System Succession and the Computerisation of Workpractices

Rodney J. Clarke

Reader in Organisational Semiotics
Faculty of Computing, Engineering and Technology, Staffordshire University
Beaconside, Stafford ST 18 0DG, United Kingdom
Email: R. J. Clarke@staff.ac.uk

Abstract
The paper presents an attempt to develop a theory of system change and replacement that does not attempt to reify systems. Systemic semiotics is used to produce descriptions and explanations of system change and replacement that are communicative, socio-semantic, and contextual. The situational and cultural contexts of four distinct but related information systems are described. The contributions of these workpractices across multiple systems are analysed and described. Related workpractices form so-called genre assemblages. Persistent workpractices enter into metastable relationships with other related workpractices in the genre assemblages. This explains how systems can be difficult to actually decommission and accounts for some unusual modalities in the succession of systems.

Keywords: systemic semiotics, workpractices, genre, computerisation, system decommissioning

1 Introduction

This paper concerns an area of investigation that is normally not well represented in the systems development literature, namely a description of what happens when one system replaces another in an organisation. We can easily imagine reasons why this might not be thought of as an especially worthy topic of investigation. When systems are so difficult to build in the first instance, why spend time thinking about how they end? Instead shouldn't we be spending our time figuring out better ways of developing them? When we use traditional IS theory and methods we become fixated on the obvious product aspects of the system itself- the fact that it is a material artefact of our development practices. We conceive systems in terms of subsystems, code and data- and the attendant aspects of the development practices that produce these types of artefacts- team structure, work breakdown, project management, communication and documentation. As a consequence, if we think of systems as the products of our practices, then systems changeover will be construed in terms of products partially or fully replaced. Not surprisingly the IS/CS literature describes systems changeover in terms of tasks in implementation and user acceptance plans focusing on whether a new system is to be tested using system simulations or run in parallel with the existing system (together with the necessary data conversion plans) and whether it is to be made operational using phased deployment or complete cutover (see Heap et al 1992).

The observation that when we think of systems changeover we think of ourselves as developers, provides us with an insight into the central problem with conventional approaches to the area, and holds the key to developing new ones. When we think about the changeover from one system to another, we tend to reify these systems. In doing so, we will necessarily negate the role of human agency in the use of these systems. By representing systems as static objects, we arrest their dynamic, complex and social behaviour. In fact system changeover provides us with unique opportunities to better understand how technologies function in workplaces, how they assume a familiarity of use, requiring a kind of organisational knowledge or social literacy that enables its users to make organisational sense by linking the

technology into productive social action (Hill 1991, 100). It enables us to separate complex social behaviours from the technologies responsible for reproducing them. This prevents us from erroneously thinking of the technologies as creating these complex social behaviours. In order to discourage the reification that occurs when we try to understand what takes place when systems are used in workplaces or when one system replaces another, in whole or part, we need to first privilege processes over products. To paraphrase Pap (1991), we need to move from 'thingness' to 'eventness'. This immediately raises questions concerning what counts as an adequate account of systems change and replacement? What general shape and specific concepts would a theory need to possess in order to provide such an account?

In order to describe diachronic changes to systems, a theory must be able to adequately account for changes in discrete workpractice structure and function. Candidate theories of system change and replacement must also be able to describe how changes in workpractices also affect the structure and function of related workpractices. However, structure and function are not sufficient or compelling enough attributes for such a theory if we expect it to be able to explain as well as describe these changes within and between systems. A useful theory must possess mechanisms to describe how changes within and between workpractices mutually determine and are determined by the organisational milieu in which they are found. This last feature adds a further constraint on suitable candidate theories in that these structures and functions of systems must be contextually defined. It also strongly suggests that communicative approaches would be very useful in understanding system change and replacement. There are a number of communicative approaches that have been explored within the IS/CS literature that may provide suitable candidate theories, including conventional *discourse analysis* (Auramäki et al 1992; Lehtinen and Lyytinen 1984), and *theories of action* (Lehtinen and Lyytinen 1986; Lyytinen et al 1991). The most well known include those which utilise *speech act theory* (Austin 1962; Searle 1969, 1980) together with the *theory of communicative action* (Habermas 1987a, 1987b) that forms the theoretical basis for various *language action perspectives* described by a range of authors, for example Goldkuhl and Lyytinen (1982), Goldkuhl (1984), Dietz (1994), and de Moor (2000). By including material and communicative acts, a range of methods have been developed by members of the VITS research group (Information Systems and Work Contexts) centred at Linköpings University, Sweden. Change analysis has always been an important aspect of the VITS group's research, originating in research undertaken when developing the ISAC methodology in the later 1970s and early 1980s (see Lundberg et al 1982).

Interestingly in an early article on the relevance of theories of language to the IS discipline, Lyytinen (1985) did not consider most functional linguistics theories and excluded all semiotic approaches as well- despite the strong relationship that has always existed between modern semiotics and linguistics dating from the work of Saussure. It is precisely this intersection of communication and meaning that will be explored here. The approach advocated in this paper involves a combination of *systemic functional linguistics* and various *social semiotic* theories to form the so-called Systemic Semiotic Workpractice Framework (Clarke 2000, 2001). There are numerous theoretical ties between systemic functional linguistics and social semiotics given the latter has emerged from the former as a development in general semiotics. These ties include but are not limited to the association between agents and social role as revealed through tenor relations in systemic functional linguistics (Halliday 1985) and social subjectivity and subject position developed in social semiotics (Foucault 1972), see Fairclough (1989) for further details. Thibault (1991) describes parallels between lexico-grammatical patterning of *texts*, the unit of communication used in systemic semiotics analyses (Halliday 1985), and the utterance of Bakhtin/Vološinov, see Todorov (1984), as

well as between 'ideology' in language (Halliday 1985) and discourse in social semiotics (Foucault 1972). Considerable advantage can be gained by developing and using a composite theory of this type. Systemic functional linguistics can be used to analyse when direct texts are available, as well as providing a theory of elicitation for indirect texts in which the structural and functional details of workpractices can be recovered when direct (textual) evidence is not available. Social semiotics on the other hand enables descriptions of systems and workpractices that do not rely exclusively on direct textual evidence. The non-language based aspects of system changeover, the semiotic organisation of collections of workpractices, as well as the material traces of workpractices no longer reproduced, can also be explored (Clarke 2000, 2003).

In the next section we introduce the systemic semiotic methodology necessary for developing an approach to systems change and replacement. Within this approach completed acts of communication- texts- are defined with respect to specific cultural, national, and institutional contexts as well as to specific situational contexts. Discrete workpractice structure and function can be identified and changes between related workpractices can be described. We also introduce some relevant concepts for thinking about this area.

2 Systemic Semiotic Methodology and Relevant Concepts

From a systemic semiotic perspective an information system can be considered as a set of system features that exist to instantiate and reproduce particular communication patterns in organisations. In order to determine that a communication *pattern* is occurring, the collected texts will need to share specific contextual and textual features. If the texts share these features then they may be considered as belonging to the same text type. Similarly, patterns of action in workplaces form action types. A *workpractice* is therefore defined as one or more texts types together with zero or more action types. For workpractice texts, there are three *analysis situations* that can occur when collecting texts associated with workpractices. The first is the so-called *text situation*, which produces a record of language-in-work, a direct text in the form of a spoken language transcript or a written document. The second analysis situation is called a *non-text situation*, which produces an indirect text or language-about-work. Finally the most difficult analysis situation to deal with is the *empty corpus situation* in which no texts are available and the work must be either observed or inferred. Each analysis situation provides different combinations of deliverables; see Clarke (2003).

It is the contextual properties of texts that are of particular importance in studies of information systems in organisations. Methods are available to describe the actual communicative pattern for a text type, known as *genre*. The category of genre in systemic semiotics, akin to Wittgenstein's *language games* or Peirce's *habits*, is defined as a conventional pattern of communication associated with specific cultural, national, and institutional contexts. There are at least three kinds of commonly reoccurring genres including the Service Encounter, and two families of genres called Activity Structured Factual Genres, and Non-Activity Structured Factual Genres relevant here. The immediate situational context can be recovered from texts using three methods that collectively form *Register- field* involving social actions and activities, *tenor* which describes social participants and roles, and *mode* describing how language effects the situation. Direct texts can be analysed using these sets of methods. However, the generic options change for indirect texts. By definition indirect texts cannot possess the generic structure of a service encounter. They can however possess the generic structure of any of the narrative family of genres, an option not available for direct texts. No texts are available for analysis in empty corpus situation and frustratingly these are precisely the kinds of situations we expect to occur when systems features are no longer being

used. In this case, our options are limited. We can attempt to infer the social actions and activities and role relationships that may be occurring by examining program code for example. The staging may be represented as a *qualitative digraph*. It may also be possible to infer the role relationships that would support the staging. *Actions* are handled in the same way as empty-corpus situations through direct observation and in some cases by reconstructing activities. Further descriptions of the discursive relationships between language and action can be found in Clarke (2003). We can subdivide actions into *proxemic acts or types*- these correspond to concrete or material actions in workplaces, and *chronemic acts or types* that are time or event-oriented and which are useful for describing amongst other things keystroke sequences in the operation of computers.

We can classify system features into one of two types, those that exist to support the system itself or *technical infrastructure* and those required to support *organisational workpractices*. A feature is *commissioned* when it becomes available for use by users of the system and *decommissioned* when it is no longer available to the users of the system in which the feature was available. The code to implement a feature may still reside in the system, but from the point-of-view of the users it has been rendered obsolete. If a feature is *effectively decommissioned* then in principle it is still available to its users, but is either never or rarely used. We can distinguish between two different types of effective decommissioning, the first is when a feature is still available to its users, but because it is irrelevant to current operations, is never or rarely used in current practice. When an alternate system is available and preferred, then the original feature is said to be *functionally redundant* since the functionality provided by the feature is no longer required or has been made irrelevant in current practice. The second type of effective decommissioning is when a feature is still available for use by its users, but if selected would fail to complete its intended function. The feature may provide misleading information, or it may cause a system failure. In either case the feature is said to be *dysfunctional*. If new systems are developed we can describe a functionally redundant feature as having been *migrated* to it.

Using systemic semiotics we can see workpractices being decommissioned, as well as existing workpractices being recommissioned or preserved in subsequent systems. We can also see workpractices being developed and changed over time in more than one system. Because workpractices are theorised in relation to organisational contexts (texts in contexts) we are in a position to be able to explain the structural and functionally shifts that are evident when systems replace one another in workplaces. We can also describe the processes of change and replacement at the system level. When we see similar register or generic features being re/produced across systems this is evidence for what is referred to here as *systems persistence*. The complementary point of view, and one which is easier to consider because it seems to reify the objects of investigation, is referred to as *system succession*- when one system replaces another in a given organisational context. A systemic semiotic approach shows some unusual kinds of system succession, rather than just simple replacement. In the next section we describe the results of applying systemic semiotic methods to a set of related (manual and computerised) applications developed to support the provision of computing services, in particular, access to software to users at the Microcomputer Laboratories, University of Wollongong. But before we can use these concepts we need to develop descriptions of how these systems behave communicatively by reference to how they function in organisations contextually.

3 Computing Service Provision 1: Situational Context (Register Features)

The Microcomputer Laboratories developed a range of related systems to support the provision of computing services to its users. These systems include the so-called Ad-hoc System, the Manual System, the Automated Library and Borrowing System (ALABS), and the LOGIN system (developed after the facility was fully networked). Initially we describe the register features of these systems, which enable these systems to be related to their immediate situational contexts. Register features include the social actions and activities (field) supported by the candidate system, the role language plays in the conduct of the workpractices (mode), and the social subjects and role configurations (tenor) reproduced by it. Register features tell us a considerable amount about a system. While system networks are usually applied to describe field, we also use them to show tenor relations because information systems are productive of complex relationships between social agents in workplaces, especially if these systems are integrated into many aspects of the organisation's operations.

3.1 Ad-hoc System

The *Ad-hoc System* was a prelude to formalised workpractices and was developed from the middle of 1981. By the end of that year, it comprised a catalogue and (small) listing of the software holdings. The software that could be 'loaned' was able to be stored in a small number of boxes on the operator's desk located in one of the laboratories. The software was simply provided to those who needed it, or the users could browse the software themselves. An honour system existed for the return of items; users often returned software by placing it on the systems operator's desk when they were done. A simple loan field taxonomy describing the social actions and activities instantiated by the Ad-hoc System would include a shallow subsystem for software category and one for the various machines held in the facility, with users selecting from both these systems. The System Operator was involved in purchasing or acquiring software and they also used it. In general the software holdings consisted of programming languages, system utilities, or educational games and bespoke programs developed by school teachers and which represented the interests of the School of Education that financed the facility. Since most software was in the form of 'backups', multiple copies of the associated documentation were unavailable.

The tenor relations were in the form of a simple Customer (User) and Server (Systems Operator) dyad that was to be reproduced across all four systems considered here, see Figure 1a. But of these systems, this one presents us with a (tenor) situation that is the least formal- customers and servers exhibited relatively equal power, frequent contact, and relatively high levels of affective involvement typical of work colleagues. Users were primarily academic staff or the occasional graduate student. The number of users was so small that the System Operator merely memorised what software was currently in use. Not surprisingly from the point of view of mode, the system permitted close spatial/interpersonal distance, 'loaning' and 'returning' involved visual/aural feedback and immediate feedback between the interactants. These workpractices make language accompany the social process- a view of language as action. For analysts this was the least interesting of the systems considered here, but for its participants it representing the most pleasant working environment! This system was still in use by late 1984, but the facility was now supporting more students. With an immanent organisational restructuring which would see large numbers of users from the Commerce Faculty, this system needed to be replaced.

3.2 Manual System

The *Manual System* was an interim system introduced in early 1985 just prior to the commissioning of ALABS, and was introduced when the facility had became the responsibility of the Commerce Faculty. This system helped Labstaff to explore workpractices that were to be implemented in its successor. The patterns of communication instantiated as the informal service encounters of the Ad-hoc System became formal features of the Manual System. The Manual System mirrored the actual Loan and Return workflow but unlike the Ad hoc System, these workpractices were engineered to complete a written audit trail for the transaction using a contract binding the action of borrowers. A single Loan Form was used for each client. It had a section on it to record what was borrowed and another to record what was (hopefully) returned. Through the use of a single written Loan Form, clients were reminded of their obligations to return undamaged all items. The emphasis in operation moved from user assistance to the enactment of loan and return activities in the shortest time possible.

The tenor relations are more complex in the Manual system than the Ad hoc system that preceded it on both sides of the Customer-Server dyad. The Manual System first constructs and then reproduces strict distinctions between various classes of users (Students, Staff and Tutors) by applying different regulatory conditions to each (see Figure 1b). To handle increases in the number of users, additional employees are added to the facility and a management hierarchy (Operations Supervisor, Laboratory Assistant and Trainees). Along with the unequal, hierarchical power between Customers and Servers came relatively infrequent contact and low affective involvement. Therefore by definition this system transformed a relatively informal usage situation into a formal one. Mode is identical to that established in the Ad-hoc system. There is close spatial or interpersonal distance, with visual/aural feedback and the potential for immediate feedback between the interactants. In terms of experiential distance, language accompanies rather than constitutes the social process.

3.3 Automated Library and Borrowing System

ALABS was commissioned in 1986 to support the operation and management requirements for the loan and return of software, hardware and documentation to students and other clients of the laboratories as well as providing management information in the form of statistical and graphical reports. At the time ALABS was developed, networking of the Microcomputer Laboratories had not yet occurred. Therefore ALABS was designed as a standalone system and consequently all loans and returns were conducted through a centralised service desk instigated when the Manual System was used. ALABS employed barcodes to uniquely identify all its users- student ID cards provided a unique form of student identification, while internally produced barcodes in a Barcode Book provided Staff and Tutor identification. Barcodes on internally generated Labpasses provided the ability to allocate students to machines, while all items that could be borrowed including software, hardware and manuals (audio-visual, materials) also had barcodes affixed to them. As with the Manual System, the loan and return of materials was conducted using service encounters, but barcodes enabled these to be conducted rapidly and as a consequence this aspect of the system was raised to the level of an art form; see section 4 for further details.

ALABS used almost identical tenor relations as those installed by the Manual system. The only difference involved the sub-classification of Staff into Normal and Long (term) loans in Version 2, based on complaints made by staff who were borrowing software for use in

teaching subject and who were getting regular weekly reminders of overdue loans in their mailboxes (Clarke 2000). This feature was actually decommissioned from ALABS in Version 4. These workpractices exhibit close spatial or interpersonal distance- visual/aural feedback with the potential for immediate feedback between the interactants. Here language accompanies the social process. Therefore in terms of Mode, ALABS is identical to the Manual and Ad-hoc systems that preceded it.

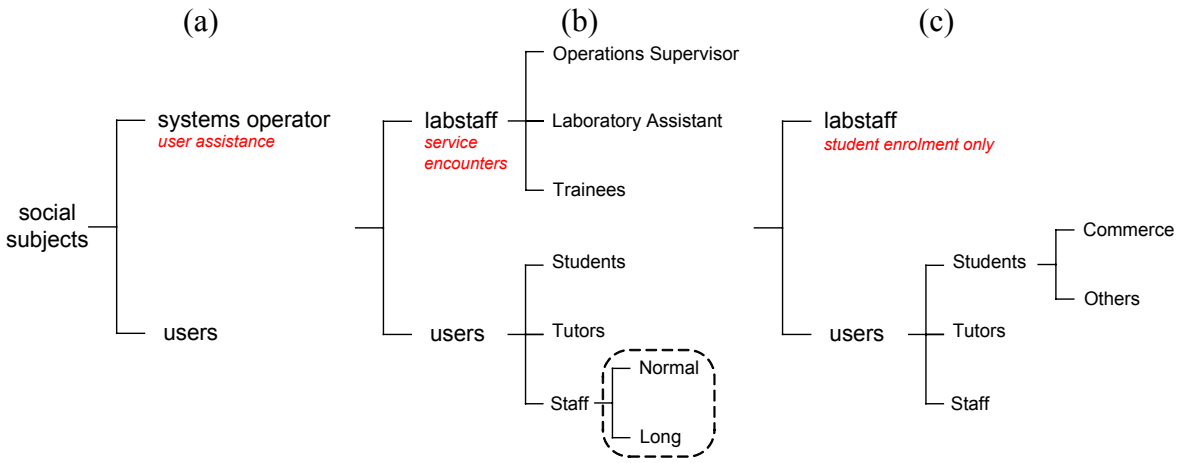
ALABS survived three platforms and three language changes. Its success is indicated by the fact that it has been in continual use in one form or another for 13 years. However, when the Laboratories were eventually networked, many of the functions that ALABS performed have become irrelevant to the operations of the facility. By this stage the loan and return activity (documentation) was so low that casual staff would often simply hand over items to users, echoing the early days of the facility and the Ad-hoc. ALABS has become effectively decommissioned with the exception of the Accounts subsystem, described below.

3.4 LOGIN System

The *LOGIN System* was commissioned in 1992 to run on Novell networks and it is still in use although it has been rewritten several times to move from DOS to various flavours of Windows. Students gain access to network-based software by entering a login and password and then selecting the subject code/name, which gives them access to folders containing relevant network based software.

The network based LOGIN system saw major changes in the simple Customer and Server dyad that had been a feature of all previous systems at the facility; see Figure 1c. This system computerised the loan and return workpractices that had been carried out by Labstaff, and as a consequence reduced their role in daily operations to that of exception handling: the enrolment of late students or the provision of new passwords or reinitialising accounts when necessary. Concerns over who pays for network software licenses caused a distinction to be made between Commerce Faculty students and other faculty's users, see Figure 1c. Supporting commerce subjects reduced the costs of providing networked software; non-commerce students used University-wide resources (for example, Word processing software) by means of 'guest' accounts. Despite changes to the configuration of social subjects, for the most part tenor remains unchanged from ALABS; for example, there is still a full complement of features that describe a formal language situation.

Figure 1: **Configurations of Social Subjects across the (a) Ad-hoc System, (b) the Manual System and ALABS, and (c) LOGIN at the Microcomputer Laboratories. The Manual and ALABS systems share social subject with the exception of sub-network indicated by dashed lines that is specific to ALABS (see text).**



The implications of the computerisation of loan and return workpractices are two fold. The first implication relates to how *language* is involved in the workplace. The mode of these workpractices has shifted dramatically from 'speech' to 'writing'. As a consequence, the spatial or interpersonal distance has shifted to the middle of this continuum away from the prospect of feedback and interactivity towards a situation where there is no visual or aural contact and no possibility of immediate feedback when conducting the workpractice. Information technologies can exhibit complex modes, usually clustering around the middle of this continuum (Eggins 1994). The second implication relates to the distribution of proxemic and chronemic *actions* (Clarke 2003). Simple chronemic acts once performed by Labstaff selecting options from ALABS menus are now performed by Users nominating software to use from the network based LOGIN system. While these changes may appear to be trivial, they act to diffuse action into the User population, and release the Labstaff to undertake duties other than service provision. Efficiencies in workpractices computerisation are gleaned from just these kinds of changes. In the case of LOGIN these efficiencies involved a number of interrelated changes including a change from a text situation to a non-text situation, the removal of all proxemic acts, swapping who conducts the chronemic acts (Users not Labstaff), and a shift to decentralised rather than centralised service provision afforded by the use of networking technology. It is not by chance that networking technologies were implemented in the Microcomputer Laboratories, but these are the effects of this choice on the patterns of communication that construe work for social subjects in this organisational context.

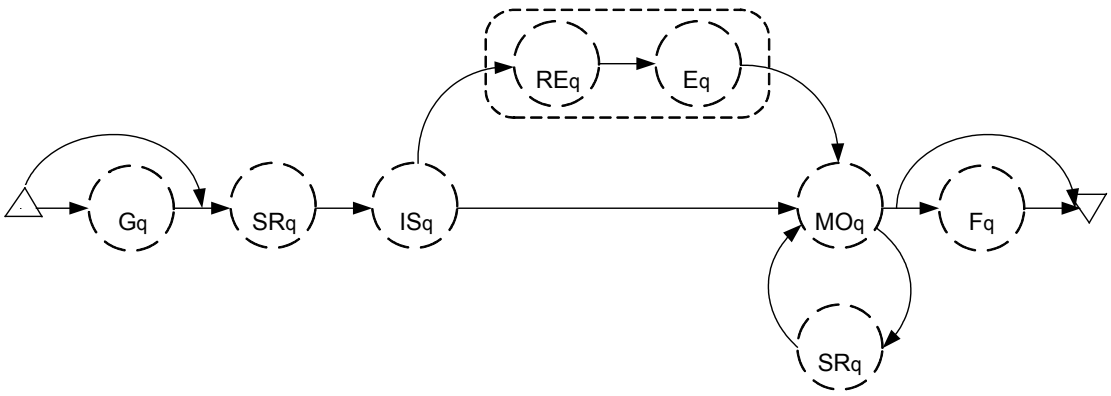
4 Computing Service Provision 2: Cultural Context (Genre Features)

An overview of some generic features associated with these systems is provided below. Following Candlin and Maley (1996, 14), three broad approaches to the analysis of generic structures have been proposed in the systemic literature (Fairclough 1995) including linear and sequential schematics with recursion and optionality (Hasan 1985) complex schemata permitting functional complexity and/or embedding (van Leeuwen 1993; Unsworth 1996, 79) and polyphonic heterogeneity comprising intertextual elements. These three aspects of generic structure are compatible with each other within systemic semiotics (Clarke 2001).

Ad-hoc System: When the provision of goods (materials) occurred between a user of the facility and the Systems Operator, both utilised the only linguistic resource available for demanding and offering goods and services, the service encounter genre. However, the Ad-hoc system had no explicit Loan and Return practices and any pragmatic exchanges were embedded within casual conversation. Casual conversation consists primarily of chat stages, stretches of language typified by fluid interpersonal negotiation (Eggins and Slade 1997, 1). Interspersed within casual conversation are stretches of language called *chunks*, which are both pragmatically focused and generically organised. Consequently, the users and Systems Operator realised these service encounters as chunks within casual conversation. This accords with participant observation (by the author) and interview evidence supplied by the Systems Programmer (McGrath 1998). The *Manual System* was the first system to formalised the use of service encounters as a means to conduct service provision at the Microcomputer Laboratories, amongst these were the Student Loan/Return, Tutor Loan/Returns, and the Class Loan/Returns, conducted at a specially created centralised Service Desk. With respect to the loan of items to Students, the loan also included the possibility of enrolment.

ALABS formalised the loan and return features of the Manual system by separating out the Conditions of Loan into a separate written language regulatory genre signed by the student at the beginning of teaching and witnesses by the Labstaff member before being placed on file at the facility. The Student Loan genre digraph is provided in Figure 2 and is indicative of this workpractice through all four versions of the system. All student loans had an inbuilt generic side sequence that enabled Labstaff to enrol students onto ALABS. The enrolment generic-side sequence consisted of an element in which the Conditions of Loan document was completed, the Regulations element (RE). The information provided by the student was entered into the system (E). Students could subsequently borrow items. The genre structure that enabled them to do this is depicted in Figure 2a. An optional Greeting element (G) was followed by a Service Request (SR) element. Labstaff would request and scan the Student's Identification Card (IS). Material would be provided (MO), followed by one or more subsequent requests for service (SR) and then an option leave taking stage. G and F are phatic elements. These workpractice genres were modified over the course of the four versions of the system. For more information on these workpractices see Clarke 1996, 2000, 2001).

Figure 2: **Student Loan workpractice of ALABS Version 1. For an explanation of diagramming conventions see text.**



With the advent of the *LOGIN*, students seeking to use the facility needed to have an account, although commerce students (who were not late in enrolling) would have their accounts set up automatically. All other students were enrolled at the laboratories office and the student

requiring a valid Student Identification Card. A first time user had the password for their account set to their student number and so a new password must be entered and then re-entered for verification. First time users also needed to select from a faculty/department list to nominate the area of their major. Once a user has been registered they can log onto the networks. The log on procedure first involves entering a valid student name and password. Clicking on the login button provides access to standard university wide applications. The login dialog also has a check box called Subject Login that provides access to applications allocated to a particular subject. Interestingly, Labstaff operating ALABS would use a course code and name to determine what software a student might need if they were not sure of what to borrow (Clarke 1996). What was once a *repair strategy* for an unrealisable element in the ALABS Student Loan service encounter genre was now a compulsory stage in gaining access to network-based software using LOGIN. Clicking on the Subject Login check box displays a network application launcher screen divided into two panes. The left-hand pane displays a tree of folders, and the right hand side pane are presented on the relevant application icons. Clicking on one of the folders displays the relevant applications that are available, and double clicking one of the icons launches the application.

Structural similarities exist between the Student Loan in ALABS Version 1 and the Student Login of the LOGIN system. The only system features that were commissioned in Version 4 of ALABS were the Accounts subsystem, and its database included a record of all valid users for a given period (normally the academic year). The Account database was used by the LOGIN system to determine if those attempting to log into the networks were valid users. These details were supplied at the beginning of each semester by Student Administration and were uploaded to the ALABS Accounts table by the Labstaff once the student enrolment period was complete.

5 Relationship between System Succession and Persistence

Various studies have shown that genre assemblages construct a kind of 'ecology' that assists in the production and reproduction of its constituent genres, and by means of its intertextual mechanisms enables related but none-the-less distinct workpractices to coexist together within similar situational contexts. This has been invoked to explain why systems can persist as recognisable complexes of workpractices in the form genre assemblages for significant periods of time. One aspect of the *persistence of systems* is that these assemblages can collectively exercise a kind of *generic inertia* in a workplace, acting to damp down the introduction of newer system features that don't share the same contextual features. The Student Loan/Return workpractices of ALABS Version 3 may illustrate this point. This genre assemblage formed between Labstaff and Students consisted of six distinct workpractices realised using spoken language service encounters (Student Loan, Student Return, Student Append, Student Renewal, Student Move and Student Booking) and one regulatory genre, the Conditions of Loan form. These genres vary in field only and in some cases not by much, but each contributes a distinctive and useful component to the meaning potential instantiated by the system in its organisational context. The tenor and mode relations are essentially identical across these genres. Any hypothetical new workpractice in which the power continuum between student and labstaff was suddenly equal, or that required new roles be assigned which brought students and labstaff into frequent contact- would be simply unthinkable, except perhaps as a bad joke, because such a workpractice flies in the face of the formal social occasions (unequal, hierarchical power; infrequent one-off contact, and low affective involvement) reinforced by all the other workpractices in this assemblage. This is one reason why particular workpractices, and indeed entire subsystems or systems themselves, can be remarkable difficult to remove entirely from workplaces and can resist change.

The persistence of genre assemblages is also *productive*. It suggests that new workpractices will have the best chance of entering into *metastable relationships* with other related workpractices if they share similar contextual features. New workpractices can be quickly included into an existing genre assemblage if the contextual features are compatible. One example of this is the Student Append workpractice that allows extra items to be loaned to student who already has an active Student Loan. This so-called Dependent Service Encounter was not planned in Version 1 as the need for it was not anticipated by its developers. However it was very quickly added soon after ALABS became operational. When new workpractices are incorporated into a genre assemblage, the composition of the assemblage may become unstable leading to the additional rounds of commissioning or decommissioned until a new set of metastable relationships is established.

The concepts of persistence and succession operate at a range of different levels, at the micro-level of individual workpractices within a system, at an intermediate level across multiple versions of a system, and at a macro level across multiple systems. Here, both persistence and succession are defined socio-semantically and contextually in contrast to traditional accounts of system change and replacement that force us to reify systems. The Ad-hoc, Manual, ALABS and LOGIN systems provide examples of many types of system succession.

Explaining System Succession

Using conventional system change and replacement approaches, the Ad-hoc system looks as if it is neatly and cleanly succeeded by the Manual system and in fact it might be argued that the Manual system was in some way better fit to these tasks than its predecessor. This kind of narrative about systems change and replacement relies on technological determinism. A socio-semantic and contextual approach to system succession can provide good explanations as to why one system succeeds another in the ways that they do. For example the Ad-hoc 'loan and return' chunks within casual conversation were replaced by more formalised system workpractices involving explicit loan and return service encounters. In the face of a significantly larger user population, and therefore a larger investment in human capital to service them (Labstaff) a move from an informal to a formal situation with respect to register was completely predictable. This example of system succession explains the contribution of the Ad-hoc system to the Manual system, and the centrality of communication in the provision of items to users.

Another interesting arrangement involves the replacement of the Manual System by ALABS. Conventional histories of systems change and replacement may simply emphasise the obvious advantages rendered by the technology (for example the ability to produce reports and statistics). But a *socio-semantic and contextual approach to system succession* enables a more detailed analysis of the structure and function of workpractices. An interesting example is the significant changes in loans and returns between the Manual and ALABS system. The loan and return in the manual system was conducted using a single form for each transaction and the rules were listed on this form as well. In ALABS the loan and return were two separate spoken language genres and the rules where consolidated into a separate written Conditions of Loan genre. This form was only signed once but its conditions applied across all subsequent loans for that session. This represents an interesting shift in semiotics to a situation in which the obligations of being a student are not negotiated each time a loan is conducted.

There are three aspects to the effective decommissioning of ALABS. As the technology shifted from a centralised stand-alone system to a range of network-based and more recently web based distributed systems, there has been a corresponding shift from text situations involving service encounters and a variety of written texts to non-text situations. This shift from text to non-text situations has caused the removal of the small amount of proxemic actions supported by ALABS. Also, the large number of chronemic actions enacted by Labstaff during the operation of ALABS has now shifted to the enactment of a small set of chronemic actions. With the removal of service encounters, Labstaff are now involved almost entirely in chronemic actions associated with the support of the technical infrastructure associated with networks and the Internet. Students on the other hand are involved in chronemic actions associated with selecting, as well as using software located on Microcomputer Laboratories file servers.

Systems can appear to be 'brittle' in that when the decommissioning of a system begins to take place it may precede very rapidly. Table 1 shows the ALABS system features- all 104 of them over the course of its useful life- classified by version and according to whether they were workpractices designed at serve an organisational need (indicated by *o*), like loaning items to students or placing a student on an offence database for having an overdue loan, or whether the workpractice was designed to support the technical infrastructure, like 'packing' or compacting a database or changing system parameters (indicated by t). There was a relatively rapid commissioning phase for ALABS features. About 36% of the total features commissioned in ALABS were introduced in Version 1, while 50% of all features were commissioned in Version 2. No new features to support ALABS technical infrastructure were commissioned after Version 2. Version 3 circa 1988 saw the introduction of only 11 new system features, but for the most part these belonged to a single Statistics subsystem designed to provide graphical outputs for management reporting, which had been planned but not implemented since the commissioning of ALABS. Version 3 in operation for about 5 years represented a period of relative metastability for the genre assemblages involved in provision of loan return services to various classes of social subject. Version 4 had the smallest number of system features commissioned- at just under 4%. More interestingly, while in the first three versions of ALABS there were no system features actually or effectively decommissioned and none migrated to other systems, Version 4 of ALABS saw 25% of its system features actually decommissioned, over 30% effectively decommissioned and 15% of its features migrated to other systems. Version 4 therefore represents the point at which ALABS as a system becomes effective decommissioned.

Table 1: Commissioned and decommissioned (actual, effective, and migrated) ALABS system features across all versions.

5.1.1.1.1	Commissioned +				5.1.1.2 Decommissioned					
					Actual x		Effective –		Migration *	
	o	t	Σ	%	o	t	o	t	o	t
1	*19*	18	37	35.6	0	0	0	0	0	0
2	34	18	52	50.0	0	0	0	0	0	0
3	11	0	11	10.6	0	0	0	0	0	0
4	4	0	4	3.8	23	3	16	16	9	7
ΣΣ	68	36	104	100	**Σ**26 25**%**		**Σ**32 30.7**%**		**Σ**16 15.3**%**	

System Succession without Systems Changeover

While ALABS is effectively decommissioned, there is one place where it is still absolutely essential and that is in providing lists of valid Students Users for the LOGIN system. But why is this case? Why not just migrate the enrolment functionality out of ALABS and re/commission it LOGIN? Why set up the new functionality of ACCOUNTS in ALABS at all? It is as if we have System Succession without Systems Changeover. This is an example of the advantages of having a socio-semantic and contextually based theory of system changeover and replacement. The reason why this functionality was added to ALABS is that 'enrolment' goes with backup and reporting. In other words, the Loan and Return genre assemblage was supported by additional workpractices that supported the technical infrastructure and also connected the Loan and Return activities to other potentially useful system features like reporting. As has been described earlier, the ALABS Student Loan workpractice has been superseded by a Student Login workpractice, but ALABS could still support useful aspects related to enrolment and so there was no need to cutover from one system to the other. The strangeness of this situation is understood by the developers at the Microcomputer Laboratories who are developing new applications that may end up eventually completely decommissioning ALABS in the operations of the Microcomputer Laboratories; see Table 2 for a recent applications portfolio. The Central Administrative System (CAP) currently under development will recreate some ALABS features, particularly the Accounts features. CAP will also manage information concerning subject accounts, which were the responsibility of the LOGIN systems. The functionality of the ALABS Statistics Menu features was migrated to the LOGIN systems and the Software Metering Program (SMP). Interestingly, ALABS will still provide Loan and Return workpractices for Staff as well as providing a central repository of item holdings for the Microcomputer Laboratories. It appears very difficult indeed to actually decommission all of the ALABS functionality from the workpractices of the Microcomputer Laboratories although the emphasis on systems development will shift to supporting the teaching process.

Table 2: Current Applications Portfolio at the Microcomputer Laboratories

Group		Applications
1	Network Support	Printer Management System (PQ) Version 2.0d PQ allows the MicroLabs staff to examine and manipulate jobs on the printer queues of the interconnected Novell file servers. First commissioned in 1992.
2	Teaching Support and Administration SUBMIT Version 2.01 and QUIZ Version 2.0 are to be actually decommissioned and replaced by SUBMIT 2000 an internet based application.	SUBMIT Version 2.01 (Microcomputer Laboratories 1992) Server-based assignment submission system, extended to include automated assignment marking and distribution of lecture materials. First commissioned in 1988.
		QUIZ System Version 2.0 Server-based student multiple choice quiz system. First commissioned in 1989.
3	Network-based Applications (replacing ALABS functionality)	LOGIN System Version 1.1 for DOS A server-based login system running under DOS (Dodds and Athanasiadis 1995), first commissioned in 1992 when the Microcomputer Laboratories relocated to Building 40.
		LOGIN System Version 1.0 for Windows 95 Same as above but for Windows 95 operating system
		Software Metering Program (SMP) Version 1.4 Network license management system, first commissioned in 1995.
	TES is effectively decommissioned. Parts of it are used to add late enrolments not conducted through TPS.	Tutorial Enrolment System (TES) Version 2.2 (first commissioned Microcomputer Laboratories 1990)
		Tutorial Preference System (TPS) Version 2.0 A web-based preference selection system for tutorial places, first commissioned in 1997.
	CAP is still underdevelopment and is slated for release in 2000.	Central Administration System (CAP) Version 0 Supports student accounts currently implemented with ALABS Accounts feature. This system will also support the Student Loans (manual) currently conducted with the ALABS Student Loan feature. It will be designed to support the management of subject accounts currently conducted through a feature in the LOGIN system. This system will replace PQ.

6 Conclusions and Further Research

An approach to systems change and replacement has been described using systemic semiotics that does not attempt to deny the role of human agency nor reify the systems undergoing the change processes. As a communicative, contextual and socio-semantic approach, systemic semiotics enables us to better understand how new technologies function in workplaces, at various levels including at the micro-level of individual workpractices, the intermediate level across multiple versions of a system, and at the macro-level across related sets of systems.

Systems succession can be seen less as the replacement of one system with another (reification) but by how one system opens up a meaning potential in an organisation in terms of establishing and reproducing register patterns including the actions and activities, the social

arrangements of participants and utilisation of language resources as well as the staging of the work at hand. The reasons why some workpractices and their attendant systems features and systems (in the case of ALABS) persist are connected to the metastability that can be found in the genre assemblages themselves. Unusual modalities of system succession that can be revealed by these methods and the associated theory including the actual contributions that 'relict' workpractices from bygone systems can make on currently operating systems.

Acknowledgements

Occasionally when you are responsible for teaching you realise that some cohorts actually take seriously their responsibility to learn. I remember with satisfaction the work of Robert Bujaroski and the class of BUSS 906: Information in Organisations, delivered during the Autumn Session of 1998 at the Department of Information Systems, University of Wollongong, Australia and acknowledge their efforts.

References

Auramaki, E.; Hirschheim, R. and K. Lyytinen (1992) "Modelling Offices Through Discourse Analysis: The SAMPO Approach" *The Computer Journal* 35 (4) 342-352

Auramaki, E.; Lehtinen, E. and K. Lyytinen (1988) "A speech-act based office modeling approach" *Transactions on Office Information Systems* 6 (2) 126-152

Austin, J. L. (1962) *How to Do Things with Words* Oxford: Oxford University Press

Candlin, C. N. and Y. Maley (1996) "Generic Heterogeneity in the Discourses of Law and Dispute Resolution" *23rd International Systemic Functional Congress (ISFC23)- Abstracts*, University of Technology Sydney, Australia July 15-19, 1996, p. 14

Clarke, R. J. (1996) "The Persistence of Systems in Organisations: Genre Analysis of Systems Decommissioning" in Holmqvist, B.; Andersen, P. B.; Klein, H. and R. Posner eds/ (1996) *Signs of Work: Semiosis and Information Processing in Organisations* Foundations of Communication and Cognition (Grundlagen Der Kommunikation und Kognition) Series, 59-91

Clarke, R. J. (2000) "An Information System in its Organisational Contexts: A Systemic Semiotic Longitudinal Case Study" *Unpublished PhD Dissertation* Department of Information Systems, University of Wollongong

Clarke, R. J. (2001) "Social Semiotic Contributions to the Systemic Semiotic Workpractice Framework" *Sign System Studies* 29 (2), pp. 587-605

Clarke, R. J. (2002) "Intertextuality at Work: Large-Scale Structure of Information Systems" in Clarke, R. J.; Liu, K.; Andersen, P. B. and R. K. Stamper eds/ (2002) *Organising Signs: Studies in Organisational Semiotics 2*, Information, Organisation and Design Series, Kluwer Academic Press

Clarke, R. J. (2003) "The Discursive Organisation of Action and Language in Workpractice Descriptions" in Goldkuhl, Göran; Lind, Mikael and Pär J. Agerfalk eds/ (2003) *Action in Language, Organisations and Information Systems* (ALOIS 2003), Linköping, Sweden, 12-13 March 2003, pp. 155-172

de Moor, A. (2000) "The Initialization of Conversations for Specification: A Context of Social Norms" in Schoop, C. Q. M. ed/ (2000) *Proceedings of the Fifth International Workshop on the Language-Action Perspective in Communication Modelling (LAP 2000)*, Aachen, Germany, pp. 1-20

Dietz, J. L. G. (1994) "Business Modelling for Business Redesign" *Proceedings of the Twenty-Seventh Hawaii International Conference on System Sciences, 1994. Vol IV: Information Systems: Collaboration Technology, Organizational Systems and Technology*, IEEE Press, pp. 723-732

Dietz, J. L. G.; Goldkuhl, G.; Lind, M. and V. E. van Reijswoud (1998) "The Communicative Action Paradigm-An Agenda" *Proceedings of the Third International Workshop on the Language Action Perspective on Communication Modelling (LAP'98)*, Stockholm, June 25-26, 1998

Eggins, S. (1994) *An Introduction to Systemic Functional Linguistics* London, United Kingdom: Pinter Publishers Ltd.

Eggins, S. and D. Slade (1997) *Analysing Casual Conversation* London and Washington: Cassell

Fairclough, N. (1989) *Language and Power* Chapter 2: Discourse as Social Practice London: Longman 17-42

Fairclough, N. (1995) *Critical Discourse Analysis* London: Longman

Fawcett, R. (1986) "Forward" in Ventola, E. (1987) *The Structure of Social Interaction: A Systemic Approach to the Semiotics of Service Encounters* Open Linguistics Series, London: Frances Pinter

Foucault, M. (1972) *The Archaeology of Knowledge* Translated by A. M. Shendon Smith, London: Tavistock Publications

Freadman, A. and A. Macdonald (1992) *What is this thing called "Genre"? Four Essays in the Semiotics of Genre* Mount Nebo, Queensland, Australia: Boombana Publications

Goldkuhl, G. (1984) "Understanding Computer-Based Information Systems Through Communicative Action Analysis" *Human-Infological Research Group, Department of Information Processing (HUMOR), Chalmers University of Technology*, S-412 Göteborg, SwedenGoldkuhl, G. and K. Lyytinen (1982) "A Language Action View of Information Systems" SYSLAB Report No. 14; August 1982; *Third International Conference on Information Systems*, Ann Arbor, 13-15 December 1982, 24pp.

Habermas, J. (1987a) *The Theory of Communicative Action. Volume 1: Reason and Rationalization of Society* London: Polity Press and Basil Blackwell

Habermas, J. (1987b) *The Theory of Communicative Action. Volume 2: Lifeworld and System: A Critique of Functionalist Reason* London: Polity Press and Basil Blackwell

Halliday, Michael A. K. (1985) *An Introduction to Functional Grammar* London: Edward Arnold

Hasan, R. (1985) "The Structure of a Text" in Halliday, Michael A. K. and R. Hasan (1985) *Language, Context, and Text: aspects of language in a social-semiotic perspective* Geelong, Victoria: Deakin University Press, p.52

Halliday, Michael A. K. and Ruqaiya Hasan (1976) *Cohesion in English* London: Longman

Heap, G.; Stanway, J. and A. Windsor (1992) *A structured approach to systems development* Berkshire, England: McGraw Hill Book Company Europe

Hill, S. (1991) "Technological Change and the Systematisation of Organisational Culture" in Aungles, S. ed/ (1991) *Information Technology in Australia: Transforming Organisational Structure and Culture* Kensington: New South Wales University Press, 92-113

van Leeuwen, T. (1993) "Genre and Field in Critical Discourse Analysis: A Synopsis" *Discourse and Society* 4 (2), 193-223

Lehtinen, E. and K. Lyytinen (1984) "Discourse analysis as an information system specification method" *Proc. 7th Scandinavian Research Seminar on Systemeering*, Helsinki 26-29 August

Lehtinen, E. and K. Lyytinen (1986) "Action based model of information systems" *Information Systems* 13

Lundberg, M.; Goldkuhl, G. and A. Nilsson (1982) *Information Systems Development- A Systematic Approach* Englewood Cliffs, New Jersey: Prentice Hall

Lyytinen, K. (1985) "Implications of theories of language for information systems" *MIS Quarterly*, March

Lyytinen, K., Klein, H. and R. Hirschheim (1991) "The effectiveness of office information systems: a social action perspective" *Journal of Information Systems* 1 (1) 41-60

Martin, James R. (1992) *English Text: System and Structure* Philadelphia and Amsterdam: John Benjamins Publishing Company

McGrath, A. (1998) *Personal Communication*

Nicastri, C. (1999) *Personal Communication*

Pap, L. (1991) *Semiotics: An Integrative Survey* Toronto Semiotic Circle, Victoria College in the University of Toronto Monograph Series of the TSC, Number 7

Pipek, V. and V. Wulf (1999) "A Groupware's Life" in Bødker, S.; Kyng, M. and K. Schmidt eds/ (1999) *Proceedings of the Sixth European Conference on Computer-Supported Cooperative Work* 12-16 September 19999, Copenhagen, Denmark, The Netherlands: Kluwer Academic Publishers, 199-218

Searle, J. R. (1969) *Speech Acts- An Essay in the Philosophy of Language* Cambridge: Cambridge University Press

Searle, J. R. (1980) “The Background of Meaning” in Searle, J. R.; Kiefer, F. and M. Bierwisch eds/ (1980) *Speech Act Theory and Pragmatics* Dordrecht, Holland: D. Reidel Publishing Co., 221-232

Thibault, P. J. (1991) *Social Semiotics as Praxis: Text, Social Meaning Making, and Nabakov’s Ada* Theory and History of Literature, Volume 74 Minneapolis: University of Minnesota Press

Todorov, T. (1984) *Mikhail Bakhtin: The Dialogic Principle* Translated by Wlad Godzich, Theory and History of Literature, Volume 13, Minneapolis: University of Minnesota Press

Unsworth, L. (1996) “Explanation genres in school science books: Issues of typology, topology and delicacy in descriptions of schematic structure” *23rd International Systemic Functional Congress (ISFC23)-Abstracts*, University of Technology Sydney, Australia July 15-19, 1996, p. 79