

# The Pendulum of Standardization

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**Abstract.** Cooperation and collaboration are generally an inherent part of everyday practice, and particularly among nurses. However, the technologies that support these practices are still inadequate. In this study, we present and discuss the use of classifications in nursing practice, and highlight the collective re-construction of classifications that emerge over time. Specifically, we study how the negotiation between global classifications and local practice takes place with long-term use, and depict this dynamic interaction as a pendulum movement. Furthermore, we characterize this standardization as a collective re-construction grounded in everyday practice. This paper contributes to the body of research on this topic by doing the following: (i) characterizing the process of standardization as a pendulum movement; (ii) drawing out theoretical perspectives for standardization as a collective, emerging accomplishment; (iii) stating the practical implications of our perspective. Finally, we compare the local adjustment (local classifications) discussed in this study with social classifications (social tagging), and suggest how social classification may lead to increased flexibility in the use of classifications.

## Introduction

Continuity of care is the “Holy Grail” of hospital information systems. Although such care has been widely discussed, it is difficult to carry out. Standardization is a key objective of the strategy for electronic cooperation in the health care sector in Norway. This strategy considers electronic interaction to be crucial for ensuring the free flow of information necessary to achieve the vision of continuity of care (Norwegian Ministry of Social Affairs and Health 2008, p. 72). In line



# Theory

## Standardization

Globalization and an increased reliance on large-scale information technology have involved an ongoing transformation of modern organization and everyday life. In this transformation, standards remain the sine-qua-non in virtually all fields of information technology. Previous research has mainly considered standards as being technical artefacts, which are part of programming languages, communication protocols and exchange formats (Schmidt et al. 1998). Traditionally, there has been a technocratic, top-down approach to standardization as an objective, absolute and static state (Ure et al. 2009). The increased complexity and scope of standardization in our "networked" world requires a conceptualization that is typically broader than past research has indicated, and involves investigation from various streams. While previous studies mostly focused on standards as being a technological development, recent studies have focus on the social shaping of technology, and consider standards to be the backbone of a socio-technical network (Hanseth et al. 2001). Fomin, Keil and Lyytinen (2003) have provided a framework for analyzing standardization as a process of design, sensemaking and negotiation. Similar studies emphasize standardization as a dynamic interaction in a socio-technical network (Hanseth et al. 2001), where a standard represents agreed upon rules for the production of the (textual or material) objects required (Bowker et al. 2000). A key feature is the dynamic interaction between both human and non-human actors in the network. Consequently, standardization is not just a technical issue, but a negotiation between technical artefacts, humans, work practice, procedures and so on. Scholars from this tradition aim at achieving more flexibility in the standardization process, to make it adaptable across diverse practice (Timmermans et al. 1997; Bowker et al. 2000; Hanseth et al. 2001).

Other studies have also emphasized the need for more flexibility in the standardization process. Hinrich, Pipek and Wulf (2005) developed the concept of "context crabbing" to assign contextual information in the form of metadata. A similar study by Simone and Sarini (2001) focused on the importance of classification schemes for intra- and intergroup collaboration. They distinguished between exogenous and endogenous classification schemes as a framework for analyzing the complexity inherent to the situated, distributed and evolving nature of collaboration, when such classification schemes are taken into account.

Collaboration and interaction are inherent properties of most work practices in hospitals, where information and knowledge need to be shared across time and space. Moreover, standardization is embedded in efforts to improve efficiency and quality in health care (Timmermans et al. 1997; Ellingsen et al. 2007). Based



meaning and comparability across different contexts. On the other hand, their use restricts activity that does not conform to the types recognized in the category systems. The enabling factor is dependent on the degree to which it facilitates their actions outweighs the difficulties created by its restrictions (Orlikowski 1994). Accordingly, the use of international classifications in nursing is not only a translation of concepts to local practice, but a process of negotiation and transformation (Carlile 2004).

Despite these challenges, nursing classifications have been nationally and internationally adopted, and there is an ongoing struggle to integrate the classifications as part of electronic nursing documentation, and to facilitate the use of nursing care plans. The uses of both classifications and care plans are closely related to each other, since classifications are often used to describe the steps of the nursing process. This is a well-known method for nursing, and consists of five phases: assessing, diagnosing, planning, implementing and evaluating. The nursing process is the basis for the use of care plans for documenting nursing. Still, as some researchers have suggested, the implementation of care plans has been slow due to the lack of a uniform and unambiguous system (Bjorvell et al. 2002). The implementation process and the use of new technology has thus generated new expectations for the use of electronic care plans as a support for information sharing and collaboration. Although some researchers fear that the use of care plans will lead to “cookbook medicine,” Timmerman and Berg (1997) also elaborate on how the use of “protocol allows more complex and detailed treatment plans to become possible. Once implemented, the protocol can articulate activities and events over time and space – staff members can delegate coordinating tasks to it, transforming the nature of their work.” (Timmermans et al. 1997, p. 296). Furthermore, they emphasize, “how standards manage the tensions among transforming work practices while simultaneously being grounded in those practices”. Similar studies by Bowker and Star (2000) illustrate how standardized applications are an attempt to regularize the movement of information from one context to another, and how shared objects arise in the tension between locales as an ongoing relationship between different social worlds (ibid. p.292). From these perspectives, the tension between standardized care plans and local practice can be viewed as a dynamic process of naturalization. These perspectives also illustrate how standards entail new opportunities at the same time as they are challenges in a process of change.

### Standardization as an ongoing change process over time

Previous studies have shown how the implementation of new technology in complex, dynamic organizations has led to a re-configuration of work processes (Hanseth et al. 2001; Ellingsen et al. 2007). Key issues in these studies have been the re-construction of standards in situated action and how working



approach for managing the difficulty of replicating the role of local knowledge and communication in large-scale, multidisciplinary and distributed collaboration (Ure et al. 2009, p. 423). Such bottom-up strategies are the compromise between the hierarchical meta-model and folksonomies, and they support the distribution of information to those persons who are actually doing the work (Hepsø et al. 2009, p. 444)

## Methodology

Our field study focused on everyday information sharing between nurses and social workers in a psycho-geriatric ward at the University Hospital of North Norway. Patients who are admitted to the ward are 65 years or older, and their hospitalization lasts for an average of six to eight weeks. The psychogeriatric ward is an in-patient ward with 14 beds, and provides treatment and care to patients who suffer from psychiatric disorders like dementia, anxiousness, and depression. The work at the ward is highly interdisciplinary and nurses are believed to play a key role in observing and monitoring patients' needs, as well as assessing the patients' cognitive abilities for self-care. The clinical staff comprises physicians, psychologists, nurses, social workers, occupational therapists, physiotherapists, and unskilled personnel.

The empirical data was collected and analyzed following the interpretive tradition of field study in information systems (Klein et al. 1999). The study was guided by this data collection to point out the aspects that were prominent in the standardization process. It has been an iterating process where we have focused on standardization in general, and then considered different aspects of information sharing.

The primary methods of data collection were interviews and participant observation. Between 2008 and 2010, the first author carried out 200 hours of observation of the work practices of nurses and social workers to gain insight into the historical, social, and local context of information work at the ward. The first author was also given access to the EPR system during the observation study. This provided important contextual information on how they actually performed the electronic documentation. To gain additional insight into the information work, 13 semi-structured interviews and 6 open-ended interviews were carried out, which lasted from half an hour to an hour and a half. The first author also had regular meetings with key personnel at the ward during the last two years, participated in various projects at the ward and has had access to different kinds of internal documentation. All of the interviews were taped and transcribed. Along with the field notes, the transcribed interviews constituted the basis for analysis where data have been systematized in relation to key elements of the situation of inquiry.





nursing plan. Another approach is to use “Standard plans/guidance plans” that can be made available in the system. Using this option allows the user to fetch a “Standard plan” in the nursing module, and choose among pre-defined diagnoses and interventions that are developed by each hospital in relation to specific illness trajectories. This is also a functionality that is optional, and it is one that each hospital may choose to use as a support in facilitating the use of the care plan.

The use of classifications and standard plans have been adopted on a large scale in many Norwegian hospitals, in accordance with the implementation of an electronic care plan module. However, the University Hospital of North Norway has chosen a mixed strategy. While the Department of Special Psychiatry has adopted international classifications, the other departments at the hospital have decided to use free text to describe diagnoses and interventions in the care plan. The psycho-geriatric ward, which was one of the pilot wards during the implementation, has particularly aimed at using a standardized language to describe nursing practice. Both during and after the implementation, a key person from the project team was also employed at the ward and completed several internal projects which focused on highlighting care plans as a key player in the nursing documentation.

In this study, we have focused on the implementation and use of nursing classification at the psycho-geriatric ward. In the further case description, we will illustrate the generation, implementation and adoption of nursing classification as an episodic, punctuated process of change that evolved over time. To illustrate this, we have divided the process into four phases that illuminate the development from free-text documentation into a collective adjustment of international classifications as well as the cyclic variation between the different phases over a certain period of time.

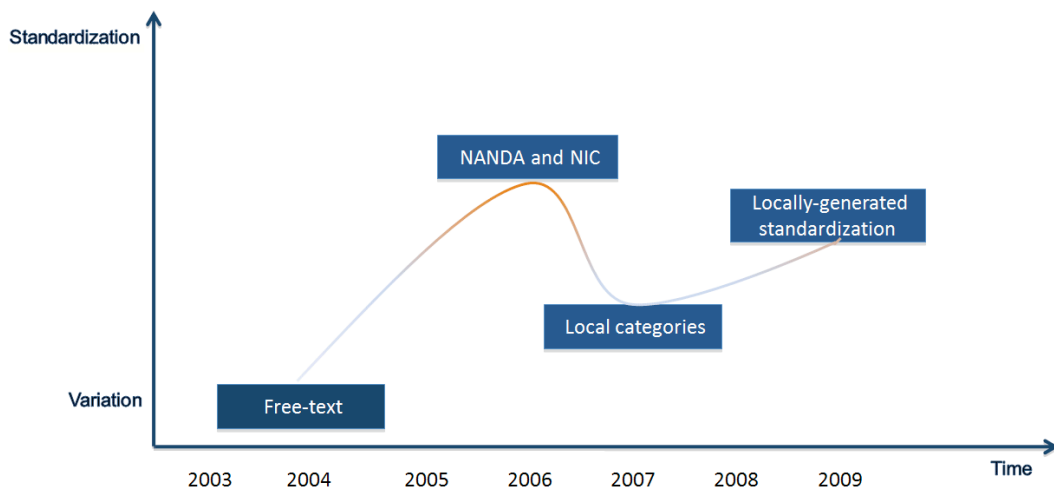


Figure 1. The phases in the local standardization process.



key player in the daily documentation and exchange of information between nursing staff.

The implementation of the nursing module involved a major change process. First, staff had to learn to use the new electronic system. Second, they had to become familiar with a new language for describing nursing practice. The electronic nursing module is an integrated part of the EPR system, and has been developed to support the nurses' daily reporting routine, as well as a structured nursing care plan that supports assessment, planning, implementation and evaluation of nursing care.

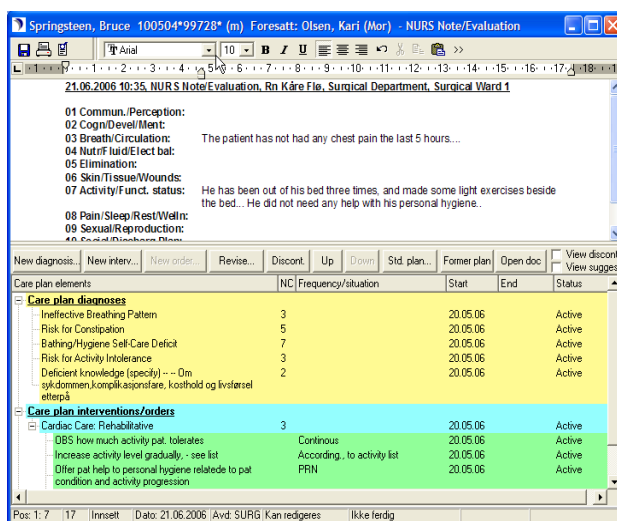


Figure 1. Screenshot of the nursing plan, where the lower part of the note contains the care plan, and the upper part shows the evaluation of the given care according to the plan. The yellow field indicates the nursing diagnoses, and the blue field indicates the nursing interventions.

The nursing module contains two separate parts that are interdependent. The lower part of the screen contains the care plan, which represents nursing diagnoses and interventions. The term nursing diagnosis has become an internationally used concept for identifying the specific nursing needs of the individual patient. These are needs that provide a focus for the planning and implementation of nursing care. At the core of the nursing plan are the international classification systems of the North American Nursing Diagnosis Association (NANDA) and the Nursing Intervention Classification (NIC) (NANDAInternational 2007; Bulechek et al. 2008). Both NANDA and NIC classifications are supported by research, and facilitate continuity of care across settings. The vendor of the EPR system, in cooperation with the Norwegian nursing community, has translated these classifications to Norwegian, and made them available as part of the nursing module. By clicking on the menu item "New diagnosis" in the action bar in the care plan, the system provides a new search window where the classifications are listed, and enables the user to search and



the situation of the patient, it is still easy to use the classification as a starting point. Instead of 'Self Care Deficit, Eating', I can write 'Self Care Deficit, All Function Areas'."(Nurse)

In this way, the use of local concepts was gradually unleashed to compensate for limitations in NANDA and NIC, in order to combine several classifications, and to facilitate the coherence between nursing diagnoses and interventions in the care plan. For example, frequently used classifications are "Risk for falls" and "Impaired Physical Mobility". If used separately, these terms represent two different NANDA diagnoses. However, some nurses prefer to link several terms into one nursing diagnosis, such as "Impaired Physical Mobility with Risk for falls". In these cases, they have become familiar with two different NANDA terms and combine them to form a local diagnosis. One problem with NANDA is that the terms are fragmented. Firstly, patients often have many different problems that are related to each other. In many cases, it would therefore be appropriate to relate to the symptoms and causes of nursing diagnosis. Secondly, many patients do have several problems, and the care plan may consequently be very long and complex if the information is fragmented. As a result, through experience and discussions, it has become common to link different problems with one nursing diagnosis.

In order to establish a nursing diagnoses, specification is recommended in relation to a PES-format, i.e., defining the problem or health state, aetiology or related factors, and associated signs and symptoms (Gordon 1998). For example, "Anxiety" is a commonly used NANDA diagnosis, but requires a more specific definition. They need to specify the symptoms related to anxiety, and aetiology or probable factors causing or maintaining the condition. Entering this information in the care plan requires intensive mouse clicking in various windows, dialogue boxes and menus in the application, and some nurses find it easier to just add the entire entry as a local diagnosis.

The adjustments of local concepts have gradually taken place in relation to both NANDA and NIC. Since these are two different classification systems, they have developed local concepts that facilitate the overview of the care plan. Some NIC concepts are often used, but in many cases, they have become accustomed to relating interventions to a nursing diagnosis.

"In making a link between problem and intervention in the care plan, we have become accustomed to writing, for example, intervention related to anxiety. Similarly, there is a NIC classification called wound care. A corresponding NANDA diagnosis is "Impaired Skin Integrity". We are more accustomed to using the term "wound" and think it fits better in relation to the NIC classification."

In this way, global concepts have been adjusted to local needs. This adaptation was the result of collaboration with colleagues when they sat together and wrote care plans, and in discussions and meetings.



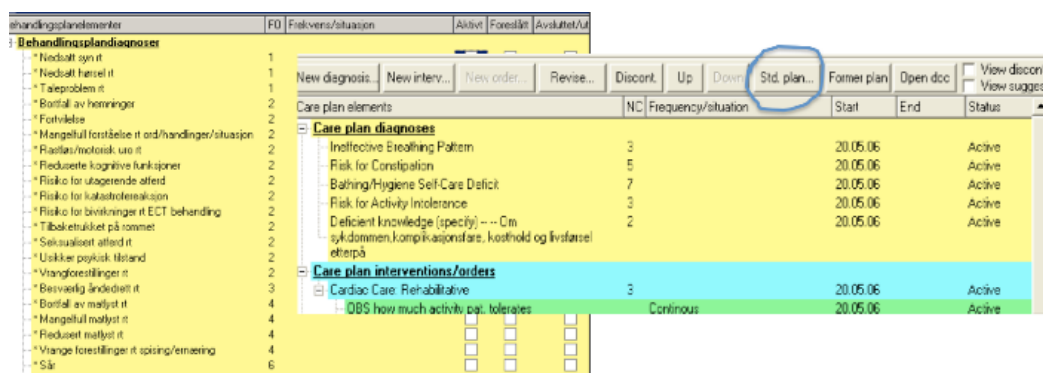


Figure 2. Screenshot of the electronic care plan and local concepts

Using this functionality in the nursing module made it easy to click on the menu item “standard plan” and then choose from local concepts. Since then, the local list has become a supplement to NANDA to attend to local needs.

## Discussion

In accordance with the internal goals and motivations for adopting a standardized language, this case study illustrates a successful outcome. The psychogeriatric ward extensively use NANDA and NIC, and the nurses have acquired skills in using the system, gained an increased awareness on the use of language, and promoted the use of care plans as a major factor in information sharing at the ward. However, if we study the implementation process more closely, we see that unintended changes have also occurred. As anticipated changes have taken place, even opportunity- based and emergent changes have arisen (Orlikowski et al. 1997). These changes have not happened on a stable basis, but have been part of an ongoing process, and we illustrate this as a pendulum that moves back and forth over time. In the subsequent analysis, we will elaborate on some of these changes, including a) the gap between global classifications and local categories, and b) the collaborative creation of social classifications.

### Bridging the gap between global classifications and local categories

As mentioned above, the use of classification has had a major impact on nursing language used by the ward. This progress has been influenced by several factors, not just the use of NANDA and NIC per se. A cyclic variation between global classifications, local routines, skills and the technical system have shaped the local information infrastructure. This has been an ongoing process, where increased knowledge about classifications has involved increased opportunities to improvisation. In accordance with the change model described by Orlikowski and





all diagnoses in NANDA, this has a label, a definition, defining characteristics, and related factors.

<b>DISTURBED SENSORY PERCEPTION</b> (Specify: Visual, Auditory, Kinesthetic, Gustatory, Tactile, Olfactory) (1978, 1980, 1998)	
<b>Definition</b> <i>Change in the amount or patterning of incoming stimuli accompanied by a diminished, exaggerated, distorted, or impaired response to such stimuli</i>	
<b>Defining Characteristics</b>	
<ul style="list-style-type: none"> <li>• Change in behavior pattern</li> <li>• Change in problem-solving abilities</li> <li>• Change in sensory acuity</li> <li>• Change in usual response to stimuli</li> <li>• Disorientation</li> </ul>	<ul style="list-style-type: none"> <li>• Hallucinations</li> <li>• Impaired communication</li> <li>• Irritability</li> <li>• Poor concentration</li> <li>• Restlessness</li> <li>• Sensory distortions</li> </ul>
<b>Related Factors</b>	
Altered sensory integration	Electrolyte imbalance
Altered sensory reception	Excessive environmental stimuli
Altered sensory transmission	Insufficient environmental stimuli
Biochemical imbalance	Psychological stress

Figure 4. Guide to nursing diagnoses developed by NANDA International.

Although this diagnosis may be useful in some contexts, it does not make sense in local practice:

“I cannot stand to use this diagnosis, it sounds strange and does not fit what I want to express.”  
(Nurse)

The above quote illustrates a general attitude to this particular diagnosis among the staff at the ward. First, they found the sound of the classification to be strange and it to be difficult to translate the classification to everyday language. Second, the classification is comprehensive and covers a wide range of problems related to nursing care. Consequently, they did not use it, and have instead developed local categories like “Impaired vision” and “Impaired hearing”. The way they have made local categories available as a list in the nursing module is an achievement of neutralization and co-construction of NANDA and NIC, and a way of managing the tension between divergent viewpoints (global and situated). Thus, how has this process of “artful standardization” occurred? How are local classifications created, maintained and made sense of? These questions are particularly interesting since many of the local categories are the same or similar to NANDA. This was not planned in advance, and the alteration had not been possible without the knowledge of NANDA and NIC.

### Collective development of local categories over time

The development of the local concept at the ward has been an ongoing, emerging process, and has many similarities with folksonomies (social tagging, social classification). The dynamic and structure of folksonomies are characterized by



this way, local classifications emerge as a result of the professional development of the language used in local practice. This process shows how the gap between the static classifications of NANDA/NIC and the dynamic interaction in the situated practice is managed.

This is not an argument against the use of NANDA and NIC, but rather demonstrates that there are limitations that must be confronted. Instead of distinguishing between formal and informal classifications, we must look at how these constitute each other. The development of local classifications is considered to be successful at the ward. However, in the electronic system, they are handled as free-text and require the use of workarounds. This implies that we need new technologies to support this artful standardization.

## Conclusion

We have presented here an innovative deployment of nursing classification. Much of this so-called "artful standardization" can be attributed to engaged leadership, as well as skills and competence achieved in everyday practice during long-term use. First, we have illustrated how they collectively reconstructed the use of classification to manage the gap between global classifications and local practice. Second, we have showed how the re-construction of classifications has emerged over time, and describe this change process as a pendulum movement that moves back and forth. We have emphasized this pendulum movement, since the long-term use of classifications has not been well described in the literature. We have further compared the emergence of local classifications as they have collectively evolved as a supplement to formal classification. The way in which the local classifications have been used in the electronic system can be considered to be a workaround. However, we suggest that this innovative use of classification highlights local knowledge and supports a shared meaning among nurses in everyday practice. Global and local classifications used in combination both constitute each other and support professional development. Finally, we argue that we need a more bottom-up approach to standardization and believe that local classifications (folksonomies) may be a useful supplement to formal classifications, and a contribution to system design.

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