In this issue we’re featuring one of KMi’s flagship projects. OU Analyse, using machine learning methods, is designed to identify early signs of OU students who are at risk of failing their modules. This research allows interventions to take place to adapt learning methods/delivery to help students persist with their studies.

Supporting Learners through Analytics

Earlier in the year one of KMi’s projects made the headlines in the Financial Times and on the BBC news website. Its purpose is to support students and guide them on successful learning paths.

What is it?

The project, led by Professor Zdenek Zdrahal, analyses the online behaviour of Open University students to predict whether or not they are likely to submit their TMAs and if so, whether they will successfully pass their module. The objective is to highlight at-risk students and alert the module teams and the students’ tutors so that they can judge whether or not to intervene.

According to (Quinn, 2013) in some EU countries between 20% and 54% of students fail to complete their degrees. In distance education, the percentage of students who fail to complete the degree is about 78% (Simpson, 2010) and in MOOCs it is more than 93% (Parr, 2013). “Learning factors” and “institutional factors” are among the top 6 reasons significantly contributing to failure (Quinn, 2013).
OU Analyse makes use of the fact that OU courses are being studied by thousands of students simultaneously. So when a student is taking a course, they’re treading the same path that thousands have recently taken before them.

You can imagine that a student interacting with a virtual learning environment (VLE) is similar to someone playing a game of chess. They’re making moves, they’re reading materials and they’re watching videos. Some of these ‘moves’ will lead to success. Other moves will lead to failure, such as failing an assignment or failing a whole course.

What OU Analyse does is compare the moves that a current student is making to previous moves that previous students have made. If the path seems to be leading to failure, we try to move the student onto a successful path by sharing relevant information with the student’s tutors.

**Why do some people find it controversial?**

The project has occasionally been considered controversial, as in some peoples’ eyes it is not necessary to monitor students’ actions online. However, there is no reason for students to be alarmed, the team is simply recording the patterns of actions displayed by students in order to alert tutors about those who are struggling.

**How does it work?**

The team visualise the paths taken by learners in terms of online behaviour. In a simplified example here you can see how a typical successful student’s actions on the Virtual Learning environment (VLE) are plotted. Each row represents a week and each letter represents an activity type. A combination of letters represents a combination of activity types taken by a student in the given week.

For example, “ORS” means the student has accessed **OU Content**; and a learning **Resource** such as a video and
visited a Subpage on their module’s website. You’ll notice that the analysis begins even before the module has started.

### OU Analyse so far

In 2014 OU Analyse supported two modules which started in February 2014. We marked the occasion in the lab with a celebratory cheesecake.

- By the time the October came around OU Analyse was supporting 12 modules.

- In February 2015 OU Analyse was supporting eight more modules, while the October 2014 modules were still running.

- Up until September 2015, the project has so far supported 23 presentations across seven OU Faculties, totalling 41,254 students.

- In the meantime, the team has created a weekly dashboard to display fresh predictions for the relevant module teams.

Currently OU Analyse supports 12 modules

---

**Dasha Hermannova**  
**PhD Research Student**

Dasha is a PhD student at KMi, her supervisors are Prof. Zdenek Zdrahal and Dr. Petr Knoth from KMi. She initially joined KMi as an intern in October 2011. Apart from OU Analyse, she’s interested in utilising natural language processing to aid research evaluation.

---

**Martin Hlosta**  
**Research Assistant**

One of Martin’s key areas of interest is machine learning, it’s application in learning analytics and learning from imbalanced data. He works on the OU Analyse Project and at the same time he is a PhD student at Brno University of Technology.
The Future of the Project

OU Analyse is now developing its offering including features such as Customised Support and Open Learning Analytics. As for the former, while tutors previously received updates via email, they are now interested in having direct access to their tutor group’s information. To meet this demand the team are developing a customised view for tutors. This will also offer tutors the option of sending feedback to the team behind the service to maximise its value to the end-user.

Another recent development of OU Analyse is that selected data collected has been anonymised and made available online (https://analyse.kmi.open.ac.uk/open_dataset). These datasets provide valuable research for other Higher Education organisations and can be accessed by developers who may wish to work with them.

Zdenek’s team promoted this open data resource at the Open Data Mashup Challenge in November this year. This will allow developers to use the resource when facing the event’s challenge: How can we use open data sets to support university students through their learning journey? (https://elevator.jisc.ac.uk/e/open-data-mashup-challenge/about)

The OU Analyse team would like to express their thanks to colleagues from the OU LI Portfolio, in particular Bart Rientes (IET), Avinash Boroowa and Kelly Bevis (both from Learning and Teaching Centre) for all their continued collaboration and support for this work.

Reference:


Simpson, O. (2010). 22% - can we do better? Supporting students at a distance. From Articles on Distance Education: http://www.94669.mrsite.com/
And in other news...

FORGE Runs an EU Commission Future Internet and Digital Skills Workshop

At the request of the EU Commission FORGE, an EU project coordinated by KMi, ran a workshop at the headquarters of the Future Internet Research and Experimentation (FIRE) unit in Brussels on Digital Skills and the Future Internet. The workshop was attended by senior FIRE representatives including the unit’s Head and Deputy Head as well as representatives from the eSkills unit in Luxembourg by video link. In addition to presentations from members of the FORGE project there were presentations from the European Research and Education network GEANT and Cisco. The key theme of the event was that there is a growing digital skills gap which deeply affects European industry. For example, one recent study estimates that the UK is losing 2 billion pounds per year due to unfilled roles which require digital skills. Piotr Pluta Director of Corporate Affairs at Cisco Systems stressed the importance of digital skills within their corporate vision of the Internet of Everything (people, things, processes and data) which will soon be the foundation of a 19 trillion dollar market. KMi’s FORGE team (John Domingue, Alex Mikroyannidis and Aitor Gomez-Goiri) and Andrew Smith of MCT are liaising with Piotr and other senior Cisco managers to see how our FORGE results can meet their significant training requirements. One specific technology is PT Anywhere which embeds Cisco’s powerful internet simulator within eBooks. The event was chaired by John Domingue.

The FORGE iBook is live on the Apple Store

The FORGE iBook is now live on the Apple iBooks Store and available in 51 stores worldwide. This is a fully interactive eBook for iOS and MacOS and introduces a range of Future Internet topics using FIRE facilities. Readers have the opportunity to study in depth various aspects of networking protocols and infrastructure, watch instructional movies and screencasts, as well as conduct experiments using the FIRE infrastructure. The iBook features a number of FORGE widgets offering access to various FIRE testbeds. Additionally, it features PT Anywhere, a network simulation widget developed in collaboration with the Cisco Networking Academy. PT Anywhere offers a simplified HTML5 interface to the powerful Packet Tracer network simulator.

http://kmi.open.ac.uk/
AR app for TV series - The Hunt

The Knowledge Media Institute’s Paul Hogan has developed an augmented reality mobile application for the Open Media Unit to be used in conjunction with their HUNT poster campaign, that compliments the new OU/BBC series 'The Hunt' which started on 1st November on BBC 1. The app, available for both Android and IOS, provides the user with an augmented reality enhanced view of the HUNT poster. A 3D movie cube is displayed when the user points their device at the poster and they can interact with the cube to view films from the TV series narrated by Sir David Attenborough, with some additional exclusive to the OU content. There are also short films with scientist interviews that will be released in parallel with each aired TV episode. Broadcast Project Manager for The Hunt, Caroline Green, from The Open Media Unit project managed the development of the app from concept to release.

Two New Senior Researchers

We gathered at the Town Meeting at the end of September to celebrate promotions for Carlos Pedrinaci and Mathieu d’Aquin. Both members of staff are now officially "Senior Research Fellows."

Director, John Domingue congratulated the pair, and with a glass of bubbly and a slice of cake, and they each gave a brief speech.

Mathieu admitted that, although he had put in the hours and the effort to get to this point, he couldn’t have done it without his a hard-working team.

Carlos echoed these sentiments and reported that this was a particularly happy time for him, as he and fellow-KMi’er, Anna De Liddo expect the birth of their first child. In fact, Carlos said he had only a number of hours before he would board the plane to Italy to visit Anna.

Congratulations to all three from the whole lab!
Strong KMi presence at ISWC 2015

The International Semantic Web Conference this year witnessed another populous KMi delegation, with 8 people from the lab attending the conference, which took place in Bethlehem, Pennsylvania, USA, on October 11-15. The KMi contributed in a variety of ways to the main Semantic Web conference, both with a significant presence in the organising committee and by presenting a keynote, a research paper, two workshop papers and three demos. Mathieu d’Aquin served as In-Use and Software Track chair and also gave the keynote at the 1st International Workshop on LINKed EDucation workshop, entitled “Sharing knowledge is what we do: The Education and/or The Semantic Web”. Miriam Fernandez served as Workshop and Tutorial Chairs and was one of the senior researchers involved in the mentoring lunch, which is an annual ISWC event that brings together students and early-career researchers with experienced researchers. In the competitive research track (22% acceptance rate), Francesco Osborne and Enrico Motta authored a paper on the automatic generation of huge ontologies of research topics titled “Klink-2: Integrating Multiple Web Sources to Generate Semantic Topic Networks”. Aba-Sah Adzie and John Domingue contributed to the workshop “Visualizations and User Interfaces for Ontologies and Linked Data” (VOILA 2015) with the paper “Visual Exploration of Formal Requirements for Data Science Demand Analysis”. At the Doctoral Consortium, Angelo Salatino, a first year PhD student at KMi, presented the paper “Early Detection and Forecasting of Research Trends” which was discussed with PhD students and senior researchers.

FORGE and Go-Lab meet in Dublin

Representatives from all FORGE partners met on 4-5 November in Trinity College Dublin. This plenary meeting offered an opportunity to check on the progress of the individual work packages of the project, as well as prepare a work plan for the third and final year of the project. Denis Gillet, technical coordinator of the Go-Lab project, joined the meeting in order to present the latest technological and pedagogical developments of the Go-Lab project, as well as plan the next steps of the ongoing collaboration with the FORGE project. The two projects have initiated an active
collaboration by establishing a Special Interest Group (SIG): Remote Labs and Online Experimentation. The SIG has been established within the European Association of Technology Enhanced Learning (EATEL) in order to drive and promote remote labs and online experimentation and to offer the technologies that can help stakeholders build experimental infrastructures and use them across different domains. The next steps of the FORGE - Go-Lab collaboration will focus on the integration of the technologies offered by the two projects. This will be achieved by offering FORGE widgets via the Go-Lab repository, as well as by enabling FORGE users to access Go-Lab virtual and remote labs via FORGESTore and FORGEBox.

Award winning participation at K-CAP

Every two years the ACM conference highlights significant research on the extraction of knowledge from diverse information sources. The main themes this year included capturing Scientific Knowledge, the acquisition of complex Logical Knowledge, Knowledge Processing with Big Data and Semantic Web Technologies such as Linked Data, Knowledge Extraction from structured and unstructured sources, Crowdsourcing, and Knowledge Base Learning. The acceptance rate at this years conference was 29%.

The conference launched this year the 1st International Workshop on Capturing Scientific Knowledge (SciKnow 2015), where KMier Allan Third presented "Capturing Scientific Knowledge on Medical Risk Factors." coauthored with KMi Director John Domingue, in collaboration with Eleni Kaldoudi, Stefanos Roumeliotis, and Kalliopi Pafili (Democritus University of Thrace), and George Gkotsis (ex-KMi, now at King's College London).

Three out of sixteen papers in the main conference track were contributions from KMi.

Thomas Dickinson presented "Identifying Prominent Life Events on Twitter", a paper written in collaboration with Miriam Fernandez, Paul Mulholland, Harith Alani and Lisa A Thomas Pam Briggs from the Northumbria University.

The second paper was "An Ontology Design Pattern to Define Explanations", a work by Ilaria Tiddi, Mathieu d’Aquin and Enrico Motta, in a session dedicated to Ontology Engineering.

Finally, Enrico Daga presented "Propagation of Policies in Rich Data Flows", co-authored with Mathieu d’Aquin, Enrico Motta and Aldo Gangemi (ISTC-CNR, Italy and Université Paris 13, France), during the closing session on Ontology and Knowledge Base Learning.
European Data Science Academy at ICT 2015

The middle of October saw the European Data Science Academy (EDSA) at ICT 2015. ICT is the major European Commission event in the communications and computing area and this year had over 7,000 registrations. The opening talk included speeches from Günther Oettinger the European Commissioner for Digital Economy and Society and Anibal Cavaco Silva the President of Portugal.

EDSA addresses the data science skills gap within the EU – within the UK alone there may be 750,000 technical vacancies by 2017 and industry reports that 77% of Big Data roles are “hard-to-fill”.

Within the event EDSA organised a Networking Session, entitled: “Addressing the Big Data and Data Science Skills Gap” chaired by John Domingue. The objective of the session was to bring together researchers and key industrial players to discuss ways of tackling the Big Data and Data Science skills.

Three speakers presented short perspectives on the problem:

- Market View - Gabriella Cattaneo, Associate Vice President, IDC European Government, Consulting

- Industry view - Oscar Corcho Professor Universidad Politecnica de Madrid, Computer Science School

- EDSA view - Elena Simperl, Associate Professor & Director Data Science Master’s University of Southampton

Overall the session was a great success with attendees extending discussion well beyond the allotted time.

John Domingue also presented the vocabularies and ontologies used within the project at a separate networking session on “Co-designing a taxonomy of digital skills”.

http://kmi.open.ac.uk/
Double Award at VMworld Europe

We’re pleased to announce that the MK Data Hub has received two prestigious awards in an event run by a global leader in Virtualisation and Cloud Computing. The MK Data Hub received awards for “Best virtualisation and disaster recovery project” and the top prize of “Best at show” at the VMworld Europe User Awards 2015.

The event held in Barcelona, Spain this year took place at the European conference for Virtualisation and Cloud Computing hosted by VMware, which is the second largest annual conference of its kind. Senior Systems Manager of the Data Hub Technical Operations (DTOP) team, Robbie Bays was pleased by the double-win, commenting: “We’re excited that the project has received further recognition for the work by the DTOP team. We were all proud to win ‘Best virtualisation and disaster recovery project’, but ‘Best at Show’ was the cherry on the top!” The award wins were announced on Computer Weekly’s website, where it was noted that: "With the smart city initiative gaining momentum worldwide, projects such as this are important to highlight for best practice purposes for other towns and cities looking to do something similar." The DTOP team have implemented a Disaster Recovery solution using Arcserve UDP after a successful proof of concept in a tight timeframe. The deployment is helping to maximise the availability of the MK Data Hub, safeguarding the reputation, and ultimately the success of, the MK:Smart initiative.

Season’s Greeting from KMi

The Knowledge Media Institute’s Paul Hogan has developed a mixed Augmented Reality / Virtual Reality mobile app to complement its Christmas card this year. Users can simply point their device at the card and see it come to life. They can also use the app with Google Cardboard and enter a virtual winter wonderland and take a sleigh ride through the snowy landscape. Although this is some festive fun it is a way to demonstrate the use of AR and VR in action. Google Cardboard is an inexpensive way to experience this technology, there are however other more sophisticated VR headsets available on the market. To get the app for both iOS and Android plus a copy of the card visit the URL below and sign in using your OUCU from your mobile device and follow the instructions.

http://appstore.open.ac.uk/xmas/
KMi presents new methods for markerless motion capture method at CVMP

Prof. Stefan Rueger’s recent work on markerless motion capture was presented at a landmark Conference for Visual Media Production that was held at BFI Southbank. The significance of this joint work with Frederic Fol Leymarie, Prashant Aparajeya and Vesna Petresin of Goldsmiths is that it will allow a practical way of capturing the motion of articulated moving bodies from a standard single-camera video feed without depth information and without placing markers on the subjects. Potential applications might see dancing performances using computer-aided lighting and projections based on the motion analysis or real-time avatars in video games copying the players’ motions or reacting to them.

The Conference for Visual Media Production is a longstanding event where specialists from the worlds of film, broadcast and games meet with imaging and graphics researchers. The packed auditorium in BFI’s blue cinema saw industrial keynotes from NVIDIA, Google, Double Negative and Industrial Light and Magic.

Dasha Herrmannova & Petr Knoth success in WSDM Cup 2016

Dasha and Petr have participated in the challenge which is part of the upcoming Web Search and Data Mining (WSDM) conference. The challenge, co-organised by Microsoft and Elsevier, was to assess the importance of scholarly articles, using data from Microsoft Academic Graph -- a large heterogeneous graph comprised of more than 120 million publications and the related authors, venues, organizations, and fields of study. Dasha and Petr (the team was called BletchleyPark) were the best out of 32 teams in the training round of the competition and after the validation round were invited to take part in the second phase of the challenge as one of the eight best of the 32 teams. They will also present their method at the workshop in San Francisco, California, in February.
MK:Smart a finalist at World Smart City Award 2015

The Barcelona based World Smart City Congress, a key annual event for Urban Innovation, has judged MK:Smart to be a great example of applied innovation derived from collaborative endeavour. Alan Fletcher, KMi business development manager, Peter Marland, Leader of MK Council and Geoff Snelson, director of strategy Milton Keynes Council were delighted to accept the nomination on behalf of the project. “Being a finalist in this competition is a fantastic endorsement for MK:Smart. Recognition at this level for our approach and application is fantastic for the entire consortium” said Alan Fletcher. MK:Smart was shortlisted for this award against significant competition from around the world. This was warmly welcomed by Peter Marland, Leader of MK council. “Once again, MK is seen to be at the leading edge of innovation on the global stage. This is great news for the city on many levels” said Marland.

Enrico Motta speaks at British Ambassador’s Residence in Vienna

As a prelude to European Utility Week an invitation-only networking reception was held on 2nd November in the centre of Vienna. KMi’s Professor Enrico Motta, project director of MK:Smart, took this opportunity to discuss the key issues related to smart cities within the context of utilities. Following an introduction by HMA to Poland Robin Barnett, Professor Motta led the first session of the evening. He advised on what kind of role Big Data analytics play in the utility industry and what that means for privacy and data ownership. The ‘Digital Utility of the Future’ and the issues which surround Operational and Information Technologies appeared amongst the topics his talk covered. Other speakers included Patrick Caiger-Smith CEO of Green Energy Options and Daniel Burgess, Senior Business Development Manager for Trade and Investment in the Welsh Government. The event served as an excellent opportunity to share the experience of the MK:Smart project with a wider audience. Attendees included delegates from industry, government and local authorities from across Central Europe.

http://kmi.open.ac.uk/
PhD Student Highlights

*KMi is pleased to announce another two PhD awards making a total of four in 2015! Congratulations to Drs Thomas Ullman and Gregoire Burel.*

Greg’s thesis entitled ‘Community and thread methods for identifying best answers in online question answering communities’ This thesis introduces the concepts of qualitative and structural design in order to investigate if features derived from community questionnaires can enrich the understanding of best answer identification in Q&A communities and if the thread-like structure of such communities can be exploited for better results. The results show that the proposed measures allow for a better understanding of what constitute best answers. The findings also reveal that the thread-wise algorithms and optimisation techniques created from the structural design methodology correlate with best answers. In general both structural and qualitative design appear to improve best answer identification meaning that a similar methodology could be applied to other classification tasks.

Thomas investigated in his monograph, how natural language processing and machine learning techniques can be utilised to support the automated recognition of reflective writing, thereby developing a new unified model of reflection as well as rigorously evaluating a set of algorithms apt to identify the different aspects contributing to creative sense-making of the past.

Thomas was supervised by Fridolin Wild and KMi’s last Director Professor Peter Scott.
In this issue we asked Dr Trevor Collins to talk us through work he has recently published.

What we are writing: in the spotlight

Dr Trevor Collins


This article demonstrates how participatory design and development can be applied to introduce sustainable technological innovations within the teaching practices of an outdoor learning organisation. A case study describing an on-going collaboration between the OU and the Field Studies Council (FSC) is presented, which highlights the challenges and issues regarding the usability, scalability and sustainability of mobile technology at a residential outdoor learning centre. It is argued that participatory research with education service providers is a contributing factor to the diffusion of technology-enhanced learning and necessary for sustainability.


This chapter explores the use made of a portable WiFi network and mobile communication technologies to support the inclusion of mobility impaired students in field study courses. The Enabling Remote Activity (ERA) approach, is introduced and a case study involving two field courses from a second-level undergraduate environmental science module is presented. The findings are discussed with regard to inclusive education and a set of recommendations for facilitating social inclusion is provided.

ERA involves the students and tutors in a process of technology appropriation to support their active participation in distributed group work at field locations. Where students can access a site the technology is not needed, but where a site is difficult to access the students get as close as possible (usually within sight) and the ERA toolkit provides a live video and voice link between the students and the rest of their group. Ultimately, ERA combines elements of ‘enabling’ and ‘responsive’ approaches to accessibility. The use of the communication tools are planned and prepared to meet a wide range of needs. Local adaptations are carried out as individual differences and day-to-day variations between students emerge.

The Field Network System (FNS) being used by two FSC tutors and an A Level Biology school group at Dale Fort in Pembrokeshire.

The ERA kit in action: A group of students at Malham Tarn with a nearby student participating in the discussion via a VoIP phone call with the tutor (middle) and watching the live video stream being sent by the camera operator (right).
**KMi’s World Stage and Closer to Home**

**John Domingue and Aneta Tumilowicz** travelled to Brussels for the FORGE year 2 review (29-30 Nov).

**Elizabeth Cano** attended AMP Camp 6 in Berkley, USA. (18-21 Nov).

**Miriam Fernandez** attended the Sense4us annual review in Brussels. (16-19 Nov).

**Fridolin Wild** travelled to S Korea to attend an Augmented Reality meeting. (4-8 Oct).

**Carlos Pedrinaci** attended the Compose final review in Brussels. (1-4 Dec).

**Michelle Bachler** represented KMi at the Catalyst final year review. (7-10 Dec).

**Allan Third**, attended the CARRE Project second year rehearsal and review in Brussels (6-10 Dec).

**Fridolin Wild** travelled to Milan for the TELLME project final year review (2-3 Dec).

**John Domingue** attended the FIRE Forum and e-skills in Brussels. (8-9 Dec).

**KMi Future**

**Events Coming Soon...**

- Mathieu d’Aquin, Alessandro Adamou and Keyur Dave are travelling to Madrid for the AFEL Project kick off meeting. (14-15 Dec)

- Harith Alani, Lara Piccolo and Miriam Fernandez are attending the Decarbonet Project second year review in Brussels. (15-16 Dec)

- Brian Pluss is attending the Dagstuhl seminars on debating technologies in Berlin (13-18 Dec)

- John Domingue is attending the SlideWiki Project kick off meeting in Sankt Augustin, Germany (18-19 Jan).

*In the NEXT Issue - Web Broadcasting*