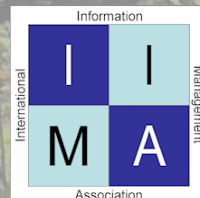


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# ABSTRACTS





**IIMA/ICITED UWS Joint Conference**  
**University of the West of Scotland**  
**Paisley**

**ABSTRACTS**

**Monday 11<sup>th</sup> September 2017**

**Stream: Health**

**Calculating a Severity Score of an Adverse Drug Event Using Machine Learning on the FAERS Database**

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An Adverse Drug Event (ADE) is medical injury that can result from a prescription or over the counter drug that causes an allergic reaction, overdose, reaction with other drugs or is the result of a medication error (health.gov 2017). There are approximately two million ADEs every year (Lazarou, Pomeranz, and Corey 1998) with 1,320,389 reported to the FDA in 2015 alone. ADEs are directly responsible for over 100,000 deaths annually and is the fourth leading cause of death with the number of reported deaths increasing as shown in Figure 1.

Aside from the number of ADEs occurring, another important aspect of ADEs is the medical costs associated with hospital visits, rehabilitation and follow-up care. It is believed that adverse drug events cost \$4.7billion annually (Romeril 2017) and could be as high as \$30.1billion when taking into account unreported events (Sultana, Cutroneo, and Trifirò 2013). Many of these costs can be attributed to hospital admissions where ADEs are linked to 148,000 admissions annually and 6.5% of all admissions in the UK are ADE-related (Davies et al. 2009). Furthermore, mean hospital stays increase from 8 to 20 days for ADE-related admissions.

Vulnerable populations such as children and the elderly are most susceptible to ADEs. It is estimated that between 2.1% and 5.2% of hospital admissions for children were ADE-related where 39% of those admissions were either life-threatening or fatal (Impicciatore et al. 2001). For the elderly, it is estimated that between 11.4% and 35.5% of admissions were ADE-related (Budnitz et al. 2007) with the numbers climbing to 32%-65% in nursing homes (Cooper 1996; Cerety et al. 1993).

To address the problem of post-marketed drugs causing ADEs, the US Food & Drug Administration (FDA), created a repository in 1969 to collect and disseminate adverse reaction data. This repository, the FDA Adverse Reporting System (FAERS) has undergone several transformations over the years, however, its mission remains the same. To voluntarily collect adverse reaction data on drugs, medication errors and adverse events concerning medical devices from manufacturers, medical professionals and the general public. Many of the records are directly submitted by pharmaceutical manufacturers, however, anyone can submit data using MedWatch (Form FDA 3500) which collects patient demographic data, the adverse event, product availability, suspect products, suspect medical device, other medical products that might be involved and information about the reporter. FAERS data is publicly available<sup>1</sup> and contains nearly 112,000,000 records over the past 12 years. This makes it difficult to find salient information between drugs that may be adversely affecting one another or finding those drugs that are connected to a disease state. Also, because of the variety of inputs into the FAERS system, many fields contain a non-trivial amount of non-standardized data such as misspelled drug names, use of multiple brand names for the same drug, abbreviations, extraneous information, excessive punctuation/formatting, mixed capitalizations and non-descriptive data such

as “unknown purposes.” This lack of standardized data has kept FAERS from fulfilling its full potential as a pharmacovigilance tool and its limitations have been the subject of numerous studies, which will be discussed later.

Early and accurate identification of ADEs and their severity is critically important for public health. Rather than waiting for sufficient post-market evidence to accumulate for a given ADE, a predictive approach that relies on leveraging existing, contextual drug safety information would have the potential to identify certain ADEs earlier.

Some studies have begun to use FAERS data in a bid to construct their own pharmacovigilance systems, however, many of these studies examine specific bivariate drug associations rather than analyze all historical data using data mining algorithms to determine the potential of previously unknown drug interactions.

Our motivation is to improve drug safety by creating a new type of pharmacovigilance system that 1. Performs data cleaning and standardization of FAERS data, 2. Computes a drug reaction severity score for each ADE based on the reported indications and coded using a modified Hartwig Severity scale, 3. Models the data to A) empirically identify drug-interaction events and their relative strength of event in specific symptom-related incidents and to B) identify drug-disease event severity for specific indications such as hypertension, stroke and cardiac failure, 4. Computes a predicted severity score for the models using machine learning algorithms such as Back-Propagation Neural Networks, Extreme Learning Machines, Tensor Deep Stacking Networks and Support Vector Regression, 5. Evaluates the accuracy of the predicted severity score versus actual severity on a holdout dataset, and 6. Builds a predictive clinical tool for physicians that can interact with a patient’s EHR and identify adverse reaction potential at the point of prescription.

We propose a global data-driven approach with the TylerADE System. This system uses advanced machine-learning techniques to sift through data and uncover potentially unknown drug events. This research has the potential to 1) improve the efficiency of pharmacological research by identifying potentially unknown n-drug events that merit further study; 2) create a risk score of potential medication events that physicians can use in a clinical setting; and 3) improve patient safety.

**Keywords:** Pharmacovigilance; BioInformatics; Machine Learning; Adverse Drug Events

## **A Game-Theoretic Method to Share Fixed Costs across Competing Health Networks**

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The growing demand for readily available healthcare combined with the current disarray in the health insurance market in the United States has created a situation where rival health networks are competing by building duplicate hospitals, stand-alone outpatient centres, and neighbourhood mini-clinics. A primary intent of this strategy is to capture customers through convenience and proximity to services (Fine & Frazier, 2011). On the surface, this tactic appears beneficial because competition normally lowers prices while easier access to services should be advantageous to healthcare customers. However, the unintended consequence of this trend is that costs for health services can increase, provider profits can decrease, and community access to healthcare services can potentially be eroded (Weiss, 2004; Kaissi, Charland, & Chandio, 2013). This is, in part, due to the unnecessary duplication of expensive healthcare equipment, facilities, and personnel.

A better, more economically rational approach would be for competing health networks to share the fixed cost of expensive medical equipment, facilities, and personnel so that all can utilize these resources in an efficient manner. Profit could still be generated through specialized services and dedicated facilities, while at the same time the customer base as a whole would benefit through decreased costs. Unfortunately, this ideal solution is difficult to attain because it requires a method that is both fair and neutral be used to divide the fixed cost of those healthcare resources among the competing participants.

Game theory provides a potential solution to this problem with the Shapley Value. The Shapley Value was developed by Lloyd Shapley in 1953 as a way for players in an abstract game to determine the outcome of that game prior to actually playing it (Shapley, 1953). When used as a cost allocation method, the Shapley Value is considered fair, equitable, and neutral by virtually all researchers (Boatsman, Hansen & Kimbrell, 1981). Unfortunately, it is seldom used for this purpose because it is very cumbersome to calculate and the information requirements are overwhelming when the number of players (i.e., participants) in the joint venture increases. Specifically, the Shapley Value requires the development of  $2^n - 1$  cost sharing scenarios where 'n' is the number of participants in the joint venture. A solution to this limitation is to develop simplifications to the Shapley Value that generate identical allocations for any number of players without the corresponding computation and information burden.

This presentation will describe and demonstrate the application of a set of Shapley simplifications that can be used to allocate the fixed costs associated with a joint venture among healthcare providers. These simplifications are computationally easy to apply and do not require excessive information. In addition, they result in the same sharing solutions that would be generated if the full Shapley Value were computed.

The contribution made by this research is the availability of a method that allows competing healthcare networks to share expensive resources in an economically efficient manner. This will not only help manage competing healthcare services in the United States, but is also applicable to healthcare systems that are more closely managed by the government in other countries.

#### **References**

- Boatsman, J. R., Hansen, D. R., & Kimbrell, J. I. (1981, April). A rationale and some evidence supporting and alternative to the simple Shapley value. In Proc. Univ. of Oklahoma conf. cost allocation.
- Fine, A., & Frazier, B. (2011). Can a hospital benefit from partnering with physicians? *Healthcare Financial Management*, 65(5), 70-77.
- Kaissi, A., & Charland, T. A. (2013). How satisfied are hospital systems with their ownership of retail clinics?. *Journal of Healthcare Management*, 58(2), 143-155.
- Shapley, L. S. (1953). A value for n-person games. *Contributions to the Theory of Games*, 2(28), 307-317.
- Weiss, R. (2004). The challenge of boutique healthcare. *Marketing Health Services*, 24(4), 10-13.

**Keywords:** Game theory; Shapley Value; Joint venture; Healthcare cost sharing

## Constructing digital skills indicators for the use of m-health in research, practical and evaluation settings

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In the health care sector the use of Information Technology (IT) is increasing. The use of IT health systems for supporting and optimizing health care (e-Health) has become one of the highest priorities in modern healthcare organizations. With the development and use of mobile technology, the health care sector is also embracing mobile health care applications (m-Health). However while innovative technologies appear on the market rapidly, the development, implementation and adoption (actual use) of healthcare technology seems to be going at a slow rate. For successful development, implementation and adoption of (health care) applications insight is needed in the digital skills of the current and future users. There are frameworks available to determine basic digital skills or for more specific skills such as the use of internet. Examples are the European e-Competence Framework, the digital competences self-assessment grid of the European Union (2016) and the validated measures of digital skills, a study of the University of Twente (2014). However in the context of m-Health these measures are not completely useable. In the study of the University of Twente (2014) the measures are validated for use in research, practical and evaluation settings. Therefor the research question of this study is: What is the best set of reliable measures of m-Health skills for use in research, practical and evaluation settings?

To construct a first set of measures, a case study is performed in collaboration with the project GoAPP (Godivapp Applied in Pediatric Primary Care). The project aims to develop and implement a telemedicine application (the Godivapp) to exchange videos between parents of young children whom suffer from lack of motor development and practitioners working in child physiotherapy. As theoretical foundation is based on 1. The above mentioned study of the University of Twente which defines measures for digital internet skills, 2. The general set of measures by the European Union to measure digital skills and 3. The study of Vries and Gielen (2014) whom have defined eight e-skills for health care professionals.

In an iterative process between ten health care professionals, eight project researchers and two experts in the field of digital skills a set of measures is developed. Currently a first validation is performed by 150 Dutch physiotherapists. This paper will present the set of measures, the results of the validation and recommendations for perfecting the measures.

**Keywords:** Digital skills; Measures; Health care; M-Health; Telemedicine

## Critical Success Factors for Adopting Telemedicine Applications

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The use of IT within health care is increasing, but at a slow rate. In complex projects like the implementation of a telemedicine application within the context of primary health care and their patients, it is still unclear what factors should be taken into consideration for a successful adoption of such an application. Therefore, the research question for this study is: 'what are the critical success factors for adopting a telemedicine application for primary physiotherapists and their patients within the Netherlands?'

A literature study is performed followed by a thematic analysis to determine the factors that are relevant for adoption of a telemedicine application. To validate these factors, two validation sessions with experts in the field of innovative business models for e-health applications were organized. Furthermore, child physiotherapists and parents of children under the age of five have ranked the success factors via a survey to establish which factors are critical. The results show that the factors Security, Cross Platform, User Friendly and Usefulness are the critical success factors for adopting a telemedicine application by Dutch primary physiotherapists and their clients.

**Keywords:** Critical success factors; Telemedicine application; Adoption; Health care; Physiotherapy



## Reengineering open source software for extended functionality: The case of Open Medical Record System (OpenMRS)

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**Purpose:** To proffer solution to the numerous problems of paper-based medical record systems predominant in low- and medium-income countries (LMICs), by reengineering an open source electronic medical record software system, the OpenMRS, for customized and extended functionality in hospitals.

**Methodology:** Software reuse-oriented model and reengineering was applied to extend the functionalities of the OpenMRS. Qualitative interviews were conducted to gather information, analysis of the OpenMRS' core architecture, bundled modules and form creation features were done to identify functional and non-functional requirements. The software development tools: Java, Maven, HTML, JSP, Tomcat, and MySQL were used for the reengineering.

**Findings/Results:** The study found major constraints in the management of hospital records and service delivery due to paper-based methods. An open source client-server electronic medical record system was successfully extended to accommodate features like efficient staff-patient scheduling, and facility mortality data, all at less cost and with minimal programming effort.

**Research limitations:** Inability to include all units of the hospital, such as pharmacy, accounting/billing, and others in the implementation, due to time and some technical hitches.

**Practical implications:** The study showed that, open source electronic medical record systems can be reengineered for extended and customized functionalities for hospitals in LMICs, with the overarching target of improving service delivery in these climes. The integration of facility-based and community-based software systems is recommended for further research.

**Originality:** Lots of research has been done and many still on-going in the fields of open source software and reengineering, but this study is the first to adopt an approach of a practical case study of the reengineering of an open source medical record system.

**Keywords:** Open source; Reengineering; OpenMRS; Electronic medical record system; Software reuse; Paper-based system.

**Monday 11<sup>th</sup> September 2017**

**Stream: Cybersecurity**

**Next Generation Secured and Trustworthy Cyberspace Solutions for Instant Monitoring, Detection, Mitigation, Containment**

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Decades ago, no one would have imagined that one of the biggest threats in today's society would be cybercrime, but the exponential level and universal nature of cyberattacks are proving otherwise. In today's cyber platform of increasingly networked, distributed, and asynchronous connectivity, cybersecurity involves hardware, software, networks, data, people, and integration with the physical world. Various study have indicated that society's overwhelming reliance on this complex cyberspace has, exposed its fragility and vulnerabilities. Enterprise systems rush to embrace cyberspace, exposed its fragility and vulnerabilities that resulted in corporations, agencies, national infrastructure and individuals being victims of cyber-attacks. This study will examine the fundamentals of security and privacy issues as a multidisciplinary subject that can lead to fundamentally new ways to design, build and operate cyber systems, protect existing infrastructure, and motivate and educate individuals about cybersecurity. By achieving a truly secure cyberspace, the study will address both challenging on scientific and engineering concerns involving many components of a system, and vulnerabilities that can arise from anomalies in human behavioural patterns and choices. The study will conclude by providing IT security decision makers with a better understanding of how their perception, concerns, priorities and defensive postures stack against those of other IT organization. These findings and analysis can be used to gain insights into potential solutions for detections, containment and mitigation threats.

**Keywords:** Secured; Trustworthy; Cyberspace; Exploits; Hacking; Vulnerabilities

## Framework for Information Security Attack Disruption

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Information security teams have been constrained by laws in the United States to a defensive posture, when responding to attacks by active hackers from both inside and outside the country's boundary. This legal constraint has focused the development of the information security tool industry to those systems that help detect, contain, eradicate, and recover from specific attack vectors. However, in a proposed United States federal bill (Discussion Draft Amendment HR., 2016) that would amend section 1030 of the Computer Fraud and Abuse Act (18 U.S.C. § 1030), victims of an ongoing attack would be enabled to fight back against hackers. The amendment would allow organizations more powers to build and maintain an offensive capacity in a concerted effort to not only identify hackers, but to disrupt any attacks. While this legal change would do little for the information security industry in terms of detection given the maturity of tools already in that sector, it would provide opportunity for the development of a new class of security tools focused on the offensive disruption. In this paper, we examine the brief history of the information security legal framework that established the current defensive posture, review the proposed amendment to section 1030 of the Computer Fraud and Abuse Act, propose a framework for the industry, and look briefly at guidelines, as well as the moral and ethical issues in taking on this type of activity. The goal of this paper is to ensure there is a clear understanding of how organizations may change to support and take advantage of this type of legal structure change.

### Reference:

(Discussion Draft Amendment HR., 2016)

To amend title 18, United States Code, to provide a defence to prosecution for fraud and related activity in connection with computers for persons defending against unauthorized intrusions into their computers, and for other purposes. Retrieved from

[https://tomgraves.house.gov/uploadedfiles/discussion\\_draft\\_ac-dc\\_act.pdf](https://tomgraves.house.gov/uploadedfiles/discussion_draft_ac-dc_act.pdf)

(18 U.S.C. § 1030)

Fraud and related activity in connection with computers, (2014). Retrieved from

<https://www.law.cornell.edu/uscode/text/18/1030>.

(Discussion Draft Amendment HR., 2016)

To amend title 18, United States Code, to provide a defence to prosecution for fraud and related activity in connection with computers for persons defending against unauthorized intrusions into their computers, and for other purposes. Retrieved from

[https://tomgraves.house.gov/uploadedfiles/discussion\\_draft\\_ac-dc\\_act.pdf](https://tomgraves.house.gov/uploadedfiles/discussion_draft_ac-dc_act.pdf)

**Keywords:** Attack Disruption; Hacker; Hack back

## Open Source Intelligence in Cybersecurity Education

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The digital revolution, advanced search engines, and social networking sites transformed the way we think about cyber security. Open Source Intelligence (OSINT) is the art of collecting publicly available information to produce behavioural reports and make predictions. As more and more information becomes available online, individuals, corporations, and governments are increasingly at risk for victimization by criminals, hackers, and scammers. However, educating students in OSINT in Cybersecurity Education is a challenge. The tools of the trade are constantly changing, the ethical lines are grey, and privacy issues are always on the horizon. This paper will outline curriculum for teaching OSINT in Cybersecurity education, provide insights from past instruction, and provide recommendations for the future.

**Keywords:** Open Source Intelligence; Cybersecurity; Cybersecurity education; OSINT



## Cybersecurity Economics and Analysis: Preliminary Findings from an Explorative Research Study

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Major cybersecurity breaches and cyber frauds are common, and they result in huge financial and reputation losses to organisations who are ready to spend huge amounts to tackle them. Vendors can present tens of solutions to a single cyber problem and a single solution can cost thousands of Euros. Therefore, it is very important for organisations to make the right choice from the solutions that they are offered. Existing decision tools are many but they only address the tangible aspects of cyber security. This research therefore presents Cybersecurity Economics and Analysis (CEA) - a novel model that addresses both tangible and intangible aspects. The model utilizes a holistic approach to cybersecurity based on a deep and comprehensive analysis of organisations' security – considering not only technological perspectives, but institutional, economic, governance and human dimensions – taking forward existing 'best' and effective practices from national audit frameworks, sectoral guidelines and organisational policies. This new solution should account for the wants and needs of various stakeholder groups and existing sectoral requirements. It should contribute to increasing harmonization of European cybersecurity initiatives and reducing fragmented practices of cybersecurity solutions and also helping to reach EU Digital Single Market goal. The ambition of the new model is to re-establish and increase the trust of the European citizens in European digital environments through practical solutions. The model is at a conceptual level at the moment. However, a validation methodology has been developed and will be used in the next stage of the research.

**Keywords:** cybersecurity; cybersecurity economics; cybersecurity cost-benefit; cybersecurity; cost-benefit model; advanced cyber threats; cyber fraud; cyber secure; cybersecurity impact

**Tuesday 12<sup>th</sup> September 2017**

**Stream: Smart Systems/AI**

**Identifying Relationships of Interest in Complex Environments by Using  
Channel Theory**

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Complex environments show a high degree of dynamics caused by vital interactions between the objects within those environments and the alterations the set of objects and their characteristics within those environments go through over time. Manufacturing is an area where those kinds of dynamics are quite obvious as e.g. manufacturing companies increasingly have to manufacture new products and variants of products or to integrate new equipment or machinery to an existing production system.

We show that we can tame the level of complexity in dynamic environments by identifying relationships of interest between the objects in such environments. Knowing about the relationships that are relevant to a particular task or of a particular interest between the objects in complex environments gives us insights on how those objects behave and interact with one another under specific circumstances. We can use this information to reveal regularities that govern such kind of behaviour and interaction between the objects and thus can predict the behaviour of the overall system when particular surrounding conditions are met.

To identify a type of relationship of interest between the objects in a specific complex environment, we apply the theory of Information Flow (IF for short), also known as Channel Theory put forward by Barwise and Seligman in 1997, to the manufacturing area to find out which equipment and tooling might be used to conduct a particular production step. We chose the Channel Theory as it is a solid theory, well designed for distributed systems, and our application area of complex environments can perfectly be seen as such a distributed system. Furthermore, there exists a series of applications based on the Channel Theory that proves that this theory is able to find relationships between two or more sets of objects from different contexts in a distributed environment.

While applying the Channel Theory in the application domain of manufacturing, we recognise that the so far known approaches from the literature that have been used in other application areas are not capable of addressing the higher level of complexity in this environment adequately. We observe that we should revise especially the usage of IF classifications, which are one of the main building blocks in constructing the channel to infer the relationships between objects. Furthermore, to cope with the high degree of complexity in our application domain, we introduced an iterative 2-step approach

based on composite channels to derive the relationships of interest between the production steps that has to be conducted and the production capabilities of the available equipment.

We enhance the way how the Channel Theory has been applied so far by using an iterative approach for finding out the relationships between product specifications and production capabilities. By introducing this iterative approach, we show with the help of an example from the manufacturing domain that the Channel Theory can also be applied successfully in complex environments.

**Keywords:** Relationships of Interest; Complex Environment; Channel Theory; Information Flow; Manufacturing

## Code generation on Mobile for Mobile Apps

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There is both a demand and a need rapidly developing mobile apps for data management as well as apps for conducting surveys. Much of the code for data management operations – create, retrieve, update and delete (CRUD) is the same, except for the parameters passed. Such boilerplate type code is well suited for code generation. Many tools are available for creating apps for conducting survey, but are ill suited for data management scenarios since CRUD operations are not supported. The tools available generally require a PC to access the web based build tool, and do not provide source code for the application created. This paper proposes a mobile app (as opposed to a web app) for creating a full data management app to run on android devices, as well as the generation of all the code for the native app, the supporting PHP pages for a web application, and the SQL scripts for the associated normalized database. An example app created by this mobile app code generator and app builder is also given.

**Keywords:** code generation; mobile app; CRUD; native android



## Computer Simulation of Deterministic and Stochastic Service Systems

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In this age of tremendous computer power, it is increasingly important that students in graduate business programs, have the ability to tackle complex management problems without necessarily spending a lot of time on the analytical underpinnings required to obtain a solution to such problems. It should be possible to educate business students on the use of computer simulation to model different business scenarios. This paper presents four scenarios where computer simulation is used to develop algorithms for modelling service systems in the areas of Inventory Systems, Waiting Line Systems, Transportation Systems, and Market Share Analysis. Microsoft Excel is used extensively to develop such models, and, where possible, macros are used to facilitate the development of such models.

**Keywords:** Computer Simulation; Transportation Systems; Waiting Line Systems;  
Inventory Systems

## Smart Systems and Addressing the Complex Problem of Work and Employment in Remote and Rural Areas; the Case of Scotland

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Work and employment is a complex problem in remote and rural areas, as economic, social and technological change, including the evolution of smart systems, act together to create serious challenges to community sustainability while also enabling positive change. On the supply side smart systems can be the infrastructure for new work and employment, yet the demand side of vision and expectations about new work and employment based on smart systems in remote and rural areas seems to be lagging behind as mega cities and other urban environments take precedence. The challenge is to inspire and share in change and growth through new work enabled by smart systems, and opportunity is the chance to imagine new potential and capabilities around work which help sustain and grow communities in remote and rural areas. This paper considers the case of the Scotland, as the national initiative 'Digital Scotland' is rolled out, showing the challenge and focusing on the opportunity. New work and employment merits a stronger presence and role in how key strategic themes around the digital economy are framed, the business agenda. Otherwise the presence or role for new work and employment, despite the potential, will continue to be unrealised in the future of remote and rural areas. The reasons for this and implications of this are considered.

In Scotland four main themes have been identified. These are connectivity, the digital economy, digital participation and digital public services. The presence of work and employment is seen explicitly in the theme of connectivity, with specific reference to flexible working. It is also seen explicitly in the 'economy' theme with relation to changing skills needs. Digital participation is more general, though this includes economic aspects of participation in employment. Digital public services implies an HRM agenda as this is by far the largest sector of employment in Scotland, so change here will impact on digital HRM for the workforce. These will all be reviewed with regard to remote and rural areas use of smart systems to secure new work and employment.

The conclusion is that there is a big gap between plans for providing basic infrastructure and the true potential if the 'demand side' of new work and employment is more dynamically imagined with higher aspirations and goals. National digital dialogues would benefit from more imaginative thinking on the potential and adoption demands, beyond replicating forms and sites work and employment that currently exist more flexibly. In the organizational work and employment context we need to address rather than subsume smart systems potential in the promotion of ERP and encourage, empower and enable new work and employment as part of dynamic change and more fully realised and augmented smart system futures.

**Keywords:** Work and Employment; Remote and Rural Areas; Scotland

## Process Models Discovery: A Fuzzy-BPMN Mining Approach

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Discovery of worthwhile process models and effective data representation must be performed with due regard to the transformation that needs to be achieved, as well as the available data processing tools. Indeed, such transformations should be aimed at turning data into real value. Presently, the field of process mining has been proved to provide useful techniques that are used to improve real time processes by extracting knowledge from event logs readily available in many organisations information systems. There are two main drivers for such growing interest in process mining techniques. On the one hand, more and more events are being recorded, thus, providing detailed information about the history of processes. On the other hand, there is need to improve and support business processes in a competitive and rapidly changing environment. Process mining means extracting valuable, process-related information from event logs about any real time process. Besides, process discovery has been lately seen as the most important and most visible intellectual challenge related to process mining. The approach involves automatic construction of process models from event log about any domain process, and describes causal dependencies between the various activities that are performed within the process base i.e, execution environment. In principle, one can use process discovery to obtain process models that describes reality. To that effect, the work in this paper presents how we apply the amalgamation of two process mining techniques namely: Fuzzy miner and Business Process Modelling Notation (BPMN) to provide a method for discovering useful process models and improved analysis. The Fuzzy-BPMN mining approach uses a training event log representing 10 different real-time business process executions to discover process models, and then cross-validating the derived model with a set of test event logs in order to measure the performance of the discovery process. Our aim is on carrying out a classification task to determine the traces, i.e. Individual cases that makes up the test event log to determine which traces that can be replayed by the original model. Thus, we focus on providing a model which is as good in balancing between overfitting and under fitting as it is able to correctly classify the traces that can be replayed (allowed) or non-replayable (disallowed) based on the analysis of the test event logs. In other words, we show through a series of validation experiments, how given any trace (for the test event log) and process model (the training log) in the set up Fuzzy-BPMN replaying notation, it can be unambiguously determined whether or not the traces can be replayed on the discovered model. In addition, we discuss the replaying semantics of the process modelling notation that has been employed, and also provide a description of the tools used to discover the process models as well as evaluation of the results of the classification task. Above all, the work looks at the sophistication of the proposed Fuzzy-BPMN mining approach, validation of the classification results, and the discovered process models. The outcome of the experimentations and data validation shows that the proposed mining approach has correctly classified 85.5% of the traces in the original process model.

**Keywords:** Process mining; Process modelling; Classifiers; Fuzzy models; BPMN notation; Event logs

## Analysing Various Forecasting Methods on Crude Oil and Gasoline Prices

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In this research, we analyse various predictive forecasting methods on crude oil and gasoline prices by comparing time series forecasting models with artificial intelligence forecasting models. The former includes simple moving average, simple exponential smoothing, autoregressive integrated moving average, and multiple linear regression. The latter consists of support vector regression and artificial neural network. Due to its wildly fluctuating nature, crude oil price forecasting has always been an interesting and challenging research subject both in academia and for practitioners. We found that autoregressive integrated moving average (ARIMA) models, along with multiple regression models (RG), in general outperforms support vector regression (SVR) and artificial neural network (ANN), which challenges the mainstream literature where SVR and ANN are often considered more accurate.

**Keywords:** Forecasting; Crude Oil; ARIMA; SVR; ANN



## Smart City for Developing Economies: a Combined Model for Citizens Involvement

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There are many definitions of smart cities but they tend to centre on the application of technology with sensors and data analysis to address city problems like transportation and environmental issues so as to give city dwellers a higher standard of living while avoiding the negative effects of urbanisation, e.g. pollution. We have to note though that the problems that smart city technologies address are not just technology issues but social and sometimes political. Also, the solution offered by technology (e.g. electric and driverless vehicles) most often rely on social and behavioural change to make it work. The smart city concept has been of interest to researchers, practitioners, governments and citizen advocates because more than half of the world's population had their homes in cities in 2008 and the UN has predicted that two-thirds of the world population will be city dwellers by 2050.

Though it is expected that developed economies would be at the forefront of smart city development, the development equally concerns developing economies because the UN forecasts that over 90% of urban growth in the world will be in developing economies by 2050. Rather than feeling disadvantaged developing economies and cities can leapfrog smart developments by adopting global best practices and applying technologies, data analytics and sensor systems when building their infrastructures, services and policies. The leapfrogging has already taken place in different technologies notably the smart mobile phone diffusion (293.8 million in 2017 in Africa and Ovum predicts the growth at 52.9% year-on-year). Developing countries did not have as much landlines as in developed countries and were poor in terms of communication but now it is not only mobile phones but smart (mobile) phone that is very popular in these economies. Chinese brands offer low cost smartphones from US\$50 to US\$100 to Africa.

The original trend in smart city projects was concentrated on the top down rather than the bottom up approach. The first approach is highly technology led with city dwellers acting as data sources and passive beneficiaries of the products of smart cities. Recently, there has been the new approach, with little research so far, of originating smart city projects from the citizens e.g. through crowd-sourcing of ideas, involving citizens in the project and giving them ownership which works well for sustainability. Research has shown that the ideas generated from the top end do not often match the ones from the bottom up. It can be argued that the best ideas should come from the bottom – the city dwellers who should be in the best position to know their needs and hopefully know how to solve them. However, there is the weakness of digital divide which may place ordinary citizens with inadequate skill to comprehend the potential smart technologies so as to be so involved. This paper is based on an abstract that will use secondary research to conceptualise model that utilises a combined approach of top down and bottom up with a slant on how to help developing economies e.g. in Africa and Asia to benefit from the smart city concept.

**Keywords:** Smart city; Developing economy; Global challenge; Citizens' involvement

**Tuesday 12<sup>th</sup> September 2017**

## **Stream: Information Systems**

### **Agile Requirements Analysis**

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Imagining systems may help us to explore and investigate situations. Systems thinking creates and encourages questioning. In requirements analysis some of the most useful of these questions are concerned with purpose. If a situation is viewed as a system we may be prompted to ask about its perceived purpose(s) and parts, which are themselves systems with purposes. User Stories capture requirements in a succinct and straightforward way. The aim of this paper is to explain, and provide a worked example of, an approach to Agile information systems (IS) requirements analysis. Based on systems thinking principles this approach has been an important part of a number of IS consultancy projects. It depends on System Pictures as vehicles for inquiry, communication and systems analysis. The process of constructing System Pictures involves stakeholders and roles. The participatory nature of this investigation process seems to focus the discussion of IS project objectives, existing problems, desired improvements and the need for change. Requirements that emerge from this analysis can be recorded as User Stories.

**Keywords:** System Thinking; User Stories; System Pictures; Requirements analysis;  
IS project; Investigating problems and opportunities; Roles

# **A Voyage of Discovery - A Practitioner's Perspective on Stakeholder Engagement and Enterprise Architecture Management in SMEs working in the Scottish Housing Association Sector**

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This paper presents the findings of a Knowledge Transfer Partnership (KTP) project that involved the analysis and evaluation of existing enterprise architecture within a Scottish housing association and the subsequent procurement of an enterprise-wide housing management system.

TOGAF 9.1® (The Open Group Architecture Framework) is an increasingly influential enterprise architecture framework. TOGAF 9.1 is used for full-cycle management of enterprise solutions by providing a set of phases and artefacts which can be crafted according to needs. It is authored by The Open Group and is utilised by many leading companies worldwide. Many authors extol the value and benefit of large enterprises utilising TOGAF 9.1 to improve their operational effectiveness but there is scant reference in the literature to commensurate value and benefit to small and medium-sized enterprises (SMEs). The TOGAF 9.1 documentation highlights the adaptability of the framework but the size and complexity of the framework, the perceived cost and resource implications, and a lack of documented successful utilisation of the framework by SMEs are viewed as key barriers to its adoption by such organisations for enterprise architecture management and technology-focused business improvement projects.

This paper aims to address this lack of documented successful utilisation of TOGAF 9.1 within SMEs by discussing the use of an appropriate adaptation of the TOGAF 9.1 framework to manage the successful procurement of an enterprise-wide system in a Scottish SME - a registered social landlord (RSL). The paper presents the rationale and justification for the selected adaptation of TOGAF 9.1 and discusses the tools, techniques and approaches utilised to successfully manage stakeholder engagement and collaboration through all stages of the project. The paper provides a reflective summary, from a practitioner's perspective, of concerns, problems, barriers and other issues faced during the course of the project, highlights the key success areas of the project and presents findings on the value and benefit of utilising TOGAF 9.1 within an SME environment.

The paper concludes that there is a place for SMEs utilising TOGAF 9.1 to manage technology-focused, enterprise-wide improvement projects and suggests an appropriate adaptation of the framework that should prove valuable to SMEs embarking on large-scale procurement projects.

**Keywords:** TOGAF; SME; Housing Association; Housing Management System; KTP  
Knowledge Transfer Partnership; Successful utilisation of TOGAF;  
Large-scale SME Procurement Project

## Soft Systems Thinking as a means of analysing uncertain requirements in a multi-organizational investigation

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A popular approach taken to analysing organizational issues utilizes a structured or 'hard' systems approach to find a solution. This reductionist method was found to be deficient in social situations. In trying to apply these methods to 'management' problems, Checkland and his team encountered difficulties which required new principles to be found. They recognized a type of situation where the problem was messy and unclear and looked for ways to tackle issues embedded within these situations. Using ideas from Vickers, a holistic, 'soft' approach developed, 'for tackling real-world problems in which known-to-be-desired ends cannot be taken as given.' (Checkland, 2001)

Soft systems ideas have been applied across a wide variety of subject areas where problem situations are deemed to be 'messy'. This paper reports on a project that experimented with the methods to address the "mess" of an open-ended, multi-organizational opportunity that was not commonly understood by the participants: namely, the opportunity to facilitate greater linkage between industry and postgraduate students for work-based project work.

The paper focuses on evaluating the methodology while drawing out elements of the scenario to illustrate the value of the approach. The case study, utilizes system thinking modelling conventions to elicit rich understanding and comprehension of the complex multi-stakeholder situation. There was a web of interlacing relationships which needed to be understood before addressing the possible requirements for the case study. By meeting with stakeholders visual methods helped emergent appreciation culminating in conceptual models which were taken as the basis for questions within meetings. The work built on the systemically desirable and culturally feasible understanding, taking it forward to present the ideas as a potential 'solution'.

Emergent appreciation from the case study, utilizing system thinking modelling conventions, elicited a rich understanding and comprehension of the complex multi-stakeholder situation. The approach adopted helped to illustrate how relatively small barriers seem to provide the stumbling block to creating and maintaining the necessary types of relationship needed to improve the situation. It was necessary to accommodate the variety of views across a number of meetings to look for a possible change action. Ultimately the research findings indicated that a single technology proposal is untenable, however, blended within a future cycle of activity, it was shown to be at the heart of the proposed system.

With a single theme per model developed, this process will have inevitably affected the angle and questions posed, leaving the results open to criticism. However, the proposed solution has parallels with both current literature and similar established services. This leads to the conclusion that SSM provided a robust framework to elicit a rich, deep understanding of the diverse multi-organizational case study.

### Reference

Checkland, P. (2001) Systems thinking, systems practice: Includes a 30 year retrospective. New York: John Wiley & Sons.

**Keywords:** Soft Systems Methodology; Systems thinking; Requirements Analysis; Work-Based Learning



## **Determining the Required Capacity of Business Information Management: Towards a Concise Instrument**

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Information systems and information technology (IS/IT) have a still increasing impact on organizations. IS/IT is becoming a crucial factor to more and more organizations by penetrating into the core of organizational performance. Usage of IS/IT is still growing, as are the expenditures on IS/IT. Management of IS/IT is considered pivotal in ensuring successful use of IS/IT in organizations. From a business point of view management of IS/IT is responsible for a wide range of activities, from system initiation through design and implementation to direction of deployment and use. This comprises the care for the entire lifecycle of IS/IT. To provide guidance for this crucial responsibility, in 2005 the Business information Services Library (BiSL) was published. BiSL describes a framework for business information management and has developed to an industry standard for business information management in the Netherlands. BiSL was developed for different purposes, such as an instrument for professionalization, establishing a common vocabulary for the field of business information management, and to create a connection between information strategy/governance and operational business information administration.

Many organizations are striving for a structural and professional approach toward business information management (BIM). With help of BiSL they can shape the BIM responsibilities and processes, but they struggle with the required capacity of the BIM activities necessary for their particular situation. Therefore, research was started to develop a predictive model to determine the required capacity of the BIM activities in an organization. In this paper the predictive model will be described. A limited set of indicators may be of importance to identify the required capacity of BIM activities that is needed: complexity of business processes, complexity of IS/IT, dynamics of the organization and its environment and the size of the organization are examples of relevant indicators. However, indicators that appear relevant may prove useless in practice due to the fact that organizations have no data on these indicators available. Furthermore, the relationships between the present and desired quality of information and information services are part of the model. To evaluate the model a practical method is presented.

**Keywords:** Business Information Management; IS/IT management; Business-IT alignment; Predictive model; BiSL; Required capacity and sourcing

## Innovative IT Firms and Information Quality: Analysts' Perspective

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Information quality has been included as one of the success factors of an information system. Previous research has indicated that information quality, as perceived by investors, is enhanced when the information is produced by companies who are known to be innovative users of information technology. The current research further explores the quality of information produced by these firms by turning to the impressions and performance of expert analysts based on that information. It is hypothesized, first, that analysts will display less uncertainty about the quality of the information that they receive from companies that are known innovators in their use of IT than from those that are not particularly sophisticated IT users. Furthermore, it is predicted that analysts will actually make more accurate forecasts regarding innovative IT firms than regarding their less IT savvy counterparts. The study uses regression analysis of the dispersion of analysts' forecasts to determine how confident analysts are about reported information. It further includes regression analysis of absolute forecast error to determine the accuracy of the forecasts made based on firm-reported information for the different types of firms. Results of the study enforce the notion that innovative IT users are not only perceived, even by experts, to produce greater information quality, but that the information produced by innovative IT firms might actually be of greater quality as it leads to more accurate forecasts than those of the average firm. Results of this study are an important step in understanding the impact of investment in technology systems in terms of information quality.

**Keywords:** Information quality; Innovative IT; Analyst's forecasts

## **“All Perception is Selection”: Establishing an Interpretive theoretical basis for Information Systems Requirements Engineering**

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The number and nature of IT/IS project failures over the last 30 years has been well documented and a fundamental issue argued to underlie such failure is that of the difficulty of establishing client, or ‘user, requirements. The purpose of this paper is to use Youngson’s (1996) description of the problems of writing history as a way of exploring and highlighting the rich variety of problems we encounter when trying to derive descriptions of user requirements for computer-based information systems. Youngson’s argument that ‘all perception is selection’ is considered in the light of Checkland and Holwell’s (1997) discussion of ‘data, capta, information and knowledge’ and Vickers’ concept of ‘appreciation’ (1965). It is suggested that, together, these three ideas to provide us with a useful theoretical basis for an Interpretive approach to Requirements Engineering. A major difference of this interpretive approach to Requirements Engineering is that it promotes a process of collaborative learning towards requirements, as opposed to the more traditional approaches which attempt to ‘elicit’, ‘extract’, ‘mine’, or even ‘harvest’ requirements. The paper concludes with suggestions as to how we might implement this theoretical basis with practical Requirement Engineering tools.

### **References:**

- Checkland, P.B. and Holwell, S. (1997) *Information, Systems and Information Systems: Making Sense of the Field*, Chichester: Wiley.
- Vickers, G. (1965) *The Art of Judgment: A Study of Policy-Making*, London: Chapman & Hall.
- Youngson, A.J. (1996) *The Prince and the Pretender: Two Views of the '45*, Edinburgh: The Mercat Press.

**Keywords:** Requirements engineering; Appreciation; Capta; Perception; Selection

## **A Case study on the influence of Information Management on reducing workload.**

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At our university, the University of Applied Science Utrecht workload is a point of concern. Lecturers who teach courses are dissatisfied about the workload. Management has tried to reduce the workload, but figures show there has been no measurable impact as a result of these efforts. In this case study a new approach is described where information management was used to influence the workload in two groups of lecturers.

Every two years the UASU conducts a survey measuring different factors to determine how the lecturers appreciate their work at the university. One of these factors is the workload. Despite all efforts the university is conducting to get a better workload the numbers are still far below the average in the Netherlands. These efforts usually have a so called "soft approach" like talking about the felt workload, talking about how you can work more efficiently and sending employees on courses to learn how to work more efficiently. In this case study a different approach is discussed using information management as a tool to influence workload.

In 2010 this research started with analysing the curriculum of a 4 year course at our university and adding the information to an information management system where 6 basic tasks of a lecturer's job were translated into hours and mapped on the academic year calendar. These 6 elements are: (1) lecturing, (2) preparations, (3) administration, (4) development, (5) student counselling, and (6) coordination. After all the numbers were available, the work was divided among the lecturers (15 people) resulting in a personal work plan using the following guidelines:

1. Giving them all equal parts of the 6 elements: (1) lecturing 30%, (2) preparations 15%, (3) administration 10%, (4) development 10%, (5) student counselling 25%, (6) coordination 10%
2. Checking the work load throughout the year where peaks were prevented as much as possible

Every year these hours and the resulting personal work plan is checked again. In 2013 a second 4 year course, Farmakunde (30 people) was added to the information management system using the same requirements and standards.

The university's surveys show that both groups of lectures are more satisfied about their workload. The first group shows an improvement from 3.5 to 5.1 on a scale of 1 to 10, where the universities average is 3,9. The second group showed an improvement from 2,3 to 3.8 in a period between 2013 and 2015.

The conclusion of this case study is that information management has improved the workload in the two groups of lectures that the method was used on. Further research needs to be done to determine the usability of the method in other groups.

**Keywords:** Information management; Information-analysis; Workflow management;  
Human resource management

**Tuesday 12<sup>th</sup> September 2017**

**Stream: Business & Data Intelligence**

**BPM maturity and performance: The influence of BPM knowledge**

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In order to continuously improve performance organizations need to control their processes. To do this it is assumed that organizations need a high level of business process management maturity and employees need a high level of knowledge and experience in BPM. However this hasn't been studied before. Therefore the objective of this study is to determine what the influence is of knowledge and experience of BPM on the dependence between BPM maturity and process performance. For this study a dataset of 469 respondents from Dutch organizations was collected over the period of 2010 till 2015. Analyses of the data shows that the scores of BPM Maturity and Process performance by respondents with extensive BPM knowledge and experience are significantly higher than by respondents with limited BPM knowledge and experience. However further analyses showed that BPM knowledge and experience has no influence on the strength of the relation between BPM Maturity and Process Performance. Therefore, we can conclude that BPM knowledge has no intervened effect on the relationship between BPM Maturity and Process performance. Additionally we found that the dimensions of BPM maturity: Process Resources, Process Tools, Process Awareness, Process Improvement and Process Measurement are the main predictors of Process performance.

**Keywords:** BPM Maturity; Performance; Knowledge; Quantitative research

## From task-oriented to competence-based: improving performance

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In many organizations, the roles you play and the status you have are defined by your function. The function description specifies the tasks you are expected to execute and the responsibilities you have. But in an era of disruptive technologies, the question of what you are able to do, or more precise what your competences are, has become more important than what you actually do. As a consequence, many organizations are experimenting with competences in their HRM-processes. Some organizations have chosen to assess the development of their personnel only in terms of competences, but most organizations have adopted a hybrid system in which competences and tasks/responsibilities are both of interest. Our research aims to clarify if and how the adoption of competences can improve the performance of the employees and hence the organization.

Our research approach is case-study based: we have interviewed business managers in 15 organizations that are in transition or have already fully adopted the use of competences in their HRM-processes. The interviews were recorded and subsequently the transcripts were analysed (via coding) using MaxQDA. From these interviews, we have derived factors that influence the performance in a positive way (best practices) c.q. not at all or even negative (no-go areas). The results show that the change to competence-based makes employees more responsible both for their tasks and for their development. Even more important, it is easier to align the capabilities of the workforce with future needs of the organization. Interviewees mentioned an increase in performance as well, but this could not be quantified.

As this research is part of an ongoing study in the use of the European eCompetence Framework (<http://www.ecompetences.eu>), our focus is on the IT department. But from our interviews we have learned that it is important that the whole organization adopts the use of competences, not only the IT department.

**Keywords:** Competence; European e-competence framework; Transition to competence-based; Performance improvement

## Formative-Source Model for Guiding Student Reflection and Critical Thinking

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All people experience problems that require some level of critical thinking to resolve. The more abstract the core of the problem, the more people struggle to find meaning in order to realize a workable resolution to the problem. Ethics is one of those areas where both students and professors can struggle: doing what is legal, doing what is right, doing both may present conflict. The conflict is where the proposed model earns its credit: providing cognitive experience. Often people make lists of pros and cons when attempting to resolve a problem or make a decision. Their lists of positives and negatives, however, may not cover the “wholeness” of the problem, which can cause people to ignore relevant factors. The purpose of this presentation is to share and demonstrate a model for guiding student reflection and critical thinking: the Formative-Source Model. Scottish theologian John Macquarrie (Purdy, 2009) proposed looking at six formative factors to explore theological issues: experience, revelation, scripture, tradition, culture and reason. The proposed Formative-Source Model, similar to a technique used for theological reflection, developed at the University of the South, combines several of Macquarrie’s formative factors. The quadrants of the Formative-Source Model include tradition, culture, experience and position. When the model is used to discuss and reflect on ethical issues, the definitions of the quadrants are slightly different from the definitions that might be used for theological reflection. Insights from Tradition come from Abrahamic law, statutes (federal, state and local), company policy and codes of ethics—principles of civil interaction. Insights from Culture come from peer groups, magazines, news coverage, television programs, radio, art, music and theatre—attitudes and opinions generally held in a society. Insights from Experience come from actions from past events, thoughts, feelings and perspectives—how we participate in ethics. Insights from Position come from concepts, attitudes, opinions, convictions and beliefs—those things we hold most closely.

Professors can guide students through an ethical reflection by allowing them to talk about the formative sources. This part of the pedagogy is referred to as “talking to learn.” As students “explore: each of the quadrants, they share insight, which “teaches” those who are participating. The professor must monitor the discussion as students explore or reflect on one source at a time in order to “build” a defensible position.

This presentation will be a demonstration of the model using privacy as the ethical issue. Companies compile lists of customers and what those customers purchase. Companies that use 800 and 900 telephone numbers are allowed to capture names, addresses and telephone numbers of callers. The selling of such information has become quite lucrative, but the practice also raises ethical issues. Add to this the fact that companies can record customer profiles, Social Security numbers and credit card numbers. Companies may also trace which social media outlets and blogs their customers use.

**Keywords:** Critical thinking; Formative-source model; Privacy; Tradition; Culture  
Experience; Position



## **The Dynamics of Business Intelligence Systems in Achieving Quality of Management Decision Making and Organization Performance**

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Business Intelligence (BI) is a concept which refers to the managerial philosophy and a tool used to assist firms refine information towards effective business decisions. This study provided an insight into how Business Intelligence directly and indirectly influence the quality of managerial decision-making and firm performance. The purpose was to examine the effectiveness of Business Intelligence implementation relative to the effectiveness of the firm performance. The study adopted a descriptive research design and survey was conducted with selected industrial firm located in Lagos State, Nigeria with a total population of 460. Using an appropriate statistical technique for sample size determination, we obtained a representative sample of 370 (80.43%) respondents. Out of 370 copies of questionnaire administered, 328 copies were retrieved and fit for analysis. The validity of the questionnaire were ensured through Test and Re-test methods with selected participants from other industrial firm. The Reliability Coefficient of the variables ranged from 0.78 to 0.88, reflected appropriate adequacy of the variables. The results of the data analysis confirmed that Business Intelligence positively effects on data quality, information quality and firm performance. We also found that these effects translated into a positive indirect effect on the quality of managerial decision making. The study provided a number of implications especially for Business Intelligence to support firm performance. The study therefore contributed to bridging the gap in the empirical literature. For future research, we suggested a longitudinal approach to better understand the specific mechanisms through which Business Intelligence support firm performance. The study concluded that the benefits of Business Intelligence include accelerating and improving decision making, optimizing internal business process, increasing operational efficiency, driving new revenues and gaining competitive advantage over business rivals.

**Keywords:** Business Intelligence; Managerial Decision-making; Firm Performance

## Utilizing Dashboards and Data Analytics to Manage Student Retention and Recruitment through Cohort Analysis

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The steadily increasing cost to attend college combined with enhanced scrutiny on 4-year graduation rates has placed a heightened emphasis on managing semester-to-semester student retention rates for college programs. In a related vein, colleges are aggressively attempting to recruit students with characteristics that predict academic success in their programs. Both activities are similar in that they require raw data and are much easier to accomplish once that data is converted into usable information. One of the most effective ways to turn raw data into useful information is through visualization. Converting numbers and trends into pictures takes advantage of one of the human brain's most powerful abilities – visual analysis. Taken together, these observations imply the need for techniques and tools that can convert raw cohort data into useful visual representations to help administer college programs.

The term “data analytics” has a broad and somewhat nebulous definition. In its purest sense, it merely refers to examining data sets in order to draw conclusions. In general usage, however, the assumption is that the data sets are large, semi-structured, and that computer technology is used to find hidden patterns and connections. In practice, visualization is typically the vehicle used to represent these patterns and associations. When these visualizations, along with standard numerical information, are combined into a compact representation, or “dashboard”, it allows decision makers to gain valuable insights into the operation and status of an enterprise.

The purpose of this research is to design and create a dashboard utilizing data analytics and various visualization formats that can be used by college administrators to manage a range of student cohort factors, including recruitment and retention. The information provided by this dashboard can be used for a variety of purposes including capacity planning, curriculum redesign, and retention and recruitment strategies. The dashboard itself is comprised of commonly available tools that run on standard hardware across a network; no expensive hardware or proprietary software packages are required. The presentation of this research will describe the creation of the data analytic tools and will demonstrate the use of the dashboard for student cohort analysis. This will benefit university programs and college administrators by providing the information needed to make smart decisions in a highly competitive market.

**Keywords:** Data analytics; Cohort analysis; Data visualization; Dashboard; Retention; Recruitment

## Dense Valuable Features based Multiple People Tracking

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People tracking is a wide area of research in computer vision and machine learning due to its wide horizon of practical applications such as pedestrian monitoring, sport analysis, traffic analysis, robotics, human computer interaction, surveillance, pattern recognition, and smart homes & buildings management. The challenging problem of multiple objects tracking (MOT) is further complicated by factors such as occlusion, varying number of targets, illumination variations and objects' appearances which may be similar.

In this paper, a novel approach is proposed for multiple people tracking with a single static camera based on using dense valuable global and local features such cascaded HOG-III features, texture, and motion properties of objects to build a robust tracking system. To speed up the system, the simple and fast Hungarian association algorithm [1] is employed to associate candidate response to the target objects. Genetic algorithm is also used to provide a heuristic data association based multiple objects tracking. A comparison between two association algorithms is based on the tracking results.

In this study, TUD – crossing and TUD-campus datasets [2] that belong to the University of Darmstadtare in Germany (Technische Universität Darmstadtare), are used for validation purposes. These datasets provide 50% annotations for all occluded pedestrians and have been used to evaluate detection by tracking and tracking by detection systems in [2].A system's performance can be evaluated using a wide metrics of MOT performance indicators [3]. These metrics include an accuracy score called (MOTA), equation (1), which combines false positive, missed targets and identity switched errors.

Our method is characterised by a simple but robust framework that combines more features for multiple object tracking. The preliminary results show that the proposed method provides greater than 7% improvement in MOTA results and better than the method in [4] for MOTP for multi-people tracking. With respect to FN and FP, it provides results that can be several magnitudes better with reference to the two techniques in the literature. The results show that the proposed method can be suitably employed in scale changing or clutter background environment.

**Keywords:** Multiple; Objects; Tracking; Hungarian; Genetic; Features

## **Determinant of an e-commerce Adoption for Supply Chain Management in the Nigerian Small and Medium Sized Enterprises**

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This study empirically examines the determinants of e-commerce adoption level in managing Supply Chain in Nigerian small and medium sized enterprises located in Lagos state, Nigeria. Electronic commerce has become one of the most important instruments for the development of Nigerian economy. The study is important in a global context as SMEs are involved in exporting of produce in the global market place. The study provided a clear understanding to managements perception about e-commerce adoption in their businesses. In this study, self administered questionnaire was distributed to randomly selected 150 employees from ten (10) SMEs located in Lagos state, Nigeria, in which one hundred and thirty three (133) usable questionnaire were returned yielding a response rate of 88.67%. Data were analyzed by correlation and multiple regression analysis. All the independent variables used for the study were found to be positively significant in affecting management decisions to adopt e-commerce. Information sharing was found to have the strongest influence on the adoption level from of e-commerce, followed by organizational readiness. Despite some limitations, the study made some notable contribution and provided an analysis for advancing the field of knowledge in e-commerce technology. The study recommended that efforts should be made by the various stakeholders to encourage and promote the use of e-commerce and that the government should take steps to regulate the telecommunication sector to improve efficiency and productivity in the sector.

**Keywords:** Determinants of E-commerce Adoption; Supply Chain Management; Economic Growth

**Tuesday 12<sup>th</sup> September 2017**

**Stream: Education – Choice & Transitions**

**Increasing the Percentage of Females Majoring in Computer Science and  
Management Information Systems: A Case Study**

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In spite of a history of women in computing, women are underrepresented in technology fields, especially in upper management areas. In order to increase the percentage of women in upper management, the number of women working anywhere in information technology (IT) must be increased. To accomplish this, the number of women graduating with degrees in IT must first rise. This research explores one institution's conscious effort to increase the number of females in our computer science and management information system majors. Since 2014, the department has focused on sending students and faculty to the Grace Hopper Celebration of Women in Computing Conference and on working to build an engaged female community. We believe that inspiring females and mentoring females is the best way to increase our percentages.

**Keywords:** Women in Technology; Decreasing the gender gap; Grace Hopper Celebration of Women in Computing

## Understanding Student College Choice Criteria Utilizing Conjoint Analysis

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The New York State Legislature enacted the nation's first tuition-free degree program, the Excelsior Scholarship, designed to make a college education more affordable to middle class families. This legislation can impact the decision criteria on pursuing a college degree overall and also what institution of higher education students choose upon high school graduation. Is low cost the most important choice criteria for a college education? Do other attributes associated with institutions of higher education factor into the decision on college attendance beyond cost? Understanding the complexities of this decision making is critical, since accessibility to higher education plays a key role in economic development and empowerment (Goodchild van Hilten, 2015). In order to understand the choice criteria for higher education, a research study is in the process of being conducted among a representative sample of high school upper-class men. The data collection and analysis will be accomplished using a newly developed information management technology that leverages "choice based conjoint analysis (CBC)". Sawtooth Software is a leading developer of technology in the area of information management for complex problems; especially when understanding and predicting respondent choice is required. The first version of CBC software was released by Sawtooth Software in 1993 as a desktop solution and now the developer has created a smarter system to address complex problems with Discover-CBC, released in 2014. This is a more streamlined technology that is a web based application for CBC. The researcher is using Sawtooth Software's Discover CBC as an information management system to complete the data collection and analysis for this research to gain insight into the complex problem of choice criteria in higher education.

**Keywords:** College choice criteria; Conjoint analysis college selection; The Excelsior Scholarship Program; College choice

## Case Study: A Management Problem of Transition between Further and Higher Education

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A relevant HND allows entry to the third year of many computer science, and related, university courses. It is assumed that all students who have gained a relevant HND have the necessary skills on entry with which to engage fully with university work and further develop their skills. However, further education to university is seen as a difficult transition with many former FE students finding engagement with university modules difficult. One such difficult skill area, in which there is a high fail rate on modules, involves programming. The difficulties the students encounter with engagement in programming modules are examined in this paper.

The findings of this research reveal difficulties for the students with beginning to engage with skills such as programming; complex problems and issues for management considerations of the learning environment emerge from the data with respect to the transition for direct entry students between further and higher education.

**Keywords:** Higher Education; Further Education; Student engagement;  
Management issues of student engagement; Transition from FE to HE



**Tuesday 12<sup>th</sup> September 2017**

**Stream: Information Science/Knowledge Management**

**Utilisation of Information and Communication Technology (ICT) and  
Collection Management Practices in University Libraries in South-South  
Nigeria**

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This study examined utilization of information and communication technology (ICT) and collection management practices in university libraries in South-South Nigeria. Two hypotheses were formulated to guide the study. Survey research design was used. The population for the study constituted 215. A sample of 137 librarians was selected using purposive sampling technique. The instrument was validated by experts with Split-half reliability method. The research data was analysed with descriptive (mean and standard deviation) and inferential statistics (One-Way ANOVA). All hypotheses were tested at 0.05 level of significance.

The findings revealed that there was a significant influence of e-mail services on collection management practices,  $f=3.064^*$ ,  $P<.05$ ,  $df=3,127$ ,  $F\text{-critical}=2.65$ ) and there was a significant influence of internet services on collection management practices, ( $f=3.594^*$ ,  $P<.05$ ,  $df=2,728$ ,  $F\text{-critical}=3.00$ ). From the result of the study, it was recommended among others that librarians should utilize more ICT tools which will enhance their job performance in the library.

**Keywords:** ICT utilisation; E-mail Service; Internet Service; Collection Management  
University Libraries; South-South Nigeria

## **Availability and Accessibility of CD-ROM and Online Databases in Nigerian University Libraries**

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The paper assessed the availability and accessibility of CD-ROM and Online Databases in Nigerian university libraries. The paper discussed the concept of CD-ROM and Online Databases in Nigerian university libraries. The paper further highlighted challenges of availability and accessibility of CD-ROM and Online Databases in Nigerian university libraries. The paper adopted the descriptive survey design. Questionnaire was used to collect the data. Tables and percentage were used in the analysis. The study was carried out in Cross River State in South-south, Nigeria where 67 librarians in federal and state owned universities were used for the study. The paper concluded that the availability and accessibility of CD-ROM and Online Databases is anchored to a large extent on the budgetary allocation in university libraries, skilled personnel in university libraries and the challenges include: power supply, poor telecommunication and Internet facilities, lack of skills among librarians, underfunding of university libraries among others. The paper recommended that the level of funding/financial support to university libraries both state and federal should be reviewed upward to enhance the procurement of modern CD-ROM and Online databases for the provision of library services to users.

**Keywords:** Accessibility; Availability; CD-ROM; On-line Databases; Nigerian University Libraries

## **Preservation of Library Resources in Nigeria Universities: A Study of Collections in Cross River State Universities**

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Preservation been the appropriate housing, protection, care and maintenance of archives, records and manuscripts should be taken seriously in order to preserve cultural, social and technical context of our heritage. This study investigated the preservation of library resources in Nigeria universities: A study of collections in Cross River State universities. Through descriptive survey research design, the study adopted theory of preservation with an emphasis on 1849 John Ruskin's seven lamps of Architecture. The application of the theory helps in assessing the forms, the preservation problem encountered in the libraries and determine if the libraries were insured against disaster. To achieve these, academic librarians were investigated in the university libraries. The population of the study involved twenty eight academic librarians. Census sampling technique was adopted for the study which made sample to be twenty eight. Questionnaire, interview and direct observation of the collections in the libraries were used to collect data, data were analysed with frequency and percentage. The result of the investigation revealed that paper was the major form of resources stocked in the libraries. This made the library encountered some preservation problems. The result of the finding revealed that, rodents, insects, gaseous pollutant and many more were some of the preservation problems encountered in their libraries. The libraries were not insured against disaster. It was recommended that adequate storage facilities should be provided for appropriate housing, care, protection and maintenance of collection in the libraries. There should be among other things disaster management plan in order to preserve library resources in Nigeria universities.

**Keywords:** Preservation; Library; Resources; University

**Tuesday 12<sup>th</sup> September 2017**

**Stream: Education - Cybersecurity**

**Ensuring graduating students can perform the tasks needed by the cybersecurity workforce**

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While the number of cybersecurity related positions organizations need to fill grows, so does the shortage of people being trained for those positions. Many of the people filling the positions require retraining. This problem is due in part to a disconnect between the needs of the cybersecurity workforce and academia's instructional design process. The instructional design process provides for efficient instruction through the implementation of a factory based model and does not adequately prepare students for the real world.

The NICE Challenge Project is virtualized platform that is remotely accessible. The platform is used to develop virtual challenges and environments to test students on their ability to perform National Cybersecurity Workforce Framework tasks and exhibit their knowledge, skills and abilities. The NICE Challenge Project can be a tool to bridge the student academic experience and more adequately prepare them for entry into the workforce. This paper will explain the disconnect between academia and the workforce, introduce the NICE Challenge project and how it can be used to better prepare students for the workforce.

**Keywords:** National Initiative for Cybersecurity Education; National Cybersecurity Workforce Framework; Cybersecurity; Cybersecurity education; Competencies

# **Breadth vs. Depth in Cybersecurity Education: A Content Analysis on Degree Requirements and Course Descriptions of Academic Programs in American Schools**

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Throughout the years, there has been an increasing need for cybersecurity in all industries including banking, financing, homeland security, insurance, and medicine. The demand for professionals with knowledge in the application areas of cybersecurity calls for institutions and universities to develop academic programs in cybersecurity education (Beuran, et al.; Cheung, et al.; McGettrick, 2013; Kessler and Ramsay, 2013; Schneider, 2013). Therefore, the cybersecurity education should enable students to deal with complex cybersecurity problems as it would 'require a learning methodology that produces deeper understanding and critical thinking to defend against increasingly complex cyber attacks' (Dasgupta, Ferebee and Michalewicz, 2013, p. 20). In order to ensure the quality in cybersecurity education, we need to have a balance between the breadth and depth in the curriculum, which also integrates science, technology, management and culture. On the one hand, when focusing on breadth, cybersecurity education should enable the students to understand fundamentals of various components, such as computer science, information technology, social organizations, law, culture, ethics, mathematics, behavior and psychology, writing skills, and so on. On the other hand, when focusing on depth, cybersecurity education should "sacrifice some of that breadth for additional details, training, and practice in some of the specific tools, skills, and knowledge directly related to the practice of a particular area of information security" (Burley and Spafford, 2014, p. 43). Theoretically speaking, we know very well the importance of having both breadth and depth in cybersecurity education, but, practically speaking, we do not really know how breadth and depth have been addressed and balanced in developing the curriculums and in teaching the courses for cybersecurity programs. This paper will fill this gap by conducting a content analysis on the degree requirements and course descriptions of the degree programs in the top 100 cybersecurity schools in the United States. This paper will use a new concept, knowledge unit (KU), for the discussion of breadth and depth in the content analysis. A KU is "a midlevel grouping of knowledge and skill in an area of cybersecurity" (Conklin, Cline and Roosa, 2014, p. 2009). By identifying and categorizing Knowledge Units (KUs) in the cybersecurity programs offered by the top 100 schools, this paper will answer the following questions:

- 1) What core Knowledge Units (KUs) have been identified and matched for the cybersecurity programs?
- 2) Which core Knowledge Units (KUs) are the most popular in the cybersecurity programs?
- 3) How are the core Knowledge Units (KUs) covered in breadth in the cybersecurity programs?
- 4) How are the core Knowledge Units (KUs) covered in depth in the cybersecurity programs?
- 5) How can a KU-based content analysis will help with a better understanding of the interrelationship between breadth and depth in cybersecurity education?

The significance of this study is two-fold: it not only provides the first-hand findings on the most popular Knowledge Units (KUs) in the cybersecurity programs in the top 100 cybersecurity schools in the United States, but also shows how Knowledge Units (KUs) could reveal the interrelationship between breadth and depth in cybersecurity education.

**References:**

- Beuran, R., Chinen, K. I., Tan, Y., & Shinoda, Y. (2016). Towards Effective Cybersecurity Education and Training.
- Burley, D. L., & Spafford, E. H. (2014). An interview with Gene Spafford on balancing breadth and depth in cybersecurity education. *ACM Inroads*, 5(1), 42-46.
- Cheung, R. S., Cohen, J. P., Lo, H. Z., & Elia, F. (2011, July). Challenge based learning in cybersecurity education. In *Proceedings of the 2011 International Conference on Security & Management* (Vol. 1).
- Conklin, W. A., Cline, R. E., & Roosa, T. (2014). Re-engineering cybersecurity education in the US: an analysis of the critical factors. In *System Sciences (HICSS), 2014 47th Hawaii International Conference on* (pp. 2006-2014).
- Dasgupta, D., Ferebee, D.M., and Michalewicz, Z. (2013). Applying puzzle-based learning to cybersecurity education. In *Proceedings of the Information Security Curriculum Development Conference 2013*, pp. 20–26, ACM, Kennesaw, GA, USA.
- Kessler, G. C., & Ramsay, J. (2013). Paradigms for cybersecurity education in a homeland security program. *Journal of Homeland Security Education*, 2, 35.
- McGettrick, A. (2013). Toward curricular guidelines for cybersecurity: Report of a workshop on cybersecurity education and training. Retrieved on May 31, 2017, <http://www.acm.org/education/TowardCurricularGuidelinesCybersec.pdf>
- Schneider, F. B. (2013). Cybersecurity education in universities. *IEEE Security & Privacy*, 11(4), 3-4.

**Key Words:** Cybersecurity Education, Cybersecurity Programs, Content Analysis, Degree Requirements, Course Descriptions, Curriculum Development

## **E-Learning to m-Learning: Protocol for Data Protection and Security in Cloud Infrastructure**

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In recent years, the advancement in internet technologies has greatly altered the learning landscape thus, a shift from tradition methods of learning to internet based learning platforms. E-learning, m-learning and cloud are some of the most powerful responses to these growing technological shift by the education sectors. Their impact and benefits cannot be over-emphasised with regard to making learning accessible, affordable, available and convenient. The use of cloud technology has made the world of education more integrated, networked and composite. E-learning and m-learning can also be as highly effective as the conventional method of learning delivery. However, despite these advantages, the security and the protection of learners' data on this cloud platform have been some of the major challenges to m-learning effective implementation.

This paper discusses the various issues relating to the management of learners' data, as well as the security and privacy challenges regarding effective implementation of m-learning in cloud infrastructure environment. It also proposed a security framework and requirements needed for addressing these issues. It is expected that the proposed framework, will bring about necessary solution to issues relating to the security and data protection of m-learners in cloud computing environment when fully implemented as well as enhancement of m-learning platforms.

**Keywords:** e-learning; m-learning; Cloud computing; Security; Framework



**Wednesday 12<sup>th</sup> September 2017**

**Stream: Education - Teaching & Learning**

**The Extent of Use of Video Clip by Academic Staff for Teaching and Learning  
in Nigerian Universities**

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This study reports on a survey conducted to explore the extent of use of Video Clip (VC) by academic staff for teaching and learning at the faculty of Education, University of Calabar, Nigeria. Structured questionnaire was designed and used for data collection. One hundred (100) copies of the questionnaires were randomly distributed to respondents in their various offices in the university studied. Eighty (80) copies of the questionnaires were retrieved and used for data analysis (with 80.0% response rate). The findings of the study indicated that although vast majority ( 87.5%) of academic staff in the Faculty of Education were aware of VC tool for teaching and learning, their utilization was rather low ( 47.5% ) and the frequency of usage is equally low, as most ( 47.5% ) respondents used VC tool only occasionally based on the courses taught. Major challenges that hinder the utilization of VC by academic staff and Faculty of Education include power outage, unavailability of computers, overcrowded lecture rooms, capacity development, and inadequate provision for in-service training, among others. The paper also proffered some strategies required to eliminate the challenges.

**Keywords:** Video Clip; Educational Development; Academic Staff; University of Calabar; Nigerian Universities

## Towards More Usable VLEs

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In many information systems often the last consideration shown is to those who interact most with the systems. Nowhere is this truism more obvious than in educational software. Many systems, although following proper pedagogical techniques, do not adequately deal with the human issues involved.

This paper argues that the complex set of interactions necessary for a successful approach to teaching and learning can be simplified with the correct implementation of software supporting the right blend of educational approaches.

To illustrate the both the potential and the limitations of harnessing computational systems for educational purposes a pedagogical approach, peer assessment, is described, the limitations of a manual approach outlined and the potential for automation, using industry standard Virtual Learning Environment Moodle, explained, together with its perceived shortcomings and some suggestions for improvements in workflow, interaction, and feedback.

**Keywords:** Education; Software; Pedagogy; Peer assessment; Moodle; Virtual learning environment; VLE

## **Course Re-design with Information Technology: Prevailing Strategies for Student and Faculty Success**

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The power of Information Technology (IT) in augmenting human activities is no longer in question. But how humans use IT efficiently and effectively remains a challenge. Academic institutions have to answer: What role should IT play in creating greater student and faculty success? What instructional pedagogical models and technologies are more effective? How should technology be used to assess student and faculty success? This paper provides a meta-study of the outcomes of course re-design efforts being implemented by the California State University system (23 campuses) since 2013. The main focus is on sharing the pedagogies and technologies being used, outcomes thus far, and what faculty and students are saying about their experience with the re-designed courses. It is our belief that the insights shared here will prove useful for course re-design efforts elsewhere.

### **References:**

- McLaughlin, J.E. et al. (2014). "The Flipped Classroom: A Course Redesign to Foster Learning and Engagement in a Health Professions School." *Academic Medicine*, Vol. 89(2): 236-243.
- Bagdasarov, Z., Luo, Y., Wei, W. (2017). "The Influence of Tablet-Based Technology on the Development of Communication and Critical Thinking Skills: An Interdisciplinary Study." *Journal of Research on Technology in Education*, Vol. 49(1-2): 55-72.

**Keywords:** Information Technology; Course Redesign; Student Success; Faculty Success; Meta Analysis

## Approaching Complex Problematic Situations in Teaching and Learning Management with Soft Systems Thinking - A Case Study of Using SSM in a Chinese College

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Higher education in China has moved into a popularized and internationalisation stage, which makes the management of Learning, Teaching and Assessment (LTA) challenging and sometimes problematic. However, research into its theory and practice is sparse and in demand. To make contributions to this field, we explore how we may approach (i.e., make sense and then improve) complex problematic situations in LTA management with soft systems thinking. Our investigation was carried out through Action Research (AR) at the Business College of the Beijing Union University (BCBUU) China with our instantiation of Checkland's FMA (Intellectual Framework, Methodology and Area of Concern) model of AR. The declared intellectual framework is comprised of three building blocks namely Weltanschauung (W), Transformation (T) and Environment (E). The W is the value orientation of Scientific Humanism to achieve Relationship-Maintaining, the T a basic pathway of merging internationalization and localization, and the E systemic consideration of environment. The methodology adopted is the Soft Systems Methodology (SSM), and the area of concern is the situation of LTA management at BCBUU. Through this substantial study we made sense of and improved the problematic situation and one tangible result is the development of a new model for LTA management at BCBUU, which is composed of an articulated philosophy, a stable organisational structure and a set of procedures and regulations. We learn lessons through this study. It is found that AR grounded on soft systems thinking provides LTA managers with an innovative and fundamental approach to appreciate otherwise seemingly unapproachable and unmanageable complex and ill-structured problem situations that they face. It is also proven that our particular instantiation of the general FMA model for AR in the context of LTA management in a Chinese university college is practically effective and may be seen as substantiation of it. Furthermore, it is found out that merging internationalization and localization following a theory-to-practice track for LTA management transformation can achieve a great deal. All these have general implications for LTA management in Chinese higher education especially for LTA managers who are interested in using an insightful and effective methodology for making sense of problematic situations and for introducing changes to improve them. The validity of the findings of this work is justified by Checkland and Holwell's notion of 'recoverability' of an action research.

**Keywords:** Soft Systems Thinking; Soft Systems Methodology; Learning & Teaching Management; Complex Problematic Situations

## **Emerging Trends in Elearning and Its Impacts in Developing Countries (A Case Study of Nigeria)**

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Advancement in Information and Communication Technology has provided a leeway for emerging trends in eLearning thereby altering the concepts of the learning environment. Developing countries have started adopting eLearning as an alternative to a poorly funded educational sector that is nearing collapse. eLearning provides a window of unlimited possibilities in developing countries and have huge potentials for governments struggling to meet a growing demand for education while facing shortage of experts teachers, shortage of updated textbooks and limited teaching materials. The adoption of eLearning in developing countries is hindered by poor internet access, cheap bandwidth, the lack of stable access to electrical power and train IT staff. The study will investigate 100 students of the Amadu Bello University Zaria, Nigeria that are carrying out the University online MBA program in Nigeria in relation to (1) Student/Teacher interface experiences (2) Student group discussion experience (3) Coursework content availability (4) The average time of response while interfacing (5) Ease of navigation through their online classroom platforms (6) Their perceived benefits and challenges while carrying out the program. Questionnaires having both open ended and close ended questions will be administered to the students this will unveil not only their experiences but also problems and challenges that they have faced while undergoing the MBA program amidst the emerging eLearning trends. Government officials in the educational sector will be interviewed to ascertain the direct impact of eLearning on the national annual budget if fully adopted. Coding will be done to the data collated after which analysis will be done using SPSS. Investigating the new trends in eLearning and how these will impact the economy and subsequently be used as a blueprint in the educational sector of Nigeria is highly relevant.

**Keywords:** Elearning; Nigeria; Developing Countries; ICT; Education

**Wednesday 13<sup>th</sup> September 2017**

**Stream: ICT4D**

**Operationalising an Analytical Framework for Longitudinal Study of ICT4D**

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An analytical framework has been developed that brings into focus institutional forces, the personal capabilities of stakeholders and aspects of technology in ICT4D initiatives (Bass, Nicholson & Subrahmanian, 2013). This research contributes a novel operationalisation of that analytical framework for longitudinal studies. It is proposed that by using a combination of historical analysis, documentary sources and qualitative methods the analytical framework can help comprehend long-term trends and guide future developments.

Previously the analytical framework has been used to evaluate ICT4D initiatives at a single snapshot in time. However, it has been argued that a longitudinal, systems biography, approach should be adopted (Williams & Pollock, 2012).

At selected evaluation stages the analytical framework can be used to investigate the influence of:

- Technology: notably hardware, software, networks, storage and processes,
- Institutions: notably the regulative, normative and cultural-cognitive pillars, (Scott, 1995) and
- Capabilities: primarily the functioning's, capabilities and agency of users and key stakeholders (Sen, 2005; Robeyns, 2005).

Two case studies are presented to illustrate the longitudinal role of the analytical framework. The first case study concerns cloud computing adoption by enterprises in sub-Saharan Africa and draw on empirical data from Nigeria (Dahiru, Bass & Allison, 2014) and Ethiopia (Seifu et al., 2017). The second case study follows the evolution of a large-scale information system used for human resource management by the Malaysian Government (Omar, Bass & Lowit, 2016). Drawing on the empirical data behind these studies a novel risk assessment approach is proposed to help guide new ICT4D initiatives. Risk assessments have been used in large-scale agile development programmes (Bass, 2016) but not in agile ICT4D programmes.

**References**

- Bass, J. M. (2016). Artefacts and agile method tailoring in large-scale offshore software development programmes. *Information and Software Technology*, 75, 1–16.
- Bass, J. M., Nicholson, B., & Subrahmanian, E. (2013). A Framework Using Institutional Analysis and the Capability Approach in ICT4D. *Information Technologies & International Development*, 9(1), 19–35.
- Dahiru, A. A., Bass, J. M., & Allison, I. K. (2014). Cloud Computing: Adoption Issues for Sub-Saharan Africa SMEs. *Electronic Journal of Information Systems in Developing Countries*, 62(1), 1–17.
- Omar, A., Bass, J. M., & Lowit, P. (2016). Exploring the Factors that Influence the Success of Insourced Government ICT Projects. *Electronic Journal of Information Systems in Developing Countries*, 77(5), 1-22.

- Robeyns, I. 2005, "The Capability Approach: a theoretical survey", *Journal of Human Development*, vol. 6, no. 1, pp. 93-117.
- Scott, W.R. (1995) *Institutions and Organizations*. Sage, Thousand Oaks, CA.
- Seifu, S. D., Dahiru, A. A., Bass, J. M., & Allison, I. K. (2017). Cloud-Computing: Adoption Issues for Ethiopian Public and Private Enterprises. *Electronic Journal of Information Systems in Developing Countries*, 78(7), 1–14.
- Sen, A. 2005, "Human rights and capabilities", *Journal of Human Development*, vol. 6, no. 2, pp. 151-166.
- Williams, R., & Pollock, N. (2012). Moving Beyond the Single Site Implementations Study. *Information Systems Research*, 23(1), 1–22. <https://doi.org/10.1287/isre.1110.0352>

**Keywords:** Analytical framework; Institutions theory; Capability approach; ICT4D; Agile methods; Longitudinal studies



## Open Government Policy and Big Data Analytics: Exploring the Transformation of Government Digital Services in Sub-Saharan Africa

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The mantra of the 21st Century, in different fields from healthcare, business to education (among others), is “Big Data” – defined as enormous electronic data. The rise in the innovations of technology devices, computers and the Internet has made it much easier to collect and store different kind of data ranging from government, personal, medical, financial, and scientific data.

E-government brings about opportunity for exploiting Information and communication technology (ICT) to improve activities and services of government organizations. Open Government as one of the policies of e-government enables governments to be transparent by provision of data in a usable form for the public.

Making sense of data with analytics has proven value for substantial decision making in both enterprises and government organizations, with huge potential in the transformation of e-government services by providing real-time insights to solve problems and guide decision making in sectors like health, agriculture and transportation. While Big Data Analytics has huge potentials in e-government transformation, there are number of possible challenges ranging from data quality, privacy, archiving, security and ownership.

This study investigates opportunities, challenges, strategies and initiatives of utilising Big Data analytics for transforming digital government services in Nigeria. An Information policy framework is introduced to guide an ethical procedure of data collection and the utilization of analytics methods for knowledge discovery.

**Keywords:** Big Data; Open Data; Open Government; e-Government

## **Women in Digital Entrepreneurship: institutional influences, lived experience and perspectives from a developing country**

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Women's' participation in the economy is seen by researchers and policy makers as a contribution to economic development and it has been reported that four out of every five women live in a developing country. In other words more than half of the women in the world live in developing countries. In addition to women forming over 40% of the worlds' working population according to reported research, women's' participation in the economy through entrepreneurship has been on the rise, especially in developing countries.

Digital technology improves the opportunity for entrepreneurship and socio-economic development while empowering women. Research also shows that digital technology influences the way we experience and participate in entrepreneurship. However, the scarce literature available on the discourse of digital entrepreneurship amongst female entrepreneurs has been dominated by analysing experiences of females from developed countries. This poses theoretical and practitioner problems in the discourse of female digital entrepreneurship and limits our understanding of the phenomenon. For example, how does digital technology interplay with gender to influence the lived experiences of female digital entrepreneurs in developing countries?

In order to address the questions and gap raised above, this paper explores three objectives: 'what do we know about digital entrepreneurship?' and 'what do we know about women in digital entrepreneurship?' and it investigates how institutional changes influence the motivation of women into digital entrepreneurship. In an attempt to make sense of the female digital entrepreneurship landscape in developing countries, this paper further seeks to explore these questions in the context of a developing country.

This research aims to illuminate our understanding of the interplay between institutional influences, gender and digital female entrepreneurship in a developing country predicated on a three step model. First, we investigate extant literature in understanding digital entrepreneurship and institutional influences. Next, we aim to develop a conceptual framework drawing on socialization and institutional theories. Lastly, we recap by examining what we know about women in digital entrepreneurship, why digital entrepreneurship is an important topic for developing countries and how institutional influence shapes female digital entrepreneurial activities.

**Keywords:** Female entrepreneurship; Digital entrepreneurship; Socio-cultural influences; Lived experience

## **Information Resources and Service Delivery in Tourism Sites in Cross River State for Sustainable Development in Nigeria**

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The main focus of this research work was to ascertain the availability of information resources and service delivery in tourism sites in Cross River State. This work recognizes the existence of many tourist sites and cultural heritage in Cross River State that are often not known to some Nigerians and outside world. It is observed by the researchers that there is absence of tourism information centre (TIC) in Cross River State. The study investigated: how tourist obtain qualitative information on service delivery of tourism sites in Cross River State; as well as the methods adopted to ensure that the needed information resources and service delivery are made available to the tourists and other visitors who are in need of them. Three hypotheses were formulated for the study. The study covered the three selected public information centres in charge of tourism sites in Cross River State. They are Cross River State Tourism Bureau, National Commission for Museum Calabar and Nigerian Tourism Development Corporation, Calabar. Ex-post factor research design was utilized to carry out the study. One hundred and two (102) respondents that were selected through census and purposive sampling technique took part in the study. A well validated questionnaire was used to collate data for the study the instrument was estimated for its reliability using Cronbach Alpha reliability method. The reliability indices range from 0.714 to 0.798 and this indicated that the research instrument was highly reliable. The statistical analysis techniques used to test the hypotheses was One-Way Analysis of Variance (ANOVA). Each hypothesis was tested at 0.05 level of significance with relative degrees of freedom. Results from the data analysis showed that respondents from sites with high availability of print information resources had significantly higher mean achievement of ( $t= 19.12$ ) than respondents from sites with low ( $t= -10.34$ ) and average ( $t= -9.86$ ) availability of print information resources. This is an indication that respondents from sites with high availability of print information resources had significant provision of service delivery in tourism sites than respondents from sites with low or average availability of print information resources. Analysis of data on the second hypothesis revealed that respondents from high availability of non-print information resources had significantly higher mean achievement of ( $t= 19.23$ ) than respondents from low ( $t= -10.34$ ) and average ( $t= -9.86$ ) availability of non-print information resources. This is an indication that respondents from sites with high availability of non-print information resources had significant service delivery in tourism sites than respondents from low or average availability of non-print information resources.

Analysis of data relating to hypothesis 3 equally showed that respondents from sites with high formats of information resources had significantly higher mean of ( $t= 19.28$ ) than respondents from low ( $t= -10.34$ ) and average ( $t= -9.86$ ) formats of information resources. These results revealed that respondents from high formats of information resources had significant service delivery in tourism sites than respondents from low or average formats of information resources. Based on the findings of this study, it was recommended that: Pictures of the sites and their contents be made available to the people who are in need of them. It was also recommended that tourism information centre be established to enhance service delivery to tourists.

**Keywords:** Tourism sites; Service delivery; Information resource; Sustainable development

## **Prospects and Challenges of Developing Materials for E-Learning in Open and Distance Learning: Lessons from University of Abuja**

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In today's society, education and educational institutions are under pressure to devise new, flexible, more learner-centred and cost-effective ways of delivering the knowledge and skills which people require in order to function effectively in an information and knowledge society. In response to the pressure, there is, in recent years, a paradigm shift in the ways in which the transfer and management of knowledge is handled. One area in which this paradigm shift is most evident is e-learning. Traditional learning approaches are no longer effective in developing, acquiring and disseminating knowledge continuously and in a timely fashion needed today. The paper discusses the design and development of materials for e-learning, drawing on lessons from University of Abuja open and distance learning program. After briefly outlining the characteristics of distance and e-learning, the paper goes on to discuss instructional systems design (ISD) within the context of general systems theory, and the stages in the e-learning process, identifying the activities in and deliverables from each stage of the process. An attempt is made to give the reader practical examples of the products of each stage in the development of an e-learning course.

**Keywords:** E-Learning; Open and Distance Learning; Prospects; Challenges

## **The Role of Libraries in Promoting Peace and Justice in Calabar, Nigeria**

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Libraries are considered as the nucleus of activities that aim at developing the belief and attitude to promote broadmindedness, love, tolerance, integrity, equal opportunity, culture and personal development. They provide access to knowledge, which builds capacity for understanding among people with different opinions and different origins within our communities, and also support equal opportunity for human development- socially, economically and politically within society. These are preconditions for peace and justice and the library can help to facilitate these prerequisites. The international Federation of Library Associations and Institutions (IFLA), on its 75th anniversary in Glasgow held in 2015, proclaimed the fundamental rights of human beings to both access and express information without restrictions and also stressed the positive role libraries have to play in this process. Calabar, Nigeria, attracts a great deal of tourism which has fast become a major driver for the economy but over the past years issues of increasing security & social concerns have threatened the attraction as a holiday destination and the calm associated with the city. The study examined resources and services, the media provided by libraries, partnership between libraries and stakeholders, and strategies for enhancing the libraries role, to promote peace and justice in Calabar, Nigeria. The methodology was a descriptive survey of two libraries in Calabar, Nigeria, with a total of forty seven (47) questionnaires distributed and collected. Findings from the study revealed that the libraries do not provide, resources and services, use different media and ICT, or have any partnerships with stakeholders to help promote peace and justice in society. The study identifies strategies for enhancing the role of the library, and advocates the development of an information centre to help promote peace and justice in Calabar, Nigeria.

**Keywords:** Libraries; Peace; Justice; Access to information; Media; ICT; Partnership

**Wednesday 13<sup>th</sup> September 2017**

**Stream: Data and Business**

**Variations in the Syntactical Complexity of Corporate Annual Reports: Fog Index and Tone Variation**

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The paper studies the variations in the syntactical complexity of Annual Report narrative disclosures of companies listed in the FTSE ALL Share Index. It does this using the fog index developed in computational linguistics and Loughran and McDonald (2011) Fin-Neg word list financial dictionary, to assess the variations in the disclosure fog and tone given year and industry effects. Syntactic Analysis of corporate narratives aims to “analyse and quantify the difficulty of reading the message” written in the reports (Jones and Shoemaker 1994). This study investigates these variations in the syntactical complexity of narrative disclosure by assessing the readability and the tone of the disclosures. Readability is measured using the fog index while tone is measured using the Fin-Neg word list. Studies in accounting use the fog index to measure the reading difficulty of accounting narratives (for instance Lee 2011; Hu et al. 2017) and the financial dictionary, a dictionary developed to measure the tone in financial texts (for instance Rogers et al. 2011; Gupta et al. 2016). Other information retrieval measures identified and used to measure the reading difficulty and tone of accounting text include text classification methods, cloze procedure, and the Plain English approach for testing readability of disclosure, the naive bayes algorithm approach and other dictionary approaches for testing the tone of disclosure.

Knowledge of narrative disclosure and text mining measures is relevant for accounting research. This is because as highlighted by several policies (e.g. the SEC Plain English rule, 1998), there is the need for users of accounting information to use narratives in reports to understand the significance of the accounting numbers reported. The ability of accounting researchers to accurately measure narratives in annual reports will inform on how best to present corporate report narratives for effective decision-making. The adoption of text analysis measures from other academic fields can significantly lower the cost of measuring disclosure. It is expected to provide more accurate narrative measures that will advance accounting research (Core 2001). This study adopts a computational linguistics approach using perl programming to develop codes used to read texts and retrieve information on complex words and negative words used in the calculation of the fog index and tone respectively.

The findings show a description and interpretation of accounting narrative fog index and tone based on firm years, association between the narrative measures and industry data. It contributes to research in accounting using the fog index and tone and shows that considering the effect of the variation observed in this study within industries and firm years can inform the interpretation of results on annual report textual complexity research. It adds to current challenges of textual analysis disclosure research by showing economic variations in narrative disclosures that are important avenues for future research.

**Keywords:** Textual Analysis; Perl Programming; Industry and Year Analysis; Accounting Narratives; Fog Index; Tone

## **Big Data Tools: A Holistic Review**

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Big Data describes massive data in very large volumes, varying structures and data types coming with very high velocity from diverse sources. This definition—though incomplete—describes the complex nature of Big Data hence the need for sophisticated tools and technologies. More than the tools, Big Data requires concurrent research in several academic frontiers that power Big Data Technologies. The entire toolbox needs to be properly understood, and such understanding comes from frequent discourse and research in all associated areas. The aim of this paper is to provide information on these various techniques, tools and technologies that are available to harness the power of Big Data, with emphasis on the theoretical techniques that are often kept in the shadows of most Big Data discourse. The paper begins with a history and then a definition. Uniquely, this paper presents nine (9) vs qualifying big data as against the regular seven (7). We go on to highlight the difference between tools and application areas. In doing so, we draw relationships and highlight the differences in the fields of Data Science, Analytics, Data Mining, and Business Intelligence. A key opinion expressed in the paper is that in many big data discussions, more attention is given to software tools, especially Hadoop. Therefore, the paper takes a holistic approach by highlighting some other big data tools & techniques such as statistical learning, mathematical modelling, and machine learning. For each of these techniques, we outline their place in the Big Data Industry, setbacks/challenges in such research areas, and case studies of their application if available. However, software tools are also discussed, with attention to Hadoop alternatives. The paper concludes by putting to practice, one of the rapidly evolving Big Data tools—the R language. R is applied in two (2) big data jobs: One takes a supervised learning approach that centres on Prediction, while the other applies the K-Means Clustering Algorithm in solving an unsupervised learning problem. In solving these problems, the focus is to show how Big Data problems can still be solved, even in the absence of the sophisticated Big Data platforms provided the minimum system requirement for running Big Data analysis exists. We also seek to draw attention to the possible uses and benefits of Big Data that are obtainable within the Nigerian context. Big Data is constantly evolving, and a lot of work is being done on it. The crux of this paper is to present the Big Data tools and techniques—which have been discussed by other researchers—in a comprehensive and holistic article, with a practical dimension.

**Keywords:** Big data; Hadoop; Statistical Learning; Mathematical Modelling; Supervised Learning; Unsupervised Learning



## Supply Chain Management

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This paper evaluates the concept of supply chain management for operational efficiency distribution of crude oil in Nigeria Oil and gas industry. The concept of supply chain phenomenon has been in practice in the oil and gas industries in the developed countries such Norway, the UK and the United States of America. Oil and gas companies have applied the framework to reform their strategic management practices, enhanced efficient operational activities, improved logistics, and guaranteed the reliability of their distribution and transportation systems. However, oil and gas exploration and production in Nigeria, especially in the Niger Delta regions has not revealed any efficient supply chain management concept (Ovadia, 2016, Obinyan, 2016 and Ingelson, 2014).

Nigeria's oil and gas industry plays an important role in the international market as more than 80% of the oil and gas produced in Nigeria come from the Niger Delta. While the region is undoubtedly the epicentre of the economic drive of Nigeria, it is ironical, the centre of petroleum waste. According to Yunusa (2016), Anwuli, (2011) and Emoyan, (2008), this region experiences recurrent oil spillage, gas flaring, pipeline vandalism, oil bunkering, pilfering of crude oil, corrupt operational practices, sabotage and militant disruption of oil installations.

Given the multidisciplinary nature of supply chain management and the complex management operations involved in oil and gas exploration and production, qualitative inductive research approach will be adopted to capture deeper understanding, awareness, perception and experiences of the organisations about efficient waste elimination strategy using supply chain management philosophy. Semi-structured interviews conducted with key participants (Decision Makers, Supply Chain Experts, Logistics Managers) in the industry, communities and government agencies for the purpose of obtaining epistemological constructs in the ontological environment using pragmatism paradigm to understanding the oil and gas the industry in Nigeria. It is predicated on developing a theoretical model for the Nigerian oil and gas industry.

**Keywords:** Supply Chain Management; Theoretical Model; Waste; Nigeria Niger Delta; Oil and Gas Industry

## REST and the Management of Distributed Data

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Relational database technology generally presupposes central control of the data schema and administration, so that data gathered from multiple sources is usually extracted, transformed and loaded into a new database. The resulting data warehouse is less useful than the original data sources, because it is generally not quite up to date, the transformations may have lost some detail, and the lines of responsibility and ownership have become blurred. Rather than creating such duplication a number of writers have advocated the use of logical data warehouses.

If the data sets are naturally linked and have structural similarities, it becomes useful to identify such common schemas in the REST APIs and to provide relational database management techniques (using SQL) on the resulting integrated data set. We identify the use of REST-based Web APIs as a preferred mechanism for data integration and propose extending relational databases to include this feature. Transactional capability can also be added using the ETag concept (Fielding and Reschke, RFC 7232).

In relational database technology, a view can be defined within a database D using a stored query, e.g. `CREATE VIEW V AS SELECT A,B,C FROM T,U WHERE...`

Then the view can be used as the source of further queries, and the usual security arrangement (grant and revoke of permissions) can apply to the data in views in the same way as data in the base tables of the database.

Such views can be updatable if the SELECT query has certain properties, for example if key columns of the source data tables are included in the view. The stored query shown uses simple column names: more generally the SELECT statements can contain expressions for the selected columns and the WHERE conditions. If these are invertible and/or order-preserving, the resulting view may still be updatable.

A REST API allows a Web request to a given URL, usually on a remote server, to return a set of data rows: GET url

The server generally provides this data from a local database R, e.g. by relating the url with a query in the database R. The implementer of the REST API has the opportunity to provide the results of GET in any convenient format, and can take account of the preferences and capabilities of the intended users of the API.

Depending on credentials, the REST API may also support PUT, POST and DELETE requests. With some care, the operations GET, POST, PUT and DELETE can use the same url for the related database operations. Again, if the resulting transformations are invertible and/or order-preserving, the other verbs may still be easy to use.

The key idea in this paper is to put these two concepts together to allow data from R to be accessed within the database D:

CREATE VIEW (A INT,B DATE, C VARCHAR(40)) AS GET url so it is useful for the declaration of the REST View can include the types of the columns in the data rows so that they can be better integrated in D.

**Keywords:** Data Management; Distributed Data; Logical Data Warehouse

**Wednesday 13<sup>th</sup> September 2017**

**Stream: Business**

**How Nike is Utilizing Supply Chain Management Systems**

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Nike, Inc. is a leader in sports apparel, and a household brand name not only in America but abroad. This case study examines the period when Nike experienced a challenging time and a decline in sales during the 2000s, and how Nike continues to innovate and compete in the marketplace today utilizing information technology. The sales decline seemed to have been due to a negative change in the economy, as well as miscues regarding inventory assessment by the company and failure to meet its target market with new designs and ideas. Nike began to make a change in its supply chain management systems (SCM) and adopt lean manufacturing to reduce waste and costs, and capitalize on the usage of information systems more effectively and efficiently. Since incorporating the new SCM, Nike has seen a positive change financially and with its business relationships and partners.

**Keywords:** Nike; Supply chain management systems; Innovation; Target market

## Framework to Right Sizing the Continuity Planning for Small Business

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Continuity planning (CP) is the process of ensuring organizations can maintain operational capabilities should an incident or disaster occur requiring response or recovery efforts to be conducted (Lindström et al, 2010). Many of the process steps included in CP require a team of people, some of which work full time on a continuity team, to complete tasks that represent the different aspects of the planning process. While the CP process is well documented and often works well for larger organizations, small sized businesses struggle to find the organizational resources sufficient to implement the defined process. In conducting a literature review for this paper, there are limited publications outlining the continuity process, and no documents found in academic journals that discuss right-sizing the continuity processes to fit small businesses. With an estimated 28.8 million small businesses in the United States (US-SBA, 2016), defined as organizations with 500 or less employees, more research and guidance is needed to address this gap. This paper provides a framework for small business to right-size the continuity planning process, including providing guidance on resourcing and building the CP team, methods to right-size the analysis process within the context of the NIST 800-30 risk assessment framework, and plan preparation and testing methods that can work for a small business. The goal of this paper is to set forth a framework for small organizations to better plan and prepare for incidents and disasters to increase the probability of business survival.

### References:

- Lindström, J., Samuelsson, S., & Hägerfors, A. (2010). Business continuity planning methodology. *Disaster Prevention and Management: An International Journal*, 19(2), 243-255.
- United States Small Business Administration. (2016). Retrieved from [https://www.sba.gov/sites/default/files/advocacy/United\\_States.pdf](https://www.sba.gov/sites/default/files/advocacy/United_States.pdf)

**Keywords:** Continuity planning; Small Business; Incident Response; Disaster Recovery; Business Continuity

## **Risk Analysis Insurers on Their Relation Databases against Sanction Countries, Money Laundering and Financing Terrorism**

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Non-life insurers are at risk to get involved in financing terrorism because of the possibility that insured persons can submit false claims. In the European Union there has been a link between the rise of the number of fraud and the increasing number of terrorists who travel outside to join ISIS. Typically, these people need to get money quickly. In this study the sanction policy of insurers is analysed.

Insurers, banks, trust offices, mutual funds and other financial corporations are being required by the Dutch Central Bank (DNB) to execute the sanction regimes to prevent money laundering or financing terrorism and to compliance with international political sanctions. This is governed by the Dutch Act on Prevention of Money Laundering and Financing of Terrorism (WWFT) and the Sanctions Act 1977 (SW).

Restrictive sanction measures are political instruments in the foreign and security policy of the United Nations and the EU which are committed in response to violations of the international law of human rights by regimes. Sanctions can also being used in the fight against terrorism. The sanctions appeared in UN resolutions are basically enforced by the EU as quickly as possible by EU sanction regulations but the EU can also impose sanctions independently by herself. Additionally individual countries such as The Netherlands and the United States can impose sanctions. In the US the sanctions are executed by the OFAC (Office of Foreign Assets Control). The financial sanctions can be distinguish between the freezing of assets, prohibitions to make extensive additional resources available and prohibitions or restrictions on the supply of financial services. The freezing of assets applies to the assets of specific individuals and organisations such as alleged terrorists and terror organisations.

The sanction blacklists have more than 15.000 entries. These are terrorists, dictators and political officials PEP (Politically Exposed Person) of conflict areas for which penalties have been provided. Examples of targeted sanction countries and groups are: Iraq, Syria, Iran, North Korea, Yemen, Congo, Cuba, Russia, ISIS and Al-Qaeda.

Types of sanction lists:

- Electronic Combined Targeted Financial Sanctions List (EU Freeze List).
- US OFAC Specially Designated Nationals List (SDN List).
- *Dutch NL Freeze List* Powered by EU sanction regulations DNB lays claim to insurers and other financial corporations to execute risk analyses on their customer relations. These are the policyholders, insured persons, prospects, directors and UBO's (the ultimate stakeholder 'Ultimate Beneficial Owner') of trusts or other non-profit organisations. The relations have to be scanned with the EU Freeze List, the OFAC SDN List and the NL Freeze List.

The scanning of relations is required on the following moments:

- Ad hoc on the moment of acceptance of a new insured person.
- Per quarter on all relations in the relation databases.
- Ad hoc in case of a new sanction alert of the DNB with an addition at the sanction lists. It is required to respond within a day. Sanction alerts are published by email and Twitter.

Additions at sanction lists appear in case of new sanctions by current international political events such as recent crises regarding to Russia, Ukraine, Yemen, Iran, ISIS and Al-Qaeda.

The scanning of the relation databases is an intensive process. Relation databases which often contain more than 5 million records, must be scanned in parts of 250.000 records. The scanning is done on surname, initials, date of birth and place of residence with a searching match between 70% and 100% (fuzzy matching). A white list is also used to exclude previous matching hits. In case the scanning lets to a corresponding hit the compliance officer is ordered to further investigate in the policies and the offers to get assurance that the hit is a real match.

**Keywords:** Sanctions, Terrorism, Compliance, Data-analysis, Relationship Management

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**Stream: Ethical, Legal and Cultural**

**The Law and Social Robots**

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AI is currently enjoying a resurgence. Developments in large scale computing, processor speeds, and big data analytics have enabled the development of new AI-based applications such as autonomous aircraft, drones, self-driving cars, and a plethora of industrial and 'social' robots. Of these, the emergence of social robots is particularly interesting, from a plurality of perspectives. Social robots are at the cusp of commonplace use and acceptance in a variety of settings, and large-scale deployment of social robots not far into the future has become a reality. Potential uses of social robots include senior care, household help, companionship, personal assistance, comfort or therapy provider, playmate, story-teller, chef, and handyman – to list just a few. Such is the promise of social robots that in addition to entrepreneurs, academics in disparate fields such as sociology, security, ethics, law, policy, management, public safety, and technology are beginning to take note of and develop research projects on social robots. They are actively studying and debating issues that emanate from the emergence and commonplace presence of these robots. In this paper we focus on legal issues pertaining to social robots. We first define what social robots are, and what they are not. Then we discuss the legal issues in detail, look at existing laws that may cover these issues, locate gaps, and identify possible solutions. We are specifically interested in liability issues, 'robots as human surrogates' issues, privacy and security issues. We look at how laws affecting these areas apply at present, where they do not apply, and what are the grey areas in the application of current laws to social robots. An important question to consider is how laws in different countries (e.g. US, UK, EU, India, etc.) apply to the issue of social robots, and whether they may have to be expanded or reconsidered when they are applied to social robots.

**Keywords:** Social robots; Law; Ethics; Policy; Security; AI



# Universal Features-Variance Analysis in Speaker Gender Classification

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Speaker recognition and identification is important in security applications [1]. These applications rely on matching the speaker's speech features to reference features of individuals held in the system. Information on gender and age composition of any group of individuals is invaluable in applications ranging from security, health and safety, to behavioural economics. The data of recordings collected at call centres can be used to obtain statistical figures about clients' age and gender which can be used in marketing plans. The use of closed circuit television camera with integrated microphones is widespread and advantage of such capabilities can be taken to implement context-aware ambient systems to automatically gather and provide information on gender composition to complement video images. Microphones can also be more easily deployed than cameras. As in CCTV, privacy issues are mostly concerned with how much the data is handled protectively [2]. It is now convenient to make use of voice features for this purpose. When an individual's identity is also of interest, speaker identification systems perform better when the analysis is gender dependent [3].

Short-term spectral features of speech, especially Mel-Frequency Cepstral Coefficients (MFCC), have been extensively considered in speaker recognition [1]. MFCC proved to be a useful transformation of the speech signal suitable for the purpose of speech and speaker recognition. Its core concept is the decomposition of the speech spectrum using filter banks that mimic the human auditory system [4]. However, correlation between some of these features in speech can affect classification performance. In this paper we propose to use principle component analysis (PCA) to project these features into another dimension where the directions with maximum variance of these features are identified. The principal components are the eigenvectors of the covariance matrix of the data (feature vectors). Yet as the problem is generalised to speakers' classes, not individual speakers, we perform principle component analysis on speech features of many speakers to identify universal directions of maximum variance and thus we can spare components that represent low variance of the data. Following this methodology, we reduce the dimensionality of the features in gender classification systems and present faster performance while also removing redundant information that may affect the accuracy. Two classification criteria are deployed to evaluate the algorithm. The first, is the log-likelihood ratio of the test features vectors with two gender-dependent Gaussian Mixture Models-Universal Background Models (GMM-UBM) [5], which shown marginal accuracy improvement with PCA from 96.87% to 97.31%. The second, is the means of GMM-UBM (Supervectors) after being adapted for each test feature vectors and classified using Support Vector Machine (SVM) giving improvement from 96.77% to 97.22%. At both criteria, the obtained dimensionality reduction is 22%.

As no control is anticipated on the speech recording conditions, this research uses the telephone data of the 2002 NIST speaker recognition evaluation rather than clean speech to evaluate the performance of the developed technique and algorithm. The ability of the proposed method to achieve marginal improvement using non clean speech data is valuable for practical applications.

**Keywords:** Speaker Recognition; Gender Classification; Principal Component Analysis; MFCC

## **An Examination of the Impact of Gender and Culture on Facebook Attitudes, Privacy and Trust in Guam**

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Facebook is the world's leading social networking site and has grown rapidly since its founding in 2004. Social media and Facebook have provided a rich venue for studies in a wide range of use and user topics. Efforts to capitalize on social media investments depend greatly upon people's willingness to share information that will be valuable to third parties. Researchers are interested in understanding concerns about privacy since they can substantially reduce user willingness to share and thus reduce the value of social networking sites. Culture plays an important role in communication of psychological attributes, individuating information, and quantity of self-descriptive expression. Using data derived from a survey, we investigate gender differences and the impact of culture in Facebook privacy and trust among Guam students. Our results provide insights into why and how people from different genders and cultural groups use Facebook and their attitude toward privacy and trust.

**Keywords:** Facebook; Guam; Privacy; Students; Trust

## **A Case Study in the use of Personal Data Stores - Improving Equality and Citizen Empowerment through the provision of Person-Centred Energy Advice Services**

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This paper reports on a proof-of-concept project that is utilising cloud-based personal data stores to empower citizens of Renfrewshire by working with them to co-design, test and deliver local, digitally-enabled, person-centred energy advice services.

There is a recognised and consistent set of generic issues around the transfer of personal data between consumers of public services and organisations. The Scottish Government Data Management Board proposes a Data Vision for Scotland in 2020 where “data are used to support the delivery of outstanding public services; citizens feel confident that personal data are being shared responsibly to create better and more responsive services which meet their individual needs; citizens readily know how to and can access personal information held about them, allowing them to confirm accuracy and to choose, if they wish, to create their own personal data store”. A recent SCDI report – Smart Citizens, Smart City Regions: Delivering Digital Public Services in Scotland – acknowledges that the “Scottish public sector must build a relationship of trust with citizens that will underpin faster rollout of digital public services and put citizens in control of their digital lives. The development of a trusted ‘data bank’ mechanism that covers data collection, sharing and storage of personal data of citizens will require top-level leadership”.

This proof-of-concept project involves collaboration between a number of stakeholder organisations and citizen groups in the Renfrewshire area. The project aims to show that a switch in design to person-centred services realises benefits for citizens and that the use of cloud-based personal data stores and secure data exchange increases trust, convenience, responsiveness, accuracy and security. This applies to the provision of public services in areas such as energy, health and care, employability and employment, education, social services and any other areas of service that involve people, data and organisations. The proof-of-concept project is easily scalable to other citizens and person centred services in Renfrewshire, and to local authorities, housing associations and other public bodies at a national level. As such, this research project has implications for all UK local authorities and other providers of public services.

This paper explores the use of cloud-based personal data stores as a means of providing for more effective and more secure delivery of local public services and reports on progress to date on the proof-of-concept project, discusses the research design and practitioner’s perspective, and presents initial findings.

**Keywords:** Personal Data Stores; Personal Data Vault; Smart Citizens; E-Government; Secure Delivery of Public Services

**Wednesday 13<sup>th</sup> September 2017**

**Stream: Students (Skype)**

**Library Services in the Digital Age: Do Librarians have what it takes?**

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The digital age for decades now have taken a central stage and have gained unprecedented attention of libraries and librarians. This paper discusses what the future and the paradigm shift in services portends for libraries and librarianship in general. The main objective of this paper is to bring to the fore the changing roles of libraries and the profession in this era of information and communication's technology. The paper tries to highlight what library services is in the unfolding scenario of digital age. It tries to relate it to what obtains traditionally. The paper seeks to bring to the fore the characteristics and attributes of the 21st century librarians. The paper asserts that librarians have what it takes to ride in the digital tidal wave triggered by new technologies. The paper posits that libraries and librarians alike can, must and will adequately catch up with the unfolding development. The paper concludes that the digital age have increased the role of libraries and services to be provided to the clientele.

**Keywords:** Library; Digital age; Librarians; Information technology

## Cross-Industry Comparison of Customer Lifetime Value

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The customer lifetime value (CLV) of a customer is a measure that businesses can use to focus their resources on the most important customers. It takes into account multiple factors such as retention, profit margin, customer lifespan and potential growth into one consolidated measure that makes it easier to understand which customers provide the most value. As both the data available and the power of analytical tools grow, more businesses are able to take advantage of CLV predictions. This research paper examines case studies of industries that have implemented CLV, not only illustrating similarities and differences but also assessing the pros and cons of different methods to analyse customer lifetime value.

**Keywords:** Customer Lifetime Value; CLV; Data Mining; Predictive Modelling

## Data Mining Growth in the University Admissions Process

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The college application process is an ever-changing landscape. Many higher education institutions are utilizing machine-learning to help improve their process of screening prospective students. Additionally, many students are using data-mining techniques to influence the college admission process. This case series examines a few institutions, students, and even third parties who utilize predictive analytics in the college admissions process. The discussion explores these in depth and identifies several ethical issues that arise as a result of this process.

**Keywords:** College application process; Data mining techniques; Machine learning; Neural networks; Decision tree; Matriculation; Revenue management techniques; Educational data mining

## **Ambient Surfaces: Encouraging Communication beyond Agile Practices in Co-located Scrum Teams**

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Agile software development (ASD) is commonly used in today's software engineering industry. The agile methods Scrum and Extreme Programming (XP) are most notably adopted in companies. In both co-located and distributed ASD teams, communication (also referred to, e.g., "collaboration", "interaction" and "knowledge sharing") is highly relevant; software developers regularly attend meetings or informal discussions. Our research indicates that almost 40% of employees spend more than one-fifth of their time in informal communication. However, despite the acknowledged importance of communication in ASD, the existing empirical body of knowledge is very limited. Communication particularly beyond agile practices (e.g., daily meetings) in ASD teams has been studied inadequately so far. The literature additionally indicates that Scrum and XP practices are both not offering sufficient communication mechanisms for ASD teams. This research aims at shedding some light on communication processes in co-located ASD teams beyond agile practices.

To this end, the present research utilizes a custom ambient display solution ("Ambient Surfaces") in a long-term single-case study. Ambient displays are known, e.g., to encourage communication. However, the literature lacks in providing examples that (a) utilize these systems as a lens to empirically investigate communication in a longitudinal research endeavour and (b) indicate useful day-to-day adoption scenarios. The research is carried out in a German ASD company. In February 2014, a first Ambient Surface was deployed in a common room, a second one followed in August 2015. There are currently up to 80 people (including management personnel, Scrum Masters, Product Owners and software developers) in the same building, where both Ambient Surfaces are located. In this large-scale ASD environment, multiple Scrum teams are working simultaneously on the company's product for the pharma and biotech industry. Both Ambient Surfaces display information that is available in the company's intranet; however, employees are often not aware of such information.

A Grounded Theory Method (GTM) is being conducted to guide the ongoing study process. GTM is suitable for this research, since there are no existing dominant theories regarding communication beyond agile practices in co-located ASD teams. Different data collection techniques (e.g., questionnaires, observations and Microsoft Kinect cameras) are being utilized. Furthermore, the research is informed by a preliminary literature review prior to the study and a thoroughly conducted systematic literature review as the research progresses.

There are three main contributions: Firstly, it will provide insights on communication processes beyond agile practices in co-located ASD teams. Secondly, the study will produce novel long-term empirical findings regarding the utilization of ambient displays in an industry setting emphasizing communication-related questions. Finally, only few GTM studies have been conducted in the software engineering discipline and particularly mixed-data GTM studies are rare to non-existing. This research will contribute a thoroughly conducted mixed-data GTM study.

The study's results would be valuable for both researchers and practitioners. Researchers would benefit from, e.g., the systematic literature review which summarizes recent research gaps regarding communication in co-located ASD teams. Practitioners would learn about, e.g., which information is relevant in different collaborative settings.

**Keywords:** Agile; Scrum; XP; Communication; Ambient Displays; Grounded Theory Method; Systematic Literature Review



## **Data protection in Nigeria: Addressing the multifarious challenges of a deficient legal regime**

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Personal information or data requires to be protected from abuse by people who have the custody of such data. The rate at which Nigerians are being requested to furnish personal data has increased tremendously in recent years. Different government agencies and corporate bodies are involved in the collection of personal data. Biometric Verification Number (BVN) enrolment is being undertaken by different commercial banks to prevent identity theft and secure banking transactions. Also, the Nigerian Communication Commission (NCC) mandates telecommunications service providers to conduct Subscriber Identification Module (SIM) card registration for all new and existing subscribers. The National Identity Management Commission (NIMC) has the legal authority to issue National Identification cards by virtue of the NIMC Act No. 23 of 2007. At the moment, to a large extent self-regulation prevails on privacy issues apart from some sectoral soft codes. The vital questions that arise are as follows: Is it reasonable to leave this important issue to be subject to self-regulation? How does the legal framework address the challenges of enforcing companies' privacy undertakings about how they collect, use and secure consumers' personal information? Under the European Data Protection Directive and 2016 General Data Protection Regulation, European citizens are assured of a bundle of rights, including the right of access to their data, the right to know where the data originated, the right to have inaccurate data rectified, the right of recourse in the event of unlawful processing, and the right to withhold permission to use their data for direct marketing. Can the same be said of Nigerians?

The aim of the paper will be to critically look at data protection law in Nigeria with a view to comparing the position of the law in Nigeria with another jurisdiction in Africa, South Africa. South Africa is arguably a leading country in data privacy law in the African continent. The paper will also compare the present legal landscape in Nigeria with the European Union standards with respect to data protection as Europe leads the whole world in the enactment of data privacy laws and regulations. Nigeria lags behind in this area as there is dearth of legislation and guidelines to control data-collection bodies and ensure data privacy and protection. There is therefore an urgent need for a legislative intervention in this regard. It is a fact that the Constitution of the Federal Republic of Nigeria, 1999 clearly provides that the privacy of citizens, their homes, correspondence, telephone conversations and telegraphic communications is guaranteed and protected but beyond this constitutional provision there is no machinery for enforcement. The paper will identify the gaps in the current law and make suggestions particularly the need to provide sound policies and legislation governing data protection in Nigeria. The paper will also address some related legal issues. These issues include loss of data, identity theft, e-commerce and privacy and health and privacy. The paper seeks to make some recommendations for the reform of the law.

**Keywords:** data protection; data privacy; legislation; legal reform; Nigeria

