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# An Information Infrastructure for Sustainable IT Procurement: a Suitable Case for Actor-Network Theory?

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## Abstract

*The use of Actor-Network Theory (ANT) is assessed as a means of understanding the context of the information architecture needed to support sustainable procurement practices.*

*The Higher Education (HE) Institutions within the UK public sector have been the subject of central government initiatives to fulfil the UK's international obligations to reduce carbon emissions. This has included measures to introduce sustainability criteria into procurement decisions, which require staff to make decisions informed by the sustainability characteristics of the products available. This could include a wide range of data about the whole supply chain of a product, which could involve many different organisational entities.*

*Previous research, particularly on the evolution of inter-organisational information infrastructures, suggested ANT as a research approach. The particular features of ANT that seemed to be particularly supportive of the understanding of the issues of IT sustainable procurement are presented along with examples of their application to the problem domain.*

**Keywords:** Sustainable procurement, Information infrastructure, Actor-Network Theory

## 1.0 Introduction

The UK government has recognised the threats of global climate change since at least the start of the current century (DETR 2000) with successive governments publishing policy statements and instituting actions to address these issues. While action to tackle climate change has many forms, this paper is focused on our own backyard. It examines action to support sustainable IT procurement within one part of a higher education institution in the UK. This example is used to illustrate and evaluate a research approach based on Actor-Network Theory (ANT).

One aspect of UK government policy is the use of financial incentives to encourage universities to pursue carbon reduction. In 2010, the Higher Education Council for England (HEFCE), which distributes government money to universities, obliged universities to have plans to reduce their carbon emissions (HEFCE 2010). The broader UK government policy, applicable to the public sector as a whole, included the pursuit of sustainable procurement (DEFRA 2006).

The university with which the writers are most familiar responded to the call for carbon reduction by formulating a carbon reduction plan. One element of the plan was a sustainable procurement policy. This included the intention to foster a buying community ‘...*sharing best practice across the organisation via ad-hoc forums and improved procurement matters via a greater utilisation of the university’s intranet*’ (University of Brighton 2011). The writers had an interest in the use of information and communication technologies (ICTs) to support knowledge management and were keen to trial social network analysis (SNA) techniques in relation to sustainable procurement (see Prell 2012 for an overview of SNA). As a response to the developments above, exploratory interviews took place with some key staff responsible for university sustainability policy implementation, and with staff involved in procurement generally. With the latter interviews there was a focus on IT procurement in order to get a coherent view of the processes in one type of product/service before investigating further ones.

This paper describes currently ongoing research. The main focus of this report is a justification for the adoption of a particular theoretical approach to support the work, actor-network theory (ANT), which supplemented and refined our initial ideas about using social network analysis. Section 2 provides some background about the area of the research in sustainable procurement in the public sector. Section 3 outlines some of the issues that emerged to demand attention. There can be a question about which comes first the method or the problem. In the current research, the approach emerged from the nature of the problem area. Any adoption of an approach that has been created by others entails some degree of reconstruction (or ‘customisation’) and Section 4 describes the features of ANT that were attractive to the writers and provides a justification for their adoption. Section 5 explores how ANT concepts can be applied to the HE IT procurement scenario, and Section 6 has the obligatory concluding summary.

## **2.0 Initial exploratory work**

It quickly came to light from a preliminary literature review that there was a broad range of criteria relating to the assessment of sustainability, especially when this was subsumed under a more general concern for ‘ethical procurement’. A priority in current sustainability policy is carbon reduction. Given the threat, linked to increased

carbon dioxide in the atmosphere, of more extreme weather conditions, this seems reasonable. The emphasis on carbon dioxide reduction also has the advantage that it is straightforwardly correlated to lower power consumption, and also that the latter is desirable financially. It is therefore no surprise that carbon reduction was initially the central issue to be identified by HEFCE (2011) and the subsequent university responses. However there are many other possible purchasing criteria (Carter and Jennings 2004; Walker and Brammer 2012). For example, within sustainable procurement five dimensions have been identified: the natural environment, diversity, human rights, philanthropy and employee safety. This range of concerns means the conscientious buyer needs access to a wide range of accurate data. Appropriate ICTs have a role here, but, as will be seen, a stumbling block is that staff in various departments often deal with the acquisition of many different types of products each with its own sustainability characteristics.

In order to explore the issues relating to sustainable procurement in our local HE (higher education) institution the key people to interview appeared to be those concerned with both sustainability and purchasing. The initial perception from the first interviews was that the ‘sustainability community’ and the ‘buying community’ were generally separate with a very small overlap. While the sustainability community could be described as a true network as communication was fostered through central policy steering groups and site-based sustainability action groups, buyers were widely diffused throughout the university – after all, every department buys things – and had little communication with fellow purchasers across the university. Not surprisingly they talked mainly to their neighbours who were usually not procurement specialists. This tentative finding can be confirmed by more rigorous SNA techniques.

A decision was made to focus in the first instance on one area of procurement - IT equipment - to get a more detailed idea of the processes involved, as the foundation for a broader investigation.

### **3.0 Identification of research issues**

This research was originally envisaged as a study of existing systems. As IS (information systems) specialists the writers had some modest aspirations to make proposals for the use of IT to support information searching and decision-making

within 'buying communities'. What became apparent was that the systems needed to support sustainable IT procurement reached beyond a single HE institution and were still in the process of construction. At first, the uncertain and rapidly evolving situation was seen as a frustrating obstacle to a clear understanding of sustainable procurement. However, in the literature Preston et al (1992), who investigated the development of accounting systems in the UK National Health Service (NHS) in the 1980s, made the point that observing what they called the 'fabrication' of a system provided insights into its underlying nature. They found support from Latour (1987) who had written about the dangers of seeing existing organisational arrangements as in some way simply being part of a pre-existing natural order.

The nature of accounting practices described by Preston and his colleagues had parallels with the rather different circumstances of HE IT procurement. The process of procurement decision-making – identifying the most 'sustainable' product or service to buy – could be seen as an accounting practice. Preston et al quote Hopwood (1987 page 22) who writes about '*the particular visibilities created by accounting systems and the means by which they, in turn, shifted perceptions of organisational functioning, mediated the recognition of problems and the options available for their resolution*'. A simple illustration of this is that electricity consumption in an HE institution is often metered for each individual building on a campus. This may not identify the usage of organisational units such as Schools and Faculties which share buildings, and so electricity costs are not made part of School and departmental budgets. Thus teaching schools may have no idea of their energy consumption and no financial incentives to constrain electricity use in, for example, the computer laboratories under their control (Hopkinson & James 2009). The introduction of local metering and the inclusion of energy costs in School budgets would clearly increase visibility of the costs and be more likely to lead to actions to deal with them.

What can broadly be called 'accounting practices' are usually designed to control behaviour. The degree of control may vary in strength from absolute rules (for example, about who can authorise purchases) through incentives and disincentives, various nudge techniques (Thayer and Sunstein 2008) to simple exhortation. This locates accounting within a wider concern about 'institutionalisation'. As Giddens (1984) argued, the evolution of institutional practices requires a reciprocal relationship where individual actions create and reproduce organisational structures

(including practices) and in turn are supported and constrained by them. This means that an institutional process cannot be said truly to exist until it is 'enacted' by actual use. For example, sending everyone on a PRINCE2 project management course is not enough to make the use of PRINCE2 an embedded practice in an organisation. Further management interventions to ensure its actual use may lead to PRINCE2 becoming a part of the structure of an organisation. However, use can lead to the modification of this structure: for example, users of PRINCE2 may in the light of experience, customise the declared procedures PRINCE2 to better meet the needs of their situation.

Giddens' Structuration Theory has been seen as having parallels with ANT and indeed attempts have been made to merge the two models, as in the awkwardly named StructurANTion approach (Brooks et al 2008). While the Giddens approach seemed helpful when examining the evolution of existing organisations, much of the ANT research has had a focus on attempts at the creation systems and institutions, in the first place, usually in the form of some kind of project, which coincides with the writers' key interests.

Much of an organisation's activity consists of interacting with other bodies. In the case of procurement, this obviously includes dealing with the suppliers of goods and services. Managers should also be aware of similar organisations to their own in their sector. In the private sector this means being aware of competitors. Where a competitor appears to be gaining an advantage by adopting novel processes or technologies, its rivals are likely to emulate its practices in an attempt to catch up (Mason et al 1997 who echo principles originally laid down by Schumpeter 1934). In the public sector, local authorities – which are each anchored to a particular locality – may not see each other as competitors, but are still likely to copy what they see as best practice. It also happens that local authorities can co-operate with each other in mutually beneficial ventures.

An internal process may therefore be part of an external network of information exchanges. Such networks are facilitated by the existence of the elements of an information architecture (Hanseth and Montiero 1997) that are enabled by appropriate technologies – these days almost invariably mediated by the internet – and by shared expectations about the content and format of the information exchanges. These expectations often lead to the growth in the standardisation of practices. However, the technological infrastructure and standardisation may only emerge over

time and after much controversy and negotiation and many false starts, as Hanseath and Montiero (1997) illustrate in their classic study of the development of standards for electronic communications between different entities (such as hospitals, general practitioners and pharmacies) involved in healthcare in Norway.

In the case of the current research, the interest in information architecture was motivated by a need to find out what actors were involved in sustainable procurement, and what elements of an information architecture were already in place to support public sector sustainable procurement, and what elements were still required. This was intertwined with the question about how such an infrastructure evolved over time in response to both competitive and collaborative influences from various stakeholders.

Both Hanseath and Montiero (1997) and Preston et al (1992) used an analytical approach based on Actor-Network Theory (ANT), and initially, a pressing question was how appropriate such an approach would be in our own research. The next Section examines ANT from this point of view.

#### **4.0 Development of Actor-Network Theory as a research framework**

While the use of a quantitative SNA approach was seen as a final goal in terms of data collection and analysis, it was of limited use during the exploratory stages. A more interpretive method was sought and given the researchers' general interest in social networks, - as explained above - Actor-Network Theory (ANT) looked promising as a research framework.

It is arguable whether ANT really is a theory. Monteiro (2001) – who provides one of the clearest explanations of ANT – suggests that it '*offers an illuminating vocabulary to describe information infrastructures*' (page 71). ANT can be applied to many other contexts than information infrastructures, Monteiro's particular concern, but the concept of information infrastructures as actor-networks as described by Hanseath and Montiero provided a way of identifying the roles in sustainable procurement.

ANT stems from the sociology of science and technology and attempts to analyse and represent the interplay among three elements: social and technological factors and the features of the natural world (see, for example, Law 1987). It

visualises the processes of development as involving networks of actors. The view of the network will depend on where the main object of interest is located, but in the early years of ANT, the focus tended to be on a actor who was seen as a 'system builder' (echoing Hughes 1987) trying to carry out some undertaking, for example to develop a new product like an airplane (see Law and Callon 1992). This 'central' actor creates relationships with other actors in order to achieve success. Some actors will provide resources while others will try to constrain the system builder. For example, an entrepreneur may be empowered by backers who provide money, retailers who supply sales outlets and lawyers who ensure legal protection for intellectual property. Each of these actors, once enrolled in the systems builder's network will - in relation to the enterprise - act in their own sphere as a representative of the systems builder. The original actor is 'translated' by them into their local sphere. Each of these actors themselves will comprise a network: for, example, a lawyer can deploy the resources of a legal system, for example.

An important insight of ANT is that the neighbouring actors that empower and constrain a particular actor are not just people and organisations, but could be technical artefacts. For example, a price comparison website could be used by a purchaser to select a product. The information supplied by the website (which may well be incomplete or out of date) could have a decisive influence on the actor's purchasing behaviour. Actors or 'actants' (which is a term that some prefer as the word 'actor' is assumed by most people to refer to humans only) can even be naturally occurring phenomena such as the weather or sea currents (as in Law 1987, Callon, 1986).

With the university sustainable IT procurement scenario, a network of human actors could be clearly discerned. There were budget holders who approved expenditure, staff requesting IT equipment, a committee to recommend purchasing priorities, technical advisers, inter-university purchasing consortia, suppliers and manufacturers and many more. Non-human actors included the computer system used to place orders which restricted the placement of orders to approved products and suppliers. The IT equipment to be purchased was itself was an actor. Just as a human actor who is a sales representative can be interrogated, so a potential purchase can be interrogated by practical trials.

In this scenario the network can be extended outwards almost indefinitely. Suppliers will have their own supply chains. Government bodies will issue legislation

governing many aspects of manufacture and sourcing. Independent bodies of varying trustworthiness will claim to certify sustainable practices and products. Actors in the network cope with such complexities with simplification strategies. In our scenario, interviewees tended to declare sympathy for the concept of green IT, but then wanted to delegate responsibility for identifying green purchases to the experts in the central university IT service. In ANT terms, this was treating sustainability decision-making as a 'black box' that was the responsibility of others.

An attraction of ANT in relation to the study of socio-technical systems is that it addresses some difficulties in describing the interaction between the social and technical elements of a system. Social and cultural effects are often described in terms of influences. For example, Walsham and Sahay (1999) in their study of geographical information systems (GIS) in rural Indian local government identified some local cultural barriers to the adoption of GIS in India. Technologies, on the other hand, tend to be concrete and specific. ANT analysis is concerned with the specific actions of influential actors that affect the focal actor in the network under study and tries to treat the behaviour of human and non-human actors as far as possible on equal terms. The actors can empower or constrain to greater or lesser extent, but the ANT principle is not to assume automatically that the human actor will always be dominant. For example, a human user of an IT system might want the software functionality of a system to be extended. A software developer could be assigned to implement the change and find that the change would be impossible to implement cost-effectively because of the nature of the existing code. These problems may be because of design decisions taken when the system was first created. In reporting this back to the user, the developer is effectively acting as a spokesperson for the software which has resisted a change desired by a human actor.

There has been some resistance to this model on the grounds that it reduces the status of humans to that of just another object (e.g. Pels 1995). Defenders of ANT would argue that the status of humans is not denied, but is temporarily neutralised during the analysis of a context aimed at establishing its features and relationships. A parallel can be seen in the design of information systems where entity relationship diagrams (ERDs) are created to capture the details of the entities about which data is to be held. At this point human and non-human entities are not distinguished. At a later stage human entities would however have to be considered separately, if only because of their rights in relation to data protection.

A perhaps more telling reservation is that not all contextual influences can be mapped easily to individual interactions between actors. For example, statistical analysis might show that while no specific policies or activities can be detected that are designed to exclude certain groups of people –for example, women – from particular roles, in fact there are very few. ANT may need to be supplemented by research methods.

For those interested in the behaviour of projects, ANT has much to offer. Much of the early work in ANT examined the ways that actors were mobilised into the collective endeavours of a project. Usually a focal actor – who above, following Hughes (1989), we have referred to as a ‘system builder’ – attempted to create a network of actors who provided resources to progress the project. As Hughes states (Page 51):

*‘One of prime characteristics of the system builder is the ability to construct or force unity from diversity, centralization in the face of pluralism, coherence for chaos’.*

Callon (1986) identified four phases of action required for this:

1) Problematisation: the aspiring system builder offers a proposal for action by identifying a problem to be resolved or an opportunity to be exploited. A key aspect of the proposal is that it can be represented as producing a benefit for a significant number of other actors. The system builder would also want to establish herself as indispensable to the success of the project, that is, in ANT terms, an ‘obligatory passage point’, a central actor coordinating and controlling the project.

2) Promotion. The French word *‘interressement’* has been adopted for this. The conventional dictionary meaning of this word, ‘profit-sharing scheme’, gives a good idea of what this is concerned with. It is the process of recruiting actors into the roles that are needed to progress the project by identifying shared interests that would unite disparate actors in implementing the proposal. This is not unlike the Theory W of Boehm and Ross (1989):

*Theory W's fundamental principle holds that software project managers will be fully successful if and only if they make winners of all the other participants in the software process: superiors, subordinates, customers, users, maintainers, etc. Theory W characterizes a manager's primary role as a negotiator between his various constituencies, and a packager of project solutions with win conditions for all parties.*

(Abstract)

3) Enrolment. The various actors needed to progress the project commit themselves to various roles within the project.

4) Mobilisation. The project gets under way, and the system builder needs to maintain the commitment of all the actors. The project outcomes and the network itself may need to evolve to maintain the project. Latour's (1996) book about the failed Aramis project to develop Personal Rapid Transit technology illustrates how projects only really die when there is no longer an actor-network to support it. There is a very large body of literature on project failure, which is characterised by the large range of factors identified as possible causes of failure. ANT may be able to not only provide a unifying model of project initiation, but also of project failure.

An 'actor' whose engagement the system builder needs in order to promote their project might in fact be a large group. For example, a project to build a housing estate could need the acquiescence of the community in the neighbourhood of the development. Not all the members of the community can be communicated with effectively on a one-to-one basis, but the system builder could engage with someone or something that can be seen as representing the community, for example, the local authority. A concern during mobilisation is that the representative and the actors they represent remain aligned.

The system builder's preoccupation is with stabilising this network of actors. Most projects will produce objects, often documents such as contracts, specification and designs that seek to constrain and direct the future activities of the collective. In ANT terminology, these are called 'inscriptions'. As well as documents, the inscription could be in the form of, say, software products that prescribe that users act in a certain way or other, physical, tools that enforce a particular mode of operation. This model can be compared to that of the waterfall approach in IT development projects where there is a sequence of phases – for example, requirements, analysis, design, build, test – where each phase produces products, mainly in the form of documents, which are used by the phase that follows. Each of these intermediate documents becomes more detailed.

The blurring of the difference between human and non-human highlights the movable nature of the boundary between what human and non-human actants are responsible for in a system, that is, the variation in the degree of possible system automation. Once, again, IS/IT practitioners may see similarities between this and the

practice of presenting several technical options to stakeholders, which vary in the degree to which user functions are taken over by the IT system.

Stabilised projects tend to demonstrate a degree of relative irreversibility. As they proceed, requirements, design and implementation processes become more detailed and well-defined, but there is also an increasing reduction in the opportunities for changing the form of the projected new system being developed. This is most obviously seen in projects that create physical things like tunnels, bridges and tower blocks. The system builder is effectively working to increase this irreversibility.

A feature of conventional systems theory is the nested structure of systems which can be decomposed recursively into component subsystems and sub-subsystems. Each actant will be channelling or representing the interests and competencies of other actants with which it has relations. The ANT term for this is 'translation'. A gas-fitter who comes to service your boiler is not just an individual but also translates British Gas into your home. (For that matter, your gas boiler could also be seen as a translation of British Gas into your home). He or she will, among other things, be translating the intentions of the original creators of your gas boiler: the way the fitter carries out the maintenance will be dictated partly by the technical nature of the boiler. They will also be translating the government body which has laid down safety standards for gas appliances, and one could identify many other actants that influence the fitter's behaviour. In this sense the actors themselves are networks. A tenet of ANT is that the ideal is to make the perception of a scenario as 'flat' as possible, that is, to avoid if possible an appeal to abstract concepts such as 'statutory compliance' and to look instead at the practical way in which legislators arrive at laws and regulations, and the way government actors enforce their compliance. An excellent example of this is Bonner (2013) which looked at the way the practice in the Canadian province of Alberta of selling the personal details of motorists to commercial organisations had become established as acceptable, despite it clearly breaching commonly accepted privacy rights. Clearly, this broad approach to boundary setting could lead to researchers being overwhelmed with information. A sometimes arbitrary boundary has to be drawn around a situation of interest for purely practical reasons. Thus more abstract entities have to be accepted at the boundaries of systems, the key ANT proviso being that the actors themselves use the same summarising concepts, as when they refer to 'compliance issues' or 'the market'.

These summarising concepts are just one mechanism used to simplify the human actor's perceptions of the world. The use of representatives has already been referred to in the example of a local authority official being treated as a representative of a local community. A representative could also be seen as a spokesperson for non-human actants, for example a marine biologist acting as the representative of the sea-life in a particular coastal area (Callon 1986).

In IT and software development, a 'black-box' is an artefact where the external features are known, namely the inputs and outputs, but not the internal workings. (Interestingly, Winner (1993), a philosopher, follows this tight definition of black-box). However, descriptions of ANT concepts often stress the fixed nature of black-boxes. From the point of view of the technologist, black-boxes have internal mechanisms that can change, as long as these changes are out of sight of the users. However, it is possible to go further and say that the external behaviour of the black-box, the exact inputs and outputs, could themselves be a matter of indifference to the external user. To take an non-IT example, in the United Kingdom there is a legal requirement that cars over a certain age have to have an annual safety test to be allowed to remain on the road. For the vehicle owner the test can be treated as a black box. From one year to the next the equipment used to conduct the test might change. Moreover, the safety requirements themselves might change, so a vehicle in a certain condition might pass in one year but not the next. Here the output from the black-box has changed. However, from the point of view of the non-expert owner, the key outputs would be the pass/fail judgement and in the case of failure the cost/time needed to correct the failings. The nature of the black-box is maintained despite these changes.

The black box is just a metaphor, and so one does not perhaps need to worry too much about its precise meaning. A key point of the black-box metaphor is that it represents the way in which an entity can be submerged into the fabric of daily life – a symptom of institutionalisation – and be taken for granted. However, sometimes these embedded entities make their presence felt (Latour 2005, pp 79-82). The nature of artefacts can be very apparent as they are assembled. Those learning the use of the new technologies will also be aware of the sometimes unexpected behaviour of new tools, for example, where what one thinks is a private transaction is published to the world. The most dramatic reappearance of embedded technology is when a trusted technology breaks down.

## 5.0 An ANT analysis of sustainable IT procurement

This section explores how ANT concepts can be applied to the circumstances of IT procurement within a UK HE institution.

As was noted in the introduction, in 2010, HEFCE obliged universities in England to produce plans to reduce their carbon emissions (HEFCE 2010). HEFCE can be seen as translating the requirements of the central UK government and effectively acting as an agent on its behalf. The need to produce carbon reduction plans was reinforced by linking them to the capital grants to universities. The University of Brighton responded to this with the drafting of a carbon management plan, which included provision for actions to promote sustainable procurement (Dombey 2011). The focus of this document was carbon reduction, in order to meet the requirements laid down by HEFCE. This involved very precise targets, ‘translated’ from the HEFCE document. Given much of the technical content, the report was produced in partnership with the Carbon Trust and this can be seen as ‘translating’ that body’s view of the issues and steps needed to address them. While this document was primarily designed for consumption by HEFCE, it also had a role in engaging support for the programme within the university. In the Callon categorisation of the phases of network mobilisation, this document can be seen as undertaking ‘problematisation’, that is presenting a problem and then a solution and also initiating the process of promotion (or ‘interessement’) and enrolment.

Beside the rather precise targets for carbon reduction, sustainability was defined as ‘...responding to the imperative and obligations of sustainability, financially, environmentally and educationally’. This definition does not directly define sustainability, but refers to obligations. This can be interpreted to mean that the focus will be on compliance with current standards and requirements set by external authorities. The precise definition is thus devolved to outside actors.

This document can also be seen as ‘inscribing’ a set of actions to be carried out and thus attempting to shape the future direction of the activities of the actors involved. One section related to sustainable procurement measures, and the plan was supplemented by a further document dedicated to procurement issues (University of Brighton 2011) which translated this part of the plan into further more extended detail. Apart from the overall plan, other authoritative artefacts that constrained

freedom of action were noted in this second report: EU procurement regulations, the Equality Act and the Health and Safety at Work Act.

The strategy document identified four themes or sets of activities: governance, policy, process and delivery. A proposed development, not in the original plan, was the creation of a '*buying mentality*' which was described as a '*cultural shift way from transactional purchasing i.e. looking solely at fitness for purpose and purchase price*' to consider other possible issues such as sustainability, whole life costing, and supplier management. This cultural shift was to be implemented in part by the fostering of a 'buyers' community' which would share good practice via improved communications including the use of the university intranet ('staffcentral'). In ANT terms, the aim here can be seen as enrolling and mobilising staff into a joint venture. A similar desire to engage actors can be seen in the declared intention to engage with suppliers via the university website and a local business forum.

A focal actor or 'system builder' can be identified in the Procurement Services Division within the Finance Department. Others who were listed as needing to be engaged included members of the Board of Governors and members of the Audit Committee, as well as :

*...all university staff, but in particular deans, heads of department, procurement specialists and those responsible for purchasing on behalf of the University. All suppliers, contractors, partners, social enterprises and voluntary sector providers need to be guided by the strategy so that they know what is expected of them and how they will be supported and be able to remain valuable suppliers.*

Bonner (2013) follows Callon (1991) in cautioning against 'presentism', that is, not taking account of the fact that the current situation is largely a development of a history of past events and activities. A danger is to insert artificial time divides which, for example, might suggest a new technology created major overnight changes, when in fact its changes were incremental ones that simply took forward existing trends. So how does the current procurement system work? For the purposes of this paper, one specific area of procurement is examined, the procurement of items of IT equipment by teaching Schools.

The declared model of procurement in the university is as centralised processes under the control of the Finance Department, but with devolved budgets. To take the example of the School of Computing, Engineering and Mathematics (CEM),

a School resources committee, comprising representatives of the subject disciplines within the School, advises on the priorities for the spending on the capital items. Given the nature of the School, these items are mainly IT equipment, but can include other items of technical equipment. Any individual can submit a proposal of purchases. The resources group prioritises the bids and makes recommendations to the Head of School for purchases. The Head of School as the budget holder is the obligatory point of passage for purchases.

Purchases of IT items have to go through a second obligatory point of passage, the central Information Services Department. By going through this department, CEM or any other School, have effectively invoked a black-box to which they have delegated the responsibility for complying with EU Procurement Regulations and also responsibility for meeting sustainability criteria. The EU purchasing procedure requirements that constrain Information Services are namely Directive 2004/18C which has been implemented into national law in the UK by the Public Contracts Regulations 2006, later amended by the Public Contracts (Amendment) Regulations in 2009. The purpose of these rules is to open up markets and promote freedom of movement of goods and services within the EU. They attempt to ensure that all potential suppliers within the EU get equal treatment. They do not require the lowest bid to be accepted. 'Value for money' is the key criterion which is defined as *'securing the best mix of quality and effectiveness for the least outlay over the period of use of the goods and services bought'*. This allows scope for due consideration of sustainability criteria (DEFRA 2011)

The Information Services Department in this organisation makes purchases through a consortium of HE institutions, the Southern Universities Purchasing Consortium (SUPC). One motivation for the use of the SUPC is to take advantage of the consortium's purchasing power to negotiate favourable prices with suppliers. It is also an easy way to ensure that EU procurement requirements are met. Just as CEM delegated responsibility for statutory compliance to Information Services, so Information Services invoke the SUPC and transfer to them the responsibility for EU compliance and for adherence to sustainable criteria.

Hopkinson and James (2009) show how sustainability might be assessed by a consortium. The North-Eastern Purchasing Consortium's (NEPC) agreement on audio visual equipment, required supplier's to complete an environmental questionnaire that accounted for 5-10% of the scoring system used to assess bids. It is not clear how

much impact this would have had in practice on the outcome of the product selection process.

A consortium will use its member institutions to carry out tests and other evaluation activities to assess products and services, so it will not be a completely opaque box to its membership.

There is further scope for delegation to further black boxes in that a product selection analysis could make use of specialist accreditation schemes. For example, the UK government has published a list of ‘Quick Win’ standards to help assess the sustainability characteristics of some IT devices. A ‘Quick Win’ standard is a checklist of requirements. There is basic minimum set of requirements which in the case of desktop computers includes *‘Spare parts are available after the end of production for 5 years’*. These mandatory requirements are supplemented by additional criteria that procurement officers might wish to consider. They might use these where there are several suppliers who meet the minimum requirements as a way of making a final choice. Quick Win assessments of products are placed on a DEFRA database, so that other procurement officers do not have to repeat the assessment themselves.

The Quick Win assessment criteria for desktop computers cross-refer to yet another standard, Energy Star, which certifies the power consumption of products – yet another level of black-boxing. Other relevant certification schemes in the European Community area are the ECMA Eco-Declaration, which again covers energy consumption but also other environmental issues, and EPEAT which was originally developed in the United States, but is now international.

In ANT terms these accreditation bodies can be seen as intermediaries which represent potential purchasers to the suppliers, and potential suppliers to the purchasers.

## **6.0 Concluding remarks**

Two sets of observations will be offered. One set relates to the nature of sustainability, and the other to the use of ANT as an analysis tool.

Sustainable procurement seems in a state of flux at present (January 2014) with the existence of competing methods of assessment. An underlying issue is the choice and weighting of selection criteria. It is also unclear, in many cases, what the impact of a purchase decision is in terms of its impact on global outcomes. For

example, does replacing a car with another which is more carbon efficient actually reduce the carbon creation if you take account of the carbon produced during the creation of the new car, and that created by the disposal of the old one? Is it better for the old one to be scrapped or for someone else to use it?

Those human actors who are willing to take account of green concerns are continually making decisions that balance the personal worth of using a product or service relative to the resources it consumes and its impact on the environment. For example, when a decision is made to use a vehicle is used for a journey, an often unthinking judgement is made about the value of the car trip to the individual versus its damage to the environment. Inevitably, in most cases personal convenience wins out.

Personal qualms can be placated by passing the environmental responsibility to manufacturers of the car who are expected to meet certain environmental standards. Unpopular as it may be, greater emphasis on reducing consumption may be more effective than improving environmental value for money. The limited amount of research that we have conducted has found little evidence of demand reduction in the area of sustainable procurement.

With regard to ANT, we found its advantages to be:

- The attention paid to the practical steps by which actors seek to influence one each other and work together when necessary delivered more meaningful insights than appeals to more theoretical cultural influences
- Following the chains of translation meant delving into the context of a situation and obtaining a better understanding of it. For example, rather than just talking of 'compliance', the way the government policy being enforced was formulated and promulgated, and how an organisation reacts to it provided a more comprehensive explanation of causality
- The integration of the analysis of technical, human and environmental activities provided a description of the processes that seemed a truer reflection of what actually happens in daily life.
- A truer picture of a system is obtained by looking at it historically, that is, by seeing how it has evolved over time, rather than a taking a snapshot frozen at a particular point in time.

Many research designs – both quantitative and qualitative – focus on too narrow a unit of interest. Incredibly accurate data about a small subset of the factors involved in a situation may appear to be scientifically valid, but may be of little practical use.

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