



Quintegra Solutions Limited

Electronic Healthcare Maturity Model (eHMM)



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Healthcare Defined

A healthcare process can be defined as:

"A set of activities, methods, practices that people use to provide healthcare services and maintain the environment that supports the service providers."

This environment contains also medical devices, associated healthcare provisioning entities and infrastructure.

Electronic healthcare or eHealthcare is defined as:

"A way of delivering and achieving better healthcare process outcomes through effective and innovative use of information technology."

The convergence of the accelerating capabilities of computers, the expanding reach of the Internet and increasing ability to capture & leverage knowledge in a digital form are primarily responsible for driving eHealthcare today. eHealthcare is providing significant opportunities for healthcare providers to deliver technologically effective healthcare services to their consumers and provide consumers with ways to access the information the consumers need.

Healthcare institutions and government organizations are beginning to realize that their fundamental problem is the lack of healthcare technology infrastructure and inability to manage the healthcare process. A study of today's healthcare environment clearly defines the scope and seriousness of the healthcare technology transition problem. Major opportunities exist for:

1. Significant savings in healthcare provisioning, support and management
2. Major improvements in the service effectiveness
3. Enhanced hospital personnel and patient safety
4. Reduction of major and minor errors, resulting in improved quality of healthcare procedures
5. Improved performance through continuous process improvement and quality assurance

The full benefits of modern healthcare technology, better methods, and tools cannot be realized in the maelstrom of undisciplined and frequently chaotic process.

An electronically immature organization can be defined as:

- Reactive in nature with personnel usually focused on solving immediate crisis
- No objective basis for judging product (service) quality or for solving product or process problems
- Unpredictable healthcare product quality

On the other hand, an electronically mature organization can be defined as:

- Possessing an organization-wide ability for managing healthcare quality and cost-effectiveness
- The healthcare processes mandated are consistent with the ways the work gets actually done. These processes are updated when necessary.
- Improvements are developed through controlled pilot-tests and/or cost-benefit analysis
- Managers monitor the quality of the healthcare product and customer satisfaction

This white paper proposes a 7-level maturity model entitled **Electronic Healthcare Maturity Model (eHMM)** to exhibit the manner in which healthcare processes can reach maturity upto a national level. A maturity model shows improvement and transformation of a business over time and captures its capabilities at each intermediate level. The maturity model is used in contemporary methodologies to establish goals for achieving and measuring progress.

Maturity models typically focus on individual enterprises; However, Quintegra has developed a maturity model *incorporating all associated service providers in the healthcare process*, adaptable to any provider at any level of maturity, and able to show different levels of maturity for different business processes. Such a model did not exist. The Quintegra team has adapted industry standards for maturity models to the needs of national-level healthcare coordination.

The following process maturity levels provide a roadmap for organizations embarking on the journey of continuous process improvement.

The Quintegra eHealthcare Maturity Model

The eHMM illustrates a transformation of the healthcare enterprise electronic process from an immature level to a national state. This is explained through entities, departments and infrastructure at a defined point in time. Each level has distinct characteristics that differentiate it from other levels. The following table shows how progressive levels of maturity improve a service provider's ability to capture opportunities identified in the previous section. The base level "0" is assumed to be a level where no information technology exists and all processes are paper-based and "silo"ed.

Level	Entities	Department	Infrastructure
1. Hospital Administration Level	Hospital	<ul style="list-style-type: none"> • Patient Administration • Billing • Wards management • Diagnostics Management • MIS 	LAN
2. Hospital Enterprise Level	Set of hospitals in enterprise	Level 1 + <ul style="list-style-type: none"> • finance • materials management • HR management • electronic claims & payments processing 	Internet based access with HIPAA
3. EMR Basic Level	Hospital + Lab + Pharmacy	Level 2 + <ul style="list-style-type: none"> • Laboratory Information System • Radiology Information System • PACS • Pharmacy 	Secure HL7 based communication
4. Clinical Decision Support Level	Hospitals + Labs + Pharmacies + Medical Colleges	Level 3 + <ul style="list-style-type: none"> • Computerized Provider Order Entry • International codification of diseases • Alerts / Contraindications • Used for educational purposes 	Fully connected and paperless – SaaS ¹ Model
5. Clinical Research Level	Level 4 + Pharma Companies	<ul style="list-style-type: none"> • Clinical Trials • Clinical Data Research based on drug prescriptions and reactions 	OaaS ² Model + RaaS ³ Model
6. Regional Level	Primary Healthcare Centers + Epidemiological centers + Regional Government	<ul style="list-style-type: none"> • Telemedicine • Aggregation of data from various hospitals at the regional level 	Regional network connecting all hospitals with PHC's and Epidemiological centers
7. National Level	Federal Government	<ul style="list-style-type: none"> • Data from all regions aggregated • Enables healthcare planning and government initiatives towards healthcare 	National network connecting all associated service providers in the healthcare process

1 – Software as a Service (SaaS) is a software distribution model in which applications are hosted by a vendor or service provider and made available to customers over a network, typically the Internet.

2 – Operations as a Service (OaaS) involves running the process elements on behalf of the outsourcer. OaaS includes the software, the process management, and the people to operate the service, while a typical SaaS model includes only the provision of access to functionalities and features provided or 'served up' through the use of software, usually via web browser to the customer

3 – Research as a Service (RaaS) involves provision of clinical data research for pharmaceutical companies. Data obtained from healthcare providers are masked used for research for better drug formulation.

Maturity progression

We have identified a layer of characteristics to illustrate the nature of maturity progression in the eHMM. The characteristics defined clearly differentiate between levels and show a progression of improvement. The areas that show progress are:

- **Timeliness of process**: Time lapse between initiation of a business process/capability and the desired result; e.g., length of time to enroll a provider, assign a member, pay for a service, respond to an inquiry, make a change, report on outcomes, etc. This quality moves from an initial level of several hours / days to immediate, asynchronous turnaround.
- **Data access and accuracy of data**: Ease of access to data required by the process/capability, and timeliness and accuracy of the data used by the process. This quality moves from an indeterminate format to standardization, with authorized, authenticated parties having virtual, instant access to data.
- **Process Effort**: Efficiency level of effort to perform a business process/capability; resource requirements, burden. This quality moves from a large staff with manual performance to automated data exchange with external and internal validation sources.
- **Cost effectiveness**: Ratio of effort and cost to outcome. This quality moves from requiring a large number of staff to full automation of the process and reduced staff requirements to a core team of professionals.
- **Quality of process results**: Demonstrable benefits resulting from the business process/capability. This quality moves from manual validations & inconsistent decisions to automated verification through standardized interfaces.
- **Utility or value to stakeholders**: Impact of the business process/capability on the individual. This quality moves from being a facilitator to standardization of processes for informed decisions. This quality is illustrated in detail in the next section.

As organizations proceed from one maturity level to the next, the range of benefits from improvement activities and processes increases substantially. Since improvements at each maturity level solve different sets of problems, different benefits emerge at each level.

The eHMM thus provides a reference model that healthcare constituents can use to define business capabilities associated with business processes.

- It serves as a guidebook for hospitals, associated service providers, regional healthcare bodies and governments in the development of eHealthcare capabilities.
- eHMM provides the framework for a common definition of each level and model qualities for traceability of progression.
- It provides consistency for baselining.
- Healthcare constituents can use the eHMM to adjust the business capabilities and maintain alignment with the mission and goals.

Stakeholder Benefits

Quintegra's eHMM can empower sustainable development and productivity for cooperative healthcare operations. At the highest level of maturity (Level 7 – National Level), the benefits extend to all four core constituents of the process – Patients, Doctors, Hospitals and Government.

<p>Patients</p>	<ul style="list-style-type: none"> ■ Provides state-of-the-art experience through the ability to schedule appointments online, with the option of selecting a doctor, time and date for the appointment; ease of access to procedures, prices and care status; as well as getting up to date/minute information about billing during hospitalization ■ More personal attention via staff due to automation of their tasks ■ Waiting time and delays can be eliminated by leveraging upon real-time information on capacity utilization of different hospitals and exercising optimal load balancing ■ Provides the ability to plan ahead for consultations, surgeries and expenses ■ Instant accessibility of treatment records from central server through Electronic Medical Records (EMR) ■ Breaks down geographical barriers through online availability of consulting & results of diagnosis as well as emailed test results & medication directions ■ Ensures privacy of personal information as per HIPAA norms ■ Provides connectivity to other Healthcare and Insurance organizations via HL7
<p>Doctors</p>	<ul style="list-style-type: none"> ■ Onscreen as well as mobile phone-based alerts provides a wide range of functions – from appointments to instant awareness of critical patient conditions ■ Codification provides accuracy in diagnosis and comprehensive drug prescription based on symptoms. It not only reduces burden on personnel but also eliminates errors in prescriptions. ■ Reminders and task alerts ensure timely and accurate (fool proof) administration of drugs, resulting in reduced chances of human error and improves chances of speedy recovery ■ Comprehensive subjective, objective, assessment and plan details can be captured ■ Order for treatment requirements for patients is fully automated, drastically reducing time and costs by eliminating paper-based processes & physical movement to stores ■ Recording of patient notes and parameters will be system-based, further eliminating paper-based processes ■ Eases planning and scheduling of surgeries through instant availability of information on operation theatre, material and manpower ■ Detailed medical as well as regulatory checklists ensure compliance to processes and reduces human error
<p>Hospitals</p>	<ul style="list-style-type: none"> ■ Will seamlessly fall in line with statutory requirements and reporting ■ Can substantiate claims for grants / donations based on accurate performance data ■ JIT policies based on real-time inventory data, leading to enhanced inventory management ■ Dramatically reduces costs and errors by eliminating paper-based & redundant billing processes ■ Eliminates repetitive & redundant processes and enhances focus on value-adding activities ■ Provides dashboard reporting and detailed MIS ■ Patient traffic and department performance statistics can aid in planning capacities and building focus
<p>Government</p>	<ul style="list-style-type: none"> ■ Vast store of varied clinical data provides avenues for clinical and medical research ■ Relevant information can be pulled out from the centralized database as required by the Government ■ Allows review, planning and in turn, optimal decision making & utilization of funds, resources and manpower ■ Shortens planning cycles through improved data accuracy and availability ■ Enables the promotion of telemedicine in helping people in the remote villages to avail specialized treatment on a cost-effective basis by connecting remote hospitals to cities' state-of-the-art hospitals ■ Health policies based on real-time trends ■ Efficient tracking of critical public health related data ■ Determining the way money is being spent on arresting incidence of major threats ■ Single point access vastly improves process manageability ■ Increases transparency and accountability

About Quintegra

Quintegra Solutions Ltd, an emerging leader in global IT services and consulting, provides competitive advantage to organizations worldwide by lowering their operating costs and improving their operating reliability.

Quintegra delivers measurable business results through innovative, customized IT solutions (such as development, testing, maintenance, enterprise application integration, SAP and product implementation), proprietary software products and consultancy services in IT on various platforms and technologies, since 1994.

At Quintegra, we provide consulting expertise using our fact based approach and proven methodologies. Quintegra partners with clients to understand and address an organization's unique transformation imperative. We work in transparent consultation with our clients to define their business goals, devise a strategy, decide on a course of action, develop a solution, deploy it across the organization, and deliver improved business results. Our integrated consulting and IT services capabilities bring continuity and consistency to clients' strategic programs.

Leveraging on its expertise and experience in the healthcare domain, the Quintegra team provides specialized consulting with respect to eHMM. For embarking on the eHMM progression journey, we provide current state analysis of a level; future state definition; defining initiatives in people, process and technology; and implementation of initiatives. We help establish mature processes and instill a structured approach towards delivering and achieving better healthcare process outcomes through effective and innovative use of information technology. Our eHMM consulting services help in driving process improvement initiatives that are aligned with business objectives.

Quintegra has offices in USA, UK, Germany, Africa, Malaysia, Singapore and India, with development centers in India, Singapore and Malaysia. Quintegra is pioneering a shared services model (Operations as a Service) through unmatched competency in specific domains encompassing Business Operations and IT Operations.

Quintegra is headquartered at Chennai, India, and is listed on India's Bombay Stock Exchange (BSE), National Stock Exchange (NSE) and Madras Stock Exchange (MSE).

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