

Capturing the Opportunity of Digital Transformation in Healthcare

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Introduction

Healthcare in the 21st century needs to adapt to the rapidly changing environment it faces. It needs to do this while also ensuring the delivery of safe effective services to individuals with compassion at a time of great stress. The challenge in doing this is great, healthcare is a heterogeneous endeavour, with many aspects being specific to an individual provider or patient. The body of knowledge is rapidly expanding and this knowledge needs to be shared and coordinated across a growing multi-disciplinary team. This complex team nature of care is more than just having many different care professionals delivering services to an individual. It requires them to work together, to collaborate, to provide the best possible outcomes for the individual. Information and how it is provided and consumed is central to addressing these challenges.

But there is no universal way to do this, as each team will have its own unique requirements and restraints. By enabling each team to best utilise its own resources, and take advantage of knowledge and expertise outside their team, we can enable them to develop models of collaboration and care delivery that allows them to continuously improve their services, enhance their skills and deliver better outcomes. This requires a clear focus on the way information is accessed, shared and coordinated to create high quality clinical processes which are both efficient and adaptable to the complex individual needs to the patient and the supporting care teams.

Information is the key and information systems that are flexible to enable teams to develop solutions

that work for them are essential. Clinical teams need to develop solutions that best suit their situation. This requires a collaboration capability that is individual, team and process enabled, an information infrastructure that is efficient, adaptable and scalable. It also needs a security environment that is part of the fabric of the information infrastructure, that enables not restricts the secure and rapid sharing of complex and confidential data.

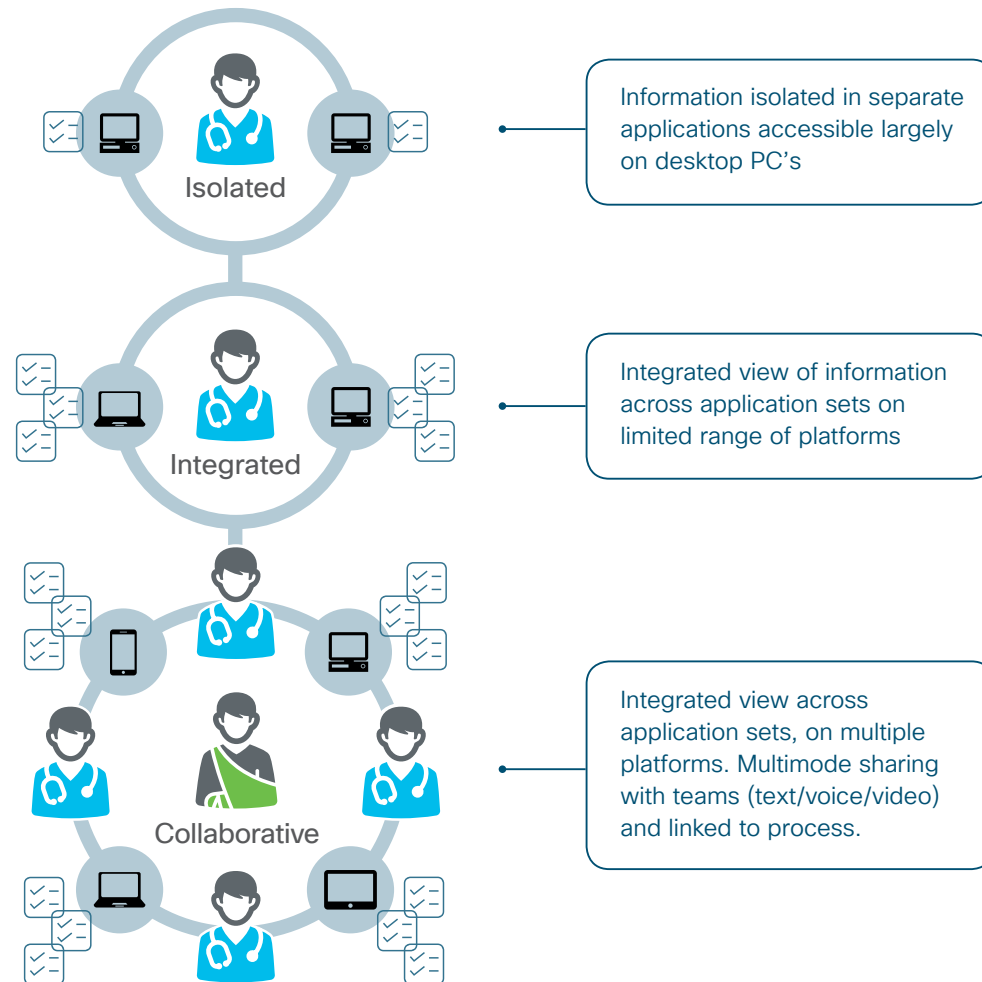
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The Role of Technology in Collaborative Healthcare

Healthcare is characterised by its relentless focus on the acquisition, processing and sharing of information to improve care. The transition from analogue (voice and paper) to digital has seen an interesting shift in balance to the almost endless capacity of digital systems to acquire and process information, but frequently limiting the ability to share information to our digital equivalent of an improved piece of paper, that is, the PC monitor. The implementation of technologies to share information has not kept pace with our ability to acquire and process it. The result is dissatisfied clinicians and patients, not fully reaping the benefits of the digital transformation of healthcare.

The opportunity is to reach beyond the relatively passive activity of point to point information exchange, and engage in the interactive practice of collaboration. But, collaboration that links all the elements of sharing, data, voice, video and location with processes, both clinical and social, that drive the delivery of care. This is the natural evolution of point to point sharing to process integrated collaboration, that will help deliver on the promise of the information value that is submerged within the mountains of data located within our digital systems.



The evolution from isolated information access to shared information collaboration

Optimising the Information Infrastructure

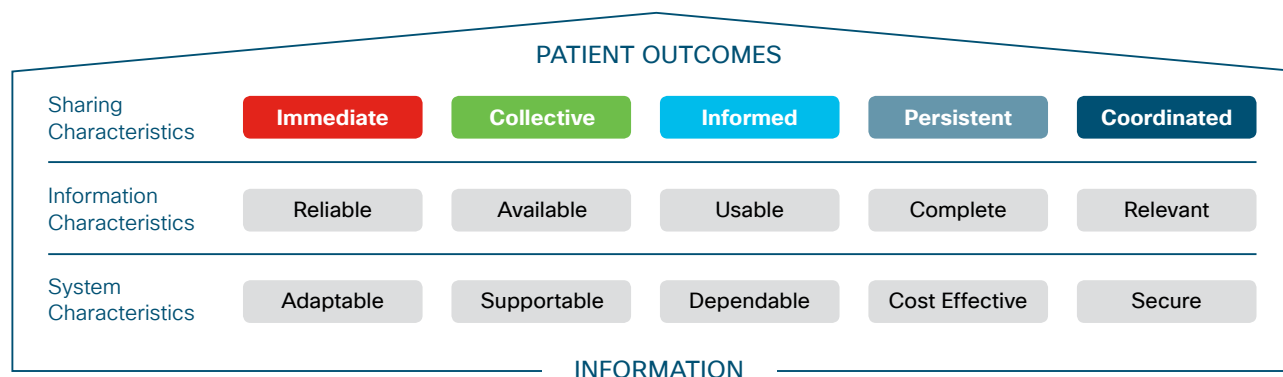
No matter where you fall on the information continuum from isolated information to collaboration, there are three sets of characteristics that need to be optimised. These characteristics form a framework that enables a structured view on how to enhance the delivery of information within a healthcare facility. The elements of each level of the framework are as follows:

The first level comprises the systems characteristics, these are the characteristics of the network architecture that define the sustainability of the system.

- **Adaptable:** To scale and conform to the evolving needs of the hospital
- **Supportable:** To conveniently maintain systems and manage change
- **Dependable:** To reliably deliver consistent performance to specification
- **Cost effective:** To deliver services with a cost that adds realisable value to the organisation
- **Secure:** To provide defence against and recovery from attack

These characteristics are delivered by a network designed to medical grade principles that leverage modern software defined capabilities such as Cisco's DNA architectures, linked with comprehensive security across the continuum of care.

The second level of the framework contain the information characteristics: how the infrastructure components are configured to create information services that are:



System, information and sharing characteristics for collaboration processes in healthcare

- **Reliable:** Information is available whenever it is required
- **Available:** Information is available wherever it is required
- **Useable:** Information delivered on/in an appropriate device/format
- **Complete:** Information contains all the context required for decision making
- **Relevant:** It is the information required for the task at hand

The optimisation of each of the information characteristics is driven through the Infrastructure Maturity Model which looks at the way in which hospitals enhance their use of information as their clinical and operational requirements evolve. A summary of the Infrastructure maturity model can be found on the Cisco agile hospital website at www.agilehospital.org

The final level of the framework describes the sharing capabilities. This is the optimisation of network and communication infrastructure that enables information to be shared in ways most appropriate to the task at hand, linked with the clinical and operational processes they are associated with. It is information that is time, location and task dependant. This ranges from point to point communication through to workflow integrated process collaboration. These capabilities are:


- **Immediate:** Rapid access to the individual
- **Collective:** Brings together multiple team members
- **Informed:** Information is aggregated from multiple data sources
- **Persistent:** The discussion is stored and supplemented
- **Coordinated:** Information is linked with workflow

Understanding the sharing capabilities is critical to empowering hospital staff and maximising the value of our information systems.

Process Collaboration

Building a more effective infrastructure for shared information use contains many technology types, including, mobility, quality of service, security, location services and task management. In this mix, the collective technology group that has the greatest power to transform an individual's engagement with information is communications. The future evolution of sharing, is about more deeply engaging the individual staff of a hospital, across multiple access technologies, using the integrated combination of images, text, voice and video. It is leveraging all the consumer capabilities of social collaboration into the secure environment of clinical process. This is the emerging domain of "Process Collaboration".

Process Collaboration encompasses accessing relevant clinical and operational information, freely on the most appropriate platform, the ability to share that information with others to come to a clinical decision and the capability to bring teams around that information to drive clinical actions. To understand this process of human to systems and human to human interaction that is time, location and task dependent it is necessary to segment the process into a series of stages with the appropriate characteristics as detailed in the earlier framework. These stages range from simple point to point communication through to full process collaboration.

Stage \ Characteristic	Immediate: Rapid access to the individual	Collective: Brings together multiple team members	Informed: Information is aggregated from multiple data sources	Persistent: The discussion is stored and supplemented	Coordinated: Information is linked with workflow
Separate Communications: Separate stacks for voice, video and data applications					
Mixed Communications: Single point linkage between individual voice, video and data communication stacks and device. Often driven through consoles and human intervention					
Unified Communications: Multiple devices with single interfaces integrating a mix of multimedia communications apps on a unified infrastructure					
Social Collaboration: Multiple devices with single interfaces integrating a mix of multimedia communications, collaboration, social networking, on a cloud based infrastructure					
Process Collaboration: Multiple devices with single interfaces integrating a mix of multimedia communications, collaboration, social networking, linked with workflow and key business application on both a secure cloud and on-premise infrastructures					

The stages evolution to process collaboration

The Healthcare Team: A Vision of Process Collaboration Enabled Care

We will look at the impact of a process collaboration enabled environment by tracking the interactions of the care team and their information and communication technologies during a patient's day in hospital. Our hypothetical patient will receive care from various clinical team members, need to communicate with a range of administrative staff, and in the background management and administrative staff will need to ensure that the highest quality care is being delivered utilising resources efficiently and equitably. At the same time, we want the patient to be well informed at each step what is happening, have the ability to ask questions and receive answers in a timely fashion, and keep their family and friends informed of their status.

Admission

Patient and family member arrive early in the morning for day of procedure. They will first meet the administrative person at the front desk who will ensure all their paper work has been completed. If the facility has the ability for online pre-admission forms completion then the process will be expedited as the admin staff check the accuracy of the data. This will be the first interaction with the hospital information system and the administrative staff have a critical role in ensuring the quality of data. This relates to both the clinical and management team, the former for expedited diagnosis and management, the latter for managing the logistics and finance of the facility.

After being admitted administratively, the next step is clinical admission. First, one of the nursing team will see the patient and confirm details. Whilst this process seems unnecessary the need for repeated conformation is important as often patients will remember relevant details at different times, triggered by interactions with different people. It is one of the reasons why it is important to have a collaborative tool that allows them to capture any relevant information about the patient and share it with the team. Often it is information that would be lost in the notes of the EMR but may be very relevant for a specific time. Religious requirements, contact details for key people, specific concerns that need to be addressed, the name of their children, or things that will help orientate an older patient are all details that can be very useful for the team as they interact with the patient over multiple shifts.

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Technology Approach

At the out-set a patient specific collaborative space is set up which enables members to communicate by text, image, voice or video as required and the communications is stored for future access. Files can be dropped into the space as needed. Information on their stay, procedures etc can all be stored within the collaborative space. Patients can communicate with family and carers as well as clinicians via the space. Clinicians are registered to the relevant patient spaces by their hospital scheduling system, they can see what other clinicians are involved and communicate with them seamlessly, and all team members can see what has been discussed removing the need for multiple communication of the same details.

Hospital Care

The doctor will see the patient next, the anaesthetist if in for a procedure, or someone from the admitting team if a medical admission. This may vary from the intern on the team to the VMO or staff specialist depending on the time of day and situation. This is another opportunity for improving care with the use of a collaboration tool. By being able to easily capture issues, concerns or just casual observations from all clinical and support staff, the quality of the patient interaction could be significantly improved.

The patient and their family at this stage are often in the dark. If it is an elective procedure they may have spoken to their doctor weeks earlier and may have forgotten much of the conversation. If a more urgent procedure they probably had the discussion whilst in pain, or scared, or under stressful circumstances. As they enter the hospital they remember part of what was discussed, they may have read something about their condition on the internet, and they probably received advice from well-meaning friends and family. How much more efficient it would be if they had access to information on their condition from their care team, the ability to ask questions and get a timely response via a collaboration tool. They would feel part of the team and be able to play a more active role in their ongoing care.

Once admitted the patient is cared for by a team, with individual team members available during defined times of their shifts. Overnight and at weekends the team may change from those primarily responsible for their care, so relevant information needs to be shared.

Clinical data is usually captured in the EMR, but other important information about the patient is often not. The patient's emotional state, specific requests, small things that build up and have an effect on the patient's wellbeing. In a hospital, this information is usually not centrally recorded and you are reliant on seeing the same person and hope they remember what you discussed a few days earlier. How much better would it be for them to have the ability to capture short notes, in text form or voice or video format and include them in a collaborative tool. Possibly another team member can answer the question, or the team needs to discuss an issue to find the best solution.



Technology Approach

Using the collaborative space set up on admission the patient can see the schedule of their procedure, keep staff informed of any relevant issues, and know who is involved in their care. They can access educational material, communicate with family, friends and carers and with staff. They can store those communications for future reference, add reminders for activities relevant to their care and join conversations with other patients with similar conditions. Clinicians can use the same room to ensure all communications are captured and actions required are carried out. They can initiate conversations with other clinicians involved in the patient's care, leave messages for team members on different shifts, and provide an ongoing summary of care that can be viewed by all team members.

Discharge

On discharge is where the need for tools that reach outside the hospital walls are most essential. Today we provide a discharge summary, essentially a data dump of what happened during the stay and one-way communication to the outside care team. There is usually a one size fits all format, so information to the doctor, home nurse, pharmacist and allied health workers is all bundled into one document, usually sent to the GP who must decide what to share with whom and in what format. Imagine if all relevant parties could log into a collaboration tool and see what their next steps are, ask questions of the other team members and have someone coordinating the care remotely without the need for the flurry of last minute phone calls which usually occur on discharge.

All team members, including the patient and their family need to be “on the same page” to ensure integrated care. Without the ability to quickly share key pieces of information in an asynchronous way the integration and coordination of care suffers. A coordination capability that sits along their other clinical tools, and has the ability to share data via APIs between systems would add significant value to the patient care process.



Technology Approach

On discharge a separate space for use post discharge can be set up and populated with relevant information and actions for the patient and care team. Contact details for all support resources can be stored and updated as needed. For high-risk patients a care coordinator can be assigned to manage the space to ensure best care is provided. By sharing the space with all key support resources continuity can be maintained, The GP can be included allowing them to easily communicate by text, images, voice or video with the entire team in a single environment and capture that communications. As a result, the entire team remains in continuous contact at critical times ensuring continuity of care. Alerts can be triggered for key activities that are time dependent and all the team can see when milestones are achieved.



Outside the hospital

The bulk of care occurs outside the hospital walls. Most patients spend much more time outside hospital than in, so ensuring the care outside the hospital is integrated with what occurred in hospital is essential. The variety of information tools used outside the hospital and their fragmented nature provides an information challenge to the delivery of best care. In an ideal world, a collection of independent yet interoperable systems would seamlessly communicate with each other and information would flow. In reality documents are imported in pdf format into systems and actions are often embedded in those documents that need to be acted upon. However, those documents often sit multiple clicks away from the screens that are usually viewed by GPs and allied health workers. Process collaboration tools could provide the ability to drop actions into individual patient's spaces to ensure they are acted upon, documented and if need discussed with the relevant people, including the patient.

Technology Approach

For ongoing care the patient specific space becomes the repository of information and communications enabling the team to keep in touch and ensure quality and continuity of care. Easily sharing educational material with the patient, sharing details of the patient's progress and enabling better coordination of care between all the providers.

Delivering an Information Enabled Clinician and Patient

Cisco Collaboration in Healthcare

The transition to a Process Collaboration enabled future has been a focus of this paper. The Cisco collaboration technologies that take an organisation to this objective can be delivered through a combination of linked collaboration applications, enabling the hospital to choose a pathway and an endpoint aligned with the organisation's objectives. The three interrelated application sets are Cisco Unified Communications Manager, Jabber and Spark. The functions they provide can be aligned to the Process Collaboration framework described earlier.

The Process Collaboration Framework

Stage	Characteristic	Immediate: Rapid access to the individual	Collective: Brings together multiple team members	Informed: Information is aggregated from multiple data sources	Persistent: The discussion is stored and supplemented	Coordinated: Information is linked with workflow
Unified Communications & Jabber	Separate Communications: Separate stacks for voice, video and data applications	●	●	●	●	●
	Mixed Communications: Single point linkage between individual voice, video and data communication stacks and device. Often driven through consoles and human intervention	●	●	●	●	●
	Unified Communications: Multiple devices with single interfaces integrating a mix of multimedia communications apps on a unified infrastructure	●	●	●	●	●
Spark	Social Collaboration: Multiple devices with single interfaces integrating a mix of multimedia communications, collaboration, social networking, on a cloud based infrastructure	●	●	●	●	●
	Process Collaboration: Multiple devices with single interfaces integrating a mix of multimedia communications, collaboration, social networking, linked with workflow and key business application on both a secure cloud and on-premise infrastructures	●	●	●	●	●

As the core of the Cisco Collaboration portfolio infrastructure, Cisco Unified Communications Manager is a unified communications call control platform that can deliver the right experience to the right endpoint. Cisco Unified Communications Manager provides services such as session management, voice, video, messaging, mobility, and web conferencing. Jabber adds the instant messaging and presence across a multiplatform user experience. Spark extends that to include all the elements of Process Collaboration, with data, voice, video and conferencing. It has a message and data interface that enables the management of simple conversations through to complex group interactions. It has a sophisticated Applications Programming Interface which enables deep integration into hospital applications or web portals. It is the platform on which to build the process collaboration future.

For more information on Unified Communications and Spark go to: <http://www.cisco.com/c/en/us/products/unified-communications/unified-communications-manager-callmanager/index.html>



Digital Network Architecture

The vision of process collaboration enabled care is founded on the characteristics described in the three-layer model described earlier. At the core of this model is the need to have an infrastructure which is both adaptable and supportable, to enable infrastructure to be deployed rapidly and cost effectively responding to the evolving needs of the healthcare system.

Cisco® DNA revolutionizes how you design, build, and manage your hospital, clinic, and research networks. It means faster, flexible deployment and simpler management of the network so IT can get up and running in days rather than months. It also means deep network insights for greater patient engagement and smarter operations in clinical, research, and operational settings. With Cisco DNA infrastructure and solutions, healthcare organizations can enable key capabilities with a digital-ready foundation.

- Faster innovation with actionable insights: Generate real-time and historical analytics to provide more relevant care and research experiences, increase clinician and staff productivity, and optimize space usage.
- Lower complexity and costs with automation: Roll out and update clinical, research, and operational networks faster and reduce day-to-day operational and network-management costs with automation, management, and assurance.

- Reduce risks with security everywhere: Secure critical patient data and clinical trial research with continuous, faster threat detection and protection, with security embedded network-wide.

More information on Cisco DNA can be found at:

<http://www.cisco.com/c/en/us/solutions/enterprise-networks/dna-healthcare.html>

Security

Security sits at the core of a cost effective, adaptable and responsive facility. When it comes to security, common challenges for healthcare organizations include data access and availability, privacy for patients, security for facilities, and protection from malware and other cyber threats, including in-house security gaps caused by workflow workarounds—like the use of shadow IT by well-meaning care teams.

Cisco's technology, scale, and expertise provide the broad and deep capabilities needed to improve security in healthcare. This means simple, open, automated security with integrated threat defence that detects and remediates threats faster and accelerates innovation. Cyber Security Services for Healthcare: Empower users to innovate freely, without technology or data-risk constraints. Cisco helps safeguard healthcare's most sensitive medical data 24 hours a day, 7 days a week to protect your clients and your reputation.

Cisco Security Systems

- **Cisco Umbrella** helps ensure the integrity of DNS requests –This helps prevent users from connecting to high-risk sites that can inject advanced malware, which protects both data in transit and at rest.
- **Cisco Stealthwatch** analyses network flow records and alerts on evidence of information loss.
- **Active Threat Analytics:** Cisco Active Threat Analytics (ATA) integrates deep expertise with cutting-edge technology, leading intelligence (from the Cisco Talos cybersecurity intelligence organisation), and advanced analytics to detect and investigate threats with great speed, accuracy, and focus.
- **The Cisco Security Incident Response Service** significantly strengthens a customer's network and information security defences. Using the latest intelligence and best practices, it introduces a process that engages all layers of defence and provides a comprehensive range of capabilities to help organisations prepare, manage, respond to, and recover from incidents quickly and effectively.
- **Cisco Next Generation Firewalls:** Cisco ASA with Firepower services combines industry-leading next-generation firewall and next generation intrusion prevention on a single platform.
- **Cisco Advanced Malware Protection** identifies and blocks the malicious code that is so often the cause of data leaks today, while protecting data stored on systems and traversing across networks.
- **Cisco Email and Web Security** are important controls for data leak protections, eradicating spam that enables phishing schemes or tricks users to connect to high-risk sites. It also blocks untrustworthy email attachments that often contain viruses and malware designed to affect system integrity or exfiltrate data.
- **Cisco CloudLock** provides access controls for Software-As-A-Service (SaaS) and cloud-based applications like Box, Office365, and Google Drive. It can detect and respond to sensitive and classified information that is uploaded to these unauthorized cloud applications, and sensitive data that is exposed via oversharing,
- **Medical Device Secure Segmentation:** With Cisco Medical NAC and Cisco TrustSec. Enable dynamic network access policies and segmentation for medical-device assets, BYOD devices, and other Internet of Things endpoints.
- **Cisco AnyConnect works with Cisco ASA with Firepower services solutions** to enable secure remote access, combining strong two-factor authentication and encryption to protect data-in-transit for remote systems and mobile users.

For more information go to: <http://www.cisco.com/c/en/us/solutions/industries/healthcare/security-and-compliance.html>



Next Steps

The opportunity presented by the digital transformation of our healthcare system is immense. But, to fully realise the available value is going to take a fresh approach to how information is accessed, shared and coordinated amongst both staff and patients. You need to build the core information handling capabilities as well as your mobility, security and collaboration competencies to transition an organisation to the Process Collaboration enabled future. This coordinated approach to the enabling technologies of digital transformation has been a core focus of Cisco.

Using the powerful combination of Cisco's and our partner's technology and process skills the team can provide the guidance your organisation needs to fully capitalise on your clinical application investments.

Visit the Cisco Healthcare website at http://www.cisco.com/c/en_au/solutions/industries/healthcare.html or contact your local Cisco health account director to take advantage of these opportunities.

