Collaboration and the Knowledge Economy: Issues, Applications, Case Studies
Paul Cunningham and Miriam Cunningham (Eds)
IOS Press, 2008 Amsterdam
ISBN 978-1-58603-924-0

Tackling the Limits of Designability, Emergence and Complexity - Co-producing Multi-Agency Service Environments: The OLDES Project

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Abstract: Recent developments in ICT's offer increasing possibilities for transforming the delivery of care. The care of older people presents many challenges and issues at many levels and the purpose of this paper is to try to capture some of the realities of the world of older people and of the institutions and agencies which care for them. In this context, this paper presents the results of a theoretical exploration associated with the complexity of needs found in care environments and the difficulties of configuring services when delivered jointly across organisational, professional and occupational boundaries. In particular, this paper presents the deployment of a computer-based graphical demonstrator that can be used to generate visualisations of sociotechnical scenarios to provide electronic delivery of services to older people at home. The tool supports processes of shared sense making, and aims at facilitating the users' engagement with the design, development and implementation of tele-healthcare system.

Keywords: e-services, user-centred design; socio-technical tools; co-production; older people

1. Introduction

Current developments in information and communication technology (ICT) provide opportunities for the use and development of telemedicine applications in a number of medical domains. These developments have the potential to transform the cost-effective delivery of medical practices. Apart from medicine, other health and social care provision could equally benefit from the application and use of ICT, such as services for disabled people, hospital after care and rehabilitation, community healthcare services and particularly healthcare provision for older people [1].

This paper describes the results of a theoretical exploration associated with a series of ongoing action research interventions in a tele-healthcare project called OLDES (FP6) - see www.oldes.eu - concerned with the deployment of information and network technologies for older people. Drawing upon the principles of socio-technical systems design this paper illustrates a new approach to the co-production of information, communication and organisational architectures in e-services for elderly people. This approach equips stakeholders -including health informaticians, service providers, system designers, technology suppliers as well as end users - with the means to engage across their various organisational, practice and cultural boundaries in the process of shaping and specifying new ways and means of working together and delivering and governing service.

We believe this approach is particularly necessary faced with the complexity of needs found in multi agency, multi-disciplinary care environments. Whilst ideas such as 'co-production' are not new, few concrete tools and techniques have been developed to support

interventions aimed at developing more user-centred approaches of this type. In this paper we outline the deployment of one such tool in the form of a multi-screen, projection oriented modelling and visualisation facility. This can be used to animate socio-technical scenarios created through a process of shared sense making, exploration and negotiation by 'user' and 'design' communities. We illustrate the use of this tool through a report of initial developments in a three-year project being conducted in the European Union (EU) to provide electronic delivery of services to older people at home.

2. The Use of Technology in the Care of Older People

Older people are an increasing percentage of the population in all EU countries. It is projected that 23% of the population will be aged 65 or over by 2020 and 31% by 2050 with major implications for 'the labour market and the health and long-term care sector' [2]. The ageing of the population is accompanied by a growing number of old people living alone and requiring support services due to their progressively reduced degrees of autonomy. Responses to the needs of this population group include the development a wide range of services, including care at home, which will be chosen by ever more people, and specialised institutions, as well as closer co-ordination between care providers in intensive care, primary care and social services.

Information technology in the domain of health is seen by the European Commission as providing an opportunity to improve illness prevention and the safety of care, facilitate active participation by patients and to facilitate the personalisation of care [3]. In 2004, the European 'e-Health Action Plan' initiated a commitment by all EU member states to develop a national or regional roadmap for eHealth [4]. As such e-health and healthcare form a key part of the Commission's vision towards an 'Information Society'[ii] in which advanced technology driven clinical systems, telemedicine services, personal wearable and portable communication systems and health network applications, will assist prevention, diagnosis, treatment, health monitoring, and lifestyle management.

3. The OLDES Project

We participate as a partner in an EU co-funded project entitled OLDES, which aims to offer new technological solutions to improve the quality of life of older people. The project is part of the European Union's Information Society Technologies (IST) Framework 6 Programme (FP6) for 'Ambient Assisted Living (AAL) for the Ageing Society'. The OLDES project involves a collaboration of local public health and social care providers, system suppliers, and intermediary research organisations with ourselves as university researchers. The project is a three-year programme that commenced in January 2007. This paper reports on progress and experience to end of February 2008. At the core of the project is the objective to develop an easy to use entertainment, health and social care platform intended to 'ease the life' of older people 'in their homes'. The OLDES platform will be based on a PC corresponding to Negroponte's paradigm of a low cost device, giving the guarantee of an affordable system. User entertainment services will be provided through easy-to-access thematic channels and special interest fora supported by animators, and health care facilities will be based on established Internet and tele-care communication standards. The system will include wireless ambient and medical sensors linked, via a contact centre to social services and health care providers. OLDES will also cover the definition, implementation and evaluation of a Knowledge Management (KM) programme, an advanced user profiling system that will enhance the communication and information sharing between care agencies. The platform will be tested at two different 'user' locations: (1) a group of 100 elderly (including 10 suffering with cardio-vascular disease) in Bologna, Italy; (2) a group of 10 diabetic patients in the Czech Republic. Alongside these objectives

is a commitment to 'user-centred' development that, 'puts older people at the centre and makes their needs the main priority in all developments' (OLDES Project Description).

4. Methodology: A 'Space' for 'Co-production'

Traditional studies of socio-technical system design have tended to emphasise the distinctive roles of "system user" and "system designer" and the need to improve user-centred interventions across the gap. Recent approaches include: Mumford, (1983), Socio-technical design; Suchman et al., (1993), Participatory Design; Checkland, (1999), Soft Systems Approach [5-7]. While these studies moved away from conventional deterministic notions of design process and provided the information systems community with a user-centred approach, they sometimes fail to provide insights and guidance on how such user-centred configurations can be achieved between various stakeholders during the design process. In particular, when the participants come from different practices and disciplines and are in the process of negotiating new shared working practices, the problem of developing the required new language has received relatively little attention. Further, often implicitly and/or explicitly these studies assume the pre-existence of an "enterprise" which is the context in which the "solution" will be deployed. This is defined by a boundary within which there is a locus of control and an assumption of rationality. In other words they define a problem-solution domain in terms of a boundary and seek to resolve conflict and incoherence within, while attempting to manage or cope with these aspects of the environments at the edge. As such these studies often tend to wrongly portray the ways in which systems design is in reality shaped by the denizens of the communities that seek to appropriate them. This is especially the case in the context of multi-agency partnership work such as the delivery of health and social care for older people in different European countries.

On the other hand contemporary thinking around socio-technical system design is increasingly suggesting that the categories of "system user" and "system designer" is becoming blurred and the boundary between them, is not given but socially constructed, as a result of configurational processes [8-10]. From the perspective of Science and Technology Studies (STS) such configurations are seen as involving non-linear interactions of negotiation(s) between diverse actors influenced not only by technical requirements but also by social circumstances [11]. This type of systems intervention is based around a model that sees key social values being embodied in technological configurations and systems during the design and development process. However, this 'embodiment' concept of technology is challenged by the practice perspective, which instead emphasises the way in which technologies such as information systems are constituted and reconstituted in their use and not during the design and development [12, 13]. As such artifacts (e.g. information systems) are not generally stable but evolve over time, to some extent in their physical form and to a greater degree in their meaning within the context of use.

This blurring of the boundary between design, implementation and use means that key areas of user engagement – innofusion and domestication – can in principle be nurtured and 'appropriation accelerated'. In this sense we can think not in terms of user-centred system design or development but of a form of 'co-production', 'co-development', 'co-operative design' or 'co-realisation' [14-16]. That is a, 'shared situated practice involving users and IT professionals' and 'grounded in the lived experience of users as they grapple with the problems of applying IT' [16]. Accordingly, we see 'digital experiments' as a 'space' or an 'occasion' where the denizens of an actual or prospective community of practice can come together and engage with the design and development process in novel ways. In order for this to happen it has to be agreed by those involved that whilst designers and developers are present in this space they *do not* have a privileged position as 'experts' and 'solution providers'. By the same token the 'rationality' of conventional development methodology

and systems practice is but one of the 'rationalities' admitted to the space. What is intended here, therefore, is a 'design space' where the discourse is not just 'technological' but involves the design of the ethical, organisational, professional, social and cultural aspects of the system.

We see a 'co-production space' as a facilitated environment where users can articulate their needs and requirements in naturalistic language. In turn this can be expressed alongside the formalised language of 'requirements capture' and system development methodologies that typically constitute the worldview of consultants, designers and developers. We have developed a graphical software tool to support stakeholders in mapping out, visualizing and developing system specifications together with understanding the organisational change models that are implicit within them

This approach, unlike more conventional system development tools and methods, starts from a position that initial interactions between 'developers' and 'users' should be grounded in the 'realities' of the practice context in which new sociotechnical arrangements are to be determined. As such, initial material presented in the deployment of the demonstrator should be: (1) recognisable by the participants as relevant and realistic in their worlds; (2) reflect and raise issues about the relevant scope, boundary conditions and capacity constraints of policy, resources, technology and the legal/ethical conditions; and (3) provide a starting point that participants can adopt and appropriate in the process of internalising and sharing an emerging set of models, plans and designs.

5. Co-Production in the OLDES Project

In their early stages, the most common mistake that a project such as OLDES can make is one of naiveté: failing to face up to the real complexities of the world in which it is operating, selecting only those aspects that make sense from the rational scientific, clinical or engineering points of view and ignoring the fact that many aspects of the real worlds of the users are, and will remain, incoherent and problematic. This mistake can lead towards developing a system that may be powerful and logical but which bears no real relationship to the needs, constraints, risks and opportunities of older people and their networks of support and care, one which bears little relationship to the way they make sense of and cope with their world.

Our empirical research in the first phase of the OLDES project has involved the observation and construction of several worldview domains that have bearing on the delivery of health and social care in Bologna, Italy. These included:

- The domain of policy and governance at national, regional and local levels.
- The corporate domain of service management and reporting.
- The practitioner domain in which needs and demands are encountered and responded to.
- The client, customer and service user domain where outcomes are experienced.
- The technical and supplier domains where systems are constructed and deployed.

The term "domain" here refers to a context or point of view in sense making, a conceptual frame and a set of values. The outcome of the initial survey, observation and interaction activities was the production of a set of rich pictures, in the soft systems sense, which were used as exhibits, provocations and stimuli for discussion between individuals who have adopted one or other of these stances. At the early phases of the use of this "projection oriented" approach, that what serves as a mirror for one group, in which they recognise their own interests, practice and values, can function as a window for others participating in the process. In this way, the articulation of these domains is used as stimulus to facilitate a process of shared sense making, exploration and negotiation between 'user' and 'design' communities.

However, the purpose of the process is to (co) produce a set of material which specifies an emerging shared vision of a proposed, complex socio-technical system. Such systems themselves can not be defined in a single projection and a single point of view but must include several distinct conceptual frames. For example, roles and responsibilities in an enterprise projection and interactions of (computational) objects in another. The architectural discourse then involved the evaluation of whether the proposed behaviours, (an object model) mapped over a proposed distribution of physical resources (a deployment model) represents an appropriate and acceptable implementation of the intentions of the conversational roles and distribution of responsibilities.

Such reasoning is complex and challenging but, in contexts like OLDES, ways must be found to engage all stakeholders appropriately in the decision making process. Information governance – which is what is implied here - can not be regarded as an alienable responsibility and "outsourced" to the technicians: it has become a core aspect of practice and of the user's role and responsibility.

So, the process being followed involved channelling the use of multiple projections for the initial purpose of representing and affirming distinct world-views to their use in the production of specifications in an architectural discourse. And all with a fundamental commitment to co-production and participation.

In practice, this results to the production of the following types of projections:

- People and places: this view situates activity from the point of view of protagonists and represents all of the information modalities that are relevant.
- Applications view: this view represents the presentations of applications and the interactions that users make with them
- Systems view: animates the activities and message passing between network resources.
- Organisational view: which identifies the domains of ownership and responsibility for physical resources.
- A business process or workflow view: which shows tokens passing round mappings of workflows as a result of transactions and messages.
- A role view: which represents abstract responsibilities and intentions and how they are allocated to different actors and organisations in the other views.

Initial versions of some of these rich pictures and projections on the OLDES environment is shown in the figures below:

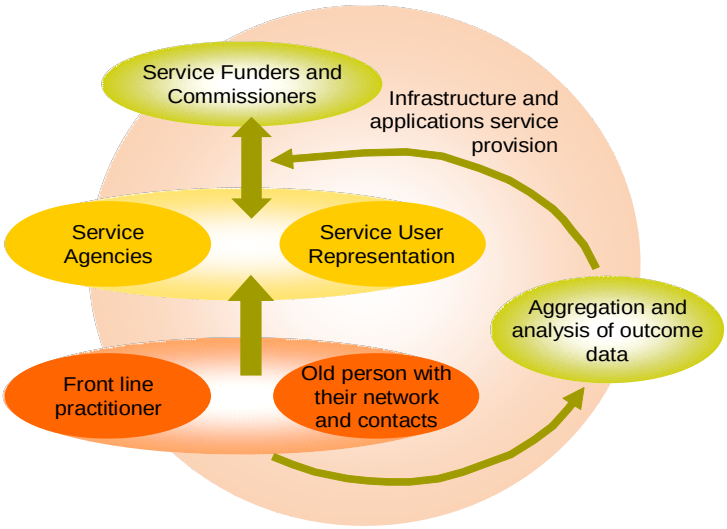

Figure 1: Stakeholder Relationship Map

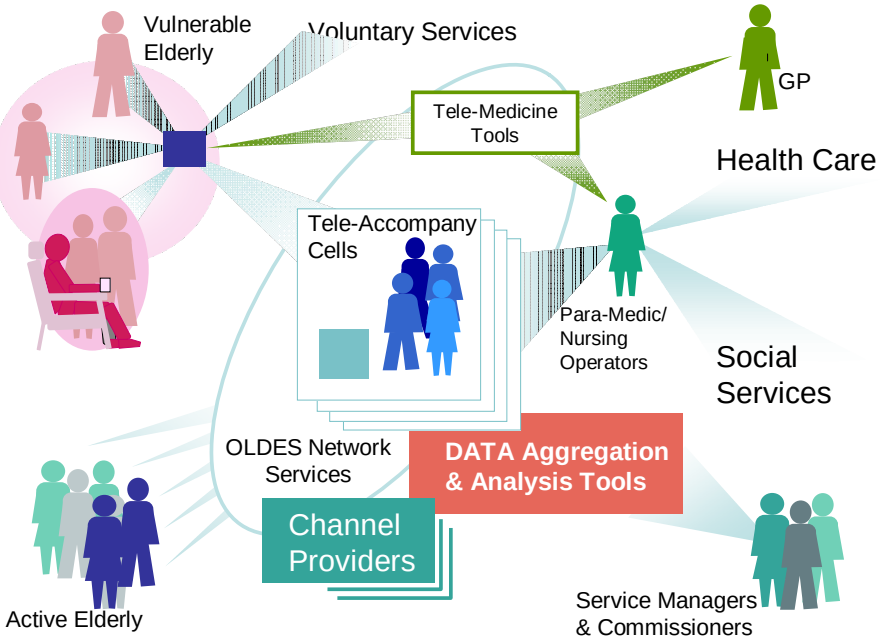

Figure 2: A Rich Picture of Roles and Relationships

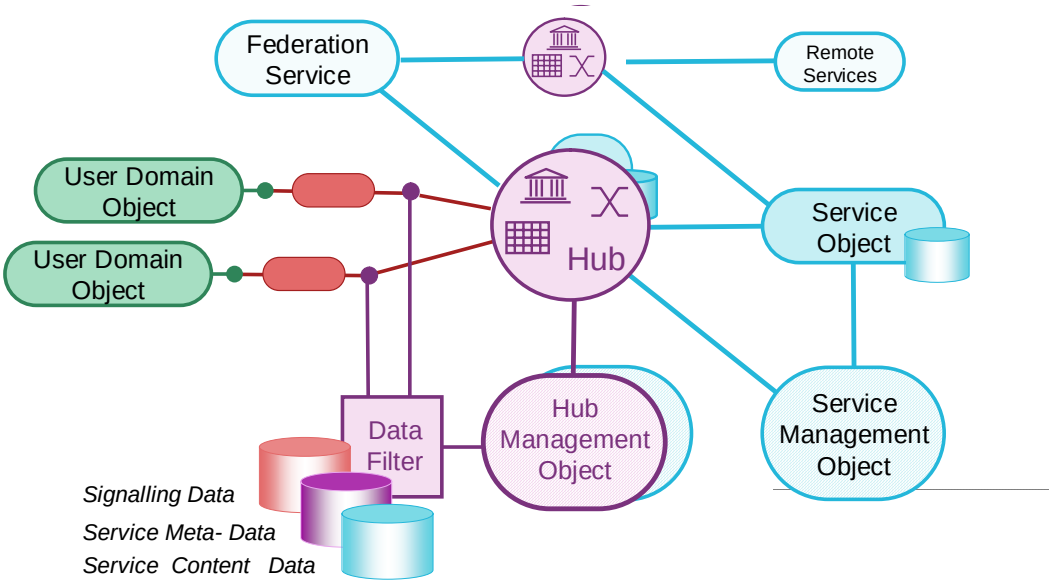

Figure 3: Functional/Object Projection

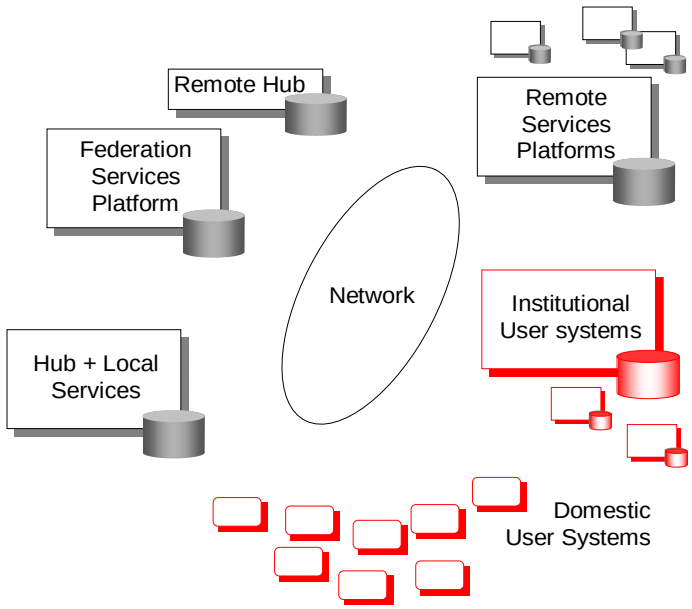

Figure 4: Networked Systems Resource Projection

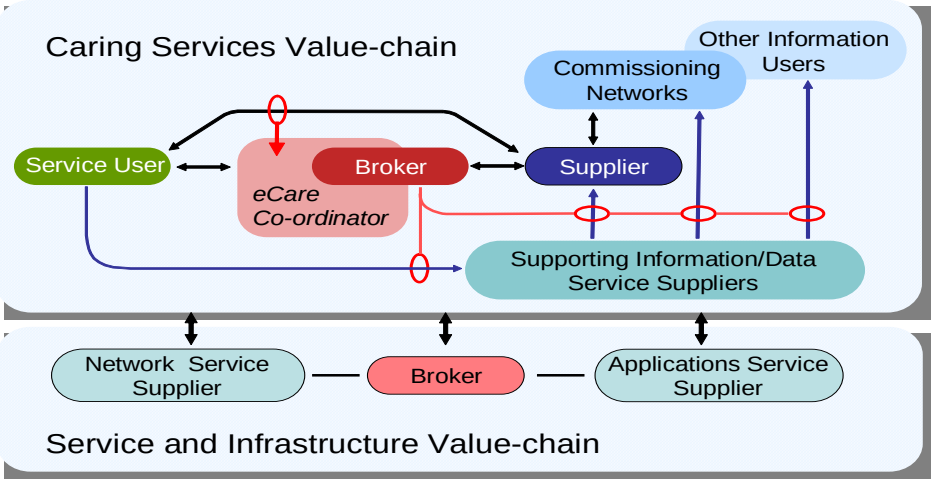

Figure 5: Value Chain Projection

The demonstrator can help practitioners, managers, technicians and strategic decision makers to plan how to structure change before putting it into practice. It plays out a scenario that can be explored from different angles, before rushing into implementation.

In the subsequent phase of the project our activities will focus more on the observation and support of the processes by which the OLDES developments are presented to, explored and evaluated by users and by the various actors in the service delivery networks. The outcomes of these observations will then be incorporated in further versions and elaborations of the demonstrator which will progressively include more real connections to the technical platform, technical devices, the electronic patient records, as well as the instruments, resources and content that it supports.

6. Conclusions and Summary Recommendations

In this paper we outline an approach to the co-production of information, communication and organisational architectures. We believe this is more appropriate for the complexity of needs found in care environments and the difficult issues of configuring services required to meet those needs when delivered across organisational, professional and occupational boundaries. The use of the graphical demonstrator in the OLDES project shows how visualisation techniques can be used to support the building of different scenarios for change in both technological and organisational architectures. In our approach such scenarios are created (or not created) by stakeholders drawn from 'user' and 'design' communities through a facilitated process of shared sense making, exploration and negotiation. Our question is what further development is needed to improve the outcome of action research interventions conceived as configuration processes in the context of socio-technical systems design and re-conceptions of tele-healthcare service?

Acknowledgments

The authors would like to acknowledge the support of the European Commission for the OLDES project and the contribution of all the partners to the project.

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[ii] The i2010 initiative was launched on June 1 2005. It sets out a digital strategy for the future that is built on three pillars: information, innovation, and inclusion
Hhttp://dbs.cordis.lu/cgibin/srchidadb?CALLER=NHP_EN_NEWS&ACTION=D&SESSION=&RCNH=EN_RCN_ID:23913