RESEARCH REPORT

From "Invented here" to "Use it everywhere!": A Learning health system from bottom and/or top?

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Abstract

Introduction: Departing from a practical problem of how to use digitalization to improve care quality and efficiency, this paper investigates how the concept of Learning Health Systems (LHSs) can be applied to an existing organization. LHSs offer a vision for how healthcare can accelerate both scale-up of innovations and quality improvements at all levels. However, aligning stakeholders at different levels to convergent development is challenging and translation and adaptation of the LHS concept to fit with the existing organization is essential.

Methods: A one-year longitudinal action research (AR) study was conducted within five psychiatric departments at the Sahlgrenska University Hospital in Gothenburg, Sweden. Translation of the LHS concept to the local circumstances within the organization was set as the aim, to both improve practice and further scientific understanding. An AR group led the practical and scholarly work and holistic data were collected, including field notes, documents, recordings, and workshops. Data were analyzed by an insider-outsider approach.

Results: The one-year study is described to provide insights into the process of designing a locally adapted LHS using an AR approach. Practical needs were identified and iteratively matched with theory to form a local LHS model. A conflict between top-down and bottom-up views on development emerged, where higher-level management tended to prioritize uniform solutions and developers local learning. An adapted solution to balance these approaches was negotiated, consisting of a technical and an organizational part.

Conclusions: The conflict between top-down and bottom-up approaches for how to implement LHSs needs to be considered both in practical work to transform care organizations and in scientific studies of LHSs. The approach to translate, rather than instrumentally implement, LHSs to real-world settings is suggested as advantageous. Furthermore, designing such endeavors as AR projects can provide excellent conditions to create LHSs that work in practice.

KEYWORDS
action research, healthcare management, implementation, Learning Health Systems, translation

1 | INTRODUCTION

Get the digitalization going! That was the mission from the heads of departments to the action research (AR) team. In pursuit of useful performance data and faster spread of innovations to make care more efficient, a problem-driven and theory-informed project was initiated. But while seemingly simple solutions were available, the attempts to change the existing system led to new insights into cross-level interactions.

1.1 | New opportunities in the age of digitalization

In recent years, digital technology has opened new possibilities for healthcare. Moving beyond *digitization* of current processes to *digitalization*, implying the transformation of roles and ways of working to build on the full possibilities of digital technology, can enable quality improvements and cost reductions.[1] Access to real-time data, data aggregation in registries, and the possibility to build networks between individuals and organizations around the world create new opportunities of innovation and identification of best practices. Building on these new opportunities, *Learning Health Systems* (LHS) has been proposed as a management innovation for healthcare systems to improve the quality of care, efficiency, and scaling up of innovations.[2-5] The Institute of Medicine[6] defines an LHS as a system "in which science, informatics, incentives, and culture are aligned for continuous improvement and innovation, with best practices seamlessly embedded in the care process, patients and families active participants in all elements, and new knowledge captured as an integral by-product of the care experience." LHSs have rapidly gained interest and have been applied to many medical specialties.[7] For psychiatric care, the concept has been claimed as promising[8,9] but a recent scoping review found no examples from psychiatric contexts.[7] However, the use of health informatics for psychiatry is growing but there are multitudes of psychometric instruments (eg, rating scales) and lack of consensus on which to use for performance measurement.[10]

LHSs builds on learning cycles, resembling quality improvement cycles but with an explicit inclusion of IT for data management.[11,12] Learning is meant to take place in clinical microsystems, at team level, and for entire patient groups at system level.[13] The rationale is that if data, interpretations, contextual conditions, values, and culture are consistent and linked across system levels, practices will conform.[14,15] However, already in the seminal work on LHSs from 2007, it is recognized that "although all stakeholders seem to be aligned on the *need* to define evidence requirements, there is not alignment on *what* evidence is needed under specific circumstances,"[5(p130)] indicating the difficulty of alignment of stakeholders' views. Practical evidence for such challenges has also been presented,[16] and in the context of this study, an example is the ambitions to define outcome measures for psychiatric patients, where, simplified, first-line professionals preferred local person-centered measures about the care process and social functioning, managers pursued aggregate ratings of symptoms and quality of life, and regional authorities monitored process measures, like the proportion of patients that were reported in a quality register (see Solberg et al[17] for similar distinctions). A recent scoping report highlights "learning communities and networks," "slack resources," "culture change for shared incentives," and "ways of thinking" as important areas for the creation of an LHS.[18] However, problematization of the issue of aligning stakeholders is scarce in earlier literature. Representing a rare exception, Harrison and Shortell[13] proposed a multi-level model of organizational learning and identified cross-level interactions as barriers to the implementation of LHSs. For example, they found that "there was limited alignment between front-line staff and managers about how to assure quality guidance" (p. 7).

1.2 | Improvement in small steps or large leaps?

Improving quality and efficiency is a key issue for healthcare providers. Two principally different ways to accomplish improvements are by *spread of innovations* or *continuous improvements of existing practices*. A variety of organizational characteristics have been related to successful spread of innovations[19] and several frameworks have been presented to guide implementation.[20-22] Guidelines for the implementation of best-practice interventions have also been integrated into the LHS concept.[13,18,23,24] A common assumption in these guidelines is that adoption of an innovation is enforced and facilitated by higher-level management and aims to bring about significant improvements in quality and efficiency.

Sharing the aim to improve quality and efficiency, quality management has long been influential in healthcare.[25,26] In contrast to the "spread of innovations" approach, quality management encourages incremental and continuous improvements by local and data-driven quality improvement cycles, hence promoting innovations and operational development in small steps.[27] Principles of cyclic improvement starting from clinical microsystems and data as the base for improvements are shared with the LHSs concept.[23,28]

1.3 | Bringing about organizational change

On a general level, many suggestions for how to design and implement LHSs exist.[4,29-32] Practical examples of real-world implementations have also been presented, but often for applications on systems or provider level rather than transformations starting from the level of departments or divisions within a larger system.[16,33] For similar comprehensive management concepts *translation*[34-38] has been proposed as a more fruitful approach than *implementation* to guide management-level applications. *Translation* emphasizes the need to adapt management innovations to achieve organizational objectives[39] and to negotiate essentials of the desired practice against essentials of the recipient context.[38] The more instrumental view that management innovations are fixed phenomena that can be evidence-based[40] and implemented is, in its stricter form, referred to by translation scholars as a "copying mode," which brings the risk of organizational misfit and rejection of the management innovation.[37]

In practice, the translation view means that "translators can use the information about various practices as relatively rough templates and examples that they can alter and mix to create something new."[38(p303)] For example, adopting the concept of value-based healthcare,[34] some managers may focus on reorganizing care based on full care cycles for specific patient groups, while others focus on outcomes and process measures to allow benchmarking. Similar differences in applications of Lean have been shown by Mazzocato et al.[41] Thus, the translation approach allows for adaptation to existing structures and culture, which is a success factor for LHSs,[42] and is in line with the view of LHSs as "an ongoing journey rather than a destination."[18(p10)] Hence, for an AR team set out to improve practice guided by LHSs as key concept but parallelly maneuvering a current organization and culture, as well as other theoretical influences, translation is the approach of choice.

2 | QUESTIONS OF INTEREST

The purpose of this paper is to study the practical translation of the LHS concept into an existing healthcare provider system from strategic management level to operative level close to clinical practice. Starting from the desire to accelerate digitalization in the context of psychiatric care, the specific questions of interest are:

1. How can LHS principles be realized within existing organizational structures?
2. How can emergent improvements be combined with controlled scale-up of innovations?

3 | METHODS

A longitudinal AR study[43,44] was conducted from September 2020 to September 2021. The study was prospective in the sense that it started from the general and dual aim to improve healthcare practice by digitalization and collect data for scholarly analysis. Soon, the focus was narrowed down to increasing the likelihood of creating a successful application of LHS and contributing to the scientific field of LHSs. The setting was the psychiatric departments of the Sahlgrenska University Hospital in Gothenburg, Sweden. The five departments together had 2000 employees, were divided according to diagnose groups, and provided both in- and out-patient specialist-level mental care for 700 000 citizens. The heads of the five departments cooperated in a board at division level within the hospital. This level of management and cooperation is in this paper referred to as division level.

3.1 | The AR approach

The initial aim of the AR project was to design a new organizational structure to accelerate digitalization and digital means to improve care efficiency. An AR team (in this paper referred to as "the AR team")

was formed, consisting of five members with different competencies and experience, and with the main author of this paper as project leader. Two of the AR team members were physicians and three psychologists, three had experience of first- and second-line management (whereof two were active managers). Four members were PhD students, whereof two in organizational science and two in clinical sciences. The AR team met weekly during the project and meetings with a steering group consisting of the heads of departments were held monthly. The abductive research process was designed based on Elg et al,[45] as described in Figure 1. In the process, the AR team acted as translators of knowledge and management innovations.[38,46] The team members' joint competency in both organizational matters (eg, LHSs and quality improvement) as well as clinical matters and preunderstanding of the organization allowed "contextual bilingualism, which means that the translators should have thorough knowledge of both the source and the recipient contexts."[38(p299)]

3.2 | Data collection

Data was collected holistically[47] and, hence, no types of data were excluded by principle. The data collected consisted of continuous field notes made by the first author, documents and presentations used in the project, and visual documentation from four nominal group-based workshops[48] (whiteboards, notes, and Miro.com). Three of the workshops were focused on an inventory of problems and one on vision and prioritizations. Recordings of six AR team meetings (lasting between 46 and 158 minutes) were also made. In these meetings the team jointly reflected on the process and themes from practice and theory, based on the research design. In the last recorded meeting, a preliminary analysis of the research findings was presented for verification and adjustments.

All AR team members and participants in workshops and steering group dialogues gave their informed consent to participating in the research study. Approval from an ethical committee was not considered necessary, as no patient data is included and the study has a purely organizational focus.
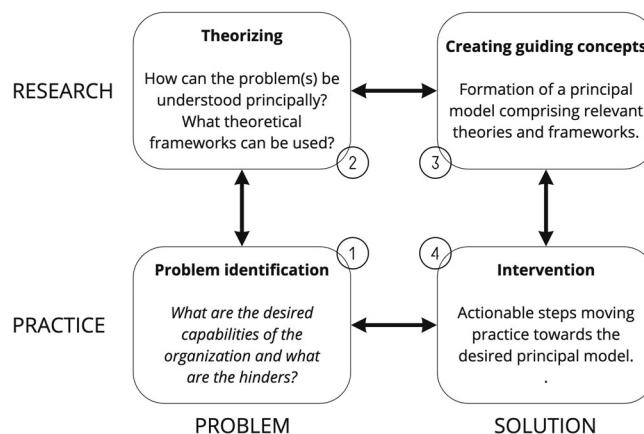

FIGURE 1 The action research design of the study, adapted from Elg et al[45]

3.3 | Data analysis

An insider-outsider approach was applied,[49,50] with an outsider researcher (the second author of this paper) with access to all data involved in the analysis for complementary perspectives, strengthened dialogic, and process validity.[51] In line with the abductive design[52] analyses of collected data were made continuously throughout the study, involving both the AR team and the outsider researcher.

4 | RESULTS

4.1 | From organizational needs to LHS model

Starting from the heads of departments' assignment to accelerate and coordinate the digitalization of psychiatric care, the AR team set out to identify potential problems. Following the design as presented in Figure 1 the AR process is outlined in Figure 2. The AR team (1) organized workshops with staff working with digital development, operations coordinators, and heads of departments to identify vital dimensions of the current situation and find root causes for existing problems. The identified problems were then (2) analyzed in relation to theoretical frameworks suggested by AR team members and the outsider researcher, to (3) form a model to guide further interventions. Several key problems concerned the need for reliable data for quality improvement, operations management, and for leading implementation and scale-up of innovations. Therefore, the AR team chose LHSs as the central theoretical framework for the guiding model, even though the model and the continued work were also influenced by other theories, such as *design thinking,*[53] *diffusion of innovations,*[19,54] and *relational coordination.*[55] The AR team (4) initiated an intervention consisting of five activities aimed to pave the way for learning cycles at unit and department levels (eg, database development, improvement science education, and handbooks for how to structure data input in IT systems), forming a technical backbone for the LHS. Parallelly, the AR team (5) revisited the identified problems to examine
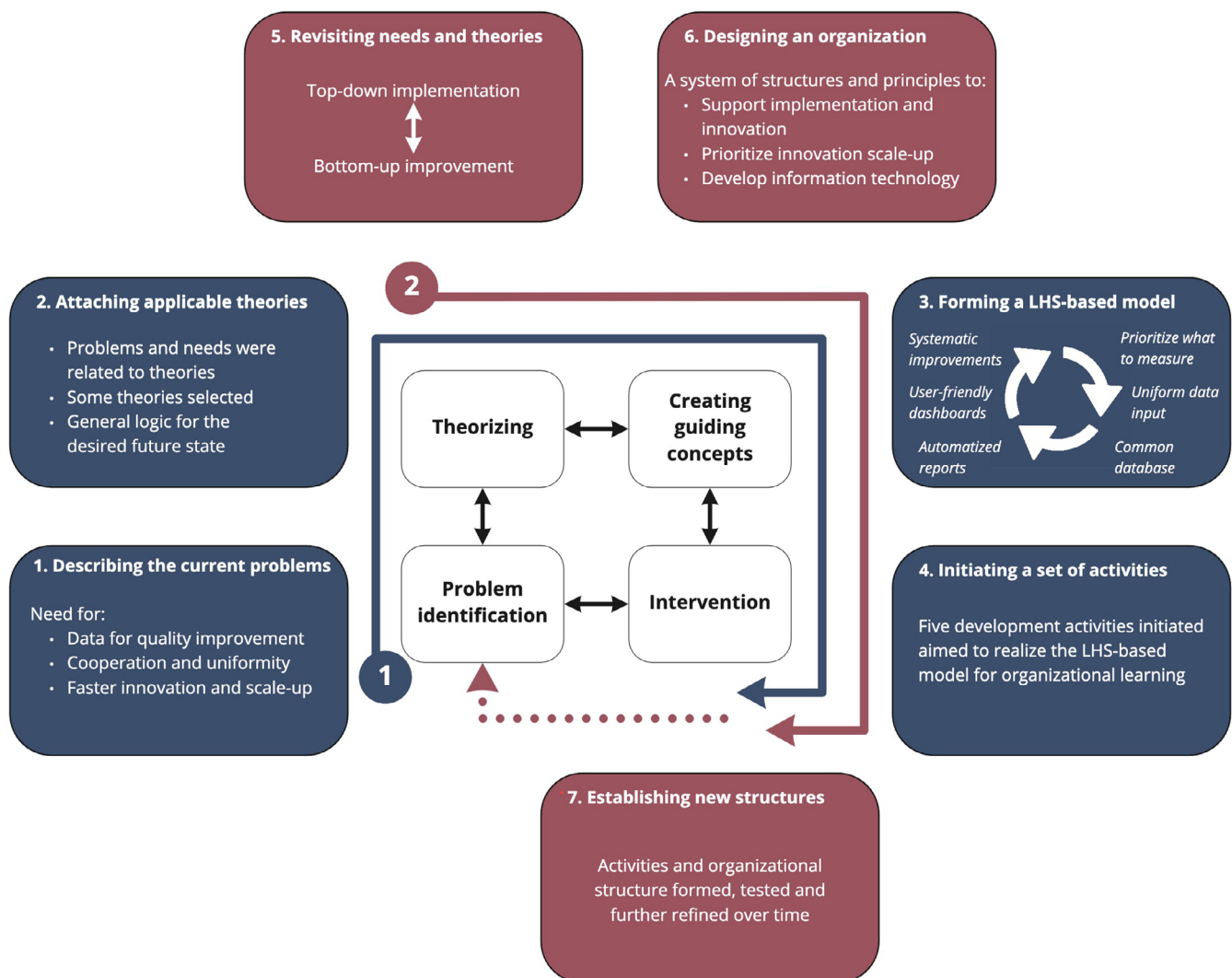

FIGURE 2 Overview of the study process in relation to the action research design. The process resulted in activities and an organizational structure connected both to the principles of Learning Health Systems (LHS) and existing structures and logics
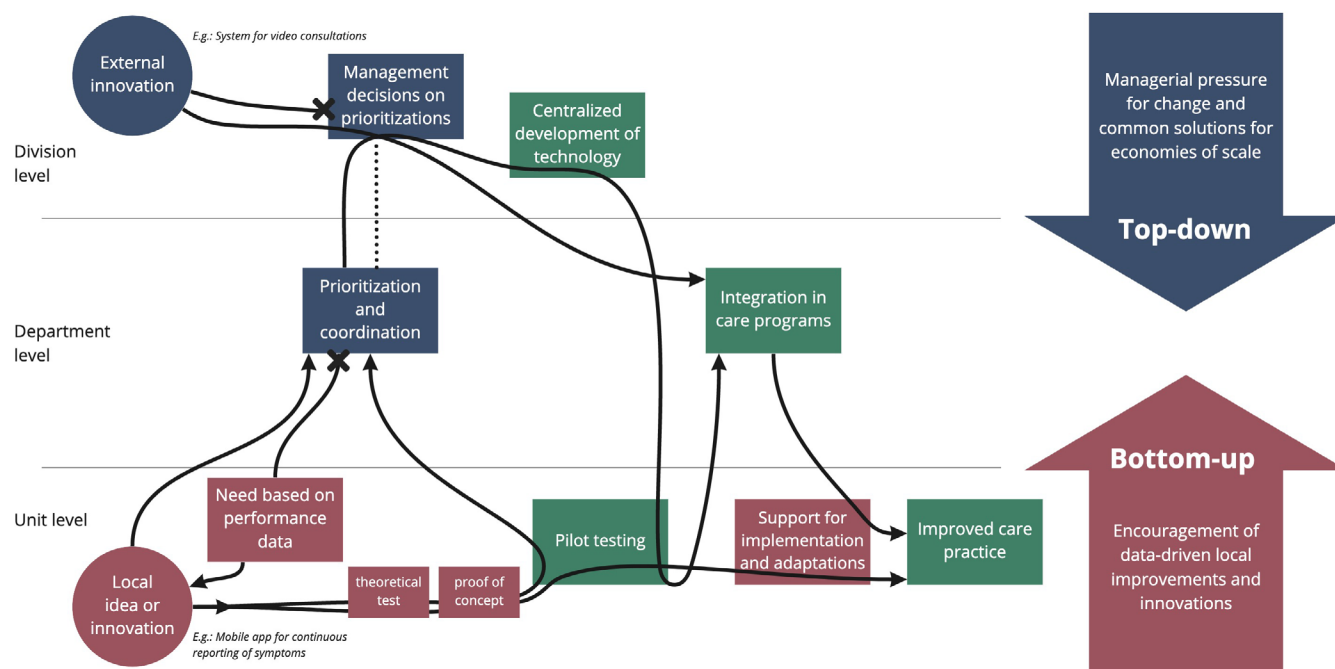
FIGURE 3 Example of how aspects of the organizational structure (boxes) were tested using fictive cases (circles) by the action research (AR) team. The aim was to find a balance between top-down (blue) and bottom-up (red) approaches, completed by mediating processual steps and functions (green). Emanating from internal units or external sources, ideas, needs, or innovations can take numerous different paths (arrows) in the structure. The structure allows for centralized prioritization of the most promising practices as well as integration and coordination with existing care practices. Forums on department and division level share participants and make prioritizations in dialogue (dotted line). Not all potential paths are presented in the figure

aspects that were not addressed by the intervention. They identified remaining problems that concerned the need for organizational structure, prioritizations of implementation initiatives, and development of a more coherent and cooperative that culture was not clearly addressed. Hence, they (6) designed a set of organizational structures and principles for the continuous work with digital development and organizational learning, forming an organizational backbone to support LHS principles. In the continued process (7), the technical and organizational backbones of the LHS will be set up, tested, and further refined over time.

4.2 | Development from bottom or top?

In the attempts to form organizational structures and principles for the continuous work with digital development and organizational learning, the AR team encountered a fundamental controversy, which the LHSs concept was not able to resolve. On one hand, the heads of departments (whereof one was part of the AR team) asked not only for an acceleration of digitalization in general, but also for economies of scale and a broader spread of innovations. Their intuitive management approach was to find ways to exert more top-down pressure on first-line managers and they desired more data and reports on operational performance and care results to better lead and control the organization on a strategic management level. Data on outcomes were also valued as a tool to show the relative advantage of new (digital)

ways of working. The AR team members with a background in quality improvement, on the other hand, argued that learning and innovation must start on an operative level, in the clinical microsystem. They meant that a bottom-up approach, in which health professionals and first-line managers have insights into the performance of their own units and conduct data-driven improvement work, have better chances of engaging all actors and bringing about successful and sustainable operational change. In this view, informal and cross-organizational networks are an important path for the spread of innovations.

Even though advocates of both perspectives had some understanding for the other perspective, fundamental differences in the views remained, which were not easily resolved. The bottom-up view assumed that fostering a cooperative culture, providing competence in quality improvement, and presenting valid and relevant data to employees would drive improvements and innovations. Continuous monitoring of performance data would help the staff to learn about their delivery of the healthcare service and support the development of local best practice and improved efficiency. Advocates of the top-down approach questioned that available data without accompanying hierarchical management directives would lead to any, or enough, transformation. Risks of divergent development and missed chances of economies of scale were also cautioned for. This skepticism toward pure bottom-up development in an LHS was based on experiences of organizational inertia and a perception that the organizational culture in many units was to distrust data and external innovations, rather than to cooperate and be inspired by best practices. Active efforts to

increase cooperation and create a common culture were expressed as important needs, to create a more coherent organization.

The AR team discussed these issues repeatedly and finally agreed that the existing organizational culture(s), including distrust in the ability of data to capture real outcomes, currently disqualifies the approach to solely rely on learning cycles for learning and development. On the other hand, there was agreement on an LHS with development distributed to all organizational levels and relying on continuous monitoring of data as a desired future state. However, in the current situation, top-down control and fostering of bottom-up improvements was seen as necessary to balance.

To design an organizational structure competent of balancing bottom-up and top-down, the AR team started from the existing hierarchy and proposed local forums for data analysis involving care professionals, department-level coordinating groups, a joint support unit, and a division-level board for prioritizations. Fictive cases were used to test and further develop the structure, as exemplified in Figure 3. Finally, the AR team and the heads of departments agreed on an organizational structure aimed both to balance bottom-up and top-down approaches, and to advance the organization toward a cultural change eventually allowing less top-down control.

5 | DISCUSSION

LHSs offers an attractive vision for how healthcare can take advantage of the accelerating development in digitalization to achieve long-sought improvements of quality and practices. However, the present study shows that the path from a theoretical and generic model to a locally adapted practice that generates results may be long and complicated. The paper provides hands-on insights into a process of realizing the LHS concept in an existing care context. For example, we identified challenges connected to differences in organizational culture both between departments and hierarchical levels, impairing internal cooperation. Similar differences have been reported between stakeholders[16] and we suggest that they may exist within a single provider organization, in line with Harrison and Shortell.[13] Moreover, we recognized a need to operationalize the LHS concept in terms of concrete organizational structures that matches existing hierarchies to lead a transformation to an LHS based on networks and bottom-up learning. Based on the in-depth study presented, this paper provides two key takeaways: (1) applying a translation approach to the implementation process and (2) recognizing the need to balance top-down and bottom-up approaches.

5.1 | A translation view for realizing of LHSs

All efforts for change need to consider the context, especially if the change is aimed at managerial or organizational structures.[56] LHSs is a sociotechnical concept that encompasses fundamental aspects of both organizational structure, culture, and technology and, hence, the existing organization must be carefully considered. A thorough understanding of

current perspectives of different stakeholders, and cultures for how learning and development occurs, is necessary to design interventions and motivate people for change. Also, leaders of the transformation into an LHS need to have enough social capital and trust among organization members to get over the initial barriers to the development of a culture of continuous learning. As this study shows, adopting the view of management innovations as *translated* into an organizational context allows for flexibility and sensitivity to contextual prerequisites.[35] Hence, we argue that translation entails better chances to succeed in designing a functional and sustainable solution for a unique target organization, than if the process is seen as a mere mechanistic implementation. To conduct the translation successfully (ie, in a way so that organizational goals are met), translation competence is needed, implying bilingualism in the specific concept being implemented and the local organization.[38] This study demonstrates that applying an AR approach to the translation process is a good way to create a thorough understanding of the context and the holistic inclusion of all relevant perspectives that is necessary to conduct a successful translation. An AR team consisting of both scholars and practitioners have opportunities to share perspectives, achieve bilingualism, reflect, and learn along the process, and to possess sufficient translation competence.

5.2 | The conflict of top-down vs bottom-up

In this study, the AR team perceived cultural challenges and lack of internal cooperation between departments, which led to a controversy between two different legitime perspectives. These two perspectives were negotiated against each other to find a suitable level of adaptation of the LHS concept. On one hand, pursuing economies of scale through common ways of working and broader scale-up of innovations, a top-down view was suggested for how to drive development. This view emanated in traditional management practices where top-down control is an important component.[28,57] However, the top-down view is also often assumed in LHS literature as one means for the spread of best practices (eg, references 13,18). On the other hand, LHSs was interpreted as implying a bottom-up view on development,[28] starting from the emphasis in LHSs literature on learning at all levels[13,15] and in self-organizing networks.[58] Thus, the conflict of top-down vs bottom-up was revealed in the meeting between the concept and a real-life context, but the conflict is also intrinsic to the LHS concept. Hence, all organizations aiming to be LHSs need to strike a balance between top-down and bottom-up approaches. That balance, in turn, have critical impact on what shape the unique LHS will be translated into. The concrete solution presented in this paper includes centralized resources to support learning at all levels and an organizational structure of forums allowing prioritizations at the department level (for specific diagnose groups) and at division level (for psychiatry in general). Thus, the solution aims to find a balance between the two approaches but with the long-term goal to allow a greater emphasis on bottom-up. Importantly, even though increased bottom-up development is seen as the goal, we view the pursuit of an LHS as an ever-ongoing journey rather than a concept

that can be fully implemented and "done." However, over time LHS principles can become more integrated in the culture and traditions of the organization and, hence, reach a higher degree of maturity. In this case, we believe that the dedication of first-line managers and professionals in leading roles is essential for the impact and sustainability of the project. Education and involvement of these groups should therefore be a priority, as well as design of relevant and visually easy-accessed dashboards facilitating bottom-up learning.

The conflict of top-down vs bottom-up is rarely discussed in relation to LHSs. Rare exceptions are Pronovost et al,[59] who noted a need to balance independence and interdependence, and Chambers et al,[23] who outlined LHSs and implementation science as separate but compatible perspectives. Furthermore, both Harrison and Shortell[13] and Safaeinili et al[24] acknowledged cross-level interactions as an essential factor for LHSs and, in contrast to other related frameworks, indicated the importance of recognizing intermediate organizational levels (eg, middle management). This study supports those findings and challenges the view of LHSs as a solution where stakeholders are assumed to automatically align to irrefutable and uniform best-practices.[14,15] In practice, "learning cycles at all levels" does not automatically lead to the same conclusions and development at all levels. Hence, a balance needs to be actively chosen in every unique LHS application.

The case presented in this paper focuses on digitalization in the context of psychiatry, which entails some unique challenges. Psychiatry and mental care is a field characterized by a tradition of individualized treatment and debate on the use of manual-based interventions which, in the context of this study, is still an ongoing issue among some groups of professionals. Standardized follow-up is sometimes looked at with skepsis and even though many psychometric instruments exist, there is a lack of consensus on how to measure outcomes.[10] Therefore, internal discussions often stop at validity and relevance, which constrains learning from the data. Green et al[60] also show substantial disconnects between the perspectives of providers, families, researchers, and patients in psychiatric care. The authors believe that this skepticism toward standardized treatment and measurement is more pronounced in psychiatry than in, for example, internal medicine, oncology, or surgical specialties. LHSs focused on quality and patient safety in more traditional areas may be less complicated to implement, in terms of stakeholder alignment and cultural change, than LHSs associated with implementation of new ways of delivering care. These contextual aspects of LHSs can be fruitful paths for future research.

6 | CONCLUSIONS

This study adds to LHSs literature by providing in-depth insights into a real-world effort to change an existing care organization into an LHS. The findings are also of practical relevance for practitioners engaged in LHS implementation, especially for department- or division-level management. Two main suggestions are made. First, we argue that adopting a view on implementation as a process of translation is a fruitful approach to create an LHS. Conducting the translation

as an AR study can be advantageous for both realization and study of LHSs. Second, we argue that in a process of translation, top-down and bottom-up approaches need to be considered and balanced to make the LHS fit the recipient organization. Overly focus on controlling development and scale-up of innovations can result in resistance or missed chances of engagement among care professionals. Overly reliance on emergent improvements, on the other hand, can result in status quo or divergent development, missing the chances for economies of scale. Specific solutions for how to balance top-down and bottom-up approaches need further investigation, as do also the processual aspects of LHS translation.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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