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DIAL Quarterly: Efficient airports, opportunities, publications and more

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Welcome from Professor Duncan McFarlane



Last week I was asked to present at a workshop focussing on Industrial Automation and Energy Management. Sponsored by Cambridge Wireless and hosted at ARM here in Cambridge. The workshop provided a fascinating perspective on the role of information & control systems generally and wireless technologies in particular in helping to address ever increasing energy reduction demands. Karl Walker and Robert Brookes from OMRON spoke very clearly and persuasively about the potential role for the industrial automation provider in reducing energy.

Their talks covered issues from inverters as an energy efficient means of controlling speeds of pumps, drives and fans to adding energy management sensors to the standard PLC managed automation infrastructure. Another speaker, Marcia Walker, of the American Council for an Energy-Efficient Economy spoke about the energy saving opportunities in manufacturing and particularly emphasised the need to see energy not as a factory overhead but as part of the Bill of Materials for a product [and hence as a cost]. From Cambridge our perspective was one of considering the complete energy picture in manufacturing: both in terms of considering production and non production energy issues but also considering the energy life cycle of the manufactured product. At Cambridge we now have a range of activities relating to the gathering, analysing and responding to energy consumption information and we will report on these in the coming issues.

In this issue, we cover the recently concluded Airport Operations Project, introduce lab manager and Auto-ID Associate Director Alan Thorne, and report on The International Asset Management Workshop held in November. In addition we begin a new section entitled Opportunities for Participation in which upcoming events and projects are described.

Opportunities for Participation

Early March sees the start of a series of eight week

PhD research on information systems

The servitization of manufacturing has led to organisations moving from the provision of products to the provision of services based around their products. In turn, this has changed the role of the customer and supplier and their obligations to one another. Furthermore, the longevity of the relationship has increased and this has been accompanied by the use of contracts as a means of monitoring the service delivered. In so doing, the information needs of the parties involved in the service provision have changed. The hypothesis of this PhD is that the information required for the delivery of availability service contracts directly impacts the nature of the information system. In order to prove this, or otherwise, a number of research questions will be answered. These questions will seek to determine the information required for the delivery of availability contracts, how information systems supporting contracts are structured/organised/used, how performance of the information system supporting the service contract can be assessed, the approach for determining whether the IS is capable and to determine changes required by the contract/Information System

If you would like to know more about this work or participate in the research then please [contact us](#)



student projects. If your company is interested in being involved please [contact us!](#)

RFID Deployment - State of the Art: This project will seek to survey company experiences with the deployment of RFID over the last 2-3 years and will also include a study of companies seeking to deploy RFID for the first time. The output of the short project will be a summary of pros and cons associated with RFID deployment today and guidelines for companies considering its use. We would welcome offers of involvement from either users of RFID [actual and potential] or from providers of RFID solutions who would be willing to collaborate on the activity.

Green Manufacturing Survey: Seeks to examine information-based techniques currently used for reducing energy consumption / carbon emissions in manufacturing operations. Through company studies and industrial literature review, the work will seek to classify the different approaches being used and provide an approach to structuring future research in this area. We would welcome offers of involvement from companies who would be prepared to have all/part of their operations studied and also from energy solutions providers who would be willing to collaborate on the activity.

Making Value Based Decisions about Industrial and Infrastructure Sensing Investment: This project will examine ways in which investment decisions are made specifically with regard to the deployment of sensors in industrial and infrastructural applications. Some case studies in the construction and civil infrastructure industry have already been identified but we are looking for one or two additional case studies to complement this work. We would welcome offers of involvement from organisations investing in sensor systems for their operations/infrastructure - particularly where the number/nature/accuracy etc of the sensors has been debated. Sensor types can range from RFID, to energy sensing, to measurement of physical properties such as wear or strain.

If your company would like to take part in these projects or register interest in future projects, [please don't hesitate to get in touch.](#)

DIAL helps to make airports more efficient

As air traffic continues to grow, fuel prices rise, security remains strict and capacity is stretched to the limit, the need to make the day-to-day running of airports as effective as possible is at an all-time high.

DIAL has been involved in an ambitious international two-year project to investigate how airport operations can be made to be more efficient. This has involved looking at everything from how flight delays are handled through to dealing with long queues, lost baggage, wasted time and rising costs.

The Airport Operations Research Programme was wholly funded by industry. Partners included airport operators BAA and the Manchester Airports Group, airlines easyJet and Czech Airlines, and service providers and trade bodies such as SITA and IATA. The project has been looking at three core themes: Passenger and ramp processes, airport reconfigurability and green airports. The work has already helped make major improvements to airport functions.



Recent research publications

[Architecting the Internet of Things:](#)

Uckelmann, Dieter; Harrison, Mark; Michahelles, Florian (Eds.)



The Internet of Things presents a model for extending today's internet to allow everyday physical objects

to be included. Detailing the latest research perspectives on the Internet of Things. Topics include business models, end-user participation and resource management

[Comparing the Control Structures of ISA S88 - and Holonic Component-Based Architecture](#)

by Wuttihiphat Covanich and Duncan McFarlane



It is generally believed that a distributed manufacturing control system, such as a holonic manufacturing system (HMS),

should be more reconfigurable than a conventional manufacturing system, which is more centralised and hierarchical. However, a recent case study suggested the control structure of a modern manufacturing control system based on the ISA S88 standard can, under certain conditions, be as reconfigurable as that of a HMS. This paper focuses on clarifying this issue.

[Benchmarking Information Quality Performance In Asset Intensive](#)

[Organisations In The UK](#)
by Philip Woodall, Ajith Kumar Parlikad and Lucas Lebrun

Maintaining good quality information is

This has included:

- Creating a simulation to test the impact on operations of location technology strategies in areas such as providing wheelchairs to passengers with mobility problems.
- Evaluating potential improvements to aircraft turnaround processes by using a simulated model. This was tested using real data from easyJet at Luton.
- A study at Manchester Airport investigating factors influencing the need for reconfigurability in airports.
- Creating an auditing tool to assess the emissions generated in operational processes such as the movement of baggage, fuel, and catering supplies to and from the aircraft.

Now DIAL are looking to consolidate and publish the results to our industrial partners (outputs from the programme are kept private to the partners for six months before wider publication).

Follow on programmes are under discussion as an industrially supported consortium, as separate bilateral projects and with UK government support. [Click here to find out more about this project](#)

Meet the team: Alan Thorne



Alan has been involved with the Auto-ID Laboratory at Cambridge since its inauguration in 2001, as part of the Auto-ID Centre project. He has provided key expertise in the field of manufacturing automation. As manager of the automation laboratory Alan has been actively involved in research and demonstrations showing the benefits that can be achieved by using RFID and network technologies within the manufacturing field.

Alan lead a research programme investigating the impact that automated ID and network technologies have on the aircraft turnaround processes at airports. For his work on this project Alan was awarded a Master of Philosophy degree by the University of Cambridge. Alan's work on airport turnaround led directly to his formation of the broader airport operations project which he has directed (see story above). Alan's research interests include Distributed Intelligent Systems, the development of Auto-ID driven manufacturing systems and developing tools to optimise RFID tag placement on products.

Latest developments in asset management research

Last November DIAL staged the 4th annual International Workshop on Asset Management.

The workshop was supported by the Cambridge Service Alliance, the Institute for Asset Management (IAM) and the Institution of Engineering and Technology (IET).



a difficult task and many

leading asset management (AM) organisations have difficulty planning and executing successful information quality management (IQM) practices. The paper (as featured in the proceedings of the World Congress on Engineering Asset Management (WCEAM)) provides guidance on how organisations can improve IQM practices within the AM unit of the business.

[A Hybrid Approach to Assessing Data Quality. In Proceedings of the 2010 International Conference on Information Quality](#)

by Phil Woodall and Ajith Parlikad



Various techniques have been proposed to enable organizations to initiate

procedures to assess and ultimately to improve the quality of their data. while some assessment techniques (ATs) are geared towards specific application areas and are often not suitable in different applications, others are more general and therefore do not always meet specific requirements. To address this problem this paper proposes the Hybrid Approach to assessing data quality, which can generate usable ATs for specific requirements using the activities of existing ATs.

Upcoming events

The next DIAL seminar is due to take place on Thursday February 17th at the IfM.

The seminar will be given by Gerry Frizelle and is entitled



It brought together thought-leaders from asset management organisations and leading academic researchers to discuss new advances in asset management research and practice. Participants included Professor Rajkumar Roy, Head of manufacturing at Cranfield University, Julian Schwarzenbach, of The Institute of Asset Management, Emil Bernal of IBM, Paul Dowson from the National Grid, Jack Huggett from The Woodhouse Partnership and Professor Andy Koronios from the University of South Australia. To view presentations from the event [click here](#).

If you are interested in anything that has been featured in the newsletter or would like further information about DIAL, then please do not hesitate to contact us on dial-enquiries@eng.cam.ac.uk or call the DIAL business manager Andy Shaw on +44 (0)1223 760361.

To subscribe you or a colleague to the DIAL quarterly newsletter, please visit www.ifm.eng.cam.ac.uk/newzapp.html

"Something new to measure? Novel approaches to assessing turbulence in systems."

For a full list of DIAL and other IfM events please click [here](#)



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