



NATIONAL INSTITUTE FOR HEALTH AND WELFARE

Towards an International Minimum Dataset for Monitoring National Health Information System Implementations

Hannele HYPPÖNEN^a, Elske AMMENWERTH^b, Christian NOHR^c, Arild FAXVAAG^d, Åke WALLDIUS^e

09/09/2011

Presentation name / Author

1

Outline of the workshop

00:00-00:10 Introduction(s)

00:10-00:30 National examples (H. Hyppönen, C. Nohr, Å. Walldius, A. Faxvaag)

00:30-01:15 Group work: indicators/measures for

- 1: monitoring success of HIT construction
- 2: monitoring success of HIT implementation
- 3: monitoring HIT impacts

01:15-01:30 Comparison and potential of the indicators, Future work and conclusions
(Moderator E. Ammenwerth)

NATIONAL INSTITUTE FOR HEALTH AND WELFARE



09/09/2011

Presentation name / Author

2

Introduction(s)

- Differing measures used to monitor eHealth implementations on national level makes it difficult to compare and cumulate results.
 - E.g. Delone & McLean framework for monitoring IS success and the HTA-based IS evaluation model further modified by MAST-project
- This EFMI WG Eval -supported workshop draws from national evaluations in some countries
- The aim is to work towards a minimum international dataset for monitoring eHealth implementations.
- The anticipated outcome is a first draft set of joint research questions (>indicators) and a proposal for measures needed in order for future collaboration.

NATIONAL INSTITUTE FOR HEALTH AND WELFARE



09/09/2011

Presentation name / Author

3

National examples 1: Monitoring impacts of implementation of the NHIS in Finland started by defining the objectives set for the system

Objectives set =>Dimensions for evaluation (in brackets: keywords searched in the bill texts)	Frequency in the bill on ePrescribing	Frequency in the bill on Client Data (eArchive)
1 Statements related to the development process of the NHIS (process requirements, actor network, roles)	14	35
2 Requirements set for the NHIS (requirement, interoperability, security, usability, reliability etc.)	42	124
3 Implementation of NHIS (training, procurement, change management, implementation, support system)	12	11
4 Impacts on service practices (activity, processes, practices, etc.)	57	31
5 Impacts on service quality (information quality, service quality)	24	25
6 Health impacts (Health, welfare)	3	3
7 Economical impacts (economy, costs, savings, productivity)	8	31
8 Secondary Impacts (state authorities, supervision, research etc)	18	11
9 Development of the NSIS (National Social Information system) (Social services)	0	48
10 Future service models (future)	4	3

NATIONAL INSTITUTE FOR HEALTH AND WELFARE



09/09/2011

Presentation name / Author

4

At the same time the technology to be monitored was defined using the HTA framework [2]

1	Who manufactures technology (A0019)?	10	How many people belong to the specific target group (A0007)?
2	What are the technical and functional characteristics of technology (B0001)?	11	What is the phase of technology (design, testing, pilot/experimental, diffusion, routine use), when has it been
3	Are there any special features relevant to this technology (B0006)?	12	What material investments, equipment and special premises are needed to use the technology (B0007-9)?
4	For what purpose (Why) is technology used (B0002)?	13	What kind of records/ registers are needed to monitor the use of technology? (B0010-11)?
5	What are the current "tools" used for this purpose (A0011)?	14	What kind of training is needed for the personnel using or maintaining the technology (B0012-13)?
6	Do other evidence-based alternatives exist? If so, what (A0014)?	15	What kind of training is needed for the patients, their families and for the general public (B0014-15)?
7	Who are the users of the technology and where is it utilized (context of use) (B0004-5)?	16	Are there published guidelines how the condition should be managed (A0012)?
8	How much is the technology being used, are there any restrictions on the use of technology	17	Has the technology been included/ excluded in the benefit basket of any country? Are there differences in coverage
9	Are there variations in use across countries/ regions/settings (A0010)?	18	Does the technology need a license or need certification (C0001)?

NATIONAL INSTITUTE FOR HEALTH AND WELFARE

HTA core model [2] was one model used to define key questions for evaluation

Table 1. Number of topics and issues in the domains (HTA core model [2])

Domain/ Category	Topics	Issues	Issues per Topic
Health problem and current use	6	19	3,17
Description and technical characteristics	3	15	5,00
Safety	7	22	3,14
Effectiveness	4	18	4,50
Costs, economic evaluation	5	6	1,20
Ethical analysis	8	16	2,00
Organisational aspects	8	27	3,38
Social aspects	7	11	1,57
Legal aspects	7	29	4,14
TOTAL	55	163	2,96

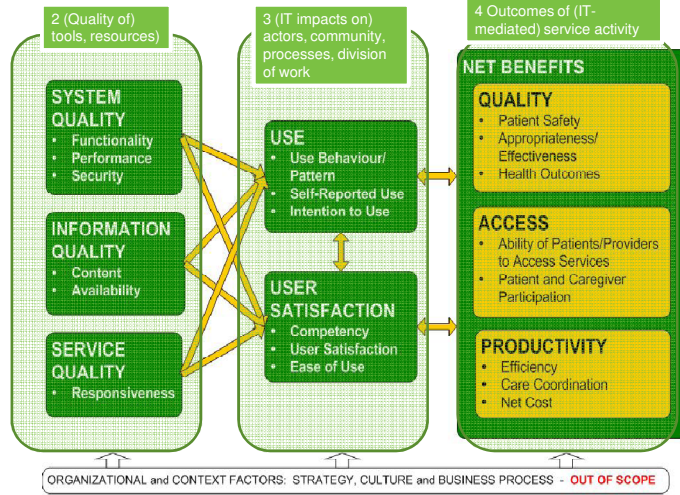
NATIONAL INSTITUTE FOR HEALTH AND WELFARE

09/09/2011

Presentation name / Author

6

Another model used was the Delone & McLean IS success model [3]



Based on the Delone & McLean IS Success Model

NATIONAL INSTITUTE FOR HEALTH AND WELFARE

30/09/2009

H. Hyppönen/ Health Care Information System Course Autumn 2009/ Turku School of Economics

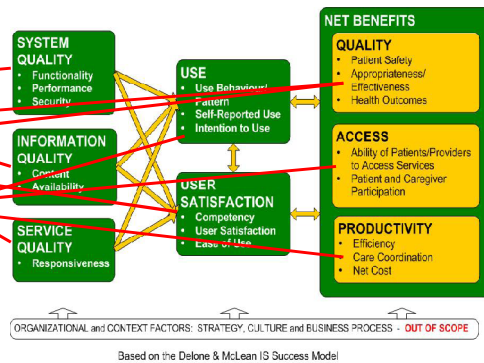
7

There are some overlapping categories. IS success model is stronger in questions for system and information quality and patterns of use, HTA model in defining purpose of use and organisational, social and legal aspects

Table 1. Number of topics and issues in the domains. (HTA model)

	Topics	Issues	Issues per Topic
Health problem and current use	6	19	3,17
Description and technical characteristics	3	15	5,00
Safety	7	22	3,14
Effectiveness	4	18	4,50
Costs, economic evaluation	5	6	1,20
Ethical analysis	8	16	2,00
Organisational aspects	8	27	3,38
Social aspects	7	11	1,57
Legal aspects	7	29	4,14
TOTAL	55	163	2,96

IS success model



Based on the Delone & McLean IS Success Model

NATIONAL INSTITUTE FOR HEALTH AND WELFARE

Exexamples from a national questionnaire: System quality

Information system			A'		B'		C'		D'		
Dimension	Category	Measure	N	Disagree %	Agree %	Disagree %	Agree %	Disagree %	Agree %	Disagree %	Agree %
System quality	Stability [31] Reliability [32][34][17]	The information system I use as a tool in my work are reliable and stable	914	34	55	38	49	18	66	11	77
		Response time [31][34][17] Efficient to use [32]	912	25	58	56	28	22	62	16	77
	Ease of use [31][17]	Compilation of statistics takes too much time	903	25	58	16	67	24	56	13	60
		Fields and functions in windows are logically placed	907	22	60	60	20	30	54	33	62
		Searching, documenting, checking and editing patient information is easy	913	41	36	70	15	46	48	45	36
		The information system tells me clearly what is going on and the outcome (e.g. saving of data)	914	25	55	49	30	38	40	32	45
		Terminology (e.g. headings) is clear and understandable	910	17	65	42	39	14	57	30	61
		The system process model is stiff and does not fit to my work process.	908	29	49	10	76	36	42	24	57
	Easy to learn [32][17]	Performing routine tasks is simple and can be done without too many 'clicks'.	915	39	47	71	16	26	64	32	55
		Information system use logic is easy to learn	914	12	74	56	28	16	60	18	66
		Use of the system does not require long training	915	29	50	62	17	30	46	27	48
	System errors [31] Few errors [32] Error rate [17]	documented data disappears sometimes from the system	912	51	29	53	26	58	28	51	23
Compatibility [32] Integration of systems [17]		It takes too long time to sign in to use the systems	912	20	66	10	81	24	62	2	91
Type of features and level of decision support [34] Usefulness of specific functions, DSS [17]	The systems offer enough reminders, warnings and other decision support.	906	46	30	46	26	30	42	73	9	
	Usefulness of specific functions										

Functions listed in questionnaire, respondents selected best and worst functioning

NATIONAL INSTITUTE FOR HEALTH AND WELFARE

09/09/2011

9

Experienced Service and info quality, user satisfaction

Information system			A'		B'		C'		D'		
Dimension	Domain, Category	Measure	N	Disagree %	Agree %	Disagree %	Agree %	Disagree %	Agree %	Disagree %	Agree %
Service quality	Responsiveness [34], User training, technical support [34]	I get enough help in problems related to information systems use	912	23	55	34	44	28	66	16	63
		Big portion of my working time is spent solving the problems with information technology	911	40	33	27	48	56	24	30	52
Information quality	Availability [33], Accessibility (distance, availability)[34][17]	Radiology results are easily available	907	28	63	34	52	24	53	28	56
		Information about medication prescribed in other organizations is easily available	902	83	6	92	4	86	8	86	7
		Accessing patient information from other organizations takes too much time	905	22	67	12	82	14	84	16	82
	Content quality [33], Completeness, accuracy, relevance, comprehension, consistency [34][17], precision, currency, timeliness, reliability, completeness, format [17]	Laboratory results are presented in a logical format	908	22	66	20	66	36	54	34	57
		Patient data (also from other organizations) is comprehensive, timely and reliable	901	40	37	59	19	52	28	50	20
		Information system provides a summary view about the situation of the patient	559	70	15	82	8	50	32	60	27
		Nursing record content is easy to read	888	39	43	63	24	38	44	48	41
Patient's medication list is clearly presented	897	58	27	57	28	42	52	35	49		
User satisfaction	Satisfaction [34]	School grade given to the Information system (scale: 4-10), relative amount of A's (9-10 = excellent) and D's (4-5 = poor)		7,1		6,2		6,9		6,9	

NATIONAL INSTITUTE FOR HEALTH AND WELFARE

09/09/2011

10

Experienced Net benefits/ impacts

Information system			A'		B'		C'		D'		
Dimension	Domain, Category	Measure	N	Disagree %	Agree %	Disagree %	Agree %	Disagree %	Agree %	Disagree %	Agree %
Net benefits/ outcomes	Productivity: Efficiency of care (resource utilization, output improvements, management improvements, effects on patient flow [34])	The information systems help reduce duplicate tests.	911	50	37	49	38	37	47	57	32
	Quality of care [34]: Appropriateness effectiveness (Adherence to guidelines, continuity of care [34] Health outcomes [34])	Information systems help to achieve continuity of care	914	26	49	31	43	28	48	32	43
		Information systems help improve health outcomes	910	25	40	34	32	22	54	30	48
	Quality of care [34]: Patient safety (preventable adverse events, near errors, reduction in patient risks [34])	The system has caused or nearly caused a serious adverse event to a patient	902	45	25	39	32	48	30	31	36
		The information systems help prevent medication errors	905	39	44	32	48	25	67	70	18
	Care coordination (doctor-nurses) [34]	The system monitors reception of orders I have given to nurses.	533	81	5	74	4	63	13	79	8
		System supports flow of information between doctors and nurses	908	17	62	25	50	14	66	23	56
	Care coordination (doctor-doctor within organisation) [34]	System supports flow of information between doctors in same organisation	916	10	75	19	63	14	74	11	73
	Care coordination (doctor-doctor between organizations) [34]	System supports flow of information between doctors in different organizations	910	62	19	78	8	60	20	77	14
	Care coordination (doctor-patients) [34]	System supports flow of information between doctors and patients	897	59	10	61	7	58	12	62	5
	Patient-centeredness of care	The information systems use requires too much attention away from the patient	913	24	62	14	73	36	52	18	77
	Support for development of own work[31]	The information systems support development of my work	906	46	25	65	13	37	37	49	23

NATIONAL INSTITUTE FOR HEALTH AND WELFARE

09/09/2011

11

Organizing for Group work

- What are the main domains/ topics/ questions that should be answered for all HIT-projects?
 - At baseline
 - During development
 - During implementation
 - After implementation
- What national and international indicators are there already?
- How should the development of international minimum data for HIT evaluation be organised?

6.1 INTEROPERABLE ELECTRONIC HEALTH RECORD PROGRAM INDICATORS SUMMARY

Category & Sub - category	Study Question	Indicator	Measures
Quality			
Change in health system outcomes	Does use of the iEHR reduce hospital readmission rates after discharge?	Readmission rates	- Hospital readmission rates within 30 days after discharge using the Discharge Abstract Database
Change in health outcomes	Does the iEHR improve chronic disease management?	Chronic disease management	- Chronic disease performance measures in patients with asthma, diabetes, heart failure, and hypertension - Qualitative data from focus group sessions - Survey data
Productivity			
Change in provider efficiency	Does the iEHR improve the productivity and efficiency of the emergency department (ED)?	Provider efficiency and effectiveness in emergency departments	- Time-motion studies with direct observation of providers in the ED - Timers and/or other recording devices given to patients to track time in ED from time they arrive in the ED to time they are discharged - Qualitative data from focus group sessions with providers - Number of lab and imaging tests ordered in the ED

NATIONAL INSTITUTE FOR HEALTH AND WELFARE

09/09/2011

Presentation name / Author

12

- Criteria for selecting domains/categories/indicators [3]
 - **Importance:** the indicator reflects aspects of health system functioning that matter to users and are high in strategic priority
 - **Relevance:** the indicator advances understanding of health system and health of population and can be used to measure system performance over an extended period of time
 - **Feasibility:** Data required for the indicator are readily available
 - **Reliability:** The indicator produces consistent results in repeated measurements of the same condition/ event
 - **Validity:** There is consensus of users and experts that the indicator is related to the dimension it is supposed to assess (face validity), covers the whole dimension (content validity), is related to other indicators measuring the same dimension (construct validity) and has predictive power (criterion validity)



Future work and conclusions

- All material presented at the workshop, analysis of the workshop results and future steps will be presented in a virtual collaborative workspace
<http://issuccess.pbworks.com/>
- All interested parties can get access to workspace. Access requires e-mail invitation from founder of workspace – send request to Hannele Hyppönen (hannele.hypponen@thl.fi)
- FP7 call: an option to get funding for the work?
<http://ec.europa.eu/research/participants/portal/page/operation?callIdentifier=FP7-HEALTH-2012-INNOVATION-1> Health 2012.3.2-2 New methodologies for health technology assessment



- **HEALTH.2012.3.2-2: FP7- HEALTH-2012-INNOVATION-1. Health Technology Assessment (HTA)** is intended to provide a bridge between the world of research and the world of decision-making by providing relevant information about the medical, social, economic, legal and ethical issues related to the use of health technology. This should be achieved in a systematic, transparent, unbiased and robust manner, also highlighted by the European network for Health Technology Assessment
 - EUnetHTA JA is a joint action funded under the EC's 2nd Community Programme of public health in response to the 2009 call - <http://www.eunetha.net/Public/Home/>.
- Research under this call should develop new and /or improved methodologies for HTA that address the present challenges affecting the current methodological framework regarding complexity, efficacy and effectiveness. Proposals should address one or more elements of the following areas:

NATIONAL INSTITUTE FOR HEALTH AND WELFARE



09/09/2011

Presentation name / Author

15

- HTA methodologies should be broadened to expand further the spectrum and complexity of technologies assessed. For example complex interventions consisting of a wide spectrum of technologies and multidisciplinary delivery modes should be addressed, such as personalised medicines, public health interventions, organisational interventions and **information and communication technologies related to health**. Other challenges to be addressed could include the need for the continuous assessment of health technologies throughout their life cycles, the integration of social, organisational, ethical and legal aspects, assessment of relative effectiveness and to evaluate their implementation into health service provision.
- Research for example could address the real need to complement those efforts already undertaken by the Member States' network of HTA organisations (EUnetHTA JA) as regards the development of HTA methodologies to assess, for example, the efficacy and effectiveness of technologies. The applicability of these technologies into broader clinical contexts requires a better understanding of their use. In addition, there is a need to strengthen HTAs so that they may be used in very specific and particular circumstances, such as in hospital settings - mini-HTAs, where very local contextual organisational considerations have to be taken into account. Non-exhaustive examples would include: advanced therapies, diagnostics, medical devices, personalised medicines, transfusion and transplantation, **health-related information and communication technologies**.

NATIONAL INSTITUTE FOR HEALTH AND WELFARE



09/09/2011

Presentation name / Author

16

References

1. H.Hypponen."eHealth Services and Technology: Challenges for Co-Development". Human Technology, Vol. 3, Nr 2, May 2007, pp. 188-213.
2. K. Lampe and M. Mäkelä(eds.). "HTA Core Model for medical and surgical interventions". First Public Draft (Revised) p.EUnetHTA: Work Package 4, 2007. available at: http://www.eunetha.net/upload/WP4/EUnetHTA_WP4_CoreModelforInterventions_FirstPublicDraftRevised-2007-07-11.pdf. Accessed Aug.17.2009
3. Canada Health Infoway Benefits evaluation indicators Technical report version 1.0, September 2006



NATIONAL INSTITUTE FOR HEALTH AND WELFARE

09/09/2011

Presentation name / Author

17