

Benefits Realisation using Information Technology in a National Surveillance System

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Declaration

I declare that the work described in this dissertation is, except where otherwise stated, entirely my own work, and has not been submitted as an exercise for a degree at this or any other university.

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Summary

The drive for changes across the public sector to produce increased efficiencies provided the impetus for this research. This research reviewed existing work processes in a national surveillance system-the National Drug Related Deaths Index (NDRDI) which is managed by the Health Research Board (HRB). This review sought to identify where increased benefits could be achieved. It was anticipated that identified benefits would be achieved within the timeframe of the research. A prerequisite was to identify and achieve benefits without the need for additional staff or funding. From the outset of the research it was envisaged that achieving efficiencies would require the development of an information technology (IT) solution.

The researcher incorporated a structured approach to achieve benefits. A literature review on benefits realisation (BR) defined BR, it outlined the importance of change management, stakeholder involvement, planning for benefits and evaluating the outcome when planning and deploying IT solutions in order to ensure benefits were realised. The Cranfield BR model was incorporated into the research to help ensure the full value of an IT enabled solution was realised.

Throughout the research a user centred approach was adopted to increase the likelihood of success. Focus group meeting with staff identified benefits, associated business changes, enabling changes, measures and owners. NDRDI staff selected a data reporting requirement for IT automation and a new software tool was designed, built and implemented.

An evaluation of this tool has demonstrated that it meets specified requirements and required changes have been implemented. This tool has successfully achieved anticipated benefits within the NDRDI. Staff morale has improved and the number of staff hours required to complete this reporting requirement has been reduced by almost 28 hours. Efficiencies sought in this surveillance system have been successfully achieved without the need for additional staff or funding.

Abbreviations

B	Benefit
BDN	Benefits Dependency Network map
BM	Benefits Management
BR	Benefits Realisation
C	Change
CTL	Central Treatment List
EC	Enabling changes
EMCDDA	European Monitoring Centre for Drugs and Drug Addiction
FSN	Family Support Network
GMR	General Mortality Register
HIPE	Hospital In-Patient Enquiry
HRB	Health Research Board
ICT	Information and Communications Technology - or Technologies
IS	Information System
IT	Information Technology
KPI	Key Performance Indicator
M	Measure
NDC	National Documentation Centre
NDRDI	National Drug Related Death Index
NR	Nurse Researcher
OECD	Organisation for Economic Co-operation and Development
RO	Research Officer
ROI	Return on Investment
SR	Senior Researcher
TCD	Trinity College Dublin
VBA	Microsoft Visual Basic for Application

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1 Introduction

1.1 Motivation

The collapse of the Irish economy in 2008 has led to the introduction of austerity measures to help deal with the economic crisis and all sectors in Ireland have been hit by these measures. One area targeted for increased efficiency is the Irish public sector. In the public sector, reduced resources as a consequence of budget cuts and staff reductions have made the task of maintaining services and meeting work commitments more difficult. Staff are now faced with the task of 'doing more with less'.

In this current economic climate of cutbacks, all funding including information technology (IT) funding is extremely limited. Budgets have been reduced and the employment of new or additional staff, renewal of temporary contracts and maternity leave cover have been curtailed under the recruitment embargo in the public sector. Public sector staff are faced with increasing workloads, and the task of maintaining current work requirements at the highest possible standards while also meeting any new requirements.

The new restrictions imposed on public sector organisations presents the dilemma of how to maintain and/or improve current work processes, and how to address any new requirements when faced with an increasing workload, reduced staff numbers and decreased budgets.

The researcher is an employee of the Health Research Board (HRB), which is a statutory organisation. New restrictions imposed by the Irish government on public sector organisations provided the impetus to re-evaluate the existing health information systems (IS) within the National Health Information Systems Unit of the HRB to determine how current services and standards could be maintained and new requirements addressed, with reduced resources and staff.

The researcher was also motivated by a desire to provide a forum for staff to voice their opinions and utilise their experience of the work area to achieve solutions and efficiencies particularly in the current era of government imposed restrictions, whereby staff may feel their view and experiences at the functional level in public organisations are not being adequately addressed.

1.2 Background to the Research

There is a large amount of research on and instances of completed, efficient, on budget IT projects which fail to provide the anticipated benefits. However, organisations are continually changing; information systems are adapted over time, system users' change, reporting requirements change etc. Benefits previously derived from a system may no longer be valid or new benefits may be required. This research explored the role of benefits realisation management in delivering greater value from ICT by seeking to address whether more benefits could be realised from the work processes and systems in use in the National Drug-Related Deaths Index (NDRDI).

This research was undertaken in partial fulfilment of the requirements for the award of an MSc in Health Informatics at Trinity College Dublin. This research focused on improving the work processes through benefits realisation (BR) and IT automation in one of the health information system units in the HRB. The researcher sought to incorporate new skills and knowledge obtained during the course of her studies, into her work environment.

The research focused on utilising the knowledge and experience of key stakeholders in a process involving IT and change management. It sought to use this information to improve the working environment for staff, through increased automation taking into account the perspectives and requirements of stakeholders and IT staff in the HRB and within the budget and staff constraints of the NDRDI.

1.3 Aim of the Research

In light of the drive to gain greater efficiencies and accountabilities in the public sector it was decided to re-examine the current work processes in the NDRDI to ascertain whether any additional benefits and efficiencies could be achieved and to ensure that current work requirements continue to be met with dwindling resources and staff.

The current staff compliment of the NDRDI is 2.23 full time equivalent staff while the required level of staffing needed to meet the demands of the unit, as outlined in the manpower plan for the unit is 2.9 full time equivalent staff (HRB, 2011b). In the current environment of achieving staff reductions it is unlikely that additional staff will be allocated to this unit, therefore the need to reduce workload burden on existing staff was deemed necessary.

This research sought to identify and achieve efficiencies in the NDRDI without the need for additional staff or an increased budget to ensure the limited resources of the unit were best utilised. A precondition of this research was to seek to accomplish efficiencies using only the current resources available to the unit as no additional staff or budget was available. The aim was to assist staff meet their work commitments through a re-evaluation of their current work processes and ultimately to gain greater efficiencies where possible.

The researcher applied a benefits realisation approach to re-examine the work processes of the NDRDI in order to identify where efficiencies are possible. Outputs from this BR application included the documentation of identified benefits and associated measures and changes required.

From the outset of the research it was anticipated that this process would involve the development of an IT solution to streamline an agreed work process of the NDRDI. Once identified and documented it was envisaged that identified benefits would be achieved by an in-house developed software solution, derived using only the resources already available to the NDRDI.

It was anticipated that if the BR strategy implemented in the NDRDI was successful then it could be subsequently replicated across other units with the organisation. The research would equip NDRDI staff with a structured set of tools, techniques and strategies to conduct a review of their work processes and would assist them deal with the new challenges they are faced with. It was anticipated that stakeholders would incorporate these strategies into their normal work processes to ensure further efficiencies are achieved.

1.4 Overview of the Research

This research is organised as follows. The motivation, background to the research and aims of the research are detailed in Chapter 1. Chapter 2 consists of a literature review on BR, this chapter begins with an exploration of the failure of IT to meet expectations and the role of change management and stakeholder involvement in the process of achieving benefits from IT investment. BR is promoted as a means to ensure benefits from IT projects are achieved, its importance in this process and key features of BR are outlined. The literature review also examined BR in the context of the public sector and outlines some the unique challenges which exist in public sector organisations. An overview of the BR model chosen for use in this research– the Cranfield model - is provided.

Chapter 3 begins with an overview of the business area being explored in the research – the NDRDI. The process undertaken to conduct the BR in the NDRDI is outlined. Outputs from this BR process achieved through the use of focus group meetings comprised the creation of a stakeholder assessment, stakeholder analysis and a Benefits Dependency Network (BDN). Benefits, measures, business changes and enabling changes are documented. This BR process led to the selection for a work process in the NDRDI for IT automation.

Once an area had been selected for IT automation, the requirements and design of the new IT tool began. The design process, IT requirements and

the final tool are presented in Chapter 4. This new tool was constructed using Microsoft Access VBA and Java.

Chapter 5 describes the approaches undertaken to evaluate the new IT tool and to measure any benefits achieved. This evaluation was necessary to ascertain whether the new tool complied with requirements whether it succeeded in providing benefits.

Limitations of the research, discussion, future work and conclusions of the research are presented in Chapter 6.

2 Literature Review

2.1 Introduction

This chapter presents a literature review of previous studies and publications on benefits management and realisation for information technology (IT) projects. The researcher begins by exploring the failure of IT to meet expectations and deliver benefits and explores some of the reasons for this. An overview of the characteristics and key features of the benefits management (BM) process and how these contribute to the realisation of benefits are also discussed. The researcher also briefly addresses issues associated with the use of BR in public sector organisations. Some characteristics specific to the public sector in Ireland which have an impact on benefits realisation and management are outlined and an overview of the choice of BR model used in this research is also presented.

Benefits management is the process of organising and managing projects in order to ensure potential benefits are realised. In this research, the terms benefits management and benefits realisation are understood to have the same meaning and these terms are used interchangeably.

2.2 Failure of IT to meet expectations

The successful realisation of benefits from investments made in Information Systems (IS)/IT has been reported to be one of the major organisational challenges (Braun et al., 2010, Braun et al., 2009a).

Expectations from IT and reality often do not converge and while organisations continue to make investments in IS/IT systems, the success rate of these projects remains disappointingly low and organisational returns based on investments in IS and IT continues to disappoint (Ashurst et al., 2008). Many projects fail to achieve the desired benefits and many systems do not succeed in delivering the improvements which led to their development and introduction (Landauer, 1995) (Braun et al., 2009b).

Healthcare IT projects are not immune from this failure in IT in intended benefits delivery (Alapetite et al., 2009),(Scott et al., 2005).

The inability of IT systems to successfully deliver the intended benefits or added value has been extensively documented, addressed and criticised in the literature (Marchand and Peppard, 2008), yet many of these issues still remain in spite of a wide array of innovations in IT research and practice (Alter, 2009).

Unfinished and run-away projects, systems which are badly aligned with business and user requirements and the financial costs associated with IS even before any benefit can be realised, continue to dominate the concerns of executives regarding IS function (Alter, 2009). This is not limited to incomplete projects; there are also many examples cited in the literature of efficient, delivered-within-budget, completed IT projects that fail to deliver the anticipated benefits (Marchand and Peppard, 2008). This is further compounded by the fact that the same IS systems deployed in similar organisations can lead to very different outcomes (Doherty et al., 2006). Not only is it the failure to achieve the planned organisational impacts, actual impacts may include user resistance and in extreme cases the rejection of the system (Martinsons and Chong, 1999).

A number of reasons for the failure to realise the benefits of IT have been cited including *“inadequate business/IT communication, inadequate user participation in projects, lack of support by business executives, difficulties with implementation in organizations, technical and conceptual complexity of IS/IT projects, inadequate resources for projects, unrealistic project schedules, and staff turnover”* (Alter, 2009).

On its own, IT has no intrinsic value. The technology is worthless if the proposed IT systems are not used by the organisation (Marchand and Peppard, 2008). Business value will not be achieved through simply implementing the technology, but by the careful planning and matching of business requirements with the capabilities and properties of the technology (Prananto et al., 2009).

However, very few organisations have adopted a benefits realisation approach (Ward et al., 1996) and while effort is exerted on providing justification for the investment, very little effort is directed towards ensuring the realisation of the expected benefits (Liu and Lin, 2008). With regard to IT investments, most organisations focus on implementing the technology and not on the realisation of expected business benefits (Peppard et al., 2007, Braun et al., 2010, Bradley, 2006), such as the implementation of the necessary tools to assist with tracking and measuring the IT project (Liu and Lin, 2008). The adoption of practices which support benefits planning is very limited and sporadic; these practices are often ignored, or where adopted typically focus on the delivery of features and technical functionality, instead of the realisation of benefits (Ashurst et al., 2008).

Few companies track the benefits from investments in IT and have no way of knowing whether benefits have been realised. In addition, many companies measure success based on the IT project being implemented on time, meeting technical specifications and being within budget. However, it is possible to meet these criteria and not deliver any real business value (Marchand and Peppard, 2008), and a project can be deemed a technical success despite failing to achieve any business benefits (Peppard et al., 2007). Major constraints and difficulties with the evaluation and benefits realisation processes of IT investments are frequently due to the complex role and scope of IT investment decision making processes (Liu and Lin, 2008).

Therefore, rather than being a result of incompetent technology, the failure of most IT initiatives is a consequence of the poor management of business and management factors (Prananto et al., 2009). Information systems are an enabler for initiating business changes both within and between organisations and are deemed fundamental to the efficient and effective operation of modern businesses (Irani and Love, 2008). How organisations manage and use their IS assets is more important than the amount they invest in the technology (Stratopoulos and Dehning, 2000), and it is those organisations that make widespread use of IS/IT evaluation methodologies

or measures which have the *"higher perceived payoffs from IS/IT"* (Liu and Lin, 2008).

However, given the number, investment volumes and complexity of IS/IT projects nowadays, it is not surprising that difficulties are encountered when seeking to realise the intended benefits (Braun et al., 2009b).

2.3 Change Management

While it is recognised that a key contributor of IT failure is the unpredictable nature of organisational change, it is also acknowledged that the benefits of IT usually come from the organisational change which accompanies the introduction of IT (Peppard and Ward, 2005). It has been argued that it is not the technology itself but the organisational change that accompanies an IT implementation that primarily leads to the realisation of benefits (Peppard and Ward, 2005).

An organisation's success and survival depends on it having the capacity to adapt and transform (Ashurst and Hodges, 2010). Projects and programmes are usually driven by a desire to realise particular benefits through structured change (Sapountzis et al., 2007) and most of the value derived from IT results as a consequence of the business changes that it allows the organisation to make (Ward and Daniel, 2006). Deploying IT without taking a business-oriented view and without focusing on the people and changes involved, the actual usage of information and the new technology by people in the workplace occurs too often in IT projects (Marchand and Peppard, 2008). When organisations consider deploying new IT systems they are either *"directly or indirectly redefining how they want their people to work and act with information and IT"* (Marchand and Peppard, 2008).

In order to facilitate benefits realisation, business process changes and changes on the part of users in the organisation are required (Peppard et al., 2007),(Ashurst and Doherty, 2003). The successful deployment of IT requires implementing new ways of working. By not recognising or not paying sufficient attention to this organisational element, organisations risk

not achieving the benefits which initially motivated the IT deployment (Granlien and Hertzum, 2009). It is the balance of business and organisational changes enacted in the organisation which produce the majority of benefits (Ward and Daniel, 2006) and IT implementation is usually linked with considerable organisational change (Peppard and Ward, 2005, Ashurst et al., 2008). These changes will result in information usage, at both the individual and organisational level and in developing the ability to work with the information. In the absence of these changes, benefits will be elusive (Marchand and Peppard, 2008).

However, change is a complex process (Higgs and Rowland, 2005). It is vital that management appreciate and comprehend the business context of proposed IT investment (Peppard and Ward, 2005). Focusing on IT deployment leads to IT-enabled change projects becoming technology-centric projects, rather than being business change projects which have an IT element (Peppard and Ward, 2005). Inadequate consideration of the organisational and social factors may result in IT solutions which do not realise the required benefits (Marchand and Peppard, 2008, Ward and Daniel, 2006).

The success of change management in an organisation is largely dependent on the level of user resistance, and system usability issues can be connected with user resistance (Liu and Lin, 2008). As change management is becoming more important, IS/IT managers will need to show and apply change management skills (Braun et al., 2009b). As benefits occur due to changes in the way people work, it is necessary to identify, plan for and manage these changes prior to and during project deployment and after the project has finished (Peppard et al., 2007).

2.4 Stakeholders

No IT project is simply about IT deployment, it is about how the IT and information is used by people in the workplace to conduct business tasks, execute processes and achieve goals (Marchand and Peppard, 2008).

Stakeholders are the people who have a stake (Bradley, 2006). Anyone who is impacted by the system or the process development should be regarded as a stakeholder, as the view they have of the investment may have an effect on the outcome (Ward and Daniel, 2006). Stakeholders are defined as *"An individual or group of people who will benefit from the investment or are either directly involved in making or are affected by the changes needed to realise the benefits"* (Ward and Daniel, 2006). The identification of stakeholders is an early part of any change process (Bradley, 2006). To do this, Bradley (2006) suggests firstly determining the most relevant elements such as organisational unit, job role, and not overlooking stakeholders external to the organisation. The involvement of stakeholders in the development of the benefits realisation plan is crucial as these are the business owners and users who will have responsibility for changing their working practices as well as making efficient use of the new systems and technology (Peppard et al., 2007).

Project failures often occur as a result of a lack of cooperation of groups who are not deemed central to success, but whose ability or willingness to accept change is crucial to the delivery of the required business improvements (Ward and Daniel, 2006). It is much easier to realise successful change if all stakeholders are committed to the process. The earlier this commitment is achieved, the smoother the process to a successful outcome will be (Bradley, 2006). User and other stakeholder participation in the design and development process should be regarded as essential (Walsham, 1993).

Stakeholder reactions to change will differ and managers should anticipate this. Imposed change may be resisted and organisational change usually entails a threat of real or perceived personal loss for those concerned (Lorenzi and Riley, 2000). In order to realise benefits, responsibility should be assigned to named individuals and they should have a clear statement of the benefits they are to deliver. As business change managers are responsible for ensuring benefits happen, therefore they must have the required accountability, responsibility and control functions. The benefits owner should be in a senior position and have sufficient influence to be able

to ensure that the project team performs their tasks within the project (Ward and Daniel, 2006). Effective accountability can be obtained by specifying a clear mandate and project scope; clearly delineated lines of accountability; the use of appropriate performance measures; and aligning accountability with a reward system (Smith et al., 2008). Therefore, organisation can realise higher levels of benefits with employee reward dependent on their benefits realisation (Braun et al., 2009a). Braun et al (2009a) argue that benefits management will only achieve its full potential if accompanied by such a reward system.

The involvement of users has a positive impact on successful outcomes with regard to system implementation (Liu and Lin, 2008). Involving users during project implementation and evaluation may improve their feelings towards the system, and enhance the significance and relevance with which they view the system (Liu and Lin, 2008). It is when the focus is on the delivery of benefits for stakeholders instead of merely the delivery of an IT system that value is realised (Ashurst and Doherty, 2009).

IT success is reliant on having an effective relationship between business and IS managers, the main responsibility for realising the benefits and deriving value from IT investments lies with the business manager, and the IT department provides the basis to achieve this by the implementation of the IS/IT (Peppard and Ward, 1999). The project team must be composed of people who understand the IS/IT, the business and how IT is connected to changes within the business (Braun et al., 2010), and a lack of people with good experience is an additional impediment of BR (Ashurst and Doherty, 2009). In order to realise the benefits from investments made in IT, enterprise-wide cooperation and engagement is required (Ward and Peppard, 2002). Rather than the technology itself, the key resource in the delivery of value using IT is knowledge, which is dispersed throughout the organisation. A major challenge for project teams when designing and implementing large-scale IT systems is how to organise and incorporate this distributed knowledge (Ashurst et al., 2008).

2.5 Definition of Benefits Realisation

Benefits management focuses on the management of investments' objectives and how these can be achieved with a successful IS/IT implementation (Braun et al., 2010). It outlines explicit practices to facilitate the realisation of benefits from investments made in IT (Paivarinta et al., 2007).

With benefits management, the desired benefits an organisation wishes to realise are identified and quantified in advance so that the organisation can identify and plan the requisite changes in business processes and ways of working to achieve these benefits. (Ward and Daniel, 2006, Bradley, 2006, Ashurst et al., 2008, Irani and Love, 2008). The BR management process manages an IT investment starting at the pre-project evaluation stage and runs through to post-project evaluation. Benefits are linked with outcomes, with benefits dependent on outcomes (Nogeste, 2008).

The benefits management process consists of a set of linked tools and frameworks that facilitate an organisation to use its collective knowledge to produce a benefits realisation plan, and to direct project implementation and the consequent review process (Marchand and Peppard, 2008), (Ward and Daniel, 2006). However, only a minority of organisations have implemented a comprehensive benefits management approach with regard to IS/IT investments (Ward et al., 2007b).

Successful benefits realisation requires an on-going commitment and focus on the benefits throughout a system's development, implementation and operation (Ashurst et al., 2008). A holistic approach of this process must be undertaken in order to ensure that anticipated benefits are actually realised (Ashurst and Hodges, 2010). This cannot occur in isolation in an organisations IT department; to succeed it should take place with and involve active user participation. It must also take into account the business goals of the organisation to ensure that clearly defined goals are defined at the outset of any IT project and actively monitored during the project (Ward and Daniel, 2006) .

Delivery of value from any program of change requires a constant focus on intended benefits if it is to remain aligned with the business goals. The expected high-level goals must be defined prior to programme approval. The identification, profiling, tracking and embedding of benefits is required to deliver value. This includes the need to assess the project risk against the desired outcome to ascertain how best to derive the value (OGC, 2005).

There is no single approach to developing a benefits management strategy; as at a micro-level each organisation is unique, however there are several similar high level steps (Simon, 2003).

2.6 Why is Benefits Management Important?

IS/IT projects are often used to implement corporate strategies and hence support organisational change and development (Braun et al., 2009b). Approximately £100 billion is spent each year in the UK on change programmes. It is assumed that these organisations anticipate that investing in change will improve performance and increase profits (Sapountzis et al., 2007). An organisation can achieve strategic benefits from IS/IT (Ward and Daniel, 2006), and organisational strategy can be implemented through projects. A clear link should be made between the key strategic priorities of the organisation and the project, and this should include agreed metrics of success (NAO, 2004). Success must be effectively planned for, and metrics are required to provide evidence of success (OGC, 2005).

It has been argued that what differentiates high-performing IT departments from others is the way they manage their IT activities, rather than their 'technical wizardry' (Braun et al., 2009a). Benefits management allows for the adjustment of resources and investments to prioritise and deliver the goals of the organisations. It can facilitate the redeployment of resources which have been liberated as efficiencies are delivered, to derive new benefits and minimise unwanted disbenefits. The critical evaluation of

project risks, costs and benefits allows for explicit decisions to be made on which project to approve, which to amend and which to terminate. Properly defined strategic business benefits should be defined prior to project approval (OGC, 2005).

Benefits realisation from investments in IS/IT facilitates an exploration of the organisation as a whole and not merely its IT function (Ashurst and Hodges, 2010). The benefits realisation process represents a holistic view of the benefits-driven approach taking into consideration the people, the processes and the technology (Ashurst and Hodges, 2010).

2.7 Key/Essential Features of Benefits Realisation

To realise the benefits from IT projects there are a number of common processes and stages which should be addressed. These processes and stages are discussed here.

2.7.1 Pre-Project Evaluation (Project selection/identification)

Prior to making any investment in IT, it is important to assess if the investment can be justified in terms of its potential to add value to the organisation. Pre-project evaluation is the process whereby the justification for the IT investment is identified. An organisation should appraise the project and identify the business objectives; these are the statements that define what the anticipated outcome of the project should be (Ward and Daniel, 2006).

It is important to conduct preliminary analysis to ascertain if a project is worth undertaking. Pre-project evaluation is hugely important as the absence of due diligence in the project selection stage could result in an organisation committing resources to a project destined to fail (Frame, 2004). This can be done by incorporating project success planning with organisational strategic management and philosophy (Phelan, 2005) to ensure projects are aligned with the business goals (Shenhar et al., 2001).

Factors such as the size of the project, expected duration, risks and required resources should be considered in the pre-project evaluation (Shtub et al., 2005).

2.7.2 Benefits Identification

Benefits identification is the process whereby the potential benefits which can arise from an IT investment are identified and documented (Bennington and Baccarini, 2004). Organisational benefits from IT-enabled change can occur as a consequence of ceasing certain activities, continuing certain activities but doing them better, or by undertaking new activities (Peppard and Ward, 2005).

This process should identify both tangible and intangible benefits. Tangible benefits are those *"that can be measured by an objective, quantitative and often financial measure"* such as revenue generated from the launch of a new product or cost saving due to discontinuing certain activities (Ward and Daniel, 2006). However some benefits are difficult to identify and/or quantify and can only be measured subjectively based on judgement or opinion. *"These benefits are often described as subjective, intangible, soft, or qualitative"* (Ward et al., 2007a). Because intangible benefits may be difficult to identify (Smith et al., 2008) and can only be judged subjectively, qualitative measures are used for these benefits such as improvements in customer or employee satisfaction (Ward and Daniel, 2006). It is difficult to express the value of intangible benefits as an exact figure (Andriessen, 2002) but the process of trying to estimate them communicates their importance for value creation (Kaplan and Norton, 2004).

In practice, successful programmes consist of both tangible and intangible benefits (Sapountzis et al., 2007). Many organisations find it difficult to pre-define and anticipate all the benefits (Paivarinta et al., 2007) at the outset of a project, as some benefits only become apparent once the system has been implemented (Ward and Daniel, 2006) and some benefits can change and evolve over time (Smith et al., 2008). Emergent or

unplanned benefits can arise from achieving an initial or planned benefit (Ward and Daniel, 2006). However, for each identified benefit a defined metric should be associated with it so that project success can be measured (Thiry, 2007) (Ward and Daniel, 2006). A common practice of organisations is to only quantify those benefits they consider most important (Lederer and Mirani, 1995) in (Braun et al., 2009b).

A common feature with unsuccessful programmes is the 'vagueness' with defining the expected benefits (Reiss, 2006). It is difficult to sustain focus when problems arise if benefits have not been clearly defined. (Sapountzis et al., 2007). Both tangible and intangible benefits need to be addressed in the business case and return on investment (ROI) for intangible benefits may need to be estimated based on assumptions. According to (Bartholomew, 1999) in (Sedera et al., 2001) hard measures such as financial figures can be deceptive as the intangible assets of a business can be worth up to 80% more than the tangible assets.

2.7.3 Benefits Planning

Benefits planning is "*the ability to effectively identify and enumerate the planned outcomes of an IS development project and explicitly stipulate the means by which they will be achieved*" (Ward and Daniel, 2006), in other words the ability to identify and plan how the benefits will be realised .

It is important that a realistic approach is taken when planning benefits (Ashurst et al., 2008). The benefits planning process maps how the implementation of the IT system will convert identified benefits into realised benefits with the business changes required to achieve this (Davern and Kauffman, 2000). Benefits and outcomes are connected and benefits are dependent on outcomes (Nogeste, 2008). It is important to explore and fully comprehend all the implications that the benefits will have on the organisation, some existing processes may need to change, and this will have implications for both the stakeholders and the organisation as a whole.

For each identified benefit it is necessary to create a profile which describes all the aspects relating to the benefits such as the beneficiaries, ownership, measurement, the feasibility of achieving the identified benefits and how it is linked to the project objectives (OGC, 2005). This profile should be updated as necessary to reflect any changes in internal or external dependencies (OGC, 2005).

Once all the expected benefits from an IS/IT investment have been identified and structured and the means of achieving these identified, then any required changes can be defined and responsibility for ensuring benefits delivery and the resulting benefits can assigned (Ward et al., 2007b). Further benefits may be identified during the development and implementation stages; if this happens then the responsible person will have to amend the benefits realisation plan in conjunction with the stakeholders to include the newly identified benefits (Smith et al., 2008),(Ward and Daniel, 2006).

However, an excellent planning process may not lead to the desired outcomes if it is not followed by suitable implementation activities, a suitable mechanism must be set up in order to facilitate implementation (Braun et al., 2009a).

The benefits planning process facilitates the development of a business case. A business case is required to support the decision on whether to make an investment in an IT project. It should also enable the organisation to plan and manage the project to a successful outcome (Ward and Daniel, 2006). Business cases may include both benefits and disbenefits (Nogeste, 2008). A disbenefit is defined as "*an impact, direct or indirect, of ICT, which has an unwanted and negative effect on the performance of an individual or organisation*" (Irani and Love, 2008). Disbenefits are undesired, often unanticipated and almost always unmeasured side effects or results of ICT projects and investments (Irani and Love, 2008).

2.7.4 The Business Case

The business case sets out the rationale for the investment. Defining a business case which clearly identifies the project's objectives and expected benefits will increase the likelihood of successfully achieving the project goals. Project success criteria are defined and linked to the business environment from the beginning of the project with a focus on the outcomes instead of processes (Nogeste, 2008). Business cases may contain benefits and disbenefits (Nogeste, 2008).

A continuously updated business case with adjustments to reflect both internal and external changes to the organisation is necessary to review progress towards the desired outcomes (OGC, 2005).

2.7.5 Measuring the Planned Benefits

Benefits are measured to ensure that projects are delivering returns. A measureable benefit is one whereby a measure exists that can determine improvements in performance after system implementation (Ward and Daniel, 2006). This requires a baseline measurement to be taken prior to project implementation and it may be necessary to have more than one measurement for a given process (Ward and Daniel, 2006).

While some benefits can be relatively easy to estimate, others such as those achieved from changing people's attitudes and behaviour are more difficult. Where possible, benefits should be expressed in financial terms (OGC, 2005). When searching for effectiveness and strategic goals, benefits may frequently be too complex to be expressed and captured by just financial measures (Braun et al., 2009b), interpretive measures such as critical success factors and other subjective methods "*capture benefits in greater variety*" than just numbers (Braun et al., 2009b).

Wherever possible, existing measures should be employed, particularly where they form part of the organisational performance measure such as

Key Performance Indicators (KPI) (Ward and Daniel, 2006). KPIs can facilitate stakeholders to assess whether the planned benefits of IT projects have been delivered. They identify the benefits to measure, and when to measure them (Bennington and Baccarini, 2004). KPIs can also facilitate appropriate action to be taken; they also clearly connect accountability to measured benefits and they assist with project funding (Bennington and Baccarini, 2004). Once the Benefits Realisation Plan has been formally agreed, measurement can begin (OGC, 2005).

After implementation, benefits may not be immediate and there may be a time period needed before a meaningful measurement can be taken. An estimate should be made as to when effects of the change can be viewed as measureable improvements but prior to the benefits becoming obscured by other events or changes (Ward and Daniel, 2006).

2.7.6 Benefits Monitoring

Regarding IT in organisations, requirements are "*dynamic and often preliminary*", regularly changing during the course of a project (Marchand and Peppard, 2008). During a benefits management lifecycle, the likelihood is that organisational drivers will change and this will have a bearing on agreed benefits. It is crucial that a robust process is in place which will accommodate and respond to change (Sapountzis et al., 2007).

Benefits monitoring is defined as the process which "*compares project results with the benefits realisation plan during the project and assesses if internal and external changes have occurred that will affect the delivery of planned benefits*" (Bennington and Baccarini, 2004). Benefits monitoring should occur throughout the lifecycle of a project, especially when particular milestones in the benefits realisation plan are reached (Smith et al., 2008), although this does not occur in practice (Ashurst et al., 2008). It may be necessary to set interim objectives and metrics to assess progress in relation to key milestones (Ward and Daniel, 2006).

An organisation must be capable of successfully monitoring and evaluating the results of their IT projects on a continuous basis (Tallon et al., 2000) to ensure that its capacity to deliver business value is incrementally progressed (Remenyi and Sherwood-Smith, 1999). Monitoring provides a 'feedback mechanism' to assess whether the objectives which will lead to the realisation of benefits are being achieved (Frame, 2004).

2.7.7 Evaluation and Review

A project is not finished once it goes live but rather is at the start of an ongoing process of value-realisation. Managers must ensure the new IT system is effectively used and that it deals with the existing business needs (Marchand and Peppard, 2008). A project should not be considered complete until the reason for its approval has been accomplished (Prananto et al., 2009).

Successful outcomes for IT projects are dependent on the effective use of suitable IT investment, evaluation and benefits realisation methodologies (Liu and Lin, 2008). The benefits from IT investments will only be realised if they are 'measured and managed in a systematic way' (Ashurst et al., 2008).

Benefits reviews are formal sessions whereby stakeholders convene to measure project achievement against targets both during and after project implementation (OGC, 2005). A formal review should be instigated following the implementation of the new technology, systems and business changes to ascertain what has and has not been achieved. The business review seeks to maximise the benefits obtained from the investment and to increasing future benefits (Ward and Daniel, 2006), (Ashurst and Hodges, 2010). An organisation must perform an evaluation and review in order to measure how well it is managing the benefits from its IS/IT investment projects (Ward et al., 2007b). The review measures the success of a project in relation to its potential benefits, the benefits delivered, and the detection of methods and means whereby further benefits might be achieved (Ashurst

et al., 2008). These reviews can also help identify reasons why intended benefits were not delivered, and provide information to assist improved management of future projects (Ward and Daniel, 2006). The timing of a review is important as in many cases the full potential of an application is not apparent until it is fully operational and stakeholders are experienced in using it (Ashurst et al., 2008).

Post-implementation reviews should not look for scapegoats or become a 'witch hunt' for failed initiatives or a way of apportioning blame for past failures. Instead they should be objective processes with a view to providing future improvements (Ward and Daniel, 2006). When justifying project success, the analysis must be thorough, comprehensive and agreed by all key stakeholders (Reiss, 2006).

However few companies conduct post implementation reviews (Peppard et al., 2007) and organisations do not conduct benefits reviews "*consistently or effectively*" (Ashurst and Hodges, 2010). In practice, usage reviews are often not performed or performed badly despite research showing a strong association between project success and organisations that conduct project retrospectives (Marchand and Peppard, 2008). In addition to a lack of resources for evaluating qualitative benefits, adequate competencies for these types of evaluations have not yet been established in most organisations (Braun et al., 2009a).

One feature which differentiates between successful and less successful organisation in IT deployment is the performance of a post implementation evaluation and review of benefits (Ward and Daniel, 2006). Findings by Ward et al (2007b) support the view that successful organisations – those with a higher percentage of project delivering expected benefits – are those organisations which adopt a comprehensive approach managing benefits from their investments in IT projects. These organisations are more likely to undertake the activities outlined in Table 2-1 which shows the five most differentiating practices between the more and less successful organisations.

Table 2-1 Top-five most differentiating practices (Ward et al., 2007b)

	Difference
Transferal of lessons learned	+42%
Evaluation and review of organizational change	+32%
Development of benefits delivery plans	+26%
Evaluation and review of benefits delivery plans	+24%
Development of organizational change plans	+23%

In a survey of enterprise resource planning (ERP) projects, 89% were deemed to be successful as the software worked and the project was implemented close to time and budget yet only 25% had realised the intended business benefits (Peppard and Ward, 2005).

2.7.8 Organisation Learning

A post project evaluation determines how successful an IS/IT project has been, and it also reveals potential for future improvement. It enables managers to better understand why some benefits may not have been realised and what actions may be useful in future projects (Braun et al., 2009b). Organisations need to learn from previous projects by conducting reviews which evaluate the project based on time, cost and product and also its *'use, learning and value'* (Marchand and Peppard, 2008). The ability of an organisation to continuously learn from both realised and non-realised benefits is key to maintaining sustainable competitive advantage (Senge et al., 2004).

Exploiting lessons learned from previous IT investments is vital to increasing the value derived from future IT investment. However, this will not occur unless formalised reviews are conducted and incorporated as essential parts of the process (Ward and Daniel, 2006). In many organisations, exploiting the benefits from IT investments is largely *"left to chance"* (Ashurst and Hodges, 2010).

2.8 Benefits Realisation and the Public Sector

For all sectors of the economy, successful utilisation of IT to facilitate business change and the realisation of benefits is an important driver of organisational performance (Ashurst and Hodges, 2010) and this includes the public sector. IS/IT is now an integral part of service delivery and a key resource in the public sector; it permeates practically all functional areas in public sector organisations (Jones, 2008). A report by the National Audit Office in 2006 identified that IT enabled business change and its successful delivery is necessary to improve public service (NAO, 2006).

2.8.1 Public Sector Challenges v Private Sector Challenges

The challenges faced by public sector organisations are different to those faced by the private sector (Cilek et al., 2004). The public sector has many conflicting and frequently intangible objectives (Caudle et al., 1991). For profit making organisations the aim of an investment, in addition to improving organisational performance, is ultimately to increase profits. This focus on increased profits is not necessarily applicable in the public sector where benefits are measured in relation to value for money and service quality (Sapountzis et al., 2007).

While use of the benefits management process is similar to that for private organisations, there are business drivers unique to the public sector such as government policies or the need to meet specific targets by a given deadline, whether or not this is possible or appropriate for the organisation (Ward and Daniel, 2006). For organisations in the public sector, the drivers tend to be related to service provision and the provision of value for money (Ward and Daniel, 2006). Public sector organisations may be legally obliged to provide services regardless of the associated economic factors and provide services in areas where '*no kind of market exists*' (Cilek et al., 2004), or the problems have no known feasible answer such as solving issues like poverty or crime (Caudle et al., 1991). Public sector projects often have a wider array of stakeholder groups including the general public

(Ward and Daniel, 2006) often with very different and often conflicting perspectives (Liu and Lin, 2008). Benefits realisation may be dependent on changes in how these external stakeholders access, utilise or contribute to services (Ward and Daniel, 2006). For IT projects such as e-government services, usage is a key determinant of benefits realisation, benefits realisation can be accelerated by increasing usage rate (Markov, 2006). Public sector projects must be all-inclusive and ensure all sections of their community are appropriately served (Ward and Daniel, 2006).

Public sector organisations differ to private sector companies in a number of areas including: environmental factors such as less exposure to the markets, more legal and formal constraints, increased political influence and inputs from interest groups; organisational/environmental transactions such as sanctions, government powers and actions for the '*public interest*'; and internal structures and processes such as more politics, no ultimate authority, difficulties with incentives, lower organisational commitment and work satisfaction (Caudle et al., 1991). They may be subject to constraints not imposed on private sector companies such as staffing levels and other government policies. Reduced staffing requirements as a result of efficiencies gained by the introduction of new technology, may not translate into actual staff reductions, due to legal or political restraints which may prevent laying off staff (Cilek et al., 2004). Additional government policies may be incorporated into the IT decision making and development process. This is illustrated in by Graham and Scarborough, (1997) who cite an Australian example regarding IT outsourcing. Here the pursuit of regional development objectives was linked to the outsourcing of IT, which was included as a criterion in the evaluation process for the IT outsourcing contract (Graham and Scarborough, 1997).

2.8.2 Benefits Management in the Public Sector

Public sector organisation are one of the world's biggest spenders on IT (IBM, 2006) yet there is a lack of understanding regarding appropriate

evaluation of IT investment (Liu and Lin, 2008). IS evaluation has traditionally been neglected in the public sector (Jones, 2008) and IT investment evaluation methods are not widely used (Jones and Hughes, 2001). It is poorly documented whether benefits management and benefits realisation approaches work well in public sector organisations (Flak and Grönlund, 2008). Research by Forrester Research in 2006 indicated that only 55% of public sector organisations planned to increase their efforts in evaluating their IT by increasing the measurement of IT's impact on business performance (IBM, 2006).

Uncertainty and unpredictability have been linked with IS cost and benefit assessments in the public sector and while there have been successes with government IS projects there have also been many costly failures and value for money issues (Jones, 2008). There can also be variability in public sector guidelines, whereby issues such as performance monitoring and evaluation may be given different priority levels in different jurisdictions (Sullivan and Ngwenyama, 2005).

A study of public sector government agencies in Norway demonstrated that benefits management can be useful in e-government projects and benefits from these projects can be achieved. In retrospect, approximately 80% of managers surveyed considered their early quantifications of expected benefits to be realistic. Another finding was that these managers consider a benefits management approach contributed to projects becoming more focused and they anticipated continuing to work with a benefits management (BM) approach. It should be noted however, that in this study the benefits are based on estimates rather than actual measurements (Flak and Grönlund, 2008).

In Ireland the need to reform public healthcare to provide greater efficiencies and measurable returns on investment led to the Personnel Payroll and Related Systems PPARS project (Sammon and Adam, 2008). However, this project was unsuccessful, the planned national rollout was suspended in 2005 (Purcell, 2005) and it led to a parliamentary inquiry. The Comptroller and Auditor General outlined a number of reasons for this

project's failure including a lack of preparedness, failure to develop a clear vision and a lack of readiness in the health agencies for the change management agenda (Purcell, 2005). From the start this project was viewed as an IT project and the project lacked focus and specific business goals. In addition, the project was poorly organised and it never obtained the required level of professionalism and leadership (Sammon and Adam, 2008). Inadequate monitoring and evaluation of IT projects is a frequently cited reason for the failure to realise benefits from IT investment (Sullivan and Ngwenyama, 2005).

2.9 Current Constraints on the Irish Public Sector

Economic turmoil experienced both nationally and internationally has added to the pressures on the Irish public sector. The current financial crisis has permeated all aspects of Irish life. Ireland is now faced with bridging a large deficit in the public finances through a combination of reducing the amount of services, cutting pay rates and reducing the numbers employed (Hardiman, 2009). This crisis has refocused attention on increasing efficiencies in the public sector. The Irish government has responded to this crisis through the issuance of a number of strategic documents.

In 2008 an OECD report on the Irish public service found that there was significant potential in the Irish public sector to increase value for money and to achieve better quality and more efficient services for citizens. According to the OECD's report, developing new ways of working and promoting closer connections between the different parts of the Service is instrumental to achieving this potential (OECD, 2008). The Task Force on the Public Service and Government statement on Transforming Public Services report was established to respond to the findings and recommendations contained in this OECD report. The report of the Task Force recommended specific actions and set timescales for these actions to be implemented. These timescales covered a three-year period. The Irish government agreed to implement these actions in a "what amounts to a

radical transformation of the Public Service” (Report of the Task Force on the Public Service, 2008).

The Report of the Special Group on Public Service Numbers and Expenditure Programmes examined exchequer spending across all government departments and agencies, to ascertain where expenditure and staff savings might be achieved and to make recommendations. In total this group made 43 rationalisation recommendations (McCarthy et al., 2009).

The Public Service Agreement 2010 – 2014 (PSA) between the government and trade unions representing public service workers is designed to support the continued delivery of excellent public services in a climate of reducing resources and decreasing staff numbers. Public sector staff have received a commitment from government that there will be no pay cuts imposed during this timeframe. While no compulsory redundancies will be sought and vacancies which arise will not be filled. Under this agreement both parties accept the need to maximise savings and efficiencies and *“productivity in the use of resources greatly increased through revised work practices, organisational restructuring, innovations and other initiatives”* (Department of the Finance, 2010).

There is a constant pressure to reduce spending and yet provide improved or at least the same quality service in the public sector (Pekkola and Wideroos, 2010), (Cilek et al., 2004). In Ireland, change is actively being pursued so that a reduced civil service can meet demand with less staff numbers operating in fewer organisations and from fewer locations *“where the performance of organisations and individuals is better managed and measured, and where there is greater accountability for delivery”* (Department of the Finance, 2010).

2.10 Benefits Management/Realisation Methodologies

There is a range of approaches to benefits realisation and a number of models have been devised and developed to assist managers and decision-makers to realise the benefits from IT investments. These include Active

Benefits Realisation (ABR) (Remenyi and Sherwood-Smith, 1998). The Cranfield Process Model of Benefits Management (Ward and Daniel, 2006), the Benefits realisation capability model–Competencies/practices approach (Ashurst et al., 2008).

A summary of some of these models and others is provided in Appendix 3 as outlined by (Nogeste, 2008) and Appendix 4 (Sapountzis et al., 2009). Rather than focusing on the IT itself these approaches focus on organisational and business changes. The realisation of benefits is associated with change management within the organisation. For this research the researcher is incorporating the use of the Cranfield model.

2.10.1 The Cranfield IT Benefits Management Model

The Cranfield model is one of the first and mostly widely cited and used benefits management approaches (Braun et al., 2009b). This model presents an approach which assists managers to identify, plan for and deliver benefits (Peppard et al., 2007). This model provides a lifecycle approach to BR, consisting of pre-investment assessment, post-implementation evaluation and the process of actively planning for and managing benefits realisation throughout the project (Ward et al., 2007b) until these benefits are ultimately realised (Braun et al., 2009a).

This model's simplistic layout illustrates the interrelationships between the main elements for effective benefits management (Sapountzis et al., 2007). This model is clearly articulated and provides a framework and tools to graphically represent the benefits management process. This approach focuses on new ways of working and organisational change in conjunction with IT to plan for and ultimately the realisation the business benefits (Peppard et al., 2007).

The model is comprised of five stages as outlined in Figure 2-1, these stages are organised in an iterative manner. This model's five stages are comprised of identifying and structuring the benefits; planning the benefits

realisation; executing the benefits realisation plan; evaluating and reviewing the results; and discovering potentials for further benefits (Marchand and Peppard, 2008). The role of IT in the benefits realisation process is identified as a problem solving role or an 'enabler' whereby IT is utilised in innovative, new or different ways to achieve gains for the organisation (Peppard et al., 2007).

At the start of any project it is necessary to identify the potential and expected benefits of the investment, and to plan how these benefits will be realised (Peppard et al., 2007). Changes required on the part of project stakeholders must be identified as well as ways of measuring the benefits. Once the benefits realisation plan has been implemented, it is vital to monitor the benefits and compare benefits outcomes with benefits expectations, identify and transfer lessons learned and identify any new benefits from the project (Ward et al., 2007b).

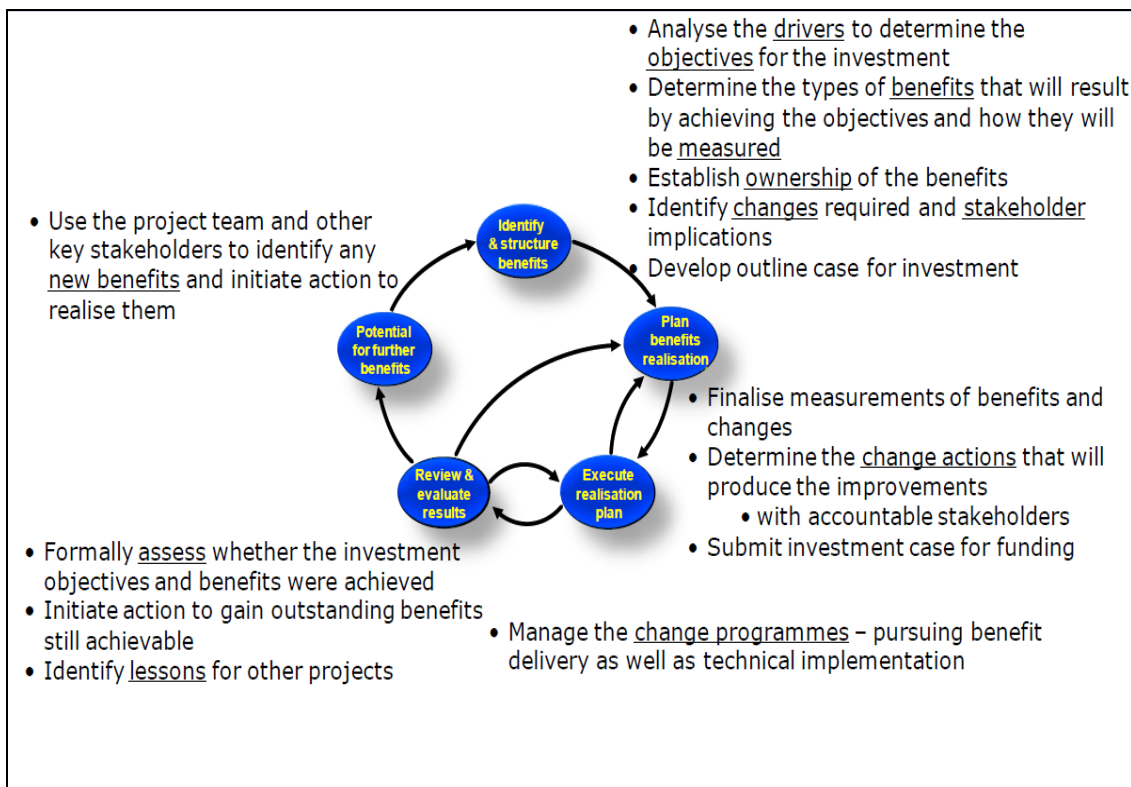


Figure 2-1 Overview of the Cranfield BM Process (Peppard, 2010)

The Cranfield model employs several tools and techniques to map benefits and how these can be achieved. A framework is provided to develop the business case, this framework structures the benefits in terms of the type of business change required; such as to do new things, do things better or to cease doing certain things. In addition it seeks to differentiate the benefits in terms of 'degree of explicitness' such as whether they are financial, quantifiable or observable (Ward et al., 2007a). Tools provided include Benefits Dependency Network (BDN), Stakeholder Assessment and Stakeholder Analysis (Peppard, 2010)

The BDN provides the framework to map the relationship between the investment objectives, the benefits, the business changes required, enabling activities and the IT functionality to enable and support the business changes delivery. The BDN identifies and links the dependencies and thereby clarifies the relationships between them. It maps how the benefits will be realised if the dependencies are met. Ownership of the benefits, business changes and enabling activities are assigned to individuals or stakeholders who are responsible for delivering the required changes and/or have a vested interest in delivering the change (Peppard, 2010). An example of BDN map is outlined in Figure 2-2.

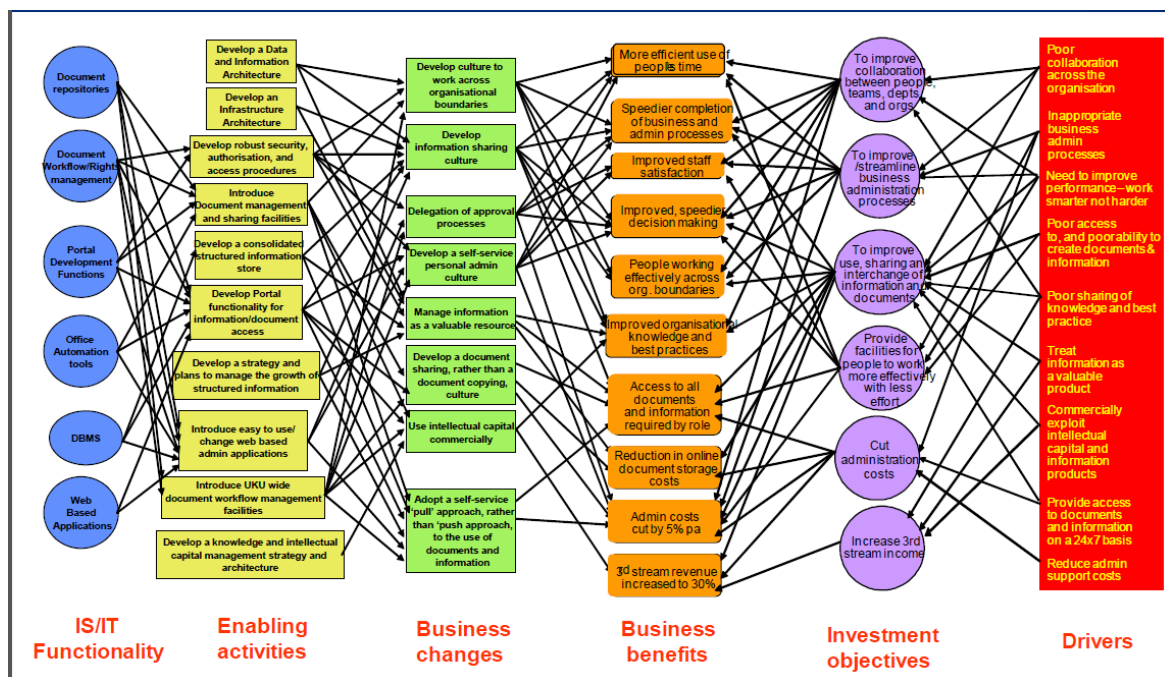


Figure 2-2 Example BDN Map (Peppard, 2010)

A stakeholder assessment helps determine the feasibility of achieving changes. Stakeholders are considered in terms of the level of benefits they will receive versus the level of change they are required to make and are then categorised into one of four groups. A stakeholder assessment outlining these four groups is shown in Figure 2-3.

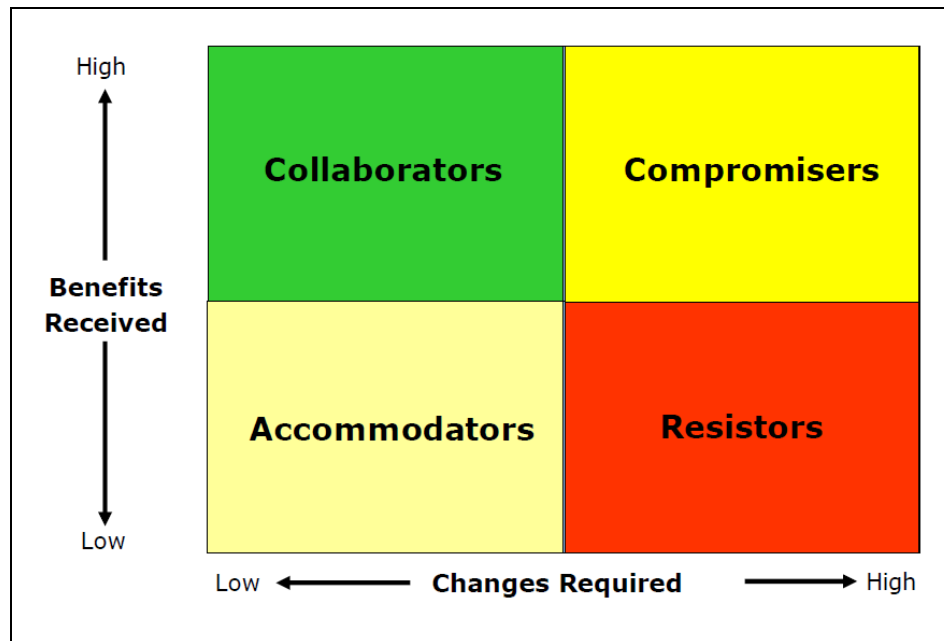


Figure 2-3 Stakeholder Assessment : Changes and Benefits (Peppard, 2010)

Once stakeholders have been identified and categorised, actions are required to deal with the resulting project risks. A stakeholder analysis identifies the level of commitment of different stakeholders, the project risk and possible barriers. It outlines stakeholders and stakeholder groups, their perceived benefits/disbenefits, the changes required and whether there is any perceived resistance. A stakeholder analysis provides a graphical representation of stakeholder perception of the level of benefits in relation to the amount of change required by them, and helps to assess their current and required commitment (Peppard, 2010). A stakeholder analysis template is presented in Figure 2-4.

Stakeholder Group	Perceived Benefits (Disbenefits)	Changes Needed	Perceived Resistance	Commitment (Current & Required)				
				Anti	None	Allow it happen	Help it happen	Make it happen
List of stakeholders and stakeholder groups:	Individual, group & organisational benefits for each stakeholder or group	Changes to be made by, or which affect, each stakeholder or group	Resistance of each stakeholder or group (if applicable) and the reason(s) for it.	Are against the project & will attempt to stop it or hinder progress	Are either unaware the project is going on or do not think it affects them	Will comply, when requested to do tasks required by the project, e.g. attend training	Will provide knowledge, time & resource to ensure the project meets objectives & time-scales	Will instigate, oversee or carry out changes and ensure that all relevant changes are completed successfully
						C → R		
						C → Action? → R		
						C → Actions? → R		

Figure 2-4 Stakeholder analysis and required actions (Peppard, 2010)

In the Cranfield model for benefits management the overall business benefits set is identified and structured. Each benefit is identified along with its business measures (both financial and non-financial), benefits delivery responsibility and the benefits realisation schedule. Stakeholders whose involvement is required to achieve each benefit are identified and the view of each stakeholder regarding benefits and change is determined.

2.11 Conclusion of Literature Review

This chapter has discussed the features and stages of BR. It has defined BR and outlined the importance for any organisation that its investment in IT is well justified and that it creates a significant value to the organisation. BM is a process for maximising the benefits from change programmes. It is a process which entails defining, agreeing, measuring and reporting on the expected benefits. However, the clear identification of business benefits does not guarantee their delivery. The reason for this is that in addition to delivering the technical functionality, delivering business value relies on redesigning business processes, organisational structures and the working practices of the users. When planning benefits realisation, organisations

need to understand the relationships between IS/IT investments, the ensuing changes in the organisation, and the measureable benefits (Braun et al., 2009a).

To successfully implement benefits realisation, it is vital to integrate it into the organisation's strategy and culture, and at the same time take into account factors which are external to the organisation. Some of the unique features of achieving BR in public sector organisations have been discussed including some of the recent constraints placed on the Irish public sector.

This chapter has outlined some features and tools of a BR model - the Cranfield model - this model will now be applied into the work processes of the NDRDI to seek greater efficiencies.

3 Methodology – Benefits Realisation Process

This research sought to determine how staff in the NDRDI could maintain existing services while achieving greater efficiencies in the current era of government imposed staff and budgetary cuts in the public sector. The literature review has determined that a BR process provides a comprehensive and systematic set of tool and techniques to manage the delivery of benefits and the researcher sought to apply this process to the NDRDI.

This chapter describes how the research was conducted. It provides overview and background information on the NDRDI, outlines the environment in which the NDRDI operates and provides an overview of the data collected. The rationale for incorporating BR to plan for increased efficiency is described. Focus group meetings are convened and a review of work processes in the NDRDI is conducted using BR tools and techniques. Areas where improvements could be achieved and additional benefits elicited are identified. The application of the Cranfield BR methodology to a work process in the NDRDI is outlined.

3.1 National Drug Related Deaths Index (NDRDI) – Overview, Background and Aims

The NDRDI is funded by the Department of Health and the Department of Justice and Equality (HRB, 2010a). It is an epidemiological database which provides a census of drug and alcohol related deaths and deaths among substance users in Ireland. The NDRDI was established in September 2005 to comply with Action 67 of 'Building on Experience: National Drug Strategy 2001-2008' (Department of Tourism Sport and Recreation, 2001) with the aim of developing an accurate instrument to record the number of deaths in Ireland which are drug-related (Lyons S et al., 2008).

The aims of the NDRDI also include the identification and prioritisation of areas for intervention and prevention and the measurement of the consequence of these interventions (Bellerose et al., 2010). The information collected by the NDRDI is used to develop "*health and social service responses*" intended to reduce the number of deaths (HRB, 2011a). Data from the NDRDI were used to inform the current National Drugs Strategy and the development of the proposed National Overdose Prevention Strategy (Bellerose et al., 2010).

The NDRDI is managed by the HRB. The HRB is the lead agency supporting and financing health research in Ireland (HRB, 2009). The HRB maintains five national health information systems including the NDRDI. The information systems of the HRB ensure the availability of valid and reliable data which is used by researchers, policy makers and for decision-making among service planners (HRB, 2010b).

The HRB is the Irish national Focal Point for the European Information Network on Drugs and Drug Addiction, which is coordinated by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). The EMCDDA was set up in 1993 and it is the central reference point for drug information in the EU. It is based in Lisbon and its role is to provide the EU and its member states with objective, reliable and comparable information on drugs and drug addiction (EMCDDA, 2009a). The HRB works in close collaboration with the EMCDDA, other Focal Points, and national partners to standardise data collection in the EU. Standardised data facilitates valid comparisons to be made about current patterns and emerging trends in drug use in Europe.

One of the EMCDDA's key indicators to measure the consequences drug situation in Europe, is drug and alcohol related deaths among substance users (EMCDDA, 2009b). The EMCDDA collects information on drugs use and its consequences from European countries (EMCDDA, 2009a). To facilitate the provision of reliable and comparable information, the EMCDDA has devised the infrastructure and tools needed to collect country specific data in a harmonised way. The EMCDDA protocol for the data collection,

validation and analysis was developed and validated by European experts and it establishes harmonised criteria for the data extraction process and data reporting. The EMCDDA has recommended that countries establish a special register to record drug related deaths, whereby data is collected from more than one source (EMCDDA, 2009a).

The NDRDI is contractually obliged to submit data on drug-related deaths to the EMCDDA and the strict rules and guidelines must be followed and adhered to by the NDRDI in this data submission (NDRDI, 2011). Only aggregated data is reported to the EMCDDA and this data is reported on an annual basis. The reporting requirements are outlined in Appendix 7.

3.2 NDRDI Data

The NDRDI collects data on cases where death has occurred as a consequence of drug and/or alcohol poisoning, it also records case of deaths among drug users and those who are dependent on alcohol (HRB, 2010a). Information is recorded on both accidental and intentional death such as those due to an overdose, and deaths among substance users due to conditions such as hepatitis C or HIV (HRB, 2011a).

The NDRDI collects data on drug-related deaths irrespective of whether the individual is dependent on the substance. For each case information is collected on the characteristics of the victim and the substances that caused the death. Information collected includes demographic information, history of drug and alcohol use, drug using risk behaviour, medical history, circumstance under which death occurred, cause of death and toxicology (Lyons S et al., 2008). The absence of a documented history of drug dependence or drug use for some cases, results in an *“under-recording of the total number of non-poisoning deaths in the drug-using population”* (Bellerose et al., 2010).

3.2.1 NDRDI Data sources

An electronic form is completed for each drug and alcohol-related death and death among substance users. To ensure that the data is complete and accurate, data is collected from a number of sources. Collection of data from a number of sources maximises the available information on each case and ensures completeness.

The Coroner Service provides data on cases following a post-mortem or inquest. NDRDI staff visit the 48 coroner districts in Ireland and collect data from 44 individual coroners' files. Data is collected on-site and NDRDI staff enter this data onto the NDRDI database stored on laptops (Lynn E et al., 2009). The Hospital In-Patient Enquiry (HIPE) scheme provides data on cases who died in hospital. NDRDI staff visit 61 hospitals each year and download electronic data onsite in each hospital from the HIPE system (Lynn E et al., 2009). Data from the Central Treatment List (CTL) and General Mortality Register (GMR) are submitted in electronic format to the NDRDI and is uploaded to the database (Lynn E et al., 2009). The CTL provides information on clients receiving methadone in Ireland, the GMR contains information on all deaths occurring in a country based on mandatory death certificates (HRB, 2010a).

3.2.2 NDRDI Database

The NDRDI database was originally set up in 2005 to facilitate data entry by NDRDI staff on site visits to coroners. Data collected includes demographics, socioeconomic, history of drug and alcohol use, history of imprisonment, treatment, toxicology. The main source of data is the coroner's files. This data is stored electronically on the NDRDI database which is a password protected specially designed database (Lyons S et al., 2008). Data from the CTL, HIPE and GMR submitted in electronic format to the NDRDI is uploaded to the NDRDI database.

As personal identifier information is stored in this database, the database is password protected with access is strictly limited to members of the NDRDI team. A password has been created to lock each identifier variable while the data is in transit or storage. Access to this information is restricted to members of the NDRDI.

3.2.3 Data Matching

As data is collected from a number of sources it is necessary to remove duplicated records. Currently there is no unique number assigned to individuals accessing health and social care in Ireland which would enable the accurate identification of individuals. Therefore cases are cross-matched from the different data sources. A range of variables, including name, gender, county of residence, date of birth and date of death are used to match the data (HRB, 2010a).

3.2.4 Confidentiality of Participants Medical Records

Once matches are identified and the data has been validated for each reporting year, identifier information such as the names of the deceased, initials and street names are removed from the database. For the purpose of reporting data, when there are four or less cases of a sensitive or rare condition, this data is grouped with other data to ensure that no individual can be identified.

3.3 Why adopt a Benefits Realisation Approach?

BR is useful for promoting and opening dialogue between management and users regarding their requirements. Through its tools and techniques it provides a systematic approach to the developments and changes required for an organisation to work more efficiently. Incorporating users in the process allows them a platform to voice their opinions, experiences and concerns. It is important for all stakeholders to view this process as a tool

for change and improvement and highlight how the users can benefit from this approach rather than simply viewing it as an academic exercise and another administrative task imposed on them by management.

The tools and techniques of this process facilitate the documentation of benefits in a clear and concise manner and in graphical form which is simple to view and comprehend. The process can clearly identify benefits, changes required, IT enablers required to achieve the benefits, and can align these to the overall organisation goals.

This research presents an opportunity for all stakeholders to incorporate the BR process into their normal working environment and to move it from theory into practice for the benefit of all stakeholders. It will assist NDRDI staff to view this as a tool/technique at their disposal to clearly and succinctly articulate their working environment and the demands placed upon them in their working environment.

3.4 Structure of the Research

The literature review identified and outlined some of the tools and techniques of the Cranfield BR model that can be used to conduct a BR process. The researcher sought to incorporate this methodology in the research project in order to re-examine the current work processes in the NDRDI with the aim of deriving new or improvements to these existing processes. It was envisaged that this would assist the NDRDI to achieve greater efficiencies and assist staff meet their work targets. An area for improvement, identified during the BR process would be chosen for IT automation in order to achieve the identified benefits. It was anticipated that this process would facilitate the continuation of a quality service in spite of dwindling resources and added pressures currently faced by the NDRDI and assist staff to meet the increasing workload demands in an era of budget and staff cuts.

3.4.1 Research Data collection Overview

Due to the nature of the research question, data collection was split into three distinct phases. These phases would consist of the incorporation of the Cranfield BR methodology to identify and plan for benefits; a software requirements specification (SRS) process and build; and a third phase comprising of an evaluation of the newly constructed software tool and any associated benefits.

The starting point would be to convene focus group meetings with NDRDI staff, where the work processes of the NDRDI would be examined in order to identify processes where changes were warranted. Based on outcomes from these meetings a work process would be selected for IT automation. An IT software tool would then be constructed based on requirements agreed with NDRDI staff. Once functional this tool would be evaluated to ascertain if it met with requirement and to identify whether any benefits were achieved. The primary method of data collection in this research would be through focus group meetings and staff discussions.

3.4.2 Preparation for the Benefits Realisation Process

The first process was to undertake a BR process to examine the current workings of the NDRDI and to identify processes where changes were warranted and which could be accomplished within the timeframe of this dissertation. In order to do this the researcher required focus group meetings with NDRDI staff. However, ethical approval to conduct the research was required before focus group meetings could take place.

3.4.3 Ethical Approval

Prior to commencing this research project it was necessary to obtain ethical approval from Trinity College Dublin (TCD). An application was submitted to

TCD consisting of research aims and objectives, participant selection criteria, an overview of the proposed research and how the research would be conducted. A copy of the information sheet supplied to participants is shown in Appendix 1. Consent forms were provided for participating staff and strict confidentiality for participants was assured (see Appendix 2).

As this research entailed the co-operation and active participation of NDRDI staff the issue of approval in the HRB was also addressed. An investigation into the approval requirements for the HRB indicated that as the researcher is a HRB staff member, the researcher was bound to uphold confidentiality by the terms of her contract of employment and therefore possibly did not require additional approval. Nevertheless written approval was sought and obtained from the HRB to conduct this research. The primary research commenced upon receipt of approval from both the HRB and TCD.

3.4.4 Establishing the Benefits

As previously stated, a data collection software database is in place to record data for the NDRDI, this system is built using Microsoft Access. This NDRDI database was set up to facilitate data collection in the coroner's office and is considered to adequately meet this requirement.

The starting point for focus group meetings would be to examine the potential of increased automation and to document this potential. The process would commence with the seven questions as outlined in the Cranfield BR process, which are:

1. Why do we need to improve?
2. What improvements are necessary or possible? These must be agreed by the key stakeholders and become investment objectives.
3. What benefits will be realised by each stakeholder if the organisational objectives are achieved? How will each benefit be measured?

4. Who owns each of the benefits and who will be accountable for its delivery? The benefit owner will be responsible for the value assigned to the benefit in the business case.
5. What changes are required to achieve each benefit? This is the key to realising benefits by identifying explicit links between each of the benefits and required changes.
6. Who will be responsible for ensuring each change is successfully made?
7. How and when can the changes be made? This necessitates an assessment of the organisation's and specific stakeholder group's ability and capacity to make the changes (Peppard et al., 2007).

3.4.5 The BR Tools

Throughout the research the tools of the Cranfield BR model would be utilised. At the conclusion of the benefits identification and planning phase of the research the following documents will have been produced:

1. Benefits dependency network (BDN) indicating the business objectives to be addressed, the desired benefits, the business and enabling changes and the IT enablers required to deliver these benefits for the process under review.
2. A Benefit Template document outlining measures for the desired benefits and evidence identifying how delivery of the desired benefits will be measured, how evidence of the required changes will be demonstrated and the identification of the benefit and change owners.
3. The Benefit template will also detail how the benefits will be measured and who owns them.
4. This document will also incorporate detailed information on each of the required changes including how evidence of their delivery will be established and who has responsibility for their delivery.

The process of achieving these deliverables by planning the benefits realisation process forms the first phase of this research.

3.5 Focus Group Recruitment

As illustrated by the literature review, stakeholder involvement is essential when changes in work practices are being introduced. The research question required the involvement of staff working at the functional level of the NDRDI and this staff involvement is key to this research. The current staff compliment in the NDRDI is 2.23 full time equivalent staff, comprising of three individual staff members. These include a Senior Researcher (SR), Research officer (RO) and a Nurse researcher (NR). As this is a small unit it was necessary to invite all NDRDI staff to take part in this research.

Each staff member in the NDRDI plays an active role and engages in all functional areas in the NDRDI, including data collection, data matching, data validation and data reporting. Therefore, all NDRDI staff members have an understanding to varying degrees, of all the functional tasks within the unit. Due to the nature of the work, a high level of medical knowledge is required by staff to work in this unit, in addition to other qualifications all current member of the unit are medically trained and all current members have a nursing qualification.

NDRDI staff were contacted and invited to participate in this research. Each staff member received an information pack which outlined the purpose of the research, and provided an explanation of how and why the research was being undertaken (see Appendix 1). This pack included a consent form for the staff member to sign, indicating their agreement to partake in the research (see Appendix 2). Written consent for participation was obtained from all NDRDI staff members. Focus group meeting took place in February and March 2011.

3.5.1 Focus Group Meeting Structure

For this process the researcher organised three focus group meetings with the NDRDI staff. Existing work processes in the NDRDI were re-examined and the staff met to produce a Benefits Realisation Plan to outline the

objectives of the NDRDI. The focus group sessions were designed to facilitate the sharing of ideas and experiences and culminate in the production of a BDN. In addition a consensus was required to select and agree a process for IT automation.

The nature of the work commitments of the NDRDI require that staff must work off site for periods of time to collect data from the coroners offices, this requirement had the potential to preclude full staff attendance at focus group meeting and impact on the scheduling of meetings. NDRDI staff spend approximately 60% of the year work off-site (NDRDI, 2011). While it was initially envisaged to organise workshops at a time when all staff members were available to attend, it quickly became apparent that external data collection requirements of the unit may preclude staff member attendance. It was agreed that meetings would be scheduled to coincide with when staff were present in the office and the number of sessions required would be minimised. Staff would also receive documentation via email prior to each scheduled meeting to allow them time to familiarise themselves with this information prior to the focus group meeting.

Staff recognised the importance of the process and the potential for benefits to their work. It was agreed with the staff that the research would be conducted as follows:

- Meetings/workshops would convene with available staff members.
- All staff including any absent members would be provided with minutes and notes for their consideration.
- Feedback would be provided both to and from any absent member via email and discussed upon their return to the office.
- Any decisions made during meetings would be relayed to those absent, whose agreement/disagreement would be sought.
- Any findings would only be published with agreement from the entire group.

The content of the focus group meetings would consist of:

- A review of current processes in the NDRDI.
- Prioritisation of imminent requirements – those deemed more urgent by staff.
- Selection of best ideas for improvement and automation.
- BDN map preparation.

3.5.2 Focus Group Meeting 1

Consent was obtained from all participants prior to the first meeting. In this meeting the researcher outlined the purpose of the research and presented an overview of BR. An exploration of the current work processes, the current system, the desired benefits from this system and how these relate back to the high level objectives of the unit was conducted during this focus group meeting.

The review of the NDRDI focused on four areas which represent the four key areas of concern for the unit. These are Data protection and ethics; Completeness (ideal coverage 95%); Accuracy (quality 95%); and Dissemination. Discussions now focused on these four key areas and where within each area that additional benefits could be elicited.

The area of dissemination was identified by the group as currently the area with the greatest potential for introducing improvement within the timeframe of the research. The key improvements could be achieved through automation in order to do things better and reduce the burden on staff to meet deadlines. Automation was viewed as the key area whereby considerable efficiencies could be achieved within the timeframe of the research project. Focusing on the area of dissemination, a flipchart was used to record all of the benefits identified by the group and an attempt was made to identify appropriate measures for these benefits. It is necessary to identify measures associated with each identified benefits as *'if a benefit cannot be measured and it has no owner then it doesn't exist'* (Peppard, 2010).

Further discussion identified two distinct areas in this category for possible inclusion in the research; these were identified as the automation of reporting requirements to the EMCDDA, and the introduction of interactive web tables to facilitate the availability of data to outside bodies.

Based on the focus group meetings, it was decided that the main priority to pursue was the automation of reporting requirements to the EMCDDA with the ultimate aim of developing a software tool to automate this process. Staff reported that this manual process caused frustration as it requires staff to manually type data onto the EMCDDA website which already exists in electronic format.

3.5.3 Focus Group Meeting 2

This session focused on the identification of project objectives, business benefits, benefit measures, the ensuing required business and enabling changes and the IT enablers sought. A flipchart was used for to record ideas. This was a lively session with full staff participation and staff engaged wholly in the process. Following this session the researcher began the task of constructing the BDN and documenting the benefit measures and change owners.

3.5.4 Focus Group Meeting 3

Prior to the third session a preliminary BDN was distributed to participants via email for their consideration. This BDN was then the starting point for the discussions in this session. The BDN was debated, and required modifications and amendments were noted for inclusion in the next draft. The identification of benefit owners and change owners was discussed and finalised, as was a timetable for the implementation of the requisite changes. It was agreed that the researcher would document the revisions and distribute the revised documents to the participants. Discussion also ensued on how to proceed once the BR process had been concluded.

A further meeting was scheduled to discuss the software requirements for the EMCDDA reporting automation tool.

3.6 The Final BDN, Stakeholder Assessment and Stakeholder Analysis

Following the completion of the scheduled focus group meetings a number of documents had been generated. These documents are outlined here and include a BDN map, a stakeholder assessment and a stakeholder analysis.

3.6.1 The Final Benefits Dependency Network

The group was asked to identify benefits associated with the proposed automation of the EMCDDA reporting requirements and to identify appropriate measures for each benefit outlined, to identify changes required to achieve the benefits and to identify the associated change owners. Initially the benefits were written on post-its. As the process progressed an outline of the BDN map was documented using the free drawing package DIA (DIA, 2010) and this process took place using the computerised BDN version.

The researcher incorporated the creation of a Microsoft excel template which listed each of the seven questions of the Cranfield BR process within a table as developed by (Bellew, 2010). This document is shown in Appendix 5 and it proved very useful in documenting the process and ensuring that all aspects were adequately addressed.

The BDN was created using information contained in this template. These documents were sent to team members and feedback was sought on the accuracy of the content in the documents. The BDN is shown in Figure 3-1.

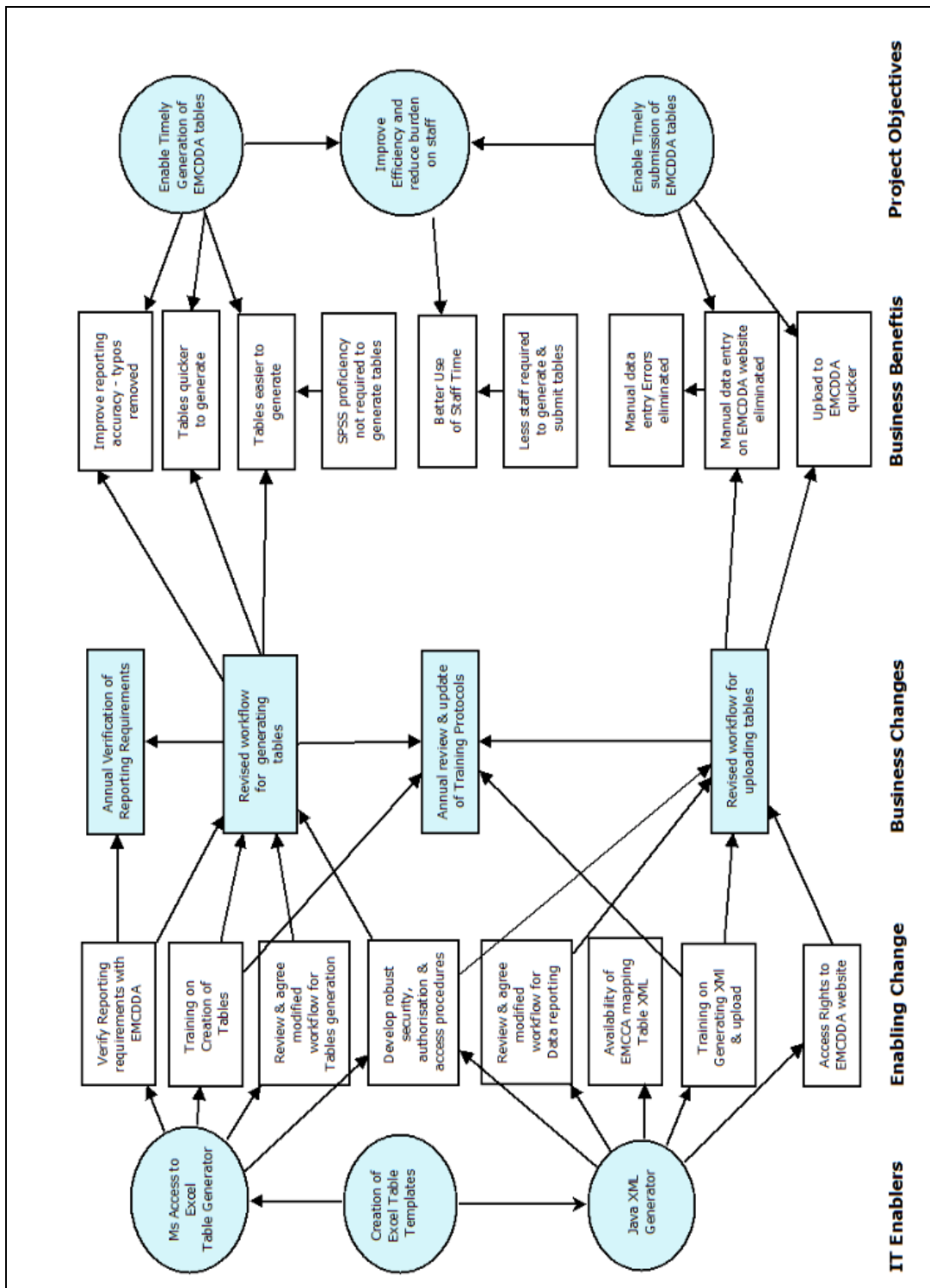


Figure 3-1 Final BDN for automated reporting to the EMCDDA

3.6.2 Stakeholder Analysis

The process examined the NDRDI staff in terms of changes each was required to make and how they would be affected. This was undertaken assess staff willingness and their attitudes to changes required. A stakeholder assessment of NDRDI staff was conducted (see Figure 3-2). The assessment considers the level of benefits staff gain versus the level of change they are required to make.

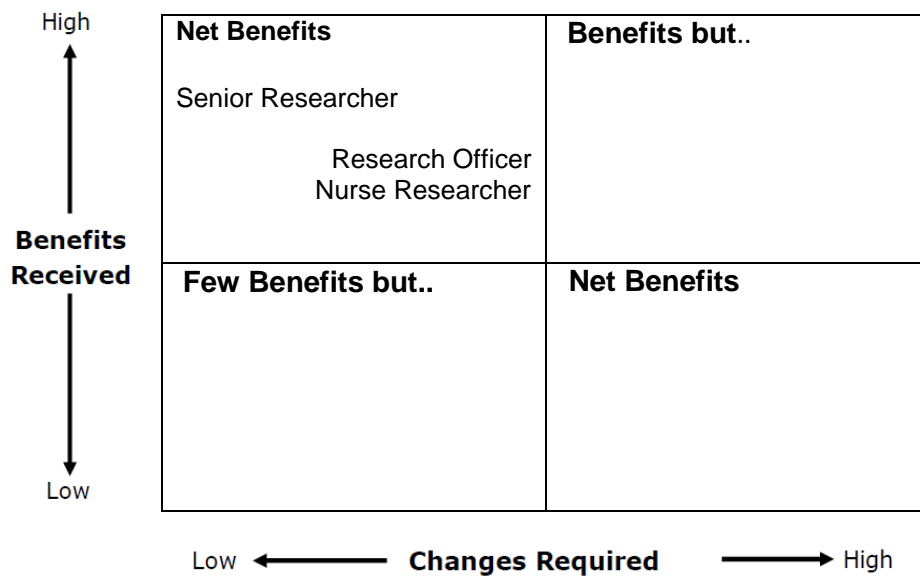


Figure 3-2 Stakeholder Assessment

A stakeholder analysis map was used to identify the actual benefits and changes required by NDRDI staff and to identify their willingness to make the changes required (see Figure 3-3). The changes (C) and enabling changes (EC) referred to in the stakeholder analysis are described in Appendix 5.

Stakeholders	Benefits Perceived	Changes Needed	Perceived Resistance	Commitment (Current & Perceived)				Make it Happen
				Anti	None	Allow it to happen	Help it happen	
Definitions	Individual and Organisational benefits for each stakeholder and group	Changes to be made by stakeholder of group	Resistance of each stakeholder or group and reason for this	Are against the project and will attempt to stop it.	Are either unaware the project is going on or do not think it affects them	Will comply when requested to do tasks required by the project eg Attend training	Will provide knowledge, time and resources to ensure the project meets objectives and time scales	Will instigate, oversee or carry out changes and ensure that all relevant changes are completed successfully
NDRDI STAFF								
Senior Researcher	<ol style="list-style-type: none"> 1. More timely reporting of data 2. Less reporting errors; improved reporting accuracy 3. Improved EMCDDA validation report 4. Improved efficiency of staff 5. Improved morale 	C1; C2; C4; EC1; EC3; EC5; EC8	None at this time					C > R
Research Officer	<ol style="list-style-type: none"> 1. SPSS analysis no longer required; checks & modifications not required 2. Not required for manual entry of data onto EMCDDA website 3. More Efficient use of time 4. Improved morale 	C2; C4; EC4; EC5; EC6; EC7; EC8	None at this time					C > R
Researcher	<ol style="list-style-type: none"> 1. Tables available at the press of a button/Quicker & Easier to generate 2. Manual data entry to EMCDDA website not required 3. Can generate data without assistance of another unit member. 4. Can upload data without assistance of another unit member. 5. More Efficient use of time 6. Improved morale 	C2; C3; C4; EC2; EC3; EC7; EC8	None at this time					C > R

Figure 3-3 Stakeholder Analysis

3.6.3 Measuring the Benefits – Setting the Benchmarks

Methods to measure each of the identified benefits were agreed and focused on the number of staff hours required to complete each of the specified

tasks. Benchmark measurements were recorded based on the 2010 data submissions to the EMCDDA and outline the time required in 2010 to generate and submit the EMCCA tables. These measures are outlined in Table 3-1.

Table 3-1 Benchmark measurements for EMCDDA reporting

Item	Task	Measurement (Minutes)	No. staff required	Total staff time required - Minutes (Hours)
1	Generate EMCDDA Tables	480	2	960 (16)
2	Input tables to EMCDDA website	150	2	300 (5)
3	Check data accuracy	300	2	600 (10)
4	Make corrections	180	1	180 (3)
5	Provide additional information & check	240	2	480 (8)
	Total			2520 (42)

It was also necessary to include measurements for the required changes in current workflow practices. It was important that the researcher could determine whether the required changes had been implemented. These measurements are outlined in Appendix 5.

3.7 Activating and Enabling Changes

Once the required changes had been identified and agreed it was necessary to commence the process of activating these changes. As this process is retrospectively examining existing work processes and procedures of an existing system, many of the enabling changes could be commenced immediately. A timetable was discussed and agreed for the automation of the EMCDDA reporting requirements as outlined in question seven of Appendix 5.

In order to fully automate the process a means of mapping the HRB generated data tables on to the EMCDDA website was required so that the tables would be uploaded to the correct location on the EMCDDA website. Therefore collaboration with the EMCDDA was necessary for the success of this project. Contact with the EMCDDA was instigated by the senior researcher in the unit, and a request was submitted for a mapping table to facilitate the mapping of the HRB generated tables to the appropriate location on the EMCDDA website for the upload of data.

3.8 Summary of the Methodology and Benefits Realisation

Focus Group Meetings

This chapter has provided an overview of the NDRDI and its operation. An overview of the processes involved to collect drug-related death data and to match data from a number of sources has been provided.

Focus group meeting were used to start the benefits realisation process. Three focus group sessions examined the work processes of the NDRDI and identified potential benefits. This process led to the production of a BDN, the identification and documentation of benefit owners and change owner and change templates. At the end of this phase a consensus was reached and participants agreed that the BDN, measures and changes outlined were accurate. Agreement was also reached on a timeframe for the implementation of the required changes. Discussion now focused on the implementation of the required business and enabling changes, and commencing the software automation process.

The area for automation had been selected and agreed by staff and the next stage of the research was initiated. This stage comprised of the design, construction and implementation of an IT software tool to automate data reporting to the EMCDDA and consequently derive benefits for the unit.

4 Software Requirements, Design, Build and Testing of EMCDDA Reporting Tool

This section outlines the methods employed in the design and construction of a software tool to automate the EMCDDA data reporting process. This chapter commences with an overview of the current processes used in the NDRDI to achieve this reporting requirement. Following this the design and construction of the new software tool is outlined and an overview of the final tool and its functionality is presented.

4.1 EMCDDA Reporting – Overview of the 2010 process

This section outlines the processes used to generate and submit the 2010 EMCDDA report and tables. The NDRDI is required to make an annual submission to the EMCDDA.

Once data collection and data matching is completed the data must be cleaned and validated. Validation is conducted using SPSS. Once the data has been validated SPSS is used to generate the tables required for submission to the EMCDDA. This requires that staff have access to and be proficient in the use of SPSS. Once the SPSS syntax has been updated and the tables have been generated, staff must log on to the EMCDDA and manually type the data values into a set of predefined table templates on this website. This is a time consuming process and increases the possibility of introducing user errors in the form of typing errors. Once data values have been entered on the website it is then necessary to cross check the entered data with the SPSS generated tables to ensure any typing errors are identified and corrected. This process requires two members of staff.

The time taken to complete this process in 2010 is outlined in Table 3-1. In the BR phase of this research, staff reported that this manual process caused frustration as it requires staff to manually type data which already exists in electronic format onto the EMCDDA website.

Part of the submission to the EMCDDA consists of a number of aggregate tables. In addition staff are required to provide additional descriptive information. The EMCDDA reporting requirements are outlined in Appendix 7.

4.2 Design of the Automated Reporting Tool prototype

Once an area has been identified and selected for IT automation, staff involvement is vital to the design and implementation of this new tool. In the literature review it has been demonstrated that projects have a better rate of success when staff are involved in the process and user involvement is required for the selection, design and implementation of any new software if it is to be used successfully by the stakeholders.

Consultation now focused on the software requirements of the new software tool. This involved further consultation with NDRDI staff to ensure a user-centred approach was incorporated into the design of the tool. A meeting was convened with NDRDI staff to discuss the requirements of the new tool and to ensure user requirements were accurately reflected in the new tool's requirement specification and incorporated into its design.

During this meeting the researcher became aware of additional reports not previously submitted by the NDRDI to the EMCDDA which would be required for the 2011 data submission. Therefore it was necessary to ascertain the specifics of these new reporting requirements.

4.3 User requirements and Design of the EMCDDA reporting tool

A user centred approach was incorporated into the identification, design and implementation of the new software tool whereby a process of design, refine and evaluate was employed.

4.3.1 Requirements Specifications

The goal in the requirements specification stage of the design is to develop an understanding of the user needs and to identify the tasks and functions of the application (Seidel et al., 2010). To achieve this, users were consulted to acquire valuable input for the formulation of the system requirements. NDRDI staff were consulted in order to properly formulate the requirements. This consultation led to the formulation of the software requirements, use case and activity diagrams.

4.3.2 User Requirements

NDRDI staff indicated a preference for a new software tool which could link to the existing master data file, this tool must be easy to use and provide staff with a view of the relevant data. The researcher consulted with staff to ascertain the requirements for each individual table required for submission to the EMCDDA.

Workflow changes for the generation of the EMCDDA tables, identified in the BR process and subsequently implemented, meant that the primary responsibility for the creation of these tables would lie with the nurse researcher.

Once the user tasks and requirements had been established use case and activity diagrams were created. A Use case diagram of the automation process is shown in Figure 4-1.

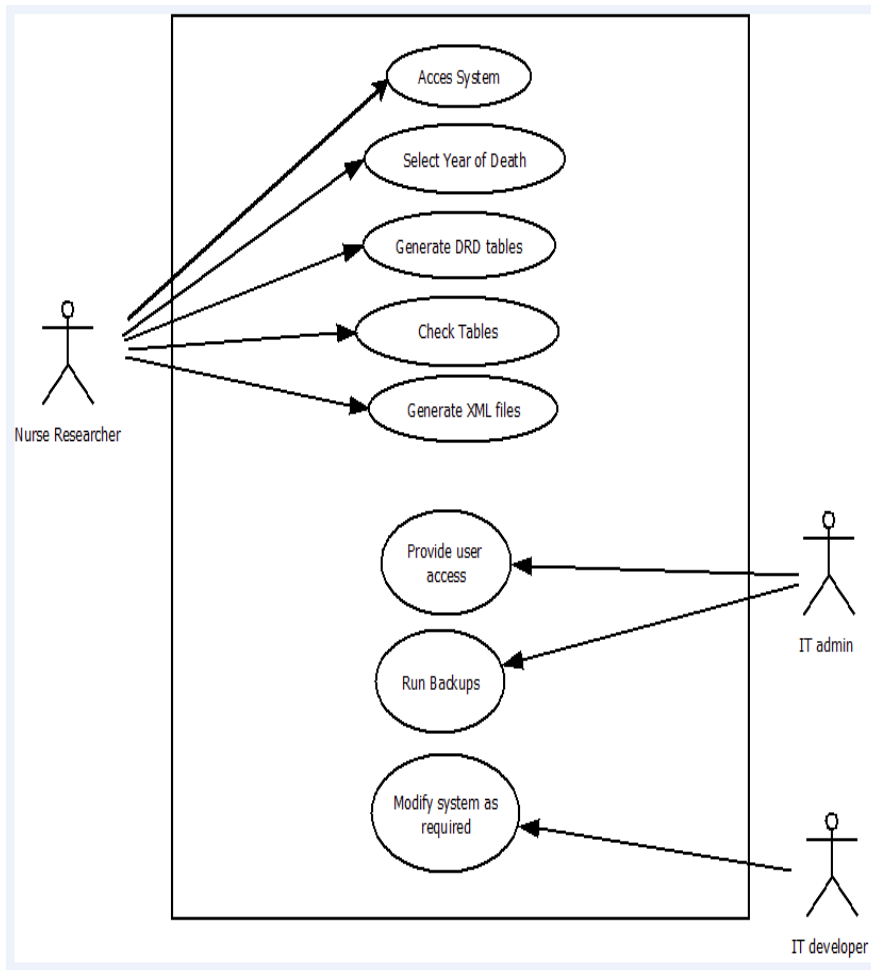


Figure 4-1 Use Case Diagram of NDRDI members' roles for new Tool

The nurse researcher accesses the system using a predefined user name and password. The reports are generated based on the year of death of the client; therefore a year of death must be entered by the user. Cases which fit the criterion of this selector and have a positive toxicology for drugs/alcohol recorded in the coroner's report are then selected for inclusion. A new data table of eligible cases is generated to be used as the basis to create the EMCDDA reporting tables. Once the tables have been provisionally checked, the nurse researcher will generate the XML files which will be uploaded to the EMCDDA website.

With this new tool, the nurse researcher will generate the EMCDDA tables and XML files by simply clicking three buttons. The Activity diagram shown in Figure 4-2 illustrates the sequence of events using the new tool. The new tool must provide the functionality to achieve the tasks outlined.

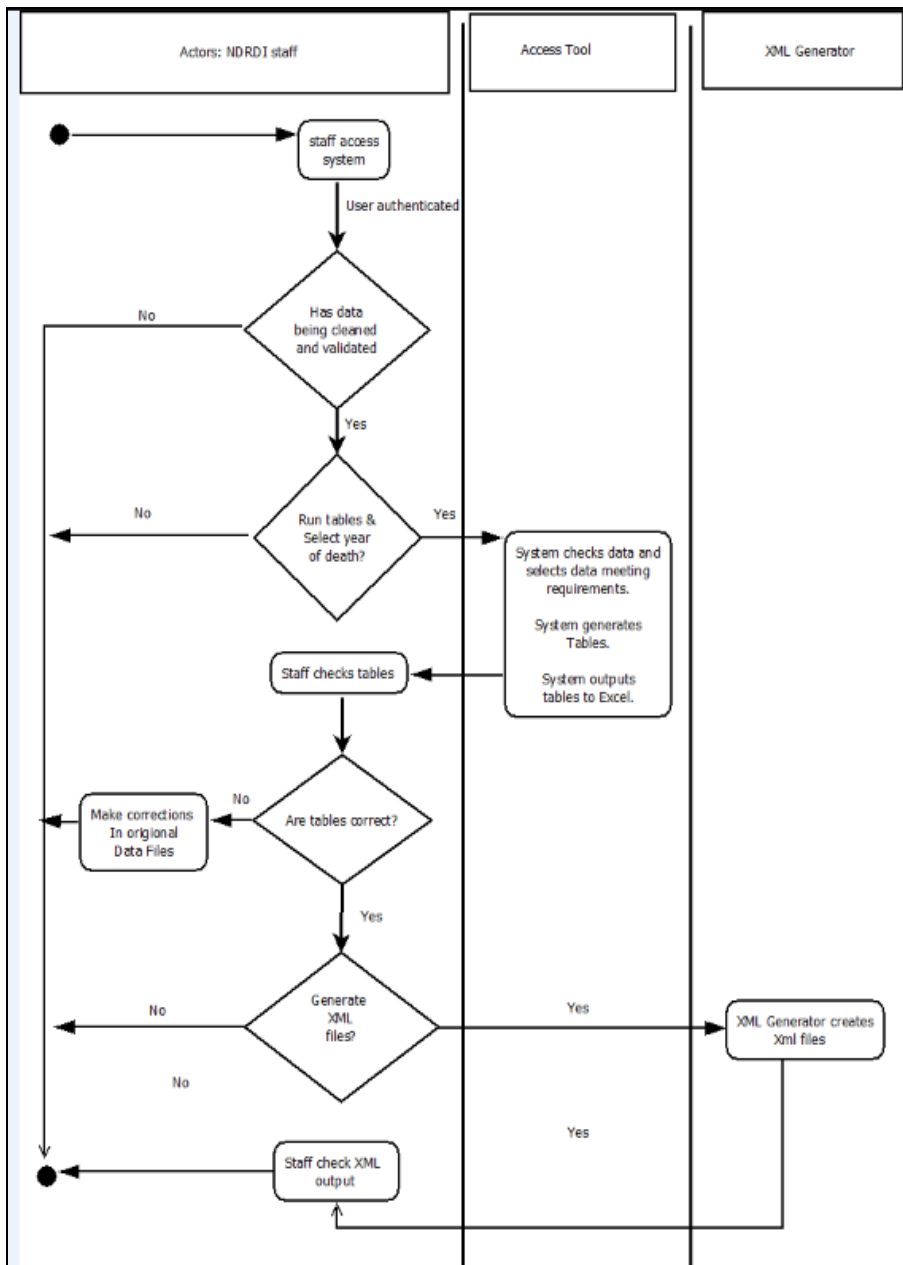


Figure 4-2 Activity Diagram for new Tool

It was agreed with staff that no data modifications to the underlying tables would be allowed using this new software tool, any amendments to the underlying data could only be made in the master file data source.

The requirements specification for the EMCDDA reporting tool included requirements which described functionality in relation to user log-in, data viewing, data edits, EMCDDA table generation and the generation of XML files. The software requirements specification is outlined in Appendix 8.

4.4 Initial Design

An initial design of the tool was generated using the set of requirements agreed with staff and a user interface mock-up was created. An iterative Design-Evaluate cycle was used whereby evaluations were conducted in order to constantly refine and improve the design of the EMCDDA reporting tool.

The literature review has highlighted the importance of stakeholder involvement in the design of any new system. In order to facilitate user involvement at this stage, paper-based prototypes and interface mock-ups were utilised to produce a first usage experience of the tool for the users. These consultations with the users resulted in the preliminary evaluation and review of the interfaces and designs by the users. Identified problems and issues were recorded and updated versions of the designs were created.

Microsoft Access VBA was selected as the appropriate technology for the new tool. To maintain consistency with the existing NDRDI system, Microsoft Access VBA was used to design and implement the new tool. Consistency of design will ensure the tool is easy to learn as users are presented with a familiar looking interface.

Only a subset of the total dataset is required to populate the EMCDDA tables. Consultation with staff identified the relevant data variables for inclusion. In addition recoding of variables and combinations of variables were discussed and agreed with staff. The researcher had no access to named data during this entire process, only a partial dataset was provided to the researcher for testing purposes.

The tool was developed in several iterations until all required features and modifications were incorporated into the tool. Requirements and design documentation are updated accordingly. The tool is currently fully functional and will be fully implemented in September 2011.

4.4.1 Valid Cases and Required Variables.

NDRDI staff consulted with the researcher regarding the selector criteria which would be built into the new software tool. It was agreed that a year of death must be entered by the user, as data for any given year may be subsequently updated and resubmitted to the EMCDDA. Other selector criteria such as a positive toxicology could be built into the database as they form part of the EMCDDA reporting requirements. Not all data collected is applicable for the EMCDDA reports. Consultation with staff led to the formulation of a subset list of data variables which would be included in the underlying tables of the new tool. Staff also provided the researcher with a coding frame for the recoding of data to meet the EMCDDA specifications.

4.5 The Final EMCDDA Tool

The final software tool incorporated three distinct pieces of functionality; the first was to generate the required underlying data table, known as the 'Table Generator'. This functionality selects the data for inclusion in the tables based on predefined selector criteria. The second stage 'Generate Excel' is to generate the excel tables, this populates the individual tables required for the EMCDDA reporting submission and automatically outputs these tables to Microsoft excel. The third piece of functionality, the 'XML Generator' is comprised of a tool to take the tables from Microsoft excel and output these tables in XML format which can then be directly imported onto the EMCDDA website.

The functionality to create the underlying data table, generate the EMCDDA reporting tables and output these tables to Microsoft excel was constructed by the researcher using Microsoft Access VBA. The functionality to convert these generated Excel tables to XML format was designed and built by staff at the EMCDDA using the programming language Java. This XML generator tool was provided to the NDRDI free of charge. It was built in response to a request submitted from the NDRDI for a mapping table to facilitate the

mapping of generated tables to the appropriate location on the EMCDDA website for the upload of data.

4.5.1 Overview of the Final Tool

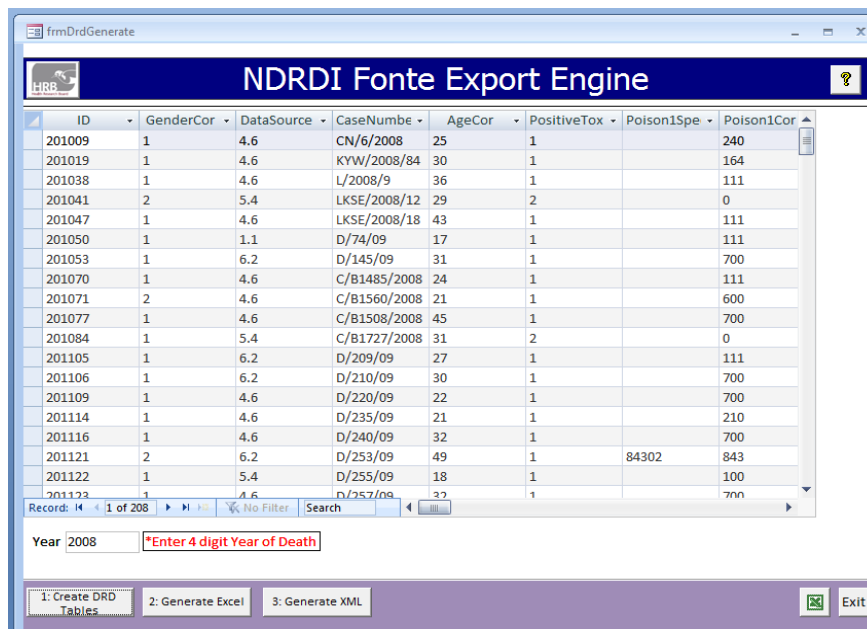
When users open the tool they are presented with a login form. The users stressed the importance of security and requested this feature. All designated users of the system are provided with a user login name and password.



A login form with a blue background. It contains two input fields: 'User Name' and 'Password'. To the right of the 'User Name' field is an 'OK!' button. To the right of the 'Password' field is a 'Cancel' button.

Figure 4-3 User Login

The user interface for the main form is shown in Figure 4-4.



The screenshot shows a window titled 'frmDrdGenerate' with a dark blue header 'NDRDI Fonte Export Engine'. Below the header is a table with the following columns: ID, GenderCor, DataSource, CaseNumbe, AgeCor, PositiveTox, Poison1Spe, and Poison1Cor. The table contains 20 rows of data. Below the table is a search bar with 'No Filter' and a search icon. Below the search bar is a 'Year' field with '2008' and a red error message '*Enter 4 digit Year of Death'. At the bottom, there are three buttons: '1: Create DRD Tables', '2: Generate Excel', and '3: Generate XML'. An 'Exit' button is also present.

ID	GenderCor	DataSource	CaseNumbe	AgeCor	PositiveTox	Poison1Spe	Poison1Cor
201009	1	4.6	CN/6/2008	25	1		240
201019	1	4.6	KYW/2008/84	30	1		164
201038	1	4.6	L/2008/9	36	1		111
201041	2	5.4	LKSE/2008/12	29	2		0
201047	1	4.6	LKSE/2008/18	43	1		111
201050	1	1.1	D/74/09	17	1		111
201053	1	6.2	D/145/09	31	1		700
201070	1	4.6	C/B1485/2008	24	1		111
201071	2	4.6	C/B1560/2008	21	1		600
201077	1	4.6	C/B1508/2008	45	1		700
201084	1	5.4	C/B1727/2008	31	2		0
201105	1	6.2	D/209/09	27	1		111
201106	1	6.2	D/210/09	30	1		700
201109	1	4.6	D/220/09	22	1		700
201114	1	4.6	D/235/09	21	1		210
201116	1	4.6	D/240/09	32	1		700
201121	2	6.2	D/253/09	49	1	84302	843
201122	1	5.4	D/255/09	18	1		100
201123	1	4.6	D/257/09	37	1		700

Figure 4-4 NDRDI new EMCDDA Reporting Tool user interface

The steps in the process for generating the EMCDDA reporting tables are numbered and must be run in sequential order. The user must enter a year of death, create the drug related deaths table, generate the excel table and then generate the XML file.

NDRDI staff requested a view of data to enable them filter variables to check expected outputs. This represents a view of the selected data only in read-only form; users are not allowed to modify the data but must return to the master data file to make any modifications to the underlying data. This is to ensure data consistency and a single correct source of data. While users may filter data in this view, this filter is for data checking purposes only, and is not applied when tables are generated, irrespective of any filters applied in the data view. The system links to a master Microsoft Access database which contains all data collected since 2005.

A help feature is provided with this tool and the help icon is fully functional and links to the user training protocol which provides detailed instructions on using this tool.

4.5.2 Generate Main Data Table – ‘Create DRD Tables’

Cases are reported to the EMCDDA based on year of death. However, as the results of a post-mortem may not be available at the time of data submission, it may be necessary to submit an updated report for the previous year’s data. Therefore, users of the system must be able to generate data for more than one year of death. The first task when selecting data for inclusion in the EMCDDA tables is to enter a year of death. The user must enter a valid four digit year of death.

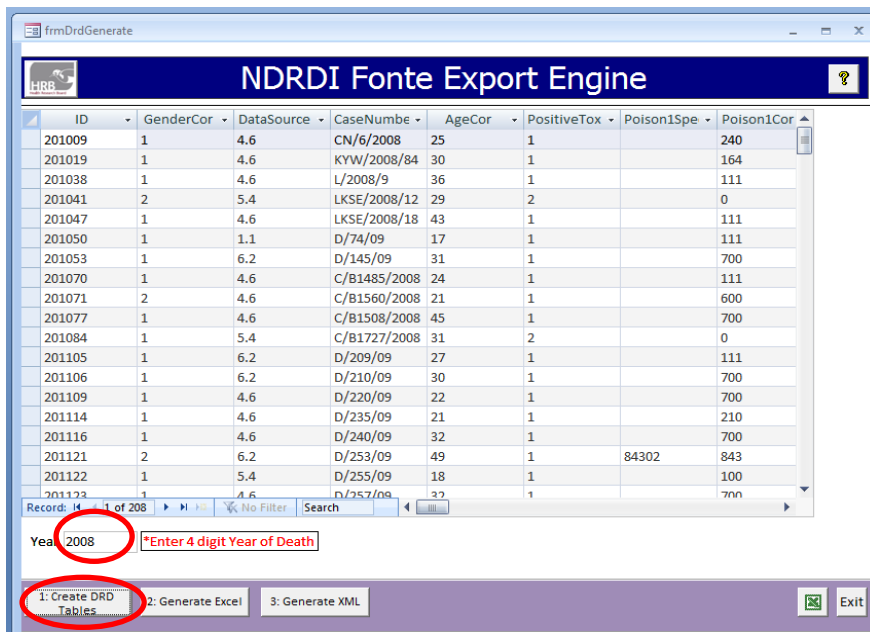


Figure 4-5 Year of Death & creation of DRD Tables

Once the year of death has been input, the user then clicks on the 'Create DRD Tables' button. This generates a new data table consisting only of cases which match the selection criteria based on the year of death entered by the user. Additional selection criteria agreed with the users, are built into the database. The additional selection criteria conform to the strict EMCDDA conditions for data inclusion and reporting. The relevant data variables are selected from the master dataset and include the results of the toxicology report and variables which indicate whether the substance in question was implicated as a cause of death in the coroner's report. A number of new variables must also be created for the EMCDDA reporting tables. These variables are automatically generated and populated when the user clicks on this button. The newly generated variables represent a count of the occurrences of particular substances across the variables which comprise the results of the coroner's toxicology report. This process culminates with the creation of a new data table which will be used to generate the EMCDDA reporting tables.

4.5.3 Create EMCDDA Reporting Tables - 'Generate Excel'

Once the main data table of valid cases has been generated, the EMCDDA reporting tables may be generated. The user must specify the 'year of death' and then click the 'Generate Excel' button. The EMCDDA tables are generated and automatically exported to Microsoft Excel. Year of death is required to ensure that the user is generating the excel files based on the correct dataset. If no data exists for the year of death specified by the user a message will inform the user of this.

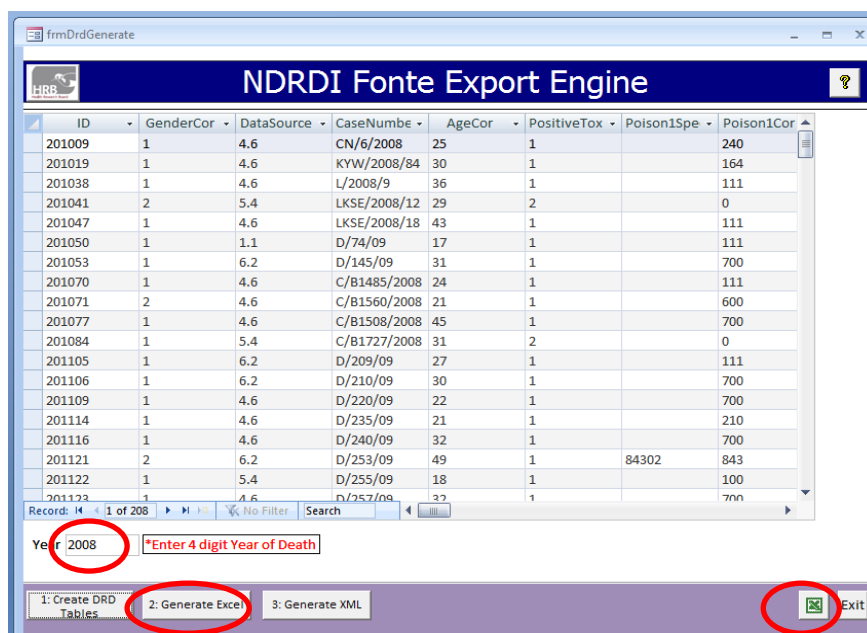


Figure 4-6 Generate excel Tables

An excel template was devised and provided by the EMCDDA. Each required table for submission is allocated a separate excel worksheet in this template.

Once generated the excel output is visible to the user. If the user wishes to keep a copy of tables they may save the data using an appropriate naming convention. All excel output is saved in a predefined folder, by clicking on the excel icon at the bottom of the user interface as outlined in Figure 4-6 the user can access previously saved output.

4.5.4 Create XML Files - 'Generate XML'

Once the excel tables have been populated, the next piece of functionality required is to generate the XML files for upload to the EMCDDA website.

The senior researcher of the NDRDI initiated contact with the EMCDDA to obtain a mapping table required to automate the upload of data to the EMCDDA website. This table was required to ensure the data values were uploaded to the correct location on the website. This consultation resulted in a java tool being provided by the software developers in the EMCDDA, to generate the XML files. This tool was provided free of charge to the NDRDI. This tool did not exist prior to this research and its development was prompted by the request from the NDRDI for a mapping table. As this tool was provided by the EMCDDA it is therefore also available to other countries wishing to automate the data upload process. This has the additional benefit for the NDRDI, whereby the EMCDDA has the responsibility for ensuring that any changes in reporting requirements are updated in the XML generator tool.

To generate the XML output users click on the 'Generate XML' button shown in Figure 4-7 to open the XML generator tool.

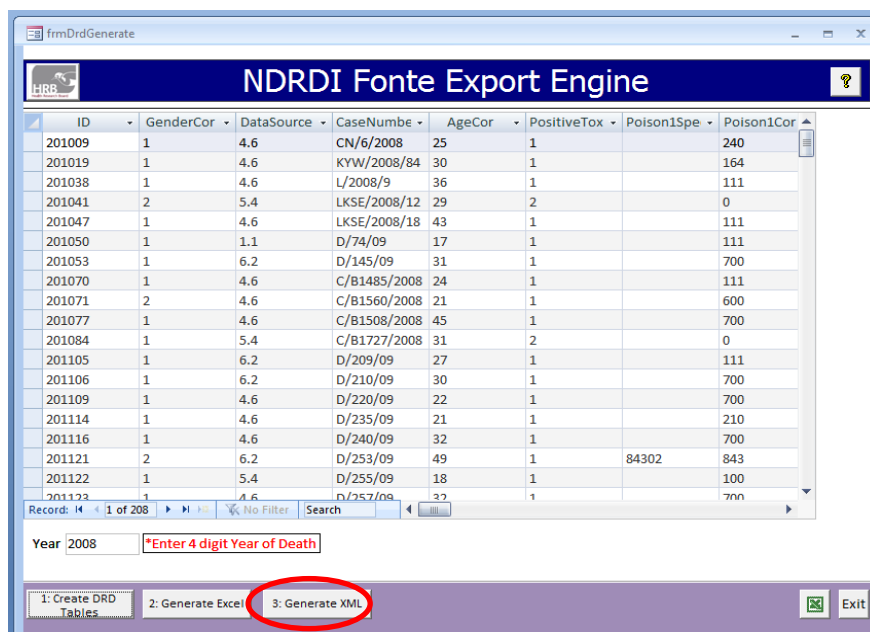


Figure 4-7 Generate XML

This button opens the java tool provided by the EMCDDA which will generate the XML files shown in Figure 4-8.

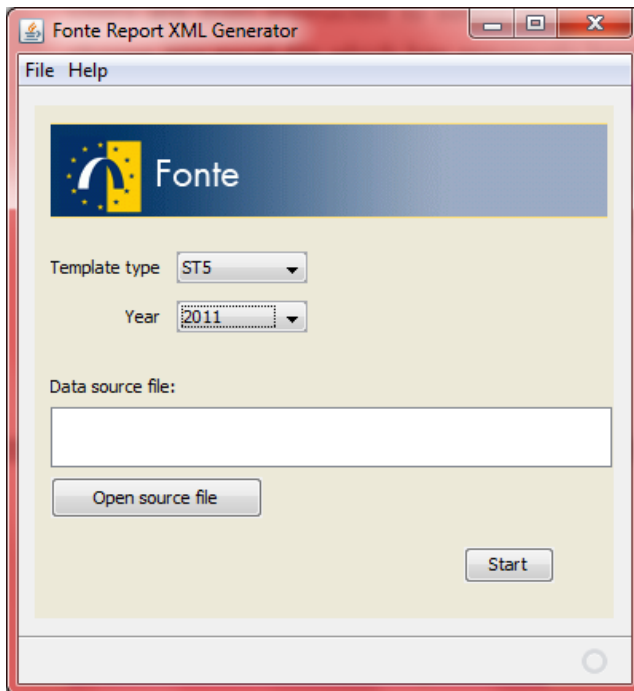


Figure 4-8 EMCDDA Reporting XML Generator

Users must select the template type - for the NDRDI this is 'ST5'. Users must also select a valid 'Year' from a drop down list. In this instance, year refers to the year data is being submitted to the EMCDDA, rather than the year of death. As previously stated more than one year's data may be submitted. Therefore it is necessary to record the year of data submission as well as the year of death when reporting data to the EMCDDA.

The tables to be included in the report, which were previously generated and saved in the Microsoft excel template must now be selected. Users click on the 'Open source file' button, this file will open a predefined folder where the excel files generated at step 2 have been saved. Users select the appropriate file and then click the 'start' button to generate the XML files. The XML file is automatically saved to a predefined folder and users are presented with a message shown in Figure 4-9 indicating that the files have been generated.

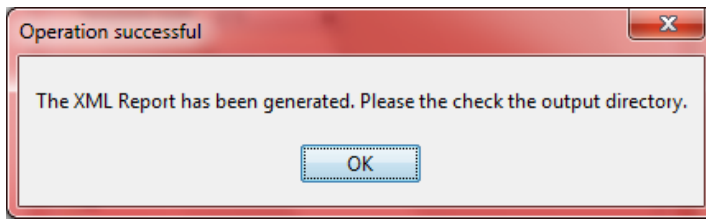


Figure 4-9 EMCDDA XML Generator Successful dialogue box

Once the XML files have been generated, users may log on to the EMCDDA website and upload the XML files by using the 'import' function provided on the EMCDDA website, as shown in Figure 4-10.

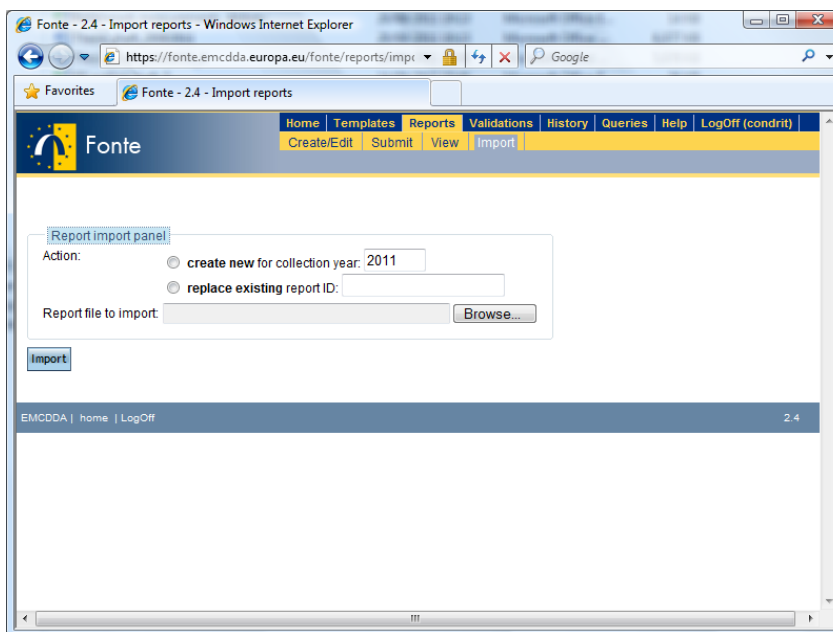


Figure 4-10 EMCDDA website data import

4.5.5 Initial System Testing

Users were presented with a prototype of the user interface and requested to provide feedback. All data was systematically tested whereby the tables were generated using the old process with SPSS and the results compared to the generated tables in the Microsoft excel output. Testing took place with two staff of the NDRDI.

Staff were encouraged to provide candid feedback and critique the system as their input and feedback would contribute to the subsequent requirements and modifications iteration of the build.

4.5.6 Design Modifications

In the tool to generate the EMCDDA reporting tables, users are required to enter just one variable – the year of death. Initially there was no constraint placed on the accepted way to enter this data item. However, initial system testing led to different variations being inputted such as a two digit year. This was changed to a compulsory four digit year for the final version of the tool.

Based on user feedback new variables which had been created for reporting data were included in the view of the data visible to the user. These new variables can be filtered by the user to calculate the number of cases expected in the generated tables. Modifications also included the incorporation of help files and ensuring that the background tables were hidden from view from the user. Use of the 'Tab' key to move between buttons was adapted to match the sequence of steps the user must undertake.

Users were presented with a final version of the EMCDDA tool with the requisite design modifications incorporated.

4.6 Summary of Software Tool Requirements, Design, Build and Initial Testing

In this chapter the methods used to design and build the new software tool to automate the EMCDDA data reporting have been outlined. User involvement led to the development of a requirements specification for the

new software tool. Use case and activity diagrams were generated by the researcher. The researcher then built a software tool to select, create and output the EMCDDA reporting tables to a Microsoft Excel workbook template. To automate the import of these tables onto the EMCDDA website, these tables must be converted to XML format. The tool to generate the XML output was prompted by this research. It was designed and built by staff at the EMCDDA and provided to the NDRDI free of charge. Initial testing was conducted and modifications were incorporated into the new software. An overview of the final software tool has been presented in this Chapter. The following chapter outlines the methods used to evaluate this newly constructed EMCDDA reporting tool.

5 System Implementation & Evaluation

An evaluation of the entire process was required to ascertain whether the new software tool matched the requirements specified by NDRDI staff, and whether it had been successful in accomplishing the desired benefits for the NDRDI. At this stage tool was functional and stakeholder involvement was required to test and evaluate the tool. It was also necessary to test whether the benefits identified during the BR process were actually accomplished. This evaluation was conducted in July 2011.

5.1 Overview of the Evaluation Process

The researcher sought to incorporate a user centred and iterative process throughout the entire research project. Although the EMCDDA reporting tool will not be fully implemented until September 2011, a preliminary evaluation was conducted to evaluate the progress to date. As this tool is on the cusp of full implementation, the results derived from this evaluation should provide an accurate reflection of the actual benefits which will be derived from this IT tool.

This section provides an overview of approaches taken to evaluate the new EMCDDA reporting tool. The evaluation sought to evaluate the tool in terms of functionality and usability. In addition, it sought to ascertain if the benefits identified during the BR phase of this research and the corresponding required business changes and enabling changes had been achieved.

Once the tool was functional the evaluation process commenced, it encompassed three separate and distinct phases, which are as follows:

1. EMCDDA reporting Tool Functionality and Usability testing.
2. Data Validation and Data Accuracy.
3. An evaluation of the Benefits Realisation Process and the consequent benefits or disbenefits; business changes and enabling changes.

An evaluation should begin with a clear definition of what is to be evaluated (Filipowska et al., 2009). The purpose of this evaluation process was to evaluate whether the following had been achieved:

- The tool was usable and conformed to the stakeholders' usability expectations, and to identify any potential areas for improvement.
- The tool functioned as required and generated accurate and high quality output and the resulting generated output could be uploaded correctly to the EMCDDA website.
- The required business and enabling changes had being implemented and incorporated into the workflow of the unit.
- Resultant benefits were measured to ascertain the degree to which they matched with expected benefits outlined during the BR process.
- To identify any new or unexpected benefits which have been realised or may require further investigation.

The evaluation process consisted of a usability test of the new EMCDDA reporting tool; a data quality and accuracy analysis of the output generated by this tool; and an assessment of the resultant benefits compared with the expected benefits outlined in the BDN.

5.2 Tool Functionality and Usability

Staff in the NDRDI tested the functionality and usability of the new EMCDDA reporting tool. The researcher provided training on the new tool, and a training manual was created in association with the nurse researcher. A checklist for testing the usability of the new tool was devised. Prior to the commencement of the tool functionality and usability evaluations, discussions were conducted with staff to ensure that the checklist was understood by its intended users and to ensure a consistent quality evaluation.

5.3 Functionality

The new EMCDDA reporting tool was required to carry out three distinct tasks as outlined below:

1. Select the cases which meet the EMCDDA criterion for inclusion and generate an underlying data table.
2. Generate & populated the Excel template with the EMCDDA reporting tables based on the selectors provided (i.e. Year of Death).
3. Generate the XML files.

These tasks were required to ensure the correct tables were generated for the data upload to the EMCDDA. Once the generated tables were output to XML format it was necessary to test whether the resultant XML files could be easily uploaded to the EMCDDA website.

This evaluation was carried out by the nurse researcher. This functionality was tested by the nurse researcher and she verified that the functionality met NDRDI requirements.

5.4 Usability

The interface was designed in an iterative manner in consultation with the users to ensure it was as intuitive as possible. This was undertaken to assist with error prevention and to ensure the tool would be used and incorporated into the workflow of the unit. It also minimised the amount of training required to use the tool. This stage of the evaluation focused on usability issues associated with the new tool. In order to assess the usability of the tool a checklist was devised.

Heuristic evaluation is a fast and cost-effective method of catching a high proportion of usability problems and it is a means to make systems easy to learn and to use (Nielsen, 1994). Usability is concerned with the consistency and ease by which the user can manipulate and navigate the system, the clarity of interaction, how the information is arranged, speed, and screen

layout (Nielsen, 1994). Prior research has demonstrated that usability confers many positive outcomes including a reduction in errors, improved accuracy, a more positive attitude by the user towards the system and increased usage of the system (Lecerof and Paterno, 1998). Therefore and evaluation of the tool with regard usability was vital to improve the user interface, and was conducted on the final tool to ascertain if modifications were required.

NDRDI staff were requested to focus on the usability of the user interface. Nielsen's Ten Usability Heuristics (Nielsen, 1994) were incorporated to provide a checklist for usability issues. Staff referenced the checklist to assist them with the evaluation of the user interface. The evaluation was conducted primarily by the nurse researcher as she would be the primary user of the tool, a less in-depth evaluation was undertaken by other staff in the NDRDI. This checklist is shown in Appendix 9.

Usability enhancement ideas generated during the usability testing were incorporated and based on these improvements were made to the reporting tool. The system was tested in two usability sessions each lasting approximately one hour, with modifications made to the tool for the second session. These sessions were based on the tasks outlined in the requirements specifications for the tool.

5.5 Data Validation

It was necessary to evaluate the accuracy and quality of the EMCDDA reporting tables generated by the new software tool. In addition the upload of the XML files to the EMCDDA website had to be verified.

5.5.1 Data Accuracy

This stage of the evaluation focused on data quality and accuracy of the generated EMCDDA tables. Data accuracy and quality of the generated output was a vital component of the evaluation process. Once the tool successfully generated the required EMCDDA tables it was necessary to

ensure that these generated tables were correct. The data quality evaluation focused on the validation of the generated output of the new tool. This involved a comparison with outputted data generated using SPSS. To validate the generated tables, the nurse researcher updated the SPSS syntax used to generate the tables in 2010. Once the syntax had been updated to reflect the changes required for the 2011 data submission, the tables were generated. The nurse researcher manually compared the output generated using both methods and highlighted any discrepancies in the tables. Discrepancies were recorded and the resulting required modifications were incorporated into the new tool. In addition the tables submitted to the EMCDDA in 2010 were regenerated using the new tool. The output generated with the new tool was compared with 2010 data submission which had been generated using SPSS. The nurse researcher confirmed that that 2010 and 2011 tables generated using the new tool matched the SPSS output.

5.5.2 EMCDDA Data Upload Validation

Once verified that the generated tables were correct, it was necessary to verify that the data could be uploaded correctly onto the EMCDDA website.

The nurse researcher undertook this task. To achieve this data validation, the nurse researcher used the tool to generate the 2011 EMCDDA tables. She then logged onto the EMCDDA website using her unique username and password. The outputted XML files were then imported. The upload tables were checked against the generated Excel output file to ensure that the data variables had been imported correctly.

This process verified that results in the generated tables were correct and the XML test files were successfully uploaded to the EMCDDA website.

5.6 Benefits Realisation Evaluation

An evaluation of the new tool was conducted to ascertain if real-value was being derived from the tool. As outlined in the literature review once a project has gone live an ongoing value-realisation process begins to ascertain if real-value is being derived. This stage of the evaluation focused on evaluating whether the expected benefits were actually realised from this process and to ascertain whether the required business changes and enabling changes had been achieved.

5.6.1 Implemented Business and Enabling Changes

Prior to measuring the benefits derived from the system it was necessary to establish if the requisite business changes and enabling changes were in place. In designing the BDN a timetable was established for the implementation of these changes. In July 2011 an evaluation in consultation with staff was conducted to ascertain whether these changes had been accomplished. The project and actual implementation of the requisite business and enabling changes are outlined below in Table 5-1.

Table 5-1 Projected and Actual Implementation of Business and Enabling Changes

Item	Task	Projected Implementation	Actual Implementation
C1	Annual verification of EMCDDA reporting requirements.	March 2011 (Nov annually)	March 2011
C2	Revised workflow for generating tables - tables now generated by NR	September 2011	June 2011
C3	Annual review & update of training documentation and protocols	August 2011	July 2011
C4	Revised workflow for submitting tables - tables submitted by RO	September 2011	July 2011
EC1	Verify reporting requirements with EMCDDA	March 2011 (Nov annually)	March 2011
EC2	Training on creation/ generation of tables	August 2011	July 2011
EC3	Review & modify workflow for generating tables	June 2011	May 2011
EC4	Develop robust security, authorisation & access processes	April 2011	April 2011
EC5	Review and agree modified workflow for data submission	June 2011	April 2011
EC6	Availability of EMCDDA mapping tables - to be used for generating XML files (mapping of data onto EMCDDA website)	March 2011	March 2011
EC7	Training on generating XML files & submitting data to EMCDDA	August 2011	July 2011
EC8	Access rights to EMCDDA website to upload data.	March 2011	March 2011

5.6.2 Benefits Measurements

The evaluation also focused on the measurement of actual benefits derived from the new tool. This entailed a breakdown of projected metrics for benefits with the actual results. Although the new tool will not become fully implemented until September 2011, an evaluation was conducted during the final testing stage of the tool in July 2011. The results obtained during the testing represent an accurate measurement of the benefits of the new tool. The measurements are shown in Table 5-2 which contains a comparison of the time and number of staff required to submit the EMCDDA

reporting tables using the old method (old) and the new software tool (new).

Table 5-2 Comparison of measurements to generate EMCDDA reporting tables

Item	Task	Measurement (Minutes)		No. staff required		Total staff time required - Minutes (Hours)	
		Old	New	Old	New	Old	New
1	Generate EMCDDA Tables	480	2	2	1	960 (16)	2 (0.03)
2	Input tables to EMCDDA website	150	5	2	1	300 (5)	5 (0.08)
3	Check data accuracy	300	300	2	2	600 (10)	600 (10)
4	Make corrections	180	0	1	0	180 (3)	0 (0)
5	Provide additional information & check	240	120	2	2	480 (8)	240 (4)
	Total					2520 (42)	847 (14.12)

A comparison with the benchmark measurements indicate that the new tool has resulted in increased efficiencies by reducing the staff time required for the submission of the EMCDDA reporting tables. The first submission of real data to the EMCDDA will take place in September 2011; this is outside the timeframe of this research. Therefore, a full evaluation cannot be conducted until November 2011 when the HRB will receive a data validation report from the EMCDDA. However, is it possible to obtain accurate measurements of the projected benefits in the final testing of the tool, as the results obtained during this testing phases represent an accurate reflection of how the tool will perform when fully implement.

The new tool has succeeded in achieving a time saving of 27.88 staff hours for the EMCDDA data reporting process. This time saving will ease the pressure on staff regarding meeting the EMCDDA reporting deadline. Time savings achieved here will be redirected towards supporting other work requirements of the NDRDI.

The new tool has streamlined the process of submitting the EMCDDA tables. Each of the benefits outlined can be delivered as a direct consequence of this tool. Methods of measuring the benefits have been identified and measures of the actual benefits and associated time savings are outlined in Table 5-3.

Table 5-3 Benefits measurements for EMCDDA reporting tool

Benefit	Projected Measurement	Actual Measurement
B1: Improve accuracy - Tables will be automatically generated	M1: Check data accuracy by comparing EMCDDA validation report for 2011 & 2010.	M1: Data accuracy confirmed using comparison output of old method with new Tool. Data accuracy based on testing is 100%.
B2: Tables quicker to generate	M2: Compare 2011 & 2010 staff hours required to generate tables	M2: Substantial time saving achieved using new tool - time has been reduced by almost 16 staff hours.
B3: Tables easier to generate	M3: Compare 2011 process to generate tables with 2010 method.	M3: Using new tool tables can now be generated by the click of a button.
B4: SPSS proficiency not required to generate tables	M4: Run Tables with new tool and compare results.	M4: SPSS no longer required to generate tables.
B5: Better Use of staff Time	M5: Compare staff hours in 2011 with 2010 for both generation & submission of data.	M5: Saving of 27.88 staff hours achieved using new tool
B6: Less staff required to generate & submit Tables	M6: Compare number of staff & staff hours involved with 2011 Vs 2010. Staff feedback.	M6: Tables can now be generated and uploaded by one member of staff. Total time required is 14.12 staff hours compared with 42 staff hours in 2010.
B7: Manual data entry errors eliminated	M7: Compare 2011 & 2010 EMCDDA validation reports.	M7: Manual data entry eliminated therefore manual data entry errors eliminated. To be evaluated in October 2011 when EMCDDA validation report received.
B8: Manual data entry on EMCDDA website to submit tables is eliminated	M8: Compare 2011 & 2010 EMCDDA validation reports.	M8: To be evaluated in October 2011 when EMCDDA validation report received.
B9: Upload to EMCDDA quicker , reduce time required to submit reports	M9: Check time taken to upload the tables to the EMCDDA website compared with 2010 submission and record time taken	M9: Substantial time saving achieved using new tool - time has been reduced by 4 hrs 55 mins

B10: Reduce the number of queries returned by the EMCDDA	M10: Compare 2011 & 2010 EMCDDA validation reports.	M10: To be evaluated in October 2011 when EMCDDA validation report received.

5.6.3 Qualitative Benefits

While the quantitative benefits of the new tool have been outlined, there were also qualitative benefits derived from this process. The main qualitative benefit was in relation to staff morale. Staff had outlined their dissatisfaction with the necessity to manually enter data onto the EMCDDA website when the required data already existed in electronic form. The success of the new tool not only reduced the time to successfully complete this reporting requirement, but discussion with staff outlined an improvement in staff morale in terms of the removal of this manual process.

Staff also stated that their inclusion and involvement in the entire process whereby their experience and expertise were taken into account in both the choice of area for automation and in the design of the new tool was a positive experience. They also cited a sense of ownership of the tool. This on-going consultations throughout the process ensured that the required changes were successfully implemented in terms of both workflow and business changes.

5.6.4 Unexpected Benefits

The pursuit of an automated method of submitting the EMCDDA reporting requirements resulted in some unexpected benefits for the NDRDI including:

- The provision of the XML generator tool free of charge from the EMCDDA reduced the work required to generate the tables as the tool will be maintained by the EMCDDA rather the NDRDI.
- The excel template provided by the EMCDDA allows for the upload of text fields in addition to the requisite tables. This means that generic

text can be uploaded to the EMCCA and modifications made on the EMCDDA website rather than the manual typing of this information annually.

- The XML generator tool did not exist prior to the commencement of this research, its creation was prompted by this research. The result is that this tool will now be available to other countries wishing to avail of this tool.
- The profile of the NDRDI is further enhanced by being the first reporting body to successfully achieve an automated electronic upload of the Drug Related Deaths Index reporting tables to the EMCDDA website.

5.7 Summary of the Evaluation

The new EMCDDA reporting automation tool was evaluated to test its functionality and usability; to validate the generated data and test data accuracy; and to ascertain whether benefits had been achieved as a consequence of this process and whether the required business changes and enabling changes had been implemented. The results of the evaluations confirmed that the reporting tool met the functionality and usability requirements of the users. The generated tables were validated with output generated using SPSS and data accuracy was confirmed. The required business and enabling changes had been successfully implemented and the benefits were recorded and compared with benchmark metrics. The evaluation process also outlined some qualitative and unexpected benefits.

The next Chapter will outline the conclusions of the research and explore some limitations of the research and provide an outline of future work.

6 Conclusions and Future Work

The following section outlines some of the limitations of this research; it discusses the research and presents future work. In addition the conclusions of the research are outlined.

6.1 Limitations

The nature of the work in the NDRDI requires that staff spend extended time working and collecting data off site. This impacted staff availability for face-to-face consultation with the researcher and reduced the timeframe for scheduling focus group meetings. This requirement placed additional pressure on the researcher to ensure that the required documentation was prepared in advance of scheduled meetings. However despite this limitation the objectives of the research were accomplished.

The tool and techniques of the Cranfield model for BR were used in this research. However, as staff consultations were restricted to NDRDI staff, staff in the wider organisation were not afforded the opportunity to participate and become acquainted with the tools and techniques of this model. Therefore an opportunity to increase awareness of these tools and techniques across the organisations was missed. The researcher decided not to consult with staff in the wider organisations in order to ensure that the focus of the research during staff consultation remained on the NDRDI. The limited time available to conduct the research within the timeframe of the dissertations also influenced this decision.

This research focused primarily on one work process in the NDRDI, there are many other work processes in the NDRDI which were not examined.

A preliminary evaluation of the new software tool was conducted to test its functionality, usability and data accuracy. The EMCDDA validation report on the 2011 data submission from the NDRDI will not be available until October 2011. Consequently this validation report cannot be incorporated

into the system evaluation of this research as it will not be available until after the dissertation deadline has passed.

While all EU countries are required to submit data on drug related deaths to the EMCDDA, the focus of this research was limited to the Irish surveillance system. Other EU countries were not consulted during this process. Consultation with other EU countries may have led to the development of a more generic tool which could have been utilised by these countries to automate their data submission. However, extended consultation beyond the Irish systems was deemed beyond the scope of this research and difficult to achieve within timeframe of the research.

6.2 Discussion

The process adopted during this research provided the stakeholders with an opportunity to affect change from the perspective of users of the system rather than as a consequence of a management enforced change. Informal discussion with participants has revealed that staff viewed this process as construction and worthwhile and they welcomed the opportunity to draw on their experiences and requirements as well as the level of inclusivity it afforded to them.

It should also be noted however, that while the design, construction, testing and implementation of the new IT automation tool did not incur a financial cost for the NDRDI, the cost of staff time required for this process should not be underestimated. In this research the time savings gained from the IT automation will compensate for this and will provide savings in the future.

The changes sought and implemented during this research represent benefits to staff in the NDRDI. While new tasks were introduced, ultimately the changes introduced will lead to a reduced workload for NDRDI staff regarding the EMCDDA data submission. While improvements gained are not sufficiently large to reduce staffing requirements in this unit, the resulting savings from this process can now be redirected to other tasks within the NDRDI.

Given the funding issues in all sectors, a review of current work practices may provide the potential to unleash greater value and is an area worth further exploration. This research outlines the structured and inclusive approach undertaken to seek and achieve benefits in the NDRDI. The outcome of this research while not generalised, may be of interest to other groups seeking to gain efficiencies with limited funding and staff.

6.3 Future Work

The data tables generated using software designed and built during this research, currently conform to the 2011 EMCDDA reporting submission requirements. However these reporting requirements are subject to change in the future, and it is likely that modifications will be required for future data submissions.

The success of this project has paved the way for the use of a BR approach for a further project in the NDRDI. A process is currently underway to incorporate the BR approach to plan the introduction of interactive tables for NDRDI data. Interactive tables would provide web access to aggregated NDRDI data and also to limited web-based report generation functionality. A preliminary BDN has been developed and is outlined in Appendix 10 with its associated preliminary business, enabling changes and measurements outlined in Appendix 11. The successful use of BR in the current research has familiarised NDRDI staff with the tools and techniques of the Cranfield BR model. Staff are now better positioned to produce a strong business case and present a strong argument for the additional funding required to realise this new project.

6.4 Conclusion of the Research

The objective of this research was to achieve efficiencies in a national health surveillance system – the NDRDI. Through the incorporation of a BR approach to identify, plan and achieve benefits, and a recognition of the importance of stakeholder involvement and change management, the

researcher achieved the task she set out to do. Increased efficiencies were accomplished in association with the implementation of a new software tool, which was planned, designed, constructed and implemented with full NDRDI staff involvement and agreement. As a consequence the research was ultimately successful in its endeavour to gain increased efficiencies in the NDRDI without requiring additional staff or funding.

Staff workload to submit the required data to the EMCDDA is now reduced, and this has been achieved without compromising the quality and accuracy of the data. In addition, informal discussions with staff have revealed that morale has improved as a consequence of the process.

This research provides a practical example of the incorporation of a BR methodology into an organisation, in conjunction with the introduction of new IT software to achieve a positive project outcome. The advantage of staff engagement throughout the entire planning, designing, construction and implementation of a new software tool has led to increased benefits for the NDRDI. Staff awareness of the BR methodology, its tools and techniques are now being employed in the pursuit of additional benefits in other work processes within the unit.

This research has proved beneficial to all research participants. NDRDI staff have obtained new software and have gained an insight into the tools and techniques of BR. They engaged fully in the research process and recognised the importance of their participation. The EMCDDA has also benefited from the process as the NDRDI can now submit data quicker and errors have been reduced. As stated in the literature and demonstrated here, the use of BR has assisted with ensuring that expected benefits were actually achieved. The BR methodology worked well to plan, design and implement a process to introduced changes to the EMCDDA data submission requirement of the NDRDI.

The outcome of this research may be of interest to individuals or groups working in similar organisations, who are seeking to gain efficiencies and introduce change within the workplace.

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Appendix 1 Information sheet for Focus Group Participants

Information sheet for participants

This research is part of a dissertation to be submitted to Trinity College Dublin as a requirement for completing Year 2 of the MSc. in Health Informatics course.

Introduction

As you are aware the Drug Related Death Index (NDRDI) is an epidemiological database which records cases of death by drug and alcohol poisoning, and deaths among drug users and those who are alcohol dependent.

The aim of this study is take a fresh look at the benefits that users would like to get from this system, to seek to incorporate additional automation into the NDRDI database to reduce the work burden on staff and to provide economies in the NDRDI. This will entail a review of the information recorded and the outputs required from this system.

In other words how to get the right information from this system at the right time and in the right format while minimising the burden of staff to produce this output.

To do this I will need your assistance. It is by speaking with staff from the NDRDI who use the database that we will be able to identify what additional benefits we would like from the system, how these benefits could be delivered and what changes would be required to deliver these benefits.

What's involved?

You have been invited to take part in this study, along with the other members of the NDRDI team, as you would work closely with this database. This will involve participation in a focus group whose remit will be to agree on essential and desired benefits that you the users would wish to pursue. The focus group will also be asked to consider approval for any system changes that may be required to release the benefits from the system and

provide input into the design and implementation of any additional functionality undertaken.

Benefits:

This study is about benefit to the user. It is an opportunity for you to your say on further developments with the system and how it is used. It is envisage that generating more benefits from the system should lead to improvements for the users.

Requirements of respondents:

Up to six focus group/meetings will be arranged in relation to the Research topic and respondents are requested to attend all of these if possible. It is envisaged that each focus group/meeting will last up to 30 minutes.

Data collection method:

No audio or video recording will occur. Data will be collected by note taking at meetings. Verification of accuracy of these notes will occur through circulation of typed notes.

Confidentiality:

If you agree to take part your identity will remain confidential. Your name will not be published and will not be disclosed to anyone outside the study group. Findings, conclusions and recommendations will not identify any group member.

All written records will be securely stored in line with the Data Protection (& Amendment) Acts and Best Practice in Scientific Research. These records will be stored in a locked cabinet in the HRB.

In the unlikely event that unlawful activities are reported to me I will be obliged to report the activity to the appropriate authorities.

Voluntary Participation:

You are invited to participate in this study. It is your choice to accept or decline. Accepting or declining this invitation will have no impact (positive or negative) on your current or your future treatment in terms of employment or career opportunities. If you agree to participate in the study you may withdraw at any time without explanation and your future

treatment in terms of employment or career opportunities will not be affected by this withdrawal. You may also request that any data given by you is deleted if this is done before the data is anonymised.

Conflict of Interest:

While the researcher is also a staff member of the Health Research Board (HRB), the researcher is not part of the NDRDI team which uses the database to be explored in the research. The HRB has an interest in the findings of the research but does not oblige nor urge the participation of its staff in the research.

Permission:

This study could not occur without the permission of the HRB and the approval of the University of Dublin - Trinity College Ethics Committee. Permission to carry out this study has been obtained from both.

Further information:

I will be available during the period of the research study to discuss any concerns or issues. You can get more information or answers to your questions about the study, your participation in the study, and your rights, from Ita Condon who can be telephoned at [REDACTED] or e-mailed at [REDACTED]

Appendix 2 Consent Form for Focus Groups

Consent Form

Research Project: Releasing additional benefits from the National Drug Related Death Index (NDRDI) Database.

Researcher: Ita Condrón

- I have received, read and understood a copy of the Information Sheet for this study.
- I have received an explanation of the nature, purpose and duration of the study and what my involvement will be.
- I have had the opportunity to ask questions and clarify details in relation to the research and my role in this research.
- I understand that my participation is voluntary and that I am may withdraw at any time and without giving any explanation and without penalty.
- I understand that information given by me during this study will be noted and used for purposes of this research.
- I understand that the researcher will provide me with a copy of any notes made at the meetings to confirm their accuracy.
- I understand that if the data is to be used in any other unrelated studies, then I shall be contacted and my permission sought for this to occur.
- I understand that all information gathered during this study will be treated confidentially.
- I understand that my participation is fully anonymous and that no personal details about me will be recorded.
- I agree to participate in this study.

Participants Name

Participants Signature

Date

Researcher Signature

Date

Contact details: email: [REDACTED] **Ext:** [REDACTED]

(The researcher will keep the original copy of this form and a copy will also be given to the participant)

Appendix 3 Summary of Five Benefits Management Approaches

A summary Comparison of five Benefits Management and Benefits Realisation Approaches (Nogeste, 2008)

Step	UK Office of Government Commerce (OGC) (Office of Government Commerce 2004)	Ashurst and Doherty (Ashurst and Doherty 2003, p2)	Bennington & Baccarini (Bennington and Baccarini 2004, p21-22)	Cranfield Process Model of Benefits Management (as cited in Lin 2002 and Ward, Murray and David 2004)	Active Benefits Realisation Model (Remenyi and Sherwood-Smith 1998 and as cited in Lin 2002)
Pre-Planning	Identify strategic outcomes and contributions to wider initiatives such as the organisation's balanced scorecard.		Benefits Identification – the identification and documentation of benefits “that will be most relevant to decision-makers”		
Planning	Initial planning for how the benefits will be managed. Benefits identification and structuring. Choosing the solution option that delivers the optimal mix of benefits.	Benefits planning conducted in parallel with, or as part of business case preparation activities. From a project perspective, this step involves describing how project related benefits align with the prevailing business unit and corporate strategies and change programs	Benefits Realisation Planning – defining each benefit “in terms that can be measured” (Ward, Murray & David 2004, p18) From a project perspective, this step occurs prior to project approval;	“Identify and structure the “overall business benefit set” (Ward, Murray & David 2004, p18) comprising each benefit (and disbenefit) along with its agreed financial and non-financial (Lin 2002, p55-56) business measures, benefits delivery responsibilities and realization schedule. Produce the benefits realization plan that is an input into the overall project investment decision; ensuring that a project remains “business-owned and business-led” (Ward, Murray & David 2004, p46). Executing the benefits realization plan in parallel with the main project plan to ensure that actual benefits “emerge as planned” (Lin 2002, p55-56).	Setting the Course – document descriptions of “the context, the required benefits” and the metrics that will be used to “monitor and control benefits realization” (Lin 2002, p55-56) - inputs to the process for deciding whether or not to proceed with a project (Ward, Murray & David 2004, p39).
Execution	Benefits realization and tracking according to set measures and targets.	Benefits Delivery - actioning the benefits plan to realise expected project benefits. From a project perspective this step runs in parallel with the project lifecycle from project initiation through to project completion.	Benefits Monitoring – monitoring project results to assess “if internal and external changes have occurred that will affect the delivery of planned benefits” Benefits realization – formal review of expected and actual benefits shortly after project completion and again “some time” later;	Evaluating and reviewing benefits realization results after the ‘main’ project has been implemented	Formative evaluation - by all stakeholders assessing the progress of the project with the expectation that the initial approach will be updated, reformed or the project terminated (if deemed irrelevant) (Lin 2002, p56).
Review	Reviewing and maximising expected and unexpected benefits.	Benefits Review assesses the delivery of expected benefits and the potential for realizing additional or future benefits along with reflecting upon lessons learned and the potential for continuous improvement of the benefits realization process			
Future Benefits/ Process Improvement	Identifying future benefit opportunities			Identify future benefits that were not identified earlier in the process (a step that may be performed at any time during the overall process)	Moving forward - a feedback loop that operates “throughout the entire life of the project (Lin 2002, p56).

Appendix 4 BR and Management Approaches and models

Benefits realisation and management approaches and models (Sapountzis et al., 2009)

Approach/model	Details
Active benefits management (Leyton, 1995)	Sets the benefits management activity in the context of business change. Identifies continuous flow between change and benefits
The Cranfield process model of benefits management (Ward <i>et al.</i> , 1996)	Key feature of this model is benefits monitoring. This compares project results with the benefits realisation plan during the project and assesses whether any internal or external changes have occurred that will affect the delivery of planned benefits. Potential benefits are identified, a plan is devised for their realisation, the plan is executed, the results reviewed and evaluated and feedback occurs
The benefits realisation approach (BRA) (Thorp, 1998)	Is based on two corner-stones: (1) The shift from standalone project management to: business programme management, disciplined portfolio management, full cycle governance (2) The three necessary conditions for the successful implementation of the BRA are: (a) accountability of activists; (b) relevant measure; and (c) proactive management of change to give people ownership stakes in programs
Active benefit realisation (ABR) (Remenyi and Sherwood-Smith, 1998)	A process for managing information systems' development through a continuous evaluation approach. ABR requires a direct and continuous focus on business benefits realisation and is based on a contingency philosophy
Towards best practice to benefits management (Ashurst and Doherty, 2003)	In this approach benefits realisation is a continuous process through an evolving organisational context. But it does not take into account influences that external factors may have on a project
Managing successful programmes (MSP) (OGC, 2007)	MSP represents the UK Government's view on the programme management principles and techniques. MSP identifies benefits management as "a core activity and a continuous 'thread' throughout the programme" (OGC, 2007), and fundamental to the realisation of benefits from new capabilities delivered by projects within the programme. Emphasis is placed on identification, quantification, assignment of owners and tracking, it has been heavily influenced by Cranfield's benefits management model and Bradley's benefits realisation management 2006
The Gateway™ Process	The Gateway Review Process indicates, at a high level, dependencies between a typical Benefits Management process and the steps for managing a major delivery programme. It also maps the main benefits management steps on to the standard delivery stages described in both MSP and OGC Gateway Reviews, but the approach can be used for any type of more specialised change initiative. This process contains identification of potential benefits, their planning, modelling and tracking, the assignment of responsibilities and authorities and their actual realisation
Benefits management in the <i>Handbook of Programme Management</i> (Reiss <i>et al.</i> , 2006)	This approach focuses the benefits management model in the delivery of benefits by projects (Nogeste and Walker, 2005). Reiss <i>et al.</i> (2006) define the scope of benefits management as "the management and monitoring of benefits during and after execution phase" and depicts the "value path" relationship between benefits and projects as a hierarchical benefits structure (Nogeste and Walker, 2005)

Source: Sapountzis *et al.* (2008a)

Appendix 5 EMCDDA Reporting Excel BR Template

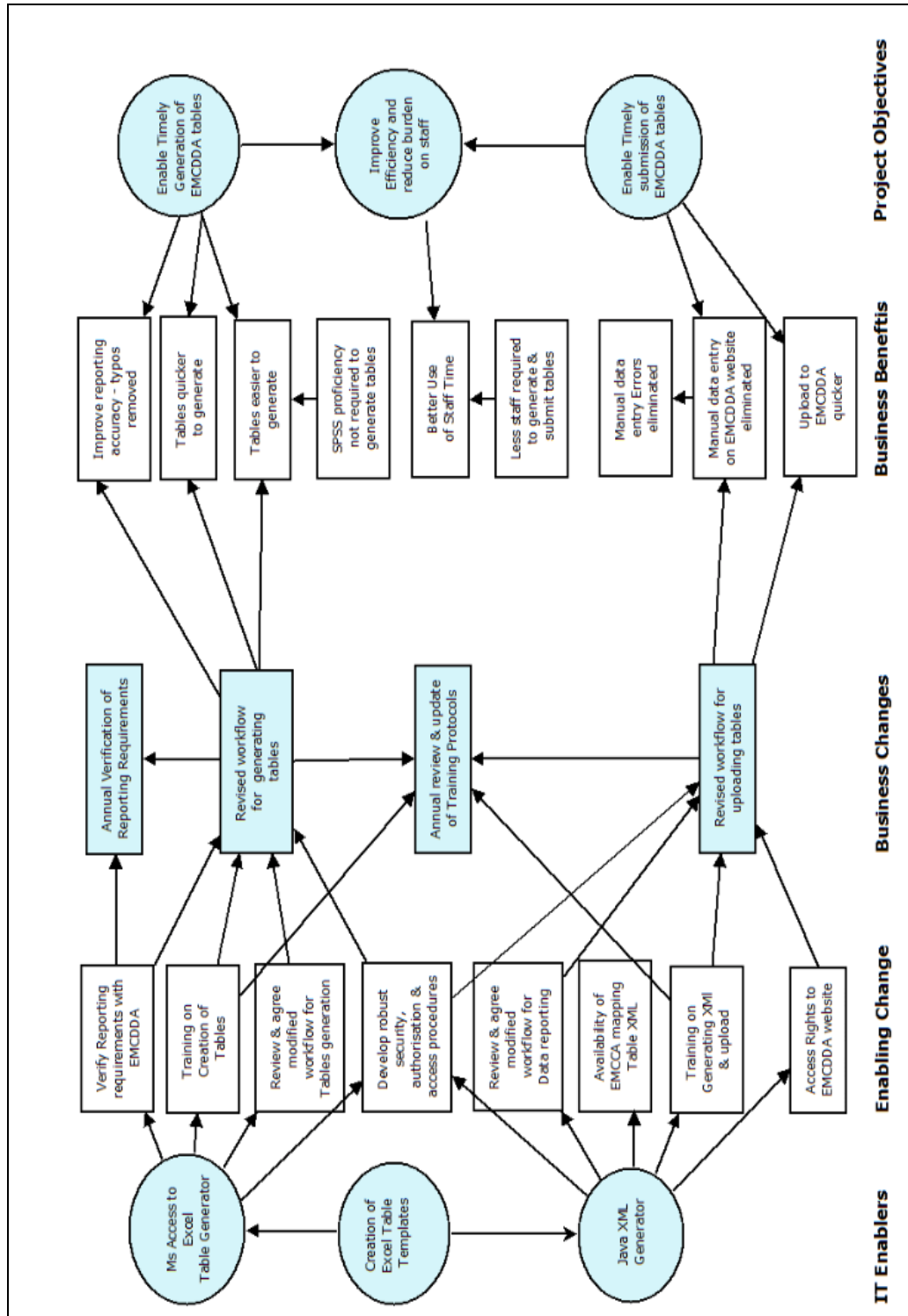
Q1. What do we want to improve/why do we need to improve performance?	1	Reduce the burden on staff to meet reporting deadlines (Current staff is 2.3, requirements is 2.9). Matching capacity to demand.
	2	Information already exists in electronic form, need to utilise this and AVOID duplication of effort.
	3	Staff time is not used to best effect (Resources (people) utilisation (Provide facilities for people to work more effectively with less effort.).
	4	Meeting Reporting deadlines/Quicker reporting
Q2. What improvements do we want/could we get?	1	Enable accurate & Timely generation of EMCDDA tables
	2	Improve Efficiency & reduce burden on staff
	3	Enable accurate & Timely submission of tables to EMCDDA
Q3. Where will it occur?		
B: Benefits	B1	Improve accuracy -Tables will be automatically generated
M: Measure	M1	Check data accuracy by comparing EMCDDA validation report for 2011 & 2010
BO: Benefit owner (person responsible for making the benefit happen)	B01	NR
	B2	Tables quicker to generate
	M2	Compare 2011 & 2010 staff hours required to generate tables
	B02	NR
	B3	Tables easier to generate
	M3	Compare 2011 process to generate tables with 2010 method. Staff survey/feedback
	B03	NR
	B4	SPSS proficiency not required to generate tables
	M4	Run Tables with new tool and compare results.
	B04	NR
	B5	Better Use of staff Time
	M5	Compare staff hours in 2011 with 2010 for both generation & submission of data.
	B05	SR
	B6	Less staff required to generate & submit Tables

	M6	Compare number of staff & staff hours involved with 2011 Vs 2010. Staff feedback.
	BO6	SR
	B7	Manual data entry errors eliminated
	M7	Compare 2011 & 2010 EMCDDA validation reports.
	BO7	RO
	B8	Manual data entry on EMCDDA website to submit tables is eliminated
	M8	Compare 2011 & 2010 EMCDDA validation reports.
	BO8	RO
	B9	Upload to EMCDDA quicker, reduce time required to submit reports
	M9	check time taken to upload the tables to the EMCDDA website compared with 2010 submission and record time taken
	BO9	RO
	B10	Reduce the number of queries returned by the EMCDDA
	M10	Compare 2011 & 2010 EMCDDA validation reports.
	BO10	RO
Q5. What changes are needed?	C1	Annual verification of EMCDDA reporting requirements.
	CO1	SR
C: change	E1	Check reporting requirements have been checked & verified
CO: change owner (person responsible for ensuring the change happens)	C2	Revised workflow for generating tables - tables now generated by NR
E: Evidence of changes	CO2	SR
	E2	NR generated tables
	C3	Annual review & update of training documentation and protocols
	CO3	NR
	E3	Changes & Updates have been documented.
	C4	Revised workflow for submitting tables - tables submitted by RO
	CO4	SR
	E4	RO submits tables
Enabling changes	EC1	Verify reporting requirements with EMCDDA
	CO1	RO
EC : Enabling Change	E1	Verification email

CO: change owner (person responsible for ensuring the change happens)	EC2	Training on creation/generation of tables
E: Evidence of changes	CO2	NR
	E2	Training completed
	EC3	Review & modify workflow for generating tables
	CO3	RO
	E3	New workflow implemented
	EC4	Develop robust security, authorisation & access processes
	CO4	RO
	E4	Processes in place
	EC5	Review and agree modified workflow for data submission
	CO5	SR
	E5	New workflow implemented
	EC6	Availability of EMCDDA mapping tables - to be used for generating XML files (mapping of data onto EMCDDA website)
	CO6	RO
	E6	Requested & Received
	EC7	Training on generating XML files & submitting data to EMCDDA
	CO7	RO
	E7	Training completed
	EC8	Access rights to EMCDDA website to upload data.
	CO8	RO
	E8	Access rights granted & authenticated.
IT enablers	ITE1	Creation of reporting & tables template
	CO1	NR
IE : IT Enabler	E1	Electronic tables & templates available for use
CO: change owner (person responsible for ensuring the change happens)	ITE2	Ms access tool to generate tables & output tables to excel spreadsheets
E: Evidence of changes	CO2	NR
	E2	Fully tested functional tool
	ITE3	Creation of XML generator - to convert excel tables to XML for upload to EMCDDA website
	CO3	RO
	E4	Fully tested functional tool
Q6. Who will be affected by the changes?	C1	SR
	C2	SR, RO, NR
	C3	NR

	C4	SR, RO, NR
	EC1	SR
	EC2	NR
	EC3	SR, NR
	EC4	RO
	EC5	SR, RO
	EC6	RO
	EC7	RO, NR
	EC8	SR, RO, NR
Q7. How and when can changes be made?	C1	February 2011 (& November annually)
	C2	September 2011
	C3	August 2011
	C4	September 2011
	EC1	February 2011 (& November annually)
	EC2	August 2011
	EC3	June 2011
	EC4	April 2011
	EC5	June 2011
	EC6	March 2011
	EC7	August 2011
	EC8	March 2011

Appendix 6 Final BDN for reporting to the EMCDDA



Appendix 7 Drug Related Deaths Standard Table 5

STANDARD TABLE 5 DIRECT DRUG-RELATED DEATHS/DRUG-INDUCED DEATHS - version 1/2011

1. - Notes:

1.1. - This table can be submitted up to three times per country, according to the possible "case definition":

Case definitions for drug-related deaths (DRD):

EMCDDA DRD standard definition for the General Mortality Registries - **Selection B**

EMCDDA DRD standard definition for the Special Registries (Forensic/Police) - **Selection D**

Specific definition if different from either Selection B or Selection D - **Selection Other**

(Note that it is recommended that one of the EMCDDA standard definitions is used as national definition)

A general overview of drug-related deaths and mortality related to drug use is provided in the [Methods section of the Statistical bulletin](#) .

Information on definitions is provided in the [drug-related death standard protocol](#) .

Methodological details per country are available in [Table 106 of the Statistical bulletin](#) .

2. - Core data - Quantitative part and methodology

2.1. - Quantitative part

2.1.1 - Country *

2.1.2 - EMCDDA data collection year *

2.1.3 - Data reported according to : *

Selection B

Selection D

Other (specific definition)

2.1.4 - Is this your national definition? *

- Yes
- No

IMPORTANT NOTE: The next question concerns only the United Kingdom. All other countries should choose the option "Non-UK"! 2.1.5 - National definition used: *

- ONS
- DSD
- UK other
- Non-UK

IMPORTANT NOTE: In the next question all countries should choose the option "National" or "Not national" (e.g. data refer only to some cities), with the exception of the United Kingdom

2.1.6 - Data coverage *

- National
- Not national
- UK (whole Member State)
- UK England and Wales
- UK Northern Ireland
- UK Scotland

2.1.7 - Year of reporting *

NOTES:

* Please provide numbers when indicated

* If there are cases with gender "Unknown" include them in the Total and state it in the Remarks below

2.1.8 - Number of cases *

	Male	Female	Total
Number of cases	<input type="text"/>	<input type="text"/>	<input type="text"/>

2.1.9 - Mean age

	Male	Female	Total
Mean age	<input type="text"/>	<input type="text"/>	<input type="text"/>

2.1.10 - Age distribution (numbers)

	Male	Female	Total
<15	<input type="text"/>	<input type="text"/>	<input type="text"/>
15-19	<input type="text"/>	<input type="text"/>	<input type="text"/>
20-24	<input type="text"/>	<input type="text"/>	<input type="text"/>
25-29	<input type="text"/>	<input type="text"/>	<input type="text"/>
30-34	<input type="text"/>	<input type="text"/>	<input type="text"/>
35-39	<input type="text"/>	<input type="text"/>	<input type="text"/>
40-44	<input type="text"/>	<input type="text"/>	<input type="text"/>
45-49	<input type="text"/>	<input type="text"/>	<input type="text"/>
50-54	<input type="text"/>	<input type="text"/>	<input type="text"/>
55-59	<input type="text"/>	<input type="text"/>	<input type="text"/>
60-64	<input type="text"/>	<input type="text"/>	<input type="text"/>
>=65	<input type="text"/>	<input type="text"/>	<input type="text"/>
Not Known	<input type="text"/>	<input type="text"/>	<input type="text"/>

TOXICOLOGY

Note:

- **If case data come from a General Mortality Registry (GMR)**, the total number of cases with known toxicology should be equal to the sum of rows (a), (b) and (c) from question 2.1.12.

- **If case data come from a Special Registry (SR)**, the total number of cases with known toxicology should be equal to the sum of rows (a) and (b) from question 2.1.12.

2.1.11 - Number of cases with known toxicology

	Male	Female	Total
Number of cases with known toxicology	<input type="text"/>	<input type="text"/>	<input type="text"/>

2.1.12 - Of which:

	Male	Female	Total
(a) number with opiates (+ any drug)	<input type="text"/>	<input type="text"/>	<input type="text"/>
(b) number with any drug without opiates	<input type="text"/>	<input type="text"/>	<input type="text"/>
(c) number with -- see below	<input type="text"/>	<input type="text"/>	<input type="text"/>

Toxicology notes:

The groups (a), (b) and (c) are mutually exclusive.

If the source is a General Mortality Registry (GMR), row c is for "other/mixed/unspecified"

If the source is a Special Registry (SR), row c is for "unknown/unspecified"

For further information, see section "3.Complementary guidelines for Standard Table 5 and Standard Table 6" below.

Breakdown of ICD codes

ICD breakdown will only apply to countries with **Selection B**

Codes X44, X64 and Y14 will apply **only** to countries that have implemented WHO ICD-10 updates (of 2006).

See 3.Complementary guidelines for Standard Table 5 and Standard Table 6

2.1.13 - If General Mortality Registry is used, break down by ICD Codes (Numbers)

	M	F	Total
1 - F codes	<input type="text"/>	<input type="text"/>	<input type="text"/>
2 - X41 codes	<input type="text"/>	<input type="text"/>	<input type="text"/>
3 - X42 codes	<input type="text"/>	<input type="text"/>	<input type="text"/>
4 - X44 codes	<input type="text"/>	<input type="text"/>	<input type="text"/>
5 - X61 codes	<input type="text"/>	<input type="text"/>	<input type="text"/>
6 - X62 codes	<input type="text"/>	<input type="text"/>	<input type="text"/>
7 - X64 codes	<input type="text"/>	<input type="text"/>	<input type="text"/>
8 - Y11 codes	<input type="text"/>	<input type="text"/>	<input type="text"/>
9 - Y12 codes	<input type="text"/>	<input type="text"/>	<input type="text"/>
10 - Y14 codes	<input type="text"/>	<input type="text"/>	<input type="text"/>

2.1.14 - If the General Mortality Registry is used, are T-codes applied in the extraction of DRD cases?

- Yes
- No

2.1.15 - If not, please explain why


2.1.16 - Were the ICD-10 updates implemented? (it does not refer to the implementation of ICD-10 itself but its updates of 2006)

- Yes
- No

2.1.17 - Are non-residents dying in your country due to DRD included in the figures provided?

- Yes
- No

2.1.18 - Could you please explain how this information is managed?



2.2. - Methodology:

2.2.1 - Complete bibliographic reference (or source of data):



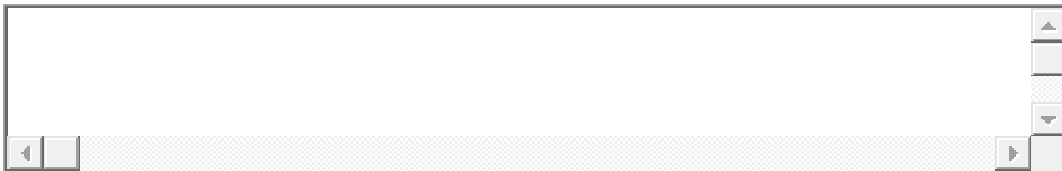
Source: 2.2.2 - General Mortality Registry *

- Yes
- No

2.2.3 - Special Registry *

- Yes
- No

2.2.4 - If yes, describe the Special Registry



2.2.5 - Why did you select as source of information the General Mortality Registry / Special Registry?



2.2.6 - Case definition used as national definition -- (1)



(1)

- If the national case definition is equal to the EMCDDA (Selection B or Selection D), please state this fact explicitly
- If the national case definition is different from the EMCDDA definition, use as much as possible the terms of the "[Methodological table](#)" in the Statistical bulletin which presents an edited and harmonised compilation of the national definitions

2.2.7 - Please explain the difference between "national definition" and EMCDDA standard definition? -- (2)



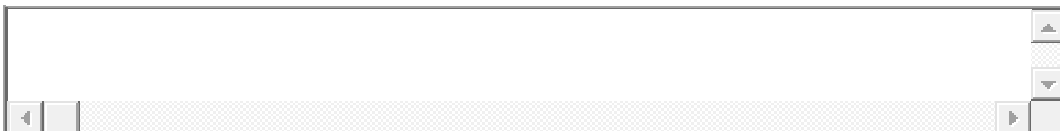
(2)

With "Selection B", if the national definition is based on General Mortality Registry, or
With "Selection D", if the national definition is based on Special Registry.
If there is no difference, please state it clearly.

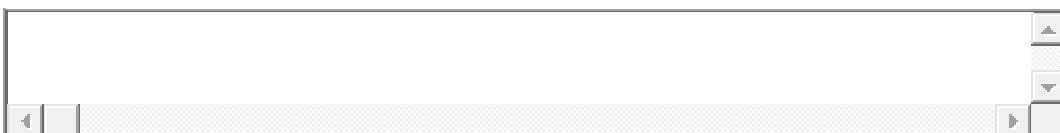
2.2.8 - Is double counting controlled?

- Yes
- No

2.2.9 - Geographical coverage



2.2.10 - Estimated level of under-reporting. How is the level of under-reporting assessed? By validation studies? Cross-comparison of different sources of information, locally or nationally? Use of cohort data?
Please specify



2.2.11 - Are there other relevant national sources of information in the country?

- Yes
- No

2.2.12 - If yes, describe those relevant sources

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2.2.13 – Remarks

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3. - Complementary guidelines for Standard Table 5 and Standard Table 6

4. - Complementary information on substances

4.1.1 - Year of reporting

4.1.2 - Total number of cases

4.1.3 - Complementary information on substances involved in acute drug-induced deaths - **TOTAL**

	Total number of cases where the substance has been found (alone or in combination)
1. All mentions of any opiate / opioid	<input type="text"/>
1.1 Mentions of heroin / morphine (or metabolites)	<input type="text"/>
1.2 Mentions of methadone (or metabolites)	<input type="text"/>
1.3 Mentions of buprenorphine (or metabolites)	<input type="text"/>
1.4 Mentions of dextropropoxyphene (or metabolites)	<input type="text"/>
2. Mentions of cocaine (or metabolites)	<input type="text"/>
3. All mentions of any amphetamine type stimulant	<input type="text"/>
3.1 Mentions of amphetamine / methamphetamine (or metabolites)	<input type="text"/>
3.2 Mentions of MDMA (or metabolites)	<input type="text"/>
4. All mentions of any hallucinogen	<input type="text"/>
4.1 Mentions of LSD (or metabolites)	<input type="text"/>
5. Mentions of cannabis / THC (or metabolites)	<input type="text"/>
6. Mentions of volatile substances	<input type="text"/>
7. Substance unspecified (but assumed to be a drug of abuse)	<input type="text"/>

4.1.4 - Complementary information on substances involved in acute drug-induced deaths - **BREAKDOWN OF THE ABOVE REPORTED TOTAL**

	Alone	With alcohol only	With other opioids only (with or without alcohol)	With other opioids and other substances (with or without alcohol)	With other substances but not opioids (with or without alcohol)
1. All mentions of any opiate / opioid	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1.1 Mentions of heroin / morphine (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1.2 Mentions of methadone (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1.3 Mentions of buprenorphine (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1.4 Mentions of dextropropoxyphene (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
2. Mentions of cocaine (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3. All mentions of any amphetamine type stimulant	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3.1 Mentions of amphetamine / methamphetamine (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3.2 Mentions of MDMA (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
4. All mentions of any hallucinogen	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
4.1 Mentions of LSD (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
5. Mentions of cannabis / THC (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
6. Mentions of volatile substances	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
7. Substance unspecified (but assumed to be a drug of abuse)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

4.1.5 - Complementary information on substances involved in acute drug-induced deaths - **BREAKDOWN OF COLUMN 'WITH OTHER SUBSTANCES BUT NOT OPIOIDS' FROM THE PREVIOUS QUESTION (LAST COLUMN)**

	With drugs of abuse only	With psychoactive medicines only	With drugs of abuse and psychoactive medicines	Not known
1. All mentions of any opiate / opioid	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1.1 Mentions of heroin / morphine (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1.2 Mentions of methadone (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1.3 Mentions of buprenorphine (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1.4 Mentions of dextropropoxyphene (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
2. Mentions of cocaine (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3. All mentions of any amphetamine type stimulant	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3.1 Mentions of amphetamine / methamphetamine (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3.2 Mentions of MDMA (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
4. All mentions of any hallucinogen	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
4.1 Mentions of LSD (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
5. Mentions of cannabis / THC (or metabolites)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
6. Mentions of volatile substances	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
7. Substance unspecified (but assumed to be a drug of abuse)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

4.1.6 - Complementary information on substances involved in acute drug-induced deaths - **ALCOHOL**

With presence of alcohol (independently of the presence of any other substance)

- | | |
|--|--------------------------|
| 1. All mentions of any opiate / opioid | <input type="checkbox"/> |
| 1.1 Mentions of heroin / morphine (or metabolites) | <input type="checkbox"/> |
| 1.2 Mentions of methadone (or metabolites) | <input type="checkbox"/> |
| 1.3 Mentions of buprenorphine (or metabolites) | <input type="checkbox"/> |
| 1.4 Mentions of dextropropoxyphene (or metabolites) | <input type="checkbox"/> |
| 2. Mentions of cocaine (or metabolites) | <input type="checkbox"/> |
| 3. All mentions of any amphetamine type stimulant | <input type="checkbox"/> |
| 3.1 Mentions of amphetamine / methamphetamine (or metabolites) | <input type="checkbox"/> |
| 3.2 Mentions of MDMA (or metabolites) | <input type="checkbox"/> |
| 4. All mentions of any hallucinogen | <input type="checkbox"/> |
| 4.1 Mentions of LSD (or metabolites) | <input type="checkbox"/> |
| 5. Mentions of cannabis / THC (or metabolites) | <input type="checkbox"/> |
| 6. Mentions of volatile substances | <input type="checkbox"/> |
| 7. Substance unspecified (but assumed to be a drug of abuse) | <input type="checkbox"/> |

4.1.7 - Case definition used to complete Section 4 (complementary information on substances)

- Selection B
- Selection D
- Other (specific definition)

4.1.8 - If other, please describe the case definition used



4.1.9 - Is the data for this complementary table (section 4) based on the same source and same cases than for the DRD core information (section 2)?

- Yes
- No

If no, please answer *all* the following questions

If yes, please move to question 4.1.13

4.1.10 - Could you please state the reason(s) why the same source cannot be used?



4.1.11 - Could you please describe the data source used and the case definition?



4.1.12 - Could you please specify the geographical coverage?



4.1.13 - Which institution(s) perform the toxicological analysis used to complete the information on this complementary table?



4.1.14 - Could you explain briefly the procedures for conducting toxicological examinations (e.g. is a screening procedure first conducted - how and in which cases - and afterwards a confirmation analysis)?

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4.1.15 - Can you estimate the proportion of cases of post-mortem forensic investigations that undergo a standard general unknown screening for drugs?

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4.1.16 - How is the toxicological information used to complete this table transferred from the laboratory to the source / mortality registry?

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Appendix 8 User Requirements Specification

1. Introduction

1.1 Purpose

The NDRDI EMCDDA Fonte report automation tool is a tool devised to automate the reporting of data to the EMCDDA. Currently, this process is undertaken using a combination of Microsoft access, SPSS and manual inputting of data onto the EMCDDA website. This tool will automate this process and minimise the amount of manual data entry involved in this reporting process.

1.2 Document Conventions

All the system requirements specified in this document have the same priority.

1.3 Intended Audience and Reading Suggestions

The intended audience is IT staff and staff currently working in the NDRDI including a senior researcher, research office and a nurse researcher.

In section 1, the purpose and scope of tool is outlined. Section 2 describes the product perspective, product features, user classes and characteristics, operating environment, design and implementation constraint, user documentations and assumptions and dependencies. In section 3 system features are discussed. In section 4, the user interface, hardware interface, software interface and communication interface are discussed. Section 5 discusses performance requirements, safety requirements, security requirements and software quality attributes.

1.4 Project Scope

The EMCDDA Fonte tool is a computerized program which will be used to automate the submission of NDRDI data to the EMCDDA. It is used to select the cases which meet the EMCDDA reporting requirements, to generate the predefined EMCDDA reporting tables and to output these tables in XML format for direct upload to the EMCDDA website.

This tool will reduce the burden of work on staff to generate and submit the required tables. Initially SPSS generated tables will be used to valid the accuracy of the tables generated using this tool. Staff time optimization and workload reduction can be achieved with the help of this tool.

The key goals of this tool are to reduce the burden of work on staff, to generate accurate tables, to optimize the use of staff time and reduce the amount of manual data entry required to submit the tables and to reduce reporting errors by the elimination of manual data entry onto the EMCDDA website, in essence it is to streamline the EMCDDA reporting process. These goals can be attained if the computer's output is presented in an effective and efficient manner, and if the computer outputs (XML files) are compatible with the EMCCA reporting website.

1.5 References

Microsoft Accessibility Guidelines:

<http://msdn.microsoft.com/en-us/library/aa291864%28VS.71%29.aspx>

(Accessed on 02/03/2011)

2. Overall Description

2.1 System Perspective

The Fonte tool is a self-contained system which will automate the generation of the requisite tables for the EMCDDA and generate XML files which can be directly imported onto the EMCDDA website.

2.2 System Features

The main functions of the system are as follows:

- a. Generate a table of cases which meet the EMCDDA reporting requirements.
- b. Generate new variables required for generating the EMCDDA tables.
- c. Output the generated tables to an Excel Template files.
- d. Generate XML files of the outputted Excel tables.

The system shall generate these requirements with minimum input from the user.

2.3 User Classes and Characteristics

The system has 2 types of user (see Figure 1), NDRDI staff and an IT Administrator, both with different functionalities. The system shall not require any special knowledge from the user. User shall not be expected to remember lines of commands to use the functions of the system: these shall be performed choosing from menus, command button or help screens. Users shall not experience data loss.

- NDRDI staff member: this is the user who has access to all functionalities except the administrative functions. This user can access generate a table of cases which meet the reporting requirements, they can generate the excel tables and save the results (functionalities described in 3.1). They can also generate the required XML files to upload the data onto the EMCDDA website.
- IT Administrator: This user is responsible for setting and enabling or disabling user accounts to access the system (functionalities described in 3.2).

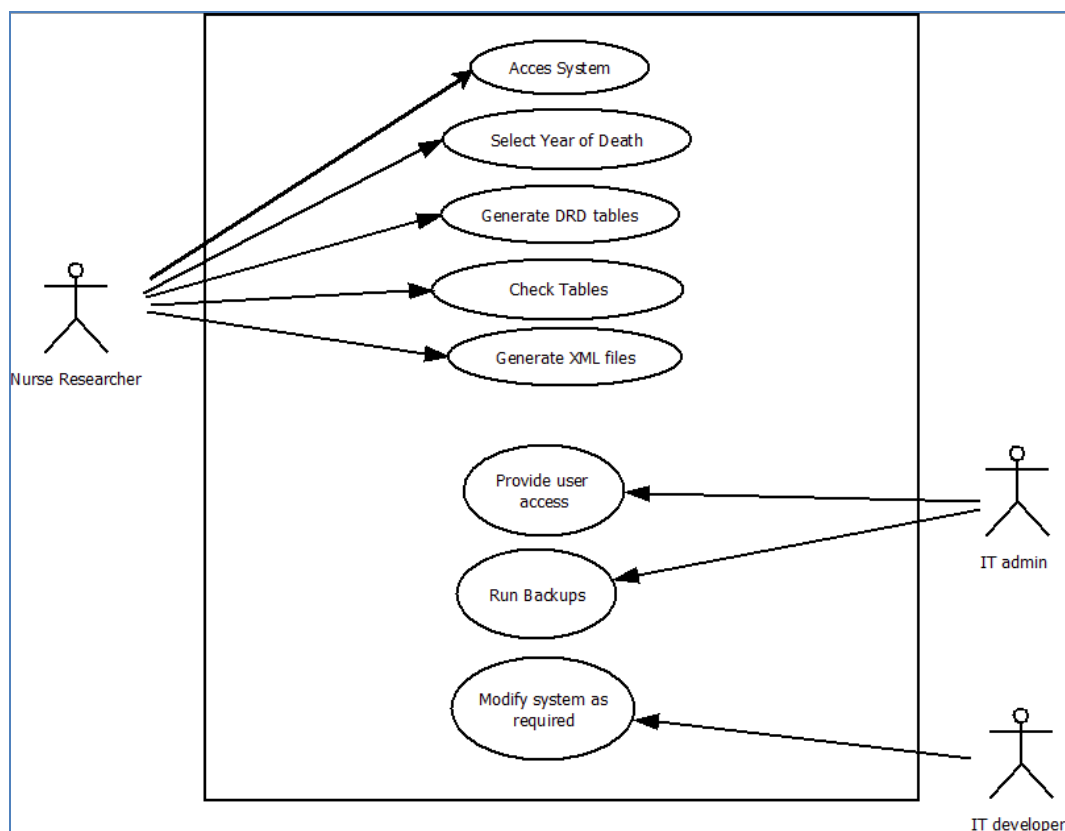


Diagram 1 System Use Cases Diagram

Use Cases	Brief Description
Login into system	User enters credentials to access the system
Select Year of Death	The user must enter the year of death on which the tables will be generated.
Generate DRD table	The nurse researcher will click a button to generated a table of cases which meeting the EMCDDA reporting.
Generate EMCDDA tables	The nurse researcher will click a button to generate the required EMCDDA tables. These tables will be generated by clicking a button and will be automatically output to an excel file.
Save tables	The nurse researcher will save the generated excel tables.
View data	The system will display a table of all cases meeting the EMCDDA reporting requirements. Staff may view and filter this data but no data modifications may be made using this system. All changes must be made to the master files.
Generate XML files.	The nurse researcher must be able to generate XML files using the save excel tables.

2.4 Operating Environment

The system shall work under the following OS: Windows XP, Windows Server 2000 and Windows Server 2003.

2.5 Design and Implementation Constraint

The system shall generate a read only table of cases meeting the reporting EMCDDA requirements. Staff may filter data but may not modify the data. The data will be visible in a specific area of the GUI and the control to generate the tables, excel files and XML files will be available in another specific area of the GUI as outlined in section 4.1.2.

The system shall work with a workstation. The workstation shall have enough disk space for the application to be installed and operated.

We will use Microsoft Excel to store the generated tables (see section 4.4 for further details).

2.6 User Documentation

An online help and Training protocol shall be always available through the user's interface.

2.7 Assumptions and Dependencies

The system shall accept the user login details in order to allow users access it. The system shall link to the master database contained all NDRDI data. This master database is populated with clean, validated data. This master database will be stored on the network drive and access to this database will be limited to NDRDI staff.

3. System Requirements

The system requirements are provided below

3.1 Functional Requirements for the NDRDI staff User

Login into system

Actor: NDRDI staff member

Pre-Conditions: Account must be enabled

Basic Flow:

1. User starts the application
2. System prompts for username and password
3. User enter login credentials
4. System authentication
5. User accesses the system

Alternate / Exceptional Flows:

- 1) Authorization Fails
 - a. System prompts to re-enter login details

Any Step:

1. User cancels login
2. User exits the application

Generate DRD table

Actor: NDRDI staff member

Pre-Conditions: User logged into the system

Basic Flow:

1. User enters year of death.
2. User clicks 'Generate DRD Table' button.
3. System selects valid cases based on year of death.
4. System generates table of valid cases

5. System generates and populates new variables required to generate EMCDDA tables.
6. System displays table on the screen
7. User may check data and filter data as required.

Alternate / Exceptional Flows:

1. Invalid year of death
 - a. System prompts to re-enter year of death displaying an error message (e.g. "Invalid year of death").
2. No data is available for the selected year of death.
 - a. Warning message is displayed (e.g. "No data available in the database")

Any Step:

1. User accesses help files
2. User exits the application
3. User accesses existing excel generated tables.

Generate Excel Tables

Actor: NDRDI staff member

Pre-Conditions: User logged into the system and has generated DRD table

Basic Flow:

1. User enters year of death.
2. User clicks 'Generate Excel Tables' button.
3. System selects valid cases generated in the DRD table.
4. System generates EMCDDA tables using the inbuilt algorithms.
5. System outputs tables to the Excel template file.
6. System displays a message informing the user that the tables have been generated.
7. System displays the generated Excel table on the screen.
8. User prompted to save the Excel tables.
9. User saves the generated Excel tables.

Alternate / Exceptional Flows:

1. Invalid year of death
 - a. System prompts to re-enter year of death displaying an error message (e.g. "Invalid year of death").
2. No data is available for the selected year of death.
 - a. Warning message is displayed (e.g. "No data available in the database")
3. System displays a warning message if the generation of the Microsoft Excel tables have not been completed.
4. Excel files stop at the point of error indicating where the error has occurred.

Any Step:

1. User accesses help files
2. User exits the application
3. User accesses existing excel generated tables.

Generate XML files

Actor: NDRDI staff member

Pre-Conditions: User logged into the system and tables have been generated and saved in excel file.

Basic Flow:

1. User clicks 'Generate XML files' button.
2. User selects reporting year for data.
3. User selects the appropriate excel file containing the generated tables.
4. User clicks on "Start" button
5. XML files are generated and automatically saved to a predefined location

Alternate / Exceptional Flows:**EMCDDA Java Tool not available**

- a. System prompts displaying an error message (e.g. "EMCCA XML tool not accessible").

Any Step:

1. User interrupts image comparison
2. User accesses help files
3. User exits the application
4. User accesses existing excel generated tables.

4. External Interface Requirements

4.1 Interfaces for users

Warning messages shall be consistent throughout the application.
The exit option shall be available always on the system interfaces.

4.1.1 Login Interface for NDRDI staff

User Name

Password

OK! Cancel

Figure 2 User login

When starting the system, user shall be able to identify a login area where she can enter login credentials.

4.1.2 Interface for NDRDI staff

A mock-up of the user interface is outlined below to to identify the following main areas on the screen (e.g. see Figure 3):

ID	GenderCor	DataSource	CaseNumbe	AgeCor	PositiveTox	Poison1Spe	Poison1Cor
201009	1	4.6	CN/6/2008	25	1		240
201019	1	4.6	KYW/2008/84	30	1		164
201038	1	4.6	L/2008/9	36	1		111
201041	2	5.4	LKSE/2008/12	29	2		0
201047	1	4.6	LKSE/2008/18	43	1		111
201050	1	1.1	D/74/09	17	1		111
201053	1	6.2	D/145/09	31	1		700
201070	1	4.6	C/B1485/2008	24	1		111
201071	2	4.6	C/B1560/2008	21	1		600
201077	1	4.6	C/B1508/2008	45	1		700
201084	1	5.4	C/B1727/2008	31	2		0
201105	1	6.2	D/209/09	27	1		111
201106	1	6.2	D/210/09	30	1		700
201109	1	4.6	D/220/09	22	1		700
201114	1	4.6	D/235/09	21	1		210
201116	1	4.6	D/240/09	32	1		700
201121	2	6.2	D/253/09	49	1	84302	843
201122	1	5.4	D/255/09	18	1		100
201123	1	4.6	D/257/09	22	1		700

Figure 3 EMCCDDA reporting tool prototype

1. About: this shall display information about the tool, including version number, copyright information and contact information for the NDRDI.
2. Help: clicking on this link shall automatically the user training Protocol.

3. DRD table: Cases meeting the EMCDDA reporting requirements will be displayed to the user. This data will be read only.
4. Year of Death: The user will be required to enter a valid year of death which is required to select the cases meeting the EMCDDA requirements.
5. Create DRD tables: The user will click this button to generate the DRD tables based on the criteria specified by the EMCDDA.
6. Generate Excel: The user will click this button to generate the EMCDDA tables based on the criteria specified by the EMCDDA.
7. Generate XML: The user will click this button to open the XML generator tool provided by the EMCDDA.
8. The user shall click this button to open Excel tables previously saved.
9. Exit: This will allow the user to close the tool.

4.2 Hardware Interfaces

The system shall meet the following hardware requirements based on existing devices in the department:

1. The GUI shall use the full size of the screen.
2. Mouse: the system shall be mainly mouse dependent. The mouse shall be replaced by keyboard functionalities whenever it is not available.
3. Keyboard: although the use of the keyboard shall be minimized, the user shall be able to use it to enter requirement such as Year of Death.

4.3 Software Interfaces

A separate tool shall be provided by the EMCDDA to generate the XML files. This tool shall be opened from the tool user interface.

4.4 Communications Interfaces

Users will connect to the system through the GUI. Microsoft Access 2007 will be used. The XML files will be generated using a Java jar file accessible from the user interface.

Local Area Network (LAN). The LAN shall be capable of achieving required response time and data bandwidths.

5. Other Non-functional Requirements

5.1 Performance Requirements

5.1.1 Response Time

The system shall be able to generate the DRD tables within 5 seconds.

The system shall be able to generate the excel files within 5 seconds.

The system shall be able to generate the XML files within 5 seconds.

5.1.2 Capacity

The system will be available to the total compliment of NDRDI staff and shall be able to accommodate all users during the peak usage window of 10:00 AM to 05:00 PM local time, with estimated average session duration of 10 minutes.

5.1.3 Conformity

The system must conform to the Microsoft Accessibility guidelines.

5.2 Maintainability

All codes must be fully documented and each function shall be appropriately commented. Program files shall include comments regarding authorship and date of change. Modules shall be used to allow future developments and modifications.

5.2.1 Backup

The system shall be stored on a HRB server and shall be backed-up in accordance with HRB backup policy.

5.2.2 Errors

The system shall display all errors in the user interface and provide appropriate error messages.

5.2.3 Patches

The system shall be updated as required to reflect any changes in the EMCDDA reporting requirements.

5.3 Software Quality Attributes

5.3.1 Availability

The system shall be available 24/7.

5.3.2 Robustness

If the connection between the user and server is broken prior to completion of process, then connection shall be resumed to server from same stage.

5.4 Security

5.4.1 Logon ID

Users will use their existing NDRDI access details to log on to the system.

5.4.2 Compliance

The system must comply with the internal HRB Regulations concerning privacy.

5.4.3 Modification

Only IT administrators shall modify the database (e.g. insert, update, delete...).

5.5 Legal Requirements

Copyright laws and license agreements must be adhered to regarding any third party software used in the development of the system.

5.6 User Documentation and Help Requirements

A user manual must be available and accessible from the user interface.

Glossary

- EMCDDA : European Monitoring Centre for Drug and Drug Addiction
- GUI (Graphical User Interface): a software interface that facilitates the use of the program making use of the computers' graphics functionalities.
- LAN (Local Area Network): is computer network covering small area.
- OS (Operating System): the foundation software that runs the computer.

Appendix 9 Usability Questionnaire

The following checklist of questions is a guideline to evaluate the usability of the EMCDDA reporting automation tool. Please read each question and write your comments in the space provided.

Visibility of system status

1. Was the feedback appropriate at all times regarding the status of the system i.e. what the system was doing?
2. Was there any instance where you felt you required feedback from the system which you did not receive?

Match between system and the real world

3. Did you have difficulty understanding any of the terminology in the user interface?
4. Were there any phrases/terms which you did not understand in the user interface?
5. Were there any phrases which you felt were unclear or open to interpretations?

User control and freedom

6. Were you able to cancel operations as required?
7. Do you know the location of the button to exit the application?
8. Is the link to previously generated and saved Excel tables useful?
9. Is the order and sequence of the required tasks clear?

Consistency and standards

10. Were there any situations where you were unclear as to the meaning of different words, situations, or actions?

Error prevention

11. Were the error messages clear?

12. Did you find any error for which you were unclear of what course of action to take?

13. Were you able to generate the tables based on an invalid year of death?

14. Were you able to make modifications to the underlying data?

Recognition rather than recall

15. After the training session were you able to perform the required tasks without having to continuously check the help documentation?

16. Was there any instance where you felt a user prompt was required but not provided?

Flexibility and efficiency of use

17. Is the system easy to learn?

18. Is the system easy to use?

19. Do you feel additional short-cut keys required?
If YES – please clarify.

Aesthetic and minimalist design

20. Are there instances where you felt unnecessary prompts were provided?

21. Do you feel that changes to the interface are required regarding any of the following items:

a. Font size

b. Colours used

c. Layout of the interface?

Help users recognize, diagnose, and recover from errors

22. Do you find any error message which you felt were not clear?

23. Do you find any error message which you felt were not concise?

24. Do you find any instance where an error message was required but not provided?

Help and documentation

25. Is the help documentation clear and easy to follow?

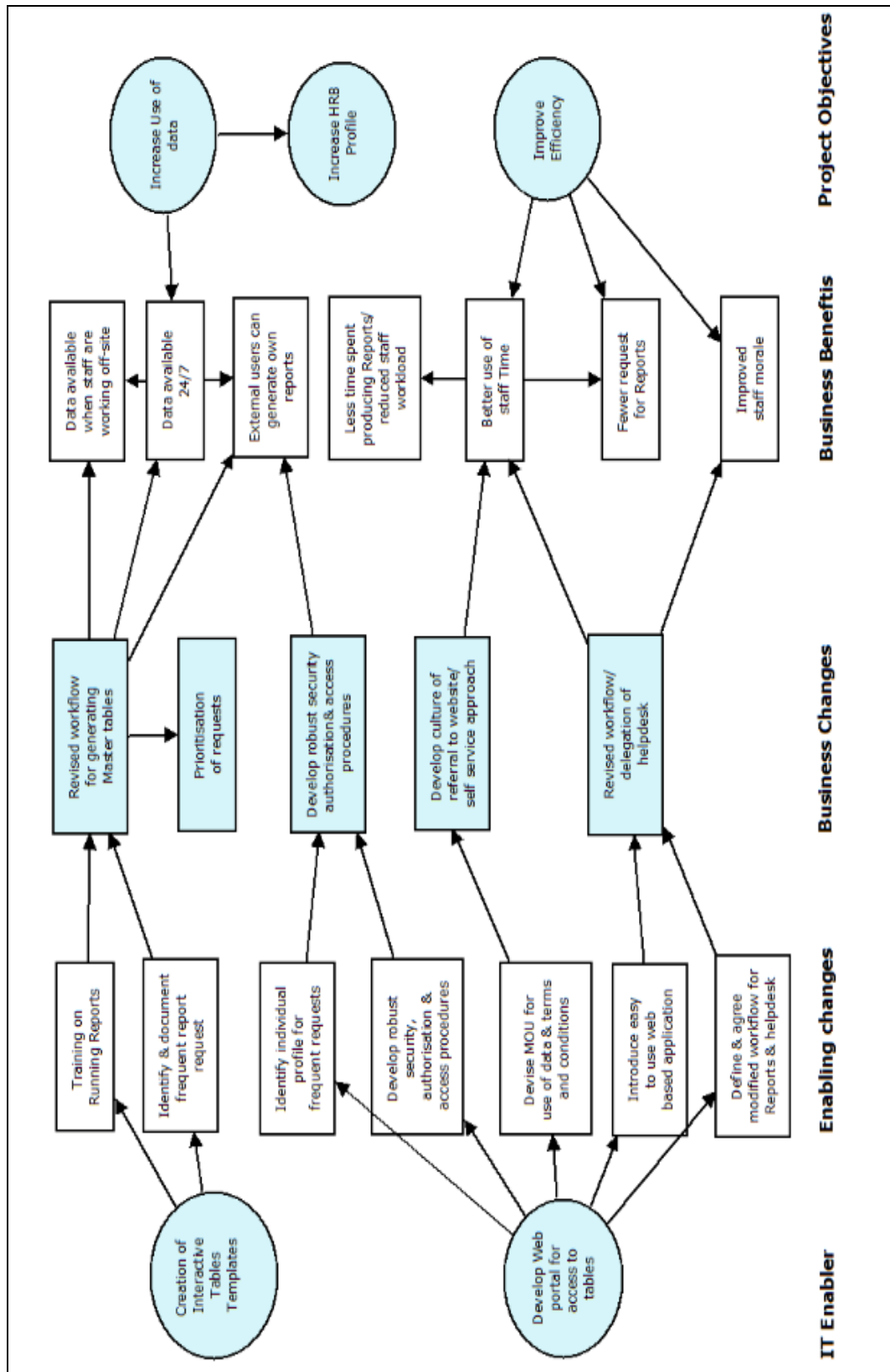
26. Do you know how to link to the help documentation via the user interface?

27. Have you have any further comments/suggestions on improving the help documentation?

28. Have you any further comments or suggestions on the overall systems?

Thank you for taking part in this usability test

Appendix 10 BDN for Interactive Tables



Appendix 11 Provisional Interactive Tables BR Template

4.1 Dissemination - Interactive Tables		
1. Project Objectives	1	Increase use of information
	2	Decrease Staff Workload - running reports
	3	Increase HRB profile
	4	Ensure target users are sufficiently informed to be able to use the tables - i.e. access the service & run tables required
2. Benefits	B1	Data available when staff are out of the office & working off-site
	M1	Interactive tables usage when staff off-site. Check 2010 number of requests when staff off-site.
B: Benefits	B01	SR
M: Measure	B2	Information available 24/7 (Information more accessible to policy makers, students etc)
BO: Benefit owner (person responsible for making the benefit happen)	M2	Interactive tables available 24/7
	B02	SR
	B3	External users can generate own tables/reports
	M3	Internet Log files - check reports generated.
	B03	RO
	B4	Less time spent by NDRDI staff generating reports therefore reduced staff workload
	M4	Measure number of staff hours generating reports & the number of reports requested.
	B04	SR
	B5	Better use of staff time
	M5	Compare number of reports generated in HRB with/without availability of interactive tables.
	B05	SR
	B6	Reduced requests for Tables from students/policy makers (fewer enquiries)/reduced number of reports generated internally
	M6	Compare number of reports requested
	B06	RO

	B7	Improved staff morale
	M7	Check increase in number of publications both internal to HRB and externally. Staff survey
	B07	SR
3. Business Changes	C1	Revised workflow for generating Master tables
	CO1	SR
C: change	E1	Master tables available
CO: change owner (person responsible for ensuring the change happens)	C2	Prioritisation of requests
E: Evidence of changes	CO2	SR
	E2	Check request logs
	C3	Develop robust security, authorisations & access procedures to interactive tables.
	CO3	RO
	E3	System in place
	C4	Develop culture of referral to website/self service approach to generating tables
	CO4	RO
	E4	check & monitor referrals & requests
	C5	Revised workflow/delegation of helpdesk duties
	CO5	SR
	E5	helpdesk duties provided by NDC
4. Enabling Changes	EC1	Training on running interactive reports/Training documentations (develop education material to support self generation of reports)
	CO1	RO
EC : Enabling Change	E1	Documents & help files created.
CO: change owner (person responsible for ensuring the change happens)	EC2	Identify & document frequent report requests
E: Evidence of changes	CO2	SR
	E2	Documented & available to support interactive table design.
	EC3	Identify individual profiles for frequent requests and target users to highlight availability of interactive tables
	CO3	SR
	E3	

	EC4	Develop robust security, authorisation & access procedures
	CO4	RO
	E4	check system in place & tested
	EC5	Devise Memorandum of Understanding (MOU) for use of data & terms and conditions
	CO5	SR
	E5	MOU created.
????	EC6	Introduce easy to use web based interactive tables
	CO6	RO
	E6	Tables online & functioning correctly
	EC7	Define & agree modified workflow for generating tables & helpdesk duties
	CO7	SR
	E7	RO generated master table & NDC undertaking helpdesk duties
	EC8	Publicise availability of tables & promote usage
	CO8	RO
	E8	Number of online users
5. IT Enablers	IT1	Creation of interactive tables templates
	CO1	RO
IE : IT Enabler	E1	Templates generated & available for use.
CO: change owner (person responsible for ensuring the change happens)	IT2	Develop a web portal for access to & generating tables
E: Evidence of changes	CO2	RO
	E2	Online access available
Q6. Who will be affected?	C1	SR,RO
	C2	RO
	C3	RO
	C4	SR,RO
	C5	SR
NDRDI staff	EC1	SR
Library/NDC staff	EC2	RO
	EC3	SR,RO
	EC4	RO
	EC5	SR
	EC6	RO
	EC7	SR,RO, NDC
	EC8	SR,RO, NDC

Q7. How and when can changes be made? (provisional)	C1	November 2011
	C2	November 2011
	C3	
	C4	November 2011
	C5	November 2011
	EC1	May 2012
	EC2	March 2012
	EC3	March 2012
	EC4	April 2012
	EC5	May 2012
	EC6	June 2012
	EC7	August 2012
	EC8	September 2012