

Health IT Maturity Models

Satellite session on challenges and international experiences

GMDS GI Working Group mwmKIS

*Methods and Tools for the Management of
Information Systems in Hospitals*

Franziska Jahn & Jan-David Liebe



UNIVERSITÄT
LEIPZIG



HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES



In light of recent events...

- **Covid-19** and the “Zukunftsprogramm Krankenhäuser”
 - **KHZG §14b**: digital maturity assessment for hospitals in mid 2021 and 2023
 - **Different guidelines** e.g. measurement of effects, new model by integrating existing models, etc.
 - **Preliminary work of the mwmKIS** working group in recent years e.g. expert workshop, definition of quality criteria for maturity models, international comparison of maturity models in healthcare
- *Today we would like to take the opportunity to learn from international experiences*

Program

- 9:10 - 9:35** **Current findings on requirements and experiences with measuring digital maturity: Results of a Delphi study** Marta Krasuska (Usher Institute, University of Edinburgh, UK)
- 9:35 - 10:00** **Experience from the Nordic eHealth Research Network in Developing Benchmarks for Availability, Use and Impact of eHealth Technologies** Christian Nøhr (SDU Health Informatics, University of Southern Denmark, Denmark)
- 10:00 - 10:25** **Experiences from the UK: The NHS Digital Maturity Assessment (DMA)** Henrik Möller (m.works, NHS, UK)
- 10:25 - 10:40** Break
- 10:40 - 11:05** **Experiences from the US: The Meaningful Use Program** Jordan Everson (Department of Health Policy, Vanderbilt University, USA)
- 11:05 - 11:30** **Requirements and approaches for a maturity model for the German hospital system: a conceptual overview** Jan-David Liebe (University of AS Osnabrück, Germany, UMIT Hall i. Tirol, Austria)
- 11:30 - 12:00** **Discussion and final remarks** Jan-David Liebe (University of AS Osnabrück, UMIT Hall i. Tirol, Germany), Franziska Jahn (University of Leipzig, Germany)

General remarks

- **Documentation:** The session will be recorded, all speakers agreed.
- **Questions and discussion:** You are welcome to ask the speakers questions by hand after each presentation. Alternatively, you can write the questions in the chat. We collect them and hand them to the speakers.

Current findings on requirements and experiences with measuring digital maturity: Results of a Delphi study

Dr. Marta Krasuska
Usher Institute, University of Edinburgh, UK

Current findings on requirements and experiences measuring digital maturity: Results of a Delphi study

Dr Marta Krasuska

**on behalf of the Global Digital Exemplar (GDE) Programme
Evaluation Team**

30th September 2020



GDE Evaluation Programme Team

University of Edinburgh



Professor Robin Williams leads this research and will be responsible for overall management



Dr Kathrin Cresswell, scientific evaluation lead



Professor Aziz Sheikh provides overall strategic input especially in relation to the health policy dimension and communication of formative findings



Dr Hajar Mozaffar facilitates setting up a supplier network



Dr Marta Krasuska, Dr Susan Hinder, and Dr Hung The Nguyen undertake data collection, analysis and dissemination

University College London



Professor Bryony Dean Franklin and Dr Henry Potts support qualitative work to explore organisational strategies, clinical and patient end-user experiences, and optimisation progress

NHS Arden & GEM Commissioning Support Unit



Wendy Lane, Sally Eason, and Jayne Rooke lead the baseline assessment of digital maturity, infrastructures, and optimisation plans



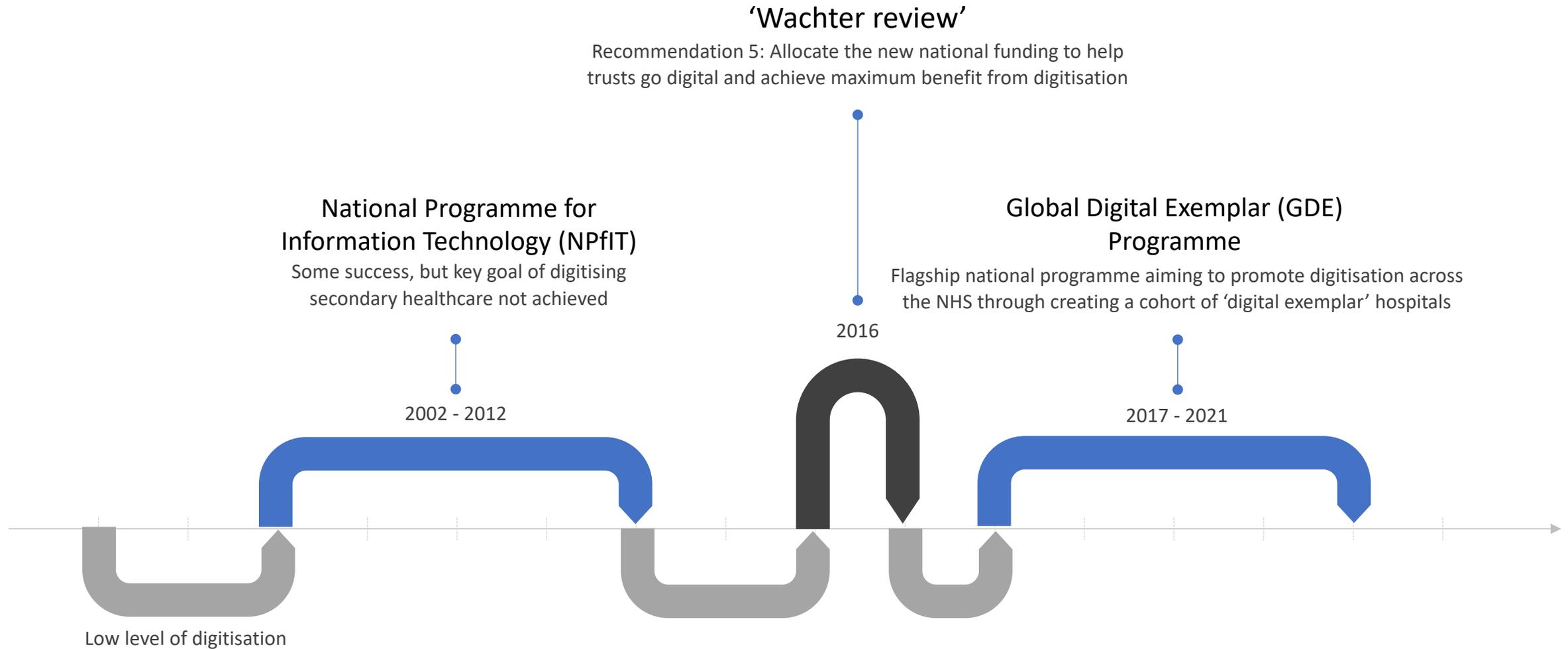
Kathy Mason Develops strategic implications for policy and practice to become global digital leaders

English National Health Service (NHS)

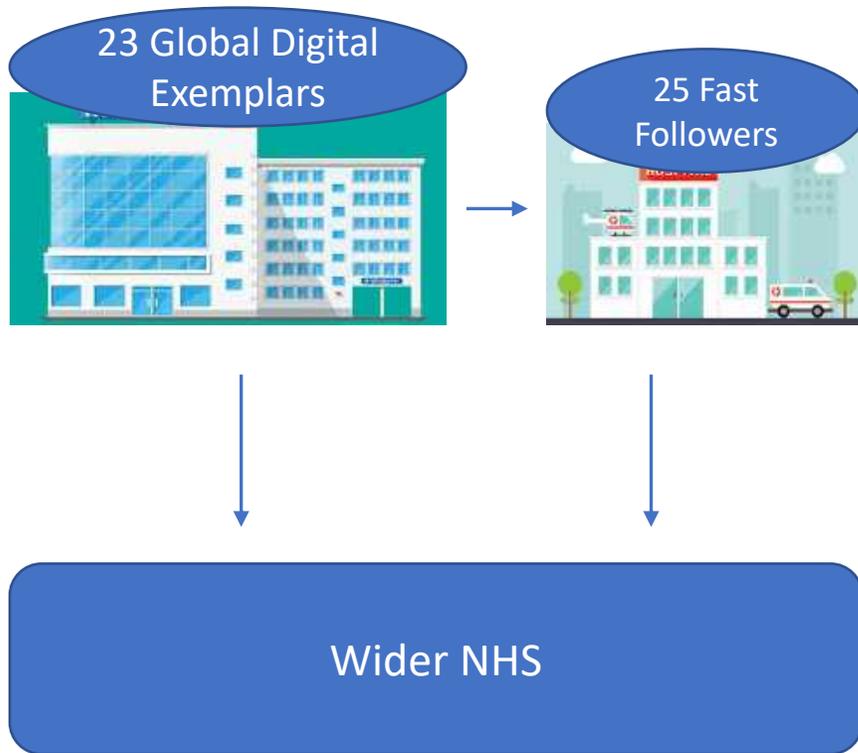


- Established in 1948
- One of four healthcare systems in the UK
- Second largest healthcare system in the world
- Provides healthcare to over 55 million people
- Largest employer in Europe (1.3 million staff)
- ‘Free at the point of care’
- Publicly funded through national taxes
- Key element: over 1600 acute, specialist and mental health hospitals and community services

History of digital transformation in the NHS



Global Digital Exemplar (GDE) Programme



The Global Digital Exemplar (GDE) Programme aims to promote digital transformation in the English secondary healthcare system

The core strategy of the GDE Programme consists of supporting digital transformation in selected digitally mature sites to create 'digital exemplars' characterised by digital excellence, followed by spread of learning to Fast Follower sites and to the wider NHS.

£385 mln (422 mln Euro) central funding, spanning over 5 years (2017 - 2021)

Focus of the independent evaluation:
To inform ongoing digital transformation efforts by working with policy makers and feeding back emerging findings

Key questions: How to demonstrate progress? How to assess digital excellence?

What is digital excellence?

- Currently there is no agreement on how to best conceptualise and measure digital excellence in healthcare
- What do we know?
 - There is no 'endpoint' that constitutes digital excellence with ever-changing goalposts, contexts and advancements in technology
- But concept of digital excellence serves a purpose:
 - Helps to justify investment & make the case for further funding
 - Provides a 'roadmap' for digitisation efforts
 - Allows benchmarking and comparisons



HIMSS Analytics Electronic Medical Records Adoption Model (EMRAM)

- Evaluates the extent to which Electronic Medical Records have been adopted within a hospital over eight progressive stages (Levels 0-7)
- Commonly used to assess digital excellence in hospitals
- HIMSS EMRAM Level 7 is often considered a 'gold standard' for digitisation in healthcare and an aspirational endpoint
- In the UK, NHS England adapted HIMSS EMRAM to develop Digital Maturity Index (DMI), and used DMI to help with assessing digital maturity in hospitals taking part in the GDE Programme

How can we advance our understanding of digital excellence?



Original Paper

Technological Capabilities to Assess Digital Excellence in Hospitals in High Performing Health Care Systems: International eDelphi Exercise

Marta Krasuska¹, PhD; Robin Williams², PhD; Aziz Sheikh¹, MSc, MD; Bryony Dean Franklin^{3,4}, PhD; Catherine Heeney², PhD; Wendy Lane⁵, MA; Hajar Mozaffar⁶, PhD; Kathy Mason⁵, MSc; Sally Eason⁵, MSc; Susan Hinder², PhD; Rachel Dunscombe^{7,8}, MSc; Henry W W Potts⁹, PhD; Kathrin Cresswell¹, PhD

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²Institute for the Study of Science, Technology and Innovation, University of Edinburgh, Edinburgh, United Kingdom

³UCL School of Pharmacy, London, United Kingdom

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⁵National Health Services Arden and Greater East Midlands Commissioning Support Unit, Warwick, United Kingdom

⁶Business School, University of Edinburgh, Edinburgh, United Kingdom

⁷Imperial College, London, United Kingdom

⁸KLAS Research's Arch Collaborative, London, United Kingdom

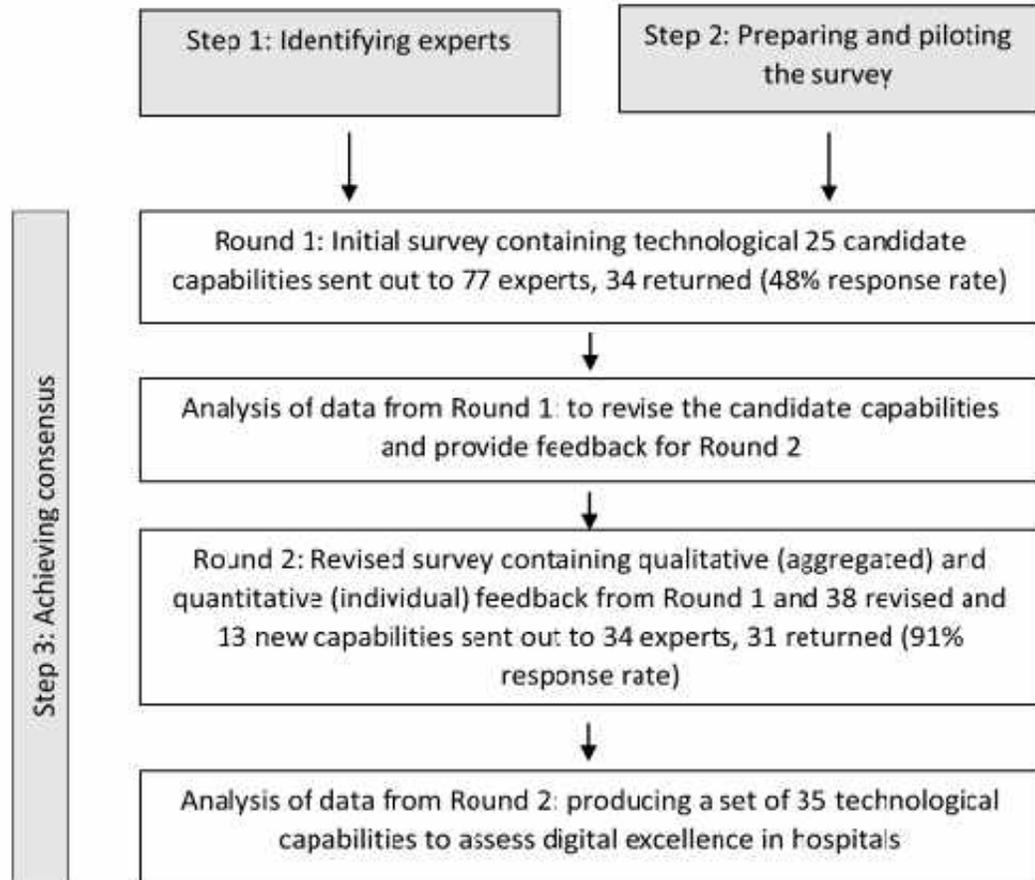
⁹Institute of Health Informatics, University College London, London, United Kingdom



Building international consensus on technological capabilities to assess digital excellence in hospitals: eDelphi exercise

- Aim → Develop internationally agreed defined set of technological capabilities to assess digital excellence in hospitals
- Delphi technique → Allows for achieving an agreement among participating experts in an area characterised by uncertainty or lack of empirical evidence
- Consists of a series of consecutive 'Rounds' where individual experts provide their opinion on a series of statements, experts receive anonymised feedback after each round
- Rounds finish once consensus is reached

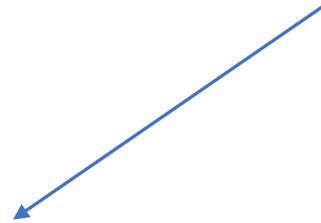
Methods



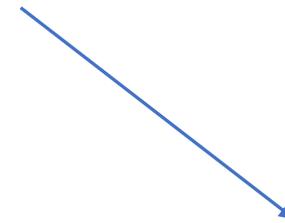
- Two rounds electronic Delphi (eDelphi) consensus building exercise indulging a qualitative analysis of free text responses
- Digital Maturity Index (DMI) uses as a basis for Round 1
- 31 experts took part in both rounds

Results

Agreed set of 35 technological capabilities



Capabilities within a hospital
(20 capabilities)



Capabilities regarding communication
with other parts of the health care
system and with patients and carers
(15 capabilities)

Technological capabilities within a hospital

Examples

- Closed-loop electronic medicines management & optimization
- Open application programming interfaces allowing different software components to interact
- Structured data (records, assessments and plans) captured digitally at the point of care
- Unstructured data (e.g., notes, free text) captured at the point of care when appropriate



Technological capabilities within a hospital

Capabilities added by experts during the Delphi study

- A single list of all medication for one patient is available
- Reducing need for duplicate entry of patient data to near zero
- Third party tools can be added through Application Programming Interfaces
- Use of machine learning and automation when appropriate (e.g., analysis of radiology images)



Capabilities related to communication with other parts of the health care system, patients and carers

Examples

- Exchange of prescription information in a structured way within and between organizations and sectors
- Records, assessments, and plans shared digitally and easily accessible to patients and carers to enter and amend the data securely and confidentially

Capabilities added by experts during the Delphi study

- A unique patient identifier used across the health care system
- Ability to interoperate with other standard-based external systems



Broader Aspects of Digitally Enabled Change:

Organisational culture

- Willingness to face the new, change the way of thinking and to take risks
- Culture of allowing innovations
- Understanding of change management
- Culture free of bullying and harassment
- Leadership to support digital transformation

Workforce

- Skills within the digital team: software development, software engineering, project management, business related skills
- Skills across hospital's workforce: ability to perform one's role using digital tools
- Professionalization of health informatics

Strategy

- Putting clinical benefits at the center of clinical strategy
- Aligning the digital strategy with the overall strategy of the hospital
- Support of the digital agenda from the hospital's board

Limitations

- Delphi technique may have forced consensus
- Represents consensus among hospital informatics experts, do we need wider voices?
- No experience with application of the measure to date

Conclusion

- Agreed set of, up to date, technological capabilities that can be used to describe digital excellence in hospitals
- Departure from traditional digital maturity models that assume progression through predefined steps from low to high maturity
- Role of non-technical aspects of digital excellence: culture, skills, strategy
- Further work needs to develop this into a full measure



Wider considerations (Part1)

- Focus on acute hospitals but also integration locally, regionally and nationally (key to integrated care delivery and effective care planning)
- Evolving contexts in which digital transformation happens, e.g. technological advancements, changed priorities
- Tensions between local and national priorities
- What is this digital excellence framework for?
 - Possible uses: to make a business case, justify investments, to identify weak points and to adjust and focus strategy, internationally or at a level of an organisation



Wider considerations (Part 2)

- Focus on measuring technical capabilities vs. wider aspects of digital transformation.
- Other frameworks to assess non-technological aspects of digital transformation include:
 - Technology, People, Organizations, and Macro environmental (TPOM) framework
 - Framework for theorizing and evaluating Non-adoption, Abandonment, and challenges to the Scale-Up, Spread, and Sustainability of health and Care Technologies (NASS)



References

M Krasuska, R Williams, A Sheikh, B Dean Franklin, C Heeney, W Lane, H Mozaffar, K Mason, S Eason, S Hinder, R Dunscombe, H Potts, K Creswell. **Technological Capabilities to assess digital excellence in hospitals in high performing healthcare systems: an international e Delphi exercise.** Journal of Medical Internet Research. 2020 <https://doi.org/10.2196/17022>

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K Cresswell, R Williams, A Sheikh. **Developing and Applying a Formative Evaluation Framework for Health Information Technology Implementations: Qualitative Investigation.** Journal of Medical Internet Research. 2020 <https://doi.org/10.2196/15068>

T Greenhalgh, J Wherton, C Papoutsis, J Lynch, G Hughes, C A'Court, S Hinder, N Fahy, R Procter, S Shaw. **Beyond Adoption: A New Framework for Theorizing and Evaluating Nonadoption, Abandonment, and Challenges to the Scale-Up, Spread, and Sustainability of Health and Care Technologies.** Journal of Medical Internet Research. 2017 <https://doi.org/10.2196/jmir.8775>



Thank You

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Experience from the Nordic eHealth Research Network in Developing Benchmarks for Availability, Use and Impact of eHealth Technologies

**Prof. Dr. Christian Nøhr (SDU Health Informatics, University of
Southern Denmark, Denmark)**



Nordic eHealth Research Network

Nordic collaboration for:

- *developing, testing and assessing a common set of indicators monitoring eHealth in the Nordic countries*
- *for use by national and international policy makers and scientific communities to support development of Nordic welfare.*

Christian Nøhr, Professor

Centre for Health Informatics and Technology, Maersk Mc-Kinney Moller Institute,
University of Southern Denmark.



Embætti
landlæknis
Directorate of Health



Karolinska
Institutet



Monitoring the effects of health information systems

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Abstract

This panel will present the state of art methods for monitoring national strategies for development and implementation of health information systems, and initiate a discussion with the audience on possible improvements to the methodological inventory.

Keywords:

Medical record systems, national strategies, monitoring, evaluation.

Panel description

Description

In Denmark an EHR-Observatory was founded in 1999, and the purpose of the EHR-Observatory is to support the realization of the national strategy by monitoring and assess the development, implementation and application patterns of EHR systems in Danish hospitals. The Danish EHR-Observatory has developed a number of methodological approaches for monitoring national deployment, and has monitored Danish EHR projects from 2000 with respect to a number of parameters such as diffusion, diffusion rate and the hospital owners expectations [1].



Nordic eHealth Indicators

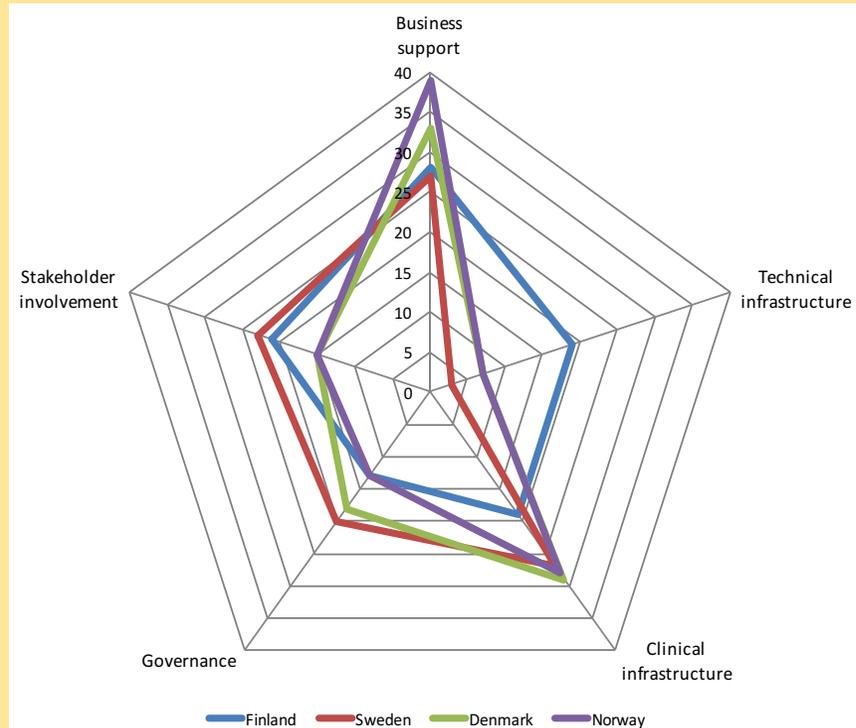
Organisation of research, first results and the plan for the future

2012

Method for eHealth indicator development¹

- Define the context
- Define the goals

eHealth policy analysis



1) Hyppönen

2012

Method for eHealth indicator development¹

- Define the context
- Define the goals
- Define methods for selection and categorization

Key systems defined by using OECD key functionalities

EHR (*Electronic Health Record*)

HIE (*Health Information Exchange*)

PHR (*Personal Health Records*)

2012

Method for eHealth indicator development¹

- Define the context
- Define the goals
- Define methods for selection and categorization
- Define the data

Data on availability and use from existing survey.

+ start a very long list of variables





Details vs. Big Picture



2014

From 279 to 49 eHealth indicators

Indicators developed

- Long list was generated from eHealth evaluation literature
- Prioritized by
 - Rating survey among key stakeholders
 - Mapping against policy goals
 - Comparing to OECD model survey

Indicators measured

- Availability of EHR functionalities: *Experts and surveys*
- Usage of HIE functionalities: *National log files*
- Usage of PHR functionalities: *Citizens surveys/National log files*
- Usability indicators: *Survey of professionals*





2017

Results on 3 major issues

 Nordic Council
of Ministers

Nordic eHealth benchmarking

From piloting towards established practice

1) Analysis of Nordic eHealth policies 2.0

How have the policies and top-down needs for eHealth changed from 2012 to 2016?

2) Analysis of governance of systems of eHealth monitoring

What is the basis for a permanent governance system for eHealth in the Nordic countries?

3) Analysis of on-line reporting systems on eHealth monitoring data in the Nordic countries (and on European level)

What is the basis for a permanent reporting system of eHealth indicator data in order to make the results accessible to decision-makers and researchers

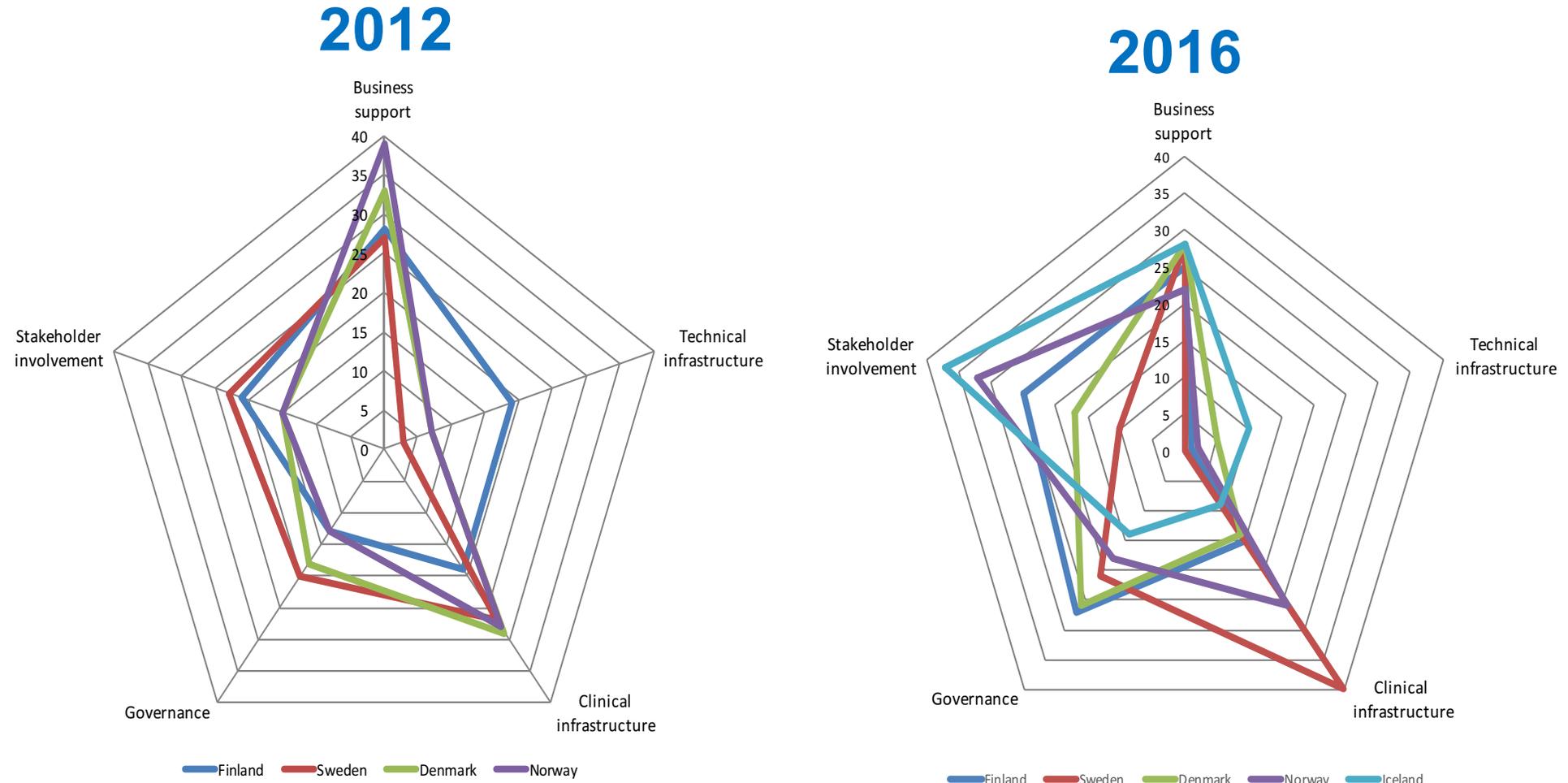
Results on defining indicators for eHealth services: patients' and citizens' points of view

What is the basis for common monitoring of eHealth services from the citizen viewpoint in the Nordic countries?

Results on exploitation of the work in a European, WHO and OECD context.

What is done internationally related to eHealth monitoring, and how can the NeRN work bring added value to eHealth indicator work globally?

1.1 Analysis of Nordic eHealth policies 2.0



- From infrastructure towards **governance** and **stakeholder involvement** in almost all countries.
- Business support remains an important strategic target.

Nordic eHealth Benchmarking

Towards evidence informed policies

 Nordic Council
of Ministers

2019

1. Impact of the E-health strategies in the Nordic countries – an analysis using Institutional Theory
2. Update on indicators outlined in the last report
3. Developing a Nordic model survey to monitor citizen views on eHealth
4. Cyber security in the Nordic Countries
5. Personas for users of indicators of eHealth availability, use and outcome in the Nordic countries

<https://pub.norden.org/temanord2020-505/#>

Commonalities and Differences - Policy analysis

Goals and Plans	 D	 F	 IS	 N	 S
Plans for establishing IT architectures and IT-services: equally prominent in all strategies					
IT-services for clinicians				+	+
IT-services for patients		+	+		+
Common IT-architecture		+			
Standardization		+	+	+	+
Enhance information security and privacy		+	+		
Improve access to data for secondary use	+			+	+
Plans for establishing law and regulatory frameworks: equally prominent in all strategies					
Support innovation		+			+
Enhancing software quality		+			
EHRs to be congruent with law, regulations and standards			+		
Importance of different stakeholders for the realization of the strategies: included in all strategies					
Healthcare leaders and health policy makers	+			+	+
IT-service operators and vendors of e-health systems	+	+			
Private vendors of healthcare services					+

Commonalities and Differences – Citizen Surveys

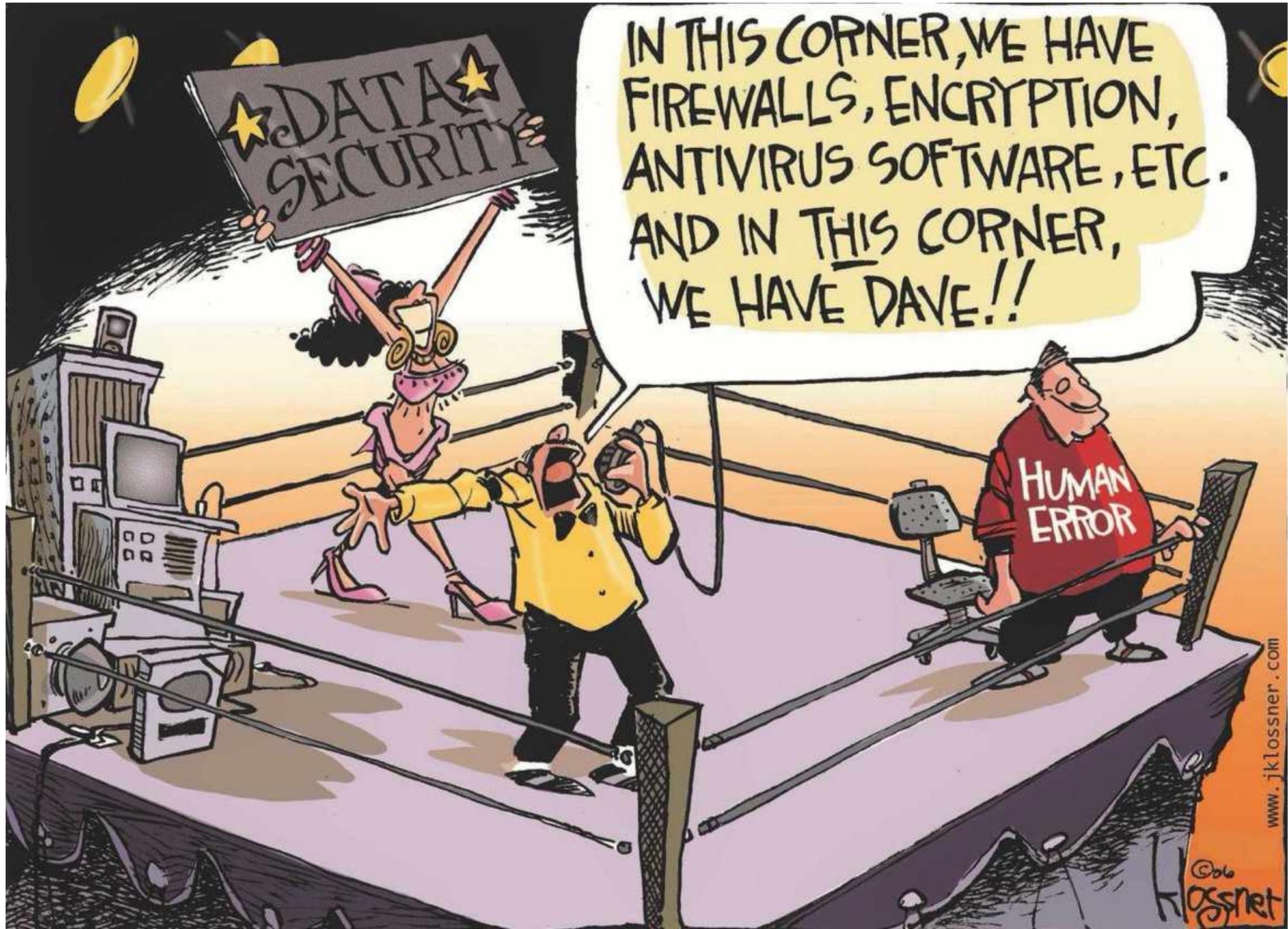
(Pu) Public
(Pr) Privat

Country	Funding	Who owns data	Who collect data	When
Iceland 	Directorate of Health (Pu)	Directorate of Health (Pu)	Directorate of Health (Pu)	2019 (snart efteråret)
Finland 	2014, Ministry of Finance. Hereafter National Institute for Health and Welfare and Ministry of Social affairs and Health (Pu)	National institute for Health and Welfare (Pu)	National polling agency commissioned by THL (Pu)	2014, 2017, 2020
Sweden 	Swedish eHealth Agency (Pu)	Swedish eHealth Agency, assisted by university researchers (Pu)	Statistic Sweden (Pu)	2019
Norway 	Separate projects and the institutions that performed the surveys. 2019 Directorate of eHealth (Pu)	Before 2019 university researchers. 2019 Directorate of eHealth (Pu)	First 6 surveys independent research institutions. The 7th Directorate of eHealth + private consultants (Pu/Pr)	2000,2001,2003, 2005,2007,2013, 2019
Denmark 	E-health Observatory annual conference (Pr)	E-health Observatory + university researchers (Pu) (Pr)	Megafon analyse (Pr)	2013, 2015, 2017 2019

Nordic Model Survey for Citizen Use of eHealth

- Recommendations

1. Coordinate citizens surveys between countries to achieve comparability
2. Structure questionnaires along three overall topics:
 - Use / non-use,
 - consequences of use, and
 - citizens expectations for the future.
3. Maintain possibility to develop country-specific questions
4. Base development of questionnaires and analysis on scientific methods to ensure validity
5. Discuss funding models to ensure financial sustainability



IN THIS CORNER, WE HAVE
FIREWALLS, ENCRYPTION,
ANTIVIRUS SOFTWARE, ETC.
AND IN THIS CORNER,
WE HAVE DAVE!!

HUMAN
ERROR

★ DATA ★
SECURITY

www.jklossner.com

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Klossner

GDPR, NIS, etc etc

National

Government

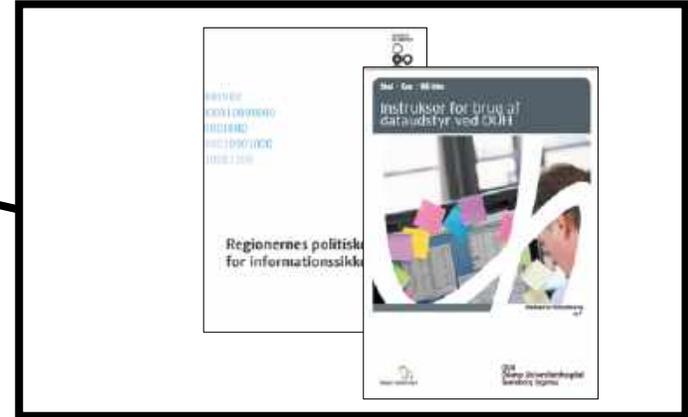
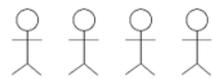
Institutional
(examples)

Hospital

Region

Municipality

Users



Review

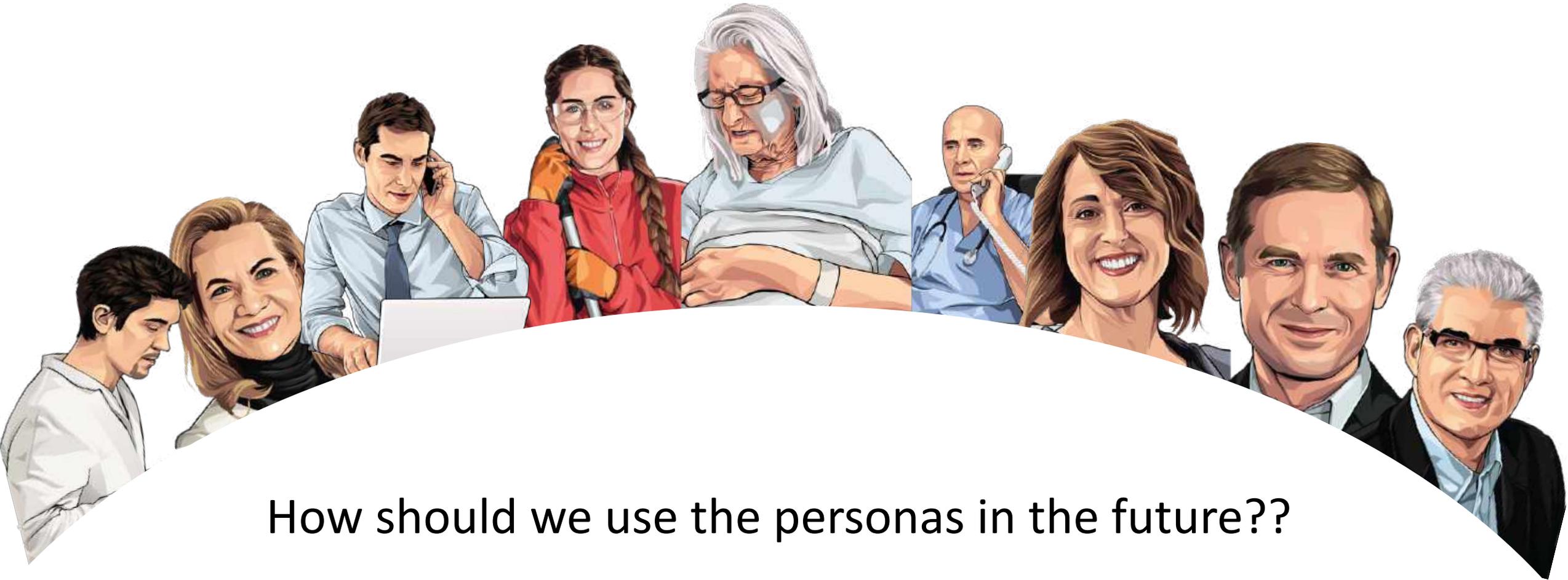
Interviews

Surveys

Commonalities and Differences - Data Security

Benchmarks	D	F	IS	N	S
Strengthening competencies	+	+	+	+	+
Collaboration	+	+		+	+
Everyday Safety	+			+	+
Dealing with cybercrime/Resilience		+	+	+	+
Legislation			+		+

Personas for users of indicators of eHealth availability, use and outcome in the Nordic countries.



How should we use the personas in the future??

The Nordic eHealth group and Nordic eHealth research Network (NeRN) interested in taking the lead in developing and testing more indicators.





Experiences from the UK: The NHS Digital Maturity Assessment (DMA)

Henrik Möller (m.works, NHS, UK)



MEISTERWORKS

MEISTERWORKS TURNS INFORMATION INTO KNOWLEDGE

Clients



DIGITAL MATURITY ASSESSMENT

Vision

Digitise the healthcare system
intelligently

- Baseline Data
- Direction & Speed of Travel
- Benefits & Priorities
- Shared Learning

Challenge

Optimise balance between
feasibility and utility

- Information fragmentation
- Encouraging buy-in
- System idiosyncrasies
- Critical mass threat

STRUCTURE AND SCOPE

High Level Standardisation

Readiness

Leadership, Strategy,
Resourcing, Governance,
Governance, Information
Skills & Training

Capabilities

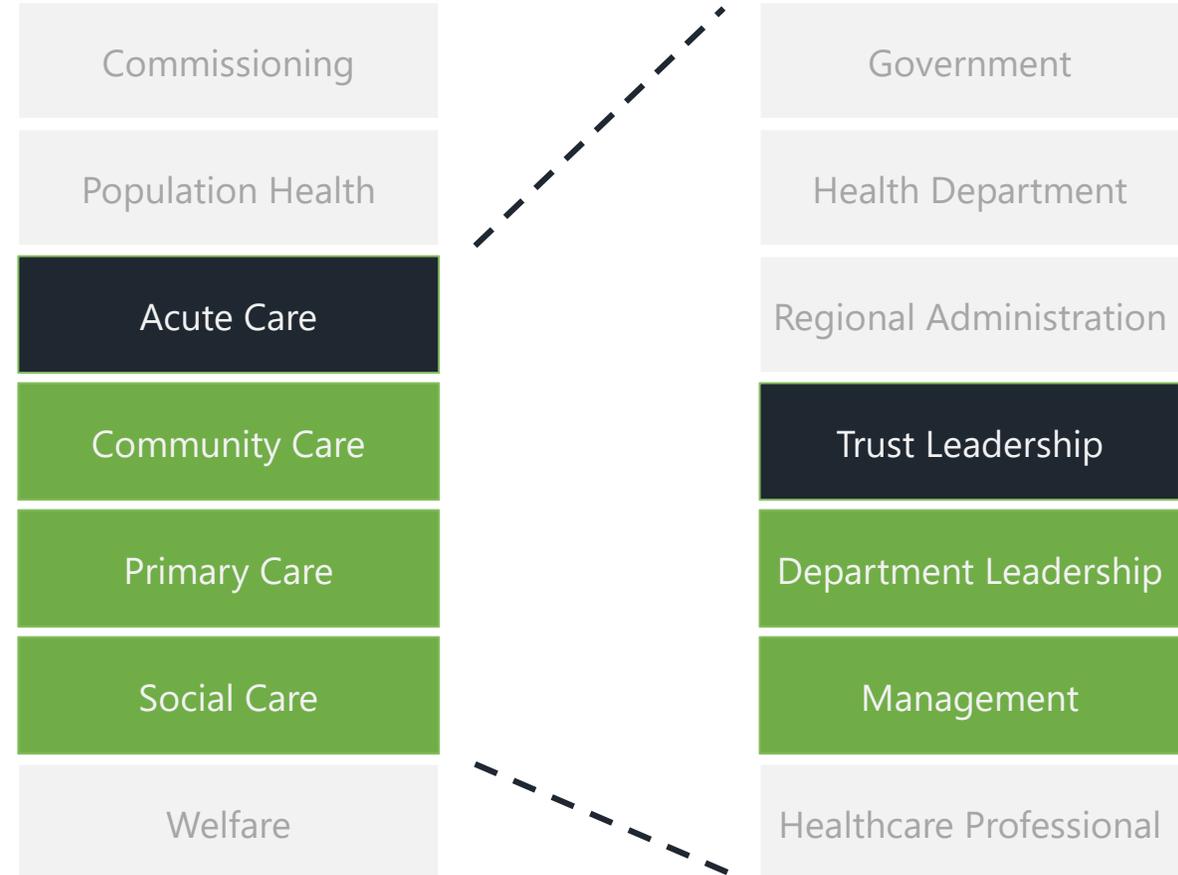
Records, Orders,
Medication, Transfers,
Decision Support,
Telehealth, Intelligence,
Standards

Infrastructure

Network, Security, Devices &
Renewal, Business Continuity,
Support, Tech User
Overhead, Policy
Development

- 90% outcome-based
- Digitisation baseline for each capability
- Key indicators for specific outcomes
- Oriented towards “ Definition of ‘Good’ “

Aligns with Health System Topology



TOOLKIT DESIGN

Intuitive	Easy To Use		
	Custom navigation, progress & status info, live support chat	Likert, 7-point percent scales, optional comments	Pre-sets by org type, care settings and previous responses
Efficient	Versatile		
	Consistent level of detail, non-linear structure	Easily bring in others and manage their contributions	Quickly poll colleagues or survey staff on individual issues
Relevant	Adaptable		
	Control contributions centrally or let collaborators decide	Evolve topics and question sets without risking continuity	Documentary evidence upload & peer validation modules
Collaborative			
Flexible			
Extendable			

TOOLKIT DESIGN

Data Dashboard	Rewarding		
	Quick, easy-to-read dashboards	Self-service analytics for custom analysis and visualisation	Access to raw data for export to external processing tools
Self-Service Analytics	Insightful		
Configurable Data Export	Standardised baseline and progress tracking	System-wide benchmarking, compare and contrast	National baseline and progress data to support command and control
Analytics and Reporting	Supportive		
Share	Share access to outputs within the tool, create reports	Include and dynamically signpost content - centrally or use generate	Responsively suggest opportunities to share learning between participants
Connect			



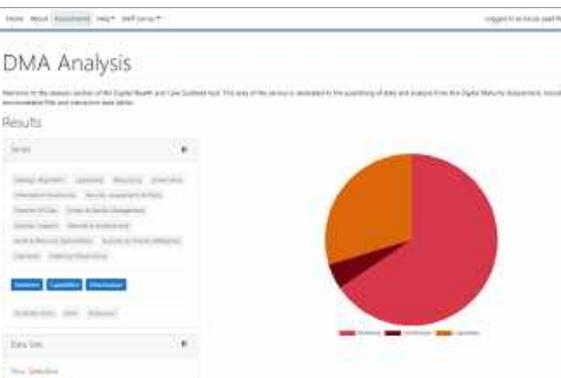
Auswertung

Zusammenfassung:

- Alle Rahmenbedingungen nach Erfüllungszustand
- Alle Rahmenbedingungen nach Auswirkung auf die Nutzenerfahrung
- Rahmenbedingungen, die im Prozesskontext besonders hemmend auf die Nutzenerfahrung wirken
- Rahmenbedingungen mit geringem Erfüllungszustand ohne hemmende Wirkung im Prozesskontext
- Prozesse mit hoher IT Durchdringung UND hoher Nutzenerfahrung
- Prozesse mit hoher IT Durchdringung, jedoch ohne bzw. mit minimaler Nutzenerfahrung
- Prozesse ohne bzw. mit minimaler IT Durchdringung, aber hoher Wichtigkeit der IT-Unterstützung
- Prozesse, in denen IT nur in einem Teil des Prozesses genutzt wird und kein/minimaler Nutzen entfaltet

Die folgende Tabelle listet alle Prozesse mit hoher IT Durchdringung (zweifelhafte oder nur minimale Nutzenerfahrung gesehen wird, im Kontext der die Nutzenerfahrung Rahmenbedingungen). Zusätzlich bietet eine Auflistung der fünf am häufigsten genannten Nutzen, die andere erschließen könnten, Orientierung zu potentiell erschließbaren Nutzen, Handlungsempfehlung, Gründe (Rahmenbedingungen) analysieren und ggf. beseitigen Nutzerpotenzialen

Prozess	Software-Nutzung	Nutzenerfahrung	Hemmfaktoren
Diagnostik, Behandlung, Therapie, Pflegeokumentation der Durchföhrung >> Dokumentation von patientenbezogener Materialbedarf (geplant und ungeplant) >> Erfassung von Narkotika	Wichtigkeit	Sehr hoch	<ul style="list-style-type: none"> Die Tele nicht in Klinisch nicht in genutzt Klinisch nicht in Nutzen
Diagnostik, Behandlung, Therapie, Pflegeaufträge und Anweisungen >> Verordnung von Arzneimitteln >> Medikamentenabrechnung >> Umstellung von Heilmittelkarte auf die Arzneimittelkarte des	Wichtigkeit	Sehr hoch	<ul style="list-style-type: none"> Die IT-A Arbeits Software benutzt In der a Kenntnis



Results by Section

The table below contains data aggregated from several questions in the current tool deployment for 'NUT' and 'User Value' measures as outlined below.

Section	National Average	Score
Asset and Resource Optimisation	81	85.00
Governance and Clinical Intelligence	84	78.00
Digital Support	82	73.00
Digital Support	88	87.00
Digital Clinician	80	74.00
Working Infrastructure	75	75.00
Connectivity	71	65.00
Information Governance	81	80.00
Learning	78	75.00
Workflow Optimisation	81	78.00

OUTCOMES

In Numbers

1,300

Unique users (England, Scotland)

300

Unique organisations (England, Scotland)

1,000

Completed Assessments (England, Scotland)

95%

Participation Rate (England, Scotland)

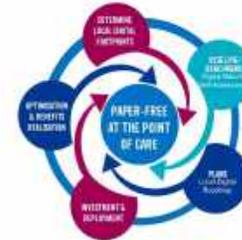
5,000

Completed Staff Surveys (Scotland)

Some Examples



Local Digital Roadmaps



Global Digital Exemplars



Regional (CCG) Needs Analysis and Investment Strategy



Capability-based National Investment Drives



National Digital Strategy



COVID-19 Telehealth Response



NEXT GENERATION



WORKGROUP
MANAGER



SHARING
MANAGER



FREEFORM
STAFF SURVEYS



DYNAMIC
CONTEXT HELP



INSTANT
WORKSHOP



INFINITE
TIMESERIES



SCREEN SHARE
SUPPORT



THANK YOU!

QUESTIONS?

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MEISTERWORKS

Experiences from the US: The Meaningful Use Program

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Experiences Measuring Health IT in the United States

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Overview

- Three complementary approaches
 - Measuring implementation of functions to identify EHR adoption
 - Measuring adoption of certified EHRs
 - Measuring 'Meaningful Use'
- Lessons Learned



Electronic Health Record Adoption

- Definition of 'basic' and 'comprehensive' EHR for hospitals and physicians published in 2009
- Motivated by sense of no agreed-upon definition of an EHR
 - >70% of hospitals at least partially implemented an EHR

Jha, Ashish K., et al. "Use of electronic health records in US hospitals." *New England Journal of Medicine* 360.16 (2009): 1628-1638.

Basic EHR Requirements

Demographic characteristics of patients

Physicians' notes

Nursing assessments

Problem lists

Discharge summaries

Medication lists

Laboratory reports

Radiologic reports

Diagnostic test results

Medication computerized provider-order entry

Electronic Health Record Adoption

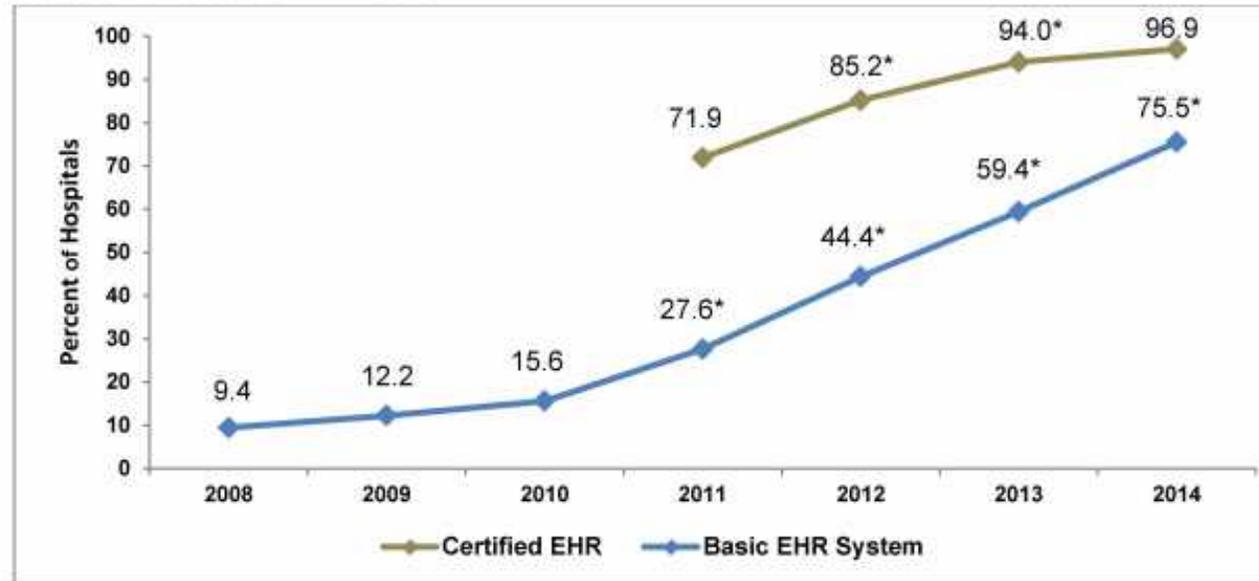
- 'Basic' EHR: implementation of 10 of 10 specific functions
- 'Comprehensive' EHR: implementation of 24 of 24 specific functions
- Measured by hospital and physician survey
- 9% of hospitals and 17% of physicians had a basic EHR

- Repeatedly cited and tracked by Federal Office of the National Coordinator for Health Information Technology and popular press



'basic' categorization created deceptively high bar

Figure 1: Percent of non-Federal acute care hospitals with adoption of at least a Basic EHR with notes system and possession of a certified EHR: 2008-2014



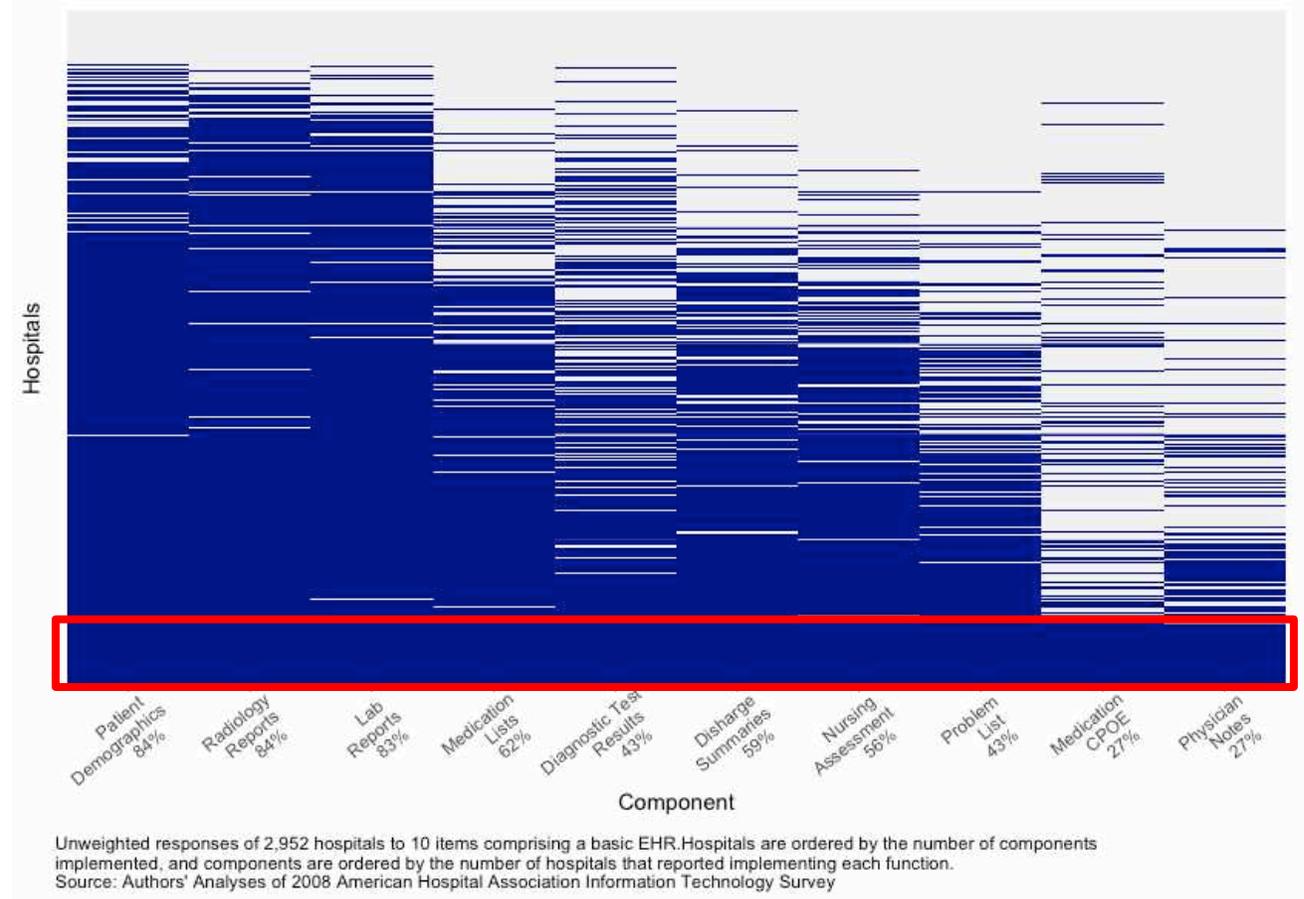
NOTES: Basic EHR adoption requires the EHR system to have a set of EHR functions defined in [Table A.1](#). A certified EHR is EHR technology that meets the technological capability, functionality, and security requirements adopted by the Department of Health and Human Services. Possession means that the hospital has a legal agreement with the EHR vendor, but is not equivalent to adoption.

*Significantly different from previous year ($p < 0.05$).

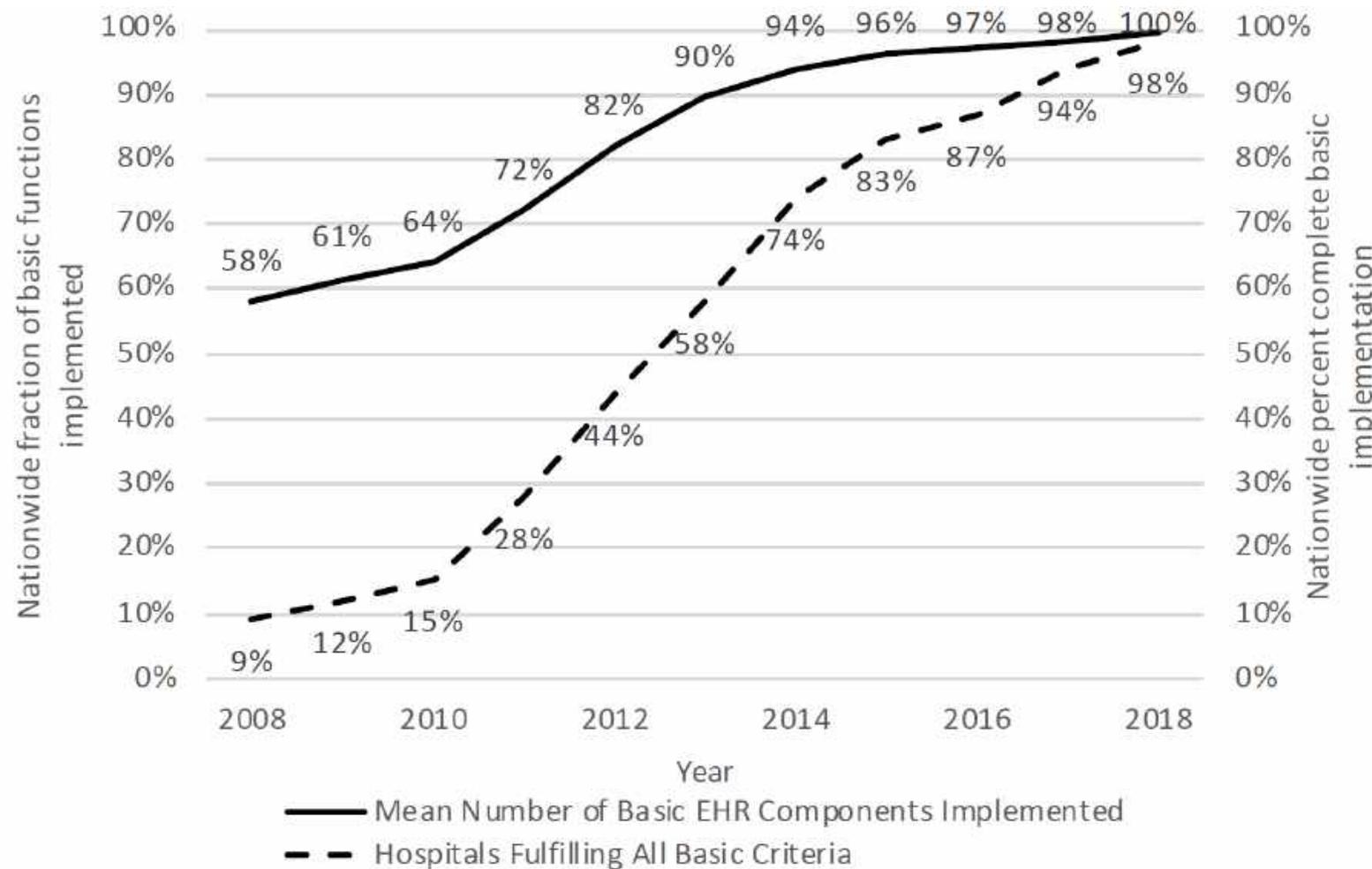
SOURCE: ONC/American Hospital Association (AHA), AHA Annual Survey Information Technology Supplement

Henry, J., Pylypchuk, Y., Searcy T. & Patel V. (May 2016) Adoption of Electronic Health Record Systems among U.S. Non-Federal Acute Care Hospitals: 2008-2015. ONC Data Brief, no.35. Office of the National Coordinator for Health Information Technology: Washington DC.

'basic' categorization awarded no credit to progress



'basic' categorization distorted view of future progress



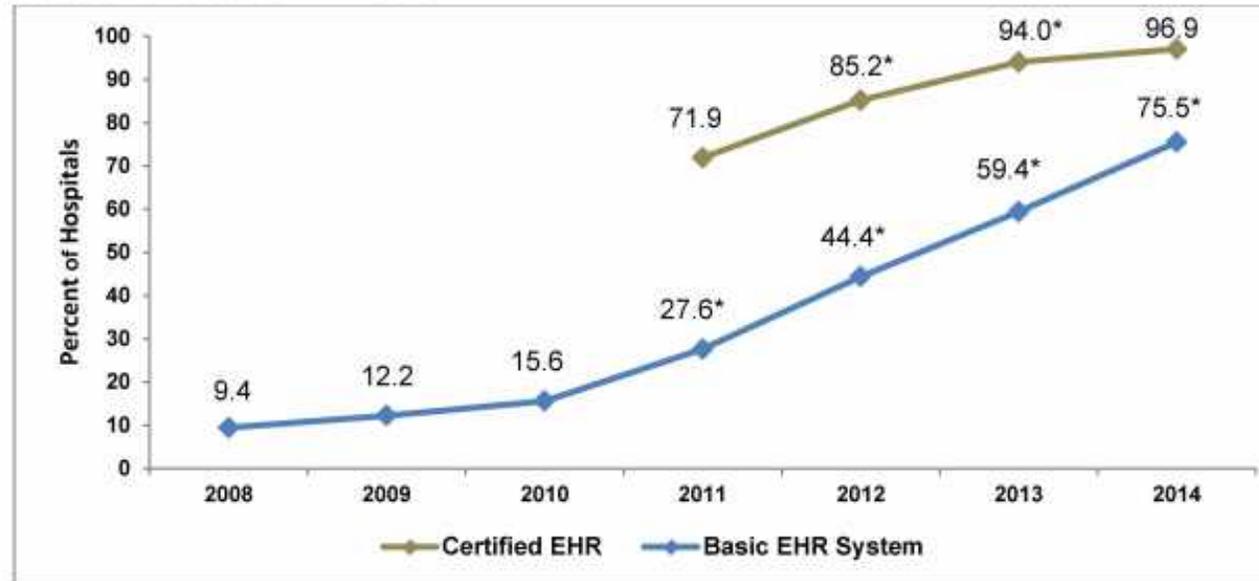
EHR Certification

- Supported Meaningful Use
- Required ability to complete activities with specific standards
 - For instance,
 - e-prescribing according to National Council for Prescription Drug Programs (NCPDP): SCRIPT Standard
 - Diagnoses via ICD-9CM or SNOMED-CT
- Privacy/security
 - For instance,
 - Upon receipt of electronically exchanged health information, verify that information has not been altered.
 - Detect the alteration of audit logs.



Adoption of Certified EHR

Figure 1: Percent of non-Federal acute care hospitals with adoption of at least a Basic EHR with notes system and possession of a certified EHR: 2008-2014



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Meaningful Use

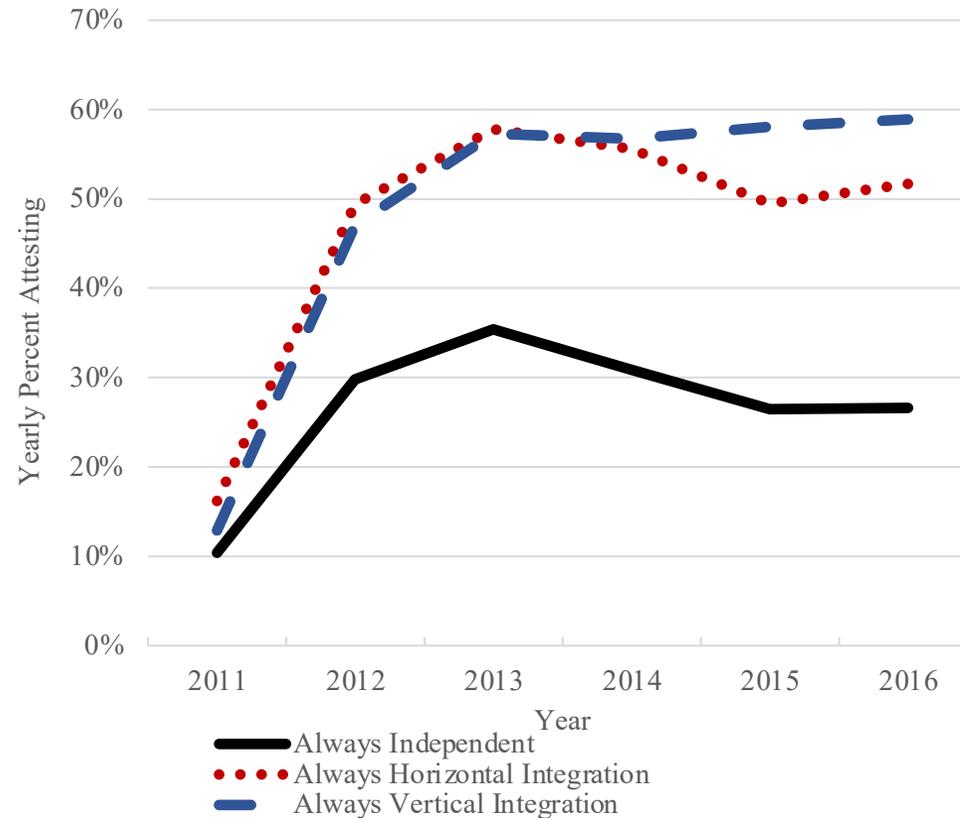
- Required adoption of certified EHR
- Attest to *Use* in specific domains
- Three Stages
 - 2011
 - 2015
 - 2017 (Promoting Interoperability)
- All-or-nothing program
 - In a given year
 - Achieved MU or did not



Meaningful Use Measures

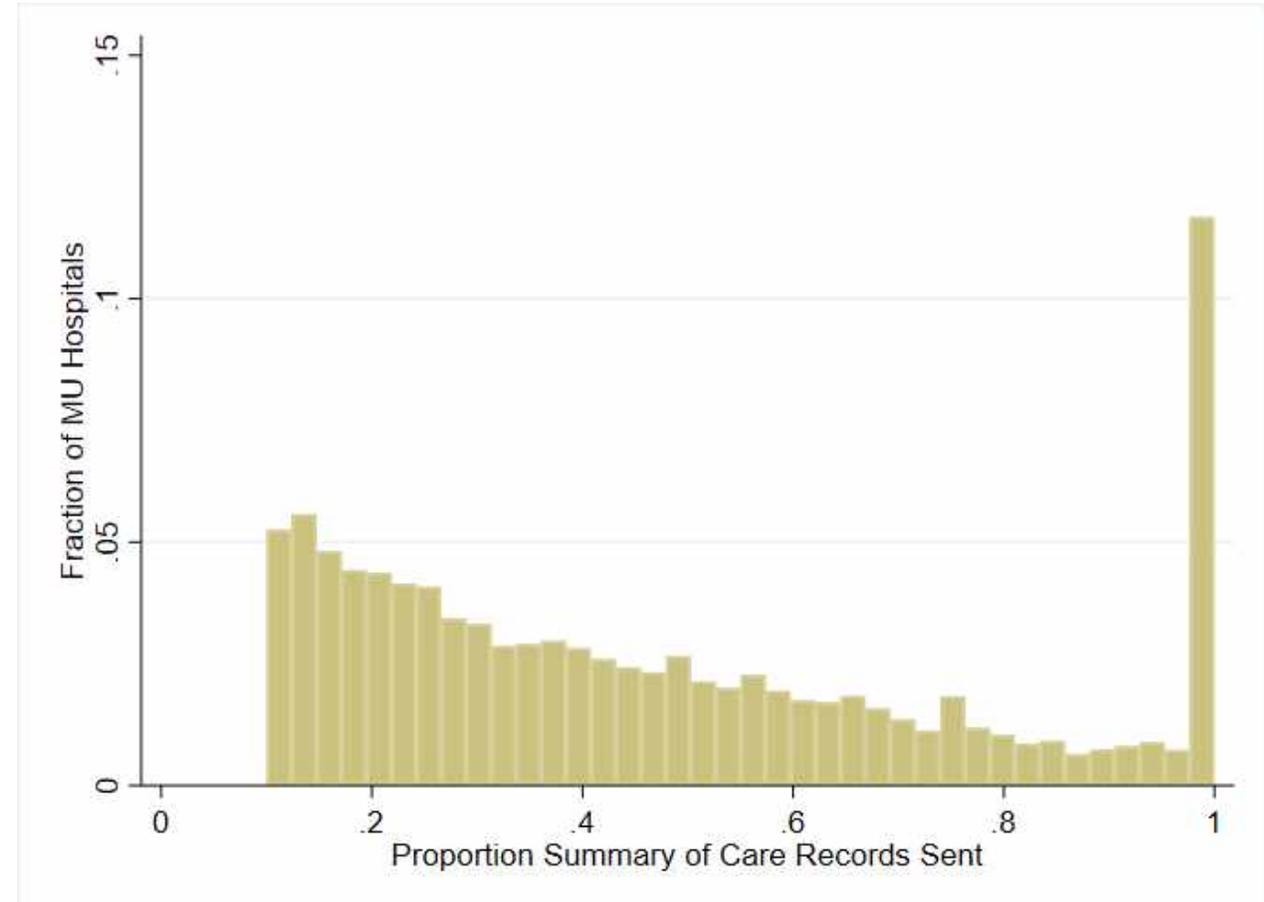
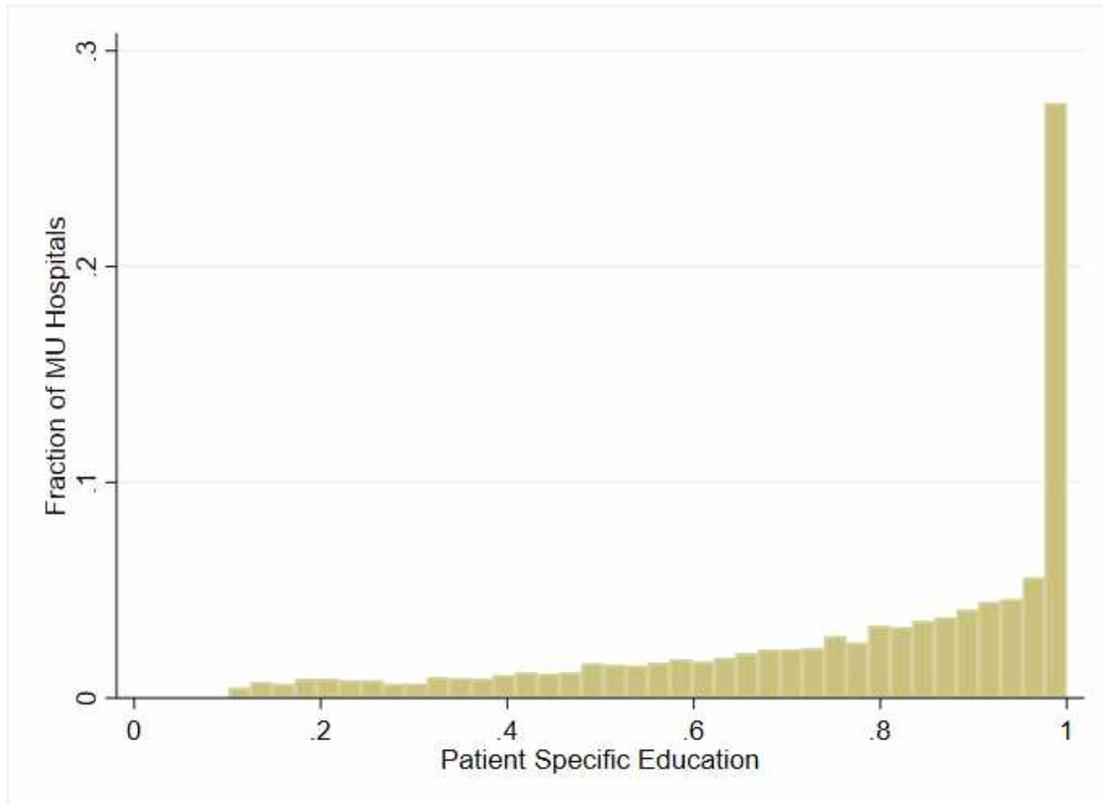
- Hospitals and Physicians attested to specific activity
 - Stage 1 (2011): 10 core objectives, 5 of 10 menu objectives
 - Example: More than 30% of patients have at least one medication entered using computerized provider order entry
 - Stage 2 (2014-2015): increasing use & new requirements
 - More than 60% of medication, 30% of laboratory, and 30% of radiology orders created using CPOE
 - The eligible hospital that transitions or refers their patient to another setting of care provides a summary of care record electronically transmitted to a recipient using CEHRT for 10% of transitions and referrals

Meaningful Use: Changing Criteria



Everson, Jordan, Michael R. Richards, and Melinda B. Buntin. "Horizontal and vertical integration's role in meaningful use attestation over time." *Health services research* 54.5 (2019): 1075-1083.

Meaningful Use Measures



Advancing Care Information/Promoting Interoperability

- Reduced public role in prescribing ‘meaningful’ use
- Restricted focus on market failure: interoperable exchange

PI Measures & Scores

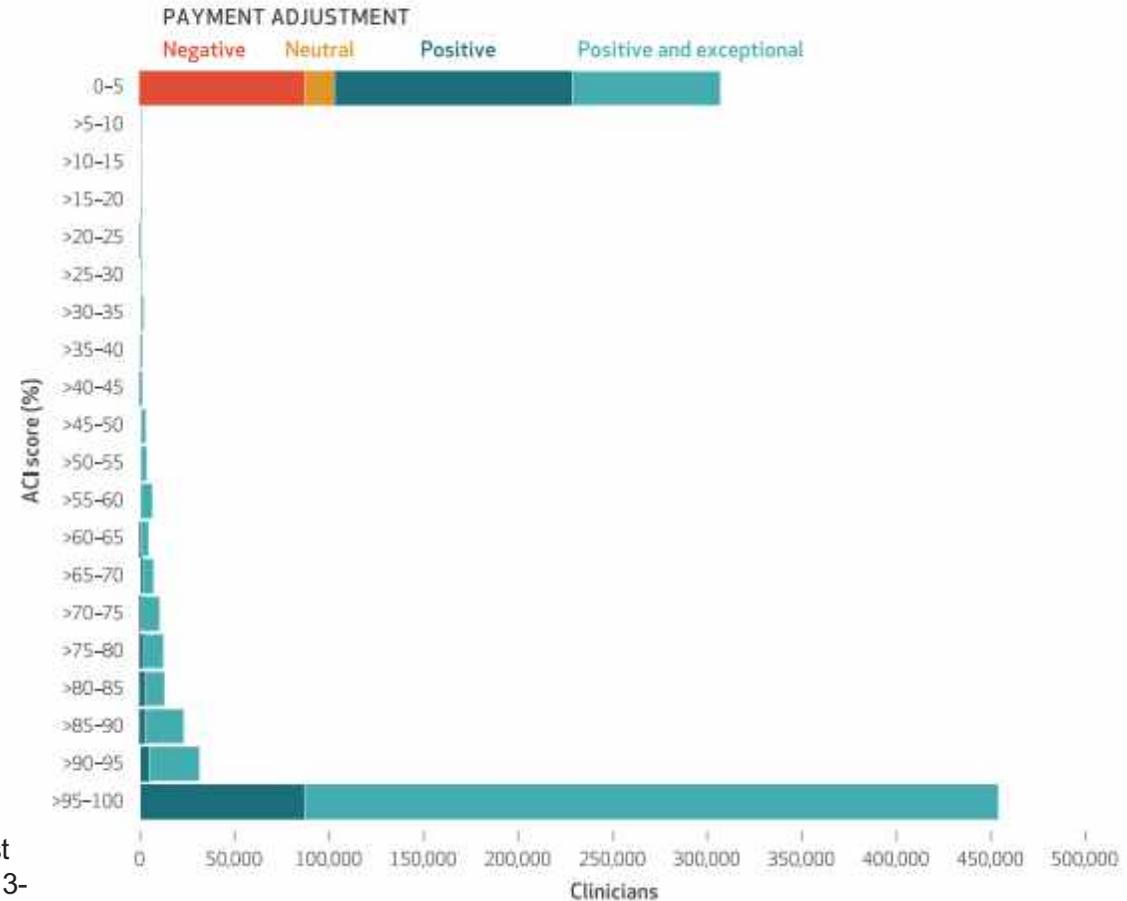
Required Measures for 50% Base Score
Security Risk Analysis
e-Prescribing
Provide Patient Access*
Send a Summary of Care*
Request/Accept Summary Care*

Measures for Performance Score	% Points
Provide Patient Access*	Up to 10%
Send a Summary of Care*	Up to 10%
Request/Accept Summary Care*	Up to 10%
Patient Specific Education	Up to 10%
View, Download or Transmit (VDT)	Up to 10%
Secure Messaging	Up to 10%
Patient-Generated Health Data	Up to 10%
Clinical Information Reconciliation	Up to 10%
One of the Public Health and Clinical Data Registry Reporting Measures	0 or 10%

Advancing Care Information/Promoting Interoperability

EXHIBIT 3

Distribution of advancing care information (ACI) category scores in the Merit-based Incentive Payment System (MIPS), 2017



Apathy, Nate C., and Jordan Everson. "High Rates Of Partial Participation In The First Year Of The Merit-Based Incentive Payment System." *Health Affairs* 39.9 (2020): 1513-1521.

Lessons Learned

Apathy, Nate C., and Jordan Everson. "High Rates Of Partial Participation In The First Year Of The Merit-Based Incentive Payment System." *Health Affairs* 39.9 (2020): 1513-1521.

DEPARTMENT OF HEALTH POLICY

VANDERBILT UNIVERSITY



School of Medicine

Lesson 1: Limitations of categorical measures

- 'Basic' EHR provides evocative case of use of a binary cut-point distorting underlying maturity
- Binary Meaningful Use design did not incentivize further achievement
- Any categorical cut-offs may penalize non-conformers and distort behavior



Lesson 2: Difficulty comparing across provider types

- Comparing rates of 'basic' EHRs led to more generosity to hospitals than physicians in MU
- Physician 'basic' EHR had fewer functions
 - Given measurement error and imperfect correlations between answers, destined to appear more common
- Hospital participation in MU near 100%; physicians near 50%
- Challenge exacerbated in other care settings
 - E.g. nursing facilities, home health



Lesson 3: Use is not linear

- Specifying a use percent to measure maturity may have limited meaning
- Thresholds often arbitrary
- ‘Use’ may be automated
- Generating metrics burdensome

- Carefully consider when measuring use is valuable
- Consider measuring high and low empirically (as well as improvement)



Lesson 4: Difficulty Measuring Clinical Decision Support (CDS)

- High perceived value of CDS
- Extremely varied implementation and use
 - MU Stage 1: 1 CDS rule implemented
 - MU Stage 2: 5 CDS rules implemented
- Difficult to measure how frequently fired, valued by clinicians, or impactful to patients



Lesson 4: Targeted use of certification

- Certification vital to ensure interoperability and data exchange capabilities
 - E.g. Fast Healthcare Interoperability Resource (FHIR), SNOMED-CT/ICD-9CM
- Certification also likely essential for privacy and security concerns
- Useful as signal of trust
- Overly prescriptive certification criteria burdens Health IT vendors

- Avoid conflating vendor capability, implementation and use

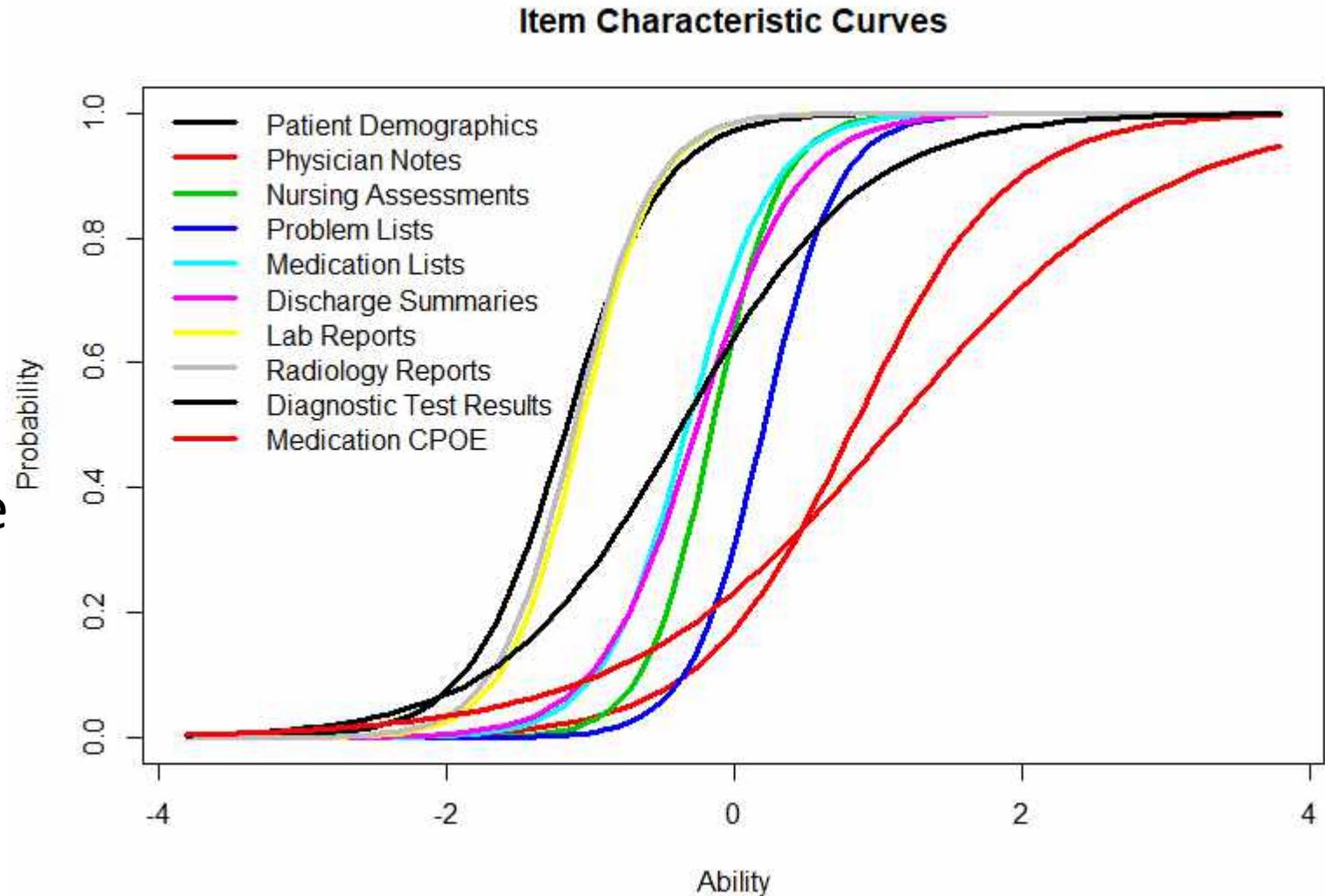


Lesson 5: Value of item response theory

- Classical test theory assumes all items are equally difficult
 - Necessary assumption for a mean of multiple items
- In context of health IT, enormous heterogeneity in difficulty of implementing and using functions
- IRT models take into account this heterogeneity in assessing a subject's underlying ability
 - Varied difficulty of items (probability of answering affirmatively)
 - Varied discrimination of items (frequency of easier items being a 'yes' when target item is a 'yes' and harder items being a 'no' when the targeted item a 'no')

IRT

Varied difficulty (probability of answering 'yes' by ability) and discrimination (slope of curve) of items facilitates more accurate measurement of underlying ability



Lesson 6: Measuring the hard stuff

- Enormous concern about provider dissatisfaction and “burn out” due to EHR
- Late developing measures of ‘workload’ and burnout
 - No national effort
- Limited efforts to measure other ‘hard stuff’
 - Culture, readiness, collaboration, climate, communication, benefit etc.



Thank you!

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Requirements and approaches for a maturity model for the German hospital system: a conceptual overview

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Requirements and approaches for a maturity model for the German hospital system: a conceptual overview

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UMIT Hall i. Tirol, Austria (associated)



HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES



§14b KHZG

What are the basic objectives and guidelines defined by the legislator?

1. **Objective:** The evaluation of effects on digital maturity and patient care
2. **Timeline:** The maturity measurement should take place in mid 2021 and mid 2023
3. **Method:** For the maturity measurement **a new model** is to be developed, which builds on **existing and approved** models
4. **Organization:** The maturity measurement is to be carried out and technically implemented under the leadership of a research institution

*(Freely translated
from the KHZG
including the
explanatory text)*

Six requirements for a successful realization

1. Holistic understanding of digital maturity for measuring effects

- All funded digitalization project (regarding the KHZG)
- Structural, process and outcome quality
- Clinical field of application, information management and organizational context
- Conceptual framework that relates the different HIT quality dimensions and the different levels of consideration
- Dynamic approach so that the current state of developments in HIT and the healthcare system can be considered

	Structure digital capability and availability	Process digital use and benefit optimization	Outcome digital benefits
Organizational context			
Information management			
Clinical field of application			

Six requirements for a successful realization

2. Acceptance through participation, transparency and an optimal cost-benefit ratio

- All relevant actors must be involved
- A comprehensible and easily understandable methodology must be provided
- For the hospitals an optimal cost-benefit ratio must be established by making the data available to IT managers for the locally optimization of the digital maturity

3. International comparability and consideration of different regional and local circumstances

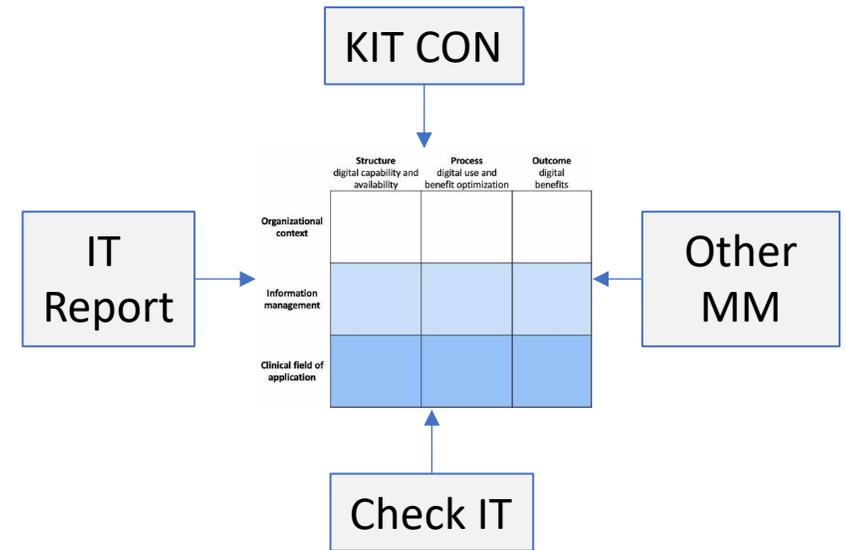
- A configurable set of maturity indicators must be provided
- An adaptive measurement and analysis of the digital maturity must be technically provided



Six requirements for a successful realization

4. Compatibility through criteria-guided selection of existing maturity models

- The identification and selection of approved maturity models must be systematic and based on a criteria-led comparison
- Only those models must be selected that meet as many criteria as possible and that together form an optimal content and methodological basis for the maturity model to be developed
- The consolidation of the identified maturity models must be conducted at the item level and against the background of a conceptual framework by using established mapping standards



Proof of concept through mapping existing maturity models

Six requirements for a successful realization

5. Science-practice dialogue through consortia building

- Besides scientific research institutions, the consortium must involve interest groups of hospitals, hospital (IT) managers, IT users and the health IT industry
- The consortium must utilize international experiences by involving international partners

6. Scalability through long-term technical and organizational institutionalization

- The maturity measurement must be anchored institutionally and technologically beyond the funding period in order to ensure follow-ups in terms of training, expert opinions and recommendations for action
- In perspective, the model must allow a digital maturity measurement for the entire health care system



<https://www.e-vendo.de/verbundgruppen/haendler-netzwerk/>

Current work

- Concept study for the elaboration of solutions for the mentioned requirements
- Workshops and webinars with different actors / interest groups
- Proof of concept for the developed methods (e.g. the mapping of different maturity models)



<http://passion-scent.com/proof-of-concept/>

Thank You!

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Discussion and final remarks