Summary

Traditionally companies operating belt conveyor systems carry out their own maintenance inspections. Due to the lack of domain knowledge of the inspectors, maintenance decisions depend on unreliable communications to receive delayed advice. Automation of the visual inspection data acquisition and maintenance decision making should overcome these problems. This study aims to build an automated smart mobile inspection tool. This mobile inspection tool guides the inspector through visual inspection, and makes intelligent maintenance decisions.
Developing a smart mobile inspection tool is achieved by integrating ICT-technology, wireless communication technology, artificial intelligence and fuzzy logic.

Based on the primary process model of the visual inspection and decision making, a functional division is made in the logical architecture. The resulting three logical sections: data acquisition, data manipulation and data storage are assigned specific functional requirements.
Together these logical sections and their data-flows are translated to a physical agent architecture. The physical architecture accommodates the online mobile inspection tool and the intelligent distributed decision making.
To achieve intelligent multi-level decision making the process is divided in into sub-tasks. Overlapping the sub-tasks with the physical division of the BCS's elements ensures appropriate domain knowledge matching to the agents. The smart decision making is achieved by the serializing the sub-tasks over the hierarchical dependency path of the physical BCS parts. Following this path takes the whole BCS maintenance status into account when making the maintenance decision.
Developing the smart online inspection tool and its supporting infrastructure, integration of several ICT-technologies is needed. Selecting these technologies is done based on functional requirements and other criteria. The criteria used are specifically defined for the purpose of implementation in this study, to satisfy the objectives of this research.

The implementation of mobile inspection tool is illustrated by supporting three uses-cases. Together these use-cases cover all functional requirements necessary to solve common problems in visual inspection. The smart mobile inspection tool is found able to handle these use-cases. This indicates the feasibility and capability of a mobile inspection tool to solve common problems in visual inspection.