, she was a senior associate at Caerus Associates, where she led the development and testing of an analytical framework for analyzing and planning urban operations for the U.S. Department of Defense. She previously worked as a research analyst at the National Defense University's gaming center, where she designed educational and analytical games for military schoolhouses, U.S. interagency initiatives, and partner-nation militaries. Her research interests include game design and analysis, irregular warfare, and Middle East politics

Ivanka Barzashka is a researcher at King's College London's Defence Studies Department, which is part of the Joint Services Command and Staff College of the UK Defence Academy. She manages a project that examines how ballistic missile defense (BMD) affects nuclear risks in the changing strategic environment through qualitative analysis, physical modelling and wargaming. The study focuses on understanding nuclear escalation among the United States, NATO and Russia. Barzashka has held visiting research positions at Stanford University's Center for International Security and Cooperation and the Bulgarian Academy of Sciences, where she assessed technical options for BMD cooperation between NATO and Russia. Previously, she managed the Federation of American Scientists' interdisciplinary assessment of Iran's nuclear capability. She holds a BS in physics from Roanoke College in Virginia and an MA in science and security (with distinction) from King's College London, where she is currently pursuing a PhD in war studies research.

Samantha Black is NSC's Chief Systems Engineer and has been working in Defence modelling and simulation for nearly 20 years. Starting her career as an analyst programmer, Sam spent her early years developing and supporting NSC's JOCASTS (Joint Operations Command and Staff Training System) simulation, attending multiple command and staff training exercises in the UK and overseas. In the mid-2000's Sam spent several years developing OA COA tools in support of NATO Operational Planning Courses, before returning to larger simulations such as CONTACT (COmmaNd and TACtics Trainer), while also moving into the area of systems integration combining simulations and COTS technology such as VBS with live operational software. Recently Sam has returned to her coding roots leading a team of software developers to re-engineer Dstl's CAEn model, improving the scenario setup process and ensuring maintainability of the model. When she is not leading projects or acting as technical authority on major programmes Sam heads up NSC's internal R&D activities. When Sam isn't surrounded by computer screens she can be found painting, gardening and enjoying family time with her husband and two small children.

Rex Brynen is Professor of Political Science at McGill University and nonresident Senior Fellow at the Atlantic Council, specializing in Middle East politics and regional security; peace, stabilization, and humanitarian operations; and political-military wargaming. He is author or editor of some eleven books on the Middle East, including Beyond the Arab Spring (2012). He is senior editor of the conflict simulation website PAXsims (http://www.paxsims.org), designer of the humanitarian crisis simulation AFTERSHOCK, and a past winner of the International Studies Association's Deborah Gerner Innovative Teaching Award for his work on classroom simulations. In addition to his academic work, Professor Brynen has served as an intelligence analyst, and as a consultant to various governments, United Nations agencies, and the World Bank.

Colonel (R) Robert E. Burks, Jr. is a Senior Lecturer in the Defense Analysis Department of the Naval Postgraduate School (NPS). He holds a Ph.D. in Operations Research form the Air Force Institute of Technology, a M.S. in Operations Research from the Florida Institute of Technology and a bachelor's degree in Aerospace Engineering from the United States Military Academy. He is a retired logistics Army Colonel with more than thirty years of military experience in leadership, advanced analytics management and logistics operations who served as an Army Operations Research analyst at the Naval Postgraduate School, TRADOC Analysis Center, United States Military Academy, and the United States Army Recruiting Command. He has led multiple analytical study teams responsible for Army Transformation (organizational change) issues and his work includes applying analytical methods to develop solutions for complex problems in support of the Combined Arms Support Command, the Army's sustainment think tank and premier sustainment learning institution. In addition, he has served as the technical expert on studies involving deployment, equipping, manning, training, and logistics operations of military forces in multiple theaters of operation. He currently teaches the Modeling for Decision Making and Statistics Courses at NPS. His research interests include Irregular Warfare and Stability Operations modeling, Information Operations modeling, Wargaming and Agent Based Modeling and Simulation. His recent major awards include the Military Leadership Award (2013), Joint Service Warfare Award (2013), Military Operations Research Journal Award (2011) for developing analytical methods for solving the Theater Distribution Problem, and the Omar Bradley Fellowship for the Study of Mathematical Sciences (2011).

Dr Stephen Downes-Martin is a Research Fellow at the US Naval War College, an independent scholar, and provides for-fee consulting services researching wargaming (theory and practice), systems thinking, decision analysis, deception and assessments methods applied to problems at the strategic, operational and tactical levels of warfare. A research focus is on how to manipulate decision support, analysis and assessment methods to deceive decision makers, how decision makers misuse such methods to deceive themselves, how to detect such attempts and protect decision makers from them. He has over 30 years of successful experience working with and for a wide variety of government, military, aerospace, and commercial organizations in the US and abroad. His full bio and list of papers is available at https://sites.google.com/site/stephendownesmartin/

Mark Gould has worked as a Senior Analyst at the Defence Science and Technology Laboratory (Dstl) for the last three years. He currently works in the wargaming team as the Software Model Custodian (SMC) for the Close Action Environment (CAEn) wargame where he ensures that the CAEn software is maintained and that the data and assumptions provided by and to project teams are suitable for use in CAEn and are fit for purpose. Since taking on the role of SMC he has begun to develop and document formal processes for using CAEn and is in the process of documenting how the elements of the model work together to produce the outputs which go on to be analysed. Prior to this he worked on operational analysis projects including identifying the challenges of providing combat service support in complex urban environments and providing support to various Defence Explosive Ordnance Disposal and Search (DEODS) questions posed by Army Headquarters. Before working at Dstl, Mark was employed by Sellafield Ltd where he created spreadsheet models and trend monitoring software for a spent nuclear fuel reprocessing plant. He has an MPhys (Hons) in Physics from the University of Bath.

Nick Hare founded Aleph Insights in 2014. Since then, he has delivered analytical training and consultancy advice to customers in both the military and government, and has worked with the Ministry of Defence to measure and improve its capacity to innovate. Prior to establishing Aleph Insights, he worked in various roles across the Ministry of Defence, the Cabinet Office and the intelligence community for 15 years, most recently within Defence Intelligence, where he was responsible for professionalising intelligence analysis. Nick has pioneered the use of structured analytical methods in the intelligence community. He has been instrumental in designing and delivering intelligence analysis training for the UK intelligence community, and he designed and oversaw the production of 'Quick Wins for Busy Analysts', which is now a standard handbook for intelligence analysts in the UK

Laura Hoffman recently completed her Master's Degree in Intelligence and International Security studies from King's College London. An avid board-gamer and occasional wargamer, she was intrigued by Dr. Sabin's Conflict Simulation course, and thought it couldn't be too hard. During the course, Laura designed a war game on the 1962-1975 Dhofar Rebellion in Oman, where she learned that creating conflict simulations is in fact, very difficult. She also worked as a Teaching Assistant for Dr. Sabin, helping to run simulations for his undergraduate students. Laura currently works as a Cyber Intelligence Operations Analyst.

Anja van der Hulst studied Educational Technology and received her PhD in Artificial Intelligence and Education from the University of Amsterdam. Since then, she has been active in developing and researching a series of Serious Games for safety and security at the Netherlands Research Organisation TNO. Her main interests are in developing concepts for good experiential learning with games and in conflict modelling for gaming, with a focus on political, economic and social/cultural factors in conflict. Since 2013, she also lectures in the master program Game Studies at the University of Amsterdam

Éric Jacopin has been playing and collecting wargames since the end of 1970s, while believing mechanical engineering would save the world. Attracted by Californian beaches, he quickly understood the importance of computer science and saw great potential in artificial intelligence (AI). Motivated by applied research, he tried to mix AI and industrial assembly planning but he soon realized that this could jeopardize his plans to keep on playing and collecting wargames. So, after a Ph.D. and an Habilitation to Direct Research in the 1990s, both focusing on AI planning and both from the University of Paris 6, he decided to both teach and apply AI planning to games, video-games and wargames. He now holds a position at the French military academy of Saint-Cyr, in Brittany.

Russell King is a career health service manager and teacher who has worked in his home town of Manchester and in Derbyshire, Yorkshire and London. He has specialised in his career in crisis management, was involved in someone of the larger more unfortunate UK disasters of the 1980s - and has more latterly been involved in bringing his area of expertise to executive education and events management, having been involved in the Tour de France Grand Depart, Tour de Yorkshire and the 2012 London Olympic Games. Last year, Russell published in association with John Curry Books, *It Could Happen Tomorrow*!, a record of his work over the last ten years in the field of civil exercises, and is about to start work on a second book which will focus on programmed instruction for practitioners in the area, and also further work with Manchester Business School on pandemics. Russell is a near-fanatic on the works of Redmond A Simonsen and Jim Dunnigan.

Michael Lee is a Systems Engineering Consultant from Jacobs. He is currently working within the Niteworks strategic partnership to develop a series of wargames focussed on information activities and outreach in a military environment. Although inter-linked, the wargames have widely varying objectives, including technical decision support, the generation of user requirements, and the testing and validation of Operating Models. Michael came to Systems Engineering after working as a project manager in the Oil and Gas sector. Prior to this he served in the Armed Forces, with roles including technical management as an Engineering Officer in Iraq as well as front line command as a Cavalry Officer in Afghanistan. Michael is a Chartered Engineer with the IMechE and holds a Master's Degree in Engineering from the University of Cambridge.

Graham Longley-Brown has wargamed since aged eight. He always preferred umpiring and creating scenarios to playing – and generally losing. He delights in wargame rules and has been known to laugh out loud at particularly clever mechanisms. A British Army Officer since 1986 (and still in the Reserves), he has used wargaming for professional purposes wherever fellow officers have been willing to listen. He was the UK Joint Services Command and Staff College Directing Staff Subject Matter Expert for wargaming from 2000-2002. Since leaving the Regular Army in 2003, Graham has made a living as a self-employed consultant in all-matters professional wargaming. He has designed and delivered wargames at UK, European and Gulf State Staff Colleges, for the UK Field Army at all levels, the NATO Joint Warfare Centre, the UK Future Force Development programme, Dstl, the American, British, Canadian and Australian Armies Programme, the Royal Brunei Armed Forces, the Pakistan National Defence University, the US Army in Europe and many others. He is the leading developer of the Dstl/Cranfield manual simulation the Rapid Campaign Analysis Toolset (RCAT). He is a published author on professional wargaming, delivers wargaming courses around the world and wrote – and teaches – the current Course of Action Wargaming section for the UK Army's Staff Officer's Handbook. The purpose of his website, www.lbsconsultancy.co.uk, is to spread wargaming best practice.

Colin Marston is a Principal Analyst at the Defence Science and Technology Laboratory (Dstl). He has predominantly worked in the Support to Operations (S2O) environment, having been deployed as an Operational Analyst to Afghanistan and Iraq. At Dstl, he has project managed and provided technical leadership to a range of projects and has been involved in numerous international research collaborations. He ran Dstl's Stabilisation Programme for five years, which involved delivering numerous wargames using PSOM (a Peace Support Operations Model) for a range of NATO and MOD customers. In 2011 he was the Field Team Leader responsible for two large deployments of analysts (Dstl and US) to deliver wargames to support the future planning of the International Security Assistance Force (ISAF) mission in Afghanistan. This work received a Chief Scientific Award. It was also awarded the OR Society's President's Medal in 2012. He is the Technical Partner, alongside Cranfield University, for the Rapid Campaign Assessment Toolset (RCAT). He has served in the Territorial Army (Infantry) and has a BSc (Hons) in Physics with Astrophysics.

Dr. Roger Mason is vice president and co-founder of LECMgt LLC located in Porter Ranch, California. LECMgt provides clients simulation/wargame design and operational management consulting. Dr. Mason has designed over 50 simulations and wargames for government, industrial, educational, and commercial applications. His expertise is in developing wargames for crisis management, course of action analysis, and critical incident response. He has developed the use of war games to evaluate threat assessments and the use of artificial life modeling in analog war gaming Dr. Mason travels internationally as a conference speaker and for a variety of clients and assignments. Some of his client partners include Georgetown University, National Defense University, and colleges and governments across the United States. Dr. Mason has 29 years of public safety experience in Los Angeles, California. He retired after 37 years of service from the United States Air Force Reserve.

ED McGrady is currently a Research Team Leader at CNA where he directs a team devoted to research on games and how they can be used to enhance decision-making. He develops games and conducts studies on a wide range of topics from force structure and planning to operational deployment of medical forces. He is currently working on projects related to Naval logistics, future amphibious concepts, and gaming cyber operations. Dr. McGrady has written and presented on the topic of games and their use in organizational and individual learning. He has designed and run games for many different clients ranging from the White House to the Department of Agriculture. He has also designed games that examine Naval issues surrounding command and control and force planning, as well as combined operations between United States and other nation's forces during consequence management events. Among his recent games have included one examining U.S. government decision-making on climate change, a game on medical casualty management in a chemical and biological environment, and games on operational concepts. Prior to becoming a Research Team Leader, Dr. McGrady led analyses on the evolving role of Naval forces and mission areas. These included a deployment with US Forces in Haiti, as well as projects examining the Navy's role in such diverse areas as disaster response, Complex Humanitarian Emergencies, command ship operations, continental defense, and information operations. He led analytical reconstructions of force protection and information operations for both Desert Fox and Desert Thunder, and deployed onboard *USS Nimitz* for Desert Storm and with E-2C squadrons for counter-narcotics operations. Dr. McGrady holds a B.A. in Chemical Engineering from the University of Florida and a Ph.D. in Chemical Engineering from the University of Michigan. He has published extensively in the Chemical Engineering, physics, and national security literature.

Tom Mouat is a serving officer currently working at the Defence Academy of the UK where he is the Directing Staff Officer for Simulation and Modelling. He has over 30 years of experience in training, military exercise planning, simulation systems and wargaming. He has an MSc in Defence Simulation and Modelling and holds a PGCE. He has experience in a wide range of military training systems from the lower tactical level to the higher strategic level, as well as spending 5 years in the procurement of these systems. In addition, he lectures on simulation, modelling and wargaming (most recently in China and Poland); has designed games for education; and facilitated Wargame events for diverse audiences, worldwide.

Stacie L. Pettyjohn is a senior political scientist at the RAND Corporation and codirector of the Center for Gaming. She is also an adjunct professor and Johns Hopkins University's School for Advanced International Studies (SAIS). Her primary research areas include wargaming, military posture, internet freedom, and American foreign policy in the Middle East. She is the author of the RAND monograph U.S. Global Defense Posture, 1783-2011 and the coauthor of several other reports, including The Posture Triangle: A New Framework for U.S. Air Force Global Presence, Overseas Basing of U.S. Military Forces: An Assessment of the Relative Costs and Strategic Benefits, and Deradicalizing Islamist Extremists. Her work has also been published in academic journals such as Security Studies and International Negotiation, and her commentary has appeared in Foreign Affairs, War on the Rocks, Defense News, The National Interest, Asia Times, and The Daily Star. Previously, she was a research fellow at the Brookings Institution, a Peace Scholar at the United States Institute of Peace, and a TAPIR fellow at the RAND Corporation. She has a Ph.D. and M.A. in foreign affairs from the University of Virginia and a B.A. in history and political science from the Ohio State University.

David Robson is a Simulation Engineer responsible for the design and delivery of Computerised and Manual Exercises for the UK and Overseas customers. David was recruited 20 years ago as the Lead Engineer for the migration of a set of legacy wargame tools from mainframe to PC technology. This involved redesigning the user interface and re-validating some of the underlying mechanics. Since then he has been involved in research projects for a number of UK defence research organisations, usually bridging the gap between the end user and the software engineering teams. Examples include Air Combat command and control systems, High Energy Weapons blast modelling and the use of unmanned systems for intelligence gathering. As well as supporting military exercises, David has been involved in civil resilience exercising for UK Cabinet Office and other organisations. Recently David was the technical lead for a series of capstone exercises for the new Qatari Armed Forces Command and Staff Collage in Doha. As a keen boardgamer and wargamer, David is currently investigating options for bringing manual gaming mechanisms into computerised training tools.

Philip Sabin is Professor of Strategic Studies in the Department of War Studies at King's College London. He has worked closely with the UK military for many years, especially through the University of London Military Education Committee, the Chief of the Air Staff's Air Power Workshop, and KCL's academic links with the Defence Academy and the Royal College of Defence Studies. Professor Sabin's current research and teaching involves strategic and tactical analysis of conflict dynamics, with a particular focus on ancient warfare and modern air power. He makes extensive use of conflict simulation techniques to model the dynamics of various conflicts, and since 2003 he has taught a highly innovative MA option module in which students design their own simulations of past conflicts. He has written or edited 15 books and monographs and several dozen chapters and articles on a wide variety of military topics. His recent books Lost Battles (2007) and Simulating War (2012) both make major contributions to the scholarly application of conflict simulation techniques. Besides co-organising the annual Connections UK conference at KCL, he has taken part in several defence wargaming projects, and he recently worked with the British Army's Centre for Historical Analysis and Conflict Research to help to design a Camberley Kriegsspiel with which officers may practise

battlegroup tactics. Professor Sabin has appeared frequently on radio and television, and has given many lectures and conference addresses around the world.

Mark Stoop served for 10 years in the Royal Netherlands Air Force in Operational Patriot Units. During my military career he completed a master's degree in Political Science, International Affairs focusing on political decision making of military operations. Since May 2004 he has been working for TNO, Dutch Institute for Applied Science. From 2004 until 2009, as program manager and project lead for TNO research program on Joint Air and Missile Defence. In this period he also contributed to the NATO Russian Federation Theatre Missile Defence Interoperability Working Group from 2004-2006 and has been involved in supporting the AMD exercise Joint Project Optic Windmill. In 2009, still for TNO, he worked as strategic innovation and policy advisor for the deputy commander of the Netherlands Royal Marechaussee. Then from 2010 he was TNO business developer for weapon systems and munitions and lead for the Design Analysis and Reporting Team (DART) in the Global Missile Defence Campaign Nimble Titan. He had a central role ensuring that 21 nations worked together in this Political and Military Missile Defence wargame. This has contributed to his experiences in designing wargames and crisis games in an international environment. From December 2013 he was assigned to the Netherlands Ministry of Foreign Affairs as senior advisor Scenario Based Policy Discussion for the Nuclear Security Summit 2014. In this capacity he prepared the interactive policy discussion between 53 Heads of Government. Since 2014 he is co-owner and Managing Director of the company Scenarios4Summits, which specializes in preparing and executing Scenario Based Discussions during summits and making defence and security films for special events. www.scenarios4summits.com

Paul Vebber is currently Assistant Director for Concept Development and Wargaming, in the Undersea Warfare directorate of Headquarters, Naval Undersea Warfare Center. His focus of effort is on developing and using wargames as tools to explore warfighting concepts and promote technology innovation. He also works to develop a cadre of "wargame savvy" engineers, analysts and scientists within the Naval Sea Systems Command Warfare Center Enterprise, and has a leadership role in efforts to improve the state of the art of DoD wargaming. In addition to his 15+ years as a civil servant, Paul is a retired Commander (USNR) with a Surface Warfare background in Mine Warfare and Anti-Submarine Warfare. He also has experience in the defense contractor realm having done analysis and training system development work for Northrop Grumman. The computer game company he co-founded and worked with from 1999 to 2010 (www.matrixgames.com) is one of the most prolific publishers of computer wargames.

Jim Wallman is a professional game designer specialising in manual games for developing insights, strategy and team development and for education, with over twenty five years' experience in the field. These wargame game designs are informed by many years as senior civil servant in the Ministry of Defence, as well as senior roles in the voluntary sector. He has designed and delivered map wargames at political, strategic and operational level for the UK Defence community; board games, map games and concept development games for the British Army; over 40 sets of wargaming rules; and command and decision games covering issues such as equipment development, political crises, strategic planning, and civil disorder. He has worked extensively with the corporate, public, educational, entertainment and voluntary sectors, in particular designing and implementing games for senior leadership development and analytical wargames for the UK MOD, corporate and the voluntary sector. Also a regular guest lecturer on wargame design and development at Wolverhampton University. His background and training is primarily in the social science, psychology and military history fields, with a particular interest in the practical application of positive psychology to game structures and the development of immersive gameplay. His game designs in the recreational arena have now been played world wide in the USA, Canada, Australia, the Netherlands, France, Italy, Germany, Austria and New Zealand as well across the UK.