Automated Checking of Regulations and Requirements Management in Healthcare Design

Benefits design teams, professionals in charge design assessment, software developers, policy makers

SUMMARY

BIM can support the automation of design assessment with regards to regulation compliance, and its use for modelling information contributes to the visualisation and organisation of requirements data. The practical adoption of automation can support transparency and consistency for designers and regulatory bodies. This research proposes recommendations for the adoption of automated checking of regulatory compliance in the design of healthcare facilities.

Main findings include an evaluation of the information content of existing healthcare regulations towards automation, and the need for a hybrid approach for assessment was identified. The hybrid approach should support the automation of objective requirements, but also address subjective requirements through human inputs.

Acknowledgements: We are grateful to Community Health Partnerships, Solibri and Hospital das Clínicas de Porto Alegre for their collaboration. We also would like to thank all our other manufacturers and companies which supported the research enabling site visits, interviews and meetings.

KEY FINDINGS

- The UK has over 100 healthcare design regulations or guidance; requirements are often described through complex and subjective expressions, creating difficulties for automation.
- The proposed taxonomy describes how regulations should be written to enable, in the future, an easier automation of quantifiable requirements and a reduction of subjectivity.
- Creating regulatory requirements that can be translated into logic rules for automated checking have low and medium logic complexity, which is beneficial for automation.
- Need for automated checking at different design stages to avoid non-compliance and rework.
- Subjectivity can be Natural - requirements contents cannot be translated into an objective sentence e.g. design flexibility, or Artificial - created by humans and hence could be presented objectively e.g. accessibility.
- Need for a hybrid approach: automation is suitable for objective requirements, subjective requirements need to be addressed through semi-automated approaches.

APPLICATION OF SOLIBRI AND DROBUS

- Regulatory requirements were inserted in Solibri, modelled and checked against the building model.
- Solibri was successfully used to verify requirements related to areas, components, corridor dimensions.
- The spaces, equipment and furniture planned in dRofus were connected to the building model, making requirements explicit during the design process.

RECOMMENDATIONS FOR AUTOMATED CHECKING OF REGULATIONS AND REQUIREMENTS IN HEALTHCARE DESIGN

- Policy makers should avoid artificial subjective elements in regulatory texts, ensuring objective and quantifiable sentences are included in the revision of regulations. There is a need to consider if any subjectivity should exist within the regulatory framework, as it can cause design errors and rework, and challenge attempts to automate the process.
- All stakeholders should manage the subjectivity embedded in the regulations by using a common language.
- Designers and policy makers should organise requirements in a common, structured and integrated database. Clients should provide constant support and inputs to this database.
- Designers and software developers should better consider the integration of regulatory and clients requirements and systems to enable such integration.
- All stakeholders should envisage the use of the regulatory framework as a support tool towards mistake-proofing rather than a mistake-finding mechanism.

University of HUDDERSFIELD
Inspiring tomorrow’s professionals