Successful implementation of electronic nursing documentation into practice

by
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Abstract

Recently, electronic nursing documentation has become inevitable in order to record the entire nursing record, thus nursing homes have to face the challenge of introducing nursing informatics software. Since an NI project is considered to be rather a technical process, the inclusion of a nursing perspective of the organisational changes associated with the project are rarely considered in the formation of project objectives. This in turn affects the success of a NI project especially regarding effectiveness and acceptance.

This paper presents a framework from the formation of a project to the measurement of success. Elements of a successful implementation framework include aspects of project decision-making and planning, and the integration process where technology becomes a common component of the organisation. Amongst other concerns, questions regarding implementation evaluation, the outcome analysis and participant feedback of the running system are presented.

Introduction

Independent of the field or branch preparing to adopt a software product, technological planning, from the theoretical profile of requirements and planned functions through to the final implementation of the running system often remains purely technical in scope. Carrying out an IT project is often regarded as a technical challenge which leads to a notable number of IT projects that fail to meet their implementation objectives due to the dominance of a technical orientation by the project management and technical staff. (Ammenwerth, Kutscha, Mahler, Eichstädter & Haux, 2001).

The literature reveals a number of project reports which describe the equal integration of structural, human and technical elements – including knowledge transfer and user acceptance - as being the key to success in implementing information technology (Ammenwerth et al., 2001; Metnitz & Lenz, 1994; Boochever, 2004). Assuming that nursing informatics projects are no different to other IT projects, the findings in the organisation and process research are significant in the implementation of NI projects (Tobey, 2004; Town, 1993).

The nursing informatics literature clearly shows that there is not only one way or one gold standard for the uniform success when planning and implementing a nursing IT project (Utz, 1998; LaDuke, 2001; Bürkle, Michel, Horch, Schleifenbaum, Dudeck, 1998). The field of nursing practice is wide and has a lot of different contexts, targets, conditions and processes. It is a field in which the individual and professional aspects of the nurses are important considerations for the definition and the functionality of nursing information systems and IT (Helleso, Sorensen, & Lorensen, 2005).

Because of this, nursing IT projects do not only represent transfers of technology in the field of practice, but they are also projects for the development of nursing organisations, processes and methods. This means that the project design and planning should be viewed using a wide angle lens to integrate all aspects of nursing, including the professional network of nursing (Ammenwerth et al., 2001).

In the context of successful nursing IT projects it is not enough to define what can be realised in a technical and functional way – a project must also focus on the content, knowledge and practice of nursing and integrate all aspects of nursing care, including nursing organisation, responsibilities and processes (McNeil, Elfrink, Pierce, Beyea, Bickford, & Averill, 2005; Helleso et al., 2005). Every nursing informatics project needs a broad, clearly defined framework which begins with the initial project decision-making through to the evaluation of the final running system (Toofany, 2006).

Besides the design of the project, it also seems very important to organize further important elements. First, the element of knowledge transfer is critical (Desjardins, Sheets-Cook, Jenkins & Bakken, 2005). This not onlyincludes the technical knowledge which is important for using the running system, but also includes organisational and process knowledge. The question is: what is the impact of the project on nursing practice and how can the individual nurse create and handle his/her role and function in the utilization of the system? (Tobey, 2002; Town, 1993)

Secondly there is the question of information, integration and acceptance. No nursing informatics project can be successfully implemented without the acceptance of the nurses within the organisation. As Nobel prize winner Konrad Lorenz said: "Heard is not learned, learned is not accepted, accepted is not used" (Staudinger, 1990).

This means that a nursing IT project has to be an integrated process, it has to make sure that all these aspects are considered, including the process engineering, organisational development and change planning, and nursing practice and science, as well as the aspect of motivation and integration of nursing culture. The interdependence of all of these elements must be clear, transparent and focused for the project implementation to be successful (Toofany, 2006).

Aims and Methods

To date, electronic tools available for use by practicing nurses are rarely found in Austrian nursing homes. A recently executed survey indicated that less than ten percent of nursing care institutions have an electronic client record in use (Schaubmayr, 2004). The reasons for this vary from missing equipment to a lack of suitable software, including the reservations nurses have themselves towards information and communication technology in context with their work (Wu, Wang & Lin, 2007; Toofany, 2006).

Nevertheless, social and professional pressure to introduce electronic tools into nursing work is steadily increasing, often linked to the documented advantages afforded by electronic documentation in improving the nursing performance on a wide scale and promoting nursing care quality (Toby, 2004; Bakken, 2001).

This paper presents a framework which could assist nursing and administrative executives in designing individual nursing informatics projects by introducing parameters for setting objectives for successful implementation. Simultaneously, these parameters are also useful in the measurement of the effectiveness of the project and for continuous future adaptation of the implemented system.

The framework of implementation of nursing informatics has been developed in corporation with an Austrian nursing informatics project called PMDS (Pflegemanagement und –dokumentationssystem, or in English, a nursing management and documentation system). This system has been created from an interdisciplinary research group of technicians, nurses, medical informatics engineers and other members. The development of the framework is based on the research and project documentation of PMDS. This

framework provides structure to the entire process, beginning with the prototyping right through the implementation and analysis processes which includes the aforementioned influencing factors. These factors correspond with both the key and customized functionalities of the implemented system after IT development and the implementation process. The result of the analysis after documentation and functionality evaluation is the presented framework.

Preconditions for a NI project

During the last decades nurses have gained political and social respect for the recognition of their work and have gained acceptance for the autonomy of their profession (Bürkle et al., 1998; Saranto & Tallberg 2003). In Austria for example, this autonomy was legally established in 1997 and the scope of personal responsibility was established. Besides the entire nursing process, the responsibility for documentation is mentioned in Austrian nursing standards (Staudinger, 2004). These standards dictate the critical responsibility for careful documentation of nurses' work. This fact influences the selection and planning of a nursing informatics project in that the electronic documentation system must include adherence to official documentation standards. Information and communication management team members of the NI project must attend to the integration of nurses' documentation standards, since the practising nurses may not play a vital role in the project planning or execution (Ammenwerth et al., 2001; Park et al., 2006).

To begin, a short review of the factors that influence NI project decisions will be presented. The factors primarily describe the environment of nursing and may be grouped into:

- legal factors
- nursing science factors
- financial factors
- skill factors
- motivational factors and
- project oriented and organisational factors.

By considering the distinct definition of these factors and their respective combinations, an implementation project can be shaped that incorporates and attends to these diverse factors. Every nursing informatics project is unique, yet these proposed factors appear important, no matter what the context. As well, the measurement of project success must be oriented towards the individual project objectives, and take these factors into account.

Factors influencing the objectives of a NI project

1. **Legal factors:**

   Due to the defined autonomy of the nursing profession nurses and nursing institutions have to face particular liability in documenting the nursing process. In particular, attention to the aspects of comprehensiveness of the nursing interventions employed, as well as risk assessment are vital to legally safe and comprehensive care (Schaubmayr, 2004).

   In 1997, nursing documentation had already been anchored in Austrian law – in particular in Gesundheits- und Krankenpflegegesetz - GuKG (health and disease nursing law). There, the documentation of nursing assessments or nursing diagnosis, care planning and nursing interventions had been changed from

common practice to an expected critical duty. This fact necessitates the consideration of whether a proposed system meets legal nursing standards when making a purchase decision.

2. Nursing science factors:

The field of nursing sciences is prospering spurring the development of several theoretical models shaped to guide nursing practice (McNeil et al., 2005; Saranto & Talberg, 2003). Nursing administration have to face the difficulty of choosing an adequate model for nursing care and how to integrate the entire nursing process when selecting a system (Maas & Delaney, 2004; Toofany, 2006). Nursing practice includes data complexity which must be included in the system, which often requires customized information and communication technology (ICT) support (Town, 1993; Bakken; 2001).

Another important consideration in the context of nursing science relates to how nursing care quality and the execution of a quality assurance program based on the respective care model can be integrated into the selected system. But even if this particular aspect of research is disregarded, the mission of data acquisition for the measurement of nursing performance and nursing quality is still critical. The verification of a quality level for a nursing intervention is sometimes measured by other domains e.g. social policy (Maas & Delaney, 2004). Hence, the generation of suitable measuring parameters, their specific compositions as well as the development of benchmark systems that are actually planned and developed through the application of nursing science play a vital role (Kim & Park, 2005; Currie, 2005).

Simultaneously, the redirected contribution of nursing practice to the development of nursing sciences, achieved through the analysis of collected nursing care data e.g. in the field of evidence based nursing can also guide the inclusion of the nursing science factor in project implementation (Saranto & Tallberg, 2003).

The influence of nursing science on a specific NI project basically depends on

- how deep nursing science theories are anchored in practice,
- how valued nursing sciences are within the specific facility in the context of client care,
- which scientifically derived instruments are employed,
- other methods considered suitable for practice, and
- the nursing model or framework employed in the specific facility.

3. **Monetary (cost) factors:**

From an administrative viewpoint, nursing homes are subject to strong cost management in order to be successful and transparent (Maas & Delaney, 2004). Additionally, quality aspects are a crucial element of cost management. The assessment of monetary factors should include the assessment of how an electronic nursing documentation system could contribute to cost and quality management (Metnitz & Lenz, 1995).

Any investment made not only has to be justified to the proprietors or the legal governing bodies, but also has to be evaluated for its contribution to cost transparency and quality management. Besides providing direct support of nurses, the project objectives must demonstrate transparency and support for

the documentation of nursing interventions. Both cost transparency and quality characteristics of the intervention must be apparent and the general needs and interests of the nursing facility must be included.

4. **Skill factors:**

Nurses develop a variety of abilities and knowledge in several subject areas during their education. In the context of nursing informatics, two skill aspects in particular take centre stage (Helleso et al., 2005; Desjardins et al., 2005).

First, nursing science knowledge and skills such as research and the application of nursing theories, models and methods, and secondly the skills and knowledge to apply ICTs are imperative in learning to handle electronic documentation systems. The combination of nursing science skills and IT skills create more complex learning needs. Therefore training is a critical factor in the implementation of any NI project (Saranto & Talberg, 2003). Skill deficits – if they are discovered – should be outlined as precisely as possible since they often result in notable financial and organisational consequences.

5. **Motivational factors:**

Motivational factors must be considered to be a complex field because on the one hand, positive commitments for the use of information technology were established in official nursing surveys yet, on the other hand, the analysis of the amount of IT innovations in Austrian nursing care institutions showed that the importance of ICT is widely communicated, yet hardly appreciated by nurses in practice (Wu et al., 2007).

Reasons for this might be found in the fact that nursing informatics systems are understood as instruments for ensuring measurable performance rather than as supportive tools for improving the quality of nursing care (NcNeil et al., 2005). Additionally, nurses view their profession as a caring practice, dependant on intimate, personal contact between nurses and clients. Reservations may arise from the argument that genuine nursing cannot be performed when computers are utilized, and many nurses may assume that they will be prevented from providing caring nursing practice through the increased employment of technology in health-care.

Motivational factors are difficult to capture by objective measures, therefore wide spread information management that communicates expected advantages and quality oriented objectives of ICT should be introduced during the early stages of the project. As proven by many software implementation projects in the past, mistrust and reservations can only be addressed by directly explaining the positive effects of ICT introduction to the employees (Ammenwerth et al., 2001).

The motivation of the nurses involved has to be regarded as a high priority because it is up to them to determine the quality of the collected data and they are therefore ultimately responsible for the entire success of any nursing informatics project (Town, 1993).

6. **Organisational and financial factors:**

The implementation of information technology not only induces financial costs, but also demands important considerations in the field of organisational development (Saranto & Talberg, 2003; Helleso et al., 2005). This can be difficult to incorporate into the everyday costs and functioning of institutions, even if the advantages of the change process are recognised. The organisational effort and change required as well as the necessary financial expense may prevent institutions from executing NI implementation projects.

The assessment of organisational and financial factors can be regarded as complete if direct and indirect project costs - which may result from direct expenses and organisational changes - are compared to the determined value of the change. Just like any other investment, nursing informatics software has to be evaluated for its logistic profit and the contribution it will make to the improvement of the entire facility (Buffone et al., 1996).

In the context of introducing information technology, two particular areas of conflict arise from the considerable change it brings to the working environment. In the first instance, the transitional period during the project entails additional work load for all involved staff. This must be addressed in context with motivational factors by describing the expected lightening of work loads once implementation is finalized. Although the additional burden can be regarded as temporary that will decrease during the course of the project, the motivational effects should nevertheless be attended to by the managers of the project.

Of more importance than this temporary burden is the fact that several work flows have to be modified – even converted – by the employment of information technology. The most obvious elements and processes of work flow management that have to be changed are:

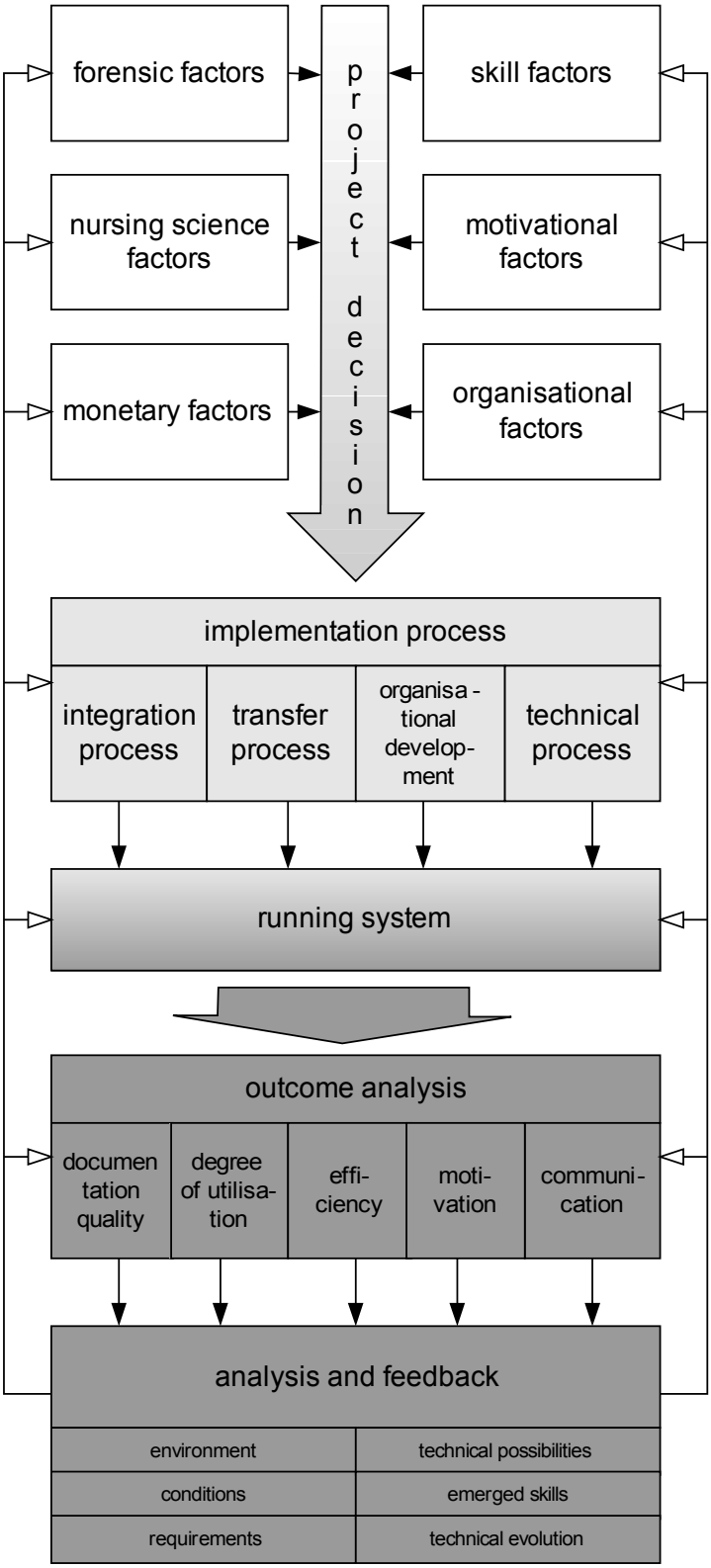
- daily planning,
- direct consecutiveness of nursing intervention and documentation,
- scale and type of communication and information transferral,
- speedier reporting by information technology.

When executing an implementation project, particular attention has to be paid to the change of work flow management whilst preparing the project. This is the ideal time to make adequate information provisions and arrangements (Town,1993).

Problem areas that arise in the context of organisational change that are detected during the implementation phase may then be identified and solved more quickly. Relevant people can be involved in this process and the entire project is more likely to succeed.

Preparing the implementation

The description of the parameter factors offer a detailed presentation of important problem areas affected by an NI project. Having discussed and thoroughly worked out the parameters, a comprehensive overview of all critical project objectives should be created. Besides the objectives and aims for the project, key data and qualitative statements to measure project success at the end of the implementation should also be appointed right from the start. Before the success of the project can be measured, the



project has to be implemented. There are four key processes dealing with project execution which occur in an NI project. Being able to recognise these processes facilitates the actual management of the project.

The four key processes (integration, transfer, technical and organizational development) interact with each other and all four are equally responsible for the success of the project - errors in one process affect all other processes. The specification of each process results from the definitions and findings of the above mentioned factor parameters.

The **integration process** means that – in contrast to the implementation of administrative or commercial software – a nursing IT system has to be introduced using a "top down – bottom up" principle. All users have to be incorporated according to a clearly committed integration model which is expressed by the development of an understanding of each participant's role and the presentation of a transparent list of project objectives containing the commonly developed and clearly communicated advantages of the project (Ammenwerth et al., 2001). The list of objectives should be broadly supported and therefore a moderated "role and goal finding process" should be initiated in an early stage of the project. The integration process is steered by the information and communication management which – as mentioned above – should assure the possibility of bottom up communication, commitment of project aims, establishment of each person's role and function within the project, and the known advantages of the project for nursing care (LaDuke, 2001).

From a project management view, the integration process means the identification of key users and communication "officers" who represent a virtual, parallel project organisation, who provide a supportive structure for the project. The organisation is virtual and parallel because the holders of these functions are members of the real organisation and are integrated into the daily activities of the organization.

Directing an integrative process may also mean collecting and detecting the different expectations and anxieties that may arise and need to be dealt with during the transfer process and stages of organisation development.

The so-called **transfer process** aims to transfer knowledge from theoretical nursing to nursing practice and vice-versa, as well as the establishment and transfer of IT skills (McNeil et al., 2005). Within the transfer process, the paradigm change in nursing sciences from solely quantitative research to the involvement of practice-based quantitative methods in generating professional knowledge is accommodated. Which nursing science model is then employed in a particular facility basically depends on the decision-maker's knowledge of the nursing theory per se, and on the client profile of the nursing home which ultimately determines the choice (Saranto & Talberg, 2003).

The **technical process** describes the transfer and implementation of technology. Although information technology is usually represented in administrative and commercial arenas, the main task of "nursing informatics" has largely been ignored in many nursing facilities. Expanding technological equipment therefore means finding a solution for installation, service and support, because the documentation system often becomes indispensable and advantageous to nursing practice once it has been implemented (Bakken, 2001; Toofany, 2006).

Organisational development is comprised of all work flow which may be changed or affected by the introduction of nursing informatics. Therefore it is important to decide which procedures shall be changed, adopted or maintained. The reason for a procedure decision may be found not only in financial or administrative aspects, but also in quality demand or even in a facility's mission or philosophy (Utz, 1998). Although it is important to describe single decisions, it is more important to describe the interdependencies of single procedures and to be aware of potential conflicts, resistances or

undesirable motivational effects in the staff nurses. Additionally, implications that arise during the project may be adjusted more quickly and satisfactorily.

Once the first cycle of the implementation process is completed, the respective facility should measure the effectiveness of the NI project. Potential measuring points should have been defined at the beginning of the project during the formation of the project objectives. Different surveys and investigations of documentation quality, the degree of system utilisation (e.g. real-time documentation), efficiency, staff motivation or communication advantages are useful to implement to assess project success. After the analysis of the project outcomes, an adjustment of the respective feedback system can be initiated to assess future conditions derived from environmental change or technical evolution (Stephens-Lee, 2007).

Measurement of project success – indicating user satisfaction

The measurement of user satisfaction after the completion of NI implementation, should include both qualitative and quantitative instruments to provide an overall picture of the implementation process outcome as well as aspects of utilizing the running system in day to day care. Furthermore, the instruments employed should be suitable for estimating the described factors in order to be able to determine and focus on any negative results to identify which aspects of the process have failed. As a quantifiable reading point the **degree of utilisation by the nurses** of the IT system can be consulted.

The process of nursing care can be considered as the sum of several standardised sub-processes which all must be mapped by the software, as well as non-standardised sub-processes which arise in individual client care. The question of the utilisation of each software function (representing a standardised sub-process) is therefore important, although this application is limited by the availability of functionality as well as the ability of the single user to apply the function. Experience with IT implementation showed that even in complex IT systems basic functions might be used while – although proper functionality is provided – other instruments still remain unused in practice. Hence, involving the utilisation degree as a reading point demands the quantification of the two limits of availability of functionality and user ability which then reflect the theoretical range parameters of utilisation. The theoretical range of utilisation again may be larger than the feasible or appreciated utilisation range, which largely should have been determined by the implementation process, the system specification and the degree of organisation development. The comparison of the ascertained utilisation with the feasible range of utilisation indicates the degree of effective utilisation.

Degree of efficiency of the NI software:

The degree of efficiency results from multiple approaches. Fundamentally it is based on the predefined, estimated advantages of the software implementation. Measuring the profit means applying quantifiable criteria and objectives which should have been defined, communicated and accepted in advance during the project preparation phase. The assessment of the quality of the electronic generation of a nursing diagnosis may serve as an example of how to generate quantifiable criteria.

For new residents, nursing diagnoses are established on the basis of assessment and a nursing plan containing interventions and evaluation time points are set up. A diagnosis can be quantified by examining how valid and stable the diagnosis proves to be for the actual nursing plan. If it is identified that the diagnosis has to be adapted again and again during a particular period of time, then the process of diagnosis generation may be negatively criticised. If the nursing diagnosis proves to be stable, then the de-

gree of efficiency of the entire system may be estimated as high and hence corresponds to the theoretical construct of documentation and planning systems.

Certainly in this example, application failure or lack of knowledge could also confuse the examination results. However, these sources of error may be identified quite easily on the basis of the documentation itself.

Due to the demand for a broad basis of acceptance for nursing informatics projects a **feedback survey** may also be a vital element of outcome analysis. If we regard the entire nursing staff as customers of the nursing IT system, the degree of customer satisfaction becomes particularly interesting. Once implemented, the IT system has to be continually adapted to both technical improvements and enhancements as well as a continuous integration of nursing science findings.

A feedback survey can be devised to capture the entire scale of suggestions and detect additional challenges in the context of using the software and system. Besides the basic questions about user friendliness and problems in the context of system usage and understanding of it's applications, the feedback could contain questions about the satisfaction of nurse involvement in the implementation process. The integration of customer-suggested improvements or further requirements for system functionality, as well as usability during the implementation process should be considered in order to assess the quality of the implementation process. Another important question is the degree of recommendation that the staff as "customers" would give for the software product itself as well as to the experience of the implementation process based on the examination of the recognised advantages of using the software in practice.

The results and experiences of the analysis and feedback phase can provide direction for any necessary amendments of the objectives which were designed during factor definition and during the planning of the implementation process. The necessity for readjustment could arise during the analysis or feedback phase of the process. During the readjustment phase, it is recommended that managers apply the same information and communication diligence as they did during the initial planning phase and that they incorporate nurses' perspectives in the readjustments as much as possible. This is important, particularly because differences in system application and work organisation may cause inhomogeneous data which subsequently result in imprecise reporting, causing further problems in the future with system development and adaptations.

Conclusion

The implementation process of a nursing informatics project is characterised by a multi- disciplinary and complex structure of conditions and requirements. It is evident that these projects - besides the technical aspects - are driven from organisational, nursing, functional, and process oriented aspects and factors. The challenge of implementing nursing informatics into practice is to solve the complex questions inherent in the transfer of IT knowledge and techniques in the field of nursing through a high level of acceptance from nurses.

To be successful in such a project presumes that the main factors of the implementation process discussed above are incorporated into the decision-making and planning of the project. The main factors are legal, skill, motivational, organisational factors, nursing science and monetary factors and aspects. The project decisions should provide guidelines for the entire process from implementation to the actual day to day use of the final running system and should also include instruments of outcome analysis to ensure that the project as well as the running system can be assessed and modified as needed to ensure that the system meets the needs of both nurses and clients.

The implementation process is usually focused on a technical process but the requirements of nursing in practice necessitate that the factors of integration and the factor of the transfer process should be given the same priority as the technical process itself. Furthermore, it should be made clear that the development of organisational support, training, and modifications will be a precisely planned part of the whole implementation process. In this phase of the project it is very important to integrate nurses into the project, assuring the transfer of knowledge on one hand, and the creation of user acceptance and feedback of the IT implementation process.

The evaluation of the final running system can be done using different methods described in literature. It should be made clear which aspects of evaluation will be observed, which system of calibration of data will be used, and how analysis and feedback can be managed to develop the running system further.

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