# Going Beyond Systematic Reviews: Realist and Meta-Narrative Reviews

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**Abstract.** Health information technologies are complex interventions whose effects differ across contexts. To improve our understanding of the effects of health information technologies, approaches are needed that utilize evidence beyond experimental results in order to provide explanatory answers to how and why a given technology works. The relatively new realist and meta-narrative review approaches are introduced as important methods in synthesising and analysing evidence in the field of health informatics. A common purpose of these two review approaches is to help create a sense of evidence about complex interventions that enables an understanding of how and why they work. A detailed description of the principles and objectives of the two types of reviews is presented. Key steps required to conduct each of the reviews are summarized, and examples of how the review approaches have been applied to topics related to health informatics are provided. Limitations of the two review approaches are discussed.

**Keywords.** Evaluation, evaluation methodology, health information technology, medical informatics, narrative review.

## 1. The value of realist and meta-narrative reviews for gathering evidence in the field of health informatics

The effect of health information technology often differs across settings. Also, there are numerous accounts of technologies that have worked in one context, but failed in another. In this contribution, we examine approaches to advancing the health informatics evidence base in ways that allow for explaining these varied effects under differing contexts.

An important notion in any such exploration of health information technologies is that these typically represent complex interventions whose effects are influenced by the interplay of several interconnected parts [1], acting in non-linear and emergent ways [2]. First, there are a large number of interacting components that affect the implementation of a given technology. Implementation of an Electronic Health Record (EHR) system in a large hospital, for example, typically entails involvement of the executive board, managerial and clinical leadership, front line physicians, nurses and other staff as well as technical, financial, customer service, and legal departments. Second, there are a large number of complex behaviours required by those delivering

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services supported by an EHR as well as those receiving health care services in such a system. EHR system implementation relies on actions by people to carry out complicated and skill-demanding tasks in a coordinated fashion. Third, since the EHR is used in the work processes of clinical and technical staff throughout the hospital, sometimes in interplay with patients, a large number of groups or organizational levels must be served by the system.[2] Fourth, it is likely that there will be variability in outcomes of EHR use, as the EHR system may be used differently in different parts of the hospital. In some cases, system implementation may even have negative implications, for instance due to disrupted workflow. Fifth, a high degree of flexibility or tailoring of the EHR system is required. Typically, even with standard EHR products provided by large vendors, considerable customization is required to fit the EHR into the organization, and several rounds of modification can be expected as the system matures. These and further characteristics of complexity (see [2] for further methodological discussion on complexity) are important to keep in mind when studying implementation of health information technology. The multi-faceted, dynamic, and social properties of the context in which the technologies are implemented make it unlikely that a given technology will work similarly in different contexts.[3]

Systematic Cochrane reviews[4] that draw on experimental studies of the effects of interventions have been conducted for several decades, proving to be indispensable for gathering evidence on effects of 'simple interventions' such as a new medication [3]. However, while Cochrane-type reviews are useful for such simpler interventions, their ability to incorporate heterogeneity across primary studies with respect to research design, characteristics of the study population, the context in which the intervention is implemented, types of interventions, and outcome indicators is limited. In fact, Cochrane reviews expressly seek to filter out all variance. Accordingly, Cochrane reviews have primarily focused on estimating the effect size of an intervention, asking questions such as 'does this intervention work and how well?' and seeking deterministic answers such as 'a + b = c' [4]. However, for most health information technology interventions such results are not meaningful. As reasoned above, complex health information technologies are embedded in open, social systems; rely on human action and interaction; and are continually affected by the organizational and socio-political context. Such technologies do not lend themselves to 'recipes'; a recipe for one context at one space in time cannot be assumed transferable to another context at another space in time. Thus, complete reliance on the Cochrane review with a relatively narrow focus on effectiveness limits our ability to build a useful evidence base in health informatics. In fact, relying solely on evidence generated from systematic Cochrane-like reviews that expressly filter out contextual influence and human factors may give decision- and policy makers only partial, or even misleading, information on which to base decisions.

Hence, there is a need for review approaches that synthesize data in a way that allows for incorporating the influence of context and dealing with heterogeneity. Further, approaches are required that can utilize evidence beyond experimental results

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[2] See also: S. Marceglia, Domains of Health IT and tailoring of evaluation: Practicing Proces Modeling for Multi-Stakeholder Benefits, in: E. Ammenwerth, M. Rigby (eds.), Evidence-Based Health Informatics, Stud Health Technol Inform 222, IOS Press, Amsterdam, 2016.

[3] See also: K. Cresswell, Evaluation of Implementation of Health IT, in: ibid.

[4] See also: C. Urquhart et al., Systematic Reviews and Meta-Analyis of Health IT, in: ibid.

in order to provide explanatory answers to how and why a particular intervention works. In this contribution, we look closer at such approaches for reviewing contextually relevant and real world evidence. Importantly, these review approaches do not replace Cochrane-type reviews. However, depending on the research question, they may be better suited to understanding an intervention's effects than the Cochrane review or may be provide insights that complement the findings generated by a Cochrane review.

## 2. Introduction to the realist and meta-narrative review approaches

The realist and the meta-narrative reviews take centre stage in this contribution, although many other types of review approaches exist. Examples include Meta-Ethnography, Grounded Theory, Thematic Synthesis, Textual Narrative Synthesis, Meta-study, Critical Interpretive Synthesis, Ecological Triangulation and Framework Synthesis (for more information about these approaches see [5]). A common purpose of the realist and meta-narrative review approaches is to "help make sense of heterogeneous evidence about complex interventions applied in diverse contexts in a way that informs policy" [6], thus allowing systematic exploration of and explanations for how and why complex interventions work. A realist review does this by building and testing theories about how a given intervention will work. We focus on realist reviews in this contribution as, unlike many other theory driven interpretive review approaches, they have a coherent analytical process that enables sense-making of the relationship between context and outcomes. Meta-narrative reviews make sense of complex interventions by elucidating and exploring the implications of different conceptualizations and applications of a given construct – an approach that is missing from many other theory driven review approaches. In the following, we give a more detailed account of the origin, philosophical principles, and objectives of the two types of reviews.

### 2.1 Realist review

The realist review, in common with realist evaluation [7], is based on a realist philosophy of science. Its goal is to systematically examine how contextual factors influence outcomes, through mechanisms [8]. This core aim of the realist evaluation has often been summarized in the question of 'what works, how, for whom, in what circumstances and to what extent?'. To answer these questions, realist evaluation "seeks to unpack the mechanism of how complex programmes work (or why they fail) in particular contexts and settings" [9]. Its philosophical lens is realism, which assumes that there is an external reality, but that this reality is modified through human actions and perceptions. The implication of this philosophical lens is an understanding of complex, social interventions as constantly perceived, generated and altered [10]. In the realist conceptualization of the world, this understanding is integral to explaining why some interventions work and others do not, and is therefore part of any realist review of a complex intervention. As we noted earlier, this understanding is pertinent to effectively implementing health information technology in real world systems and organizations.

A realist review is theory-driven. This implies that the review starts with articulation of key theories about how an intervention is assumed to work, which are

then explored, tested and refined in the review [11]. Such theories are called programme theories; a programme theory outlines the assumptions about how an intervention is expected to achieve desired outcomes, for whom, in what circumstances and why [8]. To develop programme theories, a realist review seeks to tease out and describe the relationships between context and mechanisms that create outcome pattern.[9] In the realist conceptualization of how the world 'works', mechanisms are the 'agents of change' that affect whether an interventions brings about any effects [10]. There are many definitions of mechanism, but they can usefully be conceptualized as hidden entities, processes, or social structures that operate in particular contexts to generate certain outcomes [12]. As such, mechanisms are seen as causal processes that tend to, but not always, occur under a particular set of conditions - activation of a mechanism is thus contingent on the context in which an intervention is implemented [4]. Context may be conceptualized as "those features of the conditions in which programmes are introduced that are relevant to the operation the programme mechanisms" [10]. These may be social, economic or political characteristics of the geographical area in which the intervention is implemented. However, it can also be more local features pertaining to the particular setting or even population receiving the intervention. Outcomes patterns are "the intended and unintended consequences of programmes, resulting from the activation of different mechanisms in different contexts" [10]. An important point to note is that context, mechanism and outcomes are linked. An outcome (O) occurs because it has been caused by a mechanism (M) that has been 'triggered' under specific context(s) (C) – often summarized in the heuristic C+M=O.

During analysis in a realist review, a feature in an intervention is only conceptualized as a context because data indicates that it has caused a specific outcome to occur through a certain mechanism. In other words realist analysis does not produce 'free-floating' lists of context, mechanisms and outcomes but configurations of context-mechanisms-outcomes – often referred to as CMO configurations. These form the basic explanatory building blocks of a programme theory. Within a realist programme theory there may be several CMO configurations and a complete programme theory contains an explanation of both the CMO configurations and the relationships between these [13].

Realist reviews have an explicit and coherent explanation for why it is that programme theories from one context may be relevant to another. Analysis in realist reviews focuses on the causal mechanisms found within programmes – specifically the behaviour of a mechanism in different contexts and the outcome(s) caused. Any justification for learning from or extrapolating the explanation for how and why an outcome occurs in one setting as well as in another is based on the assumption that the same mechanism(s) are found in both contexts. Any such assumption must then be tested against data.[6] As an example, a programme theory may suggest that under certain contexts a health information technology can trigger the mechanism of patient engagement to produce a certain outcome. The reviewer may be able to learn more about the behaviour of this mechanism by gathering data from other fields of research where it has been studied and not just in health informatics. The idea of focusing on mechanisms within programmes, rather than types of interventions, as the unit of analysis is especially useful in emerging areas of research where evidence on effectiveness is still limited [3].

The ultimate goal of a realist review is to provide explanatory propositions that make visible the contingencies that are likely to affect whether an intervention will

generate intended outcomes.[10] Hence, it does not produce deterministic theories that can always predict outcomes across contexts. Recommendations possible through a realist review are thus likely to take the format: 'In circumstances such as A, try B, or when implementing C, watch out for D' [9]. The analytic focus on the causal mechanisms within programmes that generate given outcomes in a given context may provide guidance to policy makers or practitioners about ways to tweak organizational structures or processes to most likely activate relevant mechanisms [4].

## 2.2 Meta-narrative review

Greenhalgh et al. developed the meta-narrative review approach in 2004. It is particularly suited to topics where there are different perspectives about the nature of the topic [14]. Thus, it is intended for use when a topic has been differently conceptualized, theorized and empirically studied by different groups of scientists. The underlying assumption in the meta-narrative approach is that key constructs mean and are valued differently to groups of scientists who (implicitly or explicitly) belong to different research traditions and/or paradigms [15]. (Please note that in this contribution we will for the sake of brevity use the term research tradition to include both research tradition and/or paradigm.) Specifically, Greenhalgh and colleagues developed the review method to help explain the apparently disparate data encountered in a review of research from a wide range of research traditions, namely diffusion of innovation in healthcare organizations. The authors found that constructs such as 'diffusion', 'innovation', 'adoption' and 'reutilization' had been conceptualized and studied very differently by researchers from a wide range of traditions including psychology, sociology, economics, management and philosophy [16].

Meta-narrative review uses a constructivist philosophical lens, which proposes that science progresses in paradigms; that is, knowledge is produced within particular research traditions, which have their own assumptions about theory, the legitimacy of study objects, research questions and knowledge [16]. As Greenhalgh et al. pointed out "an empirical discovery made using one set of concepts, theories, methods and instruments cannot be satisfactorily explained through a different paradigmatic lens" [17]. The meta-narrative review thus makes sense of complex, heterogeneous, and conflicting bodies of literature by identifying and analysing the belief systems that exist within a research tradition or paradigm. As such, a research tradition becomes the unit of analysis in the meta-narrative review [17]. Through combining and comparing findings generated within different research traditions or paradigms, an overarching narrative can be illuminated that provides a richer picture of the topic area than would be possible to obtain by including only one perspective. Key questions that a meta-narrative review will seek to answer are (1) Which research traditions or paradigms have considered this broad topic area? (2) How has each tradition conceptualized the topic? (3) What theoretical approaches and methods did they use? (4) What are the main empirical findings? and (5) What insights can be drawn by combining and comparing findings from different traditions? [14]

The meta-narrative review and the realist review share several properties [3]. However, in comparison to a realist review, a meta-narrative review deliberately focuses its analysis on the implicit and explicit assumptions, value systems, world views and so on of the researchers, and not just the theories that explain the behaviour of interventions in different contexts [6]. Like the realist review, the meta-narrative

review offers a strategy to assist decision and policy makers to use a conflicting body of research to guide decisions.

## 3. Description of review approaches and steps

A set of steps has been proposed to guide efforts to use the two review approaches.

### 3.1 Realist review

In 2005, Pawson et al. proposed guidelines for conducting a realist review, consisting of five steps of an iterative and non-linear nature [9]. These guidelines have been further expanded and detailed in Pawson [8] as well as through the RAMESES project (which will be introduced later in the contribution). In the following, we summarize the five review steps, while pointing the reader to the aforementioned resources for more thorough explanations of the steps.

*Step 1: Clarify scope.* The first activity in this step is to identify the review questions, which may be sharpened as new information and insights emerge. It is advised that this step is conducted in close collaboration with the commissioner(s) of the review to ensure that the findings match their needs and expectations. Subsequently, the reviewers should map the programme theory(ies) that explain(s) how the given intervention works. This mapping exercise should result in the articulation of the key programme theories that the review will explore. This may entail doing exploratory searches to come up with a list of possibly relevant programme theories that are then grouped, categorized or synthesized. This product of this step – an initial programme theory (or theories) that focuses on the needs and expectations of the commissioner(s) of the review - should then be further refined with data from documents.

*Step 2: Search for relevant evidence.* The search for material should be purposive and iterative, that is, geared to continually capture emerging primary research data to refine program theories. As opposed to a Cochrane review, the realist review includes all types of study designs, reasoning that information about a programme theory and other intervention processes are captured in a variety of sources including peer-reviewed quantitative and qualitative studies as well as grey literature such policy documents, business plans, and websites. In other words, a broad range of document types may be able to contribute to programme theory refinement in a realist review. The search process may comprise four iterative search strategies. The first strategy is an exploratory background search to scope the literature. As programme theories start to emerge, the reviewers may then be able to refine inclusion criteria, thus further focusing the search. Upon agreement on a shortlist of programme theories, purposive searching may be applied to explore and test the corresponding hypotheses, making extensive use of snowballing. Searching may continue to be needed even when the review may be close to completion, as additional data may continually be needed to refine programme theory.

*Step 3: Select and appraise documents and extract data.* From searching the literature, reviewers will hopefully have identified documents that may possibly contain data that might be useful for programme theory refinement. Reviewers still need to decide if a document does in fact contain the data needed data. In practice, this

process of determining if a document contains the data needed often takes place when reading the full text of the document. Document selection in a realist review, is thus based on relevance. Relevance refers to whether any document retrieved during searches can contribute data to build or test a certain programme theory or aspects of it. For any relevant data, a judgment has to be made about the rigour of the method(s) (if any) that has been used to produce the data. In other words, rigour concerns the credibility of the method(s) used to produce the pieces of data. In extracting data from the included material, the realist logic of analysis plays an important structuring role: data should be extracted about programme theories, context, mechanisms and outcomes configurations that will help in programme theory refinement.

*Step 4: Synthesize evidence and draw conclusions.* The goal of the realist review is to use data to build one or more programme theories that explain what has caused the outcome patterns observed under different contexts; that is, why an intervention generates particular outcomes in particular contexts through one or more mechanisms. Theory building entails making inferences about 'CMO' configurations and the place of these configurations within a programme theory (or theories). Reviewers should thus make clear how they derived to such inferences and what data have been used to develop and support them. In addition clarity is needed on how what they have conceptualized as context, mechanism and outcomes with relevant data. The value of such clarity is that readers and users of the review's findings are provided with transparency – they can see for themselves the links from data to programme theory. Since the findings from realist analysis are dependent on contextual factors, conclusions should not lead to deterministic formulae. Instead they must indicate the contingencies upon which it is expected that a mechanism will be triggered in a context to process certain outcomes such as 'If A, then B' or 'In the case of C, D is unlikely to work'.

*Step 5: Disseminate, implement and evaluate.* With the audience in mind, reviewers should explain the relevance of one or more key programme theories that emerged from the analysis and highlight the strength of evidence for the main conclusions. In doing so, the reviewers may want to test out recommendations and conclusions with key stakeholders in order to place focus on actions that are feasible in the given policy context. This will entail dialogue with practitioners and policy-makers to apply recommendations in particular contexts.

## 3.2 Meta-narrative review

Based on experiences deriving from conducting the first meta-narrative review, Greenhalgh et al. [17] suggested a set of phases that should be followed to conduct a meta-narrative review. In common with realist review, iterative refinements are often needed - it is normal and appropriate for the review objectives, question and scope to transform as the review progresses as the key research traditions are uncovered and become better understood. This review approach is guided by six principles. These are: pragmatism (reviewers should include what makes most sense for the intended audience); pluralism (the topic should be illuminated from multiple perspectives); historicity (deepest understanding of a topic comes from studying its evolution over time); contestation (conflicting data from different research traditions should be examined to generate higher-order insights); reflexivity (reviewers should continually reflect on the emerging findings); and peer-review (emerging findings should be presented and discussed with an external audience).

We summarize here the phases from Greenhalgh's approach (more details maybe found in [17]).

*Step 1: Planning*. In this initial phase, a preliminary scoping of the literature can be done to discern the research traditions dominant in the field of review. Then, a multidisciplinary research team should be formed. The guiding principle for the team composition is that the researchers' scientific backgrounds cover all relevant research traditions identified through the scoping of the literature. The team should formulate some initial, broad research questions, and should agree with the review's commissioners about the desired outputs. As a last step in the planning phase, the team should plan regular meetings, which may also include representatives of the review's intended audience.

*Step 2: Search.* The search process should start with initial and intuitive browsing of literature and consultation with experts and stakeholders in each research tradition, with the aim of identifying the array of perspectives and approaches within each relevant research tradition. Reviewers may want to consider the parameters of each tradition such as its scope, historical roots, key constructs and assumptions, commonly asked research questions and methods used, main empirical findings, and strengths and limitations. Upon reaching agreement about key narratives emerging through this initial search, the reviewers should conduct a systematic search for empirical papers within each research tradition. The reviewers can make use of electronic and paper-based databases and sources as well as tracking references of seminal conceptual references to accumulate a relevant subset of primary research.

*Step 3: Mapping*. This phase, which often takes place in parallel with the searching phase, entails mapping the key conceptual, theoretical, methodological, and instrumental components of each research tradition. Furthermore, reviewers should outline key actors and events in the unfolding of the tradition over time, including main findings and how they came to be discovered, using the prevailing narrative styles used by scientists in the selected traditions.

*Step 4: Appraisal.* Using the quality criteria determined by experts within a study's particular research tradition, the review team should appraise the quality of each primary study. The purpose of the quality appraisal is to determine which studies within a tradition are considered to be examples of high quality. These will then be analysed to ascertain what data they can contribute to building a narrative of that research tradition. Then, data elements should be extracted that can contribute to constructing a narrative of how research on a topic evolved in a particular tradition. The review team may want to develop a data extraction form to summarize key data items such as the papers' research question, theoretical basis, study design, validity and robustness of methods, sample size and power, nature and strength of findings, and validity of conclusions for each empirical study.

*Step 5: Synthesis.* In the synthesis phase, the review team should compare and contrast all the key dimensions of the topic that have been researched within each research tradition. The aim is to generate higher-order data by comparing conflicting findings and explaining them in terms of contestation between the different traditions from which the findings were generated. Greenhalgh et al. propose that this synthesis is guided by a set of questions, such as (1) What is the range of research questions that different groups of scientists have asked about each of the dimensions of the research paradigm? Can these questions be grouped meaningfully and classified across traditions? (2) What are the commonalities of research findings across paradigms, and where the empirical findings from different paradigms are conflicting, to what extent

can discrepancies be explained? (3) Given the 'rich picture' of the topic area achieved from these multiple perspectives, what are the overall key findings and implications for practice and policy? and (4) What are the main gaps in the evidence on this topic and where should further primary research be directed?

*Step 6: Recommendations.* Through reflection, multidisciplinary dialogue and consultation with the intended users of the review, the review should distil and discuss recommendations for practice, policy and further research.

To ensure that realist reviews and meta-narrative reviews are being executed consistently and rigorously, checklists and publication standards have been proposed for both approaches. Specifically, in 2013 the Realist And MEta-narrative Evidence Syntheses: Evolving Standards (RAMESES) for reporting realist and meta-narrative reviews were published.[11,14] Further, quality criteria have been set forth, which should be used to determine the rigour with which a review has been done. For a complete overview of this methodological work dedicated to advancing the review approaches, the interested reader can benefit from visiting the RAMESES project website [18] and reviewing the project outputs. Researchers interested in realist and meta-narrative approaches may also wish to consider joining the RAMESES email listserv (www.jiscmail.ac.uk/RAMESES)

## 4. Application of realist and meta-narrative reviews in health informatics

The realist and meta-narrative review approaches have been applied on topics as diverse as the effects of joint health and safety committees, school feeding programmes, diabetes education programmes, innovations in health service delivery and organization, and the role of urban municipal governments in reducing health inequities. However, thus far, the application of the realist and meta-narrative reviews in the field of health information has been limited. In the following we highlight an example of a realist review (case A) and a meta-narrative review (case B) of literature in health informatics to demonstrate the nature of the evidence they can generate.

*Case A: Internet-based medical education: a realist review of what works, for whom and in what circumstances.*

Wong et al. [19] conducted a realist review of literature on Internet-based medical education, which is increasingly offered by means of online courses. The objective of the review was to contribute to a limited evidence base on what actually works when offering medical education via the Internet. Specifically, it aimed to generate recommendations that could inform the development and assessment by (potential) users of Internet-based medical courses. The realist review included 249 studies that were believed to be relevant to testing two main theories to explain variation in course-takers' satisfaction and outcomes: Davis's Technology Acceptance Model and Laurillard's model of interactive dialogue. Studies were included with various designs and outcomes as long as they addressed interventions that used the Internet to support learning, involved doctors or medical students, and reported a formal evaluation. The included material was used to test and refine the two main theories. The review established that course-takers are more likely to follow a course if they perceive the course to have advantage relative to non-Internet alternatives, high ease of use and compatibility with their values and norms. Further, the review found that 'interactivity' can result in effective learning, but only if course-takers receive formative feedback,

for example through dialogue with a tutor, fellow students or virtual tutorials. Hence, in designing and/or choosing an Internet-based medical course, it is important to consider how the interaction between technology and course-taker can be made most meaningful. This will require efforts to improving the fit between the technical attributes of the course and the needs and priorities of the course-takers. As a way of offering recommendations, the review provides a set of questions that can spur helpful lines of thought. Due to the varying contexts in which internet-based medical courses are implemented, these questions are not considered to offer deterministic guidance that will always generate desirable outcomes.

*Case B: Tensions and Paradoxes in Electronic Patient Record Research: A Systematic Literature Review Using the Meta-narrative Method.*

Greenhalgh et al. [20] conducted a meta-narrative review on Electronic Patient Records (EPRs) with the goal of explaining how the Electronic Patient Record and its implementation had been conceptualized and studied in different research traditions. The review team included scholars representing key research traditions that had addressed the topic including health information systems, change management in health services research, information systems, computer-supported cooperative work, and more. The review included twenty-four systematic review and ninety-four primary studies that helped develop an understanding of the key constructs related to EPRs within each of these research traditions. In the synthesis, key tensions between the constructs in the different research traditions were identified and illuminated. The identified tensions centred on the conceptualization of seven constructs: (1) The EPR (whether it was thought as a 'container' or 'itinerary'); (2) The EPR user (as either an 'information-processer' or 'member of socio-technical network'); (3) The organizational context (as 'the setting within which the EPR is implemented' or 'the EPR-in-use'); (4) Clinical work and knowledge (as 'decision making' or 'situated practice'); (5) The process of change (as 'the logic of determinism' or 'the logic of opposition'); (6) The impact of change and definition of success (as 'objectively defined' or 'socially negotiated'), and lastly, (7) Definition of complexity and scale ('the bigger the better' or 'small is beautiful'). The findings raise questions about the positivistic assumptions typically underlying EPR implementations by bringing forth insights from a variety of perspectives. For example, the findings suggest that EPR use will always require human input to re-contextualize knowledge. Further, even though administrative tasks may be made more efficient by the EPR, primary clinical work may become less efficient, since paper-based recording of information may provide more flexibility on the work floor. Lastly, contrary to a widely held belief, smaller EPR systems may sometimes be more efficient and effective compared to larger ones. Hence, these findings from outside and inside the health informatics research tradition offer food for thought for EPR researchers and policy-makers that can be considered in their future EPR work.

## 5. Limitation of review approaches

The preceding text has focused on the potentials of the realist and the meta-narrative reviews and has demonstrated their application in the field of health informatics. This has included two specific examples that show the potential usefulness of the approaches to help make sense of heterogeneous evidence about complex interventions

in diverse contexts. Yet, at the same time, there are some limitations to the review approaches that may restrict their application and relevance for busy decision- and policymakers. In the following we highlight some main limitations as they have been discussed in the literature.

An important limitation is the extensive resources and expertise that may be needed to conduct these reviews. Both approaches may entail exploration and appraisal of literature from a potentially vast number of disciplines. Further, refining theories and narratives can become an infinite task as new information can be expected to emerge continually. It is thus not always clear when saturation has been reached. In addition to the time-consuming nature, both approaches (and especially the meta-narrative) require cross-disciplinary expertise, which can be difficult to muster in practice. Moreover, although quality standards and training materials have been proposed for conducting the reviews, there is no fixed formula that can be used slavishly to generate findings. The implications are that due consideration needs to be given by any researchers wishing to use these approaches on what the scope and focus of their review will be. As we have shown, the answers that can be generated through these review approaches tend to be complex and contingent upon several factors. Thus, answers achievable from these types of reviews may be relatively difficult for decision- and policymakers to utilize in practice [10]. Thus, a challenge for anyone using these approaches will be to make sure that their answers are useful to their intended audience. Hence, considerable time is likely to be needed to think through how to present the answers to the questions asked. In addition, as with all reviews, time and effort will need to be spent to plan and put together a review team with the relevant expertise.

Up until 2013, when the RAMESES protocols were published, there was little methodological guidance for reviewers and appraisers of realist or meta-narrative reviews. While the advent of the RAMESES protocol is likely to have improved clarity and consistency, such protocols cannot remove reviewers' interpretive judgments, which are integral to the synthesis process [17]. Due to the subjective nature of the approaches, it is questionable whether another review team would arrive at the same results. Thus, to ensure validity, much effort must be put into providing transparency into the processes used to develop and refine theories, thereby allowing the reader to understand clearly how the review was carried out and what data were used. While not necessarily permitting reproducibility, this transparency is important to allow readers to pinpoint and debate exactly where their disagreement lies with the findings of an approach.

Lastly, while it is considered a strength because it allows for inclusion of more studies with explanatory power, the inclusion of weaker study designs (such as case study reports) can arguably limit the inferences that might be drawn from the data. Moreover, many studies do not report detailed information about the interventions and the processes surrounding the interventions, making it hard of build, test and refine theories. As for all other reviews realist and meta-narrative reviews are only as good as the primary data on which they build.

## 6. Conclusion

The realist and meta-narrative review approaches hold great potential to complement traditional Cochrane-type reviews. The realist review focuses on unpacking the relationships between contexts and mechanisms that cause an intervention's outcomes.

The meta-narrative review seeks to create clarity on the conceptualization of complex topics where there is a lack of clarity or disagreement about key constructs. Both review approaches aim to inform decision and policymaking in complex policy areas. The review approaches have been applied in various research fields and disciplines, and their use may be expected to increase with the publication of the RAMESES quality standards and training materials, in that these likely make it easier to conduct and publish realist and meta-narrative reviews. Yet, so far their application in the field of health informatics has been sparse. This may be related to the fact that both approaches are relatively new, and to their potential limitations such as their time-consuming nature and the challenges of producing 'simple' recommendations.

### Acknowledgements

### Recommended further readings

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### Food for thought

1. In your day-to-day work can you think of any circumstances when the answers produced through a realist review might be more useful than those from a Cochrane systematic review?
2. Can you think of one or more (contested) topics within health informatics that could benefit from a meta-narrative review?
3. What are the most important skills required to conduct realist or meta-narrative reviews? Do you possess these skills?
4. If you wanted to conduct a realist or meta-narrative review, how would you start?
5. How would you tailor the findings of your realist or meta-narrative review so that they are understandable and useful for your specific audiences (e.g. policy and decision makers, other researchers and so on)?

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