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Evaluating Usability Barriers in Health Technology: Government Perspectives and ISO Standard Alignment

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Introduction

- Usability remains a critical barrier in health technology adoption.
- Poor usability contributes to errors, inefficiency, and user frustration.
- This study explores how Norwegian government reports perceive these barriers.
- And it investigates the relevance of ISO 9241-11 and ISO/IEC 25010 to meet this barriers.

Research Questions

- What usability barriers are identified in public sector health technology reports?
- Do these align with ISO 9241-11 and ISO/IEC 25010 requirements?
- Can these standards serve as policy tools or design frameworks?

Why the Government Perspective Matters

1

Governments are key stakeholders in developing, funding, and regulating health technologies.

2

They influence procurement, standardization, and national strategy.

3

Public sector decisions shape what technologies are adopted in healthcare systems.

4

Their perspective reflects system-wide usability concerns, not just individual user experiences.

5

Government reports offer insights into policy-level barriers and priorities.

Theoretical Framework

ISO 9241-11:2018 – Ergonomics of human-system interaction – Part 11: Usability – Definitions and concepts

- Usability defined as
  - effectiveness,
  - efficiency, and
  - satisfaction in context

ISO/IEC 25010:2023 – Systems and software engineering – Systems and software Quality Requirements and Evaluation (SQuaRE) – System and software quality models

- Usability as "interaction capability," including:
  - Learnability
  - Operability
  - Accessibility
  - Error protection
  - User assistance

Method

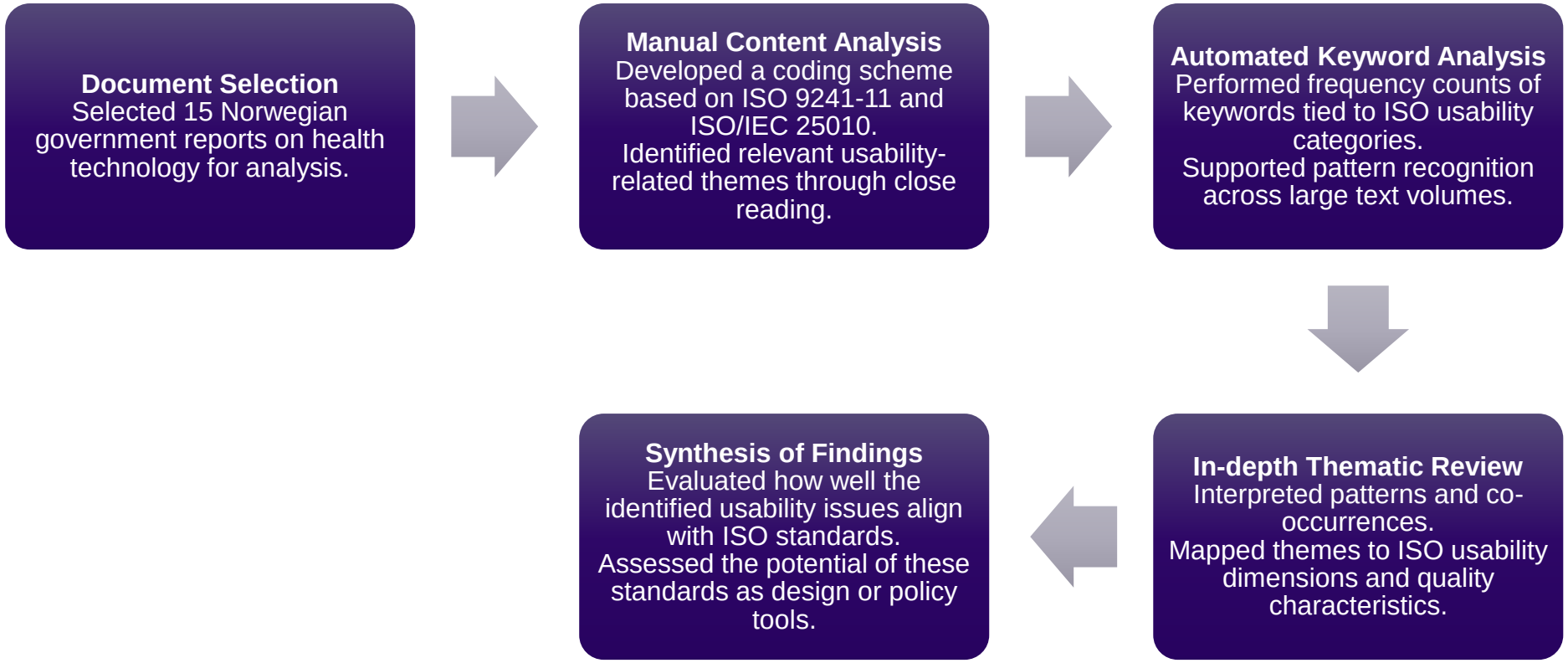
Document Selection
Selected 15 Norwegian government reports on health technology for analysis.
Manual Content Analysis
Developed a coding scheme based on ISO 9241-11 and ISO/IEC 25010.
Identified relevant usability-related themes through close reading.
Automated Keyword Analysis
Performed frequency counts of keywords tied to ISO usability categories.
Supported pattern recognition across large text volumes.
In-depth Thematic Review
Interpreted patterns and co-occurrences.
Mapped themes to ISO usability dimensions and quality characteristics.
Synthesis of Findings
Evaluated how well the identified usability issues align with ISO standards.
Assessed the potential of these standards as design or policy tools.

TABLE I. CHI SQUARE RESULTS

Theme Code	Observed	%	Expected*	Chi-Square	p-Value
Security	581	36	162,4	**1980,67**	0
Efficiency	383	24			
Satisfaction	204	13			
Learnability	203	12			
Usability	112	7			
Accessibility	60	4			
User Experience	37	2			
User Engagement	23	1			
Interoperability	16	1			
Technical Barriers	5	0			

Degrees of freedom: 9, *value for equal distribution

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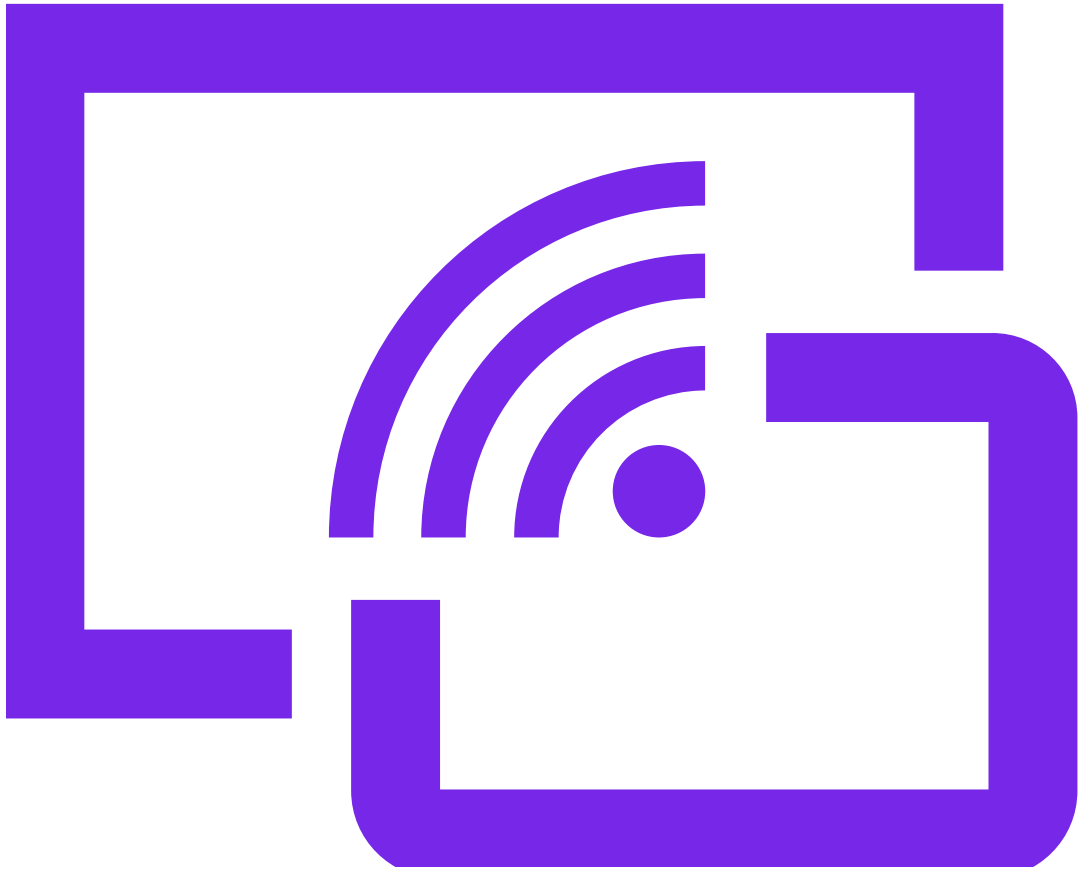
Key Usability Themes

- Need for user-centered design
- Simplified interfaces
- Interoperability challenges
- Accessibility for elderly and digitally excluded
- Consistency across systems



Identified Usability Barriers
– as perceived by the Norwegian Government

Digital Divide and Accessibility Issues: Vulnerable populations struggle with digital literacy and access to necessary devices.

User Interface Complexity: Complex or unintuitive system designs hinder effective use, especially under time pressure.

Usability for Vulnerable Populations: Systems often fail to address the needs of users with disabilities or chronic conditions.

Interoperability and Integration Challenges: Fragmented systems that don’t communicate well disrupt workflows and reduce usability.

Technical Barriers and System Downtime: Reliability issues and technical failures undermine trust and impede clinical operations.

User Trust and Satisfaction: Low confidence in system reliability and performance leads to reduced adoption and satisfaction.

Usability Barriers and ISO 9241-11/ISO/IEC 25010

Barrier	ISO 9241-11:2018	ISO/IEC 25010:2023	Can ISO Standards Solve This?
Digital Divide and Accessibility Issues	Emphasizes context of use, ensuring that systems are designed for a diverse range of users, including those with limited digital skills or access to technology.	ISO/IEC 25010:2023 includes accessibility as a sub-characteristic of usability, pushing for systems that cater to the needs of vulnerable populations, such as the elderly and disabled.	Partially. The standards provide principles for accessible design, but the digital divide often stems from external factors, such as lack of access to devices or internet connectivity, which standards alone cannot address. Government policies or broader infrastructure improvements are needed alongside these usability guidelines.
User Interface Complexity	Focuses on effectiveness and efficiency, ensuring that systems are designed to be intuitive and easy to navigate	Includes operability and learnability as critical components of usability, ensuring that systems should be easy to learn and operate, minimizing the cognitive load for users.	Yes, largely. If applied rigorously during the design and evaluation stages, these standards can significantly reduce interface complexity by enforcing user-centered design and ensuring that systems are intuitive and straightforward to use.
Usability for Vulnerable Populations	Specifically considers the context of use for different user groups, which can ensure that systems are designed to be inclusive of vulnerable populations.	Emphasizes accessibility and user satisfaction, pushing for systems that are not only functional but also usable for people with disabilities or chronic conditions.	Yes, to a significant extent. If developers follow these guidelines, they can create inclusive designs that accommodate the needs of vulnerable groups. However, this requires a commitment from developers to prioritize accessibility and ensure that systems are tested by diverse user groups during the design phase.

Usability Barriers and ISO/IEC 25010

Barrier	ISO 9241-11:2018	ISO/IEC 25010:2023	Can ISO Standards Solve This?
Interoperability and Integration Challenges		Includes compatibility and interoperability as critical quality characteristics, ensuring that systems can work together without causing usability issues.	Partially. While the standards promote interoperability, they cannot fully solve integration challenges caused by legacy systems, incompatible infrastructure, or organizational issues. To achieve seamless integration, there must be broader cooperation between vendors, developers, and healthcare institutions to implement systems that follow standardized data formats and communication protocols.
Technical Barriers and System Downtime		Addresses reliability by requiring systems to minimize downtime and ensure that recovery from failures is efficient.	Partially. The standards can push for more reliable systems, but issues like system downtime are often due to infrastructure, network failures, or inadequate resources. While following standards can help reduce technical problems, solving them completely often requires investments in IT infrastructure and system maintenance.
User Trust and Satisfaction	Includes user satisfaction as a core component of usability, ensuring that systems are designed to meet user expectations and needs.	Emphasizes user satisfaction and trust through consistent reliability, security, and usability characteristics.	Yes, to a large extent. By focusing on usability, security, and reliability, ISO standards can improve user trust in health technologies. However, achieving trust also requires good communication, training, and support, which go beyond what the standards themselves prescribe.
Training and Support Needs	Stresses the importance of learnability, meaning that systems should be easy to learn and use. This aligns with the need for less training if systems are inherently user-friendly.		While standards can help design learnable systems, the need for ongoing training and support depends on how well healthcare institutions implement the technologies and provide resources for users. Standards cannot replace the need for user education, but they can reduce the complexity that necessitates heavy training.

Summary of Alignment with ISO Standards

- All identified barriers map to core ISO usability dimensions.
- ISO 9241-11 addresses user performance and satisfaction.
- ISO/IEC 25010 extends coverage with technical quality, reliability, and accessibility.
- Both standards provide a structured foundation for improving health tech usability.
- Suggests potential for using ISO standards as **policy tools** and **procurement criteria**.

Conclusion

- Government reports highlight key usability barriers in health technology
- These closely align with ISO standards.
- ISO 9241-11 and ISO/IEC 25010 offer useful, but not exhaustive, guidance.
- Embedding usability standards into policy may improve future health technology.
- This study validates the practical relevance of ISO standards by demonstrating their applicability to real-world usability challenges

Thank you for your attention!

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