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The need for better integration between applied research and operations to advance health information technology

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ABSTRACT

Several factors contribute to the divide between applied research and operations for health information technology. These differentiating factors include: work performance metrics, project interests, funding, timelines, goals, incentives, and interpretation and dissemination of findings. We propose specific recommendations for addressing each of these factors to help reduce this gap. Factors and corresponding recommendations are drawn from experiences working in both research and operations positions within the Veterans Health Administration. The lessons learned and associated recommendations are likely to be relevant to other healthcare institutions.

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1. Introduction

Lags in transitioning medical innovation from research to practice are well documented.^{1–3} The research–practice gap is common across many fields of study, including human factors science.^{4,5} For example, safety features on automobiles are often developed long before they appear in the cars we drive.⁶ More recently, this need for more rapid translation of research into practice has been discussed in the context of academic medical centers,^{7,8} where some have advocated for closer links between academic medical center researchers and health system operational teams to facilitate healthcare innovation.⁷ The rapid development of health information technology (HIT) has widened the divide between research and implemented HIT. Because of the rapid development cycles in HIT, the implications of this divide are far reaching. For example, the introduction of each new feature within an electronic health record changes procedures, practices, and potentially even staffing roles and responsibilities. This rapid evolution in the workplace makes it even more important that research findings are implemented quickly, before the relevance of findings fade.

Although the HIT research community has strong dissemination networks, as evidenced by relatively high citation counts, research often has little impact on or relevance to actual operations and development of HIT. Further, relevant research can take years to reach the end-user. In some cases, researchers may not be integrated with operations personnel in a substantial and meaningful way. This gap is created by several factors that differentiate the research and operations organizational units within the same healthcare institution or across multiple institutions, including universities. A relevant conceptual strategy for bridging the gap between research and practice is the “rapid-learning health system”, which leverages HIT and health data infrastructure to access and apply evidence in real-time, while also using knowledge from real-world care delivery processes.^{9–11} This enables innovation and health system change based on rigorous, generalizable research.⁹ Merging of research with “on the ground” operational realities of an organization is consistent with the objective of our paper, which is to describe the major contributing factors of the research–operations divide for HIT, based on our experiences within the Veterans Health Administration (VHA), and offer actionable recommendations.

The VHA is an excellent case study for transitioning research findings to HIT design. This is, in part, because the VHA supports

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HIT research as well as operational HIT efforts. The VHA Health Services Research and Development (HSR&D) program includes a variety of research scientists, such as physicians, psychologists, human factors professionals, and others who are active members of the broader scientific community. The VHA Office of Informatics and Analytics employs multidisciplinary teams that lead HIT innovation. Both offices reside at the same level within the same organizational structure, underneath the executive for health policy and services. Cross-pollination across these organizations is encouraged, yet challenges in true collaboration between research and operations remain. The authors of this paper all have experience working with either VHA HIT research or operations and two have worked in both. This article focuses on HIT since the majority of our experience is in HIT research and operations. However, the divide between research and operations is ubiquitous to many fields and extends beyond HIT. Although the findings and recommendations in the article are written within an HIT perspective, they are likely universal and broadly applicable in healthcare.

2. The applied research–operations divide

From our collective experience working in both settings, at least eight factors contribute to the separation between research and operations (Table 1). Actionable recommendations related to each factor are summarized in Table 2.

2.1. Work performance metrics

The incongruence of performance metrics for researchers and operational partners is a substantial contributing factor to the divide between the two groups. Researcher success depends on obtaining grant or contract funding. Therefore, researchers focus on publications and accomplishments recognized by the scientific community that will increase a researcher's fundability. Operational personnel are more likely to build a resume and portfolio documenting successful IT applications, designs and products. Their career advancement is based on contributions to the design, development, and use of products.

Pursuing opportunities to publish articles is a necessity for a researcher. However, if an operational partner has an interest in working on a manuscript for publication, it is rarely tied to their performance criteria and often impractical to dedicate actual work hours toward its development. As a result, real-world, pragmatic advancements and lessons learned may never make it into the research literature. Adjusting performance criteria for researchers

and operational partners may promote more effective collaborations. Providing individual scientists with a small portion of stable salary funding could foster research–operations partnerships and facilitate more rapid turnaround. One difference between the VHA and many other healthcare organizations is that other organizations may not have a distinct research department; rather, research collaborations may exist external to the organization. Thus, there may be less control over the ability to adjust performance criteria for researchers. However, on the operations side, the performance plan could be modified to encourage and reward presentations at professional conferences and publication of project findings. This could promote collaboration with internal or external research partners. In fact, an operational partner within our organization has recently encouraged and endorsed presentation of project results at professional conferences as part of the annual performance plan of operations personnel.

2.2. Project interests

Applied researchers generally focus on applying theory to real-world problems and aligning projects with funding agency goals. These tend to be problems with implications for widespread efficiency improvement, safety advancement, or performance innovation. In contrast, operational personnel are tasked with projects in a specific context to inform a specific design. The principal researcher should collaboratively develop research projects with operational partners, based on operational needs, rather than coming to the table with finalized study aims. If efforts are not aligned, collaboration becomes a disincentive for operations since timelines and resources may be negatively impacted. A project with theoretical and more abstract research interests can also be crafted to have practical elements that may have an immediate positive impact on operations. In our experience, this type of collaborative project planning is typically initiated and driven by researchers since they are expected to demonstrate operational partnerships as a requirement for internal grant funding; similar incentives do not exist for operations personnel. An effective forum supported by our organization has been to convene a one or two day face-to-face workshop to plan or kick-off a project, with representatives from each stakeholder group.

2.3. Funding

Research grant funding can be difficult to obtain; proposals are rarely funded on the first submission and often require major revisions and one or more resubmissions. Operational personnel, in

Table 1
Factors contributing to the research–operations divide.

Factors	Type of organizational unit	
	Research	Operations
Work performance metrics	Grant funding, publications, citations	Customer satisfaction, timely deliverables
Project interests	Applying theory to real-world problems and producing generalizable knowledge	Assessing tradeoffs and measuring effectiveness (e.g., Which design will work best?)
Funding	Often dependent on grants, "soft money"	Typically stable lines of funding Assessing cost-benefit effectiveness and resource bandwidth
Timelines	Six months to 5 years	Sometimes 30 days or less
Goals	Individualistic; typically determined by the grant principal investigator	Primarily organizational
Incentives	Translating research into practice; demonstration of research impact	Launch software on time, within budget; foster end-user adoption Achievement of strategic organizational measures (e.g., cost, throughput, safety)
Interpretation of findings	Emphasis is placed on evidence	Research findings may be weighted similarly to stakeholder opinions and non-evidence-based sources
Dissemination of findings	External dissemination is necessary for career development	External dissemination often discouraged due to proprietary concerns or lack of resources

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