The bridge to possible

Designing a better patient experience through information systems

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Introduction

In a clinical setting, the experience of care is delivered through the complex and often subtle interaction of patients with their environment, incorporating its staff, facilities, services, and the processes which coordinate them. In a modern digital hospital, the facility's digital information systems choreograph and frequently mediate these interactions. As hospital care evolves, digital information systems move towards the centre of creating the patient and staff experience.

Hospital design has been centred around patient experience for many decades, however, digital systems are mainly incorporated in a fragmented fashion; deployed to resolve isolated issues, often underutilising the ability of digital information systems to create a widespread and coordinated transformation of experience. In part, this results from the lack of a framework that describes an experience in terms that can be related to information systems capabilities.

The complexity of experience limits our ability to describe its linkages to technology. The framework described in this paper takes a highly distilled approach to experience. It defines it in terms of an individual's interactions with their environment and how these impact the manageability, comprehensibility, and meaningfulness of their care journey. Known as Sense of Coherence, this is a well-established model for assessing an individual's resilience to stressors in their environment and is used in this new framework as a practical characterisation of an individual's experience.

Applying the Sense of Coherence approach to healthcare experience design enables clinical process designers to describe explicitly the experience they wish to generate in terms of an individual's needs for manageability, comprehensibility, and meaningfulness. In partnership with information architects, they can link these detailed experiences with the information systems capabilities using well-established information capability frameworks. This then enables a clear understanding of a facility's ability to deliver a desired set of experiences and to identify any technology capability deficits of the current (or planned) information infrastructure.

This paper takes you through an overview of the experience framework, including creating the underpinning experience statements and technology capability assessment. It also describes how the framework can be applied in a healthcare setting and the potential outcomes that can be achieved.

This framework provides a new, unique perspective on how information infrastructure can contribute to supportive health promoting environments and the patient experience.

Digital transformation in health care

When patients visit a hospital or are engaged in any part of the health system, it is the information systems and associated digital technologies that have a pivotal role in influencing their overall experience. Whilst there is extensive research on how hospitals might better deliver information technology to improve process, until now, there is little information on how this technology influences a patient's experience and the decisions patients make during their episodes of care. A positive experience involves effective communication and interaction between clinicians and patients and the systems which support care. Digital infrastructure is the primary vehicle for orchestrating these interactions.

The challenge with the deployment of digital technologies is that their introduction is often focused on isolated outcomes, such as the quicker delivery of a specific piece of information, the reduction of an individual process time, and the lower cost of a service within a complex system. While all these types of measures are important, they are focused on single outcomes and can be disconnected from the overall success of a patient's long-term healthcare journey. The reason that patient experience has risen to such prominence is that we now understand better how the long-term outcomes for a patient and the overall cost of care delivery are improved when the patient is a partner in care[i]. This partnership is built around the patients' experience in the healthcare system.

Consequently, the **digital transformation** of a healthcare system needs to be built around the **experience transformation** of both the patient and the staff within that system. This link between technology and experience has not been central to many digital healthcare "transformations", often resulting in poor acceptance and under achieved outcomes. This is largely a consequence of a lack of understanding of how to bring together experience objectives with technology functionality, that is, the lack of a common language to link these two important domains.

The Information Infrastructure to Experience Framework (IIEF) outlined in this paper is designed to address this gap. It describes the experience transformation that the healthcare provider is intending to deliver in terms that enable the supporting digital technology transformation to be designed. In doing this, it also provides ongoing guidance for future technology and experience decisions as the needs of the organisation evolve.

Linking Experience with Technology

Experience is a complex concept. The interaction of the environment with us (process, people, and place), our past experiences and our present mood, amongst many other factors, all contribute to our current and remembered experiences. This complexity is a significant barrier to establishing a framework which guides the use of technology in supporting experience. To address this challenge, we take a very specific definition of experience, look only at how environmental interactions affect an individual, and use a well-established model for those interactions, called Sense of Coherence. Sense of Coherence theory describes the resilience of an individual to cope with stressors in their environment. In doing this, it structures the environment in terms of the capabilities that have an impact on manageability, comprehensibility, and meaningfulness to an individual. In the IIEF, we look to enhance experience through optimising these environmental capabilities through the organisation's people, place, and process.

People (or resources they engage with) utilising the infrastructure.

An example of a patient experience statement would be: *"I feel listened to and valued by my carers. There is clear communication between my care team that enables me to feel I have the control."*

Places where the information systems are utilised.

A place can be whole-of-hospital, specific hospital units, externally dependent campuses, or car parking, among others. An example of a patient experience statement would be: *"The environment is responsive to my emotional state and creates a calm and supportive atmosphere."*

Processes that are dependent on the information systems.

For example, nurse call, bed management or task management. An example of a patient experience statement would be: *"I can engage with and appropriately manage the processes and systems to support me in a manner that is optimised to my preferences."*

The benefit of a Sense of Coherence approach is that it enables an organisation to explicitly describe the experiences that they wish to generate for the patient or staff in terms of experience statements relating to the environmental capabilities. Using this approach, it is possible to align digital technology capabilities to support the delivery of those characteristics. The assessment of digital technology capabilities in healthcare is dealt with in a previous study[ii] and forms the core of the HIMSS INFRAM digital infrastructure maturity assessment. This architectural model of healthcare information technology maturity enables the aggregation of technologies into capabilities to directly support the Sense of Coherence characteristics. The ability to describe both experience and technology through a common set of characteristics generates a framework to link experience to technology and enables the critical integration of an organisation's experience transformation with their digital transformation.

Sense of Coherence

Sense of Coherence is a well-established approach to understanding how individuals in a community respond to the stressors in their environment. One of the outcomes of this approach is to provide a model for describing the impact of the environment of an individual or a community. It does this by characterising environmental stressors in terms of:

Manageability

The behavioural or instrumental component, that relates to the experience of managing day-to-day physical realities. i.e. staying warm, dry, clean, rested, and nourished.

Comprehensibility

This is the cognitive component and is based around patient expectations. It refers to the experience of making sense of a situation and its predictability.

Meaningfulness

The foundation of the desire to live, and a belief that things in life are interesting, satisfying, and worthwhile.

In terms of delivering the healthcare experience within an organisation, this approach provides the opportunity to explicitly define the experiences, both current and desired, and focuses on the drivers of these outcomes rather than the specific process deliverables. This approach works alongside the widely used survey methodology, where patients' preferences are rated, and extends this work into better understanding of why patients or staff prefer a given experience. This is a collaborative process, bringing together patients, care providers, and technologists to define both the reality and aspirations of the organisation in a format that relates to technology capabilities. It provides a clearer definition of what the organisation and its stakeholders consider as a "good" experience and in doing so, provides a guiding direction for technology, influencing not only near-term decisions but also the future of an evolving organisation. Such an approach looks to actively drive the better engagement of people, facilities, and technology in the creation of new and innovative experiences.

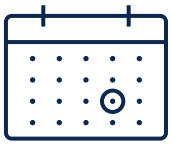
How technology supports experience

In the IIEF, the experience of the patient is defined in terms of multiple sets of experience statements which characterise either the existing or future desired patient experience. These experience statements are developed to characterise the desired manageability, comprehensibility, and meaningfulness in terms of the three aspects of the patient's environment: people, place, and process, forming a comprehensive experience requirements map.

Once this experience requirements map is completed, the delivery resources that are required to support the experiences are defined. Within the Sense of Coherence model the delivery resources are grouped into Information systems capability categories. For healthcare we have found the most useful groupings to be:

Teaming and sharing

Simply and conveniently bringing together clinicians, patients, and carers in the most appropriate format (pairs, groups, teams, and embedded into clinical workflows) to share information and emotion, and enable the processes of care delivery and social support, minimising the barriers of distance and timing.



Scheduling and coordinating

Linking the clinical, patient and carer's engagement with scheduling and booking functions within the hospital, to enable clear communication and management of activity timing to all participants, staff and systems in each stage of an individual's patient journey.

Monitoring and reporting

The ability of patients, carers, and clinicians to access, interpret and add to patient progress data, evaluate patient compliance, and modify the engagement to optimise clinical and personal outcomes.

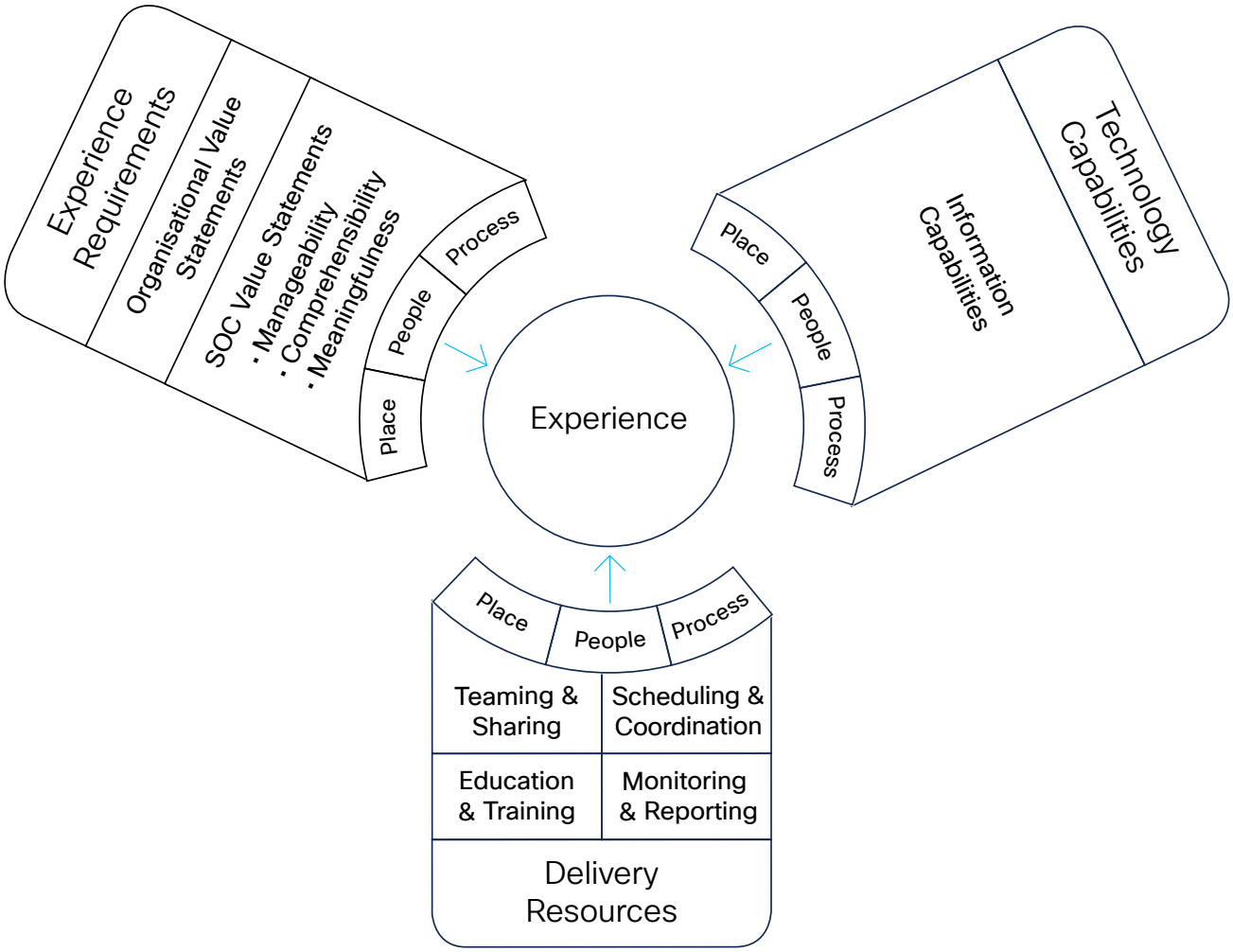
Education and training

Supporting the patient experience by providing education, training, and research materials at the right time and in the most appropriate format. Training staff on the use of IT and basing decision-making on information capabilities, is part of clinician development.

This stage of the process converts the experience requirements map into a technology requirements map enabling the characterisation of the applications, devices and information infrastructure required to support the desired patient or staff experience for each of the patient environments (people, place, and process).

Once the delivery resources are defined it is possible to define the technology sets required to create those resources. In doing this it is possible to leverage the established INFRAM information technology maturity framework to determine the required information infrastructure and how the facilities existing capabilities compare with these needs. This three-stage process is outlined in Figure 1 below.

Figure 1: Information Infrastructure to Experience Framework.



Use of the Information Infrastructure to Experience Framework

The framework can be applied in two ways, either to define a future experience state of an organisation and its supporting technology requirements, or as an assessment tool to evaluate the current information infrastructure in relation to the organisation's existing experience goals.

The starting point of both approaches is an evaluation of the organisation's existing mission, goals and patient experience documentation and the translation of this into an "existing state" experience map. This requires examination of existing documentation and discussion with leading management, clinical staff and patient representatives to obtain a clear understanding of the actual current experience and any difference from organisational expectation.

If the objective is to complete a current state analysis, then an audit of the experience delivery resources and an INFRAM assessment of the technology infrastructure is completed. These data are then brought together in an assessment of the experience aspirations, current state experience and the experience capabilities of the information infrastructure.

Alternatively, if the objective is to create a vision of an experience transformed organisation, then, in addition to the current state analysis, the development of a future state set of experience statements needs to be developed. This is done through a series of round table discussions with technologists, managers, care providers, and patients. The required delivery resources and information infrastructure are mapped from these discussions. This map is compared with the current state capabilities and consequently a roadmap for technology improvement is developed.

A typical set of project stages, timelines and output, for the evaluation of an organisation's aspirational experience technology competency using IIEF is as follow:

Stage 1: Aspirational Experience Evaluation:

This evaluation is drawn from the organisation's Mission, Vision, Objectives, and operational strategic plans, including key result areas and performance indicators. This data comes from published strategy documents and interviews with selected executive directors. The information is aggregated into the Sense of Coherence domains of manageability, comprehensibility, and meaningfulness for the operational environments of place, people and process.

Output: A map of the aspirational experiences of the organisation presented as sets of experience statements for each Sense of Coherence domains.

Time Required: The collection and supply of existing strategy and operational management documents, plus 45-minute interviews with each of the selected executive directors. This work can be done in person or remotely using video conferencing.

Stage 2: Current Experience Mapping:

This stage focuses on an "Insight Discussion" where selected clinical leaders, operational leaders, and patient representatives engage in a closely facilitated discussion on the processes and experiences that are successful and not successful within the organisation. These comments are distilled into a draft map of experiences, categorised by the Sense of Coherence domains (manageability, comprehensibility, and meaningfulness) and the operational environments of people, place and process. This map is then reviewed and finalised through discussion with clinical and operational leaders into a map that is reflective of the real experience landscape of the organisation.

Output: A map of the real experience landscape of the organisation with detailed sets of experience statements in each of the operational environments and a view of the vital experience delivery resources.

Time Required: 2-hour Insight sessions plus 60-minute review sessions with selected executive directors to review the draft output. There will also need to be a clinical and an information technology lead that the team can work with to clarify clinical and operational processes.

Stage 3: Technology and Process Capability:

The organisation's information technology group completes an information Infrastructure assessment (INFRAM) and the documentation of their major information applications to assess their Information Capabilities and process delivery capabilities. This last phase of looking at the delivery capabilities combines the work from the previous stages of experience mapping, which will give guidance on which processes are working and which are not working from a stakeholder's perspective.

Output: An INFRAM maturity score and explanation documentation, plus an assessment of the existing information capability and the resultant experience delivery resources within the organisation.

Time Required: 45-minutes with each of the ICT leaders for the INFRAM domains (mobility, security, collaboration, transport, and data warehousing) plus 3 hours with the ICT leader examining the primary information process applications.

Final Output

An integrated report is generated which details the experience landscape, documenting the current experience and aspirational desires of the organisation, using a Sense of Coherence structure. This report identifies the major technology and process gaps to be addressed to achieve the agreed experience goals.

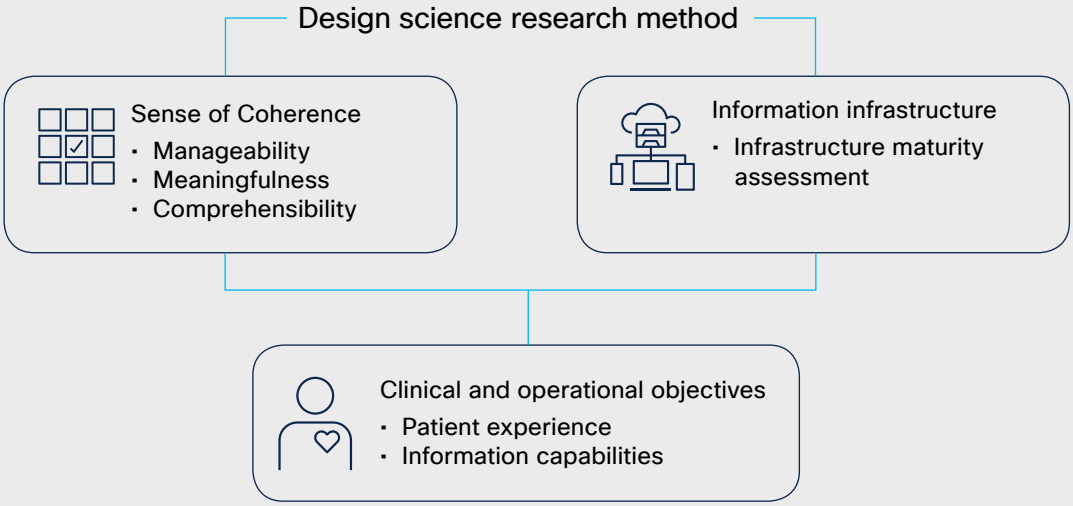
Unique differentiation

Using the Information Infrastructure to Experience Framework facilitates a new approach to healthcare experience design. The process enables clinical designers to describe explicitly the experiences they wish to generate in terms of an individual's need for a Sense of Coherence (manageability, comprehensibility, and meaningfulness). In partnership with information architects, it is then possible to link these detailed experience statements with the organisation's information systems capabilities using well-established digital frameworks. Through this analysis, the organisation can better understand its ability to deliver the desired set of experiences, and the technology deficits that need to be addressed.

Healthcare needs to accelerate design of innovative physical and hybrid physical/virtual care delivery processes, enhancing the strengths of our clinicians and physical care facilities with information technologies that better reflects patient needs.

Assembling Information Systems to Design Better Patient Experiences

Successful **patient–health care organization (HCO)** interactions depend on information infrastructure, which helps patients and staff collaborate optimally to achieve objectives



Key outcomes

Defining a positive, supportive health care experience linked with information technology capabilities

Enhancing HCO assessment of current information infrastructure to support and enhance patient experience

Fundamental shift in thinking about information infrastructure use can transform patient experience

Experience-oriented information infrastructure framework to help technology improve patient experience

Summary

This framework provides a new, unique perspective on how information infrastructure can contribute to supportive health promoting environments and the patient experience.

The way forward

The research underpinning this white paper[iii] demonstrates how a fundamental shift in the way we think about the use of information infrastructure can transform the patient experience. Reflecting the organisation's vision, mission and values into a comprehensive set of explicit technology enabled experience outcomes has the potential to drive a major evolution in the way hospitals can reimagine its IT and information infrastructure, creating new and powerful patient centred synergies between people, processes and systems.

This growing area of exploration into information capabilities, as well as a wider range of Delivery Resources and their possibilities, has the potential to branch into other industries and settings. The IIEF can also be applied to other healthcare service provider organisations or used internally to address staff experience and how it could be improved and better supported in terms of information infrastructure.

The next step in digital transformation will be the support of new models of care, such as location agnostic 'care anywhere' and virtual care. Whilst the IIEF focusses on inpatient care, the capability can be extended to facilitate these new models.

This framework enables realisation of an increased value of existing digital infrastructure and the services and information capabilities it can provide. The IIEF applies across the end-to-end continuum of care, from scheduling pre-visit, care delivery to post-care management. This fundamental shift in the way we think about information infrastructure can transform patient experience.

The Information Infrastructure to Experience Framework (IIEF) provides a bridge where the imagination of clinical care designers and information technologists can coalesce to envision new ways of delivering physical, virtual and hybrid models of care explicitly designed around the patient experience.

i Frezza, E. (2019). Patient-Centered Healthcare : Transforming the Relationship Between Physicians and Patients. Milton : Productivity Press.

ii Williams, P. A., Lovelock, B., Cabarrus, T., & Harvey, M. (2019). Improving Digital Hospital Transformation: Development of an Outcomes-Based Infrastructure Maturity Assessment Framework. JMIR Med Inform, 7(1), e12465. doi:10.2196/12465.

iii Williams, P.A.H., Lovelock, B. and Cabarrus, JA. (2022). A Sense of Coherence approach to improving patient experience using information infrastructure modelling: Design Science Research. JMIR Form Res 2022;6(4):e35418. https://formative.jmir.org/2022/4/e35418/ doi: 10.2196/35418. PMID: 35307641.

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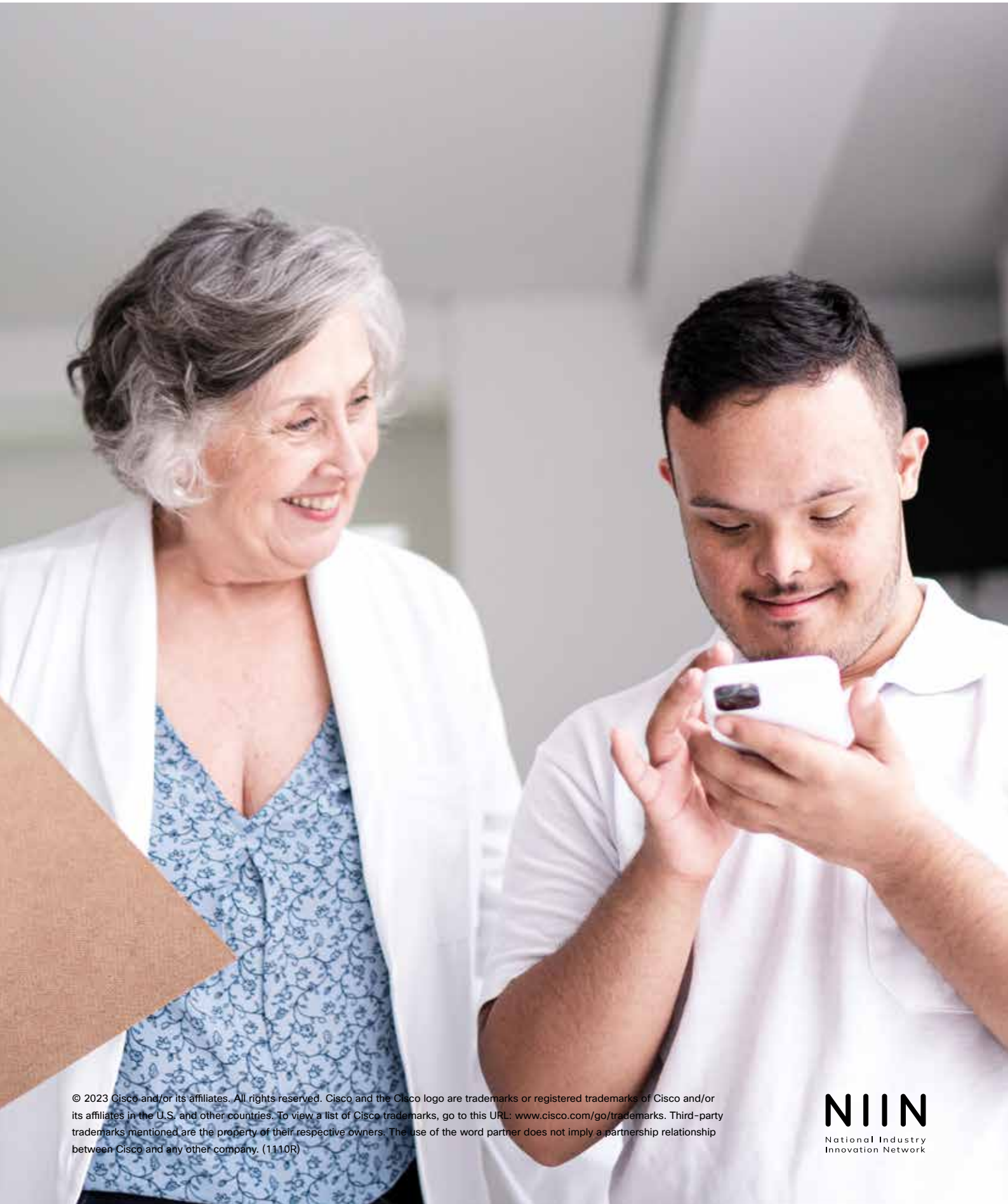

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