Monitoring the user satisfaction of major EHR brands in Finland -10 years of experience

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HL7 EHR Work Group’s Reducing Clinician Burden Project, 12th April, 2021
CONTENTS OF THE PRESENTATION:

- **Finnish Healthcare system**
  - National Health Information Exchange
  - General citizen attitude towards e-Health services

- **Backoffice: EHR for professionals**
  - Monitoring **AVAILABILITY and USE** since 2003
  - D1: EHR situation after the first wave of digitalization
  - How mature an eHealth system is?

- **Evaluation of usability and user experience**
  - Overall scope of the UX surveys
  - Results as an open data

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First in the world mobile app for smartphones was developed in Oulu already 1998-2000! (MOMEDA HC4015, 4th EU R&D framework program)
Facts about the Finnish health care system

1. Finland has a population of **5.5 million** inhabitants, average population density is 18 persons / km².
2. **Health care services** are mainly provided by public sector (75% of expenditure) and financed by municipality and state taxes.
3. Total health expenditure was **EUR 21.1 billion** in 2018, which is **9.0%** of GDP.
4. There are **21 hospital districts** providing secondary care services, 5 of them include a university hospital for tertiary care services.
5. There are **137 health care centers** organized by municipality organizations providing comprehensive primary health care services.
6. **Private sector** and **occupational health care** provide supplementary services (25% of expenditure).

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National Health Information Exchange (HIE) in Finland - 10 years of EHR archive, ePrescription and Citizen access

Source: www.kanta.fi

Twitter: @reponenjarmo
Use of on-line health and care services

Only 18% of people in the EU have used on-line health and care services without having to go a hospital or a doctors surgery.

Almost 50% of people in Finland and Estonia used e-health services, while in Denmark the percentage is slightly lower (42%).
The backoffice

17 years monitoring of the national development
National and international benchmarking of digital health information systems

- **University of Oulu** is a part of the national research consortium led by Finnish Institute of Health and Welfare that studies the **availability**, **use** and **usability** of information systems in healthcare and social welfare.


- **University of Oulu** participates the Nordic eHealth Research Network, that has since 2012 made **benchmarking** of national eHealth solutions.

- The developed indicators measure the success of national policies and enable cross-border comparison of availability, use and outcome of health information systems.

- The work is done in collaboration with **OECD** and **WHO** benchmarking studies.

Twitter: @reponenjarmo
In Finland the local patient record systems were 100% digital since 2010.

1st wave of digitalization, D1:

Health centres, %

- 1999: 53% not in use, 47% in use
- 2001: 63% not in use, 37% in use
- 2003: 94% not in use, 6% in use
- 2005: 96% not in use, 4% in use
- 2007: 99% not in use, 1% in use
- 2010: 100% not in use

Hospitals districts, n.

- 1999: 4
- 2001: 8
- 2003: 13
- 2005: 1
- 2007: 20
- 2010: 17


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D1: Electronic Health Record systems of Finland in 2019

Primary Care

Secondary Care

Results summarizing the national eHealth maturity
Finland’s summary eHealth profile: primary and secondary care 2017

- EPR
- Wireless use of EPR
- PACS
- DSS
- ePrescribing
- eReferral
- Consultation eReferral
- Televideoconsultation
- Telemonitoring
- Online appointment booking
- Exchange of clinical care information
- Exchange of laboratory results
- Exchange of radiology results
- Electronic identification and signature
- Personnel with computer skills
- Technical support for EPR

Data security and ICT skills
Regional integration

Evaluation of User Experience

How the dimensions and main statements evolved from 2010 to 2017

User experiences with different regional health information exchange systems in Finland

Hannele Hyppönen, Jarmo Reponen, Tinja Lääveri, Johanna Kaipio

National questionnaire study on clinical ICT systems

Physicians suffer from poor usability

Johanna Viitanen, Hannele Hyppönen, Tinja Lääveri, Jukka Vänskä, Jarmo Reponen, Ilkka Winblad

Indicators developed in Finland:
Used in Iceland, Denmark, Germany

Newest material collection 2020-21
UX Study: materials and methods

2010
2014
2017
2020

- Survey questions for UX, User Experience, designed by a national expert team.
- Based on OECD model survey, Nordic research collaboration, literature searches and consulting information of other relevant indicators in this area (e.g. Canada Infoway 2012 version).
- Web-based questionnaires launched through professional organizations.
- UX Statements (32 or more) with a five point Likert scale.
- One multiple choice question about the overall EHR rating with a “school grade” from 4 to 10.
- Selection lists of positive / negative properties of the EHR brand names.
- Respondents: physicians 4000 – 4700 each yr; 3600-4000 nurses each yr.
- The distribution of respondents corresponds the known distribution of target population in terms of demographics, professional distribution and geographical distribution.
1. Compatibility between clinical ICT systems and physician’s tasks

2. ICT support for information exchange, communication and collaboration in clinical work

3. Interoperability and reliability

“In this article we argued that the focus of usability studies in health informatics field should be broadened and deepened not only to cover user-interface issues but also the practices and procedures of healthcare work as well as contexts of numerous ICT systems.”
There is a great variability in User Experience between EHRs:

"From the physicians’ viewpoint the main usability concerns are related to efficiency of EHR use including lack of support for collaboration and communication, and intuitiveness of user interfaces.”

<table>
<thead>
<tr>
<th>Dimension in 2014, published in 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Stability and Reactivity</td>
</tr>
<tr>
<td>2. Usability and User experience</td>
</tr>
<tr>
<td>3. Display of information</td>
</tr>
<tr>
<td>4. Patient safety and Quality of care</td>
</tr>
<tr>
<td>5. Medication safety</td>
</tr>
<tr>
<td>6. Collaboration and Information flow</td>
</tr>
</tbody>
</table>

## 2010 - 2017 National surveys of physicians user experiences with EHRs

**Summary**

School grades (scale 4 to 10) given to EHR systems by physicians 2010 - 2017:

The average score has slightly improved.

**Source:**

### Mean scores of the main EHR systems (95% confidence intervals, CI) per year and sector (hospital, primary care), and the amount of answered physicians (n).

<table>
<thead>
<tr>
<th>Score, mean (95% CI)</th>
<th>2010</th>
<th>2014</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hospitals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effica¹</td>
<td>6.67 (6.54-6.81), n = 289</td>
<td>6.49 (6.38-6.61), n = 425</td>
<td>6.70 (6.59-6.80), n = 481</td>
</tr>
<tr>
<td>ESKO-Oberon²</td>
<td>7.21 (7.02-7.40), n = 148</td>
<td>7.32 (7.15-7.49), n = 194</td>
<td>7.63 (7.47-7.78), n = 223</td>
</tr>
<tr>
<td>Mediatri³</td>
<td>5.55 (5.20-5.90), n = 51</td>
<td>7.17 (6.81-7.54), n = 46</td>
<td>7.13 (6.76-7.50), n = 45</td>
</tr>
<tr>
<td>Pegasos</td>
<td>6.12 (5.81-6.43), n = 60</td>
<td>6.37 (6.14-6.61), n = 105</td>
<td>6.34 (6.13-6.56), n = 128</td>
</tr>
<tr>
<td>Radiologien PACS/RIS</td>
<td>6.08 (6.02-6.35), n = 96</td>
<td>7.08 (6.82-7.35), n = 96</td>
<td>7.33 (7.04-7.63), n = 81</td>
</tr>
<tr>
<td>Uranus (Miranda-Oberon)⁴</td>
<td>6.12 (6.03-6.21), n = 580</td>
<td>6.18 (6.10-6.25), n = 880</td>
<td>6.62 (6.54-6.69), n = 893</td>
</tr>
<tr>
<td><strong>Primary healthcare centres</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effica⁵</td>
<td>7.07 (6.93-7.20), n = 274</td>
<td>6.63 (6.53-6.74), n = 417</td>
<td>6.85 (6.75-6.95), n = 478</td>
</tr>
<tr>
<td>Graafinen Finstar GFS</td>
<td>6.87 (6.43-7.31), n = 31</td>
<td>7.38 (6.98-7.78), n = 37</td>
<td>7.40 (7.03-7.77), n = 43</td>
</tr>
<tr>
<td>Mediatri</td>
<td>6.94 (6.52-7.37), n = 34</td>
<td>6.96 (6.66-7.25), n = 71</td>
<td>6.74 (6.47-7.01), n = 85</td>
</tr>
<tr>
<td>Pegasos</td>
<td>6.24 (6.10-6.39), n = 231</td>
<td>6.45 (6.32-6.56), n = 339</td>
<td>6.37 (6.26-6.48), n = 404</td>
</tr>
</tbody>
</table>

**Statistically relevant changes:**

¹ 2014–2017 p = 0.027
² 2010–2017 p = 0.003, 2014–2017 p = 0.028
³ 2010–2014 p = 0.000, 2010–2017 p = 0.000
⁴ 2010–2017 p = 0.000, 2014–2017 p = 0.000
⁵ 2010–2014 p = 0.000, 2010–2017 p = 0.030, 2014–2017 p = 0.013
The Finnish National Usability-Focused HIS-Scale with dimension reliability validated (Hyppönen et al 2019 based on 2014 and 2017)*

- **Technical quality** (alpha=.82/.80)
  - Stability
  - System errors
  - Reaction speed
  - Unexpected actions
  - Missing info

- **Information quality** (alpha=.61/.62)
  - Medic list quality
  - Summary view
  - Patient-provided info
  - B2C collaboration

- **Feedback** (alpha=.88/.88)
  - Suggestion implementation
  - Vendor interest
  - Implementation speed

- **Ease of use** (alpha=.87/.86)
  - Logic
  - Terminology
  - Documenting
  - Operating info
  - Straightforward tasks
  - Needed patient data
  - Nursing record

- **Cross-organizational collaboration** (alpha= .69/.64)
  - HIE medication
  - HIE speed
  - HIE data quality
  - HIE collaboration

- **Benefits** (alpha=.85/.81)
  - Care quality
  - Care continuity
  - Guideline adherence
  - Medication errors
  - Duplicate tests
  - Care needs and impacts


Indicators developed in Finland:
Used in Iceland, Denmark, Germany
Spesifics of the 2020 – 2021 surveys

- The survey to nurses was accomplished before COVID-19 in March 2020.
- That was after the first hospital unit in the capital (Helsinki) region has taken EPIC system into use.
- Those results have been analysed.

- The survey to physicians was delayed after main COVID-19 outbreak to March 2021.
- That was after all the hospital units in the capital (Helsinki) region have taken EPIC system into use.
- The results have not yet been analysed.
School grades in scale 4 to 10 (4= fail, 10=excellent)

Only nurses’ UX results 2020 have already been published:

<table>
<thead>
<tr>
<th>Toimintaympäristö</th>
<th>Tuotemerkki</th>
<th>n</th>
<th>Kouluarvosan keskiarvo</th>
<th>Keskiarvon 95% luottamusväli</th>
</tr>
</thead>
<tbody>
<tr>
<td>Julkinen sairaala</td>
<td>Effica th*</td>
<td>109</td>
<td>7,1</td>
<td>6,9 – 7,4</td>
</tr>
<tr>
<td></td>
<td>Apotti</td>
<td>347</td>
<td>5,6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Esko</td>
<td>178</td>
<td>8,2</td>
<td></td>
</tr>
<tr>
<td>Lifecare</td>
<td></td>
<td>431</td>
<td>6,9</td>
<td></td>
</tr>
<tr>
<td>Mediatri</td>
<td></td>
<td>76</td>
<td>6,6</td>
<td></td>
</tr>
<tr>
<td>Pegasus</td>
<td></td>
<td>93</td>
<td>7,1</td>
<td></td>
</tr>
<tr>
<td>Uranus</td>
<td></td>
<td>482</td>
<td>7,3</td>
<td></td>
</tr>
<tr>
<td>Terveyskeskus</td>
<td>Effica th*</td>
<td>100</td>
<td>7,5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lifecare</td>
<td>305</td>
<td>7,3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mediatri</td>
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<td>6,7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pegasus</td>
<td>263</td>
<td>7,0</td>
<td></td>
</tr>
<tr>
<td>Sosiaalihuolto</td>
<td>DomaCare</td>
<td>61</td>
<td>7,5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lifecare</td>
<td>114</td>
<td>7,4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pegasus</td>
<td>83</td>
<td>6,9</td>
<td></td>
</tr>
<tr>
<td>Yksityissektori</td>
<td>DynamicHealth</td>
<td>81</td>
<td>7,2</td>
<td></td>
</tr>
</tbody>
</table>

*Effica terveydenhuolto

The latest survey 2020-21:
Only nurses’ UX results have been published:

### Taulukko 2. Saaraanhoitajien kokemuksia asiakas- ja potilastietojärjestelmien tuesta työhön tunnetaan julkisessa sairaalassa, terveyskeskuksessa, sosiaalihuollossa ja yksityissektorilla.

<table>
<thead>
<tr>
<th>Yhteistyö ja taidotaulukku</th>
<th>Julkinen sairaala</th>
<th>Terveyskeskus</th>
<th>Sosiaalihuolto</th>
<th>Yksityys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effica th* (n=115)</td>
<td>Apotti (n=353)</td>
<td>Eila (n=179)</td>
<td>Lifescare (n=418)</td>
<td>Me-diatri (n=72)</td>
</tr>
<tr>
<td>72</td>
<td>34</td>
<td>75</td>
<td>67</td>
<td>57</td>
</tr>
<tr>
<td>11</td>
<td>17</td>
<td>27</td>
<td>27</td>
<td>18</td>
</tr>
<tr>
<td>61</td>
<td>31</td>
<td>79</td>
<td>64</td>
<td>57</td>
</tr>
<tr>
<td>28</td>
<td>14</td>
<td>24</td>
<td>21</td>
<td>16</td>
</tr>
</tbody>
</table>

**Yleisöt**

Tietojärjestelmät tukevat yhteistyötä ja taidonvertailua. Erilaiset hyvin/ melko hyvin %

- **Collaboration, Internal and Cross-organisational**
- **Benefits**
- **Ease of use**
- **Technical quality**

UX results as an open data

www.thl.fi/digikyselyt
The STePS 2.0 project comprises five nationwide surveys targeted at
• social welfare management (SH eMap),
• health care management (TH eMap),
• physicians (PoLTe),
• nurses (PoSTe),
• citizens (additional module to the Adult health, wellbeing and service study [ATH]).

Two other sub-projects will also be implemented:
• develop and report indicators for Kanta services, obtained from Kanta log data; and
• implement the publishing of the materials as THL database reports.

Measure: The system is technically stable

Vuosi: 2017

Source: www.thl.fi/digikyselyt
Measure: The system does not require an extended training
Availability of Digital Services for Citizens, OPEN DATA

Measure: The e-appointment is available

Source: www.thl.fi/digikyselyt
Bibliography, Finnish National EHR user experience studies

- English language resources


Thank you!

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