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## Volume 11 - Issue 4, 2011 - Tech Horizons

### Technology Horizons: Digital Radiography

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The emergence of digital radiography has altered the face of radiography in the recent past. It has offered a new standard for digital x-ray image capture. DR technology has brought about a transition from film-based image capture to direct digital image capture that can be previewed immediately after exposure. This optimised workflow provided by DR is highly beneficial for end users particularly those with huge patient volumes. An estimated 70 percent of all imaging procedures are general radiography and therefore the transition to digital represents enormous market potential. Together with advancements in PACS, DR can help enable radiological departments realise improved patient throughput, optimised workflow and greater productivity.

#### Obstacles for Growth in DR Market

The European DR market has shown considerable growth in the recent past but not as much as predicted in the initial years after its conception in the market. There has been a significant decline in sales owing to economic factors that perceived DR as a luxury rather than a necessity. On the other hand DR systems still continue to face stiff competition from CR systems and upgrades as they are more economical and can be integrated into existing analog conventional systems making them a better choice for small hospital and private imaging and diagnostic centres with minimal budgets and lower patient volume. Although CR and DR complement each other in large hospitals, CR has become a commodity and is still preferred for low procedural volumes and general applications thereby negatively impacting DR sales. Another restraining factor for the growth of digital radiography is that end users believe that DR may not be as beneficial despite the advantages of optimised workflow and better throughput if they do not have high patient volumes. The high initial investments of DR cannot be justified if there are low patient volumes. Return on investment is an important attribute that is evaluated by end users before a purchase to analyse their productivity in the long run.

Despite the tremendous advantages that DR has to offer such as optimised workflow, enhanced image quality and improved patient throughput a certain percentage of physicians and radiologists are still sceptical about the transition to digital. A few of them are of the notion that a number of technical aspects need to be learned in order to use the digital solutions and therefore are hesitant to adopt this technology thus, deterring them from buying DR systems.

#### DR Hitting its Stride in Large Institutes

On the other hand, larger hospitals and universities are adopting DR rapidly. The primary forces driving this adoption are the significant reduction in patient exposure to radiation, greater throughput, flexibility in image manipulation and enhanced diagnostic image quality.

The widespread increase in PACS installation owing to decline in its prices is also acting as an impetus for the growth of DR in Europe. The enhancement in the clinical value of PACS such as the ability to make digital images accessible anywhere through digital network is fuelling the growth of DR. Some vendors in Europe are also adopting a strategy of offering comprehensive packages comprising of PACS and DR systems making it more appealing to buyers who are looking to acquire an archiving system and also make the transition to digital at the same time.

#### Market Trends

Wireless, mobile and retrofit DR are being increasingly utilised and are likely to be a growing trend owing to their easy integration into existing conventional and CR systems, providing digital technology at lesser effort and inconvenience. Mobile and retrofit DR helps make the transition from CR to DR cost-effective and with less inconvenience. These mobile retrofit kits can be integrated into existing CR systems and help in upgrading them to DR technology and help to improve productivity and provide immediate image access.

Also making a big impact on the digital x-ray market are flat panel detectors (FPD). In particular, FPD devices are gaining prominence in room-based angiography owing to their significant improvements in image quality, processing speed and dose-reduction. While the benefits of FPD have been proven to healthcare providers, the cost is a restraining factor preventing a faster shift to the technology. The high initial investments associated with FPD systems combined with recent capital expenditure freezes and hospital budgetary cutbacks have deterred product penetration. While hospital administrators are forced to decide whether the benefits of FPD DR System outweigh the initial purchasing costs. However with the decline in flat panel detector prices, the technology is expected to reach a wider customer base.

Certain DR vendors are also setting their sights on market expansion and are keen on venturing into developing markets or price conscious markets and hence are trying to make DR available to these markets through a concept of economic DR. These units are best suited for the price conscious Eastern European regions where DR is not in.

#### Technology Trends

Since its inception in 1997 many developments have taken place in DR technology sector. Some of the most significant developments in DR technology have occurred, mostly in 2009. Some of these developments are still underway in Europe and expected to be introduced in the near future.

**Portable FPDs:** In the past, fixed DR detectors were restricted by the positioning limits of a vertical wall stand, table bucky, or programmable U-/C-arm. Portable FPDs have added a great deal of flexibility to DR systems, enabling DR to be used in a broader range of applications which require cross-table or bedside imaging. In some instances, portable FPDs provide dual-detector functionality at a lower cost, since only one detector is needed and can be moved between positions within a wall stand and table bucky. Standard cassette-sized portable FPDs enable easy integration of DR technology into existing analog or CR systems, which has helped make the transition to DR easier and less expensive for many end-users. Portable FPDs are also available in smaller and lighter sizes, making them convenient in field and mobile imaging applications.

**Wireless Portable FPDs:** The integration of wireless technology into portable FPDs has been one of the most significant technology advancements in DR. This enhancement has added even more flexibility to portable FPDs, which previously required the attachment of a tethered cable during imaging and image data transfer. In addition to the numerous advantages that this technology now provides, the integration of power and wireless data transmission capabilities into portable DR panels is a significant engineering design feat. **Dual - Energy Imaging, Digital Tomosynthesis and Computer Aided Detection (CAD):** These three major technological developments are looked upon as having potential to enhance the sensitivity of DR thereby boosting its diagnostic power making it more competitive than CT for chest imaging and diagnosis. Dual energy imaging digitally subtracts bone from lung soft tissue to reveal pulmonary nodules hidden behind ribs that are otherwise not clearly visible. On the other hand CAD software incorporated with DR enhances its sensitivity in detecting lung nodules and acts as a second reader aiding inexperienced radiologists to make accurate diagnosis. The addition of digital tomosynthesis features to DR provides a sense of depth and volume and is an improvement over conventional radiography as it provides 3D information and aids in pathology detection which otherwise might be a tedious task with 2D radiography. These three technological developments have great potential for DR in future once all clinical doubts surrounding these features are addressed.

**Dual Modality R/F Systems (DR/Fluoroscopy):** The Dual DR and Fluoroscopy system which is a combination of a DR and Fluoroscopy is a recent technological advancement. This smart combination of radiography and fluoroscopy provides cost effective comprehensive clinical functionality.

#### **Market Outlook For Dr**

Germany is the most industrialised country in Europe and is one of the largest DR markets. The Scandinavian countries are technically the most developed regions of Europe in terms of installation of DR. Most hospitals in the Scandinavian regions are already digitised and are in a phase of replacing CR with DR. The United Kingdom on the other hand is a potential DR market but has been rather moderate in terms of growth. Benelux, like the Scandinavian regions, has been one of the quickest in adopting DR. Spain and France have been slow markets owing to their low investing power. These regions comprise of smaller hospitals and private imaging centres that have shown keen interest in CR systems that fall in line with their budgets and needs.

Resurgence in DR unit sales is expected in the future with the implementation of digitisation becoming mandatory in certain regions of Europe. Hospitals and large universities that have delayed purchases owing to the unfavourable economic factors and minimal budgets are expected to purchase DR in the near future this may also be due to decline in PACS pricing as many hospitals are looking forward to purchase comprehensive packages of PACS and DR.

Published on : Fri, 30 Dec 2011