Chapter 10
Effective and Efficient Business Intelligence Dashboard Design: Gestalt Theory in Dutch Long-Term and Chronic Healthcare

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ABSTRACT

This research focuses on the design process of an effective and efficient dashboard which displays management information for an Electronic Health Record (EHR) in Dutch long-term and chronic healthcare. It presents the actual design and realization of a management dashboard for the YBoard 2.0 system, which is a popular solution on the Dutch market. The design decisions in this investigation were based on human perception and computer interaction theory, in particular Gestalt theory. The empirical interviews with medical professionals supplemented valuable additional insights into what the users wanted to see most of all in a dashboard in their daily practices. This study successfully shows how effective and efficient dashboard design can benefit from theoretical insights related to human perception and computer interaction such as Gestalt theory, in combination with integrated end user requirements from daily practices.

INTRODUCTION

An electronic health record (EHR) can be viewed as an evolving concept defined as a systematic collection of electronic health information about individual patients or populations. It is a digital record with the information of patients of a particular group. By itself an EHR is just that, a record. It cannot do anything and a system is required to provide the functions that make the EHR useful. This combination is known as an electronic health record system (Moghaddasi, 2011). However, in daily practice,

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the term EHR is often used to refer to both the electronic health record as well as the system. Most of the EHRs are able to (1) capture health information in a coded format, (2) track clinical conditions and quality reporting, (3) support clinical decision-making and healthcare coordination, and (4) eventually improves performance of the healthcare institute. Spruit, Vroon and Batenburg (2014) notably perform an exploratory analYBoard on HER information in long-term care institutions within The Netherlands.

In 2008 about 98% of the healthcare professionals in the Netherlands already made use of some sort of EHR (Jha et al, 2008). For now, these systems are mostly standalone systems, or linked with just a couple of other systems. For example, an EHR of a local general practitioner can be linked with the EHR of the local pharmacy, but it is most likely not linked with the EHR of a pharmacy in a different city or state. Furthermore, according to a survey by Goldberg et al. (2012) in Virginia, USA, 'Physicians and staff also repeatedly described their EHR systems as complex, having too many functions to navigate, numerous steps needed to complete a transaction, and difficult to customize.'

However, a recent survey shows that the Netherlands is a key player in adopting EHRs in ambulatory healthcare and hospital settings. The Dutch Ministry of Health aimed to establish a national infrastructure for data exchange between electronic patient records (EPRs). This way, healthcare providers which are connected will always have up-to-date information about a patient. The core of this infrastructure is the "national switch point" (LSP), an index with pointers to all registered EPRs of a patient (Tange, 2008). This project has now been taken over by the National IT Institute for Healthcare in the Netherlands. EHRs are a very hot topic in the Netherlands because of those relatively recent changes in the development of the national EHR.

Koopman et al (2011) show the benefits that dashboards can provide within an EHR in diabetes healthcare. Their survey shows that the mouse clicks needed to find particular information about patients is reduced by 95% and the time needed to find the information wanted reduced by about 25%. Although this survey was held for an EHR used in diabetes healthcare, it may be assumed that this is not only the case for the diabetes EHR but also for non-diabetes EHRs like the EHR used in long-term and chronic healthcare. Meulendijk et al. (2013) similarly report on the high demand from general practitioners for integrated and visual systems to optimize polypharmacy in the Dutch primary care sector. On a broader level than healthcare, more research has been performed regarding the use of dashboards. A 2009 survey showed that over 80% of dashboard users think that a dashboard has a positive impact on business results (Eckerson, 2011). Finally, Wijaya et al. (2008) note that Web 2.0 technologies provide further opportunities to further enhance business values in online health systems.

BACKGROUND: DASHBOARD DESIGN

So, what exactly is a dashboard and how is it used? A dashboard is more than just a screen with some nice performance graphics in it. It is actually three applications in one, woven in a seamless fashion: (1) a monitoring application, (2) an analYBoard application, and (3) a management application. According to Eckerson (2011), the benefits of a dashboard appear to be endless; they can be used to communicate a company-wide strategy, refine and control that strategy and increase coordination and motivation throughout the company. With this taken into account, lots of companies decided to create or buy a dashboard systems tool.

Historically speaking, the first business intelligence dashboards where developed in the 1980s. Back then they were called Executive Information Systems (EIS). Those systems remained in offices