

Millennium People in Space

When cubesats challenge scale and mitigate catastrophes

October 6th 2014 **Nesta** 1 Plough Place, EC4A 1DE, London

When **JG Ballard** depicts the revolt of the middle class in his book *Millennium People*, he also introduced us to the apocalyptic vision of pop culture's potential. Ten years later, Millennium people are up for outer space. They have reclaimed full access: it is the democratisation of outer space! Smaller, cheaper, shiny and smarter, here they are, soon lifting off from Millennium people's gardens, the miniaturised satellites - **The Cubesats!** With their 2kg of technology, these Cubesats might well be the next landmark in our technological history.

Millennium people is a Nesta and Nelly Ben Hayoun **experimental workshop exploring the future of open access space** through new Cubesat technologies and possible applications for disaster resilience and personal use eg storage. Space exploration has historically been hugely expensive and difficult, but things are changing. Only a decade ago, the first private spaceflight carried three people to 100km above the earth's surface. Communication satellites have been privately developed since the 1960s. But only recently have they been a plausible option for anyone other than large corporations.

Much like the transition from room-sized computers to today's miniature personal computers, the satellite industry may be seeing its own personalised revolution. **Cubesat technology** is making it easier for anyone to launch a small satellite into space and remotely access the information it collects. Cubesats are fostering a new spirit of innovation and entrepreneurship, but what is the future of open access space? Is this the beginning of a fully connected world? Is there any privacy from nanosatellite eyes? Could cubesats detect earthquakes before they happen?

This workshop looks at the cutting edge in accessible satellite technology, exploring new kinds of applications. There will be a focus on the role of satellite information in predicting and responding to humanitarian and natural disasters. Larger numbers of small satellite systems could aid monitoring, modelling and real-time disaster response. But how will the shift from government to private satellites affect the frameworks in place such as the **International Charter for Space and Major Disasters**?

Chaired and curated by the Willy Wonka of Design and Science Nelly Ben Hayoun, Nesta is holding this workshop as part of a series of experiments in technology foresight to encourage responsible innovation and good technology governance.

Our aim is to create an event that supports the policy and technology communities to take anticipatory actions.

Media

We will be creating a short video of some of the outcomes of the workshop including comments from attendees. If you would not like to feature on any video content, please let one of the Nesta staff know on the day.

All rights in any recordings or photographs made of the workshop will belong to Nesta and Nelly Ben Hayoun and may be used or distributed for any purpose through any media, including the Internet, live or after the event.

We will be live tweeting during the event using **#diyspace**

Expert Speakers

Dr Ross Burgon
Knowledge Exchange Fellow
The Open University

Dr Stuart Eves
Lead Mission Concepts Engineer
Defence and Space Division, Airbus

James Cemmell
Head of Government Affairs
Inmarsat

Dennis Wingo
CEO Lunar Image Recovery Project
NASA Ames Research Park

Syed Karim
Founder and CEO
Outernet Inc.

Ray Purdy
Co-Director
Air and Space Evidence Ltd

David Hodgson
Managing Director
CEO DMCii

Sam Adlen
Head of Business Innovation
Satellite Applications Catapult

Prof. Chris Welch
Director of Programmes
International Space University

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Agenda

**9:30 - 10:00, NESTA Lobby
REGISTRATION and BREAKFAST**

**10:00 - 12:45
QUICK FIRE PRESENTATION (10 mins
each) AND PANEL Q&A DISCUSSIONS**

**10:15 - 10:25
TOPOLOGY OF THE TECHNOLOGY**

*In this presentation, we will explore the basics of cubesat and nanosatellite technology. Who are the main Players? How many are there? What is the philosophy behind them? Could we launch them from our gardens in the future? A Topology presentation by **Dr Ross Burgon**, Knowledge Exchange Fellow at The Open University.*



**10:25 - 10:35
THE EARTH IS SHAKING**

*Warning systems and earthquakes detection: A seismic presentation by **Dr. Stuart Eves**, Lead Mission Concepts Engineer for the Defence and Space division of Airbus.*



**10:35 - 10:45
PLAN B COMMUNICATION**

*Cubesats as a plan B communication. **James Cemmell**, Head of Government Affairs, Inmarsat.*



**10:45 - 10:55
INVINCIBLE STORAGE AND LASER GUN**

*Mac Moons NASA Ames Research Park, Storing data in Cubesat. A mind/ space blowing presentation by **Dennis Wingo**, CEO Lunar Image Recovery Project, NASA Ames Research Park.*



**10:55 - 11:05
MILLENNIUM PEOPLE: THE POP CULTURE**

*Democratisation through cubesats- open access space. A pop presentation by **Syed Karim**, Founder and CEO, Outernet Inc.*



**11:05 - 11:20
PANEL Q&A DISCUSSIONS WITH SPEAKERS**

**11:20 - 11:50
COFFEE BREAK**

**11:50 - 12:00
SURVEILLANCE 1984**

*Surveillance and privacy issues. **Ray Purdy**, Co-Director, Air and Space Evidence Ltd.*



**12:00 - 12:10
HOMO FABERS AND LOGISTICS,
INTERNATIONAL RESPONSE TO
DISASTERS**

*International Charter for space and Major Disaster, greater private satellite ownership and the future. An official presentation by **Dave Hodgson**, Managing Director of DMCii.*



**12:10 - 12:20
THE CUBE-ECONOMY, CUBESATS AND
NEW MARKET PLACES**

*A market presentation by **Sam Adlen**, Head of Business Innovation, Satellite Catapult.*



**12:20 - 12:30
THE 'FORMULA OF THE NOW', TEACHING
FUTURE SPACE ENTREPRENEURS**

International Space University, how do we teach entrepreneurship? Defining new economic and business models for space.

*An educative presentation by **Prof. Chris Welch**, Director of Programmes at the International Space University.*



12:30 - 12:45
PANEL Q&A DISCUSSIONS WITH SPEAKERS

12:45 - 13:30
LUNCH

13:30 - 13:40
HANDS ON WORKSHOP BRIEFING
12 groups of 5 / 6 briefs / 6 situations /
6 questions / 6 approaches to innovation /
6 scenes / 6x5 characters / 12 performances

13:40 - 15:00
RESEARCH / EXPERIMENTS / MAKING /
REHEARSALS

15:00 - 16:00
PRESENTATION
3 minutes per group

16:00
ANNOUNCEMENT WINNER GROUP
1 Disaster Playground gift, 1 Nesta gift

16:00- 17:00
COFFEE AND NETWORKING

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Notes

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Speakers

Dr Ross Burgon

Knowledge Exchange Fellow at The Open University

Dr Ross Burgon is a Knowledge Exchange Fellow within the Department of Physical Sciences at the Open University; fostering collaborations between OU space scientists and industry. He has a background in astrophysics and spacecraft engineering; recently contributing to the data processing software for ESA's Gaia mission and the software in C3D, the OU's imaging payload on the UKSA mission, UKube-1. Ross is keen to promote and develop the UK's space expertise. He is a founding committee member of the UK Cubesat Forum (www.cubesatforum.org.uk) and co-ordinates a national public engagement programme highlighting UK involvement in ESA's Rosetta mission (www.rosetta.ac.uk).

Dr Stuart Eves

Lead Mission Concepts Engineer for the Defence and Space division of Airbus

The highlight of Stuart's career to date was the initiation of the TopSat imaging satellite programme, which established a new world record for "resolution per mass of satellite". Indeed, the mission was so successful that whilst the actual hardware was operating in orbit, the engineering model of the satellite formed part of the space gallery at the Science Museum in London. Stuart also played a seminal role in the TDS-1 satellite mission that was launched in July this year. Stuart has an MSc in Astrophysics, a PhD in constellation design, and has been a Fellow of the UK's Royal Astronomical Society for more than 20 years. In 2013, Stuart received the Arthur Clarke education and outreach award.

James Cemmell

Head of Government Affairs, Inmarsat

James Cemmell deals with government relations matters at Inmarsat, the leading global mobile satellite operator. This includes Inmarsat's emerging international development programmes as well as relationships with IGO and European bodies on topics spanning Inmarsat's activities.

He is engaged with the Markets Group of the European Satellite Operators Association (ESOA), serves on the Council of UKSpace, the representative body of the UK's 70,000 strong space industry and leads the Maritime Regulatory stream of the 'Global VSAT Forum'.

Prior to joining Inmarsat, James worked with a policy and regulatory consultancy serving satellite companies, telcos, governments and others. Before joining the telecoms sector, James focused on European and global higher education policy matters, including developments at the World Trade Organisation (WTO) / GATS as well as European and other global policy developments.

He has a Masters in International Development from the Bradford Centre for International Development (UK) and an Advanced Certificate in International Trade Law & Regulation from the World Trade Institute (Switzerland).

Dennis Wingo

CEO Lunar Image Recovery Project, NASA Ames Research Park

Dennis Wingo is an engineering physicist and 36-year veteran of the computer, academic, and spaceflight communities. Dennis has designed and built flight systems flown on sounding rockets, the Shuttle, ISS, as well as the first student built small satellite funded by NASA. Dennis holds patents for orbital space operational concepts and has published a book (Moonrush) concerning concepts for a cost effective, commercial lunar outpost. Dennis is the CEO of Skycorp, a commercial space company developing advanced spacecraft for commercial applications. Dennis led the Lunar Orbiter Image Recovery Project (LOIRP) at the NASA Ames Research Park, funded by NASA, private grants, and ~\$100k in crowdfunding. Today Dennis and Skycorp have become the first private entity to ever command a spacecraft (ISEE-3) in interplanetary space through a Space Act Agreement with NASA, an internationally acclaimed project accomplished in six weeks with \$160k in crowd funding.

Syed Karim

Founder and CEO, Outernet Inc.

Syed Karim is the founder of Outernet, a broadcast data startup which will ensure that a basic level of news, information, and education is available to all of humanity. Through a combination of conventional geostationary satellites and low-cost, handheld nanosatellites, all corners of the globe will have access to the wealth of human knowledge found on the internet. Prior to Outernet, Syed led the investment process for news and information startups at Media Development Investment Fund, an impact investment fund which has offered debt and equity financing to independent media companies in frontier markets for almost twenty years. Syed is a failed librarian and imaginary economist, having stumbled through a few semesters of graduate study at the University of Illinois at Urbana-Champaign. www.outernet.is

Prof. Chris Welch

Director of Programmes at the International Space University

Chris Welch is Professor of Space Engineering and Director of Masters Programs at the International Space University (ISU) in Strasbourg, France. He is Vice-President and a Council Member of the British Interplanetary Society and board member of the World Space Week Association, the Spacelink Learning Foundation and the Arts Catalyst. Chris has served as a special advisor on two UK government enquiries into space policy and is a member of the advisory groups of the Space Generation Advisory Council and Institute for Interstellar Studies. His space interests range from human and robotic exploration through microgravity science to education and outreach.

Ray Purdy

Co-Director, Air and Space Evidence Ltd

Ray Purdy is a co-Director of a new expert consultancy called Air and Space Evidence Ltd (www.space-evidence.net). Before that he was a legal academic working at University College London (where he is currently a Visiting Senior Research Fellow), Imperial College and the University Of Oxford. Much of his research work has been focused on the use of Earth observation as evidence and its capacity to monitor and enforce laws. Ray has worked on projects in this field for the European Commission, UK Space Agency, Arts and Humanities Research Council, Economic and Social Research Council, and European Space Agency. His research has been directly reported within the full United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) General Assembly and Subcommittees. He has been a member of the International Law Association's Space Law Committee; associate of the International Institute of Space Law; member of the European Centre for Space Law; and member of the Global Review Panel for Europol and the International Cyber Security Protection Alliance's Project 2020. He has chaired sessions on satellite monitoring at conferences organised by The International Network for Environmental Compliance and Enforcement, International Astronautical Congress, and the European Space Policy Institute. He has published widely in this area, most recently, he co-edited a book entitled Evidence from Earth Observation Satellites. Emerging Legal Issues (Martinus Nijhoff/Brill, Leiden, 2013).

David Hodgson

Managing Director, CEO DMCii

David Hodgson is the Managing Director of DMCii (DMC International Imaging Limited) with over 22 years of satellite and service industry experience. He holds an MBA from Warwick business School and degree in computing from Surrey University. David has served for 6 years, and twice lead, the Executive Secretariat of the International Charter, 'Space & Major Disasters' and is a past chairman the British Association of Remote Sensing Companies (BARSC).

Sam Adlen

Head of Business Innovation at the Satellite Applications Catapult

Sam is Head of Business Innovation for the Satellite Applications Catapult, responsible for supporting SMEs and driving innovation across the business. He has previously been Lead Technologist for Space at the Technology Strategy Board.

Following a PhD working on a NASA Mars satellite he joined the VEGA Group, working as a consultant focusing on satellite applications. From there he has since held senior roles in Finmeccanica, as Strategy Manager for SELEX Systems Integration and in the Finmeccanica Innovation Hub. He has co-founded and successfully exited a start-up that employed smart-phone technology to transform the economics of haulage and completed an MBA focusing on Innovation and Entrepreneurship.

Sam holds an MPhys (first class) and PhD from Oxford University.

Organisers

Nesta

Nesta is the UK's innovation foundation. We help people and organisations bring great ideas to life. We do this by providing investments and grants and mobilising research, networks and skills. We are an independent charity and our work is enabled by an endowment from the National Lottery.

We achieve our mission through a combination of four core capabilities:

1. Generating new knowledge and insights about how innovation happens in the economy, society and public services
2. Supporting skills, methods, tools and capacity to innovate, both in leading edge fields (from digital technology to creative industries) and in fields where innovation is less supported (such as local government)
3. Linking diverse networks of people and organisations, and using our convening power to open up new possibilities and to help with implementation and diffusion of innovations
4. Helping fund innovative ventures, projects and programmes, particularly ones focused on solving compelling problems. We do this as an investor, a grant-giver, and through programmes that combine a mix of types of support.

Nelly Ben Hayoun

Nelly Ben Hayoun has been called the "Willy Wonka of design and science" and she is on a mission to bring chaos, subversion and disorder into the design and the scientific world. An award-winning director and Designer of Experiences she works with leading scientists and engineers, to devise subversive events and experiences. Ben Hayoun previously collaborated with Beck, Bobby Womack, Damon Albarn, Maywa Denki, Bruce Sterling and Penguin Café in a musical collaboration that took music into space. Blasted from a Japanese launch pad in August 2013; she assembled the International Space Orchestra (ISO) - the world first orchestra of space scientists from NASA Ames Research Center, Singularity University, International Space University and the SETI Institute. In 2013, Icon Magazine nominated Ben Hayoun as one of the 50 international designers "shaping the future". She is the Designer of Experiences at the SETI (Search for Extraterrestrial Intelligence) Institute in CA, USA, Head of Experiences at We Transfer, a member of the Space Outreach and Education committee at the International Astronautical Federation and an academic at world leading institutions including the Architectural Association School of Architecture where she is a Visiting Professor (as part of the Unknown Fields Division), Central Saint Martins and the Royal College of Art where she is a lecturer. She is a researcher in Geography at Royal Holloway, University of London. Ben Hayoun was awarded one of the UK largest artistic award, The Arts Council England Exceptional Award for her new project Disaster Playground considered as 'really remarkable and of national importance' (Peter Knott, Director, Arts Council England). In 2014, Wired magazine awards Nelly Ben Hayoun with a WIRED Innovation fellowship for her work to date. The 12 WIRED Innovation Fellows were selected by Wired editorial team for their 'significant impact on the world'. Ben Hayoun is a fellow of the Royal Geographical Society, in her spare time, she is training to be an astronaut.

Participants

Ray Purdy, Air and Space Evidence Ltd

Matthew Stuttard, Airbus Defence and Space

Stuart Eves, Airbus Defence and Space

Stuart Clark, Astronomy Journalist and Author

Glyn Jones, Avanti Communications

Janet Crossley, CAFOD

Rebecca Murphy, CAFOD

Catharina Cronenberger Golebiowska,
Cathproductions

John Warnes, CDAC Network

Mick Johnson, Centre for EO Instrumentation and
Space Technology

Stephanie Pau, Citizen Inventor

Nicola Ranger, Department for International
Development

Dave Hodgson, DMCii

Elena Lobo, DMCii

Ian Downey, European Space Agency

Anita Heward, Google Lunar XPRIZE

Gregson Jon, IDS

James Cemmell, Inmarsat

Janet Geddes, Innovate UK (Technology Strategy
Board)

Tim Just, Innovate UK (Technology Strategy
Board)

Andy German, InnovateUK

Chris Welch, International Space University

Voss Georgina, Lighthouse Arts

Jill Stuart, London School of Economics

Michael Lawrence, Magellium Limited

Ashton Simon, Met Office / DFID

Dhiren Kataria, Mullard Space Science Laboratory,
University College London

Nelly Ben Hayoun, Nelly Ben Hayoun Studio

Harry Armstrong, Nesta

Jessica Bland, Nesta

Ryan Schechter, Nesta

Zoe Jacob, Nesta

Michael Johnson, PocketSpacecraft.com

Abby Schlageter, Polymathine

Chris Brunskill, Satellite Applications Catapult

Guillo Corentin, Satellite Applications Catapult

Ren Capes, Satellite Applications Catapult

Sam Adlen, Satellite Applications Catapult

Mark Brenchley, Stretch Space Ltd

Bridgmohun Hiren, Student

Shaun Kenyon, Surrey Satellite Technology Ltd.

Guglielmo Aglietti, Surrey Space Centre,
University of Surrey

Ross Burgon, The Open University

Revell Tobias, Tobias Revell

Laura Bocarro, UK Space Agency

Ryan King, UK Space Agency

Colin Armstrong, UKCDS

Ian Raper, University College London

Kate Smith, University of Manchester

Chris Bridges, University of Surrey

Westgate Justin, UOW