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## Why Implement a Cardiology PACS?

### Part 1: Motivation, Barriers and the reason 'Why'

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**Note:** This article is modified from the author's Master Degree's paper

The decision to implement a Cardiology PACS isn't always that easy, while the adoption of PACS into the modern radiology department is no longer an argument of necessity but rather, a decision of 'when', the same cannot be said for Cardiology.

From simple access to patient images and data to consistent structured reports with standardized lingo across the department, the benefits of Radiology PACS that promotes efficient clinical decision-making are only starting to gain recognition in the world of Cardiology. However, while the pace is slow, it is only a matter of time before PACS gain the same foothold in Cardiology as it has in the world of Radiology.

### Drivers for Implementation

A study conducted on shows that **Workflow Efficiency** posed as the greatest motivational factor in adopting Cardiology Informatics. This is highly reflective of the heavy workload and 'mission critical' processes that takes place in a cardiology department

While it may seem alarming that motivation to **Reduce Potential Errors** came in second and the ability to **Improve Patient Care** came in fifth, further probing reveals that both factors are not prevailing in the world of cardiology and would be considered 'typical after effects' of implementing such solutions

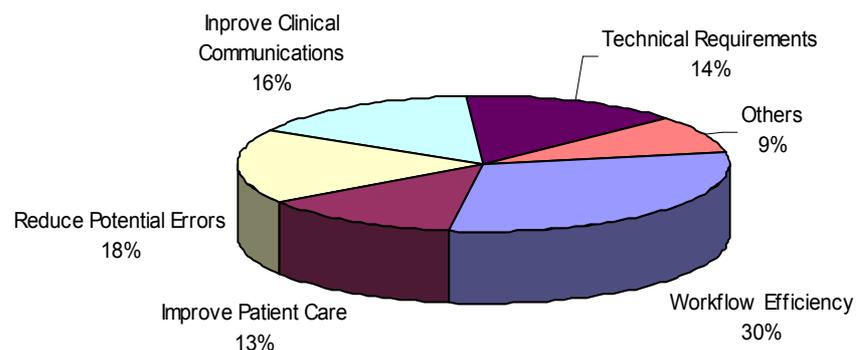


Figure 1- Drivers for Implementation

Motivation comes in many form, the main area of concerns from a Cardiologist point of view includes (but not limited to) issues like;

- Reducing turnaround time for reports
- Promoting efficiency of the diagnostic process (e.g. accessing all cardiology related data/reports/images of the patient from a single screen)
- Reducing transcription errors (from technical report to the final report)
- Reducing redundant data entry and potential errors associated with technologist
- Ensuring that the cardiology reports are distributed to the relevant recipients in a timely fasion

While the drivers / motivation for implementing a Cardiology PACS are numerous, a similar set of problem exists that deters its adoption.

## Barriers for Implementation

The top three barriers towards the implementation of a Cardiology PACS comes as no surprise,

1. Cost of Solution  
(Perceived as too expensive and or inability to justified the solution)
2. Lack of manpower to support and maintain the system  
(Due to the unique skillsets required)
3. Not sure if the system would work as what the vendor claims  
(Too many marketing hype)

The good news is, the overall percentage for the number one barrier – **Cost of the Solution** stands only at 55%., reflecting the weak barriers towards adoption of Cardiology Informatics and the market potential for Cardiology PACS is in the rise, perhaps the huge success of its counterpart – the Radiology PACS.

## Desired Product Features

Part of the research study attempts to identify the product features that are most desirable, initial research identified the following list. Further probing shows that the list bellows covers most of the generic/commonly “sought after” product features from a cardiologist view point.

Features	Specific Function	Percentage	Comments & Analysis
Patient registration and visit management	Resource planning of medical staff, rooms and equipment	70% Yes 30% No	These features highlighted are traditionally considered as features of a Hospital Information System as opposed to part of the Cardiovascular Information System, hence the overall perception obtained is that such features would be a 'good to have' as opposed to being a critical component
Logistics integration / Stock Management	While logging procedure activities, keeps inventory list of the materials and resources used	70% Yes 30% No	
	Handle stock of costly consumables (stents and catheters) to reduce the need to input these data at a later time	70% Yes 30% No	
Order management and Procedure Scheduling	Full tractability for items in stock, just in time ordering for expensive items	80% Yes 20% No	Similarly to the previous two features, <i>Order management and Procedure Scheduling</i> are traditionally considered as features of a Hospital Information System, hence the overall perception obtained is that both features would be a 'good to have' as opposed to being a critical component
	Schedule the right modalities, the right rooms and the right people	50% yes 50% No	
	Ability to trace procedures	70% Yes 30% No	

Features	Specific Function	Percentage	Comments & Analysis
Procedure management	Access to all prior patient data, both cardio and non cardio	90% Yes 10% No	Standard features that has already grown to be expected as the norm for Cardiology PACS
	Reporting on relevant modalities (Cardiac CT, MR NM, US, XA, ECG etc)	90% Yes 10% No	
	Reporting on pacemakers, implantable devices and peripheral packages	90% Yes 10% No	
	Pediatric handling and procedural reporting	60% Yes 40% No	It is important to keep in view that not all hospitals / medical facilities handle pediatric procedures, hence, the demand is still considered signification strong given that there are no pediatric specialty hospital interviewed
	Spell checker	60% Yes 40% No	This feature is deem somewhat 'irrelevant' with the adoption of Structure Reporting in Cardiovascular Information Systems
	Intelligent summary (structure reporting)	90% Yes 10% No	Structure reporting reduces the turnaround time for reporting and minimized transcription errors (and the additional manpower required for transcription)
	Automatic print routing	90% Yes 10% No	Extremely useful for filing clerks or administrative staff located away from the cardiologist reporting area. (Enhances operational workflow)
Data distribution and communication	Customized reports	90% Yes 10% No	The ability to customize relevant reports (e.g. to present what data points) to suit the cardiologist's preference remains an important feature as it is deem as part of the clinical workflow
	Minimum entry, data captured from Hemo and Echo units are transferred automatically from modality	100% Yes	This feature is highly desirable in the cardiology setting due to workflow and is currently not commonly seen in Radiology Informatics, hence, it might be deemed as an strong selling point for Integrated Radiology/Cardiology PACS
	Send to EMR (in text or PDF)	90% Yes 10% No	Standard features that has already grown to be expected as a 'normal' data distribution channel
	Download selected images into CD	90% Yes 10% No	
	Automatic email of reports	40% Yes 60% No	Feature is not suitable for respondent's operational workflow due to medico-legal restrictions
	Automatic outbound faxing of reports	30% Yes 70% No	Feature is not suitable for respondent's operational workflow due to medico-legal restrictions
	Distribution of reports in batch or real-time options	80% Yes 20% No	For referring physician, options to distribute in both batch and real-time options are important as most facilities use a vary of information system and some of the older system only support batch (to reduce bandwidth consumption during 'peak' hours)

Features	Specific Function	Percentage	Comments & Analysis
Data Mining	Management and statistical reporting	100% Yes	<p>The ability to extract data / statistics for various requirements is highlighted by respondents as one of the main reason why they implement clinical information system</p> <p>The respondents also highlighted that data / statistic generation process should ideally be via a user friendly interface and in a fast and hassle free manner (designed to be used by the 'non IT professional' (the layman)</p>
	Extraction tools for clinical research, management and epidemiology	100% Yes	
	Prepare reports for national registry	90% Yes 10% No	
Remote access (image and reports)	Within the hospital (not just cardiology department)	80% Yes 20% No	<p>The ability to provide remote access to cardiologists enhances their clinical workflow as they are no longer not restricted to certain workstations (locations) to perform verification and/or reporting</p>
	Remotely (offsite. E.g. from home, affiliated clinic)	90% Yes 10% No	<p>Demands of telemedicine, ability to access the patient's records remotely not only for diagnosis or second opinion (affiliated clinics) but also in situation of emergencies or after office hour reporting</p>
Diagnostic / Review Workstation	Good tools and features	90% Yes 10% No	Nil. This is a filler question
	3rd party quantifying tools (like medis, 4DM-Spect)	90% Yes 10% No	<p>Provides the ability to use 3rd party tools that the cardiologist is already familiar with. This indirectly enhances clinical workflow as the learning curve is shorten drastically (promoting ease of use and a sense of familiarity)</p>
Administration	Perform QA / QC procedures, fix broken studies	80% Yes 20% No	<p>Surprising, this feature did not score 100% given that is considered a criteria / core function of any 'flavor' of PACS</p> <p>This is due to some respondents not being familiar with this concept of 'broken studies' (as the duties of performing QA/QC procedures are delegated to technologists)</p>
Others	Attach external files (E.g. PDF)	70% Yes 30% No	<p>The ability to attach external files like a scanned copy of patient's report will dramatically improve patient care as criteria information can be accessed 'easily'</p>
	Local language support	40% Yes 60% No	<p>Not a commonly requested feature as English is the language of business in all 3 countries</p> <p>In addition, Most cardiologists perform their fellowship with hospitals located in the USA or UK, hence the proficient use of English is not a problem</p>

## Desired Technical Capabilities

Similarly, an attempt was made to identify the technical aspect of a desired Cardiology PACS (from an IT professional view point), the respondents' feedback falls under the following categories;

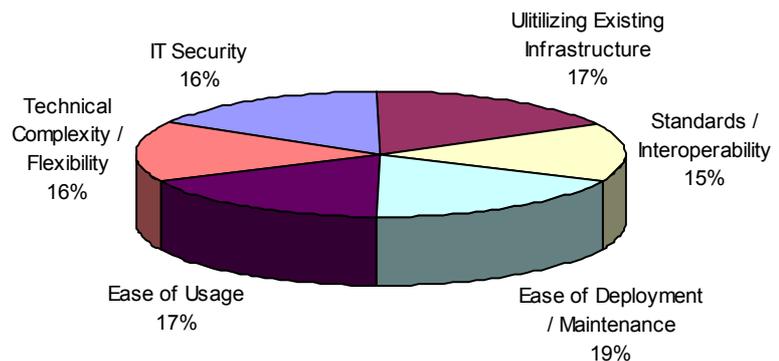


Figure 2- Technical Capabilities Desired

**Ease of Deployment / Maintenance** ranks top as implementation of Clinical Information Systems have always been proven to be tedious, laborious (and almost always unrewarding). Next on the list is the ability to **Utilize Existing Infrastructure**, which received high ratings due to trends of various solution providers building their own silos/ 'island', resulting lower Return of Investment, duplication of manpower, additional layer of complexity.

Last (but not least) is the **Ease of Usage**. Which "ease of usage" on the Human Computer Interface portion may be perceived as too vague or subjective, technical aspects related such as **retrieval speed** for images and data, applications type (Thick or Thin client), solution design, Network type and even types of storage subsystem adopted can significantly affects the end user's experience.

## Evaluation Criteria (Technical Characteristics)

Of course, having understood the motivation, barriers of implementing a Cardiology PACS as well as having a glimpse on the desired technical capabilities, it is also important to understand the evaluation criteria in place for the technical aspects of things,

Question	Percentage	Comments and Analysis
Data Processing / Data Retrieving Speed	80% Yes 20% No	The industry rule of thumb in achieving the retrieval of medial images within 3 seconds rule in order to optimized patient care (reduce waiting time for both cardiologist and patient)
Data Security	80% Yes 20% No	Ensure patient records and diagnosis are well protected (not only data loss but also data leakage)
Software User friendliness	90% Yes 10% No	Ease of usage or intuitive design that is optimized for cardiologist's clinical workflow, achieving a better 'user experience', which translated to enhance patient care
Easy to learn, Good training program	90% Yes 10% No	The ability to achieve 'self sufficiency' in utilizing the system not only to maximize performance due to having comprehensive knowledge in utilizing the solution but also to reduce potential delays and hassle of constantly relying on the solution providers for assistance
Types of connected / Integrated Modalities (such as US, NM, CT)	90% Yes 10% No	The ability to connect to all relevant modalities and review 'everything' from a single screen to optimized for cardiologist workflow (convenience, ease of performing clinical comparison)



Question	Percentage	Comments and Analysis
Ability to upgrade the solution (Application, Operating System, Database)	90% Yes 10% No	Scalability and the ability to 'future-proof' technologies are important to ensure that any technical related upgrades will result in minimum disruption for cardiologist

In the next article “**Why Implement a Cardiology PACS? Part 2**”, I will touch on the Unmet Needs, Influence Factors and Vendor Selection Criteria.

Stay tune for more.

## Contact

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