Scope of E-Health Research in Implementation of E-Health Project

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1. INTRODUCTION

Significant investment in e-Health solutions is being made in nearly every country of the world. How do authors know that these investments and the foregone opportunity costs are the correct ones? Absent, poor or vague e-Health strategy is a significant barrier to effective investment in, and implementation. Strategy is the driving force, the first essential ingredient that can place countries in charge of their own e-Health destiny and inform them of the policy necessary to achieve it. In the last two years, there has been renewed interest in e-Health strategy from the World Health Organization (WHO), International Telecommunications Union (ITU), Pan American Health Organization (PAHO), the African Union, and the Commonwealth; yet overall, the literature lacks clear guidance to inform countries why and how to develop their sustainable e-Health solutions and establishment of an e-Health favourable policy environment but locally specific e-Health strategy. To address this gap, this paper further elaborates an e-Health Strategy Development Framework, basing it upon a conceptual framework and relevant theories of strategy and complex system analysis available from other literatures. The author presents here the principles of research and development, scope of new research in e-health and stakeholders hierarchy based on the conceptual map of e-health research.

Objective:
1. The objective is to review relevant literatures related to conceptual map of e-health research.
2. To elaborate the principles of research and development of e-health research.
3. To elaborate the scope of new research using process of information using information, controlling information processing, information sharing information.
4. To explore the layers of stakeholders and their recommendation in improved health care of public, the responsibility, reliability, regulation, confidentiality, security, ownership, accessibility of stakeholder and process that support effective use of e-health.

Methodology:
1. The author searched using e-health, scope of e-health, principles of research & development, stakeholder, stakeholders’ consultation and hierarchy in the internet.
2. Reviewed 6 no of research papers on scope and policy of e-health and implementation e-health project and other articles and definitions published in internet and cited the relevant part in this paper.

2. LITERATURE REVIEW

Ray Jones and his team in their research paper “What Is e-Health (5): A Research Agenda for e-Health Through Stakeholder Consultation and Policy Context Review” studied the basics of e-health, study design, the parallel methods of stakeholders consultation and policy review, policy context, synthesis and conceptual mapping, study of principles of research and development of e-health research. According to them there are basically 12 groups of stakeholders i.e NHS e-Health innovators and implementers, University researchers in health informatics, NHS staff in primary care, NHS staff in secondary care, NHS primary care trust managerial staff, NHS acute trust managerial staff, Suppliers of ICT to the NHS, Professional organizations and royal colleges, Informatics trainers, Governance and other
regulators, Charities and other information providers, Other NHS managers. The researcher group followed 2 parallel strand method and they conducted many focus group interviews where 37 health professionals representing the above mentioned 12 stakeholders group. 15 themes were developed using content theme analysis and level hierarchy of themes developed. Parallely, they developed a “schema” for interviewing 26 policy makers and 95 documents reviewed. 32 recommendations developed and taking the view of stakeholders all the themes regrouped in to six themes which reformulated in to conceptual map of e-health research. The research concludes as follows: The scope of e-Health research (using, processing, sharing, controlling information) derived empirically from this study corresponds with “textbook” descriptions of informatics. Stakeholders would like e-Health research to include outcomes such as improved health or quality of life, but such research may be long term while changes in information technology are rapid. Longer-term research questions need to be concerned with human behaviour and our use of information, rather than particular technologies. In some cases, “modelling” longer-term costs and benefits (in terms of health) may be desirable.

Nicole Denjoy in his “e-health stakeholder group report on perspectives and recommendations on interoperability” Final version March 2014...elaborated the goals of report, the potential of e-health, main obstacles to the project, analysis of the landscape, status of e-health in Europe, standard choices in Europe, status at International level, experiences at National level and concluded the report in six no of recommendations. The stakeholder group suggested six recommendations which are as follows: focusing on priority use cases, clarifying privacy and data protection requirements, fostering the use of International standards and market focused profiles, educating local level on e-health interoperability, address semantic interoperability, investigating the particular interoperability requirements of mobile health, big data and online social networks. Again the report highlighted the potential of e-health such as easier and faster access to patient’s information, better diagnosis, better quality of treatment, better patient safety, improved cost effectiveness, increased consumer choice and enhanced competition. The main obstacles in wider spreading of e-health are organizational structure of healthcare, the recognition and adoption of standards for interoperability, the regulation and adoption of standards for interoperability, the regulation and policy framework, the awareness and attitude of people towards ICT and interoperability, the economics of interoperability, the privacy and security concerns. The analysis of landscape concludes in to 4 type of interoperability i.e. legal, organizational, semantic and technical.

Gunter Eysenbach.. the Monitoring editor & his team elaborated in their research paper “Scope of Policy Issues in e-Health: Results From a Structured Literature Review” e-health policy as e-Health policy can be defined as “a set of statements, directives, regulations, laws, and judicial interpretations that direct and manage the life cycle of e-Health”. The objective of this study was to conduct a detailed review of the literature to determine the scope of policy issues faced by individuals, institutions, or governments in implementing e-Health programs. The study does not recommend any policies or suggest the importance of any of the policy issues over the others. They conducted a structured review of both peer-reviewed and gray literature. The search was conducted using the keywords e-Health, tele-health, telemedicine, health informatics, electronic health records, health telematics, guidelines, policies, rules, and plans. They extracted 99 policy issues related to e-Health from the literature. These issues were grouped under 9 themes on the basis of similarities in their application. They identified the following themes for e-Health policies: (1) networked care, (2) inter-jurisdictional practice, (3) diffusion of e-Health/digital divide, (4) e-Health integration with existing systems, (5) response to new initiatives, (6) goal-setting for e-Health policy, (7) evaluation and research, (8) investment, and (9) ethics in e-Health. e-Health policy issues were also divided on the basis of the levels where policies should be developed to deal with a particular issue. The levels identified for the policy development were global, jurisdictional (national or provincial/sub-national), and individual institutions. We used the following operational definitions for these levels: (a) global: this level deals with the policies of global complementarity, such as standardization and inter-jurisdictional care, (b) jurisdictional (national and provincial/sub-national): this level deals with the policies required to facilitate care within a health jurisdiction—that is, national or provincial/subnational governments, and (c) individual Institutions: this level deals with the policies required to facilitate e-Health at the local level—that is, individual institution or practice.

Claudia Paligiari the prime researcher and her team in What Is e-Health (4): A Scoping Exercise to Map the Field described that the application of information and communications technology (ICT) in health care has grown exponentially over the last 15 years and its potential to improve effectiveness and efficiency has been recognized by governments worldwide. They have followed 4 methods in the research: i. Assessing the Taxonomic Structure of Research Databases and the Presence of e-Health, ii. Exploring the Composition of the Medical Informatics Literature Using the Existing MeSH Thesaurus, iii. Using e-Health as a Search Term, iv. Profiling the Literature From Wider Web-Based Sources, v. Aggregating and Analyzing Definitions of e-Health. The research resulted in following components: The first method concluded that the Medline MeSH structure for Medical Informatics contains 3 main sub-branches: Public Health Informatics, Medical Informatics Computing, and Medical Informatics Applications. Examining the definitions of these and their lower order MeSH descriptors indicates that the Medical Informatics Applications tree encompasses the greatest number of component categories relevant to e-Health, taken broadly as the use of information and communication technologies to facilitate health care. Their analysis suggests that there is significant variability in the scope and focus of existing definitions of e-Health both within the research literature and relevant sources on the World Wide Web. In terms of its functional scope, most definitions conceptualize e-Health as a broad range of medical informatics applications for facilitating the management and delivery of health care. Purported applications include dissemination of health-related information, storage and exchange of clinical data, interprofessional communication, computer-based support, patient-provider interaction and service delivery, education, health service management, health communities, and telemedicine, among others. The majority of definitions (n=24) specify the use of networked information and communications technologies, primarily the Internet, and digital data, thus differentiating e-Health from the broader field of medical informatics, which incorporates “harder” technologies, such as scanning equipment, and bioinformatics.
research which tends to take place in isolation and is less directly applicable to health care service delivery.

3. PRINCIPLES OF E-HEALTH STRATEGY DEVELOPMENT

Principle 1: Simplify Complex Contexts
Experience gleaned from the literature shows the process of integrating e-Health as a routine health care tool faces many challenges, is very complex, and requires significant time. However, by establishing a sound and evidence-based e-Health strategy, it is possible to reduce the impact of such realities. The process is most effective when undertaken by a local (institutional, regional, country) team, as it builds local capacity, is designed by those most intimately knowledgeable about the setting, and establishes pride and commitment of ownership for the undertaking and product.

Principle 2: A Pragmatic Approach Is Best
The goal of the strategy is to find an optimal solution to the most pressing (existing or anticipated) health-related problems. In other words; the approach is very focused, very health or health care “needs-based”, and strongly “evidence-informed”, but not overly researched (see Step 1 in the Process section below). This requires an understanding of pressing health care needs and alignment with, or creation of, a clear e-Health strategy to address them.

Principle 3: Spread the Cost
Networking provides opportunities to spread the cost of infrastructure and “info structure” development between the government, business, agriculture, education, and health sectors. For example, the ICT network supports all these sectors, not just one, and therefore the cost burden should not be borne by just one sector.

Principle 4: Balance Which e-Health Components Are Applied
Four primary components of e-Health exist (1) health informatics (collection, analysis, and distribution of health related data; eg, electronic records, surveillance), (2) tele-health (direct or indirect interaction with other health care providers, ill patients, or well citizens, eg, tele-consultation; social networking), (3) e-learning (use of ICT to provide teaching and education opportunities to health care providers and citizens), and (4) e-commerce (related to the business side of health care, eg, electronic reimbursement). Solutions to specific health issues may require a predominance of one component over others, but it is likely any sustainable and comprehensive solution will require elements of each.

Principle 5: e-Health Solutions Must Be Right for the Setting
e-Health solutions that are identified for implementation should be technologically appropriate and culturally sensitive. Appropriate technology can be defined as the most benign technological solution that achieves the desired purpose within the confines of current social, cultural, environmental, and economic conditions of the setting in which it is to be applied and that promotes self-sufficiency on the part of those using it in that setting. Described in this fashion, an appropriate technology would typically be simple to adopt and require fewer resources to operate and maintain (making it more likely to be sustainable and environmentally friendly). Cultural sensitivity requires solutions to respect local traditions, expectations of the health care system, beliefs about health and disease, and patterns of usage of available health care services. Ignoring local health culture, such as traditional medicines or influential shamans, may undermine efforts to introduce e-Health initiatives. Or insufficient local resources may lead to abuse of modern medicines, such as using reduced doses of antibiotics, which may permit development of resistant strains capable of global spread. Solid experience and knowledge of cultural limitations must guide the design and implementation of e-Health solutions.

Principle 6: Provide Long-Term Focus
A clear, broadly accepted vision is required to guide the process, and garner sustained support from diverse stakeholders (eg, “e-Health facilitated health care by 2020”; “Integrated e-Health-care in 5 years”).

Principle 7: Provide Medium-Term Targets
Enunciating a specific goal that people can embrace helps build and maintain momentum, for example, “To establish a needs-based, evidence informed, and national 5-year e-Health strategic plan that adopts technologically appropriate and culturally sensitive e-Health solutions and guides e-Health policy development”.

CONCEPTUAL MAP OF E-HEALTH RESEARCH

The researcher Ray Jones, Ray Rogers in their research paper “E-health stakeholder consultation and policy context review” August 2004 edition has elaborated the 4 process of information as stated below:

i. Using information- Information is used in decision support and the organisation of services as well as for reassurance of professionals and patients, and in therapy (such as cognitive behavioural therapy). A number of research recommendations arising from the policy context review concerned use of information in decision support.

ii. Sharing information- Both policy context review and stakeholders identified sharing information as having a large number of research questions including both how information should be shared across sites (including hospital to home), across sectors (for example, between social services and NHS) or between different professional (and patient) groups (for example, between doctors, nurses, dentists, patients).

iii. Controlling information - This is the group of concerns ranked second by stakeholders. It is slightly “wider” than control, incorporating issues of accessibility as well as reliability, confidentiality, security, ownership and regulation, but we have yet to find a better term.

iv. Processing information- This covers a wide range of topics from how best to present information (should it be tailored?), to where to present it (should it be ‘pushed’ to the user, or should it wait until the user ‘pulls’ it?), to how best to integrate information from a variety of sources and what services are required (for example, in electronic ordering and home delivery of medicines).

The Researchers have defined the aim of research in the same review paper as the method in which measurable and testable data can generated for accumulation of knowledge. They have elaborated the aim in general which is going to help the e-Health research are as below:

General Aim:

1. Informatics training for health professionals, identification and exploration of examples of best practice to see how these can be disseminated to achieve improved health
care, exploration of the attitudes of health professionals toward such training and use of the skills acquired in practice
2. Working practices in other sectors (eg. e-business) to identify best practice and barriers to similar uses of ICT in the health sector
3. Web-based services for citizens in public healthcare sectors to see what lessons can be learnt on when to implement e-Health solutions for patients
4. Research on telemedicine (eg, using coronary heart disease or cancer services) and barriers to its implementation
5. The costs and benefits (including improved patient safety) of hospital systems that combine e-prescribing, order entry, decision support, bar coding for medication management, and robotic dispensing
6. E-Health procedures that aim to safeguard confidentiality of patient data and disseminate best practice
7. Assessment of the experience of Odisha citizens accessing health care in other states (and vice versa) and identification of where health and other outcomes could be improved through the use of ICT.

4 Research Aims (Information used)
1. To assess clinicians’ and patients’ perceptions of the benefits and barriers to using decision support tools—in particular, to compare clinicians who use decision support tools with clinicians who do not
2. To assess the quality of information available from repositories of health data and to assess how it can be legally, ethically, and cost-effectively aggregated for public health policy and decision support
3. To explore the costs and potential benefits of birth to death records in relation to decision making and other aspects of health care and to identify policy changes required to achieve them
4. To review decision support and expert systems used in the e-health to ascertain their impact on patient services.

13 Research aims (Information shared)
1. To examine how the NRHM can work with other information and education providers to facilitate patient involvement in e-Health
2. To explore patient attitudes toward initiatives of patient involvement in e-Health
3. To identify the extent to which implanted or wearable technology removes patients’ control of their condition and to identify how ICT may best be used to encourage and facilitate patients to take responsibility for their health
4. To investigate the extent to which recently introduced information technology–based systems (such as e-registration) increase patient expectations and consequently decrease satisfaction if those expectations are not met
5. To investigate the efficacy of developing a code of collaboration under which organizations can explicitly share data and input to health records consistently, unambiguously, and sensitively
6. To determine how we can best deal with combining multiple sources of data, dealing with apparently conflicting information from different sources, with minimum patient risk, minimum cost, and patient consent and confidence
7. To examine the costs and benefits of cross-sectoral records and patient safety issues associated with cross-sectoral working
8. To investigate how ICT can best contribute to clinical services by sharing data between the referral hospital and patient
9. To investigate the potential of e-Health to enable effective interfaces, for example, between health and social care, local specialists and specialist services, care givers and professionals
10. To investigate the costs and benefits of using different technologies to support community-based staff (eg, teleconferencing in maternal care)
11. To explore the changes in work patterns, the potential for patient involvement, and legal issues in tele-consultation (eg, for obstetric and surgical cases)
12. To investigate ICT use in multisite work in relation to such issues as culture change, governance, health professional training, patient expectations, and changes to health outcomes
13. To determine the costs and benefits of the use of health data cards

5 Research aims (Information processed)
1. To identify what extent health information should be tailored to the needs of certain groups of patients, professionals, or individuals
2. To examine the costs and benefits of providing information in different locations (eg, mobile versus static for professionals, NHS versus home for patients)
3. To investigate how information can be better integrated so that patients can, for example, access their own medical record on the Web, obtain relevant and validated information about it, and order a prescription
4. To identify instances or circumstances when patients want to enquire about health information through known professionals (eg, family doctor) and when they want to use an anonymous source
5. To identify how e-Health technologies can enable or improve family support for seriously ill mother and children and provide just-in-time information tailored to individuals

10 Research aims to the way information is controlled
1. To investigate how health professionals and patients discriminate between reliable and unreliable information
2. To examine the circumstances in which regulation of information provision and use is necessary and, further, when education and empowerment of professionals is a more effective option—additionally, what are health professional and patient attitudes toward the regulation of health information.
3. To investigate the extent to which health professionals are able to advise the patients using the domain knowledge.
4. To determine the site of responsibility if health care errors are made as a result of information transfer
5. To explore how social organization and different technologies can be used to help prevent inequity of access to information for both patients and professionals, and to identify initiatives whereby groups traditionally considered to have restricted access have successfully achieved training and access to new technologies
6. To explore health professional and patient attitudes toward ownership and sharing of data
7. To develop and test guidance on regulation and responsibility
8. To examine the costs and benefits of different ways of addressing equity to inform citizens
9. To investigate ways (quality marks, portals, patient and health professional training) to assist the public in obtaining quality information from the e-health in public health care sector.
To investigate patients’ knowledge and views on confidentiality and their attitudes as to how their data should be used (eg, in e-diagnosis) in terms of potential benefits to health and quality of life.

1. **e-Health strategy in political and policy context**

A desire exists to believe policy making is rational and based upon best available empirical evidence. Marmot noted that the “evidence-based” movement attempted to influence the political/policy context to create more of an “evidence-based policy making” process, as opposed to making the evidence fit the political/policy context (termed “policy-based evidence making”). Within that frame, a very linear process was perceived: A policy issue would be identified, the scientist would gather the evidence, KT (knowledge transfer/translation) would ensure the evidence got to those who needed it, and decision-makers would inevitably make evidence-based decisions.

**Invoking “Strategy and complex System Analysis**

1. **Strategy**

Boisot has presented a typology that describes four different kinds of approach to strategy determined by the level of “turbulence” and “understandability” of the setting. According to Boisot, *intrapreneurship* is a state of great unpredictability and flux where entities respond as best they can under the chaotic circumstances surrounding them; *emergent strategy* is the product of “top down” and “bottom up” approaches which emerge incrementally over time without focussed effort; and *strategic intent* is an intuitively clear direction that can be pursued despite the turbulence present and that permits activities to be aligned with a common purpose. Finally *strategic planning* is viewed as formal consideration of a future course and has value in forcing consideration of two primary factors—the country’s setting, and the inherent uncertainty surrounding e-Health. Finally, *strategic planning* is viewed as formal consideration of a future course and has value in forcing consideration of two primary factors—the country’s setting, and the inherent uncertainty surrounding e-Health. In this way, the strategic planning process matches appropriate activities to the evolving e-Health environment. e-Health is recognized to be a constantly evolving field, but the turbulence that existed in the early days has passed. Similarly, sufficient research and application has taken place that sound lessons and good “understand ability” exists of where and how to apply e-Health. Thus, within Boisot’s typology, “strategic planning” lies at the intersection of high understand ability and low environmental turbulence and is the appropriate strategic option to pursue.

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<th>Biosot’s Strategy Model</th>
<th>Understandability of Environment</th>
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<td>High Level of Environmental Turbulence</td>
<td>Intra-prenuership</td>
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<td>Low Level of Environmental Turbulence</td>
<td>Emergency Strategy</td>
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2. **Complex System Analysis**

Situation awareness arises when elements within the immediate setting are clearly perceived with respect to time and/or space, their meaning is comprehended, and projections are made of their status within the setting after some variable has changed (eg, time, speed, direction). It is an accepted tool for critical decision making in complex, dynamic areas, since current awareness determines what issue(s) are addressed next as well as interpretation of the information perceived. The process by which this is done is termed “situation assessment” (sometimes “situational assessment”) and is a form of tactical analysis that can be related to strategic and scientific analysis as seen in table below.

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<tr>
<th>Process</th>
<th>Output</th>
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<td>Situation Assessment</td>
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<td>Sense Making</td>
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4. **STAKEHOLDERS HEIRARCHY & RECOMMENDATION**

1. **Technology meeting needs and improving health and quality of life**

i. To review the costs and benefits of a range of recent e-health applications, including the modelling of new forms of care made possible by information and communication technology (ICT) support.

ii. Further, to present those examples of e-health applications shown to have a demonstrable effect on improved health and quality of life to professional and public stakeholders to obtain their views as to the nature of the most appropriate investment in e-health.

ii. To examine the circumstances in which regulation of information provision and use is necessary and further when education and empowerment of professionals or patients is a more effective option. Additionally, what are health professional and patient attitudes towards the regulation of health information?

iii. To investigate the extent to which health professionals advise patients as to reliable sources of information on the Internet, television and other media.

2. **Reliability, Regulation, Accessibility, Confidentiality, security, ownership Responsibility**

i. To investigate how health professionals and patients discriminate between reliable and unreliable health-related information.

ii. To examine the circumstances in which regulation of information provision and use is necessary and further when education and empowerment of professionals or patients is a more effective option. Additionally, what are health professional and patient attitudes towards the regulation of health information?
iv. Further, to examine the level of preparation and support health professionals require to provide such advice and, additionally, patients’ expectations of this advice.

v. To determine the subject of responsibility if health-care errors are made as a result of information transfer.

vi. To explore how social organisation and different technologies can be used to help prevent inequity of access to information for both patients and professionals.

vii. Further, to identify initiatives where groups traditionally considered to have restricted access have successfully achieved training and access to new technologies. To explore health professional and patient attitudes towards ownership and sharing of data.

3. Processes that support effective uses of e-health

i. To identify and explore examples of effective informatics training for health professionals, and how these can be disseminated to achieve improved health care.

ii. Further, to explore the attitudes of health professionals towards such training and use of the skills acquired in practice.

iii. To examine how the NHS can work with other information and education providers to facilitate patient involvement in e-health.

iv. Further, to explore patient attitudes towards initiatives to support patient involvement in e-health.

v. To investigate how information can be better integrated so that patients can, for example, access their own medical record on the Internet, obtain relevant and validated information about it and order a prescription.

vi. To what extent does implanted or wearable technology remove the patient’s own control of the condition? Further, how can ICT best be used to encourage and facilitate patients to take responsibility for their health?

vii. To what extent should health information be tailored to the needs of certain groups of patients and professionals or, further, individualised?

viii. To identify instances/circumstances when patients want to enquire via known professionals and when from an anonymous source.

ix. To examine the costs and benefits of providing information in different locations (e.g. mobile versus static for professionals; NHS versus home for patients).

x. To explore how the use of patient (e-)power for both patients and professionals should best be assessed. To investigate the extent to which recently introduced information technology (IT)-based services (such as e-booking) escalate patient expectations and consequently decrease satisfaction.

5. POLICY CONTEST RECOMMENDATIONS

1. Decision support

i. To explore attitudes of clinicians and their patients among those clinicians who do and those who do not use decision support tools. In particular, to examine their perceptions of benefits and barriers to use.

ii. To assess the quality of information available from repositories of health data, how data can be legally, ethically and cost-effectively aggregated for public health policy and decision support. Via pilot studies, to explore the potential benefits of birth-todeath records to decision-making and other aspects of health care, what policy changes would be required to achieve them and the costs of such records.

iii. To review decision support/expert systems used in the NHS to ascertain their impact on patient services.

2. Identification of best practice and barriers to implementation

i. To investigate working practices in other sectors (such as e-business) to identify best practice and barriers to similar uses of ICT in the health sector. To review Internet-based services for citizens in other sectors to see what lessons can be learnt on when to implement e-health solutions for patients.

ii. To review research findings on telemedicine (e.g. using coronary heart disease or cancer services) and barriers to their implementation.

iii. To review research findings on e-health to identify initiatives those have had a demonstrable effect on improved health.

iv. To assess the costs and benefits (including improved patient safety) of hospital systems that combine e-prescribing, order entry, decision support, bar coding for medication management and robotic dispensing.

v. To audit NHS procedures that aim to safeguard confidentiality of patient data.

3. Sharing data and cross-sector working

i. To investigate the efficacy of developing a code of collaboration under which organisations can explicitly share data and input to health records consistently, unambiguously and sensitively.

ii. To develop and test guidance on regulation and responsibility.

iii. To determine how we can best deal with combining multiple sources of data, dealing with apparently conflicting information from different sources, with minimum patient risk, minimum cost, patient consent and confidence.

iv. To examine the costs and benefits of cross-sectoral records and patient safety issues associated with cross-sectoral working.

v. To investigate how ICT can best contribute to pharmacy clinic services sharing data with the NHS and patient.

vi. To investigate the potential of e-health to enable effective interfaces, for example between health and social care, local specialists and specialist services, carers and professionals.

4. Involving the public, access and consent

i. To examine the costs and benefits of different ways of addressing equity in informing citizens.

ii. To investigate ways (quality marks, portals, patient and health professional training) to assist the assist the public in obtaining quality information from the Internet.

iii. To investigate what services patients desire for electronic ordering and home delivery of medicine and how they can be delivered safely, equitably and cost-effectively.

iv. To investigate patients’ knowledge and views on confidentiality and their attitudes as to how their data should be used in terms of potential benefits to health and quality of life (e.g. in research).

v. To identify how e-health technologies can enable and improve family support for seriously ill children and provide just-in-time information tailored to individuals.

vi. To examine the costs, benefits and attitudes towards and use of ICT support for patients with severe and chronic disease in their homes, such as video links to NHS and voluntary services, and smart cards with patient records.

vii. To review the experience of citizens accessing health care in other countries (and vice versa), and to identify where
health and other outcomes could be improved through the use of ICT.

5. Multi-site working
   i. To investigate the costs and benefits of using different technologies to support community-based staff (e.g., notepad computers, electronic links to supporting organisations, teleconferencing in cancer services).
   ii. To explore the changes in work patterns, potential for patient involvement and legal issues in home care (e.g., for older people).
   iii. To investigate the use of ICT in multi-site working in relation to such issues as culture change, governance, health professional training, patient expectations and changes to health outcomes.
   iv. To determine the costs and benefits of the use of health data cards.

6. ADVANTAGES OF RESEARCH

1. New modelling, measuring and comparing innovative capacities
   New innovative capacity is the ability of a product to produce and commercialise a flow of innovative technology over the long term. It depends on:
   - The strength of a nation's common infrastructure (basic research, education and training, intellectual property protection, R&D tax policies, venture capital, and so forth);
   - The cluster-specific innovation environment (one or many clusters involving particular factor (input) conditions; a local context that encourages investment in innovation-related activity; vigorous competition among locally based rivals; sophisticated local customers; presence of capable local suppliers and related companies);
   - The quality of linkages (relationship between the common innovation infrastructure and industrial clusters).

2. Designing efficient incentive systems for invention and innovation: intellectual property rights, prizes, public subsidies
   One central problem in the economics of knowledge is the design of incentive systems that both reward inventors/knowledge producers and encourage dissemination of their output in e-Health.
   - What is the best solution in case of particular kind of new technologies (genomics, software, data bases)?
   - What is the nature of the tension that arises when the two systems come up against each other?
   - How designing proper incentive systems to encourage research and innovation in areas of high social return and low private profitability?
   - In what condition a prize-based reward system provides a more efficient solution than granting intellectual property rights?
   - Is there an economic case for granting intellectual property rights in the domain of research tools, instruments, basic knowledge?

3. Research in labs: new economics of science
   - Assessing the impact of organizational practice on the productivity of university technology transfer offices
   - Measuring the social value of basic research and the local spillovers (regional impact). Accounting for the effects associated with mobility
   - Scale, scope and spillovers: the determinants of research productivity in several fields
   - Exploring the effect of the patenting of research tools and biomedical innovation: transfer opportunities and social costs
   - Access policy for large scale research instrument, data bases.

4. New R&D methods and the production of reliable knowledge in sectors which lagged behind
   To summarise, rapid and effective creation of know-how is most likely to occur when the following conditions converge:
   - Practice in the field needs to be well specified, sustainable, replicable, imitable;
   - There needs to be ability to learn from experience and experiment;
   - The ability to experiment offline, with less expense than that would be involved in online experimentation, and to gain reliable information relevant to online use, greatly facilitates progress.
   - A strong body of "scientific" knowledge greatly facilitates effective offline experimentation, and also quick and reliable evaluation of varying practice online.

5. New models of innovation: open, distributed systems and the role of users
   - What are the different channels through which user innovations influence the economy and how should manufacturers adapt and respond to user innovations?
   - What kinds of learning processes / dynamic capabilities do user innovations enable across product / technological generations?
   - What kind of policy issues and challenges pertain to user innovation? Given the fact that user innovations contribute significantly to productivity growth and national competitiveness, what kinds of policy should be devised to promote them.

7. CONCLUSIONS:
   The scope of e-Health research (using, processing, sharing, controlling information) derived empirically from this study corresponds with “textbook” descriptions of informatics. Stakeholders would like e-Health research to include outcomes such as improved health or quality of life, but such research may be long term while changes in information technology are rapid. Longer-term research questions need to be concerned with human behaviour and our use of information, rather than particular technologies. In some cases, “modelling” longer-term costs and benefits (in terms of health) may be desirable.

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