Ethnography and survey analysis of a computer decision support system in urgent out-of-hours, single point of access and emergency (999) care.

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Glossary of terms/abbreviations

999	'999' emergency ambulance service
A&E	Accident and Emergency
AMPDS	Advanced Medical Priority Dispatch System
ANT	Actor Network Theory
CAD	Computer Aided Dispatch
CBD	Criteria Based Dispatch
CDSS	Computer Decision Support System
CfH	Connecting for Health
CMS	Capacity Management System
CPR	Cardiopulmonary Resuscitation
CQR	Continuous Quality Improvement
DH	Department of Health
EBM	Evidence Based Medicine
ED	Emergency Department
EU	European Union
EMSO	Emergency Medical Systems Operator
GP	General Practitioner
HIS	Hospital Information System
ICT	Information and Communication Technology
IT	Information Technology
M	Mean
NHSD	NHS Direct
NPM	Normalization Process Model
NPT	Normalization Process Theory
OOH	Out-of-hours service
PCT	Primary Care Trust
PCC	Primary Care Centre

PTS	Patient Transport Services
SD	Standard Deviation
SPA	Single Point of Access
STS	Science and Technology Studies
UCC	Urgent Care Centre
VDU	Visual display unit

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Executive Summary

Background

Digital information and communication technologies promise to modernise health care and reduce costs. Nonetheless, it has proved difficult to embed these technologies in everyday use. There is now an impressive body of international research which shows that the everyday processes of health care work and organization are central here. Digital technologies seek to change working practices and workforce configuration and – at the same time - they require concerted action by the health care workforce to bring them into use. However, whilst research has concentrated on how health care work and organization shape the outcomes of particular technological interventions, it has rarely explored the implications of these findings for workforce management and planning. This is in part because of a focus on understanding why an intervention does (or, often, does not) become embedded in practice; and in part because the case-study focus of previous research has not endeavoured to make wider, more systematic claims to inform workforce planning and policy.

Aims

This project aims to inform workforce planning and policy by undertaking a detailed comparative analysis of the workforce implications of a particular technology, a computer decision support system (CDSS).

Our objectives were to:

1) understand the impact of the technology on everyday work and service delivery;

2) identify education and training needs for staff engaging with the technology;

3) examine the implications of the CDSS for workforce reconfiguration and management planning.

Methods

To enable systematic cross-case analysis we used Normalization Process Theory (NPT) which offers a robust framework to analyse how technological interventions are used in different settings.

Our study combined ethnographic and survey methods to conduct three case studies of a CDSS in use.

The ethnography used non-participant observation, interviews and documentary research. These data comprise nearly 500 hours of observation conducted between 2008-2010; and 61 interviews with call-handlers, clinicians, organizational managers and stakeholders including policy-makers, commissioners and system developers. We collected documents describing the CDSS design, development and evaluation, minutes, training materials and publicly available policy documents, reports and media releases.

A survey of call handlers was conducted to record demographic information and to capture skills, experience and training and assess trust in the CDSS and the wider organization. A total of 166 questionnaires were distributed, with an email reminder after 3 weeks, and 103 (62%) questionnaires were returned completed.

Ethnographic data were coded independently, analysed jointly in data clinics and imported into Atlas.Ti. We examined data within each setting and then across settings structured around our research questions and Normalization Process Theory. We used a mixture of analytical approaches including thematic analysis and matrix/charting techniques to facilitate comparison.

Survey data were double entered in MS Excel, checked and corrected. The data were exported to PASW Statistics and descriptive statistics calculated.

Our methods were integrated developmentally: the ethnography informed the survey design which, in turn, supplemented the observation and interviews. We also combined data across methods to explore convergence and contradiction.

Results

We studied a CDSS designed to enable prioritization and management of telephone calls to emergency or urgent care services. It is almost exclusively used by clerical staff in our settings (although it can also be used by clinical staff).

Our settings were:

- An established emergency call-handling service provided by an Ambulance Trust (referred to as 999).

- A new single point of access call-handling service for urgent and unscheduled care provided by the same Ambulance Trust (referred to as SPA)

- An established out-of-hours call-handling service and face-to-face patient prioritization at an Urgent Care Centre, run by a GP out-of-hours service (referred to as OOH)

This same technology is used distinctively in each setting reflecting important differences between urgent and emergency care and the context of the work. There are differences in workforce characteristics (e.g. age, qualifications), roles and organizational hierarchies in the three settings. While there is a common training programme, training practice varies across the three settings.

We analysed our data using the four domains of NPT (*coherence, cognitive participation, collective action* and *reflexive monitoring*) and this also structures our longer report. The domain of **coherence** encompasses the ways in which an intervention is understood as meaningful, achievable and desirable and **cognitive participation** considers if and how the actors necessary to deliver the intervention are enrolled into action. These processes of sense-making and engaging a range of actors are essential to the third domain, c**ollective action** which focuses on the work that people do to bring an intervention or technology into use. The final domain of **reflexive monitoring** looks at the processes of appraisal and adjustment that are necessary to keep an intervention in place.

C*oherence:* was achieved around the CDSS even though local contexts varied considerably. Across all three sites, there was agreement that the CDSS was suitable for the (varied) tasks and that appropriate resources were in place to enable effective implementation, although these varied between settings. There were differences between settings where the CDSS replaced an established system with existing staff and where the service and/or the staff were new. Knowledge, experience and work identities built through doing call-handling work influenced the coherence of the CDSS for staff in different settings. Coherence was underpinned by wider understandings and discourses, notably about i) rationing ii) modifying caller/patient behaviour and iii) the legitimacy of evidence based medicine.

Cognitive participation: in all three settings key players were successful in enrolling a network of diverse actors – people and technologies - necessary to bring the CDSS into use. Managers in 999 and OOH had to work harder to enrol call-handlers and the CDSS developers had higher engagement with the 999 setting which helped build trust and foster enrolment and legitimation of the CDSS. Effort was expended in enrolling a range of staff

although not all staff were in the same position regarding the CDSS – for example call-handlers' enrolment was mandatory and they had very little power to resist its introduction.

Collective action: the work of organising and enacting CDSS call management and triage requires collective purposive action. In 999 call-handlers used the CDSS in the management, categorization and prioritization of emergency calls and it was viewed positively despite the apparent *intensification* of their work. In SPA the CDSS facilitates the management of urgent care calls, sorting by urgency and enabling referral to services and/or the giving of health advice. This work is *extended* beyond 999 work despite being similar. In OOH the CDSS managed calls to out-of-hours care and face-to-face attendees at an Urgent Care Centre. At OOH work was both extended and became more *scripted.* The operationalization of the CDSS has changed the work in each setting. Call-handling uses expertise based on discretion, negotiation and translation skills and it requires emotional labour. The skills created and sustained by introducing the CDSS include experiential, embodied and clinical expertise. Using the CDSS offered the call-handlers an identity as health workers and not as generic call centre operatives. Some existing divisions of labour and hierarchies were disrupted; for example, at 999 and SPA a new role – clinical supervisor – was introduced.

Reflexive monitoring: although similar monitoring, appraisal and adaptation mechanisms keep the CDSS in place, there were differences in how these mechanisms were operationalised across the three settings. Successful deployment of the CDSS entailed significant and long-term involvement from the developers including the need to adapt the system for each setting. All three sites devoted additional staff resources to support call-handlers, including clinical supervision (999 and SPA only) and audit and training staff. Audit processes were operationalised differently in OOH compared with 999 and SPA. Call-handlers understood the need for audit, and valued it. They trusted the CDSS, whilst recognising that it 'failed' in some circumstances.

Conclusions

The work of bringing the CDSS into use and maintaining its everyday use (*collective action*) was enabled by a range of actors who established *coherence* and secured buy-in (*cognitive participation*) and engaged in on-going appraisal and adjustment (*reflexive monitoring*). This effort has been expended to bring the CDSS into use and continues to be required to keep it in everyday use. The four constructs of collective action, coherence, cognitive participation and reflexive monitoring play out differently in each setting.

The CDSS must be understood both as a computer technology **and** as a set of practices related to that technology, kept in place by a network of actors in particular contexts. The CDSS changes call-handling work and creates a new worker identity (of health care call-handler) that needs to be recognised and supported. The three settings are characterised by different 'work' and different workforce characteristics. While there is a common core of training the content and format of this varies across the three settings. The skills and divisions of labour created and sustained by introducing the CDSS are not just those required to operate the computer system 'by rote' but are also about individual experiential, embodied expertise and team sharing of knowledge. While there may have been a vision of a clinician-free environment, two settings have found it necessary to introduce additional clinical supervision, and all three settings have expanded their workforce.

This report details three case studies where a CDSS has been brought into use and appears to have a strong chance of normalising (becoming routine). However, it is essential to recognise that this has been achieved, and will only continue to be maintained, by the efforts of those involved in the specific settings and if the wider context continues to support the coherence, cognitive participation, and reflective monitoring processes that surround this collective action.

Policy-makers and practitioners should recognise that although single technologies can be made to work in different settings, this takes more effort than simply slotting a technology into place. Not least, technological interventions may require new resources to support their effective use, for example, requiring new roles, new organizational functions and considerable management time, all – perhaps – on an on-going basis.

The Report

1 Digital technologies in health care: Promise, practice and workforce implications

1.1 Introduction

Digital information and communication technologies (ICTs) have been widely heralded as a way to modernise health care, promising to square the circle of fiscal control and rising costs and deliver high quality, cost effective, equitable health care[1-4]. However, the experience of embedding digital technologies into practice has been fraught with difficulty; despite impressive innovation getting technologies into everyday use is no simple matter.

There is considerable international research that seeks to account for the delays, compromises and failure that have characterised the introduction of digital technologies in health care[5-11]. Much of this points to the significance of embedded working and organizational practices in shaping outcomes[12-21]. Technological interventions do not slip seamlessly into established practice; they alter how health care work is undertaken and organized. Indeed, this is a significant part of the appeal for policy-makers and managers. To achieve change – to bring technologies into use - requires considerable investment and commitment, at the point of service delivery and beyond, by those who support, manage and fund this. Given that interventions commonly propose changes to working and organizational practices it is unsurprising that actors might not want to adopt new technologies or use them as originally intended.

Whilst it is clear that digital technologies propose change for the health care workforce and – at the same time - that the workforce is central to shaping the outcomes of technological interventions in health care, it remains unclear what the implications of these findings are for workforce planning and organization.

The aim of this project was to inform workforce planning and policy by undertaking a detailed comparative case analysis of a particular technology

focusing specifically on workforce questions. We used a robust theoretical framework which allowed us to generalise from our cases.

The remainder of Chapter 1 explores background literature and outlines our objectives and approach.

1.2 Digital technologies in health care: the promise

A great deal of hope, time and money has been invested in technological interventions for organizing and managing health care, especially ICTs: for example, gross spending on the national programme for IT in the NHS was £12.4 billion over ten years[22-23]. The Labour government understood that new digital technologies would

> … provide NHS staff with the most modern tools to improve the treatment and care of patients and be able to narrow inequalities in health … Our information strategy will help staff do the jobs they came into the NHS to do and to do them better.[1]

Similar claims were echoed elsewhere: one EU conference contributor described e-health as

> the most important revolution in health care since the advent of modern medicine, vaccines or even public health measures like sanitation and clear water[3].

The election of a Conservative-Liberal Democrat government in 2010 combined with serious economic recession seems likely to reduce NHS spending on ICT. The Conservative Manifesto[24] promised a public sector 'freeze on new IT spending' and 'changes to ICT procurement to deliver better value for money' and while this is not re-iterated in the coalition agreement[25] even if IT investment slows, the Coalition appear keen to promote the use of digital technologies. There is continued commitment to the National Spine electronic health care record, which – it is argued – offers individual patients more control over their health records, and to publishing hospital performance data on the web to offer greater transparency. More recently the government has announced a new 'single 3-digit number for access to every kind of urgent care' using a Computer Decision Support System and integrated database of services. Despite political and economic change there remains considerable optimism that ICT can deliver significant improvements to health care organization and delivery.

At the heart of this optimism lies the claim that digital technologies can help the NHS make more effective use of resources, particularly staff (currently some 70% of the NHS budget)[26]. There are three principal ways in which this might be achieved. First, digital technologies might be harnessed to

improve information and communication flows, raising productivity and enhancing quality (e.g. using centralised databases to integrate information and allow location-free access by multiple users to a single record). This has the advantage of allowing multiple clinicians to access and edit the same record and to access it instantly, rather than waiting for the (only) paper copy. Likewise internet search engines – such as NHS Evidence (http://www.evidence.nhs.uk) – can be used to access up to date research quickly to support clinical decision making and spread good practice.

Second – and linked to the previous point - digital technologies might enable changes to work practices and workforce configuration. There has been considerable enthusiasm for 'telemedicine' - harnessing digital technologies to offer remote consultations: doctors with particular expertise can 'see' patients from across the country[6] making service delivery to remote and rural areas more cost-effective[27,28]. Indeed, some have suggested that digitally enabled networks will 'rewrite' or improve existing organizational networks[29].

Better information and communication flows may also facilitate labour substitution: for example, nurses can lead routine clinics with remote medical supervision/support. Digitised clinical information can be transmitted to specialists so that expertise does not have to be co-located with clinics. Similarly, home-based sensors and monitoring allow patients with chronic conditions to undertake routine testing and/or data transmission, enabling remote monitoring by clinicians or clerical workers[30,31]. As more and more expertise is vested in technologies, it becomes theoretically possible to replace expensive clinical skills with cheaper staff.

Third, digital data offers new resources for organizing and planning health services. As activities become increasingly digitised, work leaves digital 'trails' offering managers extended information about everyday practice. This renders both individuals and work processes calculable, knowable and – perhaps – more governable. At the same time increasingly visible forms of surveillance may result in improved self-reflection and discipline by workers[7] thereby enhancing productivity.

The promise of digital technologies in health care is one of change: they enable work to be done differently, better and/or more cost-effectively. At the heart of these claims lie significant changes to established work practices and workforce configuration. Digital technologies can alter traditional divisions of labour, potentially reducing specialist staff inputs and reconfiguring roles and tasks to require fewer or different competencies. This, in turn, alters workforce training and education needs and impacts on how staff are recruited and retained. Technologies can also change how work is managed: digital surveillance and auditing provide precise

measurement and feedback about what workers do and open up opportunities to supervise and govern work differently.

1.3 Digital technologies in health care: the practice

Despite the promise of digital technologies in health care, a decade of research reveals a different picture. Research on telemedicine, telecare and health care information systems reveals unexpected and limited outcomes, failed and abandoned projects[5-7;9-11;32-35]. A range of explanations for these difficulties have been explored, for example cost effectiveness[36], professional engagement[37], patient satisfaction[38] and ethical difficulties[39] but it is clear that particular outcomes depend on the interplay between technologies and the workforce, and are made in the everyday conduct of health care work and organization[12-19;21].

This is, in part, because it takes so much work for technological interventions to come into use. They do not simply 'happen' but require commitment and action by those expected to bring them into everyday practice, including the provision of appropriate training, the integration of new interventions into wider technological and managerial systems or negotiation of contracts with suppliers[20].

More than this, research demonstrates that embedding technologies in practice is difficult because - intentionally or otherwise - technological interventions change work and organizational practice[21,40]. New technologies require new socially organized practice to enable their integration[41] and these often clash with established professional practices, roles and identities[13;34;42]. Often interventions that 'work' in one clinical speciality do not fit neatly with established practices elsewhere[43]: in psychiatry, for instance, co-presence has been represented as a therapeutic principle of the clinical encounter[44] but this may not be true for dermatology. Furthermore, technological interventions may disrupt inter-professional power relations. Research on the introduction of remote emergency medicine consultation shows how this disrupts established medical-nursing hierarchies, with nurses becoming more assertive when advising patients and increasing 'turn taking' between doctors and nurses[45,46]. Digital technologies also bring new forms of knowledge into play, and new 'players' - technical experts, risk managers and assessors[47]. The centrality of these new and/or increasingly powerful forms of expertise introduces new power relations, knowledge and identities into health care work and organization, fragmenting familiar boundaries. Indeed, in May and Ellis's study of a telemedicine intervention, even in the development phase there were contests between clinicians, technical experts and external evaluators 'over what kinds of knowledge and practice count'[6].

Beyond front-line service delivery, technological interventions can also change established organizational forms. Indeed, a central rationale for ICT initiatives is that they enhance organizational efficiency by improving management information. Such increased bureaucratization has been a source of tension between managers and professionals across the public sector since the early 1980s[48] and may conflict with professional imperatives [49,50]. As Doolin[7] explains, within information system architecture

> [s]ome activities are given existence and attention while others remain unrecognised, enabling managerial knowledge to make stronger truth claims (Boland and Schultze 1996) and engendering compliance in those subject to such scrutiny' (p 345).

Professional resistance to such systems may modify outcomes and disrupt power relations[7;51,52].

1.4 Implications for workforce management and planning?

It is clear that digital information and communication technologies hold considerable promise for the organization and delivery of health care and, at the same time, that bringing this to fruition is not easy. At the heart of *both* the promise and the practice lies the interplay between technology and the health care workforce. Yet the workforce management and planning implications of new technologies are seldom addressed by research.

This appears to be for two main reasons. First, the driver of much research into health technologies has sought to understand implementation processes. It focuses on why interventions do/do not get embedded in practice and does not extend this to think about strategic, political[53] or workforce issues. It is also characterised by an assumption that there is an 'it' (i.e. the technology) that is implemented – rather than seeing the ensemble of work practices and social relations that shape each other to bring a technology into use.

Second, research has tended to use case studies, focussing on specific occupational groups (e.g. doctors or nurses) and their response to particular technological interventions. This has been excellent at revealing the complex and particular processes that shape particular outcomes, but cannot offer systematic analyses for workforce policy and/or management. In addition, there are important differences between the ways that social and management scientists understand these processes - for example, between proponents of micro-level studies that draw on Science and Technology Studies (STS) and Actor Network Theory (ANT), versus those drawing on broader sociological concepts such as 'profession', 'organization', 'power', 'identity' and 'knowledge'. Whilst STS, and especially ANT, insist on the contingency and particularity of outcomes and

that broader claims cannot be made from any given outcome, endeavours to make cross-case links building on core sociological concepts (such as those listed above) only demonstrate that these capture common dynamics which nonetheless work out in contextually specific ways[21]. What is lacking is any abstraction or grasp of the generative mechanisms and processes through which outcomes are achieved - we cannot generalise, beyond saying that the same concepts are likely to be important in other cases.

If we are to fully understand the implications of new technologies – such as ICTs - on health care work and workers we must try to provide systematic cross-case analyses that can inform workforce management and planning.

1.5 Objectives of this research

Our research redresses the gaps described by focussing on the workforce implications of a particular technology used by a range of staff in different settings, adopting a systematic approach with the aim of informing policy and management.

Our objectives are to:

1) understand the impact of new technology on everyday work and service delivery;

2) identify education and training needs for staff engaging with new technologies;

3) examine the implications of new technology for workforce reconfiguration and management planning.

The focus of our research is a single technology – a computer decision support system (CDSS). The section below briefly explains what CDSS are, and is followed by a description of our theoretical approach.

1.5.1 Computer decision support systems (CDSS)

CDSS are computer programmes designed to assist with decision-making. They have diffused rapidly across the NHS, to support GP prescribing (PRODIGY), triage in urgent and emergency care (AMPDS, NHS Pathways) and for diagnosis and treatment, notably by NHS Direct and Walk-in Centres (NHS CAS and TAS).

CDSS may allow staff to work more efficiently or safely, or faster, or enable substitution or reallocation of tasks. CDSS have already impacted upon workforce skill-mix and configuration (e.g. allowing non-clinically qualified call-handlers to deal with Ambulance Service first contacts). Their use is likely to increase rapidly – for example underpinning the national telephone number for non-emergency health services[23].

Previous research has looked at CDSS design or compared CDSS with other technologies. What is missing is a systematic analysis of the relationship between CDSS, workforce reconfiguration and organizational management and strategy. Our research examines how a CDSS is used in different contexts. By theoretically grounding our analysis we seek to make generalizations that can inform NHS workforce planners and educators, managers, service commissioners and professionals in other contexts and working with other technologies, whilst also contributing directly to the understanding of how CDSS are used and managed in the NHS.

1.5.2 Theoretical approach

To enable systematic cross-case analysis our study draws on the conceptual framework offered by Normalization Process Theory (NPT)[54]. NPT is an extension of the Normalization Process Model (NPM)[16;55,56] which framed our original proposal. Both the model and the theory were developed in response to failure of new technologies to embed in health care, and aimed to develop generalizable explanations[57].

NPT offers a robust framework to analyse how a CDSS is used in different settings. We have used the core domains of the theory to structure the presentation of our analysis in this report. Given the disciplinary backgrounds of the team members, our work is also informed by other theoretical resources, in particular the conceptual insights offered by organizational sociology (e.g. theories of power, identity), from STS and ANT (e.g. theories of networks, actors and artefacts), and social psychology (theories of trust, knowledge sharing and teams).

Below we offer a brief outline of NPM and NPT and how we have used these in this study.

NPM focuses on the *collective action* required for an intervention to come into use. It developed from a series of important empirical studies – of telemedicine systems[58;59], of professional-patient interaction and the organization of health care work in chronic illness[60] and of the social production and operationalization of evidence in the clinical encounter[61]. It proposes that collective action is governed by four factors, each of which explains the degree to which an intervention will become embedded in everyday practice:

(i) *Interactional Workability*: focuses on the work necessary to bring a complex intervention into place. NPM proposes that *a complex intervention is disposed to normalization if it confers an interactional advantage by enhancing shared understandings of work and facilitating agreed outcomes* (whether explicitly/implicitly, formally/informally).

(ii) *Relational integration*: describes how knowledge and work is mediated and understood in practice. A complex intervention will affect not only the

knowledge required by users, but also the ways that they understand the actions of people around them. NPM proposes that: *a complex intervention is disposed to normalization if it equals or improves accountability and confidence within networks.*

(iii) *Skills set workability*: refers to how the work is distributed, formally and informally, between workers in the broader organizational division of labour. Complex interventions may disrupt established divisions of labour and managing these changes is not simply a technical question. The model therefore proposes that *a complex intervention is disposed to normalization if is calibrated to an agreed skill-set at a recognizable location in the division of labour*.

(iv) *Contextual integration*: refers to the organizational *incorporation* of work, e.g. expectations, resources and authority associated with the intervention and the interplay between established organizational activities and new interventions. The final proposition is therefore that *a complex intervention is disposed to normalization if it confers organizational advantage in flexibly executing and realising work.*

NPM offered a significant advantage over previous analytical models because it attempts to specify processes and conditions that shape outcomes – regardless of technology or setting. However, as they tested the model empirically its originators identified some weaknesses in the model[59]. Specifically, NPM did not explain how practices were formed in ways that held them together, how actors were enrolled into networks or how they were appraised. In response to these weaknesses, the model was extended to become a middle range theory[53;62] designed to

> *explain the processes of implementation, embedding, and integration of material practices in formally defined contexts, relates these processes to causal social mechanisms, identifies components of those mechanisms, and defines the investments that are required to energize them*[57].

NPT defines four core 'domains' of activity that will shape the success – or otherwise – of a given intervention. **Collective action** constitutes one domain - encompassing the work that brings the intervention into use (or the extent to which this can be achieved). In response to concerns about how practices are 'held together' in a way that makes sense, the domain of **coherence** encompasses the ways in which an intervention is understood as meaningful, achievable and desirable. The domain of **cognitive participation** considers if and how the actors necessary to deliver the intervention are enrolled into action, recognising that embedding an intervention is dependent on chains of interaction between diverse actors including but not limited to those who directly use the technology. Finally, the domain of **reflexive monitoring** encompasses the on-going processes of appraisal and adjustment that keep an intervention in place.

NPT provides a conceptual and analytical framework for understanding how the CDSS has been brought into use, and to make transferable propositions about its use elsewhere.

1.6 Summary

This chapter has outlined research evidence that new technologies have a direct impact on workforce planning and reconfiguration. They can change the nature of work and the workforce - requiring new or different skills/ competencies, new training, and different approaches to recruitment and retention.

1.6.1 Benefits of this research

This study examines the workforce implications of new technologies by examining how a single technology impacts on day-to-day work in different settings, and the implications for workforce planning, management and training. It also informs our understanding of change management as new technology changes work and introduces new ways of organizing and delivering care, and, contributes to the broader study of health care organizations.

Our research complements other NIHR SDO funded studies of new technologies and e-Health (notably Potts SDO/131; Mair SDO/135; Laing SDO/130). It also operationalizes and develops the conceptual model and theory used in two cognate studies (May et al DH PRP 'Integrating telecare'; Mair SDO/135), adding value to this work. The focus on a CDSS augments research on nurses' use of such technologies (Dowding et al DH PRP 'Nurses use of decision-support') providing additional case study evidence.

This project provides the first comparative analysis of a single CDSS in different health care settings. It enhances knowledge of the impact of CDSS on work and the workforce to enable better management and planning. Our findings about skills and knowledge and the division of labour can inform decisions about training and education, and the recruitment and retention of staff. Our understanding provides specific information relevant to developing new services underpinned by this technology (notably the new 111 service) and by systematically looking across different organizational contexts allows us to inform wider debates about new technologies in health care.

1.6.2 Outline of this report

The remainder of this report is structured using NPT; the theory provides a systematic framework to integrate our data and present our analysis.

Chapters 2 and 3 detail our methodological approach and the context of our research. Chapters 4-7 present our findings using the four domains of NPT (Coherence, Cognitive participation, Collective Action and Reflexive Monitoring). Chapter 7 revisits the research questions in the original research proposal to demonstrate how these have been answered, and Chapter 8 provides conclusions about the implications of the research for workforce configuration, management and training.

2 Methodology and Methods

2.1 Introduction

This section describes our methodological approach and research methods. Our approach is informed by three key considerations:

1. The need to have a detailed understanding of how technologies are used in practice – how the work gets done using the CDSS and the impact and implications that the CDSS has for everyday work;

2. The need to link our understandings of work with wider considerations of organizational management (including recruitment practices and training) and with the interests and practices of other stakeholders (including the CDSS developers and policy-makers);

3. The need to extend this detailed understanding of *individual* cases to develop a *systematic understanding* of CDSS in everyday use to contribute to future policy and organizational management.

Our study comprises three case studies of a CDSS in use. This small number of comparative cases offers the optimum combination of close familiarity with individual settings and work, with the opportunity for analytical and theoretical generalization.

Our methods are mainly drawn from ethnography, but are augmented with survey work to explore training and trust in technology.

2.2 Cases

2.2.1 Selecting the 'same technology'

The study examines the same CDSS in three different settings to see how different staff use the same technology. The CDSS was chosen for three reasons. First, it is the only CDSS developed by the NHS and 'owned' by the Department of Health, and we wanted to inform how the NHS develops appropriate decision support technologies. Second, it is one of a limited number of decision support systems used by non-clinical staff (although it can be used by nurses, doctors and paramedics) including those with limited experience of working in health care. It is therefore ideal for understanding the workforce implications of CDSS use by different staff in different settings. Third, the CDSS had not been part of a large-scale systematic evaluation.

2.2.2 Selecting the 'different settings'

Our chosen CDSS was deployed from 2006, initially as a pilot, to manage emergency calls for an ambulance service, and subsequently in two out-of-hours services, one run by a Primary Care Trust (PCT) and the other by an Ambulance Trust. Before the study began several other Trusts were either waiting to adopt, or were interested in using this CDSS and a DH decision to license the system for use in NHS Ambulance Trusts was imminent. However, the two out-of-hours pilots ceased using the software (both for what appear to have been strategic organizational reasons) and, during the course of our study, the CDSS was adopted two further urgent care services - a new single point of access (SPA) service (run by the Ambulance Trust pilot), and by a well-established GP-led out-of-hours service. The CDSS was licensed for use in Ambulance Trusts in mid-2009 and more Ambulance Trusts plan to adopt it. The constraints of our fieldwork led us to focus on the three settings where the CDSS was in use – '999' (the emergency call-handling service run by the Ambulance Trust), 'SPA' (urgent care single point of access telephone service run by the same Ambulance Trust) and 'OOH' (the GP out-of-hours service).

These sites provide different service settings in which to examine how the CDSS is used. Although we had not anticipated studying two services offered by the same Trust this, with hindsight, has proved beneficial, allowing us to explore the implications, benefits and challenges of this service configuration.

The case studies were at different stages in their adoption of the CDSS. For 999 the system was well established in the organization and staff were experienced in using it. SPA and OOH began using the CDSS in the Autumn 2009 which allowed us to observe implementation, training of new and existing staff, the launch of an additional service using the system (at OOH) and the early embedding of the technology in everyday practice.

2.3 The Ethnography

The ethnographic component of the study employed observational, interview and documentary methods to provide a detailed, nuanced description of the design, development, management and use of the CDSS in each setting.

2.3.1 Non-participant observation

An orientation visit by research team members was undertaken to each site to outline the project and negotiate access with key staff. Much of our observational work focused on the call-handlers using the CDSS but we also observed other staff, including clinical supervisors (999 and SPA site), ambulance dispatchers (999), GPs (OOH) and their interactions with each

other and the CDSS. The observation was purposively structured to capture activity at different times of day/days of the week and covered all or part of a shift depending on the setting (between 4 and 8 hours).

There were opportunities to talk informally with staff between calls (particularly at quieter periods e.g. weekday evenings) and to talk to managers and other key personnel.

The observation involved a single researcher sitting beside 1-2 call-handlers, and occasionally sitting at back of room to observe the whole environment. To avoid placing undue pressure on staff the researcher usually approached one of the managers (e.g. shift manager) to negotiate where to sit, but as the research became more familiar to staff, researchers were often able to negotiate this directly with call-handlers.

Staff being observed were given a verbal outline of the study and reminded that the researchers were not clinically qualified, and could not 'assess' practice. Staff were free to ask the researcher to move away at any time and could refuse have the researcher sit with them (in the event no call-handlers refused to be observed). Participant information leaflets were made available (Appendix 1).

Detailed notes were overtly taken and transcribed soon afterwards. These included verbatim or near verbatim statements. Details about the nature of calls and the triage process were anonymised.

The ethnographic data consist of nearly 500 hours of observation conducted over approximately 35-45 days at each site over several months (Table 1).

Table 1. Observational data: hours, days and period in each setting

Setting	Number of hours	Number of days	Time period
999	170	41	Nov 2008 – Jul 2010
SPA	172	33	Oct 2009 – July 2010
OOH	149	27	Sept 2009 – Aug 2010
Total	**491**	**101**	**Nov 2008 – Aug 2010**

2.3.2 Interviews

Having conducted initial observation at each site a purposive sample of interviewees was identified. Call-handlers and control room staff were approached opportunistically and interviews were conducted during working hours at points in the day/evening when the service was less busy (with the agreement of shift managers). Potential interviewees were given the

participant information leaflet and time to consider if they would like to participate. Stakeholders and managers (including policy-makers, commissioners, system developers, corporate and operational managers) were approached and provided with a participant information sheet (Appendix 2) and a time for the interview was arranged if they agreed. Call-handler interviews typically took 30-45 minutes because of the constraints of their work patterns, other interviews were between 60-90 minutes. Where possible, interviews took place in a private office or meeting room but in OOH some interviews took place in the call control room.

Before the interview commenced, the researcher explained the study and consent form, seeking written consent to conduct the interview (Appendix 3 and 4), digitally record and subsequently transcribe the interview. Assurances were given about confidentiality of the recording and anonymity of the transcript. All the interviews were recorded. Participants were encouraged to ask questions about the study or their involvement and to stop the interview at any time.

The interview topic guide was adjusted to reflect the experience and seniority of each participant: staff interviews focussed on their experiences and their views about using the CDSS, changes to work patterns and practices and the nature of the work (Appendix 5 and 6). Stakeholders were asked to explore the antecedents of the introduction of the CDSS, to consider how roles and skills had changed and to tell us about the wider context of the service and CDSS use. A total of 61 interviews were conducted, with a total of 64 respondents (Table 2).

Table 2. Interviews by setting and staff by role

Setting	Call-handlers	Supervisors / managers in call control room	Clinical staff	Key stakeholders /managers ~
999	7*	3	2**	6**
SPA	15	4	1**	-
OOH	12	4	1	-
Other	-	-	-	9[#]

* Includes one ambulance dispatcher
** Includes staff who cover both 999 and SPA.
# 4 in a group interview
~ Includes 3 Department of Health, 4 Trust Board members, 4 senior clinical/operational managers, 2 developers, 1 IT manager, 1 ex call-handler/supervisor.

2.3.3 Documents

We collected a range of documents. These described the CDSS design and development, and documented external evaluation and presentations by the developer team and service managers. We also had access to organizational minutes, training materials and publicly available policy documents, reports, and media releases. Many of these were available on organizational websites, and others were provided by each site (e.g. audit guidelines, training manuals). This material was used to inform the description of settings (chapter 3) and the analysis presented in chapters 4-7.

2.4 Analysis of the ethnographic data

Interviews and observational data (along with relevant documents) were analysed together. A sample of fieldnotes and interview transcripts were read and open coded independently by CP, SH, JT, JP, and MC. The codes were discussed in data clinics and refined and the interview transcripts and fieldnotes were imported to Atlas.Ti 6.1 and coded to facilitate data management and retrieval. We held 22 data clinics (approximately 100 hours) to discuss emerging codes, explore themes of interest and develop our interpretations. As the study progressed, the analysis was structured to examine all the data within each setting, and then across these using the research questions and the NPM/NPT. We had robust discussions about the affordances of the NPM and spent time exploring the data to operationalize the model. We examined the NPT and agreed that this was a preferable framework for the study. Data clinics were organized around sets of observational or interview data read in advance. As we progressed, individual team members identified emerging themes and we used discussion and consensus to determine how the data 'fitted' the core domains of the theory and to reach saturation. Where we disagreed we sought clarification and advise from CM. We also wrote narrative and data summaries to support the analysis and used a mixture of analytical approaches (e.g. identifying and refining themes) and matrix/charting techniques to facilitate comparison and had ongoing discussions with the wider team and the advisors to check our interpretations.

2.5 The Survey

The survey (see Appendix 7 and 8) was designed to capture the skills, experience and training of call-handlers and their trust in the CDSS and the work system in which it is embedded.

2.5.1 Skills, experience and training

The first part of the questionnaire collected demographic data about age, gender, academic qualifications, length of service and nature of employment (full or part-time). This was followed by six items assessing call-handlers' work experience and training relevant to their current work. Questions were asked about the specific skills required for the call-handler role and these were developed primarily from documentary analysis of the Continuous Quality Improvement tool (CQI) used for call audit. The CQI focuses on core skills regarded as essential for using the CDSS (effective call control; skilled questioning; active listening; skilled provision of information and advice; effective communication; practice according to designated role requirements; and skilled use of CDSS functionality). Our ethnographic analysis confirmed these categories were central to the daily enactment of call-handlers' work. Individual items derived from the CQI descriptions were supplemented with items tapping skills and practices not considered desirable by the system developers, but which the observation has revealed e.g. working ahead of the system and using leading questions. Further questions derived from the ethnography were added to assess team-working and knowledge sharing. This resulted in 26 items, rated on a 10 point scale, (where 1 = very poor skill and 10 = very high skill or 1 = not very important and 10 = very important).

2.5.2 Trust in the CDSS and work system

The second part of the questionnaire assessed call-handlers trust in the CDSS and in key actors associated with the system. Questions were developed from the research literatures on interpersonal and organizational trust, and models of trust in technology. The study was theoretically grounded in two of the most established and widely used models of trust. Firstly, Muir and Moray's[63] model of trust in technology based on factors of competence, predictability, dependability, responsibility and faith. Secondly on Mayer, Davis and Schoorman's[64] model of organizational trust, focusing particularly on their three factors of perceived trustworthiness in others; ability, benevolence and integrity.

To measure trust in technology, 15 items were developed from Muir and Moray's[63] trust in technology questionnaire and adapted for use in the study settings. Five questions were added to assess call-handlers trusting beliefs about the benevolence and integrity of the system's use and motives for use. A final question asked for an overall rating of trust in the technology. Respondents were asked to rate each of the factors on a five point scale (1 = strongly disagree, 5 = strongly agree).

The final section of the questionnaire addressed call-handler's trust in the major actors relevant to their use of the CDSS - the organization, the audit team, the clinical supervisor (at 999 and SPA only) and the CDSS team.

Three items were framed around call-handlers' perceptions of trustworthiness in terms of ability, benevolence and integrity and an additional overall trust item. Four final items rated trust in relation to other call-handlers, callers and their own ability to use the CDSS. All these items were again measured on a five point scale (1 = strongly disagree, 5 = strongly agree).

2.5.3 Format, piloting and administration

We planned to administer the survey as two on-line questionnaires. In consultation with managers and in view of the limited internet/additional software access (for data protection reasons) we reverted to a single paper based questionnaire.

The questionnaire was developed primarily by JP and JT with input from CP, SH and MC before being discussed more widely with the advisory board (Appendix 9). It was the piloted with six individuals at the 999 site, and managers and auditing/training staff were asked to comment on the length, readability and content. Following piloting some changes were made, notably the inclusion of additional questions, rewording some of the items.

A total of 166 questionnaire packs were prepared for staff at each setting, 999 (n=53), SPA (n=59) and OOH (n=54). Packs included a questionnaire, participant information leaflet (Appendix 10 and 11) and a freepost return envelope. The information leaflet emphasised that individual responses would not be fed back to the organization. Sites provided a list of names matched to a unique number to enable anonymization. Questionnaires were initially distributed by managers or supervisors but an initial low response led us to distribute the questionnaire packs ourselves. Completed questionnaires were returned either directly to the researcher, placed in designated locked box at the site or posted. Managers at each site sent a follow up reminder email to staff after 3 weeks.

2.5.4 Response rate

103 questionnaires were completed and returned (response rate of 62%). There was a small difference in response rates between sites, with SPA returning the highest proportion of questionnaires (Table 3). The limits of research ethics approval were such that we were not able to collect information about non-responders, but looking at the ethnographic data against the survey responders does not suggest that that they were demographically different groups.

Table 3. Survey response rate by study site

	999	SPA	OOH

Number of respondents	31	39	33
Number of non-responders	22	20	21
Population Total	**53 (58%)**	**59 (66%)**	**54 (61%)**

2.6 Analysis of the survey

Survey data were double entered in MS Excel, checked and corrected. The data were exported to PASW and descriptive statistics calculated. In the skills section of the questionnaire items within each competency category were averaged to provide a mean for that category for each participant. Analysis of Variance was used to test for differences across the three study sites.

For the purposes of the analysis Questions 1- 13 and 16 were analysed individually and compared across sites. Findings are presented in Chapter 3. For Questions 14 and 15, items were averaged for each of the six call handler competency categories for those items formally assessed through the CDSS quality assessment and audit processes (effective call control; skilled questioning; active listening; skilled provision of information and advice; effective communication; and skilled use of CDSS functionality). Reliability analysis using Cronbach's Alpha was performed on the seventeen CQI items and revealed a high level of internal consistency ($\alpha=0.94$). Further reliability analysis was performed for each of the CQI categories, again showing high levels of internal consistency (effective call control, $\alpha= 0.89$; skilled questioning $\alpha= 0.83$; active listening $\alpha= 0.80$; effective communication $\alpha= 0.87$; and skilled use of CDSS functionality $\alpha= 0.79$). Reliability analysis was not performed on category skilled provision of information and advice which only contained one item. Details of mapping between individual items and competency categories can be found in Appendix 12. The remaining items in Questions 14 and 15 were analysed separately and are presented in Chapter 6. For Questions 17 and 18, items were average for the different trust dimensions in both the CDSS and in the various actors. Reliability analysis using Cronbach's Alpha was performed on the 21 trust in technology items and revealed a high level of internal consistency ($\alpha=0.94$). Further reliability analysis was performed for each of the dimensions of trust in technology. Internal reliability was found to be high for competence and dependability ($\alpha= 0.77$; $\alpha= 0.076$, respectively). Internal reliability was found to be more moderate for predictability, faith, benevolence and integrity ($\alpha= 0.62$; $\alpha= 0.57$; $\alpha= 0.59$ and $\alpha= 0.54$ respectively. Dimensions with only two items (faith, integrity) had lower levels of reliability, reflecting Schoorman, Mayer and Davis (2007)[75] view that internal consistency tends to be lower in cases where there are fewer

items. Additionally, the internal consistency for benevolence and integrity drawn from from Mayer et al. (1995)[64] model of trust were relatively low compared to the dimension for competence. However, this finding is consistent with their own and subsequent research which has suggested that only when trusting relationships are fully established do these two dimensions become distinguishable. The lower levels of internal consistency found in this study may be reflective of an earlier stage in the development of trust between CH and the CDSS. Indeed when these two dimensions are combined the internal consistency was high ($\alpha = 0.72$). Internal reliability anlysis performed on items measuring CH trust in clinical supervisors, the audit team, their organization and the CDSS development team was all high ($\alpha = 0.91$; $\alpha = 0.91$; $\alpha = 0.89$ and $\alpha = 0.91$ respectively). Details of mapping between individual items and competency categories can be found in Appendix 13 and 14 respectively. Call handlers ratings of ability and importance of each competency category, and of trust measures were compared across sites using univariate Analysis of Variance. Significant effects, where they occurred, are detailed throughout the report.

2.7 Integration of the ethnography and survey

Our methods were integrated in two ways. First developmentally - the ethnography informed the design and focus of the survey. The survey deliberately focussed on questions that were not fully captured by the observation or interviews (e.g. views about skills/workplace, 'trust in technology'). Secondly, we explored convergence and contradiction - a process termed 'crystallization' which seeks to provide a more comprehensive account than that offered by a single method[65]. We have also sought to integrate our findings by using NPT as an overarching framework to present qualitative and quantitative findings together in chapters 4-7.

3 Context: Same technology, different settings

3.1 Introduction

This section describes the key characteristics of the CDSS ('same technology') and the three cases ('different settings') and the training associated with the CDSS.

3.2 Same technology: the CDSS

The CDSS studied here is designed to enable prioritization and management of telephone calls to emergency (999) or urgent (OOH, SPA) care services. It can be used by non-clinical (clerical) and clinical (nursing, paramedic or medical) staff. It is an expert system built on an extensive clinical evidence base subject to a continuous process of evidence review and update. A series of logical algorithms (pathways) underpin questions which the user/call-handler uses to ask the caller/patient to determine the clinical skills required, and the timeframe in which they must be accessed. The CDSS includes questions that the call-handler is required to answer, as well prompts to 'probe' or to gain more accurate and/or precise information, for example, getting callers to describe the nature of chest pain (as 'crushing', 'shooting', 'aching' and so on). The system is used to arrive at a disposition, ranging from an 8 minute emergency ambulance, an appointment with a GP, or information on the self-monitoring or treatment of symptoms.

For dispositions to primary care or other community services the CDSS is able to identify the skill required to treat the patient, and map this to a record of clinical skills in local services, using an integrated directory of services. This directory, part of the capacity management system (CMS) provides information on the location of services, opening times, response times and clinical provision.

The CDSS comprises three modules, summarised in Table 4. Module 0 is designed to support immediate identification of life threatening problems and the pathways here are typically short. It covers the vast majority of 999 calls, and provides needs assessment for the despatch of '8 and 19 minute' ambulances. Once immediately life-threatening situations have been ruled out, the call-handler moves into module 1, which includes a larger number of pathways designed to assess a wide range of symptoms. At the start of module 1, the call-handler is presented with a 'body map'

(which is age and gender specific). The call-handler clicks the computer mouse to select the body area affected and is presented with a menu of pathways. The call-handler selects an appropriate pathway (based on the information provided by the caller, and the information presented on screen). The CDSS includes documentation of all clinical conditions.

A further module (module 2) is designed for use by a clinician, (usually a nurse or paramedic) and involves a longer set of algorithms to establish the priority of the call and the most appropriate disposition. Module 2 is used in 999 and SPA by clinical supervisors and not in OOH.

Table 4. CDSS Modules

Module	Description
Module 0	Questions relate to immediate and imminent threat to life, e.g. chest pain, severe loss of blood/ consciousness or not breathing. Some information filtering e.g. whether the problem is due to trauma (injury), if the call is from the patient themselves or a third party, as well as age and gender of the patient.
Module 1	Module 1 begins after life-threatening situations have been ruled out and includes a larger number of pathways designed to assess a wide range of symptoms. The call-handler is presented with a 'body map' to select the appropriate body system /area affected, this leads to a list of pathways relating to this area.
Module 2	Nurse/paramedic assessment module where there is no obvious emergency. The call is transferred to a nurse for further assessment or provision of care advice. Typically used for more complex calls, or where the call-handler has arrived at a home care disposition.

The CDSS also includes a database of care advice for the call-handler to provide over the telephone depending on the pathway. This includes:

- advice provided during the call (e.g. cardiopulmonary resuscitation (CPR) instructions,

- 'Worsening advice' where the caller is advised to look out for signs of symptoms getting worse in the period before primary care is accessed,

- Interim advice for non-emergency dispositions and for managing symptoms in the period before ambulance or primary care response (e.g. pain relief advice),

- Home care advice for self-care dispositions where detailed care advice is provided to support the patient in looking after themselves.

3.3 Different settings 1: 999

The NHS Ambulance Trust was formed in 2006 as part of a national rationalization of the ambulance service. It employs about 2000 people and provides 999 services to a population of over 2.5 million, covering an area which includes large cities and towns, and some more remote rural areas. Since January 2008 the Trust headquarters have been located about five miles from the city centre. This houses the main ambulance control room and administrative offices. In December 2009, the Trust opened a second centre about 11 miles from the headquarters, designed to mirror the first centre (and as a consequence, a satellite centre in the south of the region was closed) as a second, independent 'back-up' facility.

The ambulance control room takes calls from the public ('999' calls), doctors, hospitals, police, and fire service. There are two main types of calls. Firstly, those relating to medical emergencies. The call-handlers have to work within the constraints of the '8 minute target' for urgent ambulances, a policy which dictates that a Category A ambulance must arrive within that time for immediately life threatening cases. Other possible dispositions, depending on urgency are: an ambulance within 19 minutes (Category B), within 60 minutes (Category C) or redirection to a clinician or other service. Secondly the service deals with calls about transporting patients to hospital from home or general practice surgeries at the request of a GP ('urgent calls' or 'bed bureau calls').

3.3.1 The 999 workforce

The 999 control room staff are organised into five teams. When a full complement of staff is on duty during a single 12-hour shift, a team is typically made up of the following:

- Eight to 15 non-clinical call-handlers who answer 999 calls and triage using the CDSS.

- four communications officers who liaise between ambulance crews and hospitals, four dispatch officers who assign crews to each incident

- a duty manager who has responsibility for managing the operational aspects of the shift, including the call-handlers and dispatch desks

- a clinical supervisor (either a nurse or paramedic) who works across both 999 and SPA services to deal with non-emergency medical calls, as well providing clinical advice and support to the call-handlers.

Most control room staff work a 12 hour shift. Staff work a 37.5 hour week on 24/7 rota and a very small number of staff work part-time. There are

three rotas (A, B and C). The A and B 12 hour rotas are organised in a 5 week pattern, which includes a 3 day week, 3 night week, 4 day week, 4 night week and a relief week (where staff cover shifts as needed for annual leave or sickness). 'A rota' staff work from 08:00 to 20:00 (or 20:00 to 00.00:800 for night shifts). 'B rota' staff have varying start and finish times (e.g. 7:30 to 19:30, 14:00 to 02:00 (or vice versa for night shifts). The C rota – on which all new call-handlers start – has a 10 hour shift pattern, with more variation in patterns of days of week and time of work.

Call-handlers

There were 53 staff employed as 999 call-handlers and most of were female and under 34 years. Of the 31 call-handler respondents to the survey, 22 (71%) were female. The most common age group for call-handlers was 25-34 years (15, 48%). Overall, 999 call-handlers had at least 1 years' experience of using the CDSS (with 12 (39%) having 1-2 years' experience and 12 (39%) three years' experience. Of 31 call-handlers surveyed, 23 (75%) were employed on a full time basis.

Call-handlers within this organization are formally titled Emergency Medical Systems Operators (EMSOs) but locally referred to as 'call-takers'.

Dispatch officers

Dispatch officers are responsible for allocating ambulance vehicles/crews to incidents/locations and sending details to the ambulances. Four sets of dispatch desks each have responsibility for a single geographical area (known as the 'centre desks' due to their position in the room) and a communications officer and a dispatch officer oversee each area. There is significant overlap between these two roles, but the dispatch officer has overall responsibility for allocating ambulances. Dispatch officers do not have the CDSS on their computers. For the most part, they are a self-contained group, although there are discussions between the dispatch officers and call-handlers.

Duty managers and control room managers

The duty manager oversees and manages 999 operations and ensures that procedures are followed. Typically, the duty managers have previously worked as call-handlers and dispatch officers. They report to control room operational managers, who monitor performance and have overall responsibility for the staff, including Human Resources functions.

Clinical supervisors

Following the introduction of the CDSS, the Trust introduced the new role of 'Clinical Supervisor' in the control room. During our 999 fieldwork there were six clinical supervisors (four paramedics, two nurses). When the SPA service was launched, additional clinical supervisors were employed.

Clinical supervisors are managed by non-control room Trust directorate managers. They provide clinical support for the 999 and SPA services - dealing with non-emergency calls (e.g. 'refer to nurse' or home care dispositions) using the CDSS Module 2 and providing clinical information for the call-handlers. They also review calls as part of the audit processes and are involved in informally debriefing staff and formal retraining.

Typically, for each shift there is one clinical supervisor in each control room, but when this is not possible (e.g. staff absence) the clinical supervisor at headquarters can be contacted by telephone.

3.4 Different settings 2: SPA

The SPA service began in October 2009 and provides an urgent care single point of access service for two PCTs serving a population of around 600,000. The Ambulance Trust provides call-handling and the PCTs provide urgent care services. SPA replaced OOH call-handling previously provided by NHS and commercial organizations.

SPA call-handlers are located at headquarters and the second centre.

There are five urgent care centres (UCCs) across the geographical area which provide 24 hour services. Although UCCs will see patients who walk in without an appointment, patients are advised to call the SPA first. Although SPA runs over the 24 hour period, the majority of calls to the service occur during the out-of-hours period. As part of the SPA service, the Ambulance Trust also provides patient transport to UCCs for patients who have difficulties (e.g. patients who have a condition which means they cannot use other forms of transport).

Following assessment and triaging of the call using the CDSS, the patient is passed to the service they need. Where necessary, the call-handler is able to book an appointment to see or speak to a health care professional (commonly a GP), and/or to book patient transport.

3.4.1 The SPA workforce

Each SPA team includes:

- Five full time call-handlers, and between 1 and 6 part-time call-handlers that work either an 8 or 10 hour shift to match periods of high demand. Full time SPA staff are based at headquarters, part-time call-handlers are split between the two sites.

- An SPA call supervisor with a similar role to the 999 duty manager.

- A clinical supervisor responsible for both 999 and SPA call-handlers.

Full time SPA call-handlers follow the same 12 hour shift rota as 999 staff, but there are more part-time staff (either 11 hours, 16 hours or 25 hours per week) and some work weekends only.

Call-handlers

There were 59 SPA call-handlers with similar age profile to 999 staff. Of 39 respondents, 30 (77%) were under 35 years and 14 (36%) under 25 years. There were a higher proportion of male SPA call-handlers compared to 999 (15/39; 38%). All SPA call-handlers had less than 2 years' experience as the service had been running for 18 months when the survey was conducted. 16 (41%) of SPA call-handlers were employed on a part-time basis.

Most SPA calls occur during the out-of-hours period of evenings, nights and weekends, or occasional closures (e.g. when a UCC closes for training). Unlike most 999 call-handlers who are trained only to deal with 999 calls, many of the full-time SPA call-handlers are 'dual trained' to take SPA and 999 calls. In periods of high 999 activity, SPA call-handlers are sometimes diverted to take 999 calls. There are only one or two 'dedicated' SPA call-handlers on shift during normal work hours.

Call supervisors

Call supervisors are a new operational role within the organization, responsible for ensuring that the OOH standards are met, that calls are properly completed and closed, checking that dispositions/information has been passed through to the UCCs, and arranging home visits and if necessary, transport. They can support call-handlers if necessary, although the clinical supervisor tends to provide support using the CDSS. Call supervisors have received CDSS training and extra training in the booking system, but are not necessarily 'super users' of the CDSS. They come from different backgrounds: some were previously call-handlers, but others were recruited from other parts of the organization or externally. Unlike 999, they are not necessarily staff who have worked their way up from call-handlers, through dispatch to supervisory level.

3.5 Different settings 3: OOH

The GP led co-operative was established in the early 1990s and provides cover for over 150 GPs serving a population of approximately 140,000, in a large town and the surrounding suburban area. In addition to GP out-of-hours (OOH) services, the organization has expanded to provide in-hours telephone answering, telephone consultations, OOH surgeries for a Dermatology Unit, a local Emergency Dental Service and OOH Local Pharmaceutical Services Dispensary. The service employs Pharmacists and Nurse Practitioners who can see, advise and treat patients.

OOH was located in a primary care centre (PCC), close to the town centre in a two-storey building containing reception and waiting area, an 'operations' room (where call-handling took place), six consulting rooms, and a pharmacy dispensing room. There were a number of administrative offices and a staff room. The organization also provided a nurse-led satellite surgery in another area at weekends.

During the course of the study, the organization began providing call answering for services in two other towns. These calls were taken and triaged but consultation/care was provided by other PCCs. Towards the end of our fieldwork, the OOH joined a new integrated service and relocated to a new UCC at an Acute hospital. The new UCC combined Emergency Department, OOH, Mental Health services and Primary Care. The OOH service aimed to provide a single point of access for patients - patients were encouraged to telephone as the first point of contact and these calls were managed using the CDSS. Patients attending the UCC and requiring urgent care were managed at a reception desk, booked in electronically onto an integrated primary and secondary care system (Adastra), and assessed using the CDSS to direct them to the appropriate service (Emergency Department or OOH care).

3.5.1 The OOH workforce

Call-handlers

The introduction of the CDSS and creation of the UCC resulted in a large increase in the number of call-handlers (from about 30 to 54 during our study). Unlike both 999 and SPA settings, OOH call-handlers tended to be older. They were predominantly female: of 33 respondents to the survey (figures include call-handlers and the shift coordinators / managers who also take calls), 28 (85%) were female. Overall 21 (64%) were over the age of 45 years, with over a third of staff over the age of 55 years (12 (36%). Many call-handlers were employed on a part-time basis, with two-thirds of responders employed part-time (67%). Several call-handlers have a 'second job' and some staff are employed on a 'zero hours' contract (no specific hours or times of work are specified; the call-handler agrees to be available for work when required). OOH staff are experienced, typically having worked for the organization for a number of years.

Shifts vary and are either 3, 4, 6 or 8 hours. Typically, the call-handling shift starts at 18:30 on weekdays, with 1 or 2 call-handlers who start at 17:00 or 18:00 to deal with surgeries that close earlier. On weekday evenings, there are typically five call-handlers on shift between 18:30 and 21:30. Between 21:30 and 22:30 staffing is reduced to three call-handlers, and to two call-handlers between 22:30 and 23:00. After 23:00, one call-handler arrives to start their night shift (finishes at 08:00). At weekends during busy periods there may be up to seven call-handlers on shift.

Shift coordinators/managers

There are several shift coordinators/managers, who typically work full-time. Their duties include organising staff rotas, responsibility for surgery and car equipment, supervising the call-handlers and operational issues - generally enduring that the service is run smoothly and solving problems related to calls or services. Whilst their role is primarily operational, shift coordinators also handle calls during busy periods.

Senior managers and training/audit staff

One senior manager oversees OOH, including the unscheduled care services directly connected OOH. Due to the small size of the organization the senior manager also gets involved in "operations at grassroots level" as well as having a more strategic role liaising with local commissioners etc.

Following the introduction of the CDSS, a staff training and auditing role was created. Initially, one member of staff was responsible for training and auditing but over the course the study two additional staff have been trained to assist with the CDSS training and audit function.

Clinical staff

Clinical care is provided by GPs, and a small number of pharmacists and nurses who work shift patterns to cover the OOH period. These staff are not co-located in the call control room – with the exception of one GP who takes calls transferred from the call-handlers. The relocation of the service to the UCC has co-located OOH with clinical staff such as ambulance crews, nurses and hospital doctors who provide emergency services and these staff are not employed by the OOH organization.

3.6 Recruitment and training across the three settings

Training for call-handlers is structured around a core training package, produced by the CDSS developers, so the following section breaks with the pattern of discussing the settings separately and instead describes the recruitment and training for call-handling across all three settings.

3.6.1 Recruitment

We examined job descriptions available on the organizational and job vacancy websites for 999 and SPA call-handler roles and paper recruitment materials used by OOH.

The Ambulance Trust in which the 999 and SPA services were based was a significant and well known employer in the region. The geographical area had historically suffered the impact of the decline in manufacturing and high levels of unemployment in each of the economic recessions of the past few decades. Recruitment for the Trust tended to be buoyant and there were

typically many more applicants for posts than the number of vacancies. For 999 and SPA the 'person specification' was identical. Job adverts and descriptions state that the organization requires call-handlers with previous experience of call-handling, customer service, initial complaint handling, working towards demanding targets and who would prefer experience of shift work. The range of skills and abilities listed included computer skills, decision making, negotiation, communication and multi-tasking. The job specification also included personal attributes such as assertiveness, confidence, being a team player, integrity, approachability, being polite and courteous, able to work under pressure and flexibility. The formal qualifications required were a minimum of 5 GCSEs (A-C) or equivalent, although the survey indicated that educational attainment tends to exceed this.

In OOH the role specification describes the core skill as being able to provide a fast, accurate and effective telephone call taking (operator) service to patients in an emergency setting to identify the best route of care. This includes taking, recording and processing information received accurately and concisely using nationally recognised software to identify whether the patient requires GP or A&E care. The current role specification explains the dual role of call-handler and receptionist as follows:

> *"In a part of the service, you will be using a phone with a headset to allow you to type relevant information on to a computer;"*

and staff area also required

> *"to be able to work face to face with patients at A&E Reception and triage patients through a nationally recognised software system;"*

The materials sent to prospective applicants include a description of the initial training programme – as an

> *"intensive internally based training programme (approx 60 hours) to be able to use the software in a safe, effective and efficient manner"*

and note that it may be necessary for staff to undertake other recognised training.

The specification goes on to list other components of the role as follows:

> *"To provide a professional and high quality telephone call taking service for local health care services i.e. District Nurses/GP practices; To be able to gather essential information in the least possible time while remaining polite and courteous; To provide customer focussed and professional reception duties to patients; To be able to follow strict procedures and protocols at all times; Ensuring full patient confidentiality at all times.; To work effectively under pressure in a calm and confident manner whilst remaining sensitive to the callers*

and presenting patients' needs.; To undertake any clerical work, administrative, data inputting and any other duties."

Shortlisted candidates undergo selection processes which vary slightly between 999/SPA and OOH. All the selection processes use group work and pre-employment tests. At 999 and SPA call-handlers participate in a three stage recruitment process – described by one manager as "stringent". Firstly, applicants are invited to a 'test centre', for a few hours of classroom based skill and psychometric tests, including numeracy and literacy, 'judgement, perception and memory tests. They also take a test to assess typing speed. Secondly, following passing these tests, applicants then are invited to a 'team day' which involves tasks and activities to look at communication and team-working skills (for example, building the highest structure with straws, working out a mathematical problem). The focus of this activity is on communication skills, role and behaviour in the team, rather than correctly 'solving the problem'. A panel of clinical supervisors, trainers and auditing staff from 999 and SPA services are involved in this selection process. Thirdly, if the applicant passes the second stage, they are invited for interview.

Selection for OOH included similar activities but was condensed into a shorter period. The recruitment process included an afternoon of similar tests followed by an interview. Applicants undertook a typing test and computer skills test which involved using various Microsoft Windows packages (e.g. PowerPoint, Excel). They were then assigned to groups to undertake a task which they subsequently presented to the other groups. As an example, one of the tasks involved planning a fund raising event. This allowed 2-3 managers/shift coordinators to observe and assess how applicants worked in a group and their communication skills. Finally, as at 999 and SPA, applicants were individually interviewed by the managers, for about half an hour. During this interview applicants were asked to provide answers to two questions that had been provided in advance. These questions related to the wider context of health care (e.g. "If you had £100,000, how would you spend it on improving the NHS in the [local area]?") and the specifics of call-handling work (e.g. "If you took a phone call and the person was desperately out of breath and couldn't get many words out, what would be the first piece of information you'd get from them?"). Unlike 999 and SPA where applicants had to pass each successive stage of the selection programme, at OOH appointments were made after an aggregate assessment of the applicant's ability across the skills testing, group work and interview.

3.6.2 Previous experience and qualifications of call-handlers

We used the survey to collect data about previous experience and qualifications of the call-handling workforce. This showed that most call-handlers held a minimum of 5 GCSEs (or equivalent). Interestingly the call-

handlers in SPA were more likely to have A-levels and/or undergraduate degrees, and this may reflect the timing of the launch of this new service in relation to an economic recession and difficulties experienced by local people finding work. By contrast OOH call-handlers had lower levels of educational qualifications (Table 5) but this may reflect older average age of this workforce and the more established service and length of employment. It is worth noting that the patterning of qualifications – notably the apparent 'over' qualification of staff in SPA may impact on career aspirations and expectations (Table 6).

Table 5. Academic qualifications of call-handlers by study site

Academic Qualifications	999 (N=31)	SPA (N=39)	OOH (N=33)
No formal qualifications	0	0	4
1+ O levels /CSEs /GCSEs (any grades)	3	0	4
5+ O levels/CSEs (grade 1), 5+ GCSEs (grades A-C) School Certificate	4	4	7
NVQ Level 1, Foundation GVNQ	0	0	1
NVQ Level 2, Intermediate GVNQ	2	2	0
NVQ Level 3, Advanced GVNQ	6	1	3
NVQ Levels 4-5, HNC, HND	2	1	0
Other (e.g. City & Guilds, RSA/OCR, BTEC / Edexcel)	4	5	5
1+ A levels / AS levels	1	1	1
2+ A levels, 4+ AS levels, Higher School Certificate	5	14	2
First Degree (e.g. BA, BSc)	4	10	3
Higher Degree (e.g. MA, PhD, PCGE, PG certificate, diplomas)	0	1	2

Table 6 shows that in all three settings, the majority of call-handlers viewed their role as a long term job or career, but this was particularly high in OOH (28/31 (85%) compared to 20 (64%) in 999 and 23 (59%) in SPA. Staff views in the OOH setting are slightly surprising given that many are employed on a part-time basis and undertake this job as a second job or fit this paid work around caring commitments. Call-handlers in SPA and 999

were more likely to report doing call-handling to gain experience for another job. SPA had a small number of staff who were also undertaking further/higher education alongside their call-handling work.

Table 6.   Staff views about their call-handling role

View of current job	999 (N=31)	SPA (N=39)	OOH (N=33)
As a long term job or career	20	23	28
It fits around study commitments	0	6	1
Gaining experience for another job	9	11	2
As a short-term job	2	9	1
Fits around childcare commitments	2	2	5
Other	1	5	3

Previous experience of working in health care was not a requirement for call-handler positions but Table 7 shows that the majority had previous experience of customer service roles (over 80% of call-handlers in each setting). OOH staff having the lowest levels of previous experience, of 33 survey respondents, 13 (41%) had call centre experience compared to 21/31 (68%) and 28/39 (72%) of 999 and SPA call-handlers respectively.

Table 7.   Previous work experience

Previous work experience	999 (N=31)	SPA (N=39)	OOH (N=33)
Call centre work	21 (68%)[a*]	28 (72%)[b**]	13 (41%)[a* b**]
Customer service	27 (87%)	32 (82%)	26 (81%)
Health and social care	5 (16%)[a*]	10 (26%)	14 (45%)[a*]
N.B. Common superscript in same row shows significant difference between those sites - [*] $p < 0.05$; [**] $p<0.01$			

3.6.3 Initial call-handler training

Training following appointment for all call-handlers across the three settings was similar. Training materials were developed by the CDSS developer team

and augmented by existing site specific materials (e.g. health and safety, organizational procedures etc).

In 999 and SPA new staff had a 7 week full-time training program based on a demonstration/training version of the CDSS. Call-handlers were trained in small groups in a dedicated classroom with computers/monitors which mimic those in the control room. Training materials include a 'distance learning pack' given to all trainees to read before they commence training. This details a wide range of clinical signs and symptoms and at the end of the pack there is a series of questions to test comprehension.

The first two days for 999 and SPA induction includes an introduction to the organization and a series of talks from and about human resources, occupational health, and the trades unions. New call-handlers are given their uniforms and computer log-in details and told about annual leave, conditions of service etc.

This is followed by two days basic clinical training covering first aid procedures and introduction to features of major, common, life threatening conditions and diseases such as heart attacks and stroke. Then the new 999 recruits begin a ten day training programme about how to use the CDSS for emergency call management. This is structured around a training workbook which covers 100 clinical scenarios – each with a series of sections teasing out how to work with the CDSS to manage the call. This is followed by a further ten days training on the related computer systems and organizational procedures – learning how to use the CAD system, dealing with urgent hospital transfer cases, using the mapping functions and so on.

The fifth and sixth weeks of training are spent working in the control room alongside an experienced call-handler or 'buddy', chosen because they have good audit results and are considered by control room managers to be 'suitable' as a buddy. By the second week the new call-handlers take calls, watched and listened to by their buddy. The buddy can intervene, but aim to make less and less input so that by the final shift of week six new call-handlers are able take calls unaided. This training is rounded off with a final week in the classroom reviewing the experiences of taking live calls, using monitoring information and feedback from the 'buddies' to identify and rectify problems or issues revealed.

The training programme for SPA was modelled on the established 999 training and followed a very similar structure. When the service launched one difficulty for the trainers was that SPA training had to run without them knowing quite what the SPA service was going to be like. The first versions of the SPA training programme had a very strong focus on emergency call-handling and life-threatening conditions. As a result, in the first months of the SPA service call-handlers tended to refer higher numbers of calls than expected to ambulance dispositions. We were able to feedback our observations about the training programme– pointing out the emphasis on

999 work, partly because the trainers were themselves previously or currently working in 999. This information, combined with audit and monitoring by the Trust and the on-going experience of delivering the SPA service meant that the trainers were able to adapt the training to reflect the slightly different nature of urgent care calls.

Training at 999 and SPA was situated in the context of a large well established organization which had a history of training staff for a range of emergency care roles. The use of the CDSS since 2006 meant that, at the time of our fieldwork, the organization had a number of staff who were able train new staff. These included human resources and training staff, clinical supervisors, and a number of experienced call-handlers. By contrast the OOH service was a smaller organization with far fewer training resources. Although the OOH service itself was well established and there were staff with experience of managing urgent care calls (using a paper based protocol system) existing and new staff had to be trained to use the CDSS. This meant quickly training members of the existing staff as CDSS trainers. When we began our fieldwork only one member of staff, who was an experienced call-handler, had trained as a CDSS trainer and this person had responsibility for cascading training to existing call-handlers and newly appointed staff. While another person was trained to deliver the training during the course of our study the training function remained considerably smaller in the OOH setting.

The initial retraining of OOH staff was supported by members of the CDSS developer team and the programme appears to have been a slightly condensed version of that delivered at 999 and SPA. With the new UCC and the inclusion of face-to-face work, existing reception staff needed to be trained to use the CDSS and the existing call-handlers needed additional training in face-to-face work. At the same time the number of staff expanded and new recruits had to be trained to use the CDSS, the associated computer technologies and had to learn about the wider organization. The CDSS training was delivered by 1-2 recently trained trainers and additional organizational orientation and training was provided by other middle managers within the organization.

3.6.4 On-going call-handler training

Continual updates to the CDSS - as the result of new clinical knowledge and practices or external changes to service provision or targets – meant that additional continuous training was required. More detail is provided about this in chapter 7 when we examine the reflexive monitoring work done to appraise and adapt the technology to keep it in use. But in brief, during early implementation at 999 system update training was delivered by the CDSS developer team – largely because they understood the nature of the changes made to the CDSS. Latterly, in all three sites continuing training was delivered using materials jointly prepared by the developer team and

the setting trainers. For example the last training we observed on CDSS release 6 at OOH involved a day for all call-handlers where they worked through a workbook of new scenarios and had short presentations reviewing changes to the CDSS questions. The OOH trainer worked through a set of prepared training materials (provided by the CDSS developers) which she had annotated and adapted during the course of repeated training sessions.

3.7 Summary: same technology, different settings - what have we learned?

We have outlined how the same technology - the CDSS – is subtly different in the different settings of emergency (999) and urgent (SPA and OOH) care. The way the CDSS is used and the dispositions reached differ between emergency and urgent care and this requires different 'work' by call-handlers and those around them (e.g. call-handlers in urgent care - OOH and SPA – are required to book appointments).

The co-location of two services (999 and SPA) in the same Trust does not diminish important differences between urgent and emergency care work, even using the same CDSS. There are also some interesting differences in characteristics of the 999 and SPA workforce e.g. educational attainment.

Another important difference between the three settings is the length of time using the CDSS, and providing their service. The 999 call-handling service is very well established and has the longest experience of using the CDSS. By contrast, SPA is a new venture for the Trust and a new type of service within the context of the NHS. The OOH service, whilst long established had relatively recently adopted the CDSS. In addition it had recently reconfigured and relocated to the UCC and begun using the CDSS for face to face reception work. All of these features distinguish this setting from the comparator urgent care service at SPA.

So, our different settings provide different types of service, in different circumstances and have different experiences using the CDSS. In terms of workforce we have deliberately focused on those staff using the CDSS on a daily basis - the call-handlers - and those immediately around them. Again there are differences workforce characteristics (e.g. age, qualifications) and in role differentiation and organizational hierarchies in the three settings.

Finally we have shown that while there is a common core of training in using the CDSS and undertaking call-handling work, this too varies across the three settings. There are differences in the content and format of training, and these are associated with the length of experience the organization has of using the CDSS, the training resources available, and the different types of work in the different contexts of urgent and emergency care.

Having established this foundation for our study of the same technology in different settings the following four chapters use NPT to structure our findings and begin to answer our questions about the workforce management and training issues arising from the deployment of the CDSS.

4 Coherence – Does the intervention make sense?

4.1 Introduction

NPT claims that for an innovation to become embedded in practice it requires coherence. The intervention *needs to make sense to the actors involved,* who must understand its functions and utility for their work. Furthermore, these actors must understand the intervention *to be practically achievable,* such that they will invest in making it work. For example, consideration may be given to whether appropriate staff are in place, with the necessary skills, whether the intervention will integrate effectively with other everyday routines, or whether there are appropriate levels of supervision and management support for the intervention.

Whilst this may sound obvious, the history of ICT interventions in health care is littered with examples of applications that seemed like a good idea to policy-makers or IT developers but failed to consider the understandings of those who would actually use the intervention in their daily work (see Chapter 1). It is clear that this has contributed to the past failures: the existence of coherence around an intervention is critical to its outcome.

NPT proposes that coherence develops through a process of *communal specification*, whereby those actors involved in its enactment develop a shared representation of the intervention and its *utility and advantages over other ways of organising the work.* The embedding of an intervention in everyday practice is affected by anything which increases or decreases the understanding of the practice as meaningful in terms of what it is, what it does and whether it is practically achievable.

In what follows, we explore the part that coherence has played in each setting.

4.2 999

Prior to the introduction of the CDSS, 999 calls were handled by non-clinical staff, with basic training in anatomy and physiology who used a computer-based classificatory system for prioritising ambulance dispatch ('Criteria Based Dispatch' (CBD)). This consisted of an initial assessment to gather demographic information, before asking a series of questions to prioritise the call and assign the patient to a category. After determining the chief complaint, the call-handler would move to a flip chart for that condition. By

asking a series of questions the call-handler allocated a specific category from the chart and an 'ABC' prioritization[66]. CBD used statement prompts and allowed the call-handler considerable flexibility in choosing questions and recording answers. There was strong coherence around this system, but there were nonetheless two concerns about it. First, there was some inconsistency in the outcomes reached by call-handlers, and managers were concerned about the decision-making process

> '*…a lot of it was intuitive, based on the experience of the call-handler and wasn't actually using the system to end up making the decision. So that was the reason why we needed to move [to a new system]'.*
> **Interview, 999 senior manager**

Second, there was pressure to reduce 'Category A' (calls requiring an 8 minute ambulance) and 'Category B' (calls requiring an 18 minute ambulance) dispositions. Paramedic assessment at the scene recorded a Category A rate of <10%, but call-handlers were producing an average of 25% [**999 Report 2007**]. Even allowing for safety margins this was judged unsustainable in the fiscal circumstances.

The CDSS was presented to 999 as an extended triage system built on a comprehensive clinical evidence base that would enable clerical staff to make more sophisticated clinical evaluations without further clinical training or experience. It promised standardised decision-making, a wider range of dispositions and enabled call-handlers to give on-going advice to the caller for worsening symptoms or self-treatment.

Against this background, the new CDSS had a high level of coherence in the 999 setting, built around a general set of beliefs – shared by the software developers, the Department of Health, 999 managers and the call-handlers – that the new technology would allow non-clinical staff to perform the re-defined task of 999 call-handling in a *safe and timely* manner.

This general specification of coherence was underscored by an independent evaluation commissioned by the Department of Health[67], which verified that the CDSS was safe for non-clinicians to use to triage calls to 999. This allowed the Ambulance Trust to become a pilot site for the CDSS [**999 Annual Report 2008/09**]

The CDSS achieved coherence here because there was widespread **trust** in its applicability and safety in handling 999 calls. Staff across the organization linked this directly to the clinical knowledge base underpinning the algorithms driving the system. The representation of the CDSS as "developed by doctors and nurses" was a message regularly repeated, for example:

> *You've got to trust the system. Sometimes I think that shouldn't be the disposition, but then again, that system [CDSS] has been designed by doctors and nurses and like a team of specialists … Even though I*

sometimes think "that question is ridiculous", there's a reason for it being there so you've got to ask it. **Interview, 999 call-handler**

[Call-handler] explains that [the CDSS] has been designed by "a huge group of people...non-clinicians, clinicians - lots of input...it's a very safe system to use, used correctly". **Observation 999**

Survey findings that directly measured trust in the CDSS supported these data (Table 8). Responses to five items on the trust survey relating to safety and effective handling of calls were aggregated to give an overall measure of trust in the systems competence to triage calls. The mean overall rating for competence was found to be quite high ($M = 3.8$; $SD = 0.6$, measured on a 5 point scale). Of note at the individual item level, call-handlers ratings of trust in the CDSS to arrive at safe dispositions and handle emergency calls effectively were particularly high ($M = 4.0$, $SD = 0.7$; $M = 4.0$, $SD = 0.8$, for safety and effectiveness respectively). Call-handlers were also asked to rate their trust in the competence of the CDSS relative to other systems they knew of. Analysis revealed this mean rating to be similar, although slightly lower, than their overall view of the systems competence ($M = 3.7$; $SD = 0.9$).

Although most of the staff in 999 had been recruited to use the simpler CBD system, the extension of their work to include a more complex process of clinically-based questioning and advice, and a fuller range of potential dispositions, was understood to be safely *achievable*, providing staff were adequately trained to use the CDSS.

Thus, the appropriateness and safety of the new CDSS provided one key element for coherence around the introduction of the CDSS at 999. But the meaningfulness of this intervention was also tied to the *additional advantages* it brought to call-handling. In part this links to the clinical evidence base, which – it is assumed – will result in *standardised decision making* and therefore 'better' resource use and health outcomes. Underpinning the CDSS is a conviction that there is an objectively 'correct' disposition for every condition. The CDSS syntheses current clinical research into to series of mathematical algorithms which, when followed accurately, should produce consistent outcomes:

The previous system gave them [the call-handlers] a lot of freedom to use a particular set of training skills in their heads, it wasn't documented, a really scary system… they had a lot of freedom to decide what was needed **Interview, CDSS developer**

its aim is to give the same disposition to every patient who presents with the same condition. **Interview, 999 manager**

On this basis, there was widespread agreement that clerical staff using the CDSS could reach *more reliable decisions* than clinically trained staff. The embedding of clinical expertise in the CDSS meant that the call-handlers did

not require extensive clinical training. Indeed having clinical knowledge could interfere with the safe use of the CDSS.

…with [the CDSS]… they only want you to concentrate on what the caller's saying at the time, and each question that's presented to you at the time. Whereas, if you've got someone who's medically trained, they tend to try and think about what's wrong with them, try and diagnose them, and they're thinking ahead all the time, and they're thinking too deep really … it can be a hindrance [being a clinician]. **Interview, 999 manager**

With these knowledge claims secure, the CDSS could be used to ration ambulances according to objective and systematic assessment of need. In the period 2006-2009 999 calls rose from 347,628 to 405,000 and budget constraint was a national and local priority:

Public spending will become much tighter and as one of the biggest spending departments, the NHS will come under scrutiny to trim its budget. … The responsibility will lie with all of us at the Trust to look for greater efficiencies in our day to day operations. **999 Annual Report 2008/09**

The need to ration was part of the coherence around the CDSS, at all organizational levels, although expressed differently by different actors. For some rationing was linked to controlling costs, for others a response to 'time wasters', whilst others saw it as empowering patients:

[call-handler] explains that she now realises how important [the CDSS] is. Many people call for an ambulance even if they do not need one. [The CDSS] helps them to select where to send the vehicles. **Observation 999**

The benefits for me were, were not taking some people to hospital and only responding to people who really needed it because that was one of [the previous system's] downfalls, was that we responded to everything. … [The CDSS] empowers patients a bit more to kind of think about what's wrong and to do something themselves about it or give them the ability to be able to confidently tell them that they can stay at home, you can take Codeine or Paracetamol, you know, if it doesn't get any better, you can go and see your doctor the next day. **Interview, 999 manager**

So it was widely agreed that that the CDSS could be used by non-clinical staff to triage 999 calls, standardising decision making and allowing rationing of scarce resources to achieve clinically, financially and socially desirable outcomes.

However, alongside this communal specification of coherence, there was a minor strand of dissent amongst call-handlers and some managers who, whilst they supported the intervention, believed that call-handlers still needed to exercise some discretion - for example, in calls that fell 'outside'

the CDSS, such as an incoherent caller, or multiple cases in the same call (e.g. a car accident). Indeed, it was accepted by the developers that there would be occasional 'over-rides' to work outside the CDSS but not that call-handlers would need to exercise discretion within the system. Whilst this did not detract from the coherence around the CDSS there was a sense that the CDSS did not 'cover every eventuality' and thus call-handlers must be prepared for the unexpected. This was linked to other concerns amongst some call-handlers that their job was being deskilled:

I think people's initial reaction when they see [this type of CDSS] … when you see questions on the screen, that look very scripted, you think well, anybody could come in and do this. It's sort of taken away the skills that I have, so I think that's how a lot of people felt and felt that it was a very scripted system and very rigid and they weren't sort of using their own sort of decision-making or their own sort of knowledge. **Interview, 999 manager**

Despite this, there was strong coherence around the CDSS at 999: it made sense and was seen as capable of supporting call-handling work safely. It was also understood as offering the opportunity to ration – saving money, delivering appropriate care, using evidence based knowledge. This coherence was maintained, in part because it was not too tightly specified; staff could understand the CDSS as better for patients because it produced more appropriate dispositions, or as a device for reining in costs, or both of these.

4.3 SPA

Whereas 999 and OOH introduced the CDSS to manage an established service, in SPA it was introduced to underpin a new service set up to provide 24/7 access and direct referral to all out-of-hours services (services provided by the PCTs). The CDSS was critical to the operation of SPA, combining the triaging software used in 999, with a new 'Capacity Management System' allowing call-handlers to offer service information (e.g. opening hours pharmacists) and to book out of hours appointments.

Coherence around the SPA service derived from the NHS Next Stage Review, which called for the development of integrated out-of-hours services. This resonated with Trust managers, looking to secure the future of their service:

…we'd already realised that, … the whole health care model's becoming so complicated it's difficult to navigate your way, way through it; it's not the patient's fault that they don't know how to, how to access and who to access and that the NHS… should get its act together and make this as easy as possible. **Interview, 999 senior manager**

Furthermore, managers clearly identified the need to improve urgent care to alleviate pressure on emergency services:

If we don't change our systems and processes the ambulance service will just implode with … increased demand. **Interview, 999 senior manager**

Thus, the development of SPA derived coherence from wider political and policy debate and a consensus that 'something must be done'. Coherence around the use of the CDSS to do this was built together by the Trust managers and the CDSS developers, and underpinned by the same rationalities of standardization and evidence-based medicine that were important in building coherence in 999 (see 4.2 above). Because the knowledge represented in the CDSS was understood as independent of context, the same system could be directly transferred:

We, thought we could help work with the [CDSS] developer to provide this, in effect, single point of access … [it] doesn't matter whether it's urgent or emergency, it's only us that define it as urgent and emergency, you know, the patient doesn't. They, they want, they've got something wrong with them and they want it sorted now. **Interview, 999 senior manager**

This sense of trust in the system's competence was supported by the survey responses of SPA call-handlers (Table 8). The mean overall rating for competence was found to be high ($M = 4.1$; $SD = 0.7$, measured on a 5 point scale). At the individual item level, call-handlers ratings of trust in the system's ability to arrive at safe dispositions and handle SPA calls effectively were particularly high ($M = 4.3$, $SD = 0.7$; $M = 4.0$, $SD = 0.8$, for safety and effectiveness respectively). Trust in the system's competence at handling SPA calls was comparable to the same call-handlers beliefs about its competence to triage 999 calls ($M = 4.1$, $SD = 1.0$) consistent with the qualitative data that there was a strong belief that the system was capable of operating effectively in both settings.

The managers, having implemented CDSS for 999, were confident about extending it to SPA. They had nearly three years' experience of recruitment, training, monitoring and supporting staff using the CDSS, so they were sure that implementation was practically achievable. They believed that SPA staff needed same skill-set as those in 999 and that this would – eventually - enable staff to work flexibly across urgent and emergency care, maximising effective workforce management.

I would like to think that they would all …be skilled to take all levels of calls. I think if we start to carve out different types of calls coming to different, then you sort of lose that, the capacity. If they are all trained to take the 999 calls, then when they're not doing an urgent call, they can pick up a 999 call and vice versa. So I think it's, you know, you have better use of resources if they're all trained up to take all calls. **Interview 999 senior manager**

4.4 Out-of-hours

Prior to the introduction of the CDSS, calls to this out-of-hours service were handled by clerical staff using a mixture of paper based clinical protocols and 'Adastra' (a computerised case management system which records patient details and clinical management decisions). The paper protocol had been developed by local GP directors partly informed by materials produced by another PCT[68]. The protocol comprised 70 pages of alphabetically organized sets of complaints (abdominal pain, accidents, etc.) within which grids of symptoms and criteria were presented enabling the call-handlers to prioritise calls for the attention of the duty GP. There was considerable flexibility for the call-handler in how questions were asked.

These call-handlers worked part-time, often alongside other health care work e.g. as GP receptionists. They were not clinically trained, but in some cases had many years' experience and experiential knowledge about prioritising calls, communicating with patients, and service user expectations. The survey shows that 45% of OOH call-handlers had prior experience in health and social care, significantly more than those at 999 and SPA (16% and 26% respectively).

Coherence around the existing system was high amongst the managers and GPs.

> *Yes, we were very happy with it; it worked very well. Like I said, we won a national award for it because it was so effective. The PCTs locally were very happy and they've audited it. And we have a clinical governance system that reviews calls and the outcomes of the calls, and the performance of the operators, the GPs, nurses, etc.* **Interview, OOH GP**

Call-handlers liked the established system, felt accomplished and confident using it. There was a strong belief that the system was both safe for handling calls, efficient and quick to use.

> *The positive, with using that system, was that the calls used to take on average 2 minutes …. with the old system, they didn't need as many operators, so it was more cost effective.* **Interview, OOH call-handler**

> *I think we had one of the best systems going.* **Interview, OOH call-handler**

There were some key differences between the protocol system and the CDSS. The latter was more structured and allowed a greater range of dispositions and the opportunity to advise patients (e.g. self-care advice). The CDSS was not presented as an alternative but as *a similar way of doing the task*, with the same staff and organizational structures. In this way, the managers attempted to build on satisfaction with the old system to develop coherence around the new one:

it backs up our decision to have non-clinical call-takers triaging and going through our initial pathways… by doing a service similar to what we were used to, it was not too much of a change for our operators. **Interview, OOH senior manager**

To me, [the CDSS] is just a system of our old protocols put onto the machine for us to read out. **Interview, OOH manager**

The protocol system did not meet national standards for OOH services[69], which required out-of-hours providers to start *'definitive clinical assessment'* within 20 minutes of answering urgent calls. The new standards did not recognise the work done using paper based protocols as clinical assessment, but the CDSS was recognised as enabling this, even when used by the same workforce

Because the staff couldn't advise patients at that point, it still wasn't recognised even though the PCTs were happy with the way we did things. So we knew we had to, sort of, do something. **Interview, OOH senior manager**

[The CDSS] in one way, helped us a great deal by continuing the similar non-clinical triage that we've always done. And when we've compared [it] to what we did, it's very similar. But because it's a nationally approved evidence-based system, it gives us the medial legal protection for our staff, and it ticks the boxes for the PCTs. **Interview, OOH GP**

Trust in the systems competence to triage calls was further supported by the survey (Table 8). The mean overall rating for competence was found to be high (*M* = 4.0; *SD* = 0.5, measured on a 5 point scale). Of note, at the individual item level, call-handlers ratings of trust in the system's ability to arrive at safe dispositions and handle OOH calls effectively were both high (*M* = 4.0, *SD* = 0.9; *M* = 4.0, *SD* = 0.6, for safety and effectiveness respectively). Despite this, however, trust in the systems competence relative to other systems was less certain (*M* = 3.6, *SD* = 0.7).

As well as meeting new standards OOH managers wanted the new system to do *more* than its predecessor which had simply sorted call urgency for the GPs. Call-handlers could not suggest alternatives to the caller so 'expensive' doctors had to deal with complex and simple calls alike. OOH managers were keen to direct callers to alternative dispositions if possible and to offer advice. The belief was that this would improve the quality and safety of care and reduce demand.

… that was an advantage … for the first time our non-clinical operators could give directed clinical advice, or direct patients to be able to go and see their GP or health care professional within several days […] So that was a bonus for us because that was new, and that was also going to reduce the pressure on the out-of-hours work. **Interview, OOH GP**

In addition, auditing calls in the protocol system was slow and managers needed a system that facilitated faster performance analysis:

> *But we did recognise that to audit all those calls, was a very lengthy process because everything was free text, basically typed in. So we decided that we needed something to audit more quickly with reporting […]* **Interview, OOH senior manager**

The communal specification of coherence at OOH centred on the need to extend the call-handlers' role so that they could offer clinical advice within an increasingly standardised regulatory bureaucracy organized at the national level. The existing system was not regarded as *un*safe or problematic locally, but was rendered unsuitable by external changes.

However, despite this broad coherence there was some ambivalence over the extent to which the CDSS would, could or should remove all discretion from the call-handlers. Concerns were raised about whether such work could be performed by non-clinical staff:

> *Ah, there's nothing that I can say that I think it is better than the way we were doing it, not at the moment. It is, first line triage done by non-clinical staff, for half the price that you're going to have to pay a nurse. If that's good, if that's saving people money, that's fine, but they're asking people who have 60 hours training and not a medical background at all, to do what they're doing, and sometimes I think, oh dear [laughs].* **Interview, OOH call-handler**

As we will show in subsequent chapters, such views had implications for the on-going coherence, cognitive participation and collective action around CDSS. As in 999, there was broad coherence around the introduction of the CDSS at OOH, but also some tensions around deskilling: this was not only a concern for call-handlers themselves in term of how skilled and interesting their work was, but also raised questions about the skills necessary to do call taking effectively.

4.5 Coherence across the three different settings

Studying the how the same technology came into use in three settings, shows that it is possible to achieve coherence around this intervention, even where local conditions vary considerably. Across all three sites, there was agreement that the CDSS was suitable for the (varied) task at hand. Similarly, there was agreement that the appropriate resources – staff, training and organizational structures – were in place to enable effective implementation of the intervention, even though these resources varied from place to place. These findings were endorsed by our survey, which showed that call-handlers self-reported trust in the CDSS was broadly similar across all three settings.

This said, we also identified a significant difference in coherence between 999 and OOH on the one hand and SPA on the other. In both 999 and OOH - where experienced staff were required to switch from an *established* system of call-handling to the 'new' CDSS, there were some doubts on the 'shop floor' about whether a CDSS could embody *all* the knowledge necessary to do the work. These call-handlers argued on the basis of experiential knowledge (sometime acquired over many years) that call-handling would continue to require off-line experiential expertise. When call-handlers were asked by our survey to assess the competence of the CDSS relative to other systems, the SPA respondents rated the CDSS more highly than at either of the other two sites. There was then a 'gap' between 999 and OOH staff trust in the CDSS per se, and their evaluation of its competence relative to other ways of doing the job. Whilst at 999 the differences between overall competence and relative competence were marginal, at the OOH site relative competence ratings were significantly lower than overall competence. These findings are consistent with the qualitative findings regarding different beliefs about the CDSS in each of the settings. Call-handlers at 999 and SPA had experience of other systems and had some reservations about this new system. In OOH some staff preferred the previous system.

Table 8. Respondents self-reported trust in the CDSS (by trust factors)

Trust Factors	999 (N=31)	SPA (N=39)	OOH (N=33)
	Mean (SD) Ratings	Mean (SD) Ratings	Mean (SD) Ratings
Overall trust in CDSS system competence	3.8 (0.6)	4.1 (0.7)	4.0 (0.5)
Competence relative to other systems	3.7 (0.9)^{a***}	4.1 (0.8)$^{a***\ b***}$	3.6 (0.7)^{b***}

N.B. Common superscript in same row shows significant difference between those sites - *** $p<0.001$

4.5.1 Workforce implications

So far as the initial specification of coherence is concerned, there appears to be a need for different managerial strategies where a technological intervention replaces an established service, run by staff in post, compared with those cases where the service and the staff are new. Staff knowledge and experience of a service and the working identities built through the everyday conduct of work influence the coherence of new technology for different staff in different settings.

4.5.2 Implications for developing NPT

Our findings about the nature of coherence, across all three settings, elaborate the processes through which coherence is achieved. We show that it is important to recognise that coherence is achieved in the context of wider discourses that shape the intelligibility of an intervention. To understand coherence we need to explore the discourses that enable this intervention to 'make sense'. This goes beyond the task-focussed question 'can the CDSS do the job?' to ask how the job is understood in broader social, political and economic terms. What underpinned coherence in all three cases was not simply a narrow evaluation of the tasks to be done but a far wider set of understandings linked to shifts in the power/knowledge relations. These include discursive shifts in how the NHS is understood (acceptance of rationing), how the public is meant to behave (challenging callers' rights to services) and wider contests about clinical knowledge (dominance of EBM). It is the interplay of these discourses that underpins the coherence of the CDSS across all three sites.

It is worth pointing out that what we have discussed here is an *initial* specification of coherence – but coherence is not a one-off or static

achievement. This underscores May and Finch's point that the constructs of NPT are 'dynamic and … their reproduction over time is emergent'[54] (p 542). Coherence is not guaranteed or stable, but demands continual re-production through people's experience of the intervention in everyday use, and as organizational structures and wider contexts change. This may work to enhance the coherence of an intervention over time or, of course, to destabilise it.

Finally, it is important to note that the discursive shifts described above are general in nature and clearly not specific to our case. Indeed, they are arguments that have been mobilised for other ICT interventions but which have – nonetheless – not been successful. Coherence per se is not enough – we need to look now at how actors are brought on board to do work that makes this intervention work.

5 Cognitive participation – Who does the work?

5.1 Introduction

NPT proposes that the processes involved in implementation are made up of long chains of engagement performed by a range of different actors. The nature of these *interaction chains* will vary depending on both the new practice itself and also on the actors involved in its enactment. The domain of cognitive participation in NPT focuses attention on these interaction chains, and proposes that the embedding of a new practice is dependent, at least in part, on the extent to which the actors needed for implementation can be defined and organised into shared purpose. Furthermore, it suggests that any factors which promote or inhibit these actors' participation will be influential in how, or indeed whether, the new practice comes into use.

NPT proposes that the actors needed to implement a new practice include not only those with the immediate hands-on responsibility for performing the task, but also those in the wider context who influence the institutional and political structures in which the intervention is situated. Some actors will have the power to participate voluntarily, whilst others – for example, junior staff - will appear to have little choice. However, in practice, any of these actors can affect the smooth operation of the interaction chains involved in implementation by either facilitating their enactment or disrupting them.

In the early stages, cognitive participation involves the *initiation* of the new practice by leading actors. However for this to progress they must also enrol the other key actors needed for collective action. This *enrolment* is itself dependent on processes of *legitimation* or 'buy-in' to the coherence around the new practice (see Chapter 4). Implicit in this is the notion of trust, both in the beliefs about the practice itself, but also in the ability, benevolence, and integrity of the various actors in the network. We now consider this process of initiation, enrolment and legitimation at our case study sites.

5.2 999

In 999, the initiating actors were the Department of Health, the CDSS developers and the local managers. Whilst (as we saw in Chapter 4) each agreed on the broad advantages of the CDSS (a *communal specification* of the CDSS) - it became clear during our research that the underlying motivations for this varied significantly between actors.

For the government and the DH, motivations to become involved related to the perceived ability of the CDSS to support rationalization and maintain services under conditions of increased demand and cost pressures. DH support for the development of the system was grounded in ambitions to reform and integrate urgent and emergency care to provide more efficient services. The particular policy advantage of the CDSS lay in its potential to replace expensive clinicians with cheaper clerical staff and to extend the scope and accuracy of triaging:

> *… if you can handle this with call-handlers and just a few nurses, adjust that skill-mix, you could save a shed load of money. And actually have no detriment to the outcomes. And to be honest, in the economic climate it's going to get tougher and tougher. …I think that's why…the DH is so keen to see [the CDSS] being used, because it's the only way they're going to afford their policy. **Interview, key stakeholder**

For the CDSS development team enrolment was about putting *their* technical solution first in the process of rationalization and standardization. The team had a strong vision of their solution, but had not found it easy to get institutional support. They needed to enrol the wider, more powerful networks in the DH to take their project forward:

> *we've just gone from strength to strength because we're now in an organization with infrastructure specifically geared to making this kind of thing available across the nation.* **Interview, CDSS developer**

With DH support the CDSS was piloted in two OOH sites but then withdrawn. Nonetheless, the developers were satisfied that the CDSS had 'worked' in these settings, attributing withdrawal to commissioning problems and local politics. The opportunity to pilot at the 999 setting offered the development team the chance to pilot emergency call-handling, new territory in which to prove the utility of the CDSS. The developers invested heavily in appealing to the ambitions of the other actors who were necessary to secure success in this new setting.

For the Trust managers, the motivation for enrolment related in part to beliefs that the CDSS could match 'the right professional' to the caller's needs and be 'in the right place at the right time'. Other systems were more expensive and the CDSS offered a means of reducing ambulance demand which could standardise call-handlers dispositions and provide sophisticated

record to document decision making. The CDSS presented itself as a means of achieving some of these aims.

However they also saw the CDSS as a means of positioning themselves as a leading Trust in the wider NHS. Consequently they found their ambitions tied to those of the CDSS developers. The 999 managers believed that by working with the developers to bring the CDSS into the 999 they could shape it to realise their ambitions.

> *the main reason we moved over onto [the CDSS] was because it became available and as… a dynamic Trust, we thought, well, if we get a hold of this tool, … get it designed … by somebody who knows what they're doing, in other words, us, and it should work a hell of a lot better than the alternative. So we wanted to get a hold of it and work with it to make it a reality.* **Interview, senior manager**

> *We've always been in the forefront of new things, new initiatives …you can guarantee if something's going to happen, we will be at the forefront of that and we've got a reputation for that, of wanting to try new things and wanting to push the boundaries a little bit further, so it didn't surprise us when we [piloted the CDSS].* **Interview, 999 manager**

There was significant pressure on the organization to implement the CDSS rapidly (such pressure was a common feature across all three settings, either from the DH (at 999) or local PCTs (SPA and OOH). The organization was under additional pressure as it had to integrate the CDSS into wider technological systems. Alongside the CDSS, the organization implemented a new CAD system at the same time. (CAD is used by dispatchers, call-handlers, and managers for ambulance resource management, communications and radio and mapping). Implementing two new systems simultaneously created challenges for the organization:

> *And the command and control system probably gave us a lot more issues than did going live with [the CDSS] […] And that's mainly because the staff, were desperately trying to answer calls with the new system whilst, at the same time, call length had doubled and, they were bemused by the new CAD system. […] So, I had lots, lots of problems around that, two different systems on the same day. Massive change.* **Interview, 999 senior manager**

> *If I was to be honest, when [the CDSS] come in, I thought I was going to have a nervous breakdown….it was such a shock…You knew all that information was there, and it was all in the computer, but it was making sure that you were going to go the right way…. because we were the first service to use it, there was a lot of problems with it, in the beginning. …when [the CDSS] first come in, it really was hard. I have had nights, when I've got in me car and I've been driving home, and I've been crying, and saying, I've never put in a day like that. It was quite, quite stressful.* **Interview, 999 call-handler**

These pressures were exacerbated by needing additional staff, and delays in a proposed move to a larger building.

> *it was a very fraught place to work when it got busy; very frenetic and frantic and, at, at times, people would be left running out of the building in floods of tears because they couldn't cope with the, you know, the environment that was building up. It was like a pressure cooker. […] When we moved across into this place we'd learnt lots and lots and lots of lessons about matching capacity to demand. So, we've got a heck of a lot more agents upstairs and building a bigger space.* **Interview, 999 senior manager**

In addition to securing information systems and other infrastructure, management also sought to secure the enrolment of their own staff, principally those who worked in the control room. For the front-line staff participation was mandatory. In formal bureaucratic terms they had no say in the decision to adopt the new CDSS. In one of the earlier pilots, members of staff were given the choice of whether to use the system or not and while some showed very high levels of commitment (even giving up annual leave in order to complete the training), others did not, disrupting the interaction chains needed for the successful completion of the work and making the on-going use of the CDSS impossible. In contrast, all 999 control room staff had to use the CDSS if they wanted to remain working in the organization. However, although in formal terms agency was withheld from this group of workers, their active consent and enthusiastic participation was nonetheless recognised as important to the success of the intervention. Both 999 managers and the CDSS developers invested time in keeping the call-handlers on board, both in the initiation phase and – later on (see Chapter 6). This investment of time was important in developing a sense of trust in the utility of the system ensuring that call-handlers were willing and committed participants in the implementation process being pressed upon them. The work building coherence around the CDSS helped to offset reservations about deskilling which might have otherwise hindered implementation and the work by managers and CDSS developers in *keeping* staff enrolled was key to the normalization of the CDSS.

Implementing the CDSS in 999 involved the enrolment of a number of key actors including the DH, the CDSS developers, managers and staff. This enrolment was possible because they identified the CDSS as a route to achieve their – diverse - ambitions. The shared communal specification of coherence around the intervention, described in Chapter 4, was broad enough to carry different interpretations and priorities and thus enable collective commitment to the CDSS at every level of the organization. However as we shall see in chapter 6, keeping the CDSS in use subsequently required the enrolment of further actors to support the call-handlers in handling more complex calls, and to monitor and audit performance.

5.3 SPA

The key actors in the initiation of this new service were the DH, the CDSS development team and the Ambulance Trust managers. All three shared the wider commitment to bring together the existing patchwork of fragmented services into a single point of access, from which callers could be triaged and directed appropriately. Through working together on 999, all three actors saw the potential for the CDSS to deliver this goal, but each had their particular concerns.

For the developers, this provided an opportunity to embed the CDSS in both emergency and urgent care simultaneously.

> *… if we can get it to a place where it's used in ambulance services and urgent care … we get some really powerful synergies out of it.*
> **Interview, CDSS developer**

For senior managers, integrated services offered benefits to patients and the NHS in rationalising and co-ordinating a confusing and costly system, but also offered an expanded role for the Trust. Based on past experience, senior managers were confident in the CDSS, and in their ability to manage the system to deliver an effective urgent care service and to do this in a more cost-effective manner than other competitors, by expanding the non-clinical workforce:

> *I think we've demonstrated so far that [the CDSS] can deliver safe assessments to the patients. It can deliver them consistently…can deliver them with a work force which is essentially, technicians, people who are not nurses, they're not doctors, they're not clinically trained. They are trained in the use of [the CDSS] and therefore they are a less expensive work force, considerably less expensive work force than that which is engaged by NHS Direct, for example, or by …doctors'.* **Interview, senior manager**

Indeed, senior managers saw the advantages of the CDSS in emergency care as just the 'tip of the iceberg' in comparison with the affordances it might bring to urgent care:

> *The big prize will be to apply it to those callers who would previously have phoned their GP in-hours because they had an unscheduled care need or they would have phoned their doctor out of hours…or they would have phoned NHS Direct… And my belief is that [the CDSS's] true worth will then be… can be truly exhibited […] then we've got the real chance of making this combination of evidence based or low cost assessment combining that with the Directory of Services and advising commissioners on what alternative services they should be putting in place out there in the community. That's when I think the real prize will be achieved by the NHS and patients.* **Interview, senior manager**

However, extending the Trust's role into urgent care presented new challenges since it required enrolling a wider range of external actors (PCTs

and local GPs). The Trust and CDSS developers had learned from previous implementations that they needed to take the time to gain this external support. For the Trust, although they had some links with urgent care providers (e.g. 999 could refer to Urgent Care Teams in some localities), working in a new sector meant establishing links with a range of services. It was also necessary to integrate the CDSS into wider technological systems – such as the clinical database which links SPA with the UCCs to book appointments.

When the two local PCT areas tendered for a five year contract to provide SPA, the Ambulance Trust and the CDSS developers negotiated a shorter contract to provide this service. This allowed them the flexibility to realise the bigger aims and ensure that work in the SPA did not jeopardise their larger ambitions:

> *And we thought this is actually really dangerous [implementing the CDSS too quickly] because the whole of the national three digit number programme depends on credibility with the clinical community […] and if this is done … badly because it's done quickly you will start to create the kind of resistance.* **Interview, CDSS developer**

Both Trust managers and the CDSS developers were aware that they had to gain trust and legitimation of the new system by getting it right and involving all the stakeholders.

> *.. we need to get all the technology in place, all the, hearts and minds that people need to have in place; the doctors who are going to be getting work from us they never had before. And…the IT stuff so the systems works, populating all of the service directories…[ ] there's lots and lots of potential interface problems, and so we have to get on top of it.* **Interview, senior manager**

> *…but there won't be any buy in, and there will be people on the sidelines sniping because the clinical community won't have had the opportunity to look at the system and reassure itself that it's appropriate. They won't have established the relationships that make them feel that their voice is heard, their concerns are real and their feedback will genuinely be taken on board.* **Interview, CDSS developer**

The launch of the new SPA presented a number of organizational and technical issues. Many of problems were not with the CDSS per se, but rather wider problems of integrating health services.

> *I think it was a case of everybody was in the same boat in terms of not really knowing what to expect and what was going on, and felt that we were kind of thrown into the deep end to start with. And we weren't really trusted, we had to go to the supervisors a lot especially for emergency responses, which I can kind of understand, otherwise we would probably be sending a lot more emergency responses.* **Interview, SPA call-handler**

A manager from the PCT comes over to talk to us. She says that they [the CDSS team, the PCTs and managers] have had a meeting today to "thrash out some of the problems". She confirms that many of the problems have been about home visits and transport […] In terms of booking out-of-hours appointments for patients, one PCT was already operating an appointment system but one wasn't. Some out-of-hours centres have experienced a bigger change than others. **Observation SPA**

The new SPA required about 50 new staff. Some were trained and ready to answer calls prior to the SPA launch, and started work in 999 first. These 'dual trained' call-handlers, laid the foundations for the emergence of a generic call-handling staff, integrating the 999 and SPA function. Because the SPA call-handlers were almost exclusively a new workforce, the Trust had less work to do in enrolling them into use of the CDSS. New call-handlers did not have the reservations that 999 call-handlers had about deskilling or about negotiating dispositions with patients, because they had nothing to compare it to. The Trust also enrolled some staff by promoting some call-handlers to the role of call handler supervisor – ensuring their commitment to the new service and the CDSS.

5.4 OOH

The key actors involved in the initiation of the CDSS at OOH, included the DH, the CDSS developers, managers and medical directors, as well as the local PCT. One influential actor in the DH, who was committed to the use of the CDSS for integrated care, had become engaged in the more diffuse activity of promoting the CDSS to those receptive to trying it out, and this individual introduced the CDSS developers to one of the OOH managers:

[me] and the commissioning manager from [the PCT] had gone to a meeting where [DH individual] was…we basically got chatting around the issues and he said that this [CDSS] was being piloted and seemed to be really successful. So basically, he put us in contact with [CDSS developers] **Interview, OOH senior manager**

This trusted source gave the CDSS additional credibility, easing the work needed to bring the CDSS team and the site together. Enrolment was further supported by the CDSS's growing reputation as a technology that could be trusted because it was used successfully for 999.

[They] have it in the Ambulance Service currently, so it's got, it must work because otherwise it wouldn't have been used, would it? **Interview, OOH senior manager**

For the out-of-hours organization, the CDSS not only helped them meet new DH Quality Requirements (see Chapter 5) but also supported their commitment to deliver integrated urgent and emergency care. The CDSS

fitted neatly into plans for a new UCC and managers saw it as a way to triage OOH calls *and* visitors to the new centre using a single system.

> *It's going to assist us with our move up to front-ending [ ] A&E, where we can then triage a lot of calls that…[ ]would originally go to A&E, and we can remove that need for them to go into the hospital system and deal with them in primary care, so it will reduce pressures on A&E as well. And the way [the CDSS] is developing, I can see it being adopted by more and more urgent centres, same-day health centres, out-of-hours services.* **Interview, OOH GP**

Like 999 these managers positioned their service 'at the cutting edge' this helped to legitimate the CDSS – which itself was a pioneering technology:

> *Obviously we're really keen on some of the developments nationally, like the 111 number and all those kinds of things. By using the system, it gives us a real focus… we've always been used to pioneering things. …[ ] we like to do things the best, so I think that's why [the developer] was quite keen on us to do it.* **Interview, OOH senior manager**

Interestingly the CDSS developers appear to have had little involvement in the decision to expand the use of the CDSS for face-to-face contacts:

> *Q: can you just talk me through how that call-handling process is going to take place in [OOH]? I'm still a bit unclear as to how that all fits with A&E*
> *Developer: I will hold my hand up as being equally confused as you. We have said right from the beginning that although we're [ ] working on a face to face product…, the way that [the UCC] is actually going to operate, they will still be using our [ ] system. But they will have to adapt it and we've kind of said, …when they suggested that this is…that you won't be getting a new product that's going to be all whistles and bells and will work for a face to face setting.* **Interview, CDSS developer**

Unlike the other settings, the CDSS was introduced before all the call-handlers had been trained and ran alongside the existing system for 6 months until training was completed. This was stressful, but it did mean that for some months, OOH had both the CDSS and the protocol system operating simultaneously. Some 50 call-handlers (both existing and newly recruited) were trained over approximately six months. As in 999, the OOH call-handlers had no choice over whether to use the CDSS – a managerial decision was taken on their behalf. When the system went live, support was provided by the CDSS developers on a one-to-one basis for the two newly CDSS trained operators. The need to implement the CDSS within a short timescale put the organization under considerable pressure, and perhaps as a result, of three members of staff identified to become CDSS trainers, only one went on to become a trainer. This technique of cascading learning by 'training the trainer' was not the CDSS developers' preferred mode of training.

it's not necessarily something that is the ideal…our preference … if you're actually going to be training somebody I think you have to know yourself essentially what you're going to come up against. …[ ] …I'm a great believer that you can't actually go and train something unless you've done it yourself. So I think you need to have a good grounding in actually taking some calls yourself and experiencing that. … [ ] in an ideal world it would be lovely, we would be able to give [individual] a month's worth of experience before she had to actually go out and train.
Interview, CDSS developer

The first training course was conducted over a five weeks, but the second round of training was condensed so that OOH could quickly implement the system. There were some additional challenges: with a largely part-time workforce fitting in training was problematic (and training sessions were run twice to ensure that staff were able to attend). Consequently there was considerable pressure on staff, especially the trainer.

[The trainer] must have worked 24 hours a day. She was shattered. It's a lot better now because we've identified more support [ ]… identified another person to go on the training programme. So we've learnt our lesson, so to speak. But we did it on the job rather than beforehand.
Interview, OOH senior manager

For the CDSS developers, it was important that OOH successfully implemented the CDSS because implementation had failed in two previous OOH services. The OOH organization was heavily supported by the CDSS team, in both the initial stages of implementation, training the trainers, and adapting the system to fit their needs.

The speed of this process may have played some role in creating ambivalence, and even resistance towards the CDSS amongst some existing call-handlers. Some did not appear to buy-in to the communal specification of the new CDSS as 'better' than the previous system or the idea that not all callers were entitled to speak to a doctor.

Q: [was] this was a necessary step, to use [the CDSS]? Do you think that you could have continued with [the protocol system] …?
Call-handler: I think it's because the powers that be need a triage to be done quicker and the only way to do that would be, probably, to employ twice or three times the number of doctors. This way [with the CDSS] it's classed as triage and we do it. So it's ticking the boxes that way. But I'm sure that if we had carried on with [previous system] I think we had one of the best systems going. **Interview, OOH call-handler**

I think what it does is it makes it very difficult for somebody who's got the experience. And because we built up a service of patients being seen straightaway, the hard thing now is to be able to say to somebody you need to be seen within 72 hours, to give them care advice and tell them to go away. Well, not to tell them to go away but to tell them that from

the information that they've given you, they don't need to be seen any sooner than that. So they can go and make an appointment with their own GP within the next three days [...] I think it's just an education for us and an education for the patient. **Interview OOH manager**

This view was not held by all staff. Managers successfully secured support and enrolment from some call-handlers to be trained to take on training roles using the CDSS and to act as champions for the system implementation. Overall, it appears that at OOH the level of enrolment and legitimating was not as strong as at 999. There was more resistance from call-handlers and some recognised that enrolment, lead from the top was going to be important to embedding the CDSS:

Quite often there'll be a heated discussion going on somewhere of people really that are just running it down, and probably people that have never used it. I mean, the doctors obviously haven't... they don't have to use it because we're using it, but there's a lot of negativity about it. I don't know what the answer is to that one, but it's the old saying: you need to get the people in charge or the right... the people at the top need to be in, trained and confident with it before we start pushing it up at the bottom. **Interview, OOH call-handler**

5.5 Cognitive participation across the three settings

In all three settings, a network of actors - DH, CDSS developers, organizational managers - took the lead in initiating the intervention and in enrolling those necessary to bring it into use. This was built on the foundations of coherence and trust that the CDSS could deliver desired goals (described in Chapter 4). Variation around coherence links to the different degree of buy in from different actors. Managers in 999 and OOH had to work particularly hard to develop trust and co-operation from the call-handlers, who had greater scepticism towards the CDSS than those in SPA. There appears to have been more resistance to implementation in OOH. It is possible that this finding is an effect of the phasing of our fieldwork which was nearer the start of the intervention than in 999. However, we do not think that this is a plausible explanation. First, because we have the comparison with SPA at a similar implementation phase, and second, because we did not find reports of similar resistance in the early days of 999 (important because this was also an established service introducing the CDSS as a new system). Rather, we suggest that the ambivalence in OOH was related to the speed of implementation and concurrence of significant organizational change, particularly the relocation and integration into the new UCC. This meant that staff could not be trained together and that there could not be a single switch over to the new system. This was a difficult transition, for managers, trainers and call-handlers alike, but may have had a particularly negative effect on the call-handlers, who already had less commitment to the communal specification

of coherence (described in Chapter 4) which rested on wider visions of rationing, standardization and EBM, rather than an immediate concern for the task at hand. Combined with all the other disruptions it is likely that these call-handlers found the CDSS implementation difficult to cope with.

Furthermore, the OOH providers spent less time with the CDSS developers compared to 999. At the 999 the developers were closely involved in the implementation to help to get the CDSS practices 'right'. This high level of engagement built a strong trusting relationship with the CDSS development team and front-line staff and fostered enrolment and legitimating of the CDSS. However, implementation at the OOH site received less attention, perhaps because the developers felt that the system 'worked' and therefore required less involvement. This reduced their opportunity to talk to staff and achieve the necessary legitimation to make the CDSS work in this setting.

5.5.1 Workforce implications

Two important workforce implications arise from these findings. First, thought should be given as to whether to make enrolment mandatory. Failure to do this at the early OOH sites (not studied here) appears to have led to a breakdown in the interaction chains needed for successful implementation. Second, the early stages of implementation need to be managed to engender the trust necessary for buy-in. Not only does trust need to be cultivated with those actors that have the power to choose to enrol (or not), but also with those for whom participation is mandatory - in this case the call-handlers. This enrolment work not only needs to take place between managers and workers, but also may be important between the CDSS developers and the front-line staff. Trust in the technology was based in part on trust in external developers and whilst this may be partially based on their reputation it is greatly influenced by direct positive personal experiences. We are not suggesting that the CDSS developers neglected OOH, indeed as we will see in chapter 7, they invested considerable time in the introduction and adaptation of the CDSS, but relative to the enormous investment of time and effort at 999, there was less investment to maximise the enrolment of call-handlers.

5.5.2 Implications for developing NPT

Despite the communal specification of coherence (described in Chapter 4) it is clear that different actors were placed distinctively in terms of enrolment into the interaction chains necessary to bring the CDSS into use. Cognitive participation was (in part at least) about how different actors were positioned, and positioned themselves in relation to the wider coherence around the CDSS and was constrained, not least by the discursive nature of the 'vision' itself and by power differences between actors. Some actors were able to exercise executive or bureaucratic power – determining, for

instance, the adoption of the CDSS for other staff who have to use it as part of their daily work. Call-handlers as clerical workers had no legitimate claims to an autonomous or experiential basis for what was essentially clinical decision making. Nonetheless, if they were to collectively deem an intervention unworkable this would be a powerful challenge to its coherence – even informal acts of resistance in the day to day use of an intervention might challenge its coherence. We know from previous studies of new technologies in health care that the top-down imposition of an intervention will not guarantee its success. Our analysis reminds us that we need to recognise different forms of power in exploring the processes of cognitive participation. Whilst policy makers may have legislative power (e.g. to license the CDSS), and managers bureaucratic power (to control the structures and deploy organizational the resources), front-line staff have *agentic power* – in the detailed enactment of the work – shaping if and how an intervention might actually work in practice. We also know, from the sociology of work, that this power is not simply constrained by rules, procedures or disciplinary practices and must be taken seriously in delivering organizational change[70-72]. In looking at cognitive participation using NPT it is important to acknowledge these different forms of power.

Linked to this, we also need to recognise the agency exercised by non-human actors and their importance in the interaction chains that deliver an intervention into everyday practice. Although the description of 'interaction chains' in NPT echoes ANT framings of 'actor networks'[73] as currently specified NPT downplays the significance of non-human actors[54]. This is perhaps because NPT focuses on social action and (human) participation in normalising innovations or practices. Nonetheless, we have indicated that the enrolment of non-human actors - notably other computer systems which managed patient information, geographical and dispatch databases -was also critical in the network mobilized to bring the CDSS into use. This is not only an important point for IT management but draws attention to the importance of relations between human and non-human actors and the ways that these shape outcomes, a point which we return to as we move on to consider the collective action undertaken to embed the CDSS in everyday practice.

6 Collective action – What is the work and how does it get done?

6.1 Collective action

NPT proposes that organising and enacting a new practice requires *collective purposive action*: it requires effort and activity by all of the actors implicated in its implementation. NPT suggests that in order to understand the collective action which enables an intervention to become routine we must focus on its **workability** - how actors operationalise the work (*interactional workability*) and the division of labour and skills required (*skill-set workability*) – and on its **integration** into the setting - how actors understand the actions of those around them (*relational integration*) and where the practice or innovation sits vis-à-vis the wider social and organizational context (*contextual integration*).

In this chapter we examine the workability and integration of the CDSS across our three case study settings. In each case, we begin with a short vignette (boxes 1-3) describing the daily work of telephone triaging for emergency and urgent care patients and show how the CDSS fits into this work. This is followed by our findings from the ethnography and survey work relating to each setting in turn.

Box 1: The work of 999

Calls to the national 999 service are answered, first, by a British Telecom operator who routes the call to the appropriate emergency service. Incoming calls are randomly allocated to an available call-handler. Call-handlers sit in twos at a double desk. They wear ambulance service uniform: a crisp white shirt – with the NHS and Ambulance Service logo, and shoulder tabs for epaulettes denoting rank – and black skirt or trousers. Each has a headset with a microphone and earpiece, a keyboard, a mouse, and two large monitors. Between calls, the call-handlers chat to colleagues, read, paint their nails or simply wait. A buzz in the earpiece alerts the call-handler to an incoming call: "hello, ambulance service?" Immediately, the call-handler clicks the 'new call button' (flashing red for 999 and blue for an urgent call e.g. from a GP). This opens the New Live Call box on screen, which requires caller details (telephone number and address) and includes a section for recording ad hoc notes e.g. for the ambulance crew. The address is double checked with a caller recognition system, or using an on-line

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Gazetteer, while the call-handler establishes whether the caller is the patient or calling for someone else, and if the patient is child or an adult. The CDSS then opens with an initial option to 'pre-alert' the dispatch desk – if the call-handler judges that this likely to be a potentially life threatening case. Still talking to the caller, the call-handler begins to navigate the CDSS.

Male and female 'body maps' have opened, and the call-handler 'clicks' with the mouse to select and asks where the problem/symptom is located. Clicking on the chest area opens a series of 'chest pathway' questions designed to narrow down the diagnosis. The call hander runs through the questions, sometimes using prompts from the screen, or versions of these. As the caller responds the call-handler clicks answers – sometimes backtracking, sometimes ticking an answer without asking a question because the information is supplied unasked and sometimes typing in a short phrase. Working rapidly through the questions the call-handler may also complete demographic details or crew notes in another window, whilst the caller supplies detail. Call-handlers are encouraged not to waste time getting patient's names before the crucial clinical information has been entered, but many do ask and use this information throughout the call. Alongside the CDSS questions, the call-handlers insert explanations to the caller about why the questions are important: "an ambulance is on it is way but taking this information now is useful for the ambulance crew in treating your son". Often the call-handlers have to probe for information, asking the caller to speak up, or clarify an answer, and sometimes the call-handler has to explain the clinical language and/or translate the callers' responses into one that fits the options in the CDSS. All the while, the call-handler is aware that an ambulance has already been sent by the dispatchers – located in the centre of the room - that she is racing against the clock to reach a disposition before the ambulance arrives. The target time for 'Category A' cases is 8 minutes and ambulances are dispatched to every call on receipt of address, in case it is a life-threatening case. If an 8 minute ambulance is not required it must be 'stood down' within 8 minutes is up. Other possible 'dispositions' from the CDSS include Category B (19 minute ambulance), Category C (60 minute ambulance), and non-ambulance options e.g. see GP within 24 hours. The call-handlers sound calm and professional – sometimes it appears that they know the clinical questions 'by heart' – but if the call is a hoax or the caller is drunk the call-handlers may become more disciplinarian, raising their voice, or making e a gesture to a colleague.

The call ends with either a final disposition or an over-ride where the call-handler exits the system early. Early exit can be used when the ambulance arrives at the location before the CDSS process is complete or where the caller is not able to provide appropriate information to complete the triaging process. The closing moments of a call may be used to advise the caller – to open the entrance door to the house so the ambulance crew can get in, or to follow a set of clinical instructions (such as those about taking aspirin in

the case of suspected heart attack). If the ambulance is a less urgent category, before handing up, she will tell the caller to call 999 again in the event that symptoms get worse. Once the call is finished the call-handler presses a button and disconnects the call. The headset is silent once more.

6.2 999

The vignette in box 1 shows that the interactional workability of the CDSS – how the call-handlers operationalise their work using the CDSS – draws on a range of skills, both in the call-handling task itself, and in the wider skill set workability – or division of labour - that underpins the 999 call-handling service.

Call-handling entails a range of tasks, many done in parallel. The call-handler must listen to the patient, talk to them and ask questions, read the screens, type in information and navigate the system with a mouse, all within a tight time frame. The CDSS has *extended* the work of call-handling (in comparison with the previous system):

> *… the call-takers never had to use negotiation skills, and they kind of had a robotic list of things you used to get done … you didn't really take the phone calls as far as we do now … you just sort of got the main bit of information for the crew. We used to pass on the message, of what was wrong, and I think now they probably feel that their helping the patient a lot more, because there's a lot more on-line care as well during the phone call. We always gave CPR and choke and things like that, but now they're ready to tell them how to give the hypo kit … We tell them how to do fever management, paracetamols and things ...I just think that is a total different model of call-taking now.* **Interview, 999 manager**

The task of asking questions is not easy, as this example shows:

> *[There is] a call from a woman who is screaming and swearing and it's difficult to understand a word she is saying. The woman is in a public place and seems unable to describe where she is. …[ ] the woman keeps saying "I don't have the address". The call-handler is quite terse and says "If you don't have the address you can't have an ambulance". The woman calms down enough to say something about being behind the school … [ ]. The call-handler tells her to "calm down, we're getting someone along". The caller says that a boy/man has been stabbed…, there's a lot of blood, he seems to be breathing - this information takes some time to elicit. The caller keeps saying "oh my God" and the call-handler is having difficulty understanding her and getting her to calm down. The caller is relaying the call-taker's questions to another man who is also shouting and swearing […] the call-handler then says "[name], when you're screaming I can't understand a word you're saying...I need you to calm down". This is a tactic used by the call-takers*

– getting and using the caller's name in an attempt to try and control the situation. **Observation 999**

Sometimes the call-handlers have to probe for answers, asking additional questions and diverging from the script on the screen.

[The call-handler] tells me how she is required to follow the system and the system makes the decision, but it's her job to use probing questions to clarify if the information she has obtained is accurate. Whilst on the one hand the system goes on what the patient says to be true, she is required to probe – particularly where she thinks the caller may be misinterpreting the question – deliberately or accidentally, and where she suspects the patient is blatantly lying to ensure that they get an ambulance. A decision has to be made when to stop probing – this seems to be when a) the call-taker has satisfactorily got enough information to answer with 'enough certainty' yes or no or when b) when the patient insists, reiterates that they are e.g. gasping for breath, pains are in their chest (even when other things they have said in the call provides evidence to the contrary). **Observation 999**

This work also includes *translation* of language and dialect, *and* rendering clinical terms comprehensible to the caller:

The first call is from a man whose first language is not English. He is calling on behalf of his son. He is OK with most of the words but has difficulty with some of the medical/health words such as "slurring". It takes [call-handler] quite a long time to get through the questions. **Observation 999**

Sometimes a language barrier makes it impossible to follow the system, if a caller cannot understand enough English or where it is difficult to translate colloquial expressions:

Someone [is] phoning on behalf of a 95 year old woman who has had a "funny turn". This phrase is commonly used by callers – particularly when used to describe elderly people. [This] non-specific description means that the call-taker has to probe to try and understand what the underlying health problem is. In this instance, it proves quite difficult and after attempts to clarify what "funny turn" means here, she chooses the "dizziness or vertigo" pathway. **Observation 999**

These extensions of the call-handlers work, using the CDSS to elicit detailed clinical information – rather than taking an address and passing the message on – requires emotional work by call-handlers (e.g. displaying empathy and handling distressing circumstances). Call-handlers sometimes used terms such as 'love' or 'dear', or first names when talking to callers, and to adjust the tone of voice to show concern or sympathy. This emotional work could take its toll, as a call-handler explained:

Once I had the case of a three year old child who was unresponsive, lying in the arms of his mum. I had to leave the control room and went to cry into the toilet. It was so difficult. I could not deal with it. How could I help in such a difficult situation?' … She says that nothing prepares you for this "real life is harder than any training". **Observation 999/SPA**

From our discussion of the workability of the CDSS in everyday practice so far, it is clear that call-handlers draw on a range of skills to make the CDSS work. There is more to call-handling that simply reading out the prompts from the screen. This raises some important questions about the relationship between the claims made for the CDSS – that it is abstracted clinical knowledge, enabling standardised clinical decision by clerical staff – and everyday practice, which is clearly more 'messy'. Whilst the CDSS was designed to control the clinical knowledge in play, call-handlers often drew on and developed experiential knowledge which influenced their use of the system. Call-handlers would sometimes draw on informal knowledge about medical conditions or health care that they had learned from the experiences of friends, family and colleagues. They also internalised knowledge of the system such that they were able to *anticipate*, asking callers questions before they were prompted and predicting likely call outcomes before a disposition was reached.

[call-handler] says 'its great working here because we've all got our bits of knowledge that no-one knows anything about' for example, someone has a husband with diabetes and [name] knows about asthma. So they can ask each other for advice/learn from each other. She tells the story of her handling of a fitting baby - 6 months old. The old advice [pre CDSS] was to strip the baby down, open windows and sponge with cold water. Now they don't advise this because the shock of the cold water can be bad for the baby. But when she was handling a call she still asked the parents what the baby was wearing - 'A little cardy because she's been poorly? Right well, undo the top buttons of the cardy and open a window or two'. The young call-taker next to her is laughing and she asks why at the end of the call. He says she sounds like 'a mam', says she's great. The call hander is merging her advice with [the CDSS] to offer what she thinks is the best advice. Her peers know this is off-piste, but are not shocked or critical. **Observation 999**

Additionally call-handlers exercised *discretion* using the CDSS:

[call-handler] says "that was naughty…sometimes you let your heart rule your head". There were two main reasons why she overrode the disposition 1) the patient was an elderly lady who was anxious 2) there were communication difficulties - the patient had speech and hearing difficulties – which made triage very lengthy. The patient had already spoken to [another health service]. If the call was referred on again the

patient would be required to speak to another. … [call-handler] felt that the call would take a long time to resolve, potentially leading to further distress for the patient. She justified her actions by saying "I haven't done an override recently…" **Observation 999**

These findings are consistent with our discussion of the moral discourses that shape the coherence of the CDSS (see Chapter 4), showing how these shape decision-making within the CDSS where alternative pathways present themselves.

The ethnography showed that making the CDSS workable in this site had intensified the call-handling task and up-skilled, rather than de-skilled these staff. The call-handlers themselves were well aware of this. In the survey, they reported that skill levels required to use the system were high and that they had trust in their own ability to use the system (*M* = 4.0, *SD* = 0.5; Table 11). Furthermore, call-handlers' evaluations of the detailed skill set required to make the intervention work was matched by their assessment of their own skill set. Whilst the switch to the CDSS now required call-handlers to offer additional information to callers, they rated this as the most important set of skills needed to do their job (*M* importance rating = 9.1 see Table 9) and rated their own skill in this as high (*M* = 8.2, *SD* = 1.1). The extended communication with callers, requires new skills of questioning (with a mean of 7.8 in terms of importance in the call-handling task and 7.0 in terms of call-handlers evaluation of own competence), communication (M importance = 8.6, M competency = 8.5) and call control (M importance = 9.0; M competency = 8.3). The latter was seen to be the most important competency in the task of call-handling.

Specific skills rated in the survey included the use of informal knowledge from friends, family, colleagues although this was ranked less highly than sharing their own experiences with others; supporting other call-handlers in their work; and judging when to over-ride (Table 10). At the same time, call-handlers endorsed the importance of allowing the system to drive the assessment (*M* = 8.3, *SD*=0.9; see Table 9), suggesting that the *combination* of call-handlers trust in the evidence base that underpins the CDSS and the call-handlers skilled use of this – and a sense of when discretion is appropriate – contributes to the workability of the CDSS in 999.

The second element of collective action focuses on the work that it takes to integrate an intervention across teams (*relational integration*). In 999 it was clear that the call-handlers had *collectively* taken on the work of making the CDSS work. They did not operate in isolation – working one-to-one with the caller – but were surrounded by supporting colleagues who would willingly contribute to the wider call-handling task, if required. For example, call-handlers often seemed to work together on more complex calls.

Interviewer: One of the things I noticed…is the way that the call-takers help each other out. Like one of you'd be on a call and the other one'll

be on the phone to the desk or looking at the map. Are you trained to do that or is that just something you, you learn to do while you're here? Call-handler: No. It's something you definitely pick up; you're not trained to do it; you're not told by anyone that you've got to help the person, but, I think, when you first start, people are obviously keeping an eye out for you and they do it for you. And then once you pick up stuff, you, you just do it. It's just natural, you, you don't even, like, make a conscious decision to listen in to the person's call, you're just sitting there, reading a book, having a conversation, but you just pick up when they're having… Like while they're on the phone or when they're struggling with the address and it's just so easy to go on over. You can just like go over and just start trying to do something or ring the desk or get the police, whatever. Um, it just comes like… I think everyone helps you like.
Interview 999 call-handler

Such observations were supported by the survey which showed that working as part of a team, supporting other call-handlers and seeking support when unsure about a call were regarded as some of the most important skills needed for doing the job in 999 (Table 10). Trust items in the survey also showed that call-handlers had a high level of trust in other call-handlers to support them.

The introduction of the CDSS did not change the division of labour in relation to the work of dispatch officers or Trust managers, although managing the implementation of the CDSS has – of course – caused a considerable amount of new work for the managers (as noted in Chapters 4, 5 and 7). However the extended auditing process for the CDSS meant that more staff were employed in this role. In addition a major change to the staffing of the service, linked directly to the way that the CDSS was made workable in 999 was the creation of the clinical supervisor role.

Clinical supervisors are nurses or paramedics recruited in direct response to the experience of using the CDSS. It became clear that additional clinical expertise was required to deal with some cases, which did not fit easily into the system, or fell outside of it altogether. Clinical supervisors advise call-handlers about which pathway to take or the meaning of medical terms. If necessary, patients are transferred to the clinical supervisor who can offer self-care and other clinical advice, sometimes using CDSS module 2, but more often drawing on clinical expertise and training.

There is another call from a pregnant 22 year old who is reporting chest pains. As she reports crushing and stabbing chest pain the call goes through as a Category A. Because the woman is pregnant [call-handler] checks with the clinical supervisor if it is safe to give the aspirin advice – [the supervisor] says that it's obviously the woman's choice, but the possibility of cardiac problems outweighs the risk to the baby.
Observation 999

The clinical supervisors also serve an important role in sanctioning overrides/exits from the CDSS and in audit and monitoring - reviewing calls and feeding back results and explaining how to improve practice. Whilst there was some initial ambivalence about the introduction of the clinical supervisor, the survey suggests that, overall call-handlers recognise the importance of this new role (Table 10).

Beyond the 999 setting the call-handlers were keen to differentiate themselves in relation to call-handlers elsewhere. The everyday performance of clinical questions allowed them to identify themselves *not* as unskilled, generic call centre workers, but as doing complex, health care work.

> *You know, there's stuff like aspirin [advice] and, and that you can get that. You can actually make a difference to someone through that.*
> **Interview, 999 Call-handler**

Box 2: The work of SPA

SPA is a new service based delivered from the Ambulance Trust headquarters and (from December 2009) a second contact centre. This vignette focuses on the main headquarters site. Here, on weekdays full time SPA call-handlers work in the emergency control room alongside the 999 staff. At weekends, all SPA call-handlers work in a separate room as the 999 room is not large enough to accommodate all of the SPA and 999 call-handling staff in the one room.

The SPA call-handlers sit at desks wearing a telephone headset, in front of a PC, seemingly identical to those in the 999 control room. These staff wear the same uniform as 999 call-handlers. The appearance of the room and the staff is thus indistinguishable from their 999 counterparts. The work too appears very similar to that of the 999 call-handlers, the SPA call-handlers also have two computer screens, but the left displays the CDSS and the right is used to display the appointment system, showing the available out of hours primary care centres, GP surgeries and other services such as the district nurse and prison health service. On the left screen there is a box displaying calls waiting in red. When a call comes in she hears a sound in her headphone and answers 'urgent care centre, how can I help?' As she is answering the call she clicks the 'new call' button on the tool bar on the left screen. A window opens allowing her to check and confirm the caller's address – to do this she types in the postcode and a list of street names pops up so that she can ask the caller their house number, and then populate the address section. A 'new live call' window opens and the call-handler confirms the name of the patient, the date of birth and the name of the GP surgery. She then clicks 'new' and the CDSS questions appear, initially those used to exclude life threatening illness, and once these have

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been answered the two body maps appear and the call-handler selects the appropriate map according to the gender of the patient/caller. As she goes through these screens she periodically saves the data via a click box on the left screen. She continues asking questions and seeking clarification about the symptoms until she reaches the box selecting the type of urgent care required. In the event that the caller needs a consultation she can check the list of available appointment slots and offer one of these. The key difference between this work and that of 999 is that the calls can take longer and there is less of a sense of urgency (unless of course the algorithms and questioning identifies the need for emergency care). The call typically ends with the caller being offered a consultation, advice about seeking treatment the next day and or immediate self-care advice.

6.3 SPA

Box 2 shows that in terms of workability, SPA also involved considerable multi-tasking and parallel processing of the tasks of listening, questioning and probing. However, compared to 999, SPA calls took longer, often 10 minutes before a disposition was arrived at. The most common dispositions were 'GP dispositions' (home visit, telephone advice or attend PCC) and the closing section of calls usually involved booking an appointment which entailed working with three computer systems:

> *The call-handlers talked together; they discussed the fact that having three systems to cope with was very intense. They had always to make sure they copied all comments and notes from the clerical system to SystmOne. They expressed the opinion that it would be better to have a unique system so that everything would be together in the future.*
> ***Observation SPA***

Making a booking was made more complex by the negotiation required about the disposition. The range of dispositions that could be offered included ambulance, GP consultations - both OOH and next day, consultation with a community pharmacist and self-care advice. In the example below the call-handler reaches an ambulance disposition for an urgent care caller, who is reluctant to accept this so the call-handler has to negotiate an alternative:

> *the final disposition was a 19 minute ambulance. The call-handler explained that an ambulance was going to be on its way but the patient did not want an ambulance: she refused it. So the call-handler called the clinical supervisor and clicked on early exit. He then arranged an appointment at one of the primary care centres at 6.50pm, by selecting a PCC from the list and clicking on the option book appointment. He*

confirmed the appointment to the caller and then filled in a box on care details with some brief comments on the case. **Observation SPA**

Similarly a disposition of 'talk to a pharmacist' could result in extended negotiation with a caller who really wanted to see a GP. The nature of the calls to SPA was different to 999, not only because they were not (typically) emergency situations, but also because the callers appeared less malleable:

[the caller] did not want to answer the questions but preferred to talk about her personal life. I observed [call-handler] trying to control the call pace. She was reading different options and clicking on them once the questions had been asked. She also clicked on some options below the sentences [including 'change answer', 'restart triage', 'early exit']'. Sometimes she did not read and was anticipating the answer. It was evident that she could not wait to finish she seemed quite impatient. Every time the call-handler was asking a question the patient talked about a new symptom. It was very difficult to triage. **Observation SPA**

Many callers had more than one medical, emotional and/or social problem. This, and the longer duration of the calls, meant that the amount of emotional work required varied. Call-handlers talked particularly about the difficulty of managing callers with mental health problems or those who were lonely and 'wanted someone to talk to'. One benefit of having more time for SPA calls than in 999 was that the call-handlers could sometimes respond to this need to talk, allowing the caller to raise 'irrelevant' details and in turn to make sympathetic responses.

The additional tasks of negotiating bookings, giving advice and communicating with 'needy' patients added to the complexity of the work at SPA. This was reinforced by our survey. SPA call-handlers reported that effective call control, skilled questioning and active listening were important to performing the job effectively. These call-handlers felt they had high levels of skill in all of these (Table 9). As in 999, the survey found that call-handlers felt that competencies in giving interim and self-care advice were the most important factor in enabling them to perform their role effectively ($M = 9.2$, $SD = 1.1$; measured on a 10 point scale 1 = not important, 10 = very important). The SPA call-handlers also reported that the work required a high level of communication skill, and they felt that they had high levels of such skills ($M = 8.2$, $SD = 1.0$; Table 9).

While there was an organizational expectation that as the SPA service grew staff would increasingly be dual trained to allow them to work in either 999 or SPA as workflows demanded, some staff and CDSS developers felt that there were different skill sets associated with the different types of work:

A conversation between a developer, clinical supervisor and researcher comparing 999 and SPA. The clinical supervisor mentions that she thinks that the work requires a "different skill set". The developer thinks that, in

some ways, the out-of-hours work is more difficult, and describes it as having "more complexity". She says that some call-takers might be suited to one type of work rather than the other. She characterises the difficulties of the different types of work broadly as: on the one hand emergency work is stressful/requires thinking on your feet/acting quickly/confidently, on the other hand, out-of-hours work is complex, less straightforward, and more time consuming – requires patience. She notes that "there are some fantastic [999] call-takers" but she says that she think some of them might find out-of-hours work "a bit boring" in contrast to the "adrenaline" involved in 999 work. **Observation SPA**

In contrast to such observations, generally the survey did not identify significant differences between 999 and SPA in terms of the skills call-handlers felt they possessed or how important they felt various skills were to performing the role (Table 9 and Table 10).

In terms of relational integration, at SPA there was no equivalent to the dispatch role and therefore the division of labour was flatter. The work of integrating the CDSS ran across the SPA staff and extended into the 999 team, so that relationships with all of these staff had to be managed. Depending on the time of day the number of SPA on shift there might be fewer opportunities to seek advice or share knowledge with other SPA call-handlers. (We did note in our observations that when working in the main 999 control room on weekdays the SPA call-handlers often sat near each other to facilitate greater team integration). The SPA call-handlers responses to the survey showed that working as a team, seeking support when unsure about a call and supporting others were all skills regarded as important for the performance of work in this setting (see Table 10).

Box 3: The work of OOH

When fieldwork began the OOH control room was housed in an office building on a busy 'A' road just outside the town centre. There was little space to move around between the four desks for the call-handlers, divided up, splitting each into 'pods' of two and the desk towards the back of the room where the triage GP sat. In mid-2010 OOH moved to the UCC housed at a large acute hospital. Face to face attenders arrive at the main UCC reception and queue to be seen at reception. The receptionist takes demographic details and presenting symptom information and uses three different information systems - the hospital information system (HIS), Adastra (a case management system) and the CDSS - to triage the attender, either to A&E or to OOH care.

Behind reception the new OOH control room contains two pods each with desks for 4-5 call-handlers although not all are occupied at any one time.

The control room manager/supervisor sits at a workbench in the corner of the room.

Each call-handler has a single monitor and telephone handset on their desk. At one desk sits a GP taking calls directed from the call-handlers and another desk is occupied by a clerical worker dealing with records and hospital inquiries. When a call comes in the phone buzzes and a red light comes on. The call-handler presses a button and answers, clicking the computer mouse. He takes demographic details, beginning with date of birth and then name. If he is lucky the patient's records will already be on the system because they have had previous contact with this service. He asks what the caller's contact phone number is and glances at the phone display where the caller identity is displayed, checking that the contact number that has automatically appeared on his computer screen is correct. (This function is useful when people call from mobile phones and don't know their number). He asks for the postcode and as he keys the last digit a list of addresses appears, he asks for the house number and populates the address field. He asks which GP the caller is registered wit and because the name given is familiar he quickly clicks on a drop down menu on the screen.

The call-handler asks, "So what's the problem [first name]". He asks if the caller is on any medications and then moves into the CDSS pathway based on the initial disclosure of the 'problem'. He prefaces this section of the call by saying "I'm going to ask a series of questions, some of them might not seem relevant but these are to rule out anything life threatening and then we'll move on to your problem, ok." He has memorised this phrasing as it is repeated with every call with few variations. He then runs quickly through questions that appear on the screen. He works systematically through pathways as they appear on the screen. Many questions elicit rapid responses, and eventually the call-handler says "Ok. We will arrange a Drs appointment for you" He looks at the screen, then looks away from it saying " But first I am going to give you a bit of care advice" he then gives advice on taking paracetamol, or ibruprofen and that warm or cold drinks can be taken, but that the caller should avoid tobacco. He looks at the screen while he says this but does not seem to be reading the script. He finishes by saying 'If you become unable to swallow liquids or saliva then call us back, if you find your symptoms get worse then call us back.' Having dispensed this self-care advice he books an appointment which is in one hour's time. He clicks through items on the screen and says to the caller "ok you have an appointment at 9.30, that is here [names UCC]"' He then says goodbye and presses a button to end the call'. A few moments later the phone buzzes and flashes again and the call-handler answers "Urgent Care how can I help you?" On reception desk receptionist is using the CDSS and the other associated software systems to respond to the patient standing in front of her. He has a wound on his face and is unkempt and a little difficult to understand. The call-handler begins to take his demographic details in

the Adastra system. She asks him to repeat the presenting problem, and decides that this is a minor injury so decides not to go through the CDSS triage. She tells him he will be seen in minor injury (part of A&E). She prints name labels and fixes one to a patient record card and hands him these forms directing him to the waiting room. She then begins to talk to the next patient in the queue.

6.4 OOH

Workability at OOH included the same multi-tasking but the intensification of the work was less apparent in this setting. The work in OOH had become more *scripted* using the CDSS - the questions had been relocated 'in' the CDSS to guide the management of the call, but call-handlers noted that triaging still required a reasonably sophisticated level of understanding:

> *You've got to drive it and you've got to have the knowledge and the background to work with that because you've got to understand the inference of what it is that you're asking. If you don't understand what you're asking, you're not going to be able to use it effectively.*
> ***Interview, OOH call-handler***

Some staff suggested that the CDSS had made the work *less intense*:

> *it's not as stressful as the old way because the only responsibility you have as a call-taker, is to listen exactly to what you're saying, and you make sure what you're answering is right. You don't have the kind of final decision on… [ ]… Because the questions are longer, you go more into depth, it does give you more time to think about the call, and make sure you're getting it right.* ***Interview, OOH call-handler***

> *I wouldn't say it's intensified the work, because they were all, the protocols we had, that we've created over the years, are quite intense themselves. So I don't think the intensity has changed. I think it's just the depth of questioning, that they feel is a little, they're resistant to it because they feel why do we have to go all through this?* ***Interview, OOH senior manager***

Nonetheless there was a strong feeling that the CDSS had extended the amount of questions to be asked and therefore the length of time required for calls. Using the CDSS to provide self-care advice and information was an important reason for its adoption, yet call-handlers were concerned about how long this took and how it was received by callers.

> *Because sometimes they're not too bad, it's just a couple of little snippets … maybe take some paracetamol on your way down, things like that. And sometimes there's little ones like, bring a urine sample with you when you come, they're very relevant. But I think if you get like a fever, vomit, and diarrhoea, abdominal pain, you could probably be giving*

advise for about ten minutes because about four come up, they're all very, very, very long, and you can feel the patient thinking, why on earth have you given me all this advice when I'm coming to see a doctor in half an hour. **Interview, OOH call-handler**

Some commented that they enjoyed being able to give this extra advice and felt it was valued and the survey confirmed that call-handlers felt that the provision of information was important ($M = 8.9$, $SD = 1.7$; see Table 9) and that they were well skilled in this area of their work ($M = 7.9$, $SD = 1.8$). One important issue related to workability was the difficulty call-handlers had establishing the validity of caller's claims about the severity of their symptoms:

You've got to probe a lot because if you don't, you can end up with an inappropriate 999. For instance, I took a call and it was a lady…. She was in Boots, the chemist in town, and she had walked up to the top floor, because that's where the pharmacy is. Well, she would be a bit out of breath, won't she? [ ] … I had to go back …I had to say, now, are you always breathless like this? Is this your normal condition? …then I could proceed and then we got a prescription for her. **Interview, OOH call-handler**

I've had people at work saying they're severely ill, and I said, can you not think or do anything else? They're like, no, I can't do anything else because I'm sick. But you're like, you're at work. So trying to rephrase, like, can you not make a cup of tea, can you get out of your chair? Using all the tools in your training to get the right answer. **Interview, OOH call-handler**

As in 999 and SPA call-handlers often had to draw on experience or 'general knowledge' gathered from friends, family or other colleagues to help manage calls. The survey revealed that using this type of knowledge was seen as important (Table 10). In addition some call-handlers appeared to have memorised the previous paper based protocols to help 'drive' the CDSS to what they felt were the correct dispositions, re-triaging if they were not happy with the outcome:

The patient had been suffering of piles since last November. He had been given a cream but had run out of it. The CT clicked on rectal in the body map and went down the path RECTAL PAIN, SWELLING, LUMP or ITCHY. The final disposition was A&E but call-handler went back to probe again to get a GP appointment. **Observation OOH**

Again survey findings were consistent with the qualitative data showing that predicting the likely outcome of calls and using own knowledge to operate ahead of the CDSS were rated as important skills, more so than at the other settings, although this difference was only significant in comparison to SPA (Table 10).

Much of the discussion amongst call-handlers about when why they used discretion to make the CDSS work centered on what they felt the OOH service should provide – namely access to general practice. They managed, this by working 'around' the system, often exiting the CDSS:

> Call handler: If it's children's coughs, colds and flu and things, then fine, I will […] let it go where it wants to go. And if it goes 'to pharmacy within three days', then that's fine, but that's not what the patient wants to hear. The patient has rung us up because they want to see a doctor or a nurse, not because they can see a pharmacy in three days. But I will let it take me and then they will say well no, I want to see somebody. So that's wrong.
> Q: You have an early exit and you will…
> Call handler: Yeah, give the patient an appointment. But then you know it's taking you where it's supposed to take you but the patients don't want that, they have expectations other than seeing the pharmacist in Tesco's in three days. **Interview, OOH call-handler**

The survey showed that SPA call-handlers felt that judging when necessary to override the system was important to performing their role at levels similar to other sites ($M = 8.9$, $SD = 1.2$; see Table 10), yet our observations suggest that this was more common in this setting. These findings, both qualitative and quantitative, relating to call-handlers frequent use of discretion can be linked to the trust survey data which showed trusting beliefs in terms of benevolence and integrity to be lower than beliefs in the systems competence (Table 11).

In relation to skills set workability there was a strong belief amongst managers and some call-handlers that the CDSS simply incorporated the existing paper based protocols and experiential knowledge into the computer. The skills of dealing with the public, asking questions and documenting answers were seen as directly transferable – this is what the OOH staff had always done. The 'new' skills required by call-handling staff were therefore those associated with learning how to manipulate the CDSS software, and working through protocols in an unfamiliar order. The survey indicated that SPA call-handlers felt themselves to be well skilled across this range of tasks as was the case at the other settings (See Table 9).

The dynamics of relational integration had been altered by both the move to the UCC and recruitment of additional staff to deal with the increased workload due to the longer call times. The OOH staff now interacted with a wider range of clinical and non-clinical staff – from primary, secondary and emergency care services at the hospital site, and the extension of the OOH to cover UCC reception meant that they also dealt with face to face patients. While the core triage skills were seen as generic to either call-handling or face-to-face work, in practice the skills required for dealing with face to face patients were slightly different. They needed additional skills to negotiate with more than one person simultaneously - often a patient came

to the desk with a carer or family member. They could also incorporate visual and non-verbal cues (e.g. establishing the amount of blood loss without asking the patient): some call-handlers liked this

> *[call-handler] commented that it really helps assess the patient because you can see things that are obvious.* **Observation OOH**

The team relationships in OOH were different to 999 and SPA in part because of the relatively smaller size of the shifts. A shift team included 7-10 call-handlers, one of whom would be a shift manager, akin to the duty manager at 999 and SPA. In addition there would be at least one GP handling calls who functioned in a similar way to the clinical supervisors in SPA and 999 – taking direct referrals from the call-handlers (usually phoning the patient back).

Call-handlers would chat between calls or put people on hold during calls to seek support from others. For the reception staff the location in the acute hospital meant that there were often other clinical and administrative staff nearby who could provide additional advice or support (although none of these staff was trained to use the CDSS). Overall our observations revealed an environment where there was strong support within the teams and this is borne out in the survey where call-handlers reported that working as team, offering and seeking support from others and accepting and responding to feedback as very important to getting their job done effectively at higher levels than at the other sites (Table 10).

Several of the staff talked about the relationships between OOH staff and other health care staff – notably GPs, in positive terms and it was clear that there was considerable pride associated with working in this health care setting and in their identity as health care workers. There was perhaps less emphasis in OOH on the clinical component of the work – although the levels of embodied knowledge we observed seemed similar:

> *we're not diagnosing, we're not… I don't want to be a doctor… if I'd wanted to be a doctor or a nurse I would have done that years ago. I don't think that, for our purposes, we really need, to do… to dwell on that, to be honest. I mean, obviously, it's interesting, but I don't think we need it actually for the job, because [the CDSS] does it for you.[…] Our job is just to collect information, input it, and let the system, not diagnose, but come out with the best, appropriate course of action.* **Interview, OOH call-handler**

6.5 Collective action across the three settings

The work of organising and enacting the practice of call management and triage using the CDSS requires collective purposive action. At 999 and SPA the workability of the CDSS has *intensified* work as call-handlers are required to navigate multiple information systems, conduct extended

clinically-based questioning, and deal with complex responses. This requires discretion, negotiation and translation skills and a good deal of emotional labour. Calls to SPA and OOH took longer than 999 calls – the work seemed intense, but in different ways to 999 where the 8 minute target for ambulance dispositions forced a more rapid pace for the call-handling. It is clear across all the settings that the work of call-handling using the CDSS is 'health care work' not simply 'call-handling'. At 999 and SPA the introduction of the CDSS altered skill set workability and relational integration by requiring a new role – that of clinical supervisor – to integrate it into everyday use. In OOH the key relational change had been around UCC reception which added the complexity of dealing with face-to-face patients. The UCC location also meant that OOH was now part of a much larger organization with an established managerial hierarchy and pre-existing working relationships.

In terms of skills, the survey shows few differences between sites and self-rated skills (Table 9). The exceptions are OOH where call-handlers rate their communication skills as significantly higher than those at SPA. This may of course reflect the greater length of experience of these staff. Across competency categories there were some differences in terms of how important various skills were perceived to be, for example OOH rate effective call control and effective communication, significantly higher than those in SPA. In addition Table 10 shows results for skills regarded as unnecessary in the formal audit, and possibly regarded as undesirable. It also highlights the importance of team relations and a range of informal knowledge sharing practices.

Table 9. Self-rating of key skills and their importance for each skill category

Competency category	999 (N=31)		SPA (N=39)		OOH (N=33)	
	Mean Skill rating (SD)	Mean Importance (SD)	Mean Skill rating (SD)	Mean Importance (SD)	Mean Skill rating (SD)	Mean Importance (SD)
Effective call control	8.3 (1.0)	9.0 (0.8)	7.8 (1.3)	8.7[a*] (1.1)	7.9 (1.5)	9.3[a*] (0.8)
Skilled questioning	7.0 (1.0)	7.8 (1.3)	6.9 (1.0)	7.9 (1.6)	6.9 (1.1)	7.9 (1.2)
Active listening	8.2 (0.9)	8.6 (1.1)	7.8 (1.1)	8.6 (1.3)	8.1 (1.3)	8.8 (1.0)
Skilled provision of information and advice	8.2 (1.1)	9.1 (0.9)	7.9 (1.3)	9.2 (1.1)	7.9 (1.8)	8.9 (1.7)
Effective communication	8.5 (1.1)	8.8 (1.1)	8.2[a*] (1.0)	8.5[b*] (1.3)	8.7[a*] (0.7)	9.1[b*] (0.7)

| Skilled use of CDSS functionality | 8.3 (0.9) | 8.8 (1.4) | 8.1 (1.2) | 9.0 (0.9) | 8.2 (1.2) | 9.4 (0.8) |

N.B. Note these skills are formally reflected in the systems audit process.)
Common superscript in same row shows significant difference between those sites - [*] $p < 0.05$

Table 10. Skill and importance ratings of competencies not included in formal system audit procedures

Competency category	999 (N=31)		SPA (N=39)		OOH (N=33)	
	Mean Skill rating (SD)	Mean Importance (SD)	Mean Skill rating (SD)	Mean Importance (SD)	Mean Skill rating (SD)	Mean Importance (SD)
Use informal knowledge from e.g. family, colleagues	7.4 (2.4)	6.3 (2.9)	6.6 (2.2)	6.2 (2.5)	7.1 (2.4)	6.6 (2.6)
Share knowledge with others gained from own experience	8.8 (1.0)	8.2^{a*} (1.9)	8.2^{b*} (1.8)	8.3^{c*} (1.9)	9.0^{a*} (1.0)	9.3^{b*c*} (0.9)
Judge when to override	8.0 (1.6)	8.3 (2.0)	7.6 (1.5)	8.2 (1.8)	7.9 (1.5)	8.9 (1.2)
Predicting likely outcome of call	7.8 (1.7)	6.6 (2.8)	7.2 (1.8)	5.2^{a*} (2.7)	7.1 (2.3)	6.7^{a*} (2.2)
Use own knowledge to operate ahead of CDSS	7.2 (2.2)	5.9 (3.1)	6.4 (2.6)	4.8^{a*} (2.9)	7.1 (2.2)	6.4^{a*} (2.9)
Work as part of a team	8.9 (1.2)	9.0 (1.3)	8.6 (1.6)	8.3^{a**} (2.0)	9.1 (0.7)	9.5^{a**} (1.0)
Support other call-handlers to perform their role	8.7 (1.2)	8.9 (1.5)	8.3 (1.5)	8.8 (1.3)	8.9 (1.0)	9.4 (0.9)
Seek support when unsure about a call	8.5^{a*} (1.2)	9.3 (1.0)	9.0 (1.1)	9.5 (0.9)	9.2^{a*} (0.7)	9.6 (0.6)
Accept / respond to performance feedback	8.2^{a*} (1.6)	8.7^{a*} (1.4)	8.4 (1.4)	8.9^{b*} (1.4)	9.1^{a*} (0.9)	9.6^{a*b*} (0.7)

N.B. Common superscript in same row shows significant difference between those sites - * p < 0.05; ** $p<0.01$

Table 11. Respondents self-reported trust beliefs in the CDSS

Trust Factors	999 (N=31)	SPA (N=39)	OOH (N=33)
	Mean Ratings (SD)	Mean Ratings (SD)	Mean Ratings (SD)
Trusting Beliefs			
Competence	3.8 (0.6)	4.1 (0.6)	3.9 (0.5)
Benevolence	3.6 (0.7)	4.0 (0.7)	3.8 (0.5)
Integrity	3.3 (0.7)[a**]	3.8 (0.8)[a**]	3.5 (0.5)
Trust in call handler support	4.4 (0.6)[a*]	4.3 (0.7)	4.0 (0.6)[a*]
Trust in own ability to use CDSS	4.0 (0.5)	4.1 (0.7)	4.1 (0.5)

N.B.   Common superscript in same row shows significant difference between those sites - [*] $p < 0.05$;   [**] $p<0.01$

Table 11 shows that there was little difference in call-handlers ratings of trusting beliefs in the system's competence, benevolence and integrity across the three settings. However the relative ratings between the trusting beliefs in the system's competence, benevolence and integrity which show that trust' in the systems competence are greater than in its benevolence and integrity. These findings are consistent with observations about how the system is used on a day-to-day basis.

We have shown that the collective action that brings the CDSS into everyday use (and keeps it in use) in the three settings entails the combination of the technology and the workers. Over time the boundary between the work and the worker becomes blurred such that dispositions were not 'made' by the CDSS but by a hybrid of the technology *and* the call-handler. The operationalization of the CDSS changes the work – making it intense, or longer for example, but also by changing the workers by offering them an identity as health workers not just call centre operatives. The skills and divisions of labour created and sustained by introducing the CDSS are not just those required to operate the computer system 'by rote' but are also about individual experiential, embodied expertise and (in 999 and SPA) the additional need for clinical expertise to support the system.

6.5.1 Workforce implications

This chapter has described how the work of managing calls (and face to face patients in OOH) was operationalised using the CDSS in the three different settings. It is clear the workability of the CDSS is only possible through the use of embodied and experiential knowledge and discretion by call-handlers. This 'expertise' needs to be accommodated in order to bring the CDSS into everyday, use rather than tightly controlled (and indeed the successful deployment of the CDSS in the three settings appears to be partly because managers and developers have recognised the need for some interpretive flexibility in using the system). The experiential nature of this expertise and its development through sharing knowledge in teams has implications for the skills required for call-handling – which extend beyond manipulating the computer system.

We have also shown that while the immediate task of dealing with a call was 'one-to-one' the relationships between call-handlers and the wider team enabled calls to be managed. The integration of call-handlers into teams, not just of call-handlers, but in the wider organizational hierarchy supports and maintains the deployment of the CDSS. In all three settings the spatial location of the work – in areas which facilitate team communication and sharing of knowledge support the operationalization of the CDSS and call-handling work – it seems unlikely that the CDSS could be made to work in environments where staff did not have this connectivity.

6.5.2 Implications for developing NPT

The collective action domain of NPT is perhaps the most elaborated, since much of its 'content' derives from the earlier specification of NPM which focused on collective action. Nonetheless one of the issues our analysis raises for using NPT to study collective action is 'what is the 'it' that is being normalised?' This chapter has shown that it is not 'the CDSS' as a pre-formed, independent entity (i.e. the software) that has been normalised, rather, a hybrid of the CDSS *and* an evolving set of practices make call-handling work in these three settings. This also means that we cannot only look at the immediate 'user' of a technology (indeed the domain of cognitive participation alerts us to the wider interaction chains that bring a technology into use), and must understand the collective co-constitution of these practices. We have shown here that this extends beyond the individual call-handler working with the CDSS, to the wider teams and organizational divisions of labour surrounding the practice, both new roles that are introduces to support the practices and the existing hierarchies within and beyond the organization.

7 Reflexive monitoring - What is required to keep the CDSS in place?

7.1 Introduction

Reflexive monitoring describes the formal and informal evaluation that is done to appraise the effects of an innovation. NPT proposes that for an innovation to become embedded in practice it requires an on-going process of monitoring and adjusting the intervention to keep it in place. In this study, reflexive monitoring is concerned with how the actors in each case review, reflect upon, and monitor their use of the CDSS.

Formalised judgements about the utility and effectiveness of a new practice, based upon institutionally shared beliefs (*systemization*), are central to reflexive monitoring. Institutional knowledge production and implementation (*communal appraisal*) exists alongside individual appraisal that relies upon experiential and unsystematic knowledge to judge the value and outcomes of a practice. Both communal and individual appraisal may lead to attempts at reconfiguration of the CDSS, where ideas about the CDSS and its use are flexible (for example, it may be subverted, modified or reconstructed by staff).

In the following analysis we consider the role that reflexive monitoring has played in each of the three case studies to examine what is required to keep the CDSS in place in each setting.

7.2 999

The CDSS developers, despite imagining the completion of the development phase, have continually upgraded the CDSS. Given that the technical know-how resides with these IT experts, it might be assumed that they alone have the power to shape the technology. However the work at 999 had been undertaken in conjunction with managers and clinical supervisors, so much so that the Trust managers describe their relationship with the developers as a partnership. The developers brought the kernel of a system, but the Trust added the specific expertise necessary to bring it into use:

We came together to discuss how we might help [the CDSS team]… we started working with the team … giving our experience and knowledge to help them to draft that first attempt at [the CDSS] … I think it was more of us lending our experience and [the CDSS team] tapping into the

knowledge that we had around emergency services. **Interview, 999 senior manager**

This teamwork is not a one-off investment in a generic system, but has been vital in embedding this technology and will be necessary in subsequent deployments of the CDSS. This investment is needed not only to make adaptations to the system so it can mesh with other technologies and other user requirements, but also to develop the working relationship and trust needed to secure enrolment and legitimation of the new technology (see chapter 5)

A key 'selling' feature of the CDSS was that it was used by non-clinical staff. However while there may have been an initial vision of a clinician-free environment, the Trust managers found it necessary to introduce the clinical supervisor role for 999 (and SPA). Part of this role was to audit the call-handlers (see below), but also to support the call-handlers by providing clinical expertise (e.g. when the call-handler has reservations about the disposition). Clinical supervisors sanction 'early exits' (where triaging is not completed within the system) and 'over-rides' (where the call-handler chooses not to follow a pathway/disposition). While the CDSS developers have tightened up on this over time, for example by re-programming the software to prevent over-rides, the presence and actions of clinical supervisors effectively legitimised 'fuzzy logic' in the day-to-day operation of the CDSS.

> *I think whenever you come up with something and you're unsure about it, and you're uncomfortable perhaps with…knowing where to go and if they've got various things, and you feel that you haven't triaged them effectively for every symptom…you can always pass it to the clinical supervisor. […] And I think that's when they become, like I say, really important, so you can pass them [the call]…they can make sure that the call is triaged accurately.* **Interview, 999 call-handler**

In 999 there was some initial conflict between duty managers and the clinical supervisors over roles and responsibilities. The establishment of the clinical supervisor role disrupted the established division of labour and daily practice but this quickly settled around the new posts and the clinical supervisors became widely accepted and valued.

> *Now that…a new lot [of clinical supervisors have come] in, everybody's got used to the system. I think the liaison with them now is good. In fact I'll go extra and say yeah, they are a benefit to the room.* **Interview, 999 call-handler**

Whilst the ethnography demonstrated that 999 call-handlers valued the role of the clinical supervisor, in the survey the 999 call-handlers had only average levels of trust in the clinical supervisors (M = 3.2; SD = 0.9; Table 12), significantly lower than SPA. Part of this might be accounted for by the

variability 999 call-handlers perceived there was in how clinical supervisors dealt with call-handlers in their everyday work. Of 33 call-handler respondents to the survey, 17 (55%) agreed or strongly agreed that clinical supervisors were inconsistent in how the dealt with call-handlers.

> *it kind of varies from clinical supervisor to the next, from one to the next. Some are more encouraging at saying, you know, use your own judgement; if you're uncomfortable with it, pass it to us. Others are a bit more: well, just use [CDSS]…[ ] And so, yeah, it kind of varies slightly.* **Interview, 999 call-handler**

Alongside the CDSS there was an extensive audit procedure (imposed by the CDSS developers as a condition of use) to appraise and monitor the performance of individual call-handlers and overall activity. Within the 999 and SPA settings the auditing process was identical and call-handlers were subject to considerable monitoring and surveillance of their work. All calls are stored and call-handlers had five of their calls analysed in detail each month. The calls were assessed and feedback provided to call-handlers. The Ambulance Trust employs a team of auditors and clinical supervisors to undertake this monitoring.

There were two main elements of the audit. First, call-handling skills were assessed against an audit tool, designed by the CDSS team (see Chapter 2). The underlying function of this was to ensure call-handlers are 'following the system' rather using their own judgement. Second, rates of 999 dispositions (against targets for Categories A, B and C) were examined, outliers and variation identified and scrutinized. Call-handlers were subject to additional audits and retraining if performance was deemed inadequate.

> *We have staff upstairs who can probably, on a lot of calls, go through it without using [the CDSS] because they are so used to it. But that is where you catch them out…You have to click a number of times, and if they don't click [ ], or it is a long time where they haven't clicked it...because we're listening to the call and they are giving the whole spiel on the phone, but they just haven't looked at it [the CDSS system] [...] They have to follow the system and have to be audited to follow the system.* **Interview, 999 manager**

> *if they're failing the audits, we normally look into why and we find it's one particular area, and it's just a misunderstanding or not full understanding on one subject matter. It's not often that we get someone failing…all over the board with different things. It's normally that they don't understand really the main job of asking questions.* **Interview, 999 manager**

This formal reflexive monitoring by the Trust is overt. Its purpose is not simply surveillance, or to discipline and punish, but to improve practice and to support the call-handlers to improve. At 999 (and SPA), there is a culture

of encouraging the call-handlers to evaluate their own practice, as a learning process.

> *The clinical supervisor talks about the importance of the audit as a way of "informing practice" […] she says that she doesn't like using the term "failing an audit".* **Observation 999**

> *We've kind of all been brought up within the service of being able to criticise yourself and not take it as being a fault. It's learning; it's making sure that you, we, all make mistakes but we just learn from it. But making sure as well that the clinicians are praising the staff…because you need that. If you're just criticising all the time that's not going to do anything for their confidence at all so we do have to try and make sure that we praise a good call, and if I see someone I go and say that was fantastic, you did well, and you're kind of making sure that they know that.* **Interview, 999 manager**

In addition to ensuring the call-handlers are working safely, they are audited to ensure that they are using the system to ration the use of valuable resources. There are strong normative messages within the organization about ambulance disposition rates, particularly relating to the deployment of 'Category A' ambulances. Anonymised print outs of disposition rates for each individual call-handler are displayed on the control room wall (with unique identification numbers known only to the individual themselves) which allows the call-handler to compare their practice.

In general, the ethnographic data suggested that the call-handlers supported the principle of audits, particularly to ensure safety. They sometimes drew a distinction between who audits the call, valuing the input of the clinical supervisor over the non-clinical auditor. We will see later in this chapter that this is particularly evident within the SPA setting.

> *I do think that it is important to have audits. I think really, they do ensure that people are clinically safe…it is important. And although people do grumble about it - no one likes to have their work checked…I've only failed one audit whilst I've been here, and I wasn't particularly happy that I'd failed it, but I'd actually failed it from the auditors, as opposed from the clinical supervisors' [assessment]….but I do think it is important that all calls are audited, because like I say, really, if you weren't being checked on a regular basis, you could literally just do anything [laughs].* **Interview, 999 call-handler**

Although the call-handlers were supportive of the audit process the survey indicated that call-handlers were less positive about the audit team. 999 call-handlers had quite low levels of trust in the audit team ($M = 2.7$, SD = 1.0), significantly lower when compared to the SPA and OOH setting. Part of this might be accounted for by the variability call-handlers perceive in audit decisions made by individual auditors: the survey found that 14 (nearly 50%) of call-handlers agreed/strongly agreed that the audit team were inconsistent in how they audited call-handlers.

Whatever the formal position regarding audit, particularly the claims to very tight monitoring of call-handlers, it seems that – in practice – the auditors allow greater leeway for the call-handlers in exercising the discretion in their day-to-day work (described in Chapter 6). The important point to note here is that whilst audit *could* have been used to insist that call-handlers stick to 'the script' provided by the CDSS, the developers and managers appear to have accepted the call-handler's using the system flexibly (e.g. call-handlers adapting phrasing and using some of their 'own' knowledge in conjunction with the system).

This relates to an inherent tension in the work of call handing. On the one hand there are strong normative messages during training and in their everyday work which reinforces the claim that "if you follow the system you can't go wrong" (Observation 999). On the other hand, call-handlers are expected to use a degree of "common sense and judgement" (**Interview, 999 manager**). Indeed, we have seen that the system works, precisely because call-handlers are able to use the system flexibly. However, the balance between following the system and using common sense/judgement is not an exact science and creates variability in auditing decisions between those clinical supervisors and other auditors:

> *Some will use it like a robot…you know they'll say, well I can't ask that because I'll deviate from the system. But I always say to them, we expect you to use some common sense and judgement and it's not about deviating from the system; it's about sometimes having that gut feeling that we all get when we think something's not right* **Interview, 999 manager**

This need to balance the CDSS script and discretion can provide grounds to challenge audit, as this call-handler explained in accounting for his decision to go 'off-script' and keep talking to a suicidal caller:

> *Q: So you made a conscious decision to stay on the phone in light of what was going on?*
> *Call handler: …yeah, I mean fair enough if there'd been calls waiting and no call-takers available, I might have cut it short, but I thought due to circumstances, the best thing for me to do would be to stay on and I got absolutely bollocked, for want of a better word for it, by one of the clinical supervisors. I did a similar thing with a different clinical supervisor a couple of weeks later and I got a well done, you used your common sense; that was exactly the right thing to do.* **Interview, 999 call-handler**

Call-handlers judgements derived from experience using the system were central to reflexive monitoring. Overall, there was a shared belief that the CDSS was reliable - indeed, there was a collective belief within the organization that the CDSS itself was more or less infallible (although a prominent belief in the 999 setting, this was particularly strong in SPA).

Concurring with the ethnographic data, the survey indicated that overall levels of trust in the CDSS were relatively high amongst 999 call-handlers in terms of competence, predictability, dependability, reputation and faith (Table 13). Failure of the CDSS is usually apportioned either to the caller who has provided incorrect or misleading information, or the call-handler using the system incorrectly (for example, selecting the wrong algorithm). The survey reported that call-handlers had only average moderate levels of trust in callers (a finding that was consistent across all three sites), but were relatively more confident of their own abilities to use the system correctly (Table 12).

> *There is so many avenues; there is exactly that, so many pathways…You just have to go with the flow, and as long as you ask the right questions, you'll go down that right road. And it, again…it depends on what they answer. If they give you the wrong answer to a question, then you'll go down the wrong thing.* **Interview, 999 call-handler**

> *Then obviously you do have that element about call-taker error or, patients not actually presenting the full truth, but I would say 99.9% we get it right.* **Interview, 999 manager**

Call-handlers did not have complete trust in the CDSS partly because they (and other Trust staff) perceived that the system was poor at handling some types of calls (e.g. calls where the patient was under the influence of alcohol or the caller was not with the patient)

7.3 SPA

Whilst at 999 the introduction of new practices to enable reflexive monitoring occurred alongside the introduction of the CDSS, many of the audit and monitoring practices were firmly in place when the SPA service commenced.

Some of the reflexive monitoring directly involved the CDSS developers, who responded to managers and call-handlers feedback by adapting and upgrading the CDSS. The CDSS was not a finished, pre-defined technology but a set of mutually evolving and inter-related actors and practices, to which staff contribute.

> *I mean, if there's any worries or if you feel something's not quite right [with the CDSS], then we approach the clinical supervisor and just say, look, what's this all about? So yes, you can discuss it. If there's any problems, obviously they're relying on us, when there's been an update to let them know if there are problems there. So yes, you do get a chance to discuss it.* **Interview, SPA call-handler**

In contrast to the 999 setting, the clinical supervisors were part of the process from the beginning in SPA. Here, the clinical supervisor is viewed

very positively, not only as an additional 'benefit' (as in 999), but rather as a necessity, in providing clinical input to ensure that the CDSS is safe and efficient (as well as being a conduit in providing feedback about the CDSS to the CDSS development team).

> *there's always going to be situations where you're not sure and you need somebody with medical [knowledge]…* **Interview, SPA call-handler,**

> *we all just use [the CDSS] as we've been trained and we've always got queries… If we've got any queries we've always got the clinical supervisors…because they're the ones with the clinical knowledge.* **Interview, SPA call-handler**

Part of the clinical supervisor's role was to ensure that the call-handlers are using the system 'correctly'. The system itself was perceived as necessarily over-cautious because the call-handlers are not clinically trained.

> *[the CDSS] errs on the side of caution, so that if there is a risk, based on what they've told you, as long as you've asked the questions correctly, and understood what they've told you, you're always going to get the best response for them.* **Interview, SPA call-handler**

The survey results, overall, supported the ethnographic data, in that the SPA call-handlers reported fairly high levels of trust in the clinical supervisors (M = 3.7; SD = 0.7), significantly higher than that of 999 call-handlers (Table 12). In addition to support from the clinical supervisors, some call-handlers were undertaking additional clinical training. The proximity of clinicians and this additional knowledge boosted the call-handlers identities as skilled, knowledgeable health care workers and helped them mange calls. This in turn made the work rewarding:

> *I'm doing an anatomy and pathophysiology course which is in my own time. They're offering us further learning in terms of medical practice, so hopefully we're going to start picking up on it […] It's through the university, and [the Trust] are paying for it […]*
> *Q: And how long is the course?*
> *It's a ten week course of four hours and then we have an exam at the end. It's…anatomy and pathophysiology, it's a module towards the student paramedic […] so if we pass these exams, we can go and do student paramedic…But I mean, I don't necessarily want to be a paramedic, it's just more further learning and it backs up things at work.* **Interview, SPA call-handler**

Although the formal audit process was operationalised identically in the 999 and SPA settings, the way in which call-handlers accept – and value it - differed. The SPA call-handlers almost overwhelmingly accepted the audit system and were extremely positive about it ensuing that they work both safely and effectively, as well as acknowledging its role in building their

confidence, and developing their skills, as a call-handler. However, it is worth noting that the SPA call-handlers did not have target rates for dispositions, a particularly unpopular aspect of auditing in 999. Additionally SPA call-handlers also derived a sense of competency, of being 'good at what they do', from passing audits. Although call-handlers were positive about the audit process, SPA call-handlers reported moderate levels of trust in the audit team ($M = 3.2$, $SD = 0.8$) significantly higher than those in the 999 setting.

> *It's also good for your confidence, as well, because they will come back to you and say, look, this is exceptionally well handled. But it's also not just the calls that they have picked - if you've got a call you're worried about, they'll audit it for you if you want it done, and then you can take away your mistakes, or the things you did right, and learn from them. But it's a very good process and they will sit down and talk you through it so you know what's going on.* **Interview, SPA call-handler**

> *I think it's definitely important to have audits in any…industry like this. It's so important because, literally, we're dealing with people's lives. We have to be monitored. And I do think it's helpful. I mean, I enjoy getting feedback just so I know what to work on and so I know what areas I can improve on. And what I'm doing well because it motivates me. I do think it is an important part of the job.* **Interview, SPA call-handler**

As in the 999 setting, the call-handlers used some interpretative flexibility to manage calls, although newer SPA call-handlers, who had less previous experience to draw upon, were more likely to report that it was important to 'follow the system'.

> *They are [some 999 call-handlers] quite often seen as over-stepping or stepping out of the boundary and that's really frustrating for them because they know, and I know, that they're right. But because the system says you have to be ultra safe, which you have to be because in this day and age, you know, litigation and all of that…We have to make sure that we kind of stay within that boundary. So it tends to be those people who've worked with the [previous] system….that do tend to just step outside every now and again. The new people don't know anything different so they follow it to the letter and that is, that is good.* **Interview, 999 manager**

> *It's too easy to get in the mindset, if you know what you're looking for and you know how to get to that disposition, but you've got to stick to the question because there could be one question where an answer is not sure, that could completely change the disposition.* **Interview, SPA call-handler**

In addition, one of the key differences was that SPA call-handlers were much more likely to consistently check out their decisions and use the clinical supervisors to legitimate their decisions:

> *[The CDSS] kept taking [call-handler] to the HEAD INJURY path but the call-handler thought that this was not appropriate, so she contacted the clinical supervisor. The clinical supervisor agreed and suggested she went for an EARLY EXIT. An ambulance was arranged for the patient.* **Observation SPA**

Call-handlers shared beliefs about the CDSS that shape the reflexive monitoring process. These beliefs were in turn shaped by their individual and collective experiences of using the CDSS. The SPA call-handlers had developed high levels of trust in the system.

> *I've never found one where I've actually got one that's completely the wrong disposition, where it's been [the CDSS] fault'. So yes, I do trust it more than me.* **Interview, SPA call-handler**

The survey findings reflected the ethnographic data in the trust that call-handlers had in the CDSS (Table 13). Overall trust in the CDSS was higher here than at either of the other two settings ($M = 4.0$, $SD = 0.6$) and SPA call-handlers reported high levels of dependability ($M = 4.1$, $SD = 0.7$) and faith ($M = 4.0$, $SD = 0.7$) in the system. SPA call-handlers were particularly strong in their beliefs that CDSS failure was the result of either call-handler or caller error.

> *it's only as good as the person who's using it and it's only as good as the answers that you're getting off the patient […] You've got to ask them [the caller]. You've got to make sure that they understand the questions because if you're not using it properly, they may not understand the questions and the [answers] they are giving you back aren't going to be the correct ones for [the CDSS] to safely assess it.* **Interview, SPA call-handler**

7.4 OOH

At OOH we were able to observe the introduction of the CDSS in a new setting and for a new type of service (face-to-face). Whilst the CDSS developers saw the CDSS as a 'finished product', albeit one requiring periodic updates, OOH wanted further adaptation to meet their (evolving) needs. Much as in 999 where the Trust added the specific expertise to bring it into use, OOH saw that they could contribute to the development of the CDSS for their setting.

> *I think it's quite a good system. I think, we, need to tweak it, find the little bits with regards to the outcomes and that's it. But I think it's fairly good.* **Interview, OOH call-handler**

Like I say, there are a few leaks, a few cracks, but that's going to be happening with any new system really, any new thing you introduce **Interview, OOH call-handler**

Like 999 and SPA the introduction of the CDSS required new roles to support the training and formal audit mechanism. This reflexive monitoring was somewhat different since existing audit systems were less developed and there were fewer staff resources to support the process in the OOH setting. Initially there was only one member of staff responsible for all training and auditing (compared to the 999 and SPA setting, which has a well-established team of about six staff for this). As more staff required training to use the CDSS the organization increased the number of staff trained to undertake training and auditing.

Unlike 999 and SPA, OOH had not introduced a clinical supervisor role to support the call-handlers' work. However they may obtain clinical advice from the triage GPs and although GPs do not sanction call-handler's CDSS use in quite the same way as the clinical supervisors do in 999. In order to support call-handlers OOH identified some call-handlers who act as 'liaison' staff (these are new responsibilities for some existing call-handlers). Their role was not to provide clinical advice but to support call-handlers with problems or difficult calls (for example, offering advice about which route the call-handler should take through the system).

Just once or twice I've not been quite sure which way to follow it through. […] Like this morning, one of the patients said she was told to ring back if her symptoms didn't get any better, and I wasn't quite sure whether to take the call or just offer an appointment […] So I just wasn't quite sure which way to take it. […] if you do struggle, there's always somebody there. You know, there's always a liaison there to just help you out if you do struggle. **Interview, OOH call-handler**

In OOH we were able to trace the introduction of formal monitoring practices from their inception. In this setting, whilst all call-handlers were audited in the same way as SPA and 999 they only received feedback on their performance if they failed an audit. As a consequence, some call-handlers seemed unaware whether or not they had been audited. This gives the impression that the process is much more covert here than at the Ambulance Trust. Furthermore, whilst the managers and trainers claimed to derive useful information from the process, it did not contribute to the wider sense of skill development, competence or security as seen in both 999 and SPA. Thus far, auditing in this site has been used to identify mistakes and problems. There was less focus on identifying good practice and on staff learning/development.

The audits will pick up anything that's just one-off. And obviously they will also identify with anything that's recurrent. And if it becomes recurrent, then we obviously bring them back into training again. [The

trainer] is quite good. She does pick up quite quickly and she's already had a couple of staff in and just given them some tips on how to do different things. **Interview, OOH Senior Manager**

We're going to be reviewing higher [ ] call volumes to start with because they're areas that we've identified already that we want to look into. We've noticed a difference in new call-takers to existing call-takers, **Interview, OOH manager**

There appears to be a subtle difference in how the audit has been presented to staff - and how in turn, it is perceived. In OOH there was a greater emphasis on 'surveillance' and identifying call-handler error, rather than audit as an opportunity for learning and developing call-handling skills. However despite this, call-handlers from the survey reported a high level of trust in the audit 'team' (mean of 4.0, significantly higher than that of 999 or SPA). This might, in part, be influenced by the fact that the OOH audit 'team' has primarily consisted of one individual, who is also the trainer and a close colleague.

Q: In terms of audits what do you think about them? Do you think they are useful, that they're helping you?

CH75: I think so, yes because once its [the call record] closed you can't go back into it so I think if we have done something wrong on it, picks up in the audit and then you're told if you have made a mistake. You're made aware of it. Without it you'll probably make the same mistakes so yes, I think they're a good thing. **Interview, OOH call-handler**

However, despite the emphasis on identifying bad practice, there was an accepted level of flexibility in using the system across the organization – to a greater extent than in the other settings. A degree of flexibility was legitimated by the OOH GPs, the trainer and the shift managers. This was particularly apparent in their decisions to not use the CDSS for certain types of calls (e.g. palliative care patients) where call-handlers decide whether to use the CDSS, or whether to simply pass the call directly to the GP.

…for the patient who's at end of life, [where it's] not possible to answer questions on the telephone, and you're asking for a specific type of pain or, and they're obviously, they can't answer you. It's not appropriate to put them all the way through questioning when you wouldn't be leaving them for two hours or six hours anyway. You would want them to be seen as quickly as possible. So there's no point in putting them through the torment of taking a load of questions, for them to be asked all over again by the doctor. So in areas like that, it's not really appropriate to assess them. **Interview, OOH manager**

In the same way that 999 and SPA call-handlers check out their decisions with the clinical supervisors, OOH call-handlers sometimes check decisions and to confirm that the GP is happy with the decision.

so if you ask if it can be upgraded and they [the shift coordinator] say no…then you shouldn't upgrade it really…but also, you can ask the doctors as well, most of them are happy to say. I mean, you can't ask pathway to choose, but…
Q: Because they are not trained, they don't know how to use [the CDSS]?
Exactly, so… but you can ask them. If it was another query, you can ask the doctors if…you know, it says that they need to speak to them, but can I [change the disposition] They go, yes that's fine. **Interview, OOH call-handler**

As in SPA there is the belief that discretion, experiential expertise and some clinical knowledge is not inappropriate given the over-cautiousness of the CDSS. This is not a criticism of the CDSS – caution is respected – but so is the human judgement to override in appropriate circumstances.

a lot of the confidence comes from the fact that the system is over cautious, you know. It's not going to make the mistake of sending you to a doctor when you really need to go to hospital. However, it is going to make the mistake of, it's going to send you to hospital when you really need to go to a doctor. **Interview, OOH call-handler**

I think it errs on the side of caution …[ ] …it's difficult for me to say whether it's the correct disposition because I'm not medically trained or anything; then you'd have to speak to the doctor to see whether they think the disposition is correct or not. **Interview, OOH call-handler**

Despite some call-handlers believing that the CDSS is safe or over-safe, some staff had doubts about the CDSS – both in the technology itself and in its potential to reduce the need for GP triage. Lack of trust in the system was particularly prevalent amongst experienced staff who had used the previous protocol system.

I understand it rules out the immediate life threatening; that's good but it… at the moment it does not take away fear; in fact it increases it.
Q: and it isn't actually helpful
I don't think so at the moment, no but they were reckoning between 25% and 40% less triage [for the GPs]. Obviously I don't have any stats but I can't see that. **Interview, OOH call-handler**

The survey findings however, reflected quite high levels of trust in the CDSS at OOH (similar to those found in the 999 setting), although 'faith' in the CDSS was scored lower (M = 3.5 compared to 4.0 in SPA, see Table 13). As consistent with the other settings, call-handlers apportioned CDSS failure as the result of call-handler or caller error.

At first I was a bit sceptical thinking that it was going [wrong] ... It turned out to be me going down the wrong route which was giving the

*wrong, or not probing enough on a question and coming out with the wrong outcome.. **Interview, OOH call-handler***

*But sometimes you find, like with the bleeding question, I think it's hard for someone to judge a pint of blood, especially if it's in a towel, or mixed with urine, or water, it's very hard to judge that. So sometimes the question the system is asking is throwing out the wrong disposition, not because I phrased it wrong, not really because what the system is asking is wrong, but because the way the public, the patient, answers, it's kind of their answering in a way. […] I suppose in that sense, the system can lead it down the wrong way. **Interview, OOH call-handler,***

7.5   Reflexive monitoring across the three settings

By studying the how the same technology comes into use in three settings, we can see how, although there are similar factors in play keeping the CDSS in place, there are differences in how these mechanisms are operationalised. Across the three settings, there was significant involvement from the developers in keeping the CDSS in everyday use. They not only invested considerable time and effort in the introduction of the CDSS (although less so at OOH), they have also invested time and effort in adapting the system in response to its use over time. Continual adaptation of the CDSS was undertaken in partnership between developers and users/managers in all three sites. One might expect that the adaptation would decrease with each site (as the system is 'refined' over time) but this does not appear to be the case. Refinements are often not around the clinical content of the system, but rather involve changes to make it work in particular settings.

To keep the CDSS in place, all sites have found that it is vital to devote additional resources to support the call-handlers in their use of the CDSS. The 999 and SPA settings both introduced a new clinical role (a clinical supervisor) to manage and audit call-handler's performance. Additional clinical support has not been introduced in OOH, perhaps because there is already GP present whose expertise can be drawn on.

The formal audit mechanism is set by the CDSS developers (e.g. the minimum number of audits per month and the use of the audit tool). However, the audit process has been operationalised differently in OOH compared with 999 and SPA. The process at 999 and SPA is formalised, developed and overt, and primarily is – or is at least is presented as - an opportunity for learning, as well as ensuring safety. In OOH, although the process is not punitive, the audit is presented as a way of identifying mistakes and preventing bad habits. Nonetheless, call-handlers across all three sites perceive that audits are an important aspect of them doing their job well. Trust in the audit team varied across sites – with it being lowest in 999 (M = 2.7 compared to 3.2 in SPA and 4.0 in OOH). This was surprising,

since one might expect that trust in the audit team would develop over time.

In spite of a formal and well developed audit system, call-handlers still exercise some considerable flexibility in using the CDSS. For example, call-handlers sometimes go 'off-piste' and use their 'own knowledge' in conjunction with the system, or adapt and translate wording so that the caller understands what is being asked. This echoes previous research which suggests that as technologies are brought into the field of daily practice, users exercise 'interpretive flexibility'[74] which describes, for example, how users ignore particular functionalities or develop creative alternative forms of use to produce outcomes that may differ significantly from the original intentions for a given innovation. Interpretive flexibility around the use of the CDSS is tolerated in all settings, but the way in which call-handlers use the system flexibly is played out in slightly different ways between the settings.

Reflexive monitoring includes the beliefs that people have about the utility of the intervention, which are necessary to keep the intervention in place. Call-handlers overall, understood the need for audit, and valued it. They trusted in the CDSS, whilst recognising that it 'failed' in some circumstances (primarily due to call-handlers not asking the questions 'correctly' or callers providing misleading or incorrect information). There was perhaps more doubt at OOH – partly perhaps because it was new and a number of staff were happier using the previous system. These findings were endorsed by our survey (Table 13), which showed that call-handlers self-reported trust in the CDSS was broadly similar across all three settings, although in SPA call-handlers rated the CDSS more highly than at the other two settings. The 'trust' factors did not significantly differ between sites (although SPA site reported higher levels of faith in the system). Findings were broadly consistent with the qualitative findings of the study regarding different beliefs about the CDSS in each of the settings.

Table 12. Call-handlers self-reported trust in other actors

Actors (trustees)	999 (N=31)	SPA (N=39)	OOH (N=33)
	Mean (SD) Ratings	Mean (SD) Ratings	Mean (SD) Ratings
Employing organization	3.7 (0.8)^{a***}	3.9 (0.8)^{b***}	4.5 (0.5)$^{a***\ b***}$
Audit team	2.7 (1.0)$^{a*\ b***}$	3.2 (0.8)$^{a*\ c***}$	4.0 (0.6)$^{b***\ c***}$
CDSS team	3.5 (0.7)^{a*}	3.7 (0.7)	3.9 (0.5)^{a*}
Clinical supervisor	3.2 (0.9)^{a**}	3.7 (0.7) ^{a**}	N/A
Callers	3.3 (1.2)	3.1 (1.3)	3.1 (0.9)
Self	4.0 (0.5)	4.1 (0.7)	4.1 (0.5)

N.B. Superscript shows significant differences between sites: *p< 0.05; **p<0.01; ***p<0.001

Table 13. Call-handlers self-reported trust in the CDSS

Trust Factors	999 (N = 31)	SPA (N = 39)	OOH (N = 33)
	Mean (SD) Ratings	Mean (SD) Ratings	Mean (SD) Ratings
Competence	3.8 (0.6)	4.1 (0.6)	3.9 (0.5)
Predictability	3.7 (0.6)	3.9 (0.6)	3.6 (0.6)
Dependability	3.7 (0.8)	4.1 (0.7) ^{a*}	3.7 (0.6) ^{a*}
Faith	3.7 (0.8)	4.0 (0.7) ^{a*}	3.5 (0.5) ^{a*}
Reputation	3.7 (0.8)	3.9 (0.9)	3.6 (0.6)
Overall trust in the CDSS	3.7 (0.6)^{a*}	4.0 (0.6) $^{a*\ b*}$	3.7 (0.4) ^{b*}

N.B. Superscript shows significant differences between sites: *p< 0.05; **p<0.01; ***p<0.001

7.5.1 Workforce implications

Having looked at reflexive monitoring across the three settings it is clear that there is a need for on-going support and development by the CDSS developers. The technology is never fixed or finished and interpretive flexibility and continual change in use contexts requires adaptation in partnership with the range of actors is necessary to keep the technology into use.

Our analysis has shown that call-handlers require support in their everyday use of CDSS – be it from other more experienced call-handlers or clinical supervisors. The extent to which *clinical* input is necessary to make the CDSS work is unclear, although there is clinical input in all three settings (the clinical supervisors in SPA and 999 and the GPs in OOH). It therefore seems unwise to assume that because the CDSS can be operated by non-clinical staff that this removes, completely, the need for day-to-day clinical input.

In terms of workforce training the organization has to be able to manage the inherent tension in call-handler work between ensuring the call-handlers follow the system, whilst at the same time recognising the a degree of flexibility in the way call-handlers use the CDSS is what makes it work. This requires flexibility in training (and audit) to support this.

7.5.2 Implications for developing NPT

NPT makes it clear that the work of embedding this intervention in everyday work is on-going: it is not done, once and for all, but requires social action to monitor practice and make adjustments to keep the intervention in place. NPT points to the importance of reflexive monitoring – as well as to collective action – required to make an intervention work and to *keep it working*. This is an important extension to NPM and reminds us that we cannot assume that there is a single, fixed entity that is normalised.

8 Answering the questions in our proposal

8.1 Fulfilling the research proposal

In our proposal, we noted that the implementation of new technologies, such as CDSS, depends on the interplay between technologies and the workforce in everyday practice. We argued that we urgently need to understand the consequences of these 'technologies in use' for workforce configuration and training and organizational management, and that this required systematic analysis.

We set out to inform workforce planning and policy by undertaking a detailed comparative case analysis of a particular technology focusing specifically on workforce issues – the nature of the work and who did it, organizational and team relationships, divisions of labour and skill-mix and the wider organizational contexts surrounding a technology.

Our objectives were to:

i) understand the impact of new technology on everyday work and service delivery.

ii) identify education and training needs for staff engaging with new technologies;

iii) examine the implications of new technology for workforce reconfiguration and management planning.

Our analytical approach, has been informed by a range of sociological and psychological theories and traditions, but was initially framed around the normalization process model (NPM)[59,60]. NPM offered a systematic approach to understanding the collective action required to embed new interventions into health care work. However, during our project NPM has evolved into a wider theory of social action – the normalization process theory (NPT)[58]. We welcome this development, which allows us to address all of our original questions and – at the same time – to broaden our analysis. However, with the extension of NPT, it makes sense to re-order our questions (and the phrasing, but not the intent of two questions). With the benefit of this revision our original 8 questions (labelled a-h in the original proposal) can be restructured as four '*how*' questions – allowing us to summarise and integrate the descriptive analyses of the preceding chapters which we do below. We are then left with four '*what*' questions which allow us to draw out the implications of this analysis for policy and practice and form the basis for our conclusions and recommendations in the final chapter.

8.2 Integrating Our Findings

The four preceding chapters worked through our analysis of the ethnography and survey data using the four components of NPT (coherence, cognitive participation, collective action and reflexive monitoring). This section integrates our analysis using four questions to review what we have learnt from the case studies

8.2.1 How does the CDSS impact upon everyday work and how is it understood / managed?

The preceding four chapters have shown that this is strongly shaped by the particular work settings.

In 999 the CDSS has facilitated the management of categorization and prioritization of emergency calls against three categories of urgency (A, B and C) for ambulance response and enabled alternative (non-ambulance) advice to be given. It has been received as a positive way of triaging 999 calls despite the apparent **intensification** of the work content (more questioning, increased tasks within the call etc).

In SPA the CDSS facilitates the management of urgent care calls, enabling sorting by urgency and consequent transfer to GP – if required – and/or direct health advice (e.g. making out of hours GP appointments or advising paracetamol and warm fluids). This work involves similar tasks to 999 in terms of navigating the CDSS but is **extended** in that the range of presenting conditions and possible dispositions is wider than in 999, and many calls take longer to handle.

In OOH the CDSS performed a similar function to that in SPA – managing calls to out-of-hours primary care – and had more recently been deployed to manage face-to-face attenders at a UCC, offering emergency care (delivered by the acute Hospital) and urgent primary care (provided by primary care). Here the CDSS had both extended the work (e.g. the number of questions and the length of time calls took, and latterly the encompassing of A&E reception tasks) and also made the work more **scripted** by relocating the knowledge previously derived from paper protocols and call-handler experience in the wording of questions in the CDSS.

In all three settings the use of the CDSS required considerable **emotional labour.** This included issues associated with managing potentially life threatening events and diseases, through to the need to establish rapport with the caller, manage anxiety and distress and to deal with anger and abusive talk. Additionally we observed that while clinical information has been embedded in the CDSS the work of using it requires considerable

discretion and the **use of embodied knowledge**. It was clear in all three settings that call-handling bore a closer resemblance to other forms of health care work than to call-handling work per se.

Across each setting the use of the CDSS appeared to have coherence; there was broad agreement that the CDSS was suitable for task even though the task varied across settings. This coherence was underpinned by wider understandings and discourses, notably about i) rationing resource use, ii) modifying caller/patient behaviour and iii) the legitimacy of EBM. The CDSS could only 'make sense' or become intelligible in light of discursive shifts in understanding that had taken place in the external environment of health services and broader society.

It is important to note that not all individuals shared exactly the same understanding of the CDSS. Indeed not all in the same position regarding this new technology. For the call-handlers as day to day users of the CDSS their enrolment (cognitive participation) in using the CDSS was mandatory and they had very little power to resist its introduction. In contrast the senior managers' understandings of the CDSS – in the case of 999 for example the particular emphasis on rationing – were key to decisions about its adoption.

Considerable effort was expended in establishing the legitimacy (coherence) of this new technology for the work and in enrolling a range of staff (cognitive participation) in the tasks of bringing it into everyday use. Further it was clear that this coherence was dynamic: it needed to be reworked and renegotiated over time. For example, there was considerable reframing of the advantages of the CDSS in OOH from when it originally replaced the paper system to when its use was extended to the face-to-face setting. The work of bringing the CDSS into use and maintaining its everyday use (collective action) was enabled by a wide range of actors who worked at establishing sufficient coherence and securing enrolment and buy in (cognitive participation).

The CDSS also had an impact on the work in terms of monitoring and governance, and vice versa. Chapter 7 showed that reflexive monitoring was essential to keeping the system and work practices in place and that the deployment of the CDSS necessitated the creation of additional training and surveillance functions in each setting.

8.2.2 How do users and networks develop confidence and trust in the CDSS?

This is not automatic and we have shown that considerable effort was expended by a range of actors prior to the deployment of the CDSS in each setting. The work by DH alongside the CDSS developers in establishing the safety of the system was an essential foundation for the local coherence of the CDSS. This coherence was supported by wider external discourses, such

as evidence-based medicine, which ensured that the idea of formally en-scripting clinical knowledge in a computer system (rather than 'in' a clinician) 'made sense'. This work helped to legitimise the CDSS and build confidence and trust in its ability to do the job safely.

For the day to day users of the CDSS – the call-handlers – there were clear differences in levels of confidence and trust in the system related to the nature of previous systems in use, if any. In OOH the call-handlers appeared least confident and trusting about the CDSS. Partly, this reflected the relative newness of the CDSS here – compared with the 999 and SPA settings. However, much of this scepticism in OOH centred on unfavourable comparisons with the previous paper based protocol system. Furthermore, there was a sense that the CDSS had been imposed on them due to external factors (new quality standards), which caused some resentment, as did the increased call times and extension to face to face interactions. However, the lower levels of trust in this setting seemed to be located in those call-handlers who had used the old system and was not shared by the newer call-handlers who seemed more positive about the CDSS and its competence to do the job. This mix of views between experienced and newer workers may explain why the survey findings do not show mean levels of trust at OOH to be significantly lower than those in the 999 setting.

At 999, where the system had been in use for the longest period of time, during our observations staff appeared confident using the CDSS and in interviews they expressed trust in the system. This trust was rooted in understandings of the CDSS' safety, respect for the clinical expertise it represented, and the fact that the DH had approved its use.

The survey shows that trust was highest amongst staff in SPA, where the CDSS had been introduced from the start of a new service. There were no comparators for these staff, most of whom had been newly recruited. It appears that this enabled higher levels of confidence and trust in the system, from the start, whereas trust and confidence appeared to develop over time for those who had experience of using other systems.

Of interest across all settings we noted that trust in the system operated across a certain bandwidth of interaction. For the majority of cases call-handlers experienced a high level of trust in the system: which lead them to blame themselves rather than the technology when things went wrong. However, for smaller percentage of cases there were reservations about the system's ability to triage the call appropriately. This lack of trust fell into three broad categories. In some instances it was felt that the system did not have the ability to deal with certain scenarios effectively, for example in cases where there were multiple symptoms, or where the caller lacked adequate language skills such as young children or those with learning difficulties, however by and large the call-handlers seemed happy to regard these calls as falling outside the system and dealt with them accordingly. In

other examples there was a lack of trust in the system's benevolence, for example in terms of whether it was acting in the best interests of the public. Call-handlers at the OOH setting (notably the longer serving staff members) expressed strongly felt dissatisfaction that the system did not give callers what they wanted – access to a GP. Finally in some cases there was a lack of trust in the system's integrity. Call-handlers felt that some cases were 'special' - that some callers, the elderly, the dying, distressed parents with unwell small children were deserving of a higher level of care. At the opposite end of the spectrum were some callers for whom the call-handlers had little empathy (e.g. callers who appeared to be under the influence of alcohol or drugs) and here the call-handlers were uncomfortable where the system lead to dispositions which gave such callers a higher level of care than they felt was warranted. The survey findings supported our observations about call-handlers showing that they felt that the system was significantly less trustworthy in terms of benevolence and integrity than it was in terms of its competence to do the job. As our observations show therefore outside the bandwidth of interaction in which the CDSS is trusted are areas of distrust which lead to the exercising of discretion by call-handlers which in turn often leads to over-riding dispositions

In all settings the organizational managers expressed high levels of trust and confidence in the CDSS and this clearly contributed to the coherence and cognitive participation of other staff in the networks surrounding the CDSS. Trust acted as a mobilising factor that promoted enrolment of actors and facilitated the operation of the chains of interaction that made the work possible. However, even where levels of confidence and trust are lower, notably at the OOH setting, the CDSS has been embedded in everyday practice. Nonetheless we suggest that confidence and trust in the system is helpful to successful deployment.

8.2.3 How are tasks divided formally and informally between staff using and managing CDSS?

There were clear *formal* hierarchies and divisions of labour in each of the three settings. However, as we have demonstrated in Chapters 4-7 these were structured and worked in specific ways in different settings.

In the 999 there was a strong organizational and managerial hierarchy up to Executive level. The distinction between call-handling and dispatch staff centred on task differentiation and predated the introduction of the CDSS, and interestingly while the CDSS intensified call-handling work, this work still appeared to have a lower position in the hierarchy. The clinical supervisor role – created after the introduction of the CDSS – extended the division of labour and disrupted the call-handler-control room management hierarchy by:

- Introducing a new layer of supervision for the call-handlers, creating some initial boundary disputes with duty managers;

- Introducing a clinical worker into an area of work designated as clerical;

- Endorsing the need for external clinical expertise to make the CDSS intervention work effectively;

- Questioning the pseudo-clinical identity of the call-handlers – by introducing a clinician to regulate clinical decisions.

The introduction of the clinical supervisor role produced some initial resentment from some call-handlers and other staff, but over time this has lessened. Nonetheless the tension between the claim that the clinical knowledge is all in the system and the presence of the clinical supervisor is not acknowledged. The clinical supervisor role was incorporated into SPA and is an accepted feature of the SPA hierarchy.

In OOH there was a division of labour between those who worked in the call-handling control room and those who dealt with face-to-face encounters. At the time of our observation, the move to the UCC was recent and some face-to-face staff had not been trained for the CDSS and some call-handlers had not learnt the face-to-face procedures. Over time it was anticipated that the distinction will be reduced as call-handlers/receptionists are increasingly dual trained and will cover either service, as required. In this setting there was no designated clinical supervisor role but there was a GP, who took calls referred by call-handlers and could provide clinical advice.

Across the three settings, there were few informal divisions of labour or hierarchy which differed from the formally established ones – except for a general awareness of seniority related to length of service which can influence who shares knowledge and supports newer workers.

8.2.4 How does the CDSS 'fit' in wider political, sectoral and organizational contexts (what are the barriers and facilitators)?

One of the key reasons why the CDSS was successfully brought into use in the three settings was the fit between what it offered as a computer technology and the ambitions and aims of those working in the wider political, sectoral and organizational contexts, notably those at high levels of management with power to enact decisions about service (re)organization and delivery.

During our study, the position of the CDSS in relation to NHS policy and political thinking shifted considerably. What was once a small scale technology with limited use, was licensed for the ambulance service and –

more significantly still – was nominated for a new national urgent care three-digit number telephone service.

Originally, the CDSS was built by a team of developers based in NHS Direct (which was employing nurses to give telephone advice, using a different CDSS). The team were seconded to NHS Connecting for Health (CfH), where the CDSS became an increasingly high profile success whilst other key NHS IT projects continued to face difficulties and setbacks. Over this period, the Development Team and CfH also established a 'National Clinical Governance Group' for the CDSS bringing together all the Royal Colleges (including midwives and nurses) in a shared endeavour to support and develop the system for a national three digit number to access urgent care. By the end of our fieldwork the CDSS was strongly aligned with the ambitions of the DH at political and policy decision-making levels.

At a local level, in 999 and SPA the CDSS was championed by the senior managers and Trust executives. As we described in Chapters 4 and 5 much of the coherence and cognitive participation around the CDSS was driven by the organizational ambitions of this Trust and the efforts of particular individuals to achieve these. The CDSS was understood as central to this endeavour. The Trust's ambitions were shaped by powerful discourses about rationing, patient behaviour and EBM: all met by claims for the CDSS, that it could enable clerical workers to deliver standardised, evidence based call management by non-clinical workers. The extension of the use of the CDSS to deliver the new SPA service built on the experience of successful implementation for 999 so the earlier service facilitated the development of the new one.

In OOH the introduction of the CDSS fitted less easily into local understandings of the OOH service, despite support from senior managers (and some middle managers). Call-handlers and some middle managers were not persuaded that the CDSS would improve the service, as they understood it, and were critical of the reduction in call-handlers' autonomy (notably in terms of meeting what they saw as the primary aim of the OOH service - to give patients GP appointments). Meanwhile, the senior managers - at executive and Trust board level – could see long term benefits to the service that could be delivered by introducing the CDSS. Specifically, the CDSS was used to deliver an ambitious plan to expand the OOH service by integrating telephone call-handling with face-to-face urgent care in a new Urgent Care Centre. The 'selling' features of the CDSS – that it could be used by non-clinical staff, that it standardised decision making, and that it was informed by EBM, and had a successful history of use elsewhere meant that it had a very strong 'fit' with this vision. Given the relatively low status and power of the call-handling staff (which we have noted before in chapters 4 and 5) their 'resistance' to the CDSS which manifested mainly as conversations comparing the CDSS unfavourably with past practice, was easy to ignore or overcome – in effect the decision to

transfer to the UCC, and to adopt the CDSS for call-handling and reception work was a *fait accompli.* More pragmatically, moving call-handling to a new location became necessary for another reason too, as the introduction of the CDSS required more call-handlers to be employed (to deal with the extended call times) and the service outgrew its previous office space.

8.3 Implications of Our Findings

This section discusses four questions which allow us to draw out the implications of our analysis for policy and practice

8.3.1 What are the implications of CDSS for work identities, organizational management and planning?

Our main finding from examining the nature of everyday emergency and urgent care triage and call management work using the CDSS is that this technology creates a new type of worker and new work identity. A naive understanding of the implementation of a CDSS in these settings might assume that the work is 'simply' about call-handling – that this task closely resembles other call-handling work and that these workers are like those who work in any other type of call centre (for example selling insurance). Our evidence indicates that we cannot assume that health care call-handlers are like other call-handlers. The fact that the work undertaken with the CDSS involves direct management of patients and deployment of health care resources is a vital part of the work identities of staff in all three settings. This is particularly pronounced in 999 and SPA and there are cultural, historical and organizational features of these settings which reinforce this (e.g. the ambulance service uniforms) but it is nonetheless also important to the call-handlers at OOH. The identity of this work as health care work – both despite and because the CDSS incorporates clinical /medical knowledge – is very important, and this needs to be recognised and appropriately supported.

The health care aspect of this work is attractive from a recruitment point of view and the links to the NHS and health care delivery are important for retaining staff. The flexibility of the configuration and use of the CDSS – allowing relatively low level clerical staff to exercise judgement and discretion – helps to sustain these identities. Even in OOH, where staff were less impressed by the functionality of the CDSS, they were willing to persevere with the system because it was important, in their eyes, to deliver health care to patients. Simple things like the job titles and role description for these call-handling roles can support this identity and help to attract and retain staff, as can the embedding of these roles in organizations that offer opportunities for career development – and this was a particular attraction for several staff at the Ambulance Trust.

Of course a potential drawback to fostering these pseudo-clinical identities is that call-handlers may become over confident about their expertise and begin to exercise inappropriate levels of discretion. As we showed in chapter 7 the reflexive monitoring surrounding the use of the CDSS, notably audit and retraining helps to temper this.

Our key message is that the CDSS helps create health care work identities and that on balance these are a good thing and need to be recognised and supported.

8.3.2 What knowledge is required by CDSS users and how is this shared within teams and across boundaries?

Our ethnographic work highlighted that despite the rhetoric surrounding CDSS technologies, the call-handlers develop and use considerable embodied and experiential knowledge to work the system. This expertise is vital to the efficient working of the CDSS. The technology does not work 'straight out of the box' or without the input of skilled operators. One of the misconceptions about CDSS in general and this CDSS in particular is the idea that because it is a system that incorporates expert knowledge – in this case clinical knowledge – all the expertise required to do the work is embedded in the software/machine. We have demonstrated that this is not the case. Huge effort – by developers in designing and continually adjusting the software, by managers in promoting coherence and enrolment, by trainers and auditors in flexibly and supportively engaging in reflexive monitoring and by call-handlers themselves in making sense of the task and developing a new practice of call management using this CDSS - has been expended and continues to be required to bring and keep this CDSS in everyday use.

Interestingly our survey work suggests that the call-handlers themselves do not value their informal and experiential knowledge as highly as some of the other skills required to use the CDSS, however they do see them as moderately important to the effective enactment of their work. They also place a premium on knowledge located at the level of the team and shared among them. Our interpretation of this finding is that our observation shows that call-handlers make extensive use of informal knowledge but that they understand that this is problematic in relation to the rhetoric about 'following the scripts' and the evidence being 'in the machine'. Training and audit activities reinforce the idea that embodied and experiential expertise are not required when using the CDSS, and our concern is that in the context of a formal survey the call-handlers responses present what they perceive as the 'right' answer rather than reflecting day to day practice. Or perhaps they are signalling that for them there is an important distinction between individualised knowledge (from individual personal experience) and informal knowledge that is legitimated in teams (where personal experience might be shared, challenged or confirmed) to inform practice.

The key implication here is that it is important to recognise the role that experiential and embodied knowledge plays in bringing the system into use. Rather than attempt to prevent this (which we think is impossible, unless staff are replaced regularly before they have time to build up experience and confidence with the system) it would be helpful to find ways to acknowledge the expertise of these workers (this would input to retention and job satisfaction) and to find ways to manage it in ways that allow rigorous quality assurance while also developing informal knowledge constructively.

Given the slight contradiction in our findings, between the ethnography and the survey, a further implication is that those involved in formal monitoring of staff should be mindful of the fact that people learn what they are 'meant to say', especially in high surveillance environments (as in these) and that to fully understand how work is done it is helpful to directly observe the work. Retrospective monitoring of calls provides one mechanism for this but we would suggest that this could be augmented by real time observations which would reveal how call-handlers anticipate questions and employ experiential knowledge.

In sum, a range of evidence shows that the use of informal experiential knowledge by call-handlers is what makes the CDSS work successfully. A better understanding of this should be incorporated into the training and management of emergency and urgent care call-handling.

8.3.3 What are the implications of CDSS for workforce planning e.g. skills, competencies, entry/retention, education and training?

The fact that this CDSS can be used by clerical staff to make complex clinical decisions, and offer clinically based advice, makes it attractive across our three settings and, of course, for the planned 111 urgent care service. This CDSS represents a significant departure from many other CDSS in use in the NHS and other health care systems - for example CAS, TAS, Prodigy – designed for use by clinical staff. We have shown that the CDSS has been successfully deployed in the three different settings and can be used by non-clinical staff. However we have also found that making the system work to deliver emergency and urgent care triage is a complicated and complex process.

In the emergency care setting the work has been intensified and it is not always possible to triage the call within the 8 minute ambulance response target time, meaning that some ambulances arrive before triage is completed whatever the eventual disposition of the CDSS. The CDSS has not enabled the proportion of Category A and B calls to be reduced to the 'real' level of priority as judged by the responding paramedics but it has

been used safely – and this is a key marker of success – and without the significant licensing costs of its closest market rival (AMPDS).

In the urgent care setting – at OOH the additional work and corresponding lengthening of call times has necessitated the employment of more staff.

The SPA is a new service and the introduction of this new service, predicated on using the CDSS, has required the employment of more staff at all three settings. At SPA and 999 clinical supervisors have been introduced to facilitate the use of the CDSS. These staff play an important role in training and audit of calls, but, crucially their additional clinical expertise supports call-handlers using the CDSS (helping to confirm our finding that not all the clinical expertise is 'in' the CDSS). In addition to these staff the deployment of the CDSS requires additional staff to undertake the training and audit requirements that ensure the safe use of the system.

The extension of the work and the creation of new roles (and in SPA a new service) meant that the introduction of the CDSS led to an increase in staff. In none of our settings had the introduction of the CDSS reduced the number of clerical or clinical staff employed. This is an important outcome that should be borne in mind when introducing the system. It has implications for longer term workforce planning, but also more immediate impact – for example on human resources staff to manage contracts, managers to supervise and plan shifts, and also for spatial configuration of the workplace – each of our three sites has had to relocate to cope with expansion in headcount. Related to this we have also shown the importance of team sharing of knowledge and learning, and we suggest that co-location is important for this. For this reason we do not believe that a workplace model which isolated call-handlers from each other would be successful.

We have argued that call-handlers acquire significant expertise – that they bring the system into use rather than 'operate' it. This needs to be recognised and supported and it may be that new systems of reward and skills development will be required to attract and retain staff. The processes for attracting and selecting staff needs to take these things into account. Our finding that the link with clinical work is important for worker identity means that these are not just call-handlers they are health care call-handlers and job titles/advertisements should reflect this to attract appropriate staff. In the context of the Ambulance Trust being part of the larger, well-respected ambulance service is important and makes this work attractive to potential recruits, as does the potential to move up a career ladder within this service. Thought needs to be given to the semiotics and branding of the organizations within which this type of call-handling work is located – our sense is that for most of the staff employed (at all levels) it was important to be part of the larger NHS and to be delivering health care as part of a nationally and or locally recognised organization. This aspect of

the work could be used constructively and effectively to attract the best staff.

We have suggested that call-handlers are able to use acquired expertise and discretion to make the system work on a day to day basis. Recognising the importance and value of this – whilst retaining the standardization offered by the CDSS is tricky, but balancing these features is necessary to bringing the system into use and we suggest to retaining staff.

Our study has shown that learning to use the CDSS is a continual process. Although the relatively short initial training enables call-handlers to deal with calls they become proficient through experiential learning and team knowledge sharing over time. In addition the necessary continual updates to the system (some of which respond to external changes in the clinical evidence base, legislation or service provision, and some of which arise directly from call-handler and user feedback) mean that training needs to be refreshed regularly. Comparing the new service at SPA with the other two settings it is clear that training staff who have previously used a different system to use the CDSS is more difficult than employing new staff. But this should only be a transitional problem – as we have shown training and audit can be used in a supportive way to ensure that both novice users and 'expert' users improve their practice.

Surveillance and monitoring is an integral feature of call-handling work, and likewise governance and audit are core aspects of modern health care delivery. In the context of this CDSS our analysis suggests that audit plays a role beyond monitoring. At the Ambulance Trust in particular audit has been systematically and creatively harnessed as an opportunity for workplace learning and on-going training. The way that the audit process (which is an essential part of reflexive monitoring) is handled is important, both the mode and the content. Statistical analysis and review of the outcomes of decisions made using the CDSS are an important part of the process, as is listening to calls. Both of these are undertaken. Given our findings form the ethnography we would suggest that observation of call-handling in real time would augment this process and highlight some of the reasons why some call-handlers seem more proficient. At the Ambulance Trust the audit process is visible and regular – so staff are aware of the process (which itself has become normalised as part of the work of the organization). It is important that the audit process is part of learning activity and ideally a team activity – given the importance of team knowledge sharing we have identified, rather than a punitive system. The process of retaining staff where problems are identified appears to be handled in a supportive and positive way at the Ambulance Trust and this is a model that could be adapted for other settings. However it is worth noting that survey findings indicate that that trust in the audit team is lowest in 999 who have the longest experience of using the system and of the audit process.

8.3.4 What are the implications of understanding the wider context and associated barriers/facilitators surrounding the CDSS for workforce and policy planning?

We have shown, by systematically using NPT as a framework for our analysis that the four constructs of coherence, cognitive participation, collective action and reflexive monitoring play out differently in the different settings in which we have studied the deployment of the CDSS.

Our conclusion is that the CDSS – the 'thing' that we set out to study - is not just the software: it is a computer technology *and* a set of practices related to that technology. It is this wider set of actors and artefacts (other technologies, multiple actors, wider contexts) that keep the intervention in place. For this reason we have tried to be clear from the outset of this report that the CDSS, and indeed our findings must be understood as technology in context.

The wider context(s) surrounding the particular CDSS we have examined include the wider actor-network (to borrow from other theories of science and technology) which includes the specific CDSS technology, associated technologies including ICT systems, hardware and software, the call-handlers – not just as users of the CDSS but as embodied agents, with identities and agency, and surrounding them the patients/callers, the CDSS development team, the myriad levels of managerial staff and the wider organizations they represent (primary care, ambulance trusts etc). Beyond this there is the wider policy and political context – which during the lifetime of our study saw a change in the national political administration and which has anyway been the subject of considerable reform and change – all of which impact on the CDSS and the work of emergency and urgent care services. Especially significant for our 'same technology' and 'different settings' are moves to integrate urgent and emergency care (notably the reorganization of services at OOH) and the introduction of the 111 service. Both of these externally driven changes have, as we have shown, implications for workforce in terms of numbers, training and management. Beyond these contexts we have argued there have been important discursive shifts – notably the discourses of rationing and EBM which have been crucial in ensuring that the CDSS could be brought into use. The implication of our understanding of the wider context surrounding the CDSS for workforce planning and policy is that this wider context matters. This CDSS is a rare example in a catalogue of case studies that have shown the failure to bring computer technologies into everyday use and to embed them into practice. This report details three case studies where a CDSS has been brought into use and appears to have a strong chance of normalising/embedding. But this has been achieved and will only continue to be maintained with the efforts of those involved in the specific settings and if the wider context continues to support the coherence, cognitive

participation, and reflective monitoring processes that surround this collective action.

8.4 Strengths and limitations

To our knowledge this is the first study of a single CDSS used in three different emergency and urgent health care service settings. Through detailed comparative case studies drawing on appropriate mixed methods we have explored the interplay between this technology and the health workforce in everyday practice. The study was predominantly qualitative with a significant ethnographic component and a smaller survey component. This affords rich detail but can be criticised for limited transferability. We have overcome these limitations of case study research by using a robust theory – the Normalization Process Theory – as a framework to provide a systematic analysis and enable us to draw out generalizations: we show how the four domains of the theory, alongside other social and psychological insights can be used to explain how a technology is brought into everyday use.

Nonetheless we recognise that we have studied three settings, and that two of the services studied (999 and SPA) were hosted by the same Trust. It is significant that this Trust was a pilot for using the CDSS in 999 and had some very active champions of the technology and service reconfiguration. As such this organization was a very supportive environment for the technology. That said, we have shown how each setting built coherence and mobilised participation in bringing the CDSS into use, such that it is possible to generalise mechanisms for ensuring this engagement in other settings.

The survey work was limited by the potential number of respondents available in the three settings. While we achieved a respectable response rate we do not have information about the non-responders and possible bias. This work was necessarily developmental. This is the first time that a survey of this kind has been used to study this CDSS. The survey design was informed by well-established theories and previous survey work and we have undertaken some validity and reliability testing but further work should be undertaken to develop and test the questionnaire for use elsewhere.

The key omissions from this study are an economic analysis and an evaluation of patient experiences. The first will be essential to inform roll out of this technology: while we have pointed to the impact of the technology on work and the apparent workforce expansion that follows deployment, we have not been able to examine the costs of this. While difficult to explore it would seem important to find out patients' views and experiences of contact with the CDSS. We suspect that many are unaware that they are not talking to a clinician when they phone 999 or the OOH service. We do not know how they manage the other end of the interaction

with this system, and again if it is to be rolled out, for example to support 111, this is worth investigating.

We have demonstrated how NPT can be used as an organising framework to analyse ethnographic data. This work provides a useful test and demonstration of the theory and we have attempted to draw out the implications for developing the theory in earlier chapters.

8.5 Concluding points

This research sought to inform workforce planning and policy by undertaking a detailed comparative analysis of the workforce implications of a particular technology, a computer decision support system (CDSS). We used Normalization Process Theory (NPT) to provide a systematic framework to analyse how the same technological intervention has been brought into everyday use in three different settings.

We have demonstrated how the four domains of NPT (*coherence, cognitive participation, collective action* and *reflexive monitoring*) play out differently in each setting, but to summarise, the work of bringing the CDSS into use and maintaining its everyday use (*collective action*) was enabled by a range of actors who established *coherence* for the CDSS and secured buy-in (*cognitive participation*) and engaged in on-going appraisal and adjustment (*reflexive monitoring*). This effort has been expended bring and keep the CDSS in use and continues to be required to keep it in everyday use.

The final chapter draws out the main conclusions and recommendations from this study.

9 Conclusions

9.1 The CDSS and everyday work

We have shown how the same technology is subtly different in the different settings of emergency (999) and urgent (SPA and OOH) care and requires different 'work' to bring it into everyday use. The co-location of two services (999 and SPA) in the same Trust does not diminish important differences between urgent and emergency care work, even using the same CDSS.

The CDSS must be understood both as a computer technology *and as* a set of practices related to that technology, kept in place by a network of actors in particular contexts. The CDSS changes the work that is done. It is viewed positively despite the apparent *intensification* of the work. In urgent care the work has also been *extended* and in one setting it appears more *scripted.* The CDSS creates a new work identity that needs to be recognised and supported: the call handlers are not 'call centre operatives', but health care call-handlers, and this distinction is important to them and for the work they do.

It is also important to note that this work requires some clinical expertise – the call handlers build up a repertoire of additional knowledge about lay and medical terminology, body systems and signs and symptoms to help them use the CDSS effectively. The call- handlers may also need additional clinical support – in two settings (999 and SPA) the additional need for clinical expertise to support the system has led to the introduction of additional clinical staff.

The skills and divisions of labour created and sustained by introducing the CDSS are not just those required to operate a computer system 'by rote'. The knowledge and skills required to use the CDSS include experiential and embodied expertise. This expertise is often developed by sharing knowledge in teams and thus the spatial location of the work – settings which facilitate team communication and sharing – is important. Despite its apparent highly individualised form, this is not work that could conceivably be done in isolation (for example from a worker's home).

Implementing the CDSS in different settings required considerable organizational effort and engagement by a range of key actors. While the use of the CDSS can be made mandatory for call-handlers, and this undoubtedly supports its adoption, the successful embedding of the technology in each setting requires tailored and sustained work to ensure coherence (shared meanings and understandings of the technology) and cognitive participation (enrolment).

Organizations and policy makers need to recognise the work required to bring a CDSS into everyday use and cannot assume that successful deployment in one setting will provide the blueprint for implementation elsewhere.

9.2 Education and training needs

We have shown that there are differences in workforce characteristics (e.g. age, qualifications) and in roles and organizational hierarchies in each of the three settings - despite all using the same technology to manage telephone calls. For established services (999 and OOH) some of these differences are historical and cultural, reflecting previous patterns in work and organization. However differences are also related to differences in the nature of the work and the context in which it takes place. This needs to be recognised if workers are to be adequately prepared and supported in their roles. It is worth noting the range of skills that call-handlers have prior to joining the different settings, and to recognise that some staff have higher qualifications or competencies than anticipated at recruitment. This is likely to have implications both for initial training and for career aspirations and staff retention which may be addressed by offering training and providing opportunities for advancement

While there is a common training programme for using the CDSS, training practice varies across the three settings. Given the differences in the work and settings, training needs to be tailored to the specific contexts of urgent or emergency work and the organizational environment where the CDSS is deployed – there cannot be a 'one size fits all' training model. In addition because the technology is never 'fixed' continual further training is required as the system is adapted and upgraded (e.g. where the CDSS is augmented with new clinical knowledge or the algorithms change in response to new standards or policies).

We have demonstrated that everyday use of the CDSS requires embodied and experiential knowledge, including some clinical knowledge, as well as that embedded in the CDSS. This is vital to the interpretive flexibility necessary to enable these workers to bring the technology into everyday use, and this should be recognised and supported in training. Moreover we have shown that this expertise is partially developed through sharing knowledge in teams such that the use of peer support as a mechanism for learning, and for checking knowledge, could be enhanced by formal recognition.

We have indicated that a supportive model of audit and feedback can function as an effective learning activity to support the use of the CDSS. As well as providing necessary formal monitoring and surveillance audit can be used creatively to ensure coherence and participation and as the basis for

continuous learning. Organizations should be encouraged to use audit in a supportive rather than punitive manner.

Organizations deciding to deploy the CDSS need to recognise the significant investment in training and monitoring required to bring and keep this technology in use.

9.3 Workforce reconfiguration

The introduction of the CDSS offers significant opportunities for workforce reconfiguration. However, we have shown that this is not a question of simple labour substitution which leaves other aspects of organizational structures and workforce management untouched. The opportunities for workforce reconfiguration do not derive from a finished software product but from an ensemble of practices that require considerable work to bring the technology into sustained use.

Our findings show that embedding this particular technology in everyday use has resulted in workforce expansion. The settings studied required more staff, both those devoted to call-handling, but also a range of new staff to support this work, this included those involved in training and audit functions, but also -in two settings- the introduction of a new additional role of clinical supervisor. In our case studies the introduction of the CDSS was not as simple as installing some software and employing clerical workers. The apparent advantages of having a 'cheaper' labour force to manage call-handling has to be set against these changes in workforce size and skill mix.

In terms of implementation, the opportunity costs of the considerable time and on-going effort to secure participation and staff buy-in, to and build teams and trust in the technology is not insignificant. Not all health care organizations are likely to have the resources to make the necessary level of investment in these activities to ensure success.

9.4 Summary

Our research shows that the ensemble of practices that includes and surrounds this technology – the CDSS - appears, in the language of NPT, to have a strong chance of normalising (i.e. embedding in everyday practice) in these three settings. But this has only been achieved, and will continue to be maintained, with the efforts of those involved in the specific settings and if the wider context continues to support the coherence, cognitive participation, and reflective monitoring processes that surround this collective action.

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Appendix 1

[The CDSS] Study
Wiltshire Research Ethics Committee Reference Number: 08/H0104/56

FURTHER INFORMATION FOR STAFF AT PARTICIPATING SITE ABOUT THE OBSERVATION AND INTERVIEWS

The Study
We are studying the design, development, management and use of the Computer Decision Support System (CDSS) called [name of CDSS] in three workplaces where it is used by different types of staff. We are using a case study approach which means that we will look at three settings in detail, including your workplace. We will conduct interviews with staff, observe the CDSS being used, and use questionnaires to collect information for this study.

This information sheet tells you about the observation and interview part of the study.

About the observation
For this part of the study 1–2 researchers will come to your workplace to watch how staff work and how [the CDSS] is used. We will display posters to inform you when the observation is taking place and if the researcher is observing an area where you work they will ask you for verbal consent before they begin observing. The researcher will sit or stand somewhere out of the way so that they do not interfere with your work and they will watch and take notes. If you have any questions or concerns before or during the observation period you can ask the researcher – and if you want them to stop observing or move to another location you can ask them to do so at any time. If you do not want to take part in this part of the study you can tell the researcher before or during the observation and they will not include you. The researcher will be happy to answer any questions you have about the observation or the study – please do not hesitate to ask.

About the interviews
We plan to interview some (but not all) of the staff here about [the CDSS]. We will choose staff with different jobs/roles to tell us about their experience with [the CDSS] and about their work. If we want to talk to you a member of the research team will approach you, and if you want to take part they will fix a convenient time for the interview.

The interview will take approx 40–60 minutes and will be in a private location. Before the interview starts the researcher will explain the study to you and go through a consent form with you to make sure you are happy to take part. The interview will be very informal, like a conversation, and if you take part in this aspect of the study we will ask you about what you do and how [the CDSS] is used. We will not be asking anything about individual patients or patient records. With your permission we will record the interview. You can ask questions during the interview and the researcher will be happy to tell you more about the study. You can decide not to take part in the interviews and can tell the researcher if you decide during the interview that you do not want to continue the interview.

Do I have to take part?
No. It is up to you to decide whether or not to take part.

Confidentiality
All of the data we collect will be kept strictly confidential. Interview recordings, and typed up transcripts of the interviews and observation notes will only be accessed by the study team and will be kept in password protected computer files and/or a locked cabinet. All personal details and information that can identify individuals will be removed from the data when it is being analysed and reported. The study will be carried out in full compliance with all relevant guidance from the NHS ethics committee, NHS research governance and Data Protection legislation.

What are the possible problems and disadvantages of taking part?
We do not anticipate any problems arising from participation in this study. We will not ask you to change anything about the way you work and you do not have to take part if you do not want to.

What are the possible benefits of taking part?
There are unlikely to be direct personal benefits to you from this study. Some people enjoy participating in this kind of research and welcome the opportunity to talk about their work. We will feed back our findings to you, and keep you regularly updated about the study and we hope that you will find this interesting.

Who is funding and organising the research?
The research is a collaboration between the Universities of Southampton, Newcastle and Bristol and the national Workforce Review Team. It is funded by the National Institute of Health Research Service Delivery and Organisation Programme but the research team is independent – we do not work for [the CDSS] or for the Trust you work for.

What will happen to the results of the research study?
The results of this study will be written up for a report to the funders and for the ethics committee, and for publications that will be read by health professionals and health service managers and other researchers. We will be happy to send you a free copy of the research report if you tell us you would like one.

Who has reviewed the study?
The study has been reviewed by the Department of Health, the Wiltshire Research Ethics Committee, and your local Trust in accordance with the Research Governance framework.

Who can I contact if I have a concern or complaint about this study?
You can contact the project leader, Catherine Pope (details below) if you have any concerns about this study or a complaint. If you would prefer to contact someone independent from the research team you can contact: Research Governance, Corporate Services, Building 37, Level 4, Room 4001, University of Southampton, Highfield Campus, Southampton, SO17 1BJ, tel: 023 8059 5058 or email rgoinfo@soton.ac.uk

Contact details:
If you have any questions about the study please contact the project leader, Catherine Pope on 023 80 59 8293 or cjp@soton.ac.uk School of Health Sciences, University of Southampton, Highfield Campus, Southampton, SO17 1BJ.

Appendix 2

UNIVERSITY OF
Southampton
School of Health Sciences

[The CDSS] Study

Wiltshire Research Ethics Committee Reference Number: 08/H0104/56

FURTHER INFORMATION FOR STAKEHOLDERS

The Study
We are studying the design, development, management and use of the Computer Decision Support System (CDSS) called [name of CDSS] in three workplaces where it is used by different types of staff. We are using a case study approach which means that we will look at three settings in detail, including [NAME OF SITE]. We will conduct interviews with staff, observe the CDSS being used, and use questionnaires to collect information for this study. We would also like to interview a range of stakeholders to explore their experience and views of [name of CDSS] and CDSS more generally.

This information sheet tells you about the stakeholder interview part of the study.

About the stakeholder interviews
We will interview various stakeholders associated with the participating site. This will include managers, policy makers, technical and support staff who have contact with or responsibility for this site or knowledge of CDSS and/or [name of CDSS] If we want to talk to you a member of the research team will approach you, and if you want to take part they will fix a convenient time for the interview.

The interview will take approx 40–60 minutes and will be in a private location. Before the interview starts the researcher will explain the study to you and go through a consent form with you to make sure you are happy to take part. In order to ascertain how experience and views of [name of CDSS] and CDSS more generally change over the course of the study we may approach certain individuals in order to conduct follow-up interviews. As a result, part six of the consent form asks for your consent, in principle, to being contacted at a later date by a member of the research team.

The interview will be very informal, like a conversation. We will not be asking anything about individual patients or patient records. With your permission we will record the interview. You can ask questions during the interview and the researcher will be happy to tell you more about the study. You can decide not to take part in the interviews and can tell the researcher if you decide during the interview that you do not want to continue the interview. We may

invite certain interviewees to take part in a follow–up interview at later point during the course of the study.

Do I have to take part?
No. It is up to you to decide whether or not to take part.

Confidentiality
All of the data we collect will be kept strictly confidential. Interview recordings, and typed up transcripts of the interviews will only be accessed by the study team and will be kept in password protected computer files and/or a secure cabinet in a locked and security card accessed building. All personal details and information that can identify individuals will be removed from the data when it is being analysed and reported. The study will be carried out in full compliance with all relevant guidance from the NHS ethics committee, NHS research governance and Data Protection legislation.

What are the possible problems and disadvantages of taking part?
We do not anticipate any problems arising from participation in this study. We will not ask you to change anything you do and do not have to take part if you do not want to.

What are the possible benefits of taking part?
There are unlikely to be direct personal benefits to you from this study but the results of this work may be useful to your organisation and the wider NHS. Some people enjoy participating in this kind of research. We will feed back our findings to you, and keep you regularly updated about the study and we hope that you will find this interesting.

Who is funding and organising the research?
The research is a collaboration between the Universities of Southampton, Newcastle and Bristol and the national Workforce Review Team. It is funded by the National Institute of Health Research Service Delivery and Organisation Programme but the research team is independent – we do not work for [CDSS developers] or for the Trust /organisation you work for.

What will happen to the results of the research study?
The results of this study will be written up for a report to the funders and for the ethics committee, and for publications that will be read by health professionals and health service managers and other researchers. We will be happy to send you a free copy of the research report if you tell us you would like one.

Who has reviewed the study?
The study has been reviewed by the Department of Health, the Wiltshire Research Ethics Committee, and your local Trust in accordance with the Research Governance framework.

Who can I contact if I have a concern or complaint about this study?
You can contact the project leader, Catherine Pope (details below) if you have any concerns about this study or a complaint. If you would prefer to contact someone independent from the research team you can contact: Research Governance, Corporate Services, Building 37,

Level 4, Room 4001, University of Southampton, Highfield Campus, Southampton, SO17 1BJ, tel: 023 8059 5058 or email rgoinfo@soton.ac.uk.

Contact details:
If you have any questions about the study please contact the project leader, Catherine Pope on 023 80 59 8293 or cjp@soton.ac.uk School of Health Sciences, University of Southampton, Highfield Campus, Southampton, SO17 1BJ.

National Institute for Health Research (NHS)

Appendix 3

UNIVERSITY OF Southampton
School of Health Sciences

[The CDSS]

Wiltshire Research Ethics Committee Reference Number: 08/H0104/56

Site Number: **Participant Number:**

STAFF CONSENT FORM

Please initial box

1. I confirm that I have read and understood the **Participant Information Sheet "[CDSS] Study_Further_information_for_staff" v1.0 Dated 170708** for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason.

3. I agree that the interview will be tape-recorded

4. I understand that anonymous quotations from this interview may be used in reports, papers and presentations arising from this study

5. I agree to take part in the above study

6. I agree to be approached at a later date to take part in a follow-up interview

_____   _____   _____

            Name of Participant   Date   Signature

_____   _____   _____

            Name of Researcher   Date   Signature

We will send you a photocopy of this form to keep.If you have any questions about the study please contact the project leader, Catherine Pope on 023 80 59 8293 or *cjp@soton.ac.uk*

When completed: 1 for participant, 1 for researcher

Appendix 4

UNIVERSITY OF
Southampton
School of Health Sciences

[The CDSS]

Wiltshire Research Ethics Committee Reference Number: 08/H0104/56

Site Number: **Participant Number:**

STAKEHOLDER CONSENT FORM

Please initial box

1. I confirm that I have read and understood the **Participant Information Sheet "[CDSS] Study_Further_information_for_stakeholders" v1.0 Dated 170708** for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free

3. to withdraw at any time, without giving any reason.

4. I agree that the interview will be tape-recorded

5. I understand that anonymous quotations from this interview may be used in reports, papers and presentations arising from this study

6. I agree to take part in the above study

7. I agree to be approached at a later date to take part in a follow-up interview

_____   _____   _____

Name of Participant   Date   Signature

_____   _____   _____

Name of Researcher   Date   Signature

We will send you a photocopy of this form to keep. If you have any questions about the study please contact the project leader, Catherine Pope on 023 80 59 8293 or *cjp@soton.ac.uk*

When completed: 1 for participant, 1 for researcher

Appendix 5

[The CDSS] Study
Wiltshire Research Ethics Committee Reference Number: 08/H0104/56

INTERVIEW TOPIC GUIDE FOR STAFF

Introduction
• Check participant has received and read project information. Recap, answer questions as necessary.
• Review the study and clarify that their identity will remain anonymous throughout the research.
• Talk through consent form, and gain permission to tape record. Ask participant to sign the consent form.

Background
• How many years have they been working at [site]? Ask them to briefly describe previous jobs and experience with CDSS generally.
• What are the main day to day tasks associated with their job? Has their job changed over the time they have worked here?

CDSS /Pathways
• How long have they been working with [name of CDSS]? Have they worked with other CDSS?
• Ask interviewee to talk through how they use [name of CDSS] – How does it work? Any problems/workarounds? What do they like/dislike about this CDSS? How has [name of CDSS] impacted on their job/workload/management and organisation of the service?
• Do staff have opportunities to contribute to any discussions or changes related to [name of CDSS]?
• Ask to describe team working and sharing knowledge about how [name of CDSS] works. How are tasks divided between staff?
• Explore confidence and trust in CDSS/[name of CDSS].

Training
• Ask briefly about formal education/qualifications and skills prior to this job, and all training related to [name of CDSS]. Explore any training gaps identified by interviewee.

Rounding Up
• Thank interviewee for their time
• Would they like a copy of the interview transcript
• Make sure they have researchers contact details

Appendix 6

UNIVERSITY OF Southampton
School of Health Sciences

[The CDSS] Study
Ethics Committee Reference Number: 08/H0104/56

INTERVIEW TOPIC GUIDE – STAKEHOLDERS

Introduction
• Review the study and clarify that their identity will remain anonymous throughout the research.
• Check consent form and confirm they are happy for the interview to be taped

Background
• Establish nature of relationship to [site]. Ask them to briefly describe their role and responsibilities.
• Explore experience with CDSS.

CDSS /Pathways
• Experience of [name of CDSS]? How does it compare with other CDSS or systems they are aware of?
• Awareness of how it works and any problems. What are the barriers and facilitators associated with CDSS/[name of CDSS]? What is the impact of CDSS/[name of CDSS] on service/ organisation/ workload/ management and wider policy around the service?
• Explore role in decision to adopt [name of CDSS] and opportunities to contribute to development or modification of [name of CDSS]?
• Explore confidence and trust in CDSS/[name of CDSS].
• Explore political, sectoral and organizational context and implications for workforce and policy planning/management.

Training
• Ask about own training related to [name of CDSS].
• Explore skills, competencies, entry/retention, education and training issues related to [name of CDSS]?

Rounding Up
• Thank interviewee for their time
• Would they like a copy of the interview transcript
• Make sure they have researchers contact details

Appendix 7

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A study of [CDSS]
Questionnaire of skills and experiences of [the CDSS]

This questionnaire asks you about your views and experiences of using [the CDSS] at [OOH] and about what you think are the skills needed to do your job.

All information you give will be treated confidentially and will only be seen by the researchers. Your individual responses will not be seen, or be given to [OOH].

Please read the enclosed leaflet which explains the purposes of the research, your rights and how we will keep your responses confidential.

It is up to you to decide whether or not to take part.

Instructions For Completing the Questionnaire

Please take your time and answer the questions as accurately as possible. This questionnaire should take you less than 25 minutes to complete. When you have completed the questionnaire, please put your questionnaire form in the envelope provided. The questionnaire can either be:

1. posted directly to Joanne Turnbull, in the FREEPOST envelope provided (School of Health Sciences, Building 67, University of Southampton, Highfield, Southampton, SO17 1BJ)

    or

2. placed and sealed in the envelope and handed to your manager for a member of the research team to collect

Thank you for time and co-operation.

Site code ☐☐☐   Respondent ID ☐☐☐

Some questions about you

1. Are you…

Male ☐ 1   Female ☐ 2

2. What is your age?

16-19 ☐ 1   20-24 ☐ 2   25-34 ☐ 3

35-44 ☐ 4   45-54 ☐ 5   55+ ☐ 6

3. What is your <u>highest level</u> of qualification? *(Please tick one box)*

No formal qualifications	☐ 1	NVQ Levels 4-5, HNC, HND	☐ 7
1+ O levels /CSEs /GCSEs (any grades)	☐ 2	Other (e.g. City & Guilds, RSA/OCR, BTEC / Edexcel)	☐ 8
5+ O levels, 5+ CSEs (grade 1), 5+ GCSEs (grades A-C), School Certificate	☐ 3	1+ A levels / AS levels	☐ 9
NVQ Level 1, Foundation GVNQ	☐ 4	2+ A levels, 4+ AS levels, Higher School Certificate	☐ 10
NVQ Level 2, Intermediate GVNQ	☐ 5	First Degree (e.g. BA, BSc)	☐ 11
NVQ Level 3, Advanced GVNQ	☐ 1	Higher Degree (e.g. MA, PhD, PCGE, post-graduate certificate diplomas)	☐ 12

4. How long have you been <u>using [the CDSS]</u>?

Less than 6 months ☐ 1   6-12 months ☐ 2   1 - 2 years ☐ 3

3+ years ☐ 4

5a. Do you work full time or part time?

Full time ☐ 1   Part time ☐ 2

5b. <u>If you work part time</u>, how many hours in an average week do you work?

☐ hours

Previous work experience and training

6. In any of your previous jobs have you done *telephone-based or call centre work*?

Yes (*Please describe below*) ☐ 1   No ☐2

7. In any of your previous jobs, have you done *face-to-face customer service or care work?*

Yes (*Please describe below*) ☐1   No ☐2

8. In any of your previous jobs have you worked in the field of health and social care?

Yes (*Please describe below*) ☐1   No ☐2

9. Are you currently undertaking or have you completed / qualified in any of the following training? *(Tick all that apply)*

	Currently training	Completed / Qualified	Planning or considering training
Paramedic training	☐1	☐1	☐1
Ambulance Technician	☐1	☐1	☐1
Emergency Care Assistant	☐1	☐1	☐1
First aid training	☐1	☐1	☐1
St John ambulance training	☐1	☐1	☐1
Health-related course (e.g. nursing, medicine). *Please describe below*	☐1	☐1	☐1
Other clinical training. *Please describe below*	☐1	☐1	☐1

10a. Did you receive any clinical training as part of your call-handling training at [OOH]?

Yes (*Please describe below*) ☐1   No ☐2

10b. If you have answered "Yes" to question 10a above, how useful would you rate this medical training in using [the CDSS]? *Please give a score by circling a number between 1 and 10 where 1 is not at all useful and 10 is very useful*

Not at all									**Very useful**
1	2	3	4	5	6	7	8	9	10

11. Prior to starting your job at [OOH], did you have previous experience of using the following (either in a previous job or using a computer at home)? *(Tick all that apply)*

a computer mouse ☐1   keyboard /typewriter ☐1

Microsoft Windows ☐1   E-mail ☐1

Internet ☐1   Word processing (e.g. Word) ☐1

Spreadsheets (e.g. Excel) ☐1   Databases (e.g. Access) ☐1

Other Computer system in a previous job or at home (*please describe below*) ☐1

12. How would you rate your current level of the computer skills needed to do your job? *Please give a score by circling a number between 1 and 10 (where 1 is very poor and 10 is very good)*

Very poor									**Very good**
1	2	3	4	5	6	7	8	9	10

Your skills: using [the CDSS]

13. In using [the CDSS], <u>please rate your level of ability</u> for each of the following skills:
(*circle a number between 1 and 10 where 1 is very poor and 10 is very good*)

	Very Poor									Very Good
Controlling the call according to clinical urgency, caller's needs and service demands	1	2	3	4	5	6	7	8	9	10
Multi-tasking in order to maintain call flow	1	2	3	4	5	6	7	8	9	10
Probing for further information	1	2	3	4	5	6	7	8	9	10
Rephrasing questions when necessary whilst retaining the clinical essence	1	2	3	4	5	6	7	8	9	10
Using leading questions to elicit answers	1	2	3	4	5	6	7	8	9	10
Picking up on and recognising relevant non-verbal cues or background noise	1	2	3	4	5	6	7	8	9	10
Recalling information given by the caller	1	2	3	4	5	6	7	8	9	10
Providing clear, accurate, clinically sound and concise information from [the CDSS]	1	2	3	4	5	6	7	8	9	10
Using informal knowledge from, e.g. friends, family, colleagues, to help callers	1	2	3	4	5	6	7	8	9	10
Addressing callers in a professional, respectful and sensitive manner	1	2	3	4	5	6	7	8	9	10
Adapting approach according to the needs of the situation	1	2	3	4	5	6	7	8	9	10
Establishing a rapport with caller	1	2	3	4	5	6	7	8	9	10
Conveying empathy appropriately	1	2	3	4	5	6	7	8	9	10
Negotiating effectively	1	2	3	4	5	6	7	8	9	10
Converting information provided by the caller back into the system	1	2	3	4	5	6	7	8	9	10
Managing your own emotional feelings about a call	1	2	3	4	5	6	7	8	9	10
Allowing the system to drive the assessment	1	2	3	4	5	6	7	8	9	10
Judging when it is necessary to override the system	1	2	3	4	5	6	7	8	9	10
Taking appropriate route through the system	1	2	3	4	5	6	7	8	9	10

Effectively predicting the likely outcome of the call	1	2	3	4	5	6	7	8	9	10
Using own knowledge to operate ahead of [the CDSS]	1	2	3	4	5	6	7	8	9	10

	Very Poor									Very Good
Documenting call details clearly, accurately, and concisely	1	2	3	4	5	6	7	8	9	10
Working as part of a team	1	2	3	4	5	6	7	8	9	10
Supporting other call-handlers to perform their role	1	2	3	4	5	6	7	8	9	10
Sharing knowledge gained from own experience with other call-handlers	1	2	3	4	5	6	7	8	9	10
Seeking support when unsure about a call	1	2	3	4	5	6	7	8	9	10
Accepting and responding to feedback about performance	1	2	3	4	5	6	7	8	9	10

The importance of skills for using [the CDSS]

14. Following on from the previous section where you rated your skills in using [the CDSS] now think about <u>how important</u> those skills are to do your job. Please rate <u>how important you think</u> each of the following skills are: (*circle a number between 1 and 10 where 1 is not very important and 10 is very important*)

	Not very important									Very important
Controlling the call according to clinical urgency, caller's needs and service demands	1	2	3	4	5	6	7	8	9	10
Multi-tasking in order to maintain call flow	1	2	3	4	5	6	7	8	9	10
Probing for further information	1	2	3	4	5	6	7	8	9	10
Rephrasing questions when necessary whilst retaining the clinical essence	1	2	3	4	5	6	7	8	9	10
Using leading questions to elicit answers	1	2	3	4	5	6	7	8	9	10
Picking up on and recognising relevant non-verbal cues or background noise	1	2	3	4	5	6	7	8	9	10
Recalling information given by the caller	1	2	3	4	5	6	7	8	9	10
Providing clear, accurate, clinically sound and concise information from [the CDSS]	1	2	3	4	5	6	7	8	9	10
Using informal knowledge from, e.g. friends, family, colleagues, to help callers	1	2	3	4	5	6	7	8	9	10
Addressing callers in a professional, respectful and sensitive manner	1	2	3	4	5	6	7	8	9	10

	Not very important								Very important	
Adapting approach according to the needs of the situation	1	2	3	4	5	6	7	8	9	10
Establishing a rapport with caller	1	2	3	4	5	6	7	8	9	10
Conveying empathy appropriately	1	2	3	4	5	6	7	8	9	10
Negotiating effectively	1	2	3	4	5	6	7	8	9	10
Converting information provided by the caller back into the system	1	2	3	4	5	6	7	8	9	10
Managing your own emotional feelings about a call	1	2	3	4	5	6	7	8	9	10
Allowing the system to drive the assessment	1	2	3	4	5	6	7	8	9	10
Judging when it is necessary to override the system	1	2	3	4	5	6	7	8	9	10
Taking appropriate route through the system	1	2	3	4	5	6	7	8	9	10
Effectively predicting the likely outcome of the call	1	2	3	4	5	6	7	8	9	10
Using own knowledge to operate ahead of [the CDSS]	1	2	3	4	5	6	7	8	9	10
Documenting call details clearly, accurately, and concisely	1	2	3	4	5	6	7	8	9	10
Working as part of a team	1	2	3	4	5	6	7	8	9	10
Supporting other call-handlers to perform their role	1	2	3	4	5	6	7	8	9	10
Sharing knowledge gained from own experience with other call-handlers	1	2	3	4	5	6	7	8	9	10
Seeking support when unsure about a call	1	2	3	4	5	6	7	8	9	10
Accepting and responding to feedback about performance	1	2	3	4	5	6	7	8	9	10

15. Which skills <u>do you think are the most important</u> to do your job? *Skills may be taken from the list above or may include others that you think are important which we have not already asked you about. Please write down the skills in order of importance*

1.

2.

3.

4.

5.

16. Which statement(s) describes how you see your current role? *Tick all that apply*

As a long term job or career	☐1	As a short-term job	☐1
It fits around study commitments	☐1	It fits around childcare commitments	☐1
Gaining experience for another job *(describe below*	☐1	Other *(please describe below)*	☐1

Some questions on your thoughts and feelings about [the CDSS]

17. The following statements relate to your perception of trust in [the CDSS] system *Please rate how you feel about the system by circling a number for each statement where 1 is Strongly disagree and 5 is Strongly Agree)*

	Strongly Disagree	Disagree	Not agree or disagree	Agree	Strongly Agree
[the CDSS] uses its expertise to arrive at a safe call disposition	1	2	3	4	5
[the CDSS] will reach a call disposition that provides care appropriate to the patients needs	1	2	3	4	5
[the CDSS] leads to poor decisions about call dispositions	1	2	3	4	5
[the CDSS] is effective in handling *emergency* care calls	1	2	3	4	5
[the CDSS] is effective in handling *out-of-hours* calls	1	2	3	4	5
[the CDSS] reaches unpredictable decisions	1	2	3	4	5
I understand how [the CDSS] works	1	2	3	4	5
I feel I can depend on [the CDSS] to deal with a wide range of call scenarios	1	2	3	4	5
[the CDSS] is dependable in handling the most common types of calls effectively	1	2	3	4	5
I have faith in [the CDSS] to handle calls	1	2	3	4	5
[the CDSS] is competent at doing what it is designed to do relative to others methods I can think of	1	2	3	4	5
[the CDSS] is less reliable at handling calls than other methods I can think of	1	2	3	4	5
[the CDSS] behaves more predictably than other methods I can think of	1	2	3	4	5
I have as much faith in [the CDSS] to handle calls as other methods I can think of	1	2	3	4	5
[the CDSS] has a reputation for being trustworthy	1	2	3	4	5
Outcomes from [the CDSS] are not always in the best interests of the public	1	2	3	4	5
I believe that [the CDSS] is used in the best interests of [OOH]	1	2	3	4	5
I believe that [the CDSS] is used by [OOH] to support me in doing my job	1	2	3	4	5
[the CDSS] operates using decision making principles that I sometimes find morally unacceptable	1	2	3	4	5

I believe that [the CDSS] operates in ways consistent with my expectations	1	2	3	4	5
Overall I trust in [the CDSS]	1	2	3	4	5

Some questions about your work environment

18. The following statements relate to your views of, and trust in, other staff and the organisation you work for ([OOH]). *Please rate how you feel by a number for each statement where 1 is Strongly Disagree and 5 is Strongly Agree*

	Strongly Disagree	Disagree	Not agree or disagree	Agree	Strongly Agree
Audit team					
The audit team is good at its job	1	2	3	4	5
I feel that support from the audit team is poor	1	2	3	4	5
I feel that the audit team are fair in their dealings with me	1	2	3	4	5
feel that the audit team is inconsistent in their dealings with me	1	2	3	4	5
I trust the audit team	1	2	3	4	5
Your organisation – [OOH]					
[OOH] is good at performing its job	1	2	3	4	5
I feel that support from [OOH] is poor	1	2	3	4	5
I feel that [OOH] is fair in its dealings with me	1	2	3	4	5
I trust [OOH]	1	2	3	4	5
The [the CDSS] team					
The [the CDSS] team is good at its job	1	2	3	4	5
I feel that support from the [the CDSS] team is poor	1	2	3	4	5
I feel that the [the CDSS] team are fair in their dealings with me	1	2	3	4	5
I trust the [the CDSS] team	1	2	3	4	5
Using [the CDSS]					
I trust other call-handlers to support me in my job	1	2	3	4	5
I trust callers to tell the truth during calls	1	2	3	4	5
I am confident in my ability to use [the CDSS] correctly	1	2	3	4	5
I am confident I know how to overcome any limitations of [the CDSS]	1	2	3	4	5

Please return your completed questionnaire either by posting directly to Jo Turnbull using the prepaid envelope provided, or by placing the questionnaire in the sealed envelope and handing to your manager.

Thank you very much for completing this questionnaire. We greatly value both your responses and the time you have taken to give them.

Appendix 8

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A study of [CDSS]
Questionnaire of skills and experiences of [the CDSS]

This questionnaire asks you about your views and experiences of using [the CDSS] at [OOH] and about what you think are the skills needed to do your job.
All information you give will be treated confidentially and will only be seen by the researchers. Your individual responses will not be seen, or be given to, [OOH].

Please read the enclosed leaflet which explains the purposes of the research, your rights and how we will keep your responses confidential.

It is up to you to decide whether or not to take part.

Instructions For Completing the Questionnaire

Please take your time and answer the questions as accurately as possible. This questionnaire should take you less than 25 minutes to complete. When you have completed the questionnaire, please put your questionnaire form in the envelope provided. The questionnaire can either be:

1. posted directly to Joanne Turnbull, in the FREEPOST envelope provided (School of Health Sciences, Building 67, University of Southampton, Highfield, Southampton, SO17 1BJ)
      or
2. placed and sealed in the envelope and handed to your manager for a member of the research team to collect

Thank you for time and co-operation.

Site code ☐☐☐   Respondent ID ☐☐☐

Some questions about you

1. Are you…

Male ☐ 1   Female ☐ 2

2. What is your age?

16-19 ☐ 1   20-24 ☐ 2   25-34 ☐ 3

35-44 ☐ 4   45-54 ☐ 5   55+ ☐ 6

3. What is your highest level of qualification? *(Please tick one box)*

No formal qualifications	☐ 1	NVQ Levels 4-5, HNC, HND	☐ 7
1+ O levels /CSEs /GCSEs (any grades)	☐ 2	Other (e.g. City & Guilds, RSA/OCR, BTEC / Edexcel)	☐ 8
5+ O levels, 5+ CSEs (grade 1), 5+ GCSEs (grades A-C), School Certificate	☐ 3	1+ A levels / AS levels	☐ 9
NVQ Level 1, Foundation GVNQ	☐ 4	2+ A levels, 4+ AS levels, Higher School Certificate	☐ 10
NVQ Level 2, Intermediate GVNQ	☐ 5	First Degree (e.g. BA, BSc)	☐ 11
NVQ Level 3, Advanced GVNQ	☐ 1	Higher Degree (e.g. MA, PhD, PCGE, post-graduate certificate diplomas)	☐ 12

4. How long have you been using [the CDSS]?

Less than 6 months ☐ 1   6-12 months ☐ 2   1 - 2 years ☐ 3

3+ years ☐ 4

5a. Do you work full time or part time?

Full time ☐ 1   Part time ☐ 2

5b. If you work part time, how many hours in an average week do you work?

Project 08/1819/217		hours

Previous work experience and training

6. In any of your previous jobs have you done *telephone-based or call centre work*?

Yes (*Please describe below)* ☐ 1   No ☐2

7. In any of your previous jobs, have you done *face-to-face customer service or care work?*

Yes (*Please describe below)* ☐1   No ☐2

8. In any of your previous jobs have you worked in the field of health and social care?

Yes (*Please describe below)* ☐1   No ☐2

9. Are you currently undertaking or have you completed / qualified in any of the following training? *(Tick all that apply)*

	Currently training	Completed / Qualified	Planning or considering training
Paramedic training	☐1	☐1	☐1
Ambulance Technician	☐1	☐1	☐1
Emergency Care Assistant	☐1	☐1	☐1
First aid training	☐1	☐1	☐1
St John ambulance training	☐1	☐1	☐1
Health-related course (e.g. nursing, medicine). *Please describe below*	☐1	☐1	☐1
Other clinical training. *Please describe below*	☐1	☐1	☐1

> (empty box)

10a. Did you receive any clinical training as part of your call-handling training at [OOH]?

Yes (*Please describe below*) □1   No □2

> (empty box)

10b. If you have answered "Yes" to question 10a above, how useful would you rate this medical training in using [the CDSS]? *Please give a score by circling a number between 1 and 10 where 1 is not at all useful and 10 is very useful*

Not at all									**Very useful**
1	2	3	4	5	6	7	8	9	10

11. Prior to starting your job at [OOH], did you have previous experience of using the following (either in a previous job or using a computer at home)? *(Tick all that apply)*

a computer mouse □1   keyboard /typewriter □1

Microsoft Windows □1   E-mail □1

Internet □1   Word processing (e.g. Word) □1

Spreadsheets (e.g. Excel) □1   Databases (e.g. Access) □1

Other Computer system in a previous job or at home (*please describe below*) □1

> (empty box)

12. How would you rate your current level of the computer skills needed to do your job? *Please give a score by circling a number between 1 and 10 (where 1 is very poor and 10 is very good)*

Very poor									**Very good**
1	2	3	4	5	6	7	8	9	10

Your skills: using [the CDSS]

13. In using [the CDSS], <u>please rate your level of ability</u> for each of the following skills:
(*circle a number between 1 and 10 where 1 is very poor and 10 is very good*)

	Very Poor									Very Good
Controlling the call according to clinical urgency, caller's needs and service demands	1	2	3	4	5	6	7	8	9	10
Multi-tasking in order to maintain call flow	1	2	3	4	5	6	7	8	9	10
Probing for further information	1	2	3	4	5	6	7	8	9	10
Rephrasing questions when necessary whilst retaining the clinical essence	1	2	3	4	5	6	7	8	9	10
Using leading questions to elicit answers	1	2	3	4	5	6	7	8	9	10
Picking up on and recognising relevant non-verbal cues or background noise	1	2	3	4	5	6	7	8	9	10
Recalling information given by the caller	1	2	3	4	5	6	7	8	9	10
Providing clear, accurate, clinically sound and concise information from [the CDSS]	1	2	3	4	5	6	7	8	9	10
Using informal knowledge from, e.g. friends, family, colleagues, to help callers	1	2	3	4	5	6	7	8	9	10
Addressing callers in a professional, respectful and sensitive manner	1	2	3	4	5	6	7	8	9	10
Adapting approach according to the needs of the situation	1	2	3	4	5	6	7	8	9	10
Establishing a rapport with caller	1	2	3	4	5	6	7	8	9	10
Conveying empathy appropriately	1	2	3	4	5	6	7	8	9	10
Negotiating effectively	1	2	3	4	5	6	7	8	9	10
Converting information provided by the caller back into the system	1	2	3	4	5	6	7	8	9	10
Managing your own emotional feelings about a call	1	2	3	4	5	6	7	8	9	10
Allowing the system to drive the assessment	1	2	3	4	5	6	7	8	9	10
Judging when it is necessary to override the system	1	2	3	4	5	6	7	8	9	10
Taking appropriate route through the system	1	2	3	4	5	6	7	8	9	10

Effectively predicting the likely outcome of the call	1	2	3	4	5	6	7	8	9	10
Using own knowledge to operate ahead of [the CDSS]	1	2	3	4	5	6	7	8	9	10

	Very Poor									Very Good
Documenting call details clearly, accurately, and concisely	1	2	3	4	5	6	7	8	9	10
Working as part of a team	1	2	3	4	5	6	7	8	9	10
Supporting other call-handlers to perform their role	1	2	3	4	5	6	7	8	9	10
Sharing knowledge gained from own experience with other call-handlers	1	2	3	4	5	6	7	8	9	10
Seeking support when unsure about a call	1	2	3	4	5	6	7	8	9	10
Accepting and responding to feedback about performance	1	2	3	4	5	6	7	8	9	10

The importance of skills for using [the CDSS]

14. Following on from the previous section where you rated your skills in using [the CDSS] now think about how important those skills are to do your job. Please rate how important you think each of the following skills are: (*circle a number between 1 and 10 where 1 is not very important and 10 is very important*)

	Not very important									Very important
Controlling the call according to clinical urgency, caller's needs and service demands	1	2	3	4	5	6	7	8	9	10
Multi-tasking in order to maintain call flow	1	2	3	4	5	6	7	8	9	10
Probing for further information	1	2	3	4	5	6	7	8	9	10
Rephrasing questions when necessary whilst retaining the clinical essence	1	2	3	4	5	6	7	8	9	10
Using leading questions to elicit answers	1	2	3	4	5	6	7	8	9	10
Picking up on and recognising relevant non-verbal cues or background noise	1	2	3	4	5	6	7	8	9	10
Recalling information given by the caller	1	2	3	4	5	6	7	8	9	10
Providing clear, accurate, clinically sound and concise information from [the CDSS]	1	2	3	4	5	6	7	8	9	10
Using informal knowledge from, e.g. friends, family, colleagues, to help callers	1	2	3	4	5	6	7	8	9	10
Addressing callers in a professional, respectful and sensitive manner	1	2	3	4	5	6	7	8	9	10

	Not very important								Very important	
Adapting approach according to the needs of the situation	1	2	3	4	5	6	7	8	9	10
Establishing a rapport with caller	1	2	3	4	5	6	7	8	9	10
Conveying empathy appropriately	1	2	3	4	5	6	7	8	9	10
Negotiating effectively	1	2	3	4	5	6	7	8	9	10
Converting information provided by the caller back into the system	1	2	3	4	5	6	7	8	9	10
Managing your own emotional feelings about a call	1	2	3	4	5	6	7	8	9	10
Allowing the system to drive the assessment	1	2	3	4	5	6	7	8	9	10
Judging when it is necessary to override the system	1	2	3	4	5	6	7	8	9	10
Taking appropriate route through the system	1	2	3	4	5	6	7	8	9	10
Effectively predicting the likely outcome of the call	1	2	3	4	5	6	7	8	9	10
Using own knowledge to operate ahead of [the CDSS]	1	2	3	4	5	6	7	8	9	10
Documenting call details clearly, accurately, and concisely	1	2	3	4	5	6	7	8	9	10
Working as part of a team	1	2	3	4	5	6	7	8	9	10
Supporting other call-handlers to perform their role	1	2	3	4	5	6	7	8	9	10
Sharing knowledge gained from own experience with other call-handlers	1	2	3	4	5	6	7	8	9	10
Seeking support when unsure about a call	1	2	3	4	5	6	7	8	9	10
Accepting and responding to feedback about performance	1	2	3	4	5	6	7	8	9	10

15. Which skills <u>do you think are the most important</u> to do your job? *Skills may be taken from the list above or may include others that you think are important which we have not already asked you about. Please write down the skills in order of importance*

1.

2.

3.

4.

5.

16. Which statement(s) describes how you see your current role? *Tick all that apply*

As a long term job or career	☐1	As a short-term job	☐1
It fits around study commitments	☐1	It fits around childcare commitments	☐1
Gaining experience for another job *(describe below*	☐1	Other *(please describe below)*	☐1

Some questions on your thoughts and feelings about [the CDSS]

17. The following statements relate to your perception of trust in [the CDSS] system *Please rate how you feel about the system by circling a number for each statement where 1 is Strongly disagree and 5 is Strongly Agree)*

	Strongly Disagree	Disagree	Not agree or disagree	Agree	Strongly Agree
[the CDSS] uses its expertise to arrive at a safe call disposition	1	2	3	4	5
[the CDSS] will reach a call disposition that provides care appropriate to the patients needs	1	2	3	4	5
[the CDSS] leads to poor decisions about call dispositions	1	2	3	4	5
[the CDSS] is effective in handling *emergency* care calls	1	2	3	4	5
[the CDSS] is effective in handling *out-of-hours* calls	1	2	3	4	5
[the CDSS] reaches unpredictable decisions	1	2	3	4	5
I understand how [the CDSS] works	1	2	3	4	5
I feel I can depend on [the CDSS] to deal with a wide range of call scenarios	1	2	3	4	5
[the CDSS] is dependable in handling the most common types of calls effectively	1	2	3	4	5
I have faith in [the CDSS] to handle calls	1	2	3	4	5
[the CDSS] is competent at doing what it is designed to do relative to others methods I can think of	1	2	3	4	5
[the CDSS] is less reliable at handling calls than other methods I can think of	1	2	3	4	5
[the CDSS] behaves more predictably than other methods I can think of	1	2	3	4	5
I have as much faith in [the CDSS] to handle calls as other methods I can think of	1	2	3	4	5
[the CDSS] has a reputation for being trustworthy	1	2	3	4	5
Outcomes from [the CDSS] are not always in the best interests of the public	1	2	3	4	5
I believe that [the CDSS] is used in the best interests of [OOH]	1	2	3	4	5
I believe that [the CDSS] is used by [OOH] to support me in doing my job	1	2	3	4	5

[the CDSS] operates using decision making principles that I sometimes find morally unacceptable	1	2	3	4	5
I believe that [the CDSS] operates in ways consistent with my expectations	1	2	3	4	5
Overall I trust in [the CDSS]	1	2	3	4	5

Some questions about your work environment

18. The following statements relate to your views of, and trust in, other staff and the organisation you work for. *Please rate how you feel by a number for each statement where 1 is Strongly Disagree and 5 is Strongly Agree*

	Strongly Disagree	Disagree	Not agree or disagree	Agree	Strongly Agree
Clinical supervisors					
Clinical Supervisors are good at their job	1	2	3	4	5
I feel that support from Clinical Supervisors is poor	1	2	3	4	5
I feel that Clinical Supervisors are fair in their dealings with me	1	2	3	4	5
I feel that Clinical supervisors are inconsistent in their dealings with me	1	2	3	4	5
I trust the Clinical Supervisors	1	2	3	4	5
Audit team					
The audit team is good at its job	1	2	3	4	5
I feel that support from the audit team is poor	1	2	3	4	5
I feel that the audit team is fair in their dealings with me	1	2	3	4	5
I feel that the audit team is inconsistent in their dealings with me	1	2	3	4	5
I trust the audit team	1	2	3	4	5
Your organisation					
[Organisation] is good at performing its job	1	2	3	4	5
I feel that support from organisation is poor	1	2	3	4	5
I feel that [organisation] behaves fairly in its dealings with me	1	2	3	4	5
I trust [the organisation]	1	2	3	4	5

The [the CDSS] team					
The [the CDSS] team is good at its job	1	2	3	4	5
I feel that support from the [the CDSS] team is poor	1	2	3	4	5
I feel that the [the CDSS] team are fair in their dealings with me	1	2	3	4	5
I trust the [the CDSS] team	1	2	3	4	5

Using [the CDSS]					
I trust other call-handlers to support me in my job	1	2	3	4	5
I trust callers to tell the truth during calls	1	2	3	4	5
I am confident in my ability to use [the CDSS] correctly	1	2	3	4	5
I am confident I know how to overcome any limitations of [the CDSS]	1	2	3	4	5

And finally a further request

We would like to see if there is a link between the skills, training and attitudes that people have and how [the CDSS] is used. This could help us develop an understanding of the benefits of [the CDSS], the skills required to do the work and how it can be successfully implemented at other locations in the future.

As a final request we would like to ask for your permission to link the responses you have given in this questionnaire to your call sorting statistics held by [Ambulance Trust] (this is the information that is put up on the wall at [Ambulance Trust]). The purpose of linking data in this way is not to assess you as an individual, but to look at patterns in responses across all EMSOs more generally.

The linked data would be seen **only by the researchers**. No-one at your organisation will see your personal responses to this questionnaire and your individual results **will not be given to [Ambulance Trust]**. The researchers will be able to link your questionnaire responses to your call sorting statistics by your individual identification number. We will never link your name to the call sorting statistics, so this will remain a completely confidential process.

If you would be happy for us to link your questionnaire responses with your call sorting statistics, then please simply write your individual identification number in the space below. If you are not happy for us to this, please leave the space below blank.

> To consent to the research team linking your questionnaire responses with your call sorting statistics, please place your individual identification number here:
>
> _____

Please return your completed questionnaire either by placing in the locked box located behind the duty manager's / SPA supervisor's desk for a member of the research team to collect, or by posting directly to Jo Turnbull using the prepaid FREEPOST envelope provided.

Thank you very much for completing this questionnaire. We greatly value both your responses and the time you have taken to give them.

Appendix 9

Advisory group

Advisors
Lucille Dowle (lay advisor)
Helen Smith (Professor of Primary Care, University of Brighton)
Nicholas Reeves (DH Advisor)
Martyn Forrest (Connecting for Health)
Kathy Jones (London Ambulance Service)
Stephen Peckham (Reader in Health Policy, LSHTM)
Arjan Shahani (lay advisor)
Ann Short (lay advisor)
Tim Strangleman (Reader in Sociology, University of Kent)

Purpose and activities

The advisory group assisted the project by providing external research and theoretical input and informing us about relevant practice and policy issues. The group members were invited because of their experience and interest in issues related to the use of technologies in health care settings and they are drawn from academic, policy making and health care arenas. The group also included public/lay representatives with the aim of helping keep our research relevant and accessible to a wide range of audiences and users.

The group played an important role in helping us think about the implications and dissemination of our findings. We held three meetings over the course of the project in May 2009, October 2009 and April 2010

The main focus of each meeting was as follows:

May 09:   Introduction to the research; choosing the three case study settings, discussion of urgent and emergency care policy

Oct 09:   Case study site selection, interim findings and analysis

April 09:   The survey, findings in relation to NPT, the structure of the final report.

The advisory group requested a further meeting to discuss the final report and dissemination plans. This will be arranged in Autumn 2010 to coincide with feedback from NIHR SDO.

Appendix 10

[CDSS] Study
Wiltshire Research Ethics Committee Reference Number: 08/H0104/65

FURTHER INFORMATION FOR STAFF AT PARTICIPATING SITE ABOUT THE SURVEY

Invitation to participate
We would like to invite you to take part in this research study by completing a survey. Before you decide whether or not to take part, please take time to read the following information which explains why this research is being done and what you involvement would consist of. Talk to others if you wish, and please feel free to ask questions if there is anything that you are unsure of. Thank you for reading this.

The Study
We are studying the design, development, management and use of the Computer Decision Support System (CDSS) called […] in three workplaces where it is used by different types of staff. We are using a case study approach which means that we will look at three settings in detail, including your workplace. We will conduct interviews with staff, observe the CDSS being used, and use a survey to collect information for this study.

This information sheet tells you about the survey part of the study

Why have I been chosen to take part?
We are asking all call-handlers at your workplace to take part because you work in an organisation that has agreed to participate in the study.

Do I have to take part?
No, taking part in this study is voluntary. It is up to you to decide whether or not to take part. You are not obliged to take part in the research just because your organisation is participating.

What will happen to me if I take part?
For this part of the research, we would like you to complete a survey which asks you about your work which should take you about 25 minutes to complete. We would like to know about your views and experiences of using [the CDSS] and what you think are the skills needed to do your job. This will enable us to understand if there is a relationship between the skills, training and attitudes that people have and how Pathways is used. This can help in developing understanding of the benefits of Pathways, the skills required to do the work and how it can be successfully implemented at other locations in the future.

We would like you to place your completed questionnaires in the FREEPOST addressed envelope that we have supplied. This can either be posted directly to Joanne Turnbull, School of Health Sciences, University of Southampton in the FREEPOST envelope provided or handed to your manager in the sealed envelope, for a member of the research team to collect.

Confidentiality

All of the data we collect will be kept strictly confidential. All data will be handled in accordance with the Data Protection Act 1998. Your surveys will be kept in a secure cabinet in the university. Your organization will not have access to your completed questionnaire. The information you give us in the survey will be entered into an anonymised database. The study will be carried out in full compliance with all relevant guidance from the NHS ethics committee, NHS research governance and Data Protection legislation.

What are the possible problems and disadvantages of taking part?
We do not anticipate any problems arising from participation in this study.

What are the possible benefits of taking part?
There are unlikely to be direct personal benefits to you from this study. Some people enjoy participating in this kind of research and welcome the opportunity to give their views about their work. We will feed back our findings to you, and keep you regularly updated about the study and we hope that you will find this interesting.

Who is funding and organising the research?
The research is a collaboration between the Universities of Southampton, Newcastle and Bristol and the national NHS Workforce Review Team. It is funded by the National Institute of Health Research Service Delivery and Organisation Programme but the research team is independent. We do not work for [the CDSS developers] or for the Trust you work for.

What will happen to the results of the research study?
The results of this study will be written up for a report to the funders and for the ethics committee, and for publications that will be read by health professionals and health service managers and other researchers. We will be happy to send you a free copy of the research report if you tell us you would like one.

Who has reviewed the study?
The study has been reviewed by the Department of Health, the Wiltshire Research Ethics Committee, and your local Trust in accordance with the Research Governance framework.

Who can I contact if I have a concern or complaint about this study?
You can contact the project leader, Catherine Pope (details below) if you have any concerns about this study or a complaint. If you would prefer to contact someone independent from the research team you can contact: Research Governance, Corporate Services, Building 37, Level 4, Room 4001, University of Southampton, Highfield Campus, Southampton, SO17 1BJ, tel: 023 8059 5058 or email rgoinfo@soton.ac.uk.

Contact details:
If you have any questions about the study please contact the project leader, Catherine Pope on 023 80 59 8293 or cjp@soton.ac.uk School of Health Sciences, University of Southampton, Highfield Campus, Southampton, SO17 1BJ.

Appendix 11

UNIVERSITY OF Southampton
School of Health Sciences

[The CDSS] Study

Wiltshire Research Ethics Committee Reference Number: 08/H0104/65

FURTHER INFORMATION FOR STAFF AT PARTICIPATING SITE
ABOUT THE SURVEY

Invitation to participate
We would like to invite you to take part in this research study by completing a survey. Before you decide whether or not to take part, please take time to read the following information which explains why this research is being done and what you involvement would consist of. Talk to others if you wish, and please feel free to ask questions if there is anything that you are unsure of. Thank you for reading this.

The Study
We are studying the design, development, management and use of the Computer Decision Support System (CDSS) called [Name of CDSS] in three workplaces where it is used by different types of staff. We are using a case study approach which means that we will look at three settings in detail, including your workplace. We will conduct interviews with staff, observe the CDSS being used, and use a survey to collect information for this study.

This information sheet tells you about the survey part of the study

Why have I been chosen to take part?
We are asking all call-handlers at your workplace to take part because you work in an organisation that has agreed to participate in the study.

Do I have to take part?
No, taking part in this study is voluntary. It is up to you to decide whether or not to take part. You are not obliged to take part in the research just because your organisation is participating.

What will happen to me if I take part?
For this part of the research, we would like you to complete a survey which asks you about your work which should take you about 25 minutes to complete. We would like to know about your views and experiences of using [the CDSS] and what you think are the skills needed to do your job. This will enable us to understand if there is a relationship between the skills, training and attitudes that people have and how Pathways is used. This can help in developing understanding of the benefits of Pathways, the skills required to do the work and how it can be successfully implemented at other locations in the future.

As part of the survey, we have a further request on the last page of the survey asking if you would give your permission to link the responses you have given in this survey to your call sorting data. Your permission will enable us to look, not at you specifically, but to see whether

there is a connection between the skills, training and attitudes that people have and how Pathways is used. If you would be happy for us to do this then simply write your [organization] unique identification number in the space where requested. If you do not wish the research team to have access to your call sorting data, then you do not have to give us this number. The research team will not be able to link your responses or data to individuals because an administrative member of staff who works at the School of Health Sciences will act as an independent administrator for the survey. This member of staff is not involved in the research and will not have access to your survey responses or data. The independent administrator will have a list of all names of all staff and will allocate each person an identification number. Only the administrator will have access to this list and this list will be destroyed once the responses have been collected. In this way, your responses will be anonymous to the research team.

We would like you to place your completed questionnaires in the FREEPOST addressed envelope that we have supplied. This can either be put in the locked box located at your organisation or it can be posted directly to Joanne Turnbull, School of Health Sciences, University of Southampton, in the FREEPOST envelope provided.

Confidentiality
All of the data we collect will be kept strictly confidential. All data will be handled in accordance with the Data Protection Act 1998. Your surveys will be kept in a secure cabinet in the university. Your organization will not have access to your completed questionnaire. The information you give us in the survey will be entered into an anonymised database with all personal details removed (including your [organisation] call sorting unique identification number if you choose to provide us with this information) when it is being analysed and reported. The study will be carried out in full compliance with all relevant guidance from the NHS ethics committee, NHS research governance and Data Protection legislation.

What are the possible problems and disadvantages of taking part?
We do not anticipate any problems arising from participation in this study.

What are the possible benefits of taking part?
There are unlikely to be direct personal benefits to you from this study. Some people enjoy participating in this kind of research and welcome the opportunity to give their views about their work. We will feed back our findings to you, and keep you regularly updated about the study and we hope that you will find this interesting.

Who is funding and organising the research?
The research is a collaboration between the Universities of Southampton, Newcastle and Bristol and the national NHS Workforce Review Team. It is funded by the National Institute of Health Research Service Delivery and Organisation Programme but the research team is independent. We do not work for [CDSS developers] or for the Trust you work for.

What will happen to the results of the research study?
The results of this study will be written up for a report to the funders and for the ethics committee, and for publications that will be read by health professionals and health service managers and other researchers. We will be happy to send you a free copy of the research report if you tell us you would like one.

Who has reviewed the study?
The study has been reviewed by the Department of Health, the Wiltshire Research Ethics Committee, and your local Trust in accordance with the Research Governance framework.

Who can I contact if I have a concern or complaint about this study?
You can contact the project leader, Catherine Pope (details below) if you have any concerns about this study or a complaint. If you would prefer to contact someone independent from the

research team you can contact: Research Governance, Corporate Services, Building 37, Level 4, Room 4001, University of Southampton, Highfield Campus, Southampton, SO17 1BJ, tel: 023 8059 5058 or email rgoinfo@soton.ac.uk.

Contact details:
If you have any questions about the study please contact the project leader, Catherine Pope on 023 80 59 8293 or cjp@soton.ac.uk School of Health Sciences, University of Southampton, Highfield Campus, Southampton, SO17 1

Appendix 12

Table a. Mapping of individual item to skill competency category for Survey Q13 and 14

Competency category	Item
Effective call control	Controlling the call according to clinical urgency, caller's needs and service demands Multi-tasking in order to maintain call flow
Skilled questioning	Probing for further information Rephrasing questions when necessary whilst retaining the clinical essence Using leading questions to elicit answers (reversed)
Active listening	Picking up on and recognising relevant non-verbal cues or background noise Recalling information given by the caller
Skilled provision of information and advice	Providing clear, accurate, clinically sound and concise information from [the CDSS]
Effective communication	Addressing callers in a professional, respectful and sensitive manner Adapting approach according to the needs of the situation Establishing a rapport with caller Conveying empathy appropriately Negotiating effectively Converting information provided by the caller back into the system Managing your own emotional feelings about a call
Skilled use of [the CDSS] functionality	Allowing the system to drive the assessment Taking appropriate route through the system Documenting call details clearly, accurately, and concisely

Appendix 13

Table b. Mapping of individual trust items to trust dimensions for Trust in CDSS technology

Trust Factors	Item
Competence	[the CDSS] uses its expertise to arrive at a safe call disposition [the CDSS] will reach a call disposition that provides care appropriate to the patients needs [the CDSS] leads to poor decisions about call dispositions (reversed) [the CDSS] is effective in handling emergency care calls [the CDSS] is effective in handling out-of-hours calls
Predictability	[the CDSS] reaches unpredictable decisions (reversed) I understand how [the CDSS] works
Dependability	I feel I can depend on [the CDSS] to deal with a wide range of call scenarios [the CDSS] is dependable in handling the most common types of calls effectively
Faith	I have faith in [the CDSS] to handle calls
Reputation	[the CDSS] has a reputation for being trustworthy
Relative Competence	[the CDSS] is competent at doing what it is designed to do relative to others methods I can think of
Relative reliability	[the CDSS] is less reliable at handling calls than other methods I can think of
Relative Faith	I have as much faith in [the CDSS] to handle calls as other methods I can think of
Benevolence	Outcomes from [the CDSS] are not always in the best interests of the public (reverse) I believe that [the CDSS] is used in the best interests of [the organisation] I believe that [the CDSS] is used by [the organisation] to support me in doing my job
Integrity	[the CDSS] operates using decision making principles that I sometimes find morally unacceptable (reverse) I believe that [the CDSS] operates in ways consistent with my expectations

Appendix 14

Table c. The mapping of individual trust items to trust in key actors

NHSP actors (Trustees)	
Employing organisation	[Organisation] is good at performing its job I feel that support from [Organisation] is poor (reverse) I feel that [Organisation] is fair in its dealings with me I trust [Organisation]
Audit Team	The audit team is good at its job I feel that support from the audit team is poor (reverse) I feel that the audit team are fair in their dealings with me feel that the audit team is inconsistent in their dealings with me (reverse) I trust the audit team
CDSS Development Team	The [CDSS Development] team is good at its job I feel that support from the [CDSS Development] team is poor (reverse) I feel that the [CDSS Development] team are fair in their dealings with me I trust the [CDSS Development] team
Clinical Supervisor	Clinical Supervisors are good at their job I feel that support from Clinical Supervisors is poor (reverse) I feel that Clinical Supervisors are fair in their dealings with me I feel that Clinical supervisors are inconsistent in their dealings with me (reverse) I trust the Clinical Supervisors
Callers	I trust callers to tell the truth during calls

Addendum

This document is an output from a research project that was commissioned by the Service Delivery and Organisation (SDO) programme whilst it was managed by the National Coordinating Centre for the Service Delivery and Organisation (NCCSDO) at the London School of Hygiene & Tropical Medicine. The NIHR SDO programme is now managed by the National Institute for Health Research Evaluations, Trials and Studies Coordinating Centre (NETSCC) based at the University of Southampton.

Although NETSCC, SDO has managed the project and conducted the editorial review of this document, we had no involvement in the commissioning, and therefore may not be able to comment on the background of this document. Should you have any queries please contact sdo@southampton.ac.uk.