# Andrew Lea MA (Cantab) FBCS FRSA

## Applied Artificial Intelligence and Data Analytics Consultant and Practitioner

I have many years experience developing artificial intelligence and applying data analytics across many sectors, including scientific, aerospace, law enforcement, financial, industrial, marketing, and public sector.  As an expert, I help organisations further their objectives in deploying AI and generating insight with data analytics and visualisation or modelling with large scale simulations.

As a BCS Fellow on its AI committee I track academic AI advances, and have pioneered much AI myself, building early award-winning text summarisers, agentic AI, and large language models.  I can help boards understand the trajectory and implications of these emerging technologies.

I am deeply aware of AI and data ethics, frequently chairing the panel sessions on ethics at the BCS Cambridge AI conferences.  I can advise companies or regulators in ethical AI and analytics.

Having run small businesses, and worked in others from start-ups to multi-nationals, I have developed skills in business management and development, bid writing, and contract negotiation. I have worked in government and have served as a local councillor (chairing the audit committee) so am skilled in stakeholder management and matters of governance.

With a degree in Natural Sciences (Applied Biology), post-graduate study in Computer Science at London, and years of practical experience, I provide expert advice research and hands-on implementation in most aspects of computer science and project management.  My interests include aviation, paragliding, cycling, astronomy, sailing, animal welfare, and climate change.

## Qualifications and Fellowships

- MA Hons Natural Sciences (Applied Biology) - Selwyn College, Cambridge University
- Diploma in Computer Science - Birckbeck College, London University
- Pilot's Licence - PPL(A), Karate 2nd Dan, Paragliding pilot and BHPA coach, RYA Day Skipper
- Fellow of the British Computer Society
- Fellow of the Royal Society of Arts

## Career Summary

*in approximate reverse chronological order*

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|---|---|---|
| Director | Computing Scientific Ltd | |
| Head of AI | at 3 consecutive projects | Marketing, Delivery, Sports sectors |
| Councillor | West Sussex & Mid Sussex | Chair of Audit |
| Visiting Fellow | University of Brighton | Student mentoring and industry projects |
| Director | Primary Key Associates | Fraud detection, digital forensics |
| Technical Director | Detica / BAe | Data analytics, AI, and client R&D |
| Director | Software Scientific Ltd | AI for competitive intelligence |
| Director | Aerospace Scientific Ltd | Application of AI to space and aviation |

Previously I worked as a project management consultant in the financial and government sectors, and as a software developer in the agrochemical and the nuclear power sectors.

# Core Competencies

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|---|---|---|
| AI application and engineering | Project management | Bid and presentation writing |
| Data insight and visualisation | Business development | Lecturing and coaching |
| Software development | Stakeholder management | Contractual negotiation |
| New techniques R & D | Business analysis | IPR protection and patents |

# Technical Skills

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| AI: | LLMs and generative models; image analysis; reasoning and inferencing; machine learning; classification; search and planning; optimisation; genetic programming |
| Research: | population simulations; symbolic regression; data analytics; robust statistics |
| Mathematics: | cryptography; evidential block chain; homomorphic encryption; toolkits & libraries |
| Development: | embedded real-time o/s, mobile (IoS and Android), MacOS and Windows, web; Python, C, C++, Java, Kotlin, Swift, assembler, JavaScript, SQL, graph DBs |
| Office: | Word / Pages, PowerPoint / KeyNote, Excel / Numbers, OpenOffice |

# Work and Project Highlights

*in approximate reverse chronological order*

- generating marketing copy with generative grammars and large language models
- increasing click-through rate with a custom recommendation engine
- AI to creating personalised exercise and fitness plans with AI
- defending against computer viruses with AI methods to detect zero-day attacks
- designing a framework to combat climate change by making carbon capture profitable

- chairing an audit scrutiny committee, and holding a failing council to account
- organising and chairing ethics panel discussions at the annual BCS AI conference
- modelling and visualising human movement in an airport

- fraud detection with a classifier, and inverting it to uncover business fraud vulnerabilities
- protecting staff from stalking threats through social media analytics
- preserving data to evidential standards using block-chain
- threat discovering in partially encrypted graph data, using a declarative language
- large scale population simulations
- discovering significant matters in unstructured digital forensics data

- business development for a consultancy, obtaining many profitable projects
- building a data analytics profession with a consultancy to foster staff development
- custom R&D on behalf of customers, solving difficult business questions
- writing and pursuing patents on behalf of the consultancy through to grant

- developing a real-time system for the on-board understanding of images by satellites
- AI for a Mars lander which would understand images and respond to textual messages
- award-winning AI for summarising documents
- competitive intelligence with natural-language directed spiders

- disaster recovery planning for financial institutions
- setting up an office for a consultancy in Lisbon whilst consulting for the Bank of Portugal
- working on public sector pension systems

- agrochemical research computing, including field data collection and analysis
- nuclear power safety systems

# Current Research Interests

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|---|---|
| Symbolic Regression: | the mathematical equivalent of large language models |
| Language *Reasoning*: | combining LLMs with symbolic AI to reason |
| Image and sound: | devices to help blind people 'see' with sound |
| Project productivity: | AI to increase sprint effort and timescale estimate accuracy |
| Human/machine interface: | reducing a pilot's cognitive load through AI advice and visualisation |

# Selected Papers, Session Chairs, and Lectures

*selected from the last ten years*

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|---|---|---|
| 2025 | Applications Session | SGAI 2025 |
| 2024 | Is large AI good or bad for society? | debate chair, SGAI 2024 |
| | Computer Chess: A Historical Perspective | BCS/Oxford Academic IT Now |
| | AI and Project Management II | BCS event, panel member |
| | Great Debate 2024 AI: Threat or Opportunity? | BCS / IET event, panel member |
| 2023 | How is AI going to change society in the coming decade? – debate chair, SGAI 2023 | |
| | AI and Project Management I | BCS event, panel member |
| | Why is AI hard to define? | BCS/Oxford Academic IT Now |
| 2022 | Explainability and Artificial Intelligence | debate chair, SGAI 2022 |
| 2021 | Artificial Intelligence and Sustainability | debate chair, SGAI 2021 |
| 2020 | How can we avoid the risks of … AI and share the benefits? – debate chair, SGAI 2021 | |
| 2019 | Regulation of AI | debate chair, SGAI 2019 |
| | Artificial Sentience and Digital Immortality | talk at AI and Robotics |
| 2018 | Can we trust AI? | debate panel member / SGAI |
| | Applications Session | session chair SGAI 2018 |
| 2017 | Artificial Intelligence and Privacy | debate chair SGAI 2017 |
| | Applications of Neural Nets | session chair SGAI 2017 |
| | AI: A brief history of man versus machine | cited in Computer Weekly |
| | How logic games have advanced AI thinking | cited in Computer Weekly |
| | Artificial Intelligence | talk at Robots in Society, BCS; April |
| | Secure Data Analytics (white paper) | primarykey.co.uk/knowledge-bank |
| | Beware Fake AI! – white paper  www.linkedin.com/pulse/beware-fake-ai-andrew-lea/ | |
| 2016 | What benefits can AI deliver…in the next 10 years? | debate chair SGAI |
| | Social Media & Personnel Safety (white paper) | primarykey.co.uk/knowledge-bank |
| | Scenario Analytics (white paper) | primarykey.co.uk/knowledge-bank |
| 2015 | Deterministic Assimilation Clustering | paper in Expert Update, ed M Petridis |
| | Is AI an existential threat to humanity? | debate chair at SGAI 2015 |
| | Representation in AI | lecture at Brighton University |
| | The End of Work | cited in BBC Focus, Dec |
| 2014 | Where will AI be in 10, 25, 50 and 100 years time? | debate chair, SGAI 2014 |
| | Spacecraft and Astronomy AI | lecture and demo at Real AI |
| 2013 | Increasing Software Resilience & Reliability | COSAC security conference talk |

*Because most of my work has delivered competitive advantage to commercial organisations, it has been subject to strict non-disclosure agreements, and has therefore not been published.*