

# Improved UX of Network Device Monitoring

## A Practical Example of Information Visualization

Lisa Claesson & Malin Tjärnemo

Institution of Design Science,  
Faculty of Engineering, Lund University

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**Information Visualization (IV)** is about how to visualize complex data to amplify cognition. The thesis presents a practical example of how to design an IV application to improve the user experience (UX). The information visualized was the data exchanged between two network security domains.

To visualize information is nothing new. Yet, the field of information visualization as a standalone research area is only a little more than twenty years old. Today, the possible amount of data to collect has grown with better computers and the internet. Therefore, the interest in how to visualize complex data has increased. The thesis demonstrates a practical example of information visualization.

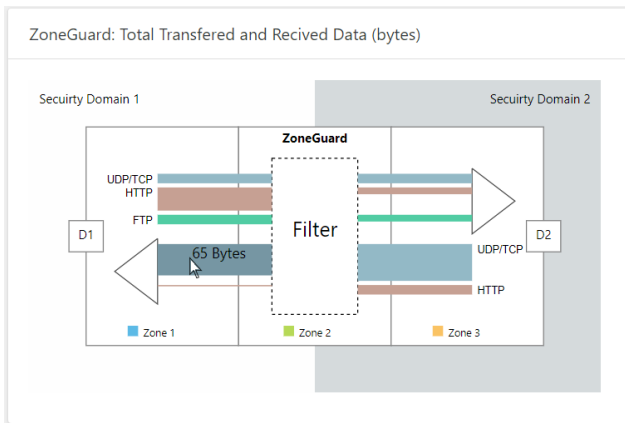


Figure 1: A card from the application with information of the data flow through a ZoneGuard.

In our thesis, we have together with Advenica developed an application that visualizes the data flow through their ZoneGuard. The ZoneGuard works as a bridge between two security domains that blocks or allows network packages to transfer between the domains. The data that can be collected from a ZoneGuard are in text format. With a visualization of the data, the UX can be improved.

One of the visualizations developed can be seen in Figure 1. An arrow represents the data flow in one

direction through a filter which can block unwanted data packages. The data can be sent with different protocols, for example, UDP/TCP, HTTP and FTP. The arrow is a type of vertical stacked bar graph. In a vertical stacked bar graph the height of a section is proportional to the data value. The user can hover over a section of a bar graph to see the exact data value.

In Figure 2, a line chart is used to represent the percentage blocked at a specific time by the filter in one direction. The arrow on the top right corner represents the direction of the data flow. The colours used to represent the different services are the same colours as in the ZoneGuard figure.

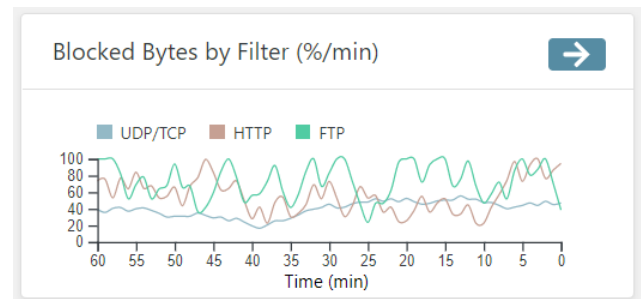


Figure 2: A card from the application with a view of how much data in percent are blocked over time for the different protocols in the direction security domain 1 to security domain 2.

One problem encountered during the project was for example that the ZoneGuard, shown in Figure 1, was difficult to design. This was because it was difficult for us to understand how a ZoneGuard worked and what data that were possible to receive from it. This problem was solved by having a design workshop with employees at Advenica that had different backgrounds with the ZoneGuard to create a discussion.

Advenica was satisfied with the visualization. However, it needs to be tested on the real end-users to confirm if the visualization has high usability or not.