

## PACS Direct Experiences: Implementation, Selection, Benefits Realized

Karen Ondo, BS, MTASCP, FHIMSS

A picture archiving and communication system (PACS) study was recently performed by KLAS, a national market intelligence firm specializing in monitoring and reporting the performance of HealthCare's Information Technology (HIT) vendors. Fifteen leading PACS vendors are included in the study, which provides a snapshot of today's market performance through the eyes of both users and vendors. KLAS interviewed clients from more than 275 sites, and the study incorporates the opinions of over 345 PACS imaging managers, medical directors, radiologists, chief information officers (CIO), department directors, and vendor executives. Results indicate that the PACS vendors are performing well and overall rate above the HIT industry norm; the market is growing and products are maturing; lines between PACS and radiology, information systems are merging; survey respondents are focusing more on functionality, price, and technology for selection; and the most common benefit of PACS is the cost savings from film and storage.

**KEY WORDS:** KLAS 2003 PACS Vendor Performance Study

A PICTURE ARCHIVING AND COMMUNICATION SYSTEMS (PACS) study was recently performed by KLAS,<sup>1</sup> a national market intelligence firm specializing in monitoring and reporting the performance of HealthCare's Information Technology (HIT) vendors. Fifteen leading PACS vendors are included in the study, which provides a snapshot of today's market performance and industry trends through the eyes of both users and vendors. KLAS interviewed clients from more than 275 sites and the study incorporates the opinions of over 345 PACS imaging managers,

medical directors, radiologists, chief information officers (CIO), department directors, and vendor executives.

Measurements from 40 indicators (including system selection and implementation experiences), special questions, technical assessments, client win/loss, and pricing provide the basis of the provider experience. Vendor overviews with information regarding product history and development, move forward strategies, product strengths, market perception, Web, partnering, and HIPAA strategies rounded out the vendor "view". Insight into industry trends are seen by comparing current survey results to 2001 and 2002 KLAS PACS Surveys<sup>1,2</sup> and to the 2003 KLAS Radiology Information System (RIS) Survey.<sup>3</sup>

### MATERIALS AND METHODS

KLAS, in concert with thousands of healthcare executives, CIOs, directors, managers, and clinicians has created a dynamic database of information on the performance of HIT vendors. The KLAS database represents the opinions of healthcare executives, managers, and clinicians from over 4,000 healthcare facilities on a total of 300+ vendors and 500+ different products. The data-gathering process is continual, with new performance evaluations and commentary reported daily (survey data more than 12 months old are archived and used for historical and trending purposes only).

---

*From the KLAS Enterprises, 630 East Technology Ave, Orem, UT 84097.*

*Correspondence to: Karen Ondo, BS, MTASCP, FHIMSS, tel: 954-943-9252; fax: 954-943-7738; e-mail: karen@healthcomputing.com.*

*Copyright © 2004 SCAR (Society for Computer Applications in Radiology)*

*Online publication 26 October 2004*

*doi: 10.1007/s10278-004-1017-3*

---

<sup>1</sup>Contact KLAS at [www.healthcomputing.com](http://www.healthcomputing.com) or 1-886-268-9348.

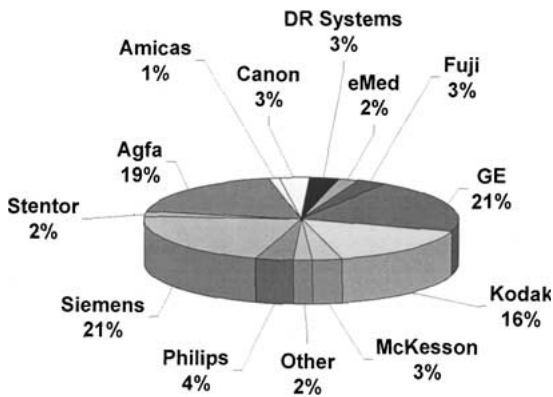


Fig 1. PACS market share by vendor.

The 2003 PACS study features ten vendors and is a follow-up from similar studies performed in 2001 and 2002. The ten featured vendors include: Agfa, DR Systems, eMed, Fuji, GE, Kodak, McKesson, Philips, Siemens, and Stentor. Five other vendors were in various stages of deployment and/or development and their information is reported accordingly. They include Amicas, Canon, Cerner, Emageon, and IDX. The PACS market and accessing a particular vendor's market share within that market is difficult based upon each vendor's definition of a full PACS implementation. Figure 1 represents the market share for the vendors included in the study, based on the number of live sites qualifying for the survey as reported to KLAS by the vendor and estimates from information KLAS has acquired over time and from other industry resources.

Survey participants represented a broad cross section of PACS users. Figure 2 demonstrates the diversity of facility size among survey participants. Every vendor had a substantial number of interviewed clients reporting 100,000 to 300,000 studies annually, with 10% reporting over 300,000 studies. Led by DRSystems and Fuji (whose users performed the most studies through PACS), nine out of ten vendors had at least 75% of all studies being handled by their PACS solution.

Performance monitoring was measured in three fundamental areas as listed in Figure 3: (1) Primary Indicators, which includes 14 key areas of general vendor performance as selected by CIOs/directors; (2) Detail Indicators, which includes 14 areas of specific performance (including more detail than primary indicators); and (3) Satisfaction Indicators, which provides an overall view of the system. Each of the customers was asked to rate, on a scale of 1 to 9 (low-high), their vendor on 28 aspects of performance, as well as answer 12 questions relating to customer satisfaction.

Special PACS survey questions were asked regarding study volumes (PACS and non-PACS), quantifiable benefits, interfaces, Web view product, and perceived top PACS vendors. In addition, analysis of client win/loss commentary provides insight into the vendor selection process and the reasons why a vendor is selected or not.

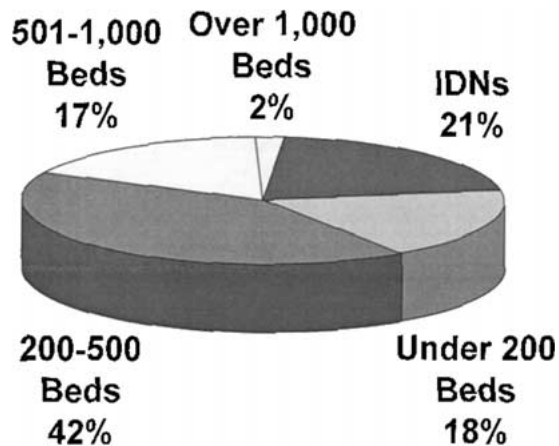


Fig 2. Facility size of participants.

#### 4 Primary Indicators of Performance

- Lived Up to Expectations
- Vendor Is Improving
- Proactive Service
- Quality: Money's Worth
- Commitment to Technology
- Executives Interested in You
- Good Contracting Experience
- Product Works as Promoted
- Quality of Training
- Quality of Implementation
- Quality of Telephone Support
- Quality of Interface Services
- 3<sup>rd</sup> Party Product Works w/ Vendor Product
- Helps Your Job Performance

#### 4 Detail Performance Indicators

- Worth the Effort
- Real Problem Resolution
- Good Job Selling
- Product Quality Rating
- Implementation On Time
- Implementation within Budget
- Quality of Implementation Staff
- Quality of Documentation
- Quality of Releases & Updates
- S/W Errors Corrected Quickly
- Interfaces Met Deadlines
- Quality of Custom Work
- Hardware Vendor Satisfaction
- Response Times

#### 2 Key Indicators of Satisfaction

- Implemented in the Last 3 Years
- Core Part of IS Plan
- Would You Buy It Again?
- Avoids Nickel and Diming
- Keeps All Promises
- A Fair Contract
- Contract is Complete
- Contract Administered Fairly
- Timely Enhancement Releases
- Support Costs as Expected
- Ranked Client's Best Vendor
- Ranked Client's Second Best Vendor

Fig 3. Performance measurements.

## RESULTS

The result of the KLAS 2003 PACS Study<sup>4</sup> identified a strong field of competitors as, together, the vendors score well (Fig 4) and average above the KLAS industry norm (the running 12 month average of all vendors and all products in the database). Although each vendor demonstrates its strengths, two vendor products, Stentor and McKesson Horizon Medical Imaging, set the scoring stage for performance monitoring in PACS.

The analysis of client win/loss commentary, as compared to previous years, indicates the prior relationship with a vendor and company size has less of an impact; whereas price, func-

tionality, and technology have much more of an influence on vendor selection. Figure 5 indicates results of commentary analysis of "why a vendor was selected" and Figure 6 indicates "why a vendor was not selected."

"Vendors Considered" in the PACS selection process, by survey respondents, indicate that they are listed in order of frequency mentioned (highest to lowest) in Figure 7. The percentage refers to the number of times a vendor was specifically mentioned by a respondent. Previous years' survey respondents clearly indicated an advantage to those vendors that were also providers of medical equipment and/or film, and while they are among the top still considered today, survey respondents indicate that they are focusing more on functionality, price, and technology for the final decision.

DISCUSSION

The KLAS 2003 PACS Study<sup>4</sup> reflects a continued interest in and deployment of PACS by healthcare providers, suggesting a sincere and sustaining interest in such systems. Synergies are anticipated in complementary venues, such as cardiology and orthopedics, and at the same time the lines between PACS and RIS show evidence of merging as PACS begins to deploy "traditional" RIS functionality.

A true PACS should be able to support all diagnostic imaging modalities, and most sites surveyed are planning to include all modalities. Nine out of ten vendors had at least 75% of all studies being handled by their PACS solution. The most common benefits verbalized in this year's study was cost savings on film and storage, increases in productivity/efficiency, and access and distribution of images (last year's number one benefit stated). Also of note is that all vendors had clients that spoke to staff reductions.

Response to the questions concerning interfaces validated that the PACS clients have the same issues with integration and interfacing that other ancillary systems encounter. The goal of being 100% interfaced/integrated with every linked system has not been achieved. The most common PACS interfaces were RIS and Health Information System (HIS). Over 75% of the sites interviewed had an interface to their RIS,

Vendor	Overall Vendor Ranking	Primary Indicators	Detail Indicators	Business Indicators	Average Score for Services Imp. & Support (Scale of 1-5)	Average Score for Interchange (Scale of 1-5)	Average Score for Satisfaction Indicators (Scale of 1-5)	Percentage of Positive Comments
Agfa IMPAX	2 <sup>nd</sup>	7.06	7.07	79%	6.90	7.26	7.12	55%
DR Systems Dominator	8 <sup>th</sup>	7.42	7.63	77%	7.53	7.61	7.39	50%
eMed Ideal	3 <sup>rd</sup>	7.65	7.68	86%	7.69	7.49	7.80	69%
Fuji Synapse	4 <sup>th</sup>	7.62	7.76	82%	7.37	7.93	7.92	65%
GE Centricity PACS	8 <sup>th</sup>	6.81	6.93	73%	6.76	6.96	6.94	53%
Kodak PACS	8 <sup>th</sup>	6.49	6.51	73%	6.21	6.32	6.64	50%
McKesson Horizon Medical Imaging	2 <sup>nd</sup>	7.81	7.99	90%	7.99	7.84	7.92	62%
Philips PACS	5 <sup>th</sup>	7.34	7.38	85%	7.21	7.44	7.50	55%
Siemens SIENET	10 <sup>th</sup>	6.34	6.78	68%	6.69	6.63	6.32	57%
Stentor site	1 <sup>st</sup>	8.13	8.08	90%	7.99	8.25	8.26	88%

Fig 4. Overall vendor scores.

	Agfa	DR Systems	eMed	Fuji	GE Medical Systems	Kodak	McKesson	Philips	Siemens	Stentor
Functionality	44%	55%	33%	40%	65%	14%	58%	33%	11%	33%
Corporate Decision	33%	9%	0%	10%	0%	0%	0%	0%	22%	0%
Sales Team / Demo	11%	9%	0%	0%	0%	0%	0%	22%	22%	0%
Prior Experience with Vendor	11%	9%	56%	0%	13%	43%	0%	0%	11%	33%
Price	0%	27%	89%	20%	25%	0%	25%	33%	22%	44%
Radiologist Preference	0%	36%	11%	20%	13%	14%	33%	11%	0%	0%
Technology	0%	9%	11%	50%	63%	14%	17%	11%	22%	44%
Best Fit	0%	0%	11%	10%	0%	14%	25%	22%	0%	0%
References / Site Visits	0%	0%	0%	0%	0%	29%	8%	0%	0%	0%
Integration / Interfacing	0%	0%	11%	0%	0%	14%	17%	22%	56%	0%

Fig 5. Why a vendor was typically selected. The percentages may not add up to 100% because of multiple comments from the same respondent.

	Agfa	DR Systems	eMed	Fuji	GE Medical Systems	Kodak	McKesson	Philips	Siemens	Stentor
Functionality	17%	40%	67%	20%	9%	25%	29%	12%	25%	33%
Technology	33%	20%	0%	7%	14%	25%	14%	24%	17%	0%
Price	44%	0%	0%	27%	51%	25%	43%	47%	38%	22%
Reputation	17%	0%	0%	7%	0%	17%	29%	0%	0%	0%
Radiologist Preference	6%	0%	0%	20%	11%	17%	0%	0%	13%	0%
Interfacing / Integration	11%	30%	0%	27%	17%	8%	14%	6%	13%	11%
Sales Team / Demo	0%	10%	0%	7%	3%	8%	0%	12%	8%	0%
Company Size / Experience	0%	20%	33%	7%	3%	8%	0%	6%	4%	22%
Prior Experience with Vendor	0%	0%	0%	7%	6%	8%	0%	0%	4%	22%

Fig 6. Why a vendor was typically not selected. The percentages may not add up to 100% because of multiple comments from the same respondent.

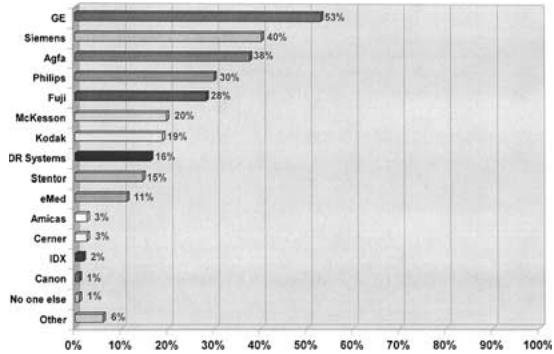


Fig 7. Vendors considered.

and 48% had an interface to their HIS. Only 2% reported they had an interface to their EMR system.

Accessibility by clinicians outside the image department is critical to success in sharing digital images for both patient care and productivity improvement. Clients this year spoke

more frequently to the benefits of patient care, physician's accessing images outside the department, and the impact of such access (improve patient care, increase in business, better collaboration with radiologist, and reduction of complaints).

The KLAS 2003 RIS Study<sup>4</sup> indicates that, unlike their PACS counterparts, RIS vendors collectively score below the KLAS norm for overall performance. This suggests an opportunity and room for improvement. With the industry looking to an RIS to increase productivity and reduce medical errors and, with an opportunity for PACS and voice transcription investment and integration, RIS performance improvements are expected.

### CONCLUSIONS

The KLAS 2003 PACS Study results show that vendor ratings seem to be "settling in" and that PACS vendors continue to perform, and together, PACS vendors average above the KLAS HIT industry norm. Key study findings include the following:

- PACS market is growing, products are maturing, are more substantive and users are satisfied.

- The lines between PACS and RIS are merging as PACS deploys more "traditional" RIS functionality.
- Survey respondents are focusing more on functionality, price, and technology for the final PACS decision.
- Quantifiable benefits are realized more quickly as the studies handled by PACS increases.
- The most common benefits are cost savings from film and storage, increased productivity/efficiency, and immediate access to studies.
- The most common PACS interfaces were with RIS and HIS.
- Web or remote access is in wide use and contributes seriously to the benefits obtained.

### REFERENCES

1. KLAS Enterprises, LLC, 2001 PACS Report, published November 2001
2. KLAS Enterprises, LLC, 2002 PACS Report, published November 2002
3. KLAS Enterprises, LLC, 2003 Radiology Information Systems Report, published April 2003
4. KLAS Enterprises, LLC, 2003 PACS Report, published November 2003