E-HEALTH: CHALLENGES AND LESSONS LEARNED

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Ericsson Nikola Tesla, Croatia

AEMH 2017 Conference
ERICSSON NIKOLA TESLA GROUP

An associated company of the Ericsson Group. Provider of communication products and services in the operators’ segment, and a provider of innovative ICT solutions related to healthcare, transport, state administration, municipal services and multimedia.

› Focused on knowledge and innovations
› Socially responsible

> 2900 Employees

PARENT COMPANY
Ericsson Nikola Tesla d. d.

SUBSIDIARIES
Ericsson Nikola Tesla Servisi d.o.o.
Libratel d.o.o.
Ericsson Nikola Tesla BH d.o.o.

MARKETS
› Croatia
› Exports markets
› Services to Ericsson

NEW EMPLOYEES

<table>
<thead>
<tr>
<th>Year</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees</td>
<td>55</td>
<td>163</td>
<td>182</td>
<td>434</td>
<td>299</td>
</tr>
</tbody>
</table>
OUR EXPERIENCE:

- CROATIAN NATIONAL HEALTHCARE INFORMATION SYSTEM
- INTEGRATED HEALTH INFORMATION SYSTEM OF ARMENIA (WORLD BANK FINANCED PROJECT)
- HEALTH INFORMATION SYSTEMS INFORMATIZATION AND INTER-OPERABILITY PLATFORM IN KAZAKHSTAN (WORLD BANK FINANCED PROJECT - ONGOING)
- ERICSSON HOSPITAL INFORMATION SYSTEM – STANDALONE AND CLOUD
- MOBILE HEALTH SOLUTION FOR MONITORING DIABETIC PATIENTS INTEGRATED WITH THE CROATIAN NATIONAL HEALTHCARE SYSTEM
- MOBILE HEALTH CAREWELL - EU PROJECT IN 6 EU REGIONS

EXAMPLE: CROATIAN NATIONAL HEALTHCARE INFORMATION SYSTEM (CEZIH)
National healthcare information system of the Republic of Croatia (CEZIH)

- 2,300+ GP offices
- 192 Pediatrician offices
- 180 Gynecologist offices
- >2,000 Dentist offices
- 1,100+ Pharmacies
- 100+ Biochemistry laboratories
- 66 Hospitals / Specialist care offices
E-REMISSION (>50M/YEAR) PREVENTS ERRORS & SAVES LIVES
EPSOS

E-REFERRAL – 15,000 PEOPLE DO NOT NEED TO DRIVE EACH DAY

E-REFERRAL IN ALL HOSPITALS (12M/YEAR)
E-BOOKING IN SPECIALIST CARE & HOSPITALS
NATIONAL HEALTHCARE INFORMATION SYSTEM OF THE REPUBLIC OF CROATIA (CEZIH)
THE STARTING POINT 15 YEARS AGO
- A HEALTHCARE SYSTEM WHERE:

Focus was on the process and „seller” not the customer
Costs were mostly fragmented, isolated, not easily manageable
Processes were mostly fragmented and isolated
Decisions were often made upon individual knowledge and experience
Ordering process was mostly manual and paper based
Experience was mostly individual and not truly shared
Information for any participant in the process was mostly fragmented, isolated and not always available

WHAT ABOUT FUTURE COSTS?
WHAT ABOUT QUALITY IN THE FUTURE?
YES, THIS IS CAN BE TOUGH!
Focus was on the process and “seller” not the customer
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Processes were mostly fragmented and isolated
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WHAT SHOULD WE DO?
WHAT CAN WE DO?
HOW CAN WE DO IT?
WHAT IF IT COULD BE LIKE THIS...?

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Processes were mostly fragmented and isolated
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Patient centric
Centralized cost management
Managed processes, clinical pathways and guidelines
Guidelines, evidence-based and personalized care
Automated
Best practices
Consolidated, centralized, comprehensive, available wherever and whenever needed
HOW TO DO IT?

TRANSFORMATION

RE-ORGANIZATION, NEW PROCESSES, NEW & REUSED KNOWLEDGE AND COMPETENCES

THROUGH USING ICT
WHERE TO START?

- **E-PRESCRIPTION**
- **EHR**
- **PREVENTION PROGRAMS**
- **DISCHARGE SUMMARY FROM PHC**
- **REPORTING INFECTIOUS, MALIGNANT DISEASES**
- **E-REFERRAL**
- **PATIENT PORTAL**
- **RETRIEVING ADMINISTRATIVE INFO (INSURANCE STATUS, MEDICAL AIDS AVAILABILITY...)**

**WHERE TO START?**

- **Patient portal**
- Reporting infectious, malignant diseases
- Discharge summary from PHC
# A LONG (AND SOMETIMES ROUGH) ROAD...

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>E-HEALTH CROATIA STARTED AS A RESEARCH PROJECT</td>
</tr>
<tr>
<td>2003</td>
<td>1st CONTRACT WITH THE MINISTRY OF HEALTH(CARE) → START OF DEVELOPMENT AND IMPLEMENTATION</td>
</tr>
<tr>
<td>2007</td>
<td>SYSTEM IN NATIONWIDE OPERATION WITH ALL PRIMARY PHYSICIANS INTEGRATED</td>
</tr>
<tr>
<td>2011</td>
<td>E-PRESCRIPTION/E-REFERRAL IN FULL NATIONWIDE OPERATION</td>
</tr>
<tr>
<td>2012-2014</td>
<td>NEW HARDWARE/MIDDLEWARE, NATIONAL PREVENTION PROGRAMS, E-BOOKING, CENTRAL CALENDAR,…</td>
</tr>
<tr>
<td>2015→</td>
<td>E-MEDICAL AIDS, E-PHYSICAL THERAPY, M-HEALTH</td>
</tr>
<tr>
<td></td>
<td>ELECTRONIC HEALTH RECORD, PATIENT PORTAL</td>
</tr>
</tbody>
</table>
„Supply and Installation of Integrated Health Information System in Armenia (IHISA)"
Contract awarded in 09/2013, project finished, system in production

Republic of Armenia

„Delivery of Health Information Systems Informatization and Interoperability Platform”
Contract awarded in 12/2015, project ongoing

Republic of Kazakhstan
• The beginning is hard.
  • legal, process, architectural, technical, motivation, resistance to change issues
• There are no quick wins. But it takes time for eHealth to make sustainable wins.
• It’s not about technology. It’s about processes.
• You need to choose the right partner – experienced solution builder rather than a solution supplier.
• Each new step is somewhat easier than the previous.
• Each new step brings significantly more benefits than the previous.
• After some point, the momentum is there and you should only not ruin it

The real cases show that there is no single, ‘right’ strategy for implementing interoperable EHR and ePrescribing systems. The most transferrable features from different projects are the experiences and capabilities gained, and requirements for success identified.
European Commission, „The socio-economic impact of interoperable electronic health record (EHR) and ePrescribing systems in Europe and beyond“, October 2009
SOFTWARE PROJECT CHALLENGES

Successful software projects rate
(on time, on budget, with a satisfactory result)

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUCCESSFUL</td>
<td>29%</td>
<td>27%</td>
<td>31%</td>
<td>28%</td>
<td>29%</td>
</tr>
<tr>
<td>CHALLENGED</td>
<td>49%</td>
<td>56%</td>
<td>50%</td>
<td>55%</td>
<td>52%</td>
</tr>
<tr>
<td>FAILED</td>
<td>22%</td>
<td>17%</td>
<td>19%</td>
<td>17%</td>
<td>19%</td>
</tr>
</tbody>
</table>

Experiences from Ericsson Nikola Tesla eHealth projects
(important project challenges)

- Understanding of the strategic role of ICT in healthcare reform
- Clear goals & phases in eHealth implementation
- High quality requirements gathering and analysis
- Pragmatic project approach with eHealth domain leadership in project management
- Right decisions at the right time

ENTERS CLOUD COMPUTING...

- Flexibility
- Automatic software updates
- Disaster recovery
- CAPEX→OPEX
- Better collaboration
- Better focus
- Work from anywhere
- Document control
- Security
- Environmentally friendly

Private cloud?  
Public cloud?  
Hybrid cloud?

IaaS?  
CaaS?  
PaaS?  
SaaS?  
...
ENTER BIG DATA ANALYTICS...

VOLUME petabytes, exabytes…

BIG DATA

VELOCITY
- Data in motion
- Latency
- Usefulness period
- Real-time results

VARIETY
- Various types
- Various sources
- Semistructured or unstructured

VALUE
VERACITY
VARIABILITY
VISCOSEITY
VIRALITY
AND THEY FURTHER EMPHASIZE THE ISSUES OF...

DATA PRIVACY AND SECURITY?!

Where does the data reside?
Who owns the data?
Who controls the data?
Who processes the data?
How is the data governed?
DATA PROTECTION & PRIVACY

USA
- HIPAA (Health Insurance Portability and Accountability Act)
- HIPAA BAA (Business Associate Agreement)
- HITECH Act (Health Information Technology for Economic and Clinical Health Act)

EU*
- Regulation 2016/679 → GDPR
- Directive 2002/58/EC („e-Privacy“)
- COE Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data
- Contracts and clauses for the transfer of personal data to third countries
- HIPAA – „useful as an initial yardstick”
- EU-U.S. Privacy Shield

* ENISA - European Union Agency for Network and Information Security
HEALTHCARE IN THE CLOUD?

HIMSS ANALYTICS CLOUD SURVEY 2014*

ADOPTION & USE

TOP REASONS FOR ADOPTING

- MAINTENANCE COSTS
- SPEED OF DEPLOYMENT
- STAFFING CHALLENGES

83% USE CLOUD SERVICES

- CLINICAL APPS + DATA
- HIE
- HR APPS + DATA
- BACK UP + DISASTER RECOVERY

TOP CONSIDERATIONS WHEN SELECTING A CLOUD PROVIDER

- WILLINGNESS TO ENTER INTO A BUSINESS ASSOCIATE AGREEMENT
- PHYSICAL + TECHNICAL SECURITY

Obstacles

33% REPORTED SLOW RESPONSE

23% REPORTED DOWNTIME OR UNAVAILABILITY

CHALLENGES

- OPERATIONS VISIBILITY: 21%
- CUSTOMER SERVICE: 20%
- COSTS AND FEES: 19%
- AVAILABILITY AND UPTIME: 16%
- MIGRATION OF SERVICES OR DATA: 15%
- CONTRACTUAL ISSUES: 6%
- OTHER: 6%

NO CHALLENGES: 38%

Infographic source: Forbes

*HIMSS – Health Information and Management Systems Society

### HIMSS Analytics Cloud Survey 2014

<table>
<thead>
<tr>
<th>Reason</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security Concerns</td>
<td>16</td>
<td>61.5%</td>
</tr>
<tr>
<td>IT Operations are Solely Internal to Org</td>
<td>11</td>
<td>42.3%</td>
</tr>
<tr>
<td>Availability and Uptime Concerns</td>
<td>10</td>
<td>38.5%</td>
</tr>
<tr>
<td>Risk Outweigh the Benefits</td>
<td>9</td>
<td>34.6%</td>
</tr>
<tr>
<td>Cloud Provider Does Not Have Own Data Center (Uses a Third Party)</td>
<td>8</td>
<td>30.8%</td>
</tr>
<tr>
<td>Geographic Location of Cloud Provider and/or Data Center</td>
<td>5</td>
<td>19.2%</td>
</tr>
<tr>
<td>Contractual Issues with Cloud Providers</td>
<td>5</td>
<td>19.2%</td>
</tr>
<tr>
<td>Geographic Location of Cloud Provider's Disaster Recovery Site</td>
<td>3</td>
<td>11.5%</td>
</tr>
<tr>
<td>Human Factor Considerations</td>
<td>2</td>
<td>7.7%</td>
</tr>
<tr>
<td>Not Sure Which Provider to Select</td>
<td>2</td>
<td>7.7%</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>26.9%</td>
</tr>
<tr>
<td>Don't Know</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

### HIMSS Analytics Cloud Survey 2016

<table>
<thead>
<tr>
<th>Concern</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security (protection of PHI from breach)</td>
<td>27</td>
<td>54.0%</td>
</tr>
<tr>
<td>Performance (availability, latency)</td>
<td>21</td>
<td>42.0%</td>
</tr>
<tr>
<td>Compliance (adherence to regulatory requirements)</td>
<td>19</td>
<td>38.0%</td>
</tr>
<tr>
<td>Migration (moving existing workloads)</td>
<td>19</td>
<td>38.0%</td>
</tr>
<tr>
<td>Financial (depreciation of existing assets or ongoing costs)</td>
<td>19</td>
<td>38.0%</td>
</tr>
<tr>
<td>Support (response times, time to resolution)</td>
<td>19</td>
<td>38.0%</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>4.0%</td>
</tr>
<tr>
<td>I have no concerns</td>
<td>4</td>
<td>8.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

HIMSS Analytics Cloud Survey 2014 - USA

HIMSS Analytics Cloud Survey 2016 - USA
### Healthcare Cloud Market: Key Market Drivers and Restraints, US and Europe, 2014–2020

<table>
<thead>
<tr>
<th>Market Drivers</th>
<th>1-2 years</th>
<th>3-5 years</th>
<th>6-10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government initiatives for electronic health records (EHR) and sharing health information drive cloud adoption for synchronized real-time data management and personalized healthcare delivery.</td>
<td>🌒</td>
<td>🌒</td>
<td>🌒</td>
</tr>
<tr>
<td>Rise of chronic disease management and remote patient monitoring with expansion of healthcare delivery to include home and community care apart from hospitals, drives healthcare cloud market growth.</td>
<td>🌒</td>
<td>🌒</td>
<td>🌒</td>
</tr>
<tr>
<td>Conversion of capital expenses to operational expenses is a key factor driving investments in cloud by hospitals.</td>
<td>🌒</td>
<td>🌒</td>
<td>🌒</td>
</tr>
</tbody>
</table>

### Market Restraints

<table>
<thead>
<tr>
<th></th>
<th>1-2 years</th>
<th>3-5 years</th>
<th>6-10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concerns on management of security and safety of patient healthcare information in compliance with regional regulations are a market restraint.</td>
<td>🌒</td>
<td>🌒</td>
<td>🌒</td>
</tr>
<tr>
<td>Lack of standardization in legacy systems leads to cumbersome and expensive data migration efforts, restraining the adoption of a new cloud solution.</td>
<td>🌒</td>
<td>🌒</td>
<td>🌒</td>
</tr>
<tr>
<td>Questionable reliability of cloud service providers in meeting provisions of service level agreements limits cloud adoption.</td>
<td>🌒</td>
<td>🌒</td>
<td>🌒</td>
</tr>
</tbody>
</table>

Impact: 0 = Low, 2 = Medium, 4 = High

Source: Frost & Sullivan analysis preview
There are beautiful opportunities ahead arising from the abundance of data residing in eHealth systems. Let’s use them.

Sure, data security and privacy are of ultimate importance. But let’s not make that an obstacle.