Management Control Systems in Enabling University Research Performance

Abstract

The purpose of this study is to investigate how management control systems (MCS) are used to enable university research performance at the operating level. At the sector level, institutionally framed research within New Public Management literature has observed the more uniform use of "managerialist" and programmed approaches to university research management. However, empirical contingent studies within the private sector Research and Development setting have substantiated how such approaches are ineffective in enabling operating level research performance. Drawing on both literatures, as well as wider MCS package research, this paper uses an exploratory case study to examine two high performing faculties with contrasting research characteristics. From these micro-level accounts, the paper develops a conceptual model demonstrating how a combination of institutional and technical factors contributes to the use of MCS. A similar complementary package of socio-ideological, administrative and incentive controls is used to satisfy the diverging managerial and collegial institutional interests within each operating unit. However, managers tailor the use of these categories of controls to suit their respective particular research cultures and contexts in order to enable university research performance.

1. Introduction

The core research question which this paper aims to address is: how are management control systems (MCS) used to enable university research performance? Inherent within this question are several issues which will be investigated: how is the notion of research performance perceived and constructed; what kinds of management systems are used to manage research outcomes; what factors influence the existence of these systems; and to what extent do these systems affect research performance?

The use of more managerialist approaches to university research management has been observed within the New Public Management[1] (NPM) literature (Anderson 2006; Coy & Pratt 1998; Gray, Guthrie & Parker 2002; Lapsley & Miller 2004; Modell 2003, 2005; Neumann & Guthrie 2002; Parker, Guthrie & Gray 1998; Willmott 1995). This managerialist approach is characterised by the use more formal and programmed controls, typical of private sector management models (Hood 1995; Jones, Guthrie & Steane 2001). For instance, researchers have observed an increased use of professionalised management, greater emphasis on measurable outputs, the linkage of indicators to fund allocation and an overall focus on cost economies and effectiveness (Anderson 2006; Neumann & Guthrie 2002; Parker, Guthrie & Gray 1998; Salavananuthu & Tinker 2002; Gray, Guthrie & Parker 2002). However, evidence from empirical studies regarding the management of research and development (R&D) within the private sector, suggests that formal and programmed MCS mechanisms are largely ineffective in managing the 'ambiguousness' of research (Abernethy & Brownell 1997; Bisbe & Otley 2004; Davilla 2000; Ditillo 2004). Furthermore, these studies also find that across different R&D settings, with contrasting research characteristics, alternate MCS mechanisms have varying degrees of suitability in managing research outcomes. This too seems at odds with the uniform, one-size-fits-all application of university research management practices observed by NPM researchers (MacGregor et al. 2006).

These apparent incongruities between the evidence from private sector R&D contingent studies and practices observed in NPM could be the result of several limitations of earlier papers within both these streams. For instance, both have applied rather dated perspectives of MCS, in which social-based and programmed controls are posited as substitutes. By merely examining individual control components in isolation or as alternatives, these studies have failed to recognise the potential complementary and interactive nature of different control mechanisms (Abernethy & Chua 1996; Alvesson & Karreman 2004; Macintosh & Daft 1987; Simons 1995). Thus they have created the risk of "serious model underspecification" (Chenhall 2003, p. 131).

In addition, due to differences in the predominant focus of the theoretical frameworks underpinning each of the two streams, each offers only partial explanations of MCS use. Although the R&D studies offer insight into technical factors, such as the impact of contrasting research task characteristics (Abernethy & Brownell 1997; Ditillo 2004), by virtue of the contingency frameworks applied, there is a limited awareness of the influence the

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wider environment in which these systems exist (cf. Abernethy & Chua 1996). On the other hand, this is the focus of studies from the NPM stream, which have examined the university sector by employing institutional frameworks attributing organisational change to wider political, social and economic pressures (Coy & Pratt 1998; Deem 2004; Gray, Guthrie & Parker 2002; Lapsley & Miller 2004; Modell 2003, 2005; Neumann & Guthrie 2002; Parker, Guthrie & Gray 1998; Willmott 1995). In particular, several studies attribute the "managerialist" transformation of the university sector to government expectations "to adopt increasingly corporatized structures and processes, strategic management practices and accountability mechanisms" (Parker, Guthrie & Gray 1998, p. 391). However, most of the NPM studies have focused on changes occurring to the management approaches at broad university sector-wide level, and therefore provide little insight into how this context translates to specific MCS use at the operational level (Juniper 2002; Modell 2003, 2005).

Therefore, by conducting an exploratory comparative case study of two high performing faculties, informed by notions from R&D, NPM and the wider MCS literature, this study aims to contribute to a more comprehensive understanding of how MCS is used to enable university research performance. By using contingent and institutional theories in tandem, the study is able to supplement the weaknesses of each with the strengths of the other. In this sense, the study will investigate how conceptions of research performance and management can be shaped by both the expectations from the university institutional context and the strategic considerations of local research contexts in order to deliver optimal research outcomes at the operational level. Furthermore, by adopting a more holistic MCS 'package' perspective, the study intends to extend upon both theories by exploring how informal and formal controls, as given preference respectively by collegial and managerial interests, are not necessarily divergent substitutes, but can possibly coexist as integrative and complementary management mechanisms. In addition, from this wider MCS literature the study will consider the role of incentive and administrative structures as control mechanisms, and the influence of other aspects from the research context besides the task characteristics of research, in order to develop a more extensive model of research management. In turn, this exploratory research aims to contribute back to wider MCS literature by providing insight into how and why 'packages' of MCS are used. Finally, in extending upon the contributing literatures, it is intended that these micro-level implications are also relevant to policy-makers and university administrators charged with research management alike.

The following section outlines the key concepts from the prior literature that will structure this study, including the use of MCS in relation to research, and the key aspects from contingent and institutional frameworks that give insight into the existence of different management systems and the relation to research performance. Following from this review, the comparative case-study research design is described. In the subsequent section, the results from the empirical analysis of the case are presented, from which the key findings regarding the existence and use of MCS in enabling research performance are discussed. Finally to conclude implications for future research are examined.

2. Prior Literature

MCS and research management
Within the prior literatures, researchers have investigated the use of several types of MCS in relation to research activities. In the R&D, NPM and wider MCS literatures the contrast between more programmed cybernetic[2] or administrative controls and more organic socio-ideological controls has been a focal point. By adopting an alternative choice perspective, this prior research has shown preference to the use of social-based controls to manage the ambiguousness of 'research'.

The collective findings of the R&D studies indicate that cybernetic controls are only effective when research is 'routine' (Abernethy & Brownell 1997) or merely 'technically' complex[3] (Ditillo 2004). In comparison, empirical evidence suggests that accounting and non-financial measures are ineffective at best, and detrimental at worst when used to manage research characterized by high task uncertainty, (Abernethy & Brownell 1997), cognitional complexity (Ditillo 2004), or technological uncertainty (Davilla 2000). In addition, contrary to the predictions of Simons (1995), who proposes that beyond the type of control, the style of use of MCS is crucial

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[2] Refer to appendix for a description of each of these MCS categories.
[3] Ditillo(2004) distinguishes between computational, technical and cognitional complexity.

to facilitating innovation[4], Bisbe & Otley (2005) substantiate that in highly innovative firms even interactive use of budgets, balance scorecards and project management systems appears to hamper innovation.

These findings are consistent with other MCS research which suggests that the characteristics of individuals conducting research are incompatible with the use of cybernetic controls. Mintzberg (1979) warns of the adverse consequences of subjecting professionals, such as academics or researchers, to standardised output controls. This incompatibility exists because academics or researchers are trained and socialised to act autonomously. As Abernethy & Stoelwinder (1995) explain:

> *"the type of control environment which individuals with a high professional orientation find most offensive is one dominated by output forms of control, that is, an environment where superiors impose targets to be achieved and measure performance based on those targets." (p.13)*

However, across numerous jurisdictions, such as Australia, Britain, Europe, New Zealand and the United States, NPM research has documented the *increasing* use of performance measurement systems at the university sector level (Anderson 2006; Coy & Pratt 1998; Deem 2004; Gray, Guthrie & Parker 2002; Lapsley & Miller 2004; Modell 2003, 2005; Neumann & Guthrie 2002; Parker, Guthrie & Gray 1998; Slaughter & Leslie 1997; Willmott 1995). Universities are increasingly measured, compared, evaluated and rewarded by central funding bodies in accordance to their performance across metrics such as research publications, grant income and research student completions (Modell 2003; Neumann & Guthrie 2002; Parker, Guthrie & Gray 1998). What remains is to explore whether similar measurement and formal evaluation is used to assess individuals at the operational level.

A similar tension exists regarding administrative controls[5], whose standardised, programmed and ex ante nature has been found unsuitable to managing R&D activities. In fact, Abernethy & Brownell (1997) found that: *"behavior controls [policies and procedures] appear to contribute positively to performance in **no situation**, and contribute negatively when task uncertainty is highest"* (p.245, emphasis added). Within the wider MCS literature, several studies have also emphasised the significance of organisation design and governance structures as controls (Abernethy & Chua 1996; Alvesson & Karreman 2004). For example, Abernethy and Lillis (2001) argue that *"the pursuit of innovation as a strategic priority has implications for the type of structural arrangements needed to facilitate innovative and creative activity" (p.110)*. However, where discussed in MCS relating specifically to R&D, organisation structure has been treated as a contingent factor that influences the design of MCS rather than an element itself (Davila 2000). Empirically examining these mechanisms is perhaps even more pertinent within the university research context, where structural changes have been highlighted as another key feature of the managerialist approach. For instance, in describing the increase in the professional administration, Anderson (2006) perceives *"the potential for intensification of control inherent in these new managerial regimes, surpassing that available within the traditional bureaucratic structures and processes" (p.579.)*

Early management theorists identified how the ambiguity of the research processes (Ouchi 1979), and the autonomy expected by researchers (Mintzberg 1979) would render "rational" market or bureaucratic forms of control ineffective, necessitating the use of more informal social controls. In support, the empirical R&D studies have evidenced the effectiveness of socio-ideological controls[6] in managing the success of R&D activities characterised by a high level of task uncertainty (Abernethy & Brownell 1997) or 'cognitional complexity' (Ditillo, 2004). Furthermore, the selection and socialisation of academics to instil values which motivate them to research for the sake of research itself – the fundamental work motives – is viewed by several in the NPM stream as a crucial driver of research performance (Anderson 2006; McInnis 2000).

However, this relation between performance and socio-ideological controls may not be as simple as hypothesised; there could be considerable interaction between social and other more technocratic controls (Alvesson & Karreman 2004). For example, Pratt, Margaritis & Coy (1999) observed how the use administrative controls, such as strategic planning, meetings, the development of policies, standardised reporting policies, a new-purpose built building and a decentralised management structure assisted in the transformation

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[4] Simons (1995) delineates between diagnostic and interactive use of formal controls, arguing that interactive use of MCS, by means of providing open communication between managers and subordinates, should facilitate innovation.

[5] Also referred to as behavioural controls (Abernethy & Brownell 1997; Abernethy & Stoelwinder 1995; Rockness & Shields 1988) or bureaucratic controls (Alvesson & Karreman 2004)

[6] Also referred to as professional control, and personnel control

of the research culture in the School of Management, University of Waikato. They also observed how this cultural change was enabled by use of various rewards schemes which, similar to the university sector level funding schemes, were tied to research output measures. Despite its wide coverage in MCS literature (Alvesson & Karreman 2004; Simons 1995) the use of incentives as a category of control as yet has not been empirically tested in relation to operational level research performance.

Therefore, this study will attempt to extend the research of earlier empirical studies by exploring the use of a more extensive array of mechanisms, including socio-ideological, administrative, cybernetic and incentive controls. Furthermore, rather than using the substitute choice perspective, a more sophisticated complementary package style approach to MCS will be adopted with the intention of capturing the potential interdependencies between MCS mechanisms.

Institutional and contingent factors on MCS use and research performance
As argued earlier, by informing the analysis with notions from both R&D and NPM streams, this study intends to provide a more comprehensive explanation of why and how MCS is used in universities to enable research performance. As the two streams are based upon contrasting theoretical frameworks, they each provide different insights into the determinants of MCS use and the relation to research performance.

The empirical R&D studies are predominantly based upon a contingent theoretical framework, which is premised upon the notion that individuals will design control systems to match the organisational context. The better the match, or the "fit", the more effectively the organisation will perform (Merchant & Simons 1986; Abernethy & Stoelwinder 1991). The key contingent variable which the R&D studies have investigated is the characteristics of the research tasks. Therefore, as per the contingent frame, variation in this factor, or others not yet identified by the prior literature, will be reflected in differences in the design of each of the research units' control mix (Fisher 1995; Otley 1980).

Underpinning these models is an assumption of "administrative rationality" (Argyris 1973), in which management is expected to rationally select controls that will maximise the ability to achieve desirable organisational outcomes. Institutional theorists on the other hand, argue that these 'rational actor' models tend to oversimplify the political and social nature of organisations, as well as the decision making processes of the individuals within them (Powell & Dimaggio, 1991). They overlook the influence of institutional contexts in transforming 'choices' into 'taken-for-granted expectations' where "actors associate certain actors with certain situations by rules of appropriateness" (March & Olsen, 1984, p741). This is of particular significance within the public sector context given the pronounced political nature of organisations such as universities and the extensive involvement of external constituents (Brignall & Modell 2000).

The key tenet of the institutional framework which underlies much of the NPM literature is that an organisation's survival requires it as much to accommodate institutional expectations and conform to societal norms of acceptable practice, as to achieve high levels of technical performance (Covaleski & Dirsmith 1988; Greenwood & Hinings 1996; Meyer & Rowan 1977; Powell & Dimaggio 1991; Scott 1987). In this sense, the MCS observed within an organisation potentially does not represent the most optimal choice; but rather, a means to establish and maintain legitimacy with influential external constituents. While historically the most influential group within university has been the professional academic groups, as the availability of public research funds has decreased, universities have become more dependent on the government funding bodies (MacGregor et al. 2006). Therefore, most NPM research directly attributes the transformations to the sector level university research management practices to changes to governments' policies over the past two decades (Anderson 2006; Gray, Guthrie & Parker 2002; Lapsley & Miller 2004; MacGregor et al. 2006; Modell 2003; Neumann & Guthrie 2002; Parker, Guthrie & Gray 1998; Salavananuthu & Tinker 2002; Slaughter & Leslie 1997; Willmott 1995).

However, the translation of these sector level practices to operating level MCS could be constrained by another key concept proposed by institutional theory – loose coupling. This concept, which originally was theorized using an educational organization example (Weick 1976), refers to a dialectic in which elements are somewhat linked and interdependent, exhibiting some degree of determinacy, but simultaneously can also be subject to spontaneous changes, maintaining their distinctive and independent identities (Orton & Weick, 1990). For example, in circumstances where incompatibilities exist between the expectations of an organizations institutional environment and its technical requirements, organisations will buffer, loosely couple or de-couple the external 'symbolic' images of control systems with the actual underlying operating systems (Abernethy & Chua 1996; Brignall & Modell 2000; Meyer & Rowan 1977). Therefore, while the federal funding bodies may pressure universities to implement more formalised MCS mechanisms, such as detailed resource allocations and

publication output measures, these displays may be loosely coupled from the operating level MCS and only symbolic.

Both literatures also diverge in the way the notion of research performance is addressed. As optimality is often assumed within contingency theory (Mak 1989), the concept of research performance has not been a focal point of the R&D studies. For instance, Ditillo (2004) assumes the control mix he witnesses within different project teams is effective. Also, although Abernethy & Brownell (1997) include a performance criterion variable, where they include unit manager's perception of performance, they recognise the limitation of this self-rating measure. In comparison, the issue of research performance has been a key issue within the institutionally framed NPM literature, where like MCS, the construction of performance is seen to be subject to the influences of powerful constituents (Brignall & Modell 2000). In fact, several authors argue that the influence of the managerialist approach has led to a reconception of 'research performance' in terms of quantifiable outputs such as grants won, research publications and research student throughput (Gray, Guthrie & Parker 2002; Modell 2003; Neumann & Guthrie 2002; Parker, Guthrie & Gray 1998; Willmott 1995). They contend that the incorporation of these quantifiable measures of 'performance' into the mechanisms which determine how research funding is allocated, has enabled this conception of performance to penetrate to the operating level (MacGregor et al. 2006; Parker, Guthrie & Gray 1998). However, what remains to be investigated is the degree to which such a conception is coupled to the use of MCS within academic units.

In summary, both the R&D and NPM literatures offer alternate and overlapping insights into how MCS could be used to enable university research performance at the operational level. The NPM research explains how the institutional university context, which appears to be driving the use of more programmed MCS at the sector level, could translate into the standardised use of cybernetic and administrative controls within university research units. Conversely, the R&D studies suggest that MCS use is related to technical factors. If so, socio-ideological controls would be expected to be the key MCS element enabling performance, although variations in research setting across different operational units would be reflected in the use of more tailored MCS packages. A third possibility exists – it could be a combination of both institutional and technical factors that drive the use of MCS. Where incompatibilities exist between the need for legitimacy and optimality, there may be a de-coupling of symbolic and operational MCS from either each other, or varying conceptions of research performance. In order to investigate these issues, it is necessary to explore the way MCS is used to enable performance at the operational level of universities. The following section outlines the approach taken in this research project - an exploratory case study design.

3. Research Method

In order to explore the use of operational level MCS in enabling to university research performance, this paper used an exploratory case study methodology. This approach is justified by three related reasons including: the exploratory nature of the inherent *how* and *why* research questions posed (Yin 2002); the limited nature of the relevant theoretical developments, restricting the ability to make *a priori* predictions and necessitating the use of a "discovery case study" (Keating 1995, p. 70); and the novel and contemporary nature phenomenon being explored (Keating 1995; Yin 2002).

To deliver more compelling evidence in regard to competing contingent and institutional explanations of the use of MCS, the study used a multiple embedded case study approach (Yin 2002) by focusing on the MCS used within two faculties embedded within the same university context. Typical of most universities, this context is characterised by a metropolitan location, a student population of over 30,000, a broad disciplinary spread and a dual focus on teaching and research activities. Access was obtained through several of the researchers' personal contacts. The selection of the two case units was conducted using a theoretical sampling (Chua & Baxter 1998) and theoretical replication (Yin 2002) approach, in which constructs from the prior R&D literature underpinned an *a priori* assessment of the organisation and selection of research areas "which would provide a rich source of data" (Chua & Baxter 1998, p. 71). More specifically, in order to test for the contingent relations between the use of MCS and the research context (Abernethy & Brownell 1997; Bisbe & Otley 2004; Davila 2000; Ditillo 2004), the study attempted to maximise the expected contrast between the research characteristics of the two selected faculties. A content analysis was conducted of the publically available information on the each of the faculties' websites. Guided by Abernethy & Brownell (1997), descriptions of research projects were reviewed for the composition of the type of research activities and the degree of involvement of corporate sponsors. The resulting faculties with the highest degree of *a priori* contrast between their research characteristics were the

Faculty of Information Systems and Technology (IST) and the Faculty of Social Sciences (FSS) [7], which contrasted in the types of external involvement – industry vs. community partners, and the composition of research activities – programs dominated by applied vs. basic research. The results of this external assessment were verified throughout the initial stages of data collection. A more comprehensive description of the contrasting research characteristics of the two faculties is outlined in the following section.

The primary source of data was information gathered from semi-structured interviews of individuals from within the selected faculties. Conscious of the need to deliver insights regarding the enablement of research performance, the study targeted successful senior academics, or the 'gatekeepers' (Parker, Guthrie & Gray 1998) within each faculty during the initial interviewing stage. Recommendations by the faculty administrators and a review of publically available information regarding the record of individuals in terms of the quantifiable measures (publication record, grant income record) used by the University, the Department of Education, Training and Science (DEST), and the Australian Research Council (ARC), were used to this end. In order to verify and expand upon the issues raised in these initial interviews, other interviewees from varying levels within the organisation were sought. Due to the exploratory nature of the research, a key consideration was to ensure that the perceptions of research management were gathered from a variety of individuals who were posited differently within the research management process: from the planners or strategic designers of MCS, the 'line-managers' of research who used the MCS to the researchers themselves who conducted research within the bounds of MCS. Therefore, following on from the initial interviews, other FSS and IST researchers at earlier stages of their career and faculty and university research administrators were interviewed. In total 16 interviews were conducted (See in Appendix B).

In order to allow the interviewees to focus on particular areas of experience and expertise the interviews were conducted in an open-ended and semi-structured manner (Silverman 2006). A preliminary schedule of questions developed from the study's key constructs was prepared (see Appendix C), which was adapted depending on the stage of the investigation and the position and experience of the interviewee. The interviews lasted for between thirty minutes and one and a half hours, and were recorded, transcribed and coded. These accounts were also supplemented by other acquired information, such as the researchers' in-situ observations of the work environments of each of the faculties, meeting attendance, documents and publically available information.

This information was then aggregated in order to develop case descriptions (Yin 2002) of each research area in terms of the types of MCS used, the conceptions of research performance and the causal links between MCS use and performance. These case descriptions were then compared and contrasted to identify potential commonalities and divergences between the design and use of MCS across the two high performing research areas. Throughout this whole process the researchers were conscious of how the exploratory nature of the study precluded the use of more prescriptive qualitative data analysis methods (cf. Miles & Hubermann 1994). Instead, a more inductive approach was adopted, in which the analysis was conducted in a way to allow the more indigenous patterns and themes to emerge from the data (Patton 1990). By examining these patterns across the two cases embedded within one institutional environment, the study produced practical and theoretical implications regarding the contingent and institutional issues raised by the R&D and NPM literatures. The findings from this analysis are presented in the following sections.

4. University Research Management and Management Control Systems

The empirical findings from the comparative case study are presented in the following sections. To frame the analysis of MCS use, the research contexts of each case faculty are described, followed by a discussion of the different ways research performance is constructed and perceived at the operating level. Using this framework, the subsequent sections detail the ways in which MCS is used within each of the faculties.

Research Context of the FSS and IST

The FSS employs approximately 80 academic staff who are from a wide range of 'research' backgrounds. As well as those from more 'traditionally academic' humanities backgrounds, there are also practitioner journalists, advertisers and librarians, social activists and those involved with producing more creatively-based works such as writers and film makers. This significant variation in background is also manifested in the range of faculty research outputs. In addition to the traditional long-ranging projects that generate a steady stream of refereed journal articles, conference proceedings and books, FSS academics are also engaged in producing films, novels,

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[7] To maintain the anonymity of the interviewees the names of the two faculties have been changed.

scripts, articles in popular press and community advisory functions and forums. The overriding characteristic of these various forms of research is the focus on socially-based issues, with a high degree of involvement with community and non-government organisations.

Historically, research within the humanities has been a highly individualistic sole-researcher endeavour:

"But yet it's the big irony, I keep saying that, in social science people are not social, right, this is anti-social science, people all work on their own, they publish on their own, they abandon their students, they assume that people are clever or they're not and they can sink or swim." (Professor, FSS)

Collaboration has therefore only traditionally only occurred on an ad-hoc basis 'round the corridor'. However, as part of a recent emphasis on a creating more collaborative research environment, the faculty's academics have been reorganised into three thematically based cluster structures, or areas of 'research strength' within of the faculty as part of the changes initiated by the university's central research office in response to wider government policy[8].

This designation of academics to areas of 'research strength' has also occurred in the Faculty of IST, which houses approximately 60 academic staff who have been organised into five areas of 'research strength' since 2002. Underlying this research strength structure are several 'studios' or 'labs', two of which form the primary focus within IST of this study. Although *"computer scientists are not well known for working in teams"* (Professor, IST), within the Lab structures in particular, there appears to be a relatively high degree of collaborative work. While there is variety in the researcher types within IST, with a significant practitioner presence, and several cross-disciplinary researchers, the majority of researchers encountered were from a scholarly background. The primary focus of the research activities is on the development of technical applications, with varying degrees of involvement with industry partners from both the private and public sectors.

Conceptions of Research Performance

Confirming the findings of Parker, Guthrie & Gray (1998), when asked to describe the concept of university 'research performance', all interviewees identified the quantifiable measures such as refereed publications, grant income and Higher Degrees in Research (HDR) student completions as the key aspects of performance expectations. More specifically, the quantifiable approach by which university performance is assessed at a sector level by external government funding bodies is replicated in the constructions of performance as perceived by individual academics. In distinguishing between the metrics, researchers in IST placed a greater emphasis on the delivery of conference publications which, due to the rapid pace of technology development, are viewed as the primary avenue where researchers 'announce' or 'timestamp' their ideas. In comparison, FSS researchers tended to focus more on the delivery of journal articles and the securing of external grant income.

Beyond the production of these traditional metrics which have been discussed at length within the extant literature (cf. Anderson 2006; Gray, Guthrie & Parker 2002; MacGregor et al. 2006; Neumann & Guthrie 2002; Parker, Guthrie & Gray 1998; Salavananuthu & Tinker 2002; Willmott 1995), the interviewees also described other aspects of the university's research performance expectations. Specifically, the respondents discussed how topics within priority areas, higher ranked publications outputs, and greater degrees of collaboration are given preference by administrators. These too were linked back to policy and reform at the sector level, such as the modification of the DEST reporting requirements[9] for the university block funding scheme, where publication lists have been tiered for quality, and the preferential treatment of research contributing to the government mandated 'National Priorities' in terms of ARC funding:

"But in terms of research priorities, that's handed down from above, that's handed down from the Federal government, so all universities now which are very corporate entities don't have a lot of autonomy anymore, the government dictates that we're going to fund you on these criteria so you've got no choice but to play the game. And if they say that income, research income, publications and higher degree research students are the most important things, we can't go off and find something and say that's more important because we don't get any money for it, so you'd go bankrupt doing it that way" (Faculty Administrator, FSS.)

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[8] Although the underlying criterion of the research strength accreditation system varies across institutions, it is used in all Australian Higher Education Providers (HEPs) as part of the reform to the Federal Government's funding requirements following the 1999 White Paper *Knowledge and Innovation*.
[9] Known as the Research Quality Framework (RQF)

While the quantifiable aspects of individual researchers' performance are captured in various output measurement systems, they are rarely formally assessed next to predetermined standards or benchmarks. Although the university has invested in developing automated information systems, evident in both faculties, which attempt to capture individuals' research outcomes, this information is not used as part of an operational cybernetic system as defined by Green & Welsh (1987)[10]. The only formal performance benchmark is an annual evaluation of whether researchers are classified as 'research active' or not, which for most academics is very easily achieved:

"It's not even that much, it's just you have to have published a certain number of publications in the last three years and it's really little, like it's not huge..."(Researcher, FSS)

Furthermore, there is little in terms of an overt or formal 'effector' or modifier of behaviour. Those not achieving this benchmark level of research output are only informally encouraged to attend more research advisory meetings, undertake research leave, or to reshape their research programs to deliver more 'capturable' research outcomes. However, this is not to discount the pervasiveness of these long range performance expectations down to the day-to-day perceptions of researchers. Rather, the significant integration of these measures into numerous MCS mechanisms (to be discussed below), has had the effect of signalling importance of these quantifiable expectations and the managerial values they represent. This is evident in the following comments:

"You can't survive without publications" (Researcher, FSS)

"Accountability now is universal in research and while it has its drawbacks and while it corporatizes the whole idea of research, the good side of it is that it is forcing academics to do research and research, after all, is part of their job description, it's 30% of their job description and you've got to do it"(Faculty Administrator, FSS)

In addition to the quantifiable measures, most researchers interviewed also described alternate personal conceptions of performance. For instance, across both faculties, researchers described aspects of performance that related to broader academic values such as making contributions to literature and theory, intellectual risk taking, novelty, and conducting studies with academic rigour.

"It's not about outputs, it's about exploring, inventing, re-inventing, identities...To what extent are you able to put yourself at risk in situations where you haven't been before. I think research performance is too often identified with the peripheral....money and publications, not enough with the spirit of what it means to go in and risk stuff."(Professor, FSS)

The juxtaposition of these conceptions of research performance next to the quantifiable expectations supports the propositions of institutional theorists such as Brignall & Modell (2000). In particular, while the increasing emphasis on the delivery of more comprehensive quantifiable measures is reflective of the institutional pressure applied by the managerialist-orientated federal funding bodies, there also remain the remnants of the influence of the collegially-motivated academic community.

However within this institutional framework there remains scope for more localised conceptions of performance, which are more closely related to the specific research contexts of the university and the faculties within. For instance, across both faculties, researchers also expressed a strong desire to be able to deliver practical, relevant outcomes out of their research:

"In all of my research, it's very important to me to deliver an outcome to people and to feel whether it's imagined or not, that that research is for someone else. So I don't consider that I do simply ideas research, I do practical, you know for me it's absolutely important to be practical" (Researcher, FSS)

This conception of performance appears driven by more institution-specific priorities such as the university's particular emphasis on relevancy and practicality both in its teaching and research activities. A further factor influencing intra-faculty performance conceptions are the different intended audiences of research In FSS, research outcomes are intended to be pertinent to community and wider society, whereas in IST, practical relevance is geared more towards technical outcomes. This added degree of variation in what researchers constitute as 'good research' seems reflective of the differing research emphasis of each of the faculties research areas described above.

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[10] Refer to Appendix A for definition

Informants suggested that these differing conceptions of research performance are not necessarily incompatible. Although the majority of researchers expressed displeasure with the quantification of their work, and the increasing use of those measures as accurate reflections of 'good research', most believed they were able to achieve a balance between the different expectations of their research:

"If you're like me and you picked an area like designing kooky interfaces for musicians, then it does become harder to get grants, but I can certainly always publish stuff." (Researcher, IST)

However, several respondents commented how the metrics promoted certain inequities. For instance, those from less academic backgrounds who are involved producing creative works, both in IST and FSS expressed dissatisfaction at the inadequacy of the DEST categories in capturing the scope of their research outcomes:

"I feel as if that process is not understood, you know, films cost a lot of money, they take a long time to write, they take a long time to finance and so it's years, it can be ten years of your life on one project and then you make the film and get one point. Which is the same as one refereed article in a journal, so my colleague, at [University X] [11] who did an in depth interview with me for [Magazine A] which is a refereed journal, did an interview with me and then wrote about the film and we also, she sent it to me and I wrote the answers to questions and sent them back, everything, she got the point but I didn't. And I got one point for the film and she got the same, you know, there is something inequitable in that." (Researcher, FSS)

In addition, another researcher noted how the focus on particular types of outputs appears to favour a minority of researchers. In particular, the focus on refereed high impact journals appeared:

"to privilege young men with partners who look after them and don't demand anything, who look after families and everything else and who allow them working environment which allows them to produce multiple, multiple papers, often about the same thing, which can be replicated rapidly in high impact journals. And there's only a small group of them." (Professor, FSS)

Furthermore, several expressed the view that their ability to deliver multiple outcomes from their research and to balance alternate expectations was hindered by the administrative burden created by the increase in administrative systems used to collect DEST performance measures:

"I mean, to some extent, they [community demands] are also easier to sidestep because they're not so compelling in terms of funding and bread on the table and other sorts of institutional pressures and so that's one of the other issues, is trying to make sure that you don't neglect the stuff which is actually important because of the pressure of paperwork."(Professor, FSS)

As will be discussed below, these inherent tensions between alternate conceptions of research performance as shaped by diverging managerial, collegial and local context factors, could be problematic if contrasting constructions of 'research performance' are substantially integrated into the operational level MCS. By requiring the MCS to enable multiple research outcomes, the use research performance in MCS could possibly further exacerbate these incompatibilities.

Research Management in IST

Within the Faculty of IST several of the high performing researchers interviewed resided within a quite unique model of research management – the 'Lab' Model. These structures are based on a cluster design – in which there tended to be *"the star, which is professor and part of a cluster with lesser individuals surrounding them and surrounded by PhD students surrounded by Honours students" (Faculty Administrator, IST)*. These groups appear to have originated as part of a strategic transformation of the Faculty's research strategy five years ago in which four professors (the stars) were appointed by the Dean and a significant amount of funds were injected to support an increase in the number of PhD and post-doctoral students. Within the Faculty these units are viewed as successful and exemplar, and thus two of them formed the primary focus of the study's analysis of MCS in IST.

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[11] The names of institutions and publications quoted by respondents have been masked in order to maintain interviewee's anonymity.

This model of research management appeared to be a very strategically crafted package of controls, which incorporated cultural, structural and, planning controls, all of which have been developed as part of a deliberate decision making process by management. Furthermore, these units are also subject to faculty wide incentive controls geared towards enabling quantifiable research performance.

Socio-Ideological Controls
Consistent with the predictions of Ouchi (1979), Mintzberg (1979), Abernethy & Brownell (1997) and Ditillo (2004) socio-ideological elements were perceived as the most important mechanisms in driving research activity. In particular researchers described an inherent value which drove the level of research activity: their 'passion for research':

"It's hard work. That's where the passion comes in, you've got to really want to do this stuff because they're, like, my students spend a lot of hours in that lab. You know, we're all there 'til midnight very often. But we love it." (Professor, IST)

All IST researchers explained how they saw personal values, such as the inherent motivation to do research for research's sake, as important qualities that are instilled through either selection or socialisation practices:

"I have students come into the lab and they're all very serious about research, it doesn't take them very long before they realize that no, it's about passion and just having fun. And then they fold, I can never get rid of them." (Professor, IST)

The researchers' belief in the role of personal values in enabling research performance was so significant that in some cases, there were those who were cynical of any role 'management' could play. One researcher proposed a much simpler and more cost effective management model:

"[Just] get good people and leave them alone." (Researcher, IST)

However, this sentiment did not seem to reflect the way in which research is currently being managed within the Labs. In contrast, there is substantial emphasis on the development of a group-orientated team culture, which was seen as beneficial by fostering greater collaboration between researchers. As will later be discussed, in comparison to FSS, this has largely been achieved within these groups as is evident in the following description of one of the Labs as:

"A society with people that are doing research, people doing interesting stuff who get together and talk once a week to find out what they are doing. Everyone talks, by listening to what other people say, you get stimulated to try new things and I guess if you want to think about it in terms of motivation, I guess, there's extrinsic motivation which could come from feeling like, oh gee, these guys are doing that, I should, I realize I'm stuck in that area, I should start addressing those issues, so as well as just the intrinsic revelation that it's fun to work with them and so, I guess, making things that other people are doing visible is important."(Researcher, IST)

Within each of these groups, interviewees described various other values, such as trust, constructive competition, support, a willingness to appear vulnerable and cohesiveness, which reinforce the culture of a group in comparison to the sole-researcher model. These have developed over a significant period of time since the inception of the groups:

"Well it's been going here for four or five years. And it's certainly, that's, at the beginning that wasn't happening at all because people didn't trust each other, so it's about trust and it's built up over time and probably built over hanging out together and doing social stuff...That group trust, yeah, like I say it's taken, when I think back to the first few meetings or the first year, people were much more up tight." (Researcher, IST)

It appears the role of the 'star' professors, or in their words 'research leaders', has been instrumental in the development of these research cultures. Both described how they have quite strategically managed and cultivated these group values, using their own experiences as a guide. For instance in explaining the development of a collaborative culture one research leader described how she has fought the notion of a 'blame game' mentality head on by facilitating constructive competition:

"So sometimes, when that becomes a real problem, I divide the group in what they think is an arbitrary way, but I separate where I think the problem is and then I get them to build a system separately and have a competition

and this is very useful when we're having a brainstorming session and someone thinks that their idea is better than somebody else's, which happens all the time, okay." (Professor, IST)

However, both research leaders have been quite careful to cultivate collaborative cultures within their groups without the appearance of doing so. Insofar as *appearing* to allow the group culture to develop organically and to *'leave researchers alone'*, the leaders have had some degree of success, given a comment by one early career researcher:

"[The research leader] is kind of, interesting, I mean, he's very hands off, really. I mean, he's away a lot and, so yeah, he leaves us to our own devices to a large extent. All the stuff we, and things like, we basically, kind of, other people started that and it just kind of emerged out of the group." (Researcher, IST)

Furthermore, the research leaders have also been crucial to the implementation of more tailored administrative controls, such as regular meetings and formal planning, which appear to facilitate the development of these group cultures.

Administrative Controls

Both research leaders use regular once a week meetings to enable the collaborative research culture and influence the values of researchers. However due to the different comparative size of the two groups this occurs in slightly different ways. In the larger of the Labs, regular once a week meetings are held in which group members' research is presented and issues, research related or not, are raised and discussed by the group. A researcher was able to observe one of these forum-like meetings and noticed how the research leader would occasionally interject and through these critical comments was able to subtly influence the group's thinking on an issue. Within the other lab, its small current size restricted the perceived effectiveness of these types of group meetings. Instead the research leader held weekly meetings with each PhD student which enabled her to develop a close working relationship, in which she closely monitored their progress and actively guided their research development.

These close relationships between students and the mentors are also reinforced in both Labs by a physical proximity:

"Well, that's why I'd like to have a good relationship with my students and, I work up in the lab with them and I'm there every day. I have an office; I feel I'm never there. I'm only there if I have to do something confidential and that doesn't happen very often. And I like it. I like the buzz in the lab for a start." (Professor, IST)

The study's researchers also observed how the physical structure of the working environment appears very conducive to collaboration. Both Labs employ 'open-plan' designs, in which researchers were all centrally located in one space, and are only separated by low cubicle walls, if anything at all.

Another key MCS component of the Lab model which appeared quite unique was the use of planning. Both research leaders promoted the idea of using 'research visions'. These are conceptual maps outlining the key challenges within the field and the key goals or projects that they thought would contribute to overcoming those challenges. They encouraged the use of these plans by their research students, sometimes referring to it through their meetings. However the design and level of formalisation of the plans was largely left up to the students themselves to suit each of their own research agendas. Overall, these plans or visions were seen as contributing to the team culture of the group:

"it's not like the university says, you must have a five year rolling plan at the faculty, and so ... these guys are really serious about having a five year plan and that gives them something to work to and something that they can share with the rest of the group, so that they can get motivated and see where things go" (Faculty Administrator, IST)

These long ranging visions were often supported by more short-term project plans, such as mapping out of the key milestones within an individual's PhD programs, or simple time management techniques. In terms of their value, most interviewees saw the positive impact of these long and short-term planning processes in enabling performance:

"I can actually see that here that really successful groups have had that star professor that has things like a five year plan" (Faculty Administrator, IST)

"It is useful. The useful part wasn't so much my planning as in the project plan sort of plan but more about just laying out a design and then now I just know I have to fill in this piece of design, this piece of design and I estimated each one would take a certain amount of time and that's how it's coming out to be" (Researcher, IST)

A comparison also emerged from informants regarding perceptions of organisational structures within IST – the faculty 'research strengths', and the underlying 'Lab' structures. Confirming the external perceptions of the success of the Labs, researchers commented how the structures gave the university a competitive advantage:

"I think, an area where we can excel because we are a comprehensive university, we're very agile compared to [University X] or [University Y], I mean, they're like the juggernauts and we can really move quickly and I think we can build a collaborative advantage in a way that traditional universities like [University X] and [University Y] just can't."(Professor, IST)

In comparison, the faculty strength structures are much larger clusters of academics, including those involved with the Labs as well as other sole-researchers, and are managed on a higher faculty and university level. These structures were viewed as much more superficial collections of researchers:

"It's more an administrative division in a way, well it's not an administrative division, it's a convenience for marketing what the faculty does, so they can say, in our research we do this, we've got three strengths"(Researcher, IST)

As 'marketing' structures, these did not appear to provide the same level of support, in particular by not containing the administrative facilitators of collaborative research cultures as observed in the Labs:

"Certainly in this department I see most other researchers are basically working on their own. Officially might be part of some research strength but they're not. They don't go and have a meeting once a week, which is a real shame." (Researcher, IST)

Therefore, these structures were perceived as less effective in enabling individual researchers and thus the faculty's research performance. Furthermore, this example also illustrates the differentiation between the perceived effectiveness of the administrative structures which appear to have been developed more locally, and those which have been imposed from a faculty and university level. This theme is replicated in perceptions of the broader incentive controls that apply to all IST researchers, as part of faculty and university-wide schemes.

Incentives
All researchers within IST, both those in Labs and sole-researchers, are subject to the third category of control observed within the faculty, that being incentives. Across the faculty there appeared to be three different types of incentive structures: project funding, promotion and conference funding. In particular, promoting and project funding incentives are closely tied with individual's research performance in terms of quantifiable outputs.

"If you want to get promoted there's a perception that you and then, probably, the reality that we need to have a certain number of publications, a certain amount of research money coming or something like that." (Researcher, IST)

It was recognised that the incorporation of these metrics into the conditions of eligibility for incentives is intended to motivate researchers to deliver the research outcomes desired by the fund providers. For example, in parallel to the responsible cost management rationales for linkage of performance measures to fund allocation observed by NPM researchers at the sector level (Parker, Guthrie & Gray 1998), one faculty administrator commented:

"A lot of the formula for funding is worked out on outputs which is, again comes back to accountability. I mean, what did you do with the last lot of money we gave you, what have you got to show for it and based on that we can fund you for this next project that you've come up with." (Faculty Administrator, IST)

However, because researchers' track records in obtaining grants become inputs into the assessment for further funding or promotion, researchers perceived that these systems are heavily weighted towards those *'already on the gravy train' (Researcher, IST)*. As one researcher commented:

"I know people I've spoken to within the faculty that are totally focused on career, it's like they're not actually interested in what they're researching, they're researching something because it happens to be, they perceive it

to be the hot topic and they'll get, like, they're likely to get lots of grants doing that but they actually couldn't give a rat's about it, it's just merely a thing to be done, to tick a box on the promotion applications because everyone knows that to get to be associate professor or professor or, you need to have got X amount of thousand dollars of grant, so, it's the same thing that works for that grant end in itself mentality, okay, well if I do get promoted I have to get a grant therefore I'll, I've got to research something, oh well, here's something that seems trendy and they'll give grants so I'll research that. Okay, what have I got to do now, get a grant, okay well here's something I can get a grant for, I'll write a thing for that. Okay, I've got the money now and that's the important thing, the actual outcome of the research is irrelevant."(Researcher, IST)

As this quote illustrates, there is a perception of the potential for these incentives, if not properly managed, to encourage 'careerism', an unhealthy myopic focus on the underlying measures themselves in the short-term at the cost of the development of quality research. This individualistic and competitive research approach appears to completely contradict the aforementioned 'passion for research' values and collaborative research cultures which were emphasised as so crucial in the generation of productive research activity. Thus, it appears that these incentives contain the potential to disable rather than enable performance.

The other key incentive structure within IST is the provision of funding by the faculty for academics to attend conferences. Interviewees from IST talked expansively about this scheme, which is perhaps reflective of the importance of conference proceedings as the primary publication medium for the dissemination of IST research, as well as a recent and substantial change to the conditions. Historically the conference scheme was quite generous in that *"you would get paid to go to any conference you wanted, if you could produce ten conference papers, the faculty would fund you to go there" (Researcher, IST)*. This was perceived to have an enormously positive impact on research performance in terms of lifting the publication output of the faculty and also generating further collaboration with external research communities:

"I think that was really helpful in boosting people's research because they, you know, people were just producing lots and lots of conference papers and then from that, often journal articles came and book chapters and books and stuff, so it was very very useful and also people were getting to conferences and meeting people and forming collaborations" (Researcher, IST)

However, the scheme was quite expensive to run and in recent years post the 'dot.com crash' the level of students enrolling in IST has decreased, which has reduced the level of funds available to support it. Therefore the structure of the scheme has changed in which researchers have been limited to the number of conferences per year, and only granted funding to conferences which are perceived as high ranking according to a tiered system. The reactions to this internal policy change were marked. Several of the respondents were quite negative, such as the following:

"If you look at our publication rate this year, it's down and I'd say part of it is connected with this new policy" (Researcher, IST)

However, while most researchers were disappointed with the reduction in funded conference travel, it appeared the source of complaints, was not the amount of funding per se - most understood the reality of the reduction in funding available. Instead, those who were sceptical of the scheme were critical of the underlying conference tiering system:

"Well the problem at the moment is the lists are completely inadequate so they don't include any of the conferences of any of the journals that people of success submit to" (Researcher, IST)

However, in contrast some approved of the tiering scheme which was seen as beneficial in *"helping young researchers keep on the straight and narrow"* by limiting them to *"mixing in the right circles"*. It appears that the differentiating factor between these two groups of interviewees was their research topic area. In general, those involved in more traditional 'hard core' computer science were more accepting of the policy change than those who were more involved in cross-disciplinary, 'fringe' research. Thus, it appears that while incentives are being used to direct research activity towards the types of outcomes that are valued by external constituents, this assessment of 'value' reignites the same tensions inherent in the underlying conceptions of research performance. Furthermore, in providing a scheme that applies uniformly across the faculty, the incentives paradoxically create inequities due to the inability to cater for the specific contexts of different research areas.

As a final observation, the collection of the quantifiable information used to assess researchers' eligibility for these incentive schemes has recently been made more automatic by use of several centralised depository

systems. However, while this information is being used to evaluate the performance of the university at an aggregate level, apart from the successes or failures of researchers in to obtain longer-term rewards, there is no regular feedback regarding individuals' performance. This is a grievance of some researchers, who complain of a significant increase in administrative burden for seemingly little obvious purpose:

"Now we have to go in and deal with this system and put it all in and find codes and all this kind of stuff which we never had to worry about before. And there are problems because things like the research codes, we don't really understand terribly well, so we're just grabbing odd ones out and, so the quality, the input's probably not very good either." (Researcher, IST)

Thus, while within the Lab structures there appears to be an assortment of MCS, including socio-ideological, administrative and incentive controls which are being used to enable research performance, there is no use of cybernetic controls at the operational level.

Research Management in FSS

In spite of the large scale changes to the university sector such as the implementation of more formal research management techniques and a heightened focus on accountability described in the NPM literature, there are individual perceptions at the operating operational level within FSS that *"research is not managed"(Researcher, FSS)*. However, this could be indicative of a lack of discourse regarding research management and some subtle repackaging of MCS by Faculty Administrators, rather than actual lack of MCS, as further probing revealed that within FSS there are several socio-ideological, administrative and incentive MCS that are used to enable research performance.

Socio-Ideological Controls

Analogous with IST, socio-ideological elements were the most often cited reason within FSS of why researchers did research. Once again all researchers described the significance of the 'passion for research':

"It's a personal passion, so, it's part of what I'm employed to do but it's part of how I see the role of my position and it's a personal passion, so that's why we do it." (Researcher, FSS)

Another value expressed by FSS academics which appeared unique to the faculty was the notion of the 'public intellectual'– in which FSS researchers feel compelled to do research as part of a feeling of responsibility towards the communities which are involved directly or the wider society of taxpayers:

"Considering that we're here in a publicly funded institution, tax payers are paying my salary, I don't feel like I have the luxury of just writing stuff, spending my entire career writing stuff that is for a tiny fraction of the world's population and I know that there are arguments for that kind of research but to me, I like research to be much more publicly engaged"(Researcher, FSS)

Both of these values are shared by most academics within FSS, indicating a strong cultural control. In particular, the reliance on these personally-held values is reflective of the traditionally individualistic 'research culture' that has existed in FSS, which has been promoted through the selection and socialisation of new members:

"Humanities' scholars are trained in a very individualistic manner, that's still the case. The doctorate processes, there's enormous pressure and expectation that students will choose their own topic, not that they will fit into a topic selected for them by a supervisor, and in fact, there's a great deal of resistance to that happening. So students are expected to have an independent topic and be independently working, essentially, not to be part of a research team" (Professor, FSS)

However, most researchers recognised how this traditional sole-researcher model is inadequate in enabling research performance, particularly given more contemporary emphasis on collaboration. Therefore, similar to IST, the creation of a more collaborative and open research environment was viewed as crucial and beneficial:

"There's lots of advantages to working with other people, you know, in a team where you can encourage each other and bounce ideas off each other" (Professor, FSS)

In particular, greater collaboration between senior 'star professors' and early career researchers was emphasised as necessary for several reasons. Firstly, the reputation capital of the professor more easily enables the early career academic to establish a 'track record' both in publications and grant applications, and thus improves their

future chances of grant and publishing success. In addition, close supervisory relationships generate flows of tacit research knowledge and experience. As a faculty administrator noted:

"Ultimately I think the research performance will ultimately hinge on the style of supervision that you have dealt from the relationship of relevant students and colleagues and this is something that comes of medicine.... I mean, people know that junior doctors who go into hospitals, doesn't matter how much you teach them or how clever they are, if you have an intense and good relationship with your senior consultants, you're more likely to do better and I think the same thing holds with supervisors and research students or colleagues."(Faculty Administrator, FSS)

In facilitating these kinds of supervisory relationships and this type of collaborative research environment, *'proximity'* was again perceived as necessary. Similar to IST, this is enabled by use of administrative controls.

Administrative Controls

In order to facilitate more collaborative research cultures, several administrative controls have been implemented by the faculty research office. The first of these administrative controls was the designation of FSS academics to "research strength" organisational structures. In FSS, while this clustering of researchers was initially managed by the university's central research office, operationally these semi-autonomous structures now fall within the management of the faculty:

"So, yeah, it's quite hierarchical, the federal government hands down it's template, the university fiddles with that and hands down that template to the faculties and then we fit in with that."(Faculty Administrator, FSS)

Through these research centres several academics are able to collaborate on large scale projects, which due to the 'research strength' status of their work, have greater funding support both through the university and ARC. This funding 'encouragement' to be involved with research strengths is also manifested through the supply of PhD scholarships:

"You have to be essentially attached to a research strength in order to allow your PhD students to have a chance of getting a scholarship." (Professor, FSS)

Also, through the research strengths, regular thematically based seminars and meetings are organised in order to promote idea-sharing between the researchers:

"One of the things I really value about the research centre...is that we fostered a series of these winter schools or summer schools... in which we built in a postgraduate session, usually a day where people present, they get mentored by visiting scholars, it's sort of like a master class but we've developed strategy quite extensively. (Professor, FSS)

As this quote illustrates, the research strengths have been used as an administrative structural control to facilitate the types of beneficial supervisory relations which were so strongly emphasised as drivers of individual's research performance.

Seminars and meetings are also used by the faculty research office which runs a series of workshops. These are focused around providing useful information and advice regarding key indicators of research performance, such as writing successful grant applications and getting published. Through these forums the 'star' researchers are again able to impart aspects of their tacit knowledge and experience to their colleagues.

"So we just had, we just had a publication seminar, how to get published, and we brought in [Professor], used him from an academic's perspective and what to do to get published but we also brought in [Professor] from Business as an editor just to show what editors look for when a paper comes in and that was really successful, it was very well attended and very successful."(Faculty Administrator, FSS)

The less conspicuous value of these workshops is they function as a forum in which researchers and administrators can discuss the faculty's expectations of researchers in terms of these research outcomes.

As in IST, the role of physical proximity in facilitating a collaborative research culture is viewed as important, particularly as *"it is frequency of contact that gives people confidence in being able to kind of express concerns, doubts about what they're doing and for me to be able to kind of share that with them" (Professor, FSS).* In addition to the use of regular meetings and seminars in enabling physical proximity, interviewees also discussed

the role of the physical working environment. Compared to the open plans of IST, the researchers observed how academics are segregated into individual office spaces, which was seen as hindering the development of 'round the corridor collaboration':

"It's not conducive to actually working together; it's very isolating."(Researcher, FSS)

Beyond inter-academic relations the physical space is also a concern in terms of generating positive relations between academics, research students and research administrators. One of the latest initiatives by the faculty research office was to relocate to the same building that housed the majority of FSS academics, in order to increase the accessibility of research administrators to academics.

The perceptions of the success of these administrative controls in enabling a transformation of the research culture were mixed. While acknowledging the increase in administrative burden in recent years, faculty administrators saw value in these mechanisms both in generating greater research performance directly, (such as the higher success rate of PhD scholarships awarded to FSS in 2007) and indirectly as signalling devices to academics of the importance of more quantifiable expectations of performance.

"The administrative structures added a degree of legitimacy to the whole thing and they send the message that we're taking this seriously, I mean, people see we've got a faculty research office and a faculty research manager and they say, okay, this faculty is taking this seriously, taking our research seriously, so it does send that message as well" (Faculty Administrator, FSS)

However the administrators were also caught in a paradox. Similar to IST, most researchers expressed dissatisfaction that the increase in the use of certain administrative systems, such as the quantifiable output measure information system, which did not seem to link to any performance feedback or cybernetic use of performance information. Yet they were also cynical of the degree in which the research office was seen to be 'managing' the research culture via administrative controls. For instance, informants perceived that involvement in seminars is not something that can be mandated but should instead develop organically. Informants also expressed that while a more collaborative research culture was beneficial, the administrative controls need to be more flexible to the inherent sole-researcher models of research within Humanities. As such, the research administrators were conscious of presenting the administrative controls as 'facilitators' of the development of the underlying research culture within FSS:

"But in things like that, there's always those tensions where they see us bureaucratizing their research and treading on their territory, so you have to frame it in a way, we have to frame it in a way, that this unfortunately is the game we've got to play and we're here to help you play it and we're not here to tread on your territory, we're here to try and help you play this game as best as possible."(Faculty Administrator, FSS)

In this sense while the administrative controls are used to enable research performance, at the operational level their role is perceived as very much to complement rather than to substitute for the underlying socio-ideological controls within FSS.

Incentives

Consistent with Anderson (2006), the most important factor which FSS researchers highlighted as constraining the production of research outcomes was time. Several interviewees described accounts of how increasing teaching and administrative commitments of their academic roles limited the time resources available to conduct thorough, meaningful research. Therefore, research funding was seen as an extremely valuable resource, even more so than monetary incentives, allowing FSS researchers to 'buy time':

"It's not a lack of money that's preventing you from doing research, it's a lack of time, so if the money was going to be able to be used for anything it would be to perhaps help you to buy out of some of your teaching so that you had more time, but money per se, I don't think, is really much of an incentive." (Researcher, FSS)

Similar to IST, these funding incentives are often accompanied by various conditions which related to aspects of research performance. As already mentioned, researchers are more likely to obtain funding from either the university or ARC if they are related to a 'research strength', have a 'track record', and are able to demonstrate relevance to the government mandated 'National Priorities'. By tying the researcher values to university outcomes these incentives are able to influence the research culture into directing what research outcomes are produced. For instance, there was a perception that within the faculty there is *'good culture around ARC*

discovery grants'. Likewise researchers were aware of the need to perform in terms of publication and grants in order to be competitive for promotion:

"You've got to do it for your job but basically I'd lose my job, or I wouldn't be able to get out of here, I wouldn't be competitive to apply for another job anywhere else unless I had a really big track record." (Researcher, FSS)

However, in another parallel with IST, due to the close incorporation of more quantifiable conceptions of performance, the perception of imbalance within the metrics translated to tension around incentives controls. For example, the funding system was seen to significantly advantage senior researchers, at the expense of the early career academics who have no publication record:

"And, obviously, point in career makes a huge difference as well because as a senior researcher you have access to money and in early career research you have no track record, no access to money." (Researcher, FSS)

Other evidence of imbalance were instances in which researchers recalled managing how the research was presented or 'packaged' in order to increase the success of funding applications:

"We need to be strategic and use those buzz words in order to show how your work fits [in the National Priorities] and I think sometimes that does mean that research that you think is important doesn't actually get expressed." (Researcher, FSS)

Also, the incentive structure exacerbated potential incompatibilities between alternate performance expectations more specifically related to FSS. In spite of the considerable emphasis on collaboration, the funding incentives for teaching relief are only allocated to one supervisor:

"The funding structure from the university is completely, as far as our area is concerned, is completely unsympathetic to collective management of research projects because the process about allocating teaching relief for supervisors has really confused and really just privileges one person, despite the fact that there's supposed to be teams of people"(Professor, FSS)

Therefore, comparable to within IST, each of these circumstances is illustrative of a reduced level of suitability between incentive controls and the specifics of the some of the research context in FSS. In comparison to the operation of the administrative controls which are mostly designed and managed by the local faculty research office, funding incentives are managed according to conditions set by the university or federal funding bodies. Thus, incentives are powerful, albeit blunt mechanisms, which sit above the more integrated socio-ideological and administrative components of the package of MCS used within FSS to enable the production of desirable research outcomes.

5. Discussion – Enabling Research Performance

These case narratives provide insight into several issues underpinning the central research question posed by this paper. Specifically, these descriptions detail the various conceptions of research and the different kinds of MCS used to manage these outcomes at the operating level. These observations will be expanded upon in the following sections, with the focus of the discussion on the relation between MCS use and performance. In particular the complementary roles of the different types of MCS will be outlined, followed by an analysis of the way in which the enablement of research performance at the operational level is reflective of the institutional NPM and contingent R&D literatures. To conclude, the study's key findings and implications for theory will be summarised.

Complementary MCS enabling Operational Research Performance

Commonalties emerge from the case narratives in terms of the way research performance is enabled through the use of MCS in each of the two faculties. In each of the research areas, socio-ideological, administrative and incentive controls all appear to contribute to the delivery of research outcomes, although each performs a different role. Specifically, as depicted in Figure 1, which will be detailed below, it appears that socio-ideological controls are used as the key drivers of research activity, facilitated and enabled by administrative structures, while incentives are used to shape research outcomes to suit the university's conceptions of research performance. Furthermore, while there are implicit and longer-term feedback mechanisms regarding performance outcomes, these are not occurring as part of a regular cybernetic system at the operating level.

Figure 1: The operational level package of complementary MCS

Socio-Ideological Controls –drivers of research activity

Within each case study, socio-ideological controls were perceived by interviewees as the primary driver of research activity at the operational level – it was seen as the reason why researchers 'did' research. Within both faculties the study found that all researchers, from those of more traditional scholarly backgrounds, studying cultural studies or computer systems to those with more creative or practice based backgrounds, all shared and emphasised the value of the 'passion for research' in generating research activity. It was this passion which drove the researchers to work late into the night, and or six or seven days a week. These accounts are consistent with what others have observed before as academics 'fundamental work motives' (Anderson 2006; McInnis 2000). This common value was supplemented by several other values which appear more specific to the particular research contexts, such as the notion of the 'public intellectual' in FSS, or constructive competition in IST. Both of these are emphasised within each of the contexts in promoting types of research outcomes which are hallmarks of 'good research', be it community relevant outcomes, or the development of a 'winning' technical application.

These values formed the basis of wider research cultures or environments within each of the research contexts. In particular, within FSS and the IST Labs, there was a significant focus on developing collaborative research cultures. These were seen to be beneficial in terms of research outcomes by fostering more mentoring relationships between highly successful researchers and less experienced academics and students. Within the IST Labs, the increased visibility of individual members' achievements was perceived as a strong motivating factor for individuals to produce research, indicative of the value of constructive competition facilitated by the group. Across both faculties, a key criterion which seemed to affect the perceived value of these research cultures was the degree to which they had the appearance of organic development, despite the sometimes very deliberate intervention by research managers.

Collectively, these accounts of the significance of social-based controls in enabling research performance by driving raw research activity reinforces both the contingency based literature (Ouchi 1979; Mintzberg 1979; Abernethy & Brownell 1997; and Ditillo 2004), and the arguments of the vocal critics of managerialism in universities (Anderson 2006; Coy & Pratt 1998; Gray, Guthrie & Parker 2002; Juniper 2002; Neumann & Guthrie 2002; Parker, Guthrie & Gray 1998; Salavananuthu & Tinker 2002). However, within each of the research units, it appears that these controls were not operating in isolation.

Administrative controls - enablers and directors of research activity

Within the both R&D and NPM literatures, it has been argued that administrative controls have a negative impact on research performance, by being either ill-suited to the task complexity of research activities (Abernethy & Brownell, 1997) or increasing the bureaucratic burden on academics and thus diverting time away from precious research (Anderson, 2000). Throughout the investigation some examples were encountered

supporting this view, such as the perceptions of the relatively benign research strength structures within IST or the increasing use of various information systems to capture research outputs.

However, in both high performing research contexts, an array of administrative controls were being used to enable research performance. The primary way in which administrative controls contributed to the generation of desirable research outcomes was by fostering the physical and conceptual proximity required to allow the productive collaborative research cultures to develop. Both the research strength and Lab organisational structures were used to enable researchers to work on joint projects and facilitate productive supervisory relationships between 'star' researchers and early career academics. Regular meetings and closer physical locations increased the frequency of contact between academics which facilitated the initiation of more serendipitous collaboration. Planning mechanisms within IST provided groups with collective research visions towards which they worked. Therefore, similar to the predictions of Alvesson & Karreman (2004) and Abernethy & Chua (1996), and the observations of Pratt, Margaritis & Coy (1999), there appears a substantial degree of integration between socio-ideological and 'technocratic' elements to deliver research outcomes.

In another parallel to the package MCS perspective, rather than being completely acquiescent to the underlying research cultures, these administrative controls appeared to also be 'hidden sources of socio-ideological control' (Alvesson & Karreman 2004, p. 442). In seems that in facilitating the research culture, the administrative structures and processes also served to influence it – represented by the dashed arrow line in Figure 1. An example that is common to both settings is the use of the regular meetings by the research managers as opportunities to signal the expectations of performance:

"I think these structures, as I said, kind of help the culture because they send a message that we're taking it seriously and it's a serious game we're playing". (Faculty Administrator, FSS)

A key aspect of the success of these administrative mechanisms appears to be the degree to which they were developed and presented with the faculty and Lab research cultures and contexts in mind. Research managers were able to subvert the expected resistance towards the administrative controls, not only by tailoring the university instituted controls – the Lab structures, nested within the research strengths being a classic example - but also supplementing these with more locally developed mechanisms such as the long term planning. This adaptation and entanglement of administrative controls with local research cultures gave the structures and processes legitimacy, not only in the eyes of the university and government as institutional theory would suggest, but with the researchers themselves:

"One of the main aims of any faculty, such as this, to get it through to the engineers and everybody else that's coming up with these metrics and say, your functionalism only gains vitality through people creatively innovatively engaging with the structures that you set up. And if there's no dialogue between you and the people that have kind of different ways of thinking and working, then there is no functionality." (Faculty Administrator, FSS)

Incentives – shapers of research outcomes
The final component of the operational package of MCS was incentive controls. These were used to align the values of individual researchers to those of the university in order to direct the outcomes of the underlying research activity towards specific performance outputs. Underpinning each of the incentives types (project funding, teaching relief, conference travel, PhD scholarships and promotion), were conditions incorporating the university's conception of research performance, such as high quality research publications and successful externally competitive grant applications. Furthermore, the incentives were used to reinforce other control mechanisms, such as the condition that PhD scholarship students and their supervisors be designated to research strengths. The bluntness of these mechanisms is evident in the accounts of perceived imbalance or inequity. These tensions typically arose at the borders of the 'funnel' in Figure 1 – where researchers either could not, or perhaps even would not, find balance between the outcomes they expected from their research and the outputs required by the university.

Furthermore, similar to administrative controls, incentives were used to signal the expectations of research performance. The success or failure of researchers to obtain rewards such as conference travel indicated the acceptability of their performance and therefore served as a long-term feedback loop.

Finally, the tight coupling between researchers and university values within the design of reward schemes has perhaps made incentives even more powerful shapers of the underlying research culture than the more subtly crafted administrative controls (depicted by the dashed arrow line). Similar to how the changes to the funding

logics at the sector level has changed university conceptions of performance (MacGregor et al. 2006; Modell 2005; Neumann & Guthrie 2002; Parker, Guthrie & Gray 1998), incentives possess the power to alter the values,   - what is considered worthy - held by researchers at the operating level.

However, similar to administrative controls, it is foreseeable that incentive controls in isolation would not necessarily enable desirable research performance. In particular, there is a potential danger that if incentives go beyond shaping the output generated from the local cultures, the quantifiable measures may replace the values (such as the passion for research), which for so long have been the drivers of university research performance. To a degree this is already occurring, as expressed by one early career researcher who observed:

"It's a new culture. The era of intellectual production has gone, absolutely gone. Now its research to survive and it's very clear that, yeah, I mean, the whole concept of doing a project that was interesting, I mean that doesn't exist." (Researcher, FSS)

A more extreme example of the adverse impact of incentives is the phenomenon of 'careerism' described by interviewees, where grant success and promotions become more of an end than a mean. In this sense, although the incentives still enable research performance in quantifiable terms, these potentially no longer reflect desirable research outcomes. However, this was not encountered within the high performing areas investigated for this study, which perhaps is reflective of the success of the local level managers in balancing the three different MCS components.

In summary, by comparing the way in which MCS is used across several high performing areas with differing research contexts, this study is able to develop an initial conceptual MCS model of a how university research performance is enabled at the operational level, comprising socio-ideological, administrative and incentive controls. Rather than substitutes, these mechanisms are used in a complementary fashion, which reinforces the validity of the contemporary 'package' perspective of MCS as a useful lens of analysis (Abernethy & Chua 1996; Alvesson & Karreman 2004; Chenhall 2003; Macintosh & Daft 1987; Simons 1995). It appears that each is able to coexist successfully because each type of control system serves a distinct role: the individuals' values and collaborative research culture are the drivers of research activity; the tailored organisational and physical structures, meetings and planning processes enable this research activity by supporting and facilitating the research cultures; and the incentives direct this research activity into delivering outcomes desired by the university.

While this package contains cyclic elements, where research performance outcomes affect the underlying activities of researchers, these feedback mechanisms only occur on an informal, long-term basis. Although individual performance measures are captured by a host of information systems, they are not used as part of a formal, regular feedback system, periodically evaluating individual researchers' performance and if necessary, enacting ways in which the researcher's behaviour could be modified. Therefore, at the operating level there is an absence of cybernetic control used to enable individuals' research performance.

This lack of use of cybernetic controls within high performing research units is confirmatory of the collective findings of the empirical R&D studies (Abernethy & Brownell 1997; Bisbe & Otley 2004; Davilla 2000; Ditillo 2004). Furthermore, it is indicative of a de-coupling between the way in which NPM researchers have described how aggregate university research performance is managed and how individual research performance is enabled. Therefore, this study provides evidence that MCS use within high performing university units is being driven, to some extent, by technical factors at the operational level. The intersection between institutional and contingent explanations of MCS use in enabling research performance issue will now be further expanded upon.

Tailoring the Institutional Package

From an institutional perspective, the fact that the study findings were able to be developed into a model explaining the use of a common package across two faculties with contrasting research contexts, provides some evidence for a 'one size fits all' approach (MacGregor et al. 2006). Furthermore, the use of the organisational structures and incentive controls have largely originated from the central university administration, in what appears to be responses to government policy that requires universities to demonstrate how research is 'accountable', and research funds are used economically to deliver high 'quality' research outcomes. The collegiality interests of the academic communities also influence how research is managed at the operational level. This is most evident in the presence of socio-ideological value controls, where the individuals who become researchers across both faculties share a common value – 'the passion for research'. The bridge between the divergent interests of these two influential external constituent groups is through the logics underpinning the various incentive schemes which deliver the key resources academic researchers' value most: time, recognition,

advancement, and interaction with peers, in return for quantifiable, 'high quality' research outputs. In comparison to the conceptual model of Brignall and Modell (2000), what this study illustrates is how in order to balance divergent interests of external constituents MCS are not being strategically loosely coupled or buffered, but used in a more integrative package fashion.

Other indicators of the institutional underpinnings of this package are the accounts of how the controls are not always suitable, or deliver optimal research outcomes, across all settings. For instance, within IST the research strength structures were perceived to have limited impact in facilitating meaningful collaboration, and have been more for 'marketing convenience'. In addition, the cases provide examples where the one-size fits all approach have caused tensions. These include the researchers who produce research outcomes which extend beyond the standard output metrics, those who aren't accommodated within the designated areas of research 'strength', or those who are in earlier stages of their career who perceive they are disadvantaged by the uniform incentive mechanisms.

However, while the basic composition of the package could be driven by institutional factors, the differential way in which it is applied and used provides support for the notion that MCS use in enabling research performance is also contingent on the strategic alignment to 'technical' factors (Abernethy & Brownell 1997; Bisbe & Otley 2004; Davilla 2000; Ditillo 2004). Across the range of research areas, high performing researchers were subject to variants of the MCS package. For instance, where the clustering of academics was accomplished by use of the research strength structures in FSS, this organisational design was modified to incorporate smaller Labs within IST. While meetings were used in both faculties to facilitate a collaborative research culture, in the Labs these are much more regular, formalised and managed, whereas within FSS, where the culture is still in the formative stages of transformation, these seminars were used more as open informative forums. These examples also illustrate how the range of technical factors affecting MCS use are much broader than characteristics of research tasks, which have been the dominant focus of the prior R&D MCS studies.

Also, the adaption of these MCS appears driven by quite deliberate decisions at different management levels within the faculty. Within IST, the Lab model itself appears to owe its existence to a series of faculty level strategic decisions five years ago, including the appointment of four professors and the increase in places for PhD and post-doctoral students. Both the faculty level research managers in FSS and the research leaders in each of these groups have been quite instrumental in implementing a raft of strategic administrative controls, as well as tailoring elements of the institutional package controls to facilitate the growth of productive research cultures. As one faculty administrator within FSS commented regarding this tailoring at the operating level:

"We are duty bound to align our research priorities with the research priorities of the university, so they have a model, a template and we have to operate within that template, we can certainly adjust and prioritize within that, to what is specifically suited to FSS rather than science or engineering or business but we have to operate within their guidelines." (Faculty Administrator, FSS)

Therefore it appears that as within Abernethy & Chua (1996), a combination of both institutional and technical factors contribute to the use of MCS. More specifically, while a similar package of socio-ideological, administrative and incentive controls is used to satisfy the diverging managerial and collegial institutional interests, the management of each operating unit applies and uses these categories of controls in slightly different ways to suit their respective research cultures and contexts.

Summary of key findings and implications for theory

In summary, by adopting a broad-theoretical perspective informed by R&D, NPM and wider MCS literatures to analyse these micro-level accounts of how researchers and administrators from within two high performing research perceive research management and performance, several key findings, with implications for theory and practice, have emerged.

Firstly, this study provides evidence in support of Parker, Guthrie & Gray (1998), that the university and government mandated conceptions of research performance are replicated in the perceptions of academics and research managers. Although they are supplemented by an array of alternate perceptions of 'desirable research outcomes' as influenced by more collegial values or specific university and faculty contexts, these quantifiable conceptions of performance appear to be the primary outcomes which MCS is used to enable at the operational level. Therefore, by combining NPM and R&D insights, it appears that while the construction of research performance is institutionally driven, its use and its close relation with the MCS are much more reflective of a contingent model.

Likewise, the use socio-ideological, administrative and incentives controls across the two research settings simultaneously confirms and extends both R&D and NPM research. Firstly, the presence of similar sets of MCS across different research settings and the use of programmed controls comparable to those mandated or used at a sector level, simultaneously confirms the NPM 'story' (Anderson 2006; Coy & Pratt 1998; Gray, Guthrie & Parker 2002; Modell 2003, 2005; Neumann & Guthrie 2002; Parker, Guthrie & Gray 1998; Willmott 1995), while also extending the R&D models (Abernethy & Brownell 1997; Bisbe & Otley 2004; Davilla 2000; Ditillo 2004). In particular, the study demonstrates the role of the university institutional context in shaping MCS use which necessitates the consideration of more programmed administrative and incentive MCS in managing research outcomes. Conversely, the strategic use of MCS to suit local research contexts verifies the contingent R&D theories and supplements the NPM literature with insights from the operational level. Specifically, lack of replication of sector-level cybernetic controls in assessing individuals' research performance and the tailoring in the use of institutionally driven controls by faculty and department managers demonstrates that even within a public sector organisation such as a university, consideration has to be given to the role of managerial choice, or rationality, in using MCS to suit more technical factors.

In addition, by adopting the package perspective from wider MCS literature, the study is able to explain how, in contrast to the prior evidence (cf. Abernethy & Brownell 1997; Bisbe & Otley 2004; Davilla 2000; Ditillo 2004), programmed or 'managerialist' controls *can* enable research performance. Instead of positing these mechanisms as substitutes to collegially motivated social-controls as has occurred in prior R&D and NPM literatures, this research demonstrates how administrative and incentive controls can act as complements. In particular, the study highlights how they can facilitate and direct research activity, and even influence the base socio-ideological controls. In doing so, it also substantiates another contingent factor necessary for consideration in future R&D studies - interaction with other MCS mechanisms themselves.

Through a combination of the empirical findings from the case studies and the incorporation of institutional and technical explanations for MCS use, this study is extend upon the MCS 'package' literature (Abernethy & Chua 1996; Alvesson & Karreman 2004; Macintosh & Daft 1987; Simons 1995) by providing further insight into how and why combinations of MCS are used. Firstly, in response to Abernethy & Chua 's (1996) call for "*future research to explore how accounting and non-accounting controls can act as complements"(p.598),* the cases illustrate that it is through serving specialised roles, be it as drivers, facilitators or directors of research performance, that each of the MCS mechanisms are able to be used as complements rather than substitutes. Secondly, substantiating the predictions of Simons (1995) regarding the differential use of alternate 'levers of control', this study finds that by using different controls for specific purposes, the package allows managers to be much more strategic in their use of MCS to 'fit' local research contexts. Compared to the bluntness of application afforded by uni-dimensional models, the use of multiple mechanisms provides research administrators more degrees of freedom to tailor the MCS package to specific research contexts. Finally, the study again builds upon research work of Abernethy & Chua (1996), by expanding upon the role of institutional expectations in influencing MCS use. As well as reflecting the *"organisation's institutional environment and the strategic agendas of the dominant coalitions"* (Abernethy & Brownell 1997, p. 599), the university's control mix can be used to simultaneously satisfy the *divergent* interests of alternate constituents. More specifically, as depicted in Figure 1 and explained above, through integrative use of more informal socio-ideological and programmed administrative controls, complemented by the value-alignment bridge of incentive controls, the MCS package is able to legitimise the university research management processes to managerialist administrators and collegial academic communities alike.

6. Conclusion

In order to investigate how MCS is used to enable university research performance, this study conducted a comparative case study, interviewing academics and research managers from two high performing faculties with contrasting research characteristics. The study was motivated by a series of apparent incompatibilities between evidence from empirical studies regarding the effectiveness of different MCS in the private R&D sector and contemporary changes to research management in universities as observed within the NPM literature. Owing to their contrasting theoretical backgrounds, the tensions between these two alternative streams extended into issues regarding the conception of research performance, the kinds of management systems that are used across different research settings, the factors which influence the existence of these systems, and the extent to which these systems affect research performance. This study was able to balance these diverging literatures and incorporate insights from wider MCS theory, to provide a more comprehensive explanation of how an institutionally driven package of complementary MCS, tailored by managers to suit contrasting research contexts, enables university research performance at the operating level.

To conclude, it is necessary to acknowledge some of the limitations of this study as well as avenues for future research. For example, the study has viewed research management through only one particular MCS lens and thus there remains significant room to explore whether other analytical MCS frameworks more adequately explain the way MCS is used to enable performance. Also, by adopting a more qualitative methodology, the study's findings are largely dependent on the perceptions of the interviewees and the subjective analysis of these statements by the researchers. An area where this could be of concern is the conception of performance, and the classification of our case faculties as high performing. Thus future research could attempt to verify the findings of this study using more quantitative techniques. Finally, the key limitation of this exploratory study is one of scope, in the sense that this initial study has only investigated MCS in two high performing research units within one university. Therefore an obvious extension is to conduct a wider comparative study, across multiple dimensions such as variations in research performance, more contrasting research contexts and different institutional environments.

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Appendix A

Table 1: Descriptions of MCS Categories

MCS category	Characteristics	Examples
Cybernetic	A process of a feedback loop comprising of several key components: a quantifiable standard or benchmark, a sensor to measure actual performance, a discriminator that allows the comparison of actual outcomes with standards, and an effector that modifies the system's behaviour or activity. (Green & Welsh 1987)	Financial measures, non-financial measures, budgets, Balanced Scorecards
Administrative	Structures and policies to coordinate and supervise the overall processes of the organisation, particularly in terms of developing co-operation between various branches of an organisation (Govindarajan 1988)	Organisational design – e.g. decentralisation, accountability hierarchies, policies and procedures, defined roles and responsibilities
Socio-Ideological	"Efforts to persuade people to adapt to certain values, norms and ideas about what is good, important, praiseworthy, etc. in terms of work and organisational life" (Alvesson & Karreman 2004)	Cultures, clans, systems of values and beliefs, credos, mission statements, accepted practices, rituals
Incentives	Reward and compensation systems designed to motivate individuals behaviour that is congruent with organisational goals (Flamholtz, Das & Tsui 1985)	Monetary compensation, salary, bonuses, non-monetary compensation, intrinsic rewards

Appendix B

Table 2: Outline of Interviews

Number of Interviewees		FSS	IST
University Research Administrator	1		
Faculty Administrators		2	3
Senior Researchers		2	2
Middle Career Researchers		1	1
Early Career Researchers		2	2
Total	**16**		

Appendix C: Interview Questions
1. Could you tell me about your role within the faculty?
2. How do you see research being structured or grouped within this faculty?
3. Can you please describe the process of a typical research project that you are involved in?
4. To what extent is this similar to the type of research that is conducted within the department?
5. How would you explain the notion of "research performance"?
6. How are external parties involved with the research of the department?
7. Could tell me about any systems, processes or approaches which are used to manage research in this department?
8. What is the history behind these approaches?
9. How do these management systems influence the outcomes/aspects of research performance we talked about earlier?