

Wake Radiology & Vitrea® Intelligence Analytics

# Creating Actionable Data for Strategic Development & Patient Care Quality Improvement

Prepared By



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## Statement of Purpose

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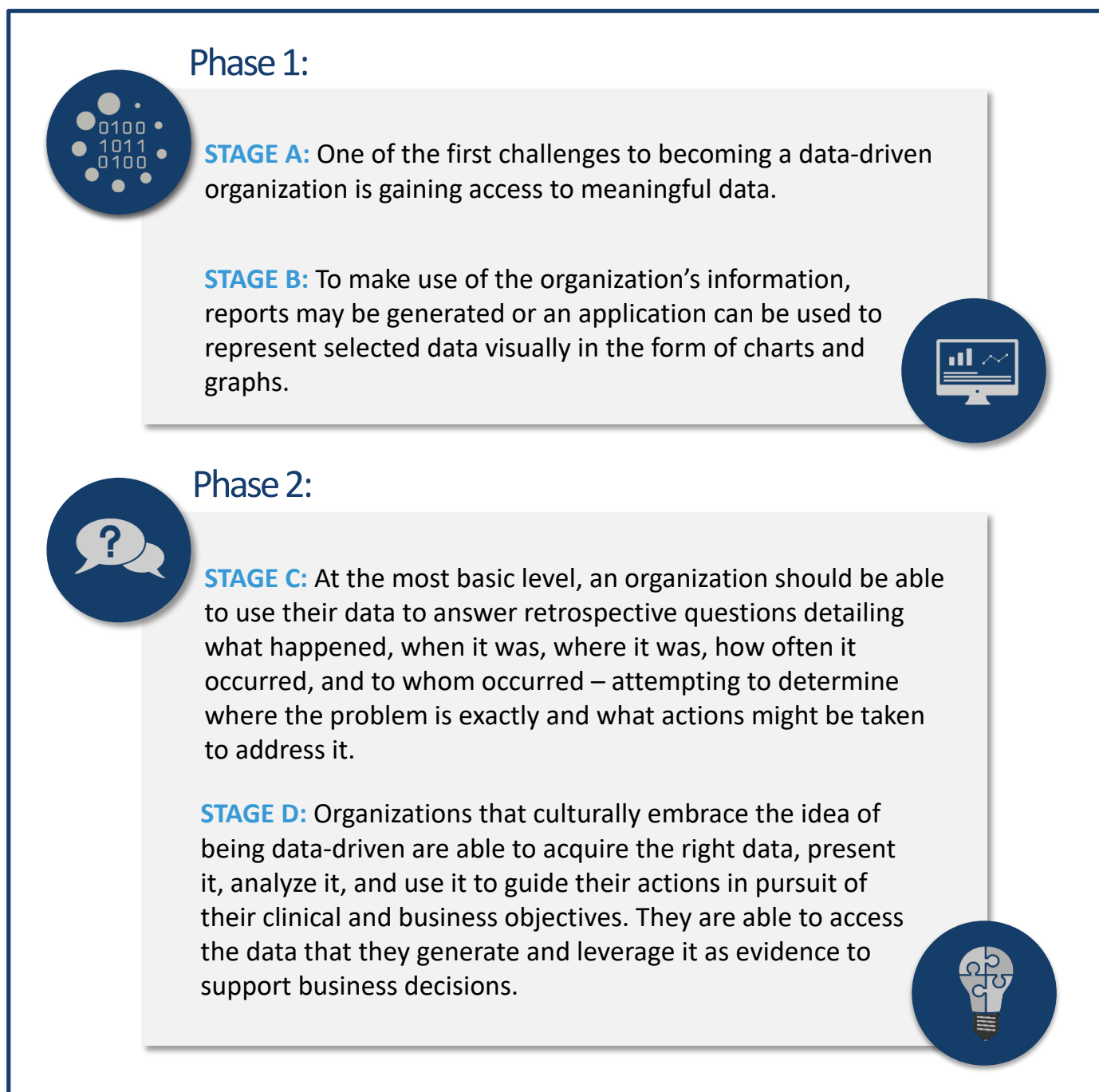
This report reviews and describes what should be considered as a Phase 1 of ‘Creating Actionable Data for Strategic and Patient Quality Improvement’ project. It reviews the governance model and identifies the initial set of Key Performance Indicators (KPIs) and performance quality-control processes to capture and resolve defects related to missing data. The project included

the design, review, and approval of various KPIs.

Becoming a data-driven organization requires a concerted effort to progress through two phases comprising four main stages of ‘analytics maturity’ (Figure 1):

*Becoming a data-driven organization requires a concerted effort to progress through two phases comprising four main stages of 'analytics maturity'*

Figure 1: Four Main Stages of Analytics Maturity



# Executive Summary

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Wake Radiology (WakeRad) in collaboration with Vital Images (Vital) and Paragon Consulting Partners (PCP Imaging) embarked on an effort to fully utilize its recently acquired analytics solution from Vital known as Vitrea Intelligence. WakeRad faces competitive threats, shifting market relationships, and other forces in the Raleigh, North Carolina market. One key to meeting those challenges is the ability to quantify, interpret, and utilize actionable data, not only for patient-focused and practice-focused improvements, but also for leveraging competitive advantage.

Working with Vital and PCP Imaging, WakeRad first developed a strategic plan and governance model to guide the initiative. Onsite working sessions with the team and individual interviews followed. There was a commitment from WakeRad senior management for an open dialog between the operational, clinical, marketing, and administrative teams and Vital and PCP Imaging to establish

the goals and objectives and to identify the needs and desired outcomes of all stakeholders. These important discovery actions aided in the establishment of key targets for KPI development and sought to ensure a broad range of measures for WakeRad.

Working with PCP Imaging's professional Project Management (PM) services and their Subject Matter Experts (SME), WakeRad and Vital developed a package of KPIs including general business, financial, and productivity performance measures designed to leverage performance data to guide change-management activities. Data inputs included WakeRad's RIS, PACS, VNA, billing, and reporting systems using various methods for data input from DICOM, to HL7, to flat files. The process included a thorough review of data dictionaries and building cross-referenceable data links to assemble the data into Vitrea Intelligence, utilizing highly flexible KPI dashboards,



On-Demand Reporting, and other various administrative modules. These efforts produced an initial set of eleven (11) KPIs and nine (9) On-Demand Reports as the basis for building an effective ongoing process for strategic-management and patient-focused quality-improvement efforts. WakeRad has a long history of patient-focused processes in all clinical areas with special attention to women's health. These tools will augment and

expand those efforts. Equally important, the Vitrea Intelligence solution will deliver quantifiable, accurate, longitudinal information for fulfilling state and federal quality mandates. It will empower WakeRad's efforts in continuous improvement and enhance its competitive position across the Research Triangle region (Raleigh-Durham-Chapel Hill) of North Carolina.



# Challenge:

## Creating Information, Not Just Data

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WakeRad is the premier provider of Diagnostic Imaging (DI) services in the Raleigh region. WakeRad faces significant challenges in addressing the rapidly evolving market for DI services. The practice spans the operation of multiple imaging centers and various strategic partnerships. It is imperative that the radiology group quantifies, measures, and applies actionable quality-performance data from the practice in response to market competition, to address the demands of the government quality initiatives, and to deliver the highest quality DI services to their patients. The primary goal of this project was to support and provide expert advice and guidance to WakeRad in its deployment of Vital's Vitrea Intelligence solution. In addition to Vital's support, WakeRad engaged PCP Imaging for PM and SME services because of the team's experience in practice operations, financial analysis, and enterprise imaging. The team worked with the Vitrea Intelligence data

model and analytics to develop and deploy targeted business, operational, and quality-of-care KPIs. The focus was on providing actionable data to identify potential quality-of-care improvements. There was interest in understanding evolving referral patterns as well as in gaining insights about existing and new business relationships, and site and clinician quality-performance feedback. This is in addition to quantifying fundamental standards-of-care quality measures, including turnaround times, patient throughput, wait times, care access, modality utilization and performance, and revenue and operating margins.



Early in the initial stages, the project team recognized that the potential number of KPIs was unlimited. Therefore it was important to have an effective governance model and process in order to prioritize KPI development and implementation, including dashboards and various on-demand reporting capabilities. Another key challenge was identifying

potential data sources and how WakeRad could link disparate datasets into a common database, allowing it to unify RIS, PACS, VNA, billing, and scheduling data sources. The process was also to consider the planning steps for future inputs from Voice Recognition (VR), physician scheduling, and other software used in the practice.

## Approach: Project Governance & Fact Finding

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WakeRad, Vital, and PCP Imaging first established a formal project plan and process that addressed key needs, including having clearly stated goals and objectives with desired outcomes. This is an essential step in any Information System (IS) deployment, but, in the case of analytics initiatives, there was a group imperative for open discussion and to reach a consensus about project goals and objectives. Dr. William Way and Matt Dewey (CIO) lead the WakeRad management and IT teams respectively as executive sponsors for the project. Both continued to be active and visible in

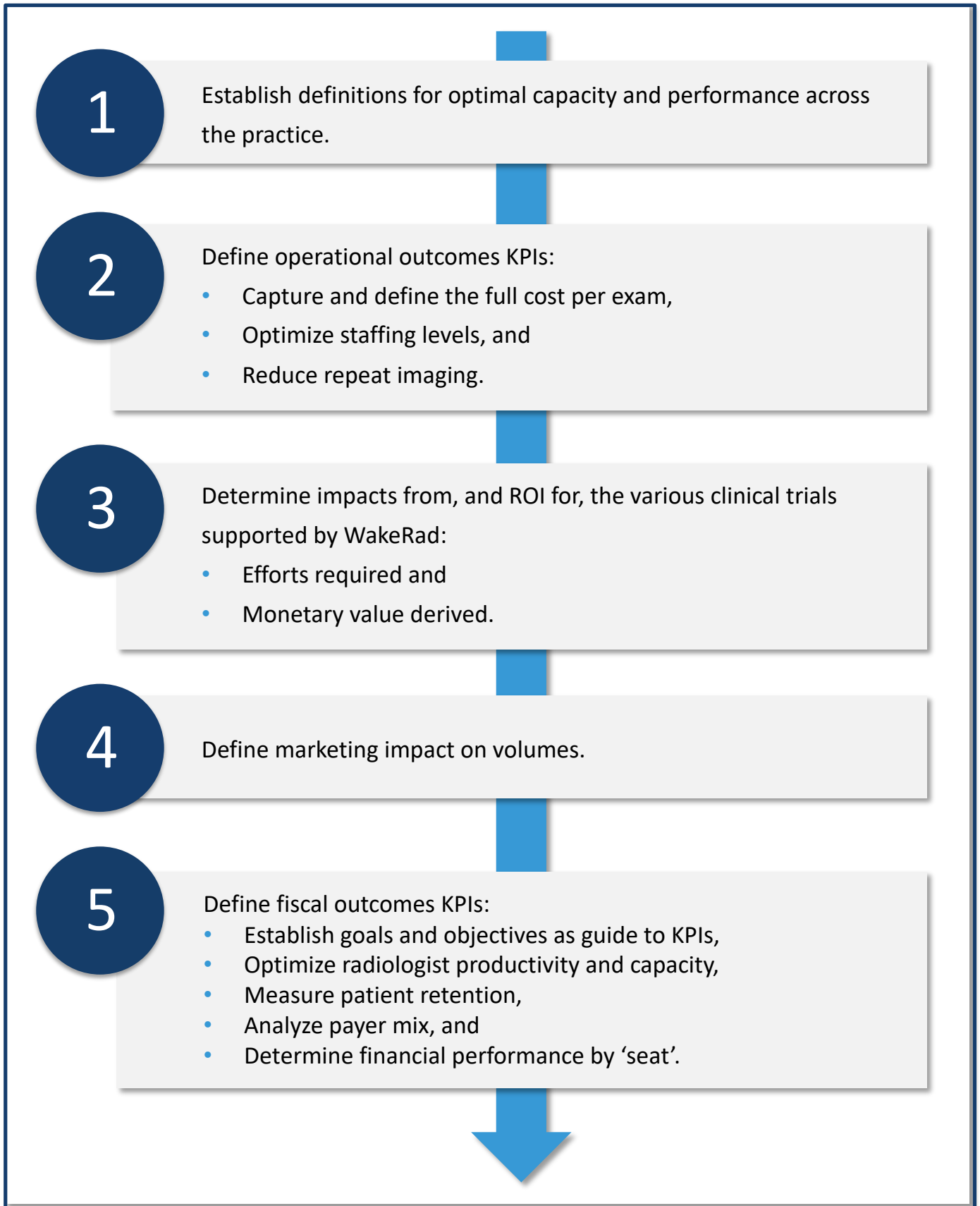
guiding this process. Furthermore, a broad base of participants was engaged throughout the project, including the COO; financial, technical and office management; marketing and sales leadership; and key IT personnel lead by the CIO.

The outcome of the formal kick-off meeting resulted in the definition of key areas of interest and concern. Amongst the various outcomes from the two-day process, the following items were identified and approved for guiding the process (Figure 2):





Figure 2: Process Guidelines



This initial list evolved over the course of the project as the result of additional direct interaction with WakeRad’s leadership team. Over the course of the project required adjustments were identified that necessitated additional interventions by the project team. The final KPIs deployed emerged from this process and have established a solid base of both general practice performance as well as quality of care. The output included a range of KPIs – from Relative Value Units (RVUs) productivity by site and by specialty, to specific productivity measures for WakeRad’s extensive and critical women’s health services. Additional KPIs were analyzed and provided direction on operations performance measure – again in the women’s health program – as well as for key, high-value procedures within MRI services. All KPIs were reflected in near **real-time data** based on the various data feeds.

The project also began to address matters regarding the delivery and performance of key professional

services with a focus on the impact of physician behavior and efficient and timely service delivery in support of the women’s health program. The work to identify and measure such performance data has provided critical feedback to Vital’s product team to guide improvements in gathering and analyzing the complex data queries needed.

These efforts and the evolution of the dashboard, KPIs, and on-demand reporting will provide important feedback and the means to measure changes in performance and quality. Additionally, they will also provide WakeRad with data needed to address quality initiatives of CMS over time. While reporting to CMS continues to evolve, the solution has allowed the project team to establish the process, methods, and, critically, the flexibility to address final regulatory needs at the local, state, and federal levels.



# Key Process Phases

PCP Imaging’s team provided PM and SME resources to support project efforts and assigned teams from WakeRad and Vital. Given that there were multiple teams and personnel engaged in the project, it was essential

to have effective leadership guiding the project and to support the creation, validation, and deployment of various goals, objectives, and measures defined in Table 1 below.

Table 1: Established Project Goals & Measures

Project Goals/Measures	Description
Define and Establish Project Governance	<ul style="list-style-type: none"> <li>• Roles and responsibilities</li> <li>• Communication, documentation, and review</li> </ul>
Develop KPI Matrix	<ul style="list-style-type: none"> <li>• Identify and define KPIs based on governance and review process</li> <li>• Collaborate and develop agreements to form KPI structure</li> <li>• Identify outliers and exception management</li> <li>• Visualize the distribution of data using standard statistical analysis</li> </ul>
Data Dictionary	<ul style="list-style-type: none"> <li>• Identify and review data elements required to support accurate analytics</li> <li>• Identify data and systems that provide the necessary data elements</li> <li>• Build crosswalks and key data elements to link and translate data definitions between systems to provide consistency in the final Vitrea Intelligence solution</li> </ul>
Data Design Document	<ul style="list-style-type: none"> <li>• Document data sources</li> <li>• Establish definitions for the data model design</li> <li>• Support for ongoing iterative analytics efforts</li> </ul>



## Business Consulting Inputs

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As analytics were generated and opportunities identified, PCP Imaging and Vital assisted with additional models and strategies that were of organizational value. While this was anticipated as a post-implementation effort, process complexity and the evaluation of data requirements to address specific business issues resulted in substantial effort over the course of the project.

PCP Imaging conducted a two-day, onsite review of proposed and possible KPIs. This involved discussion between WakeRad leadership and IT database and reporting teams. During this

process, detailed dialog with Dr. William Way identified the desire and need for physician-derived KPIs. These were essential for identifying quality-improvement opportunities as well as the critical objective of quantifying productive and clinical quality-performance measures. During these hands-on work sessions, a key issue was identified in the model for presenting financial data. This challenge is described and discussed in Attachment A. The important outcome from this resulted in an update to the data model and improved processes for incorporating financial data into the KPIs.



# Data Interface & Model Build

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The project reviewed all necessary data elements ingested by Vitrea Intelligence, including the communication mode and frequency by which they were updated via HL7 and CSV files from the billing, RIS, PACS, and VNA systems and databases.

The deployment and gathering of data points from various systems enabled

the build, analysis, and deployment of reporting functions within Vital's analytics solution. This included auto-generated reporting and dashboards with technical documentation that supported the implementation.

# Testing & Data Validation

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An extensive testing model was used to observe and validate the outputs from the analytical tools. The project team developed various use cases and models designed to focus on specific questions that WakeRad sought to answer and address using the tool. Vital

and PCP Imaging identified and documented various steps and processes used to derive KPIs and then supported WakeRad's IT team in transferring and deploying KPIs from the test environment into the production environment.



# Organizational Readiness

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Both PCP Imaging and Vital worked directly with WakeRad leadership and technical teams to support organizational readiness. This included pre-go-live training and educational

tools along with a comprehensive rollout plan for identified system end-users and respective privileges and roles within the Vitrea Intelligence solution.

## Final Conclusion

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The joint efforts of WakeRad, Vital, and PCP Imaging have established the foundation that will guide WakeRad's efforts to continue to grow and address the practice's needs. The governance and validation processes provide the tools and structure for direct operational inputs at all organizational levels. This will strengthen and build on WakeRad's existing commitment to delivering quality imaging services to its patients and referring communities. There is an expectation that Vitrea Intelligence solutions, with support

from various professional services inputs, will provide the clinicians, technologists, and operational and information systems personnel the means to identify opportunities for quality and process improvements and to implement those changes, as well as understand the results and impacts on the practice. As was noted previously, WakeRad's efforts enhance its competitive position across the Research Triangle region (Raleigh-Durham-Chapel Hill) of North Carolina.



# Attachment A:

## Major Data-Quality Challenge

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**Project Corrective Action Item:** Billing Data Accuracy

**Issue:** Data accuracy for presentation of financial and billing data for Charges, Payments, and Adjustments

### Scope of Issues:

**Issue 1:** During review of initial KPI data outputs of billing data, an issue was identified indicating that the accumulation of data appeared to be overstated. The totals appeared to be aggregated by patient and not by the accession number. The source data was provided by accession number, so if the logic of the model is adjusted, then this should correct the problem.

**Issue 2:** All three (3) source data systems, Imagecast, Imagine, and Mach7, treated procedures differently. Imagecast had exams that were bundled but Imagine combined multiple procedures if the reports were the same. However, the A-life coding system detects report matches and then returns the CPTs only

for that code. This caused accession numbers to “disappear” when matched back to RIS data. WakeRad has written some queries to look for those disappearing accession numbers in Imagine for auditing purposes. The CPT counts will be off from RIS counts for a patient per day, because of the invalid information in the RIS.

**Issue 3:** The open or remaining balance of each claim was not displayed. This functionality would offer a more accurate representation of the potential of receivables or future revenue. This data is available, but the current model does not expose that information. If an unused field can be used to hold this information, and if it could be exposed in the KPI Graphical User Interface (GUI), this will provide an estimate of Accounts Receivable (AR), and it would be a method for evaluating the reasonableness and validation test of data returned in the KPI.



## Other Contributing Factors and Comments:

1. RIS Imagecast uses bundle codes for group procedures. There is a lack of confidence in the CPT/HCPCS codes, as they weren't maintained over time. As such, when this data is passed over to Imagine, only the procedure description appears.
2. The Imaging system passes reports and information to a

Natural Language Processing (NLP) engine provided by A-Life. Appropriate CPT/HCPCS procedure codes are applied by A-Life. In some cases, procedures can be re-bundled based on appropriate coding standards. Unfortunately, in this process the accession number can be stripped or replicated for multiple separate charges.





# Attachment B: KPI & On-Demand Report Listing

## General Use Cases

KPI	Description and Measure
1. Volume by Radiologist Specialty	Volume by diagnostic specialty grouping; running 12 months
2. Volume (by Site)	Volume by acquisition location; running 12 months
3. PCP_RVU (Relative Value Unit) by Specialty	RVU by diagnostic specialty grouping; running 12 months
4. PCP_RVU by Site	RVU by site; running 12 months
5. RVU By Radiologist by Site	RVU by Radiologist by site; running 12 months
6. RVU Breast Specialty by Site	RVU for breast specialty by site; running 12 months
7. Mammography Volume (by Site)	Mammography volume by site; running 12 months

## Process Improvement & Change Management Use Cases

KPI	Description and Measure
8. Daily Diagnostic Mammography & US Breast Resource Distribution	Daily volume for diagnostic mammography and breast ultrasound; by day, by month
9. +20m Patient-Wait Exceptions – Top 10 RVU Procedures	Monthly exception volume for top 10 RVU procedures – running 12 months
10. +7d Access Wait on Top 6 MRI Exams by Site	Monthly volume of top 6 MRI procedures and greater than 7-day wait based on scheduled times – running 12 months
11. +1h Exam Duration on Top 6 MRI Exams by Site	Volume of top 6 MRI with more than 1 hour of procedure time based on RIS time stamps – running 12 months



## On-Demand Reports

KPI		Measure
1.	Top 10 RVU Procedures Overview	Supports KPI #9
2.	RVU Volume by Site by Specialty-MG	Supports KPI #6 and #7
3.	Radiologist Work RVU	Supports KPI #3 and #5
4.	RVU Volume by Specialty	Supports KPI #1 and #2
5.	Specialty Work RVU	Supports KPI #3
6.	RVU by Radiologist	Supports KPI# 3 and #5
7.	Diagnostic MG Operational Overview by Site	Supports KPI #8 and #9
8.	MRI Procedure Mix	Supports KPI #10 and #11
9.	Top 6 MRI Procedure Performance Metrics	Supports KPI #10 and #11
10.	Top 10 RVU Procedures Overview	Supports KPI #9
11.	RVU Volume by Site by Specialty-MG	Supports KPI #6 and #7

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# About Wake Radiology

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Founded in 1953, Wake Radiology is the Triangle's leading provider of outpatient medical imaging. It is the region's largest outpatient imaging practice with nearly 50 radiologists who perform close to 600,000 procedures each year. It is the first outpatient imaging

provider in the Triangle to earn the American College of Radiology's prestigious Breast Imaging Center of Excellence designation. Wake Radiology is an independent, locally owned and physician-led practice that actively supports the local community.



[www.wakerad.com](http://www.wakerad.com)



# About Vital Images

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Vital Images, Inc., a Canon Group company, is a leading provider of diagnostic imaging and enterprise informatics solutions to help healthcare organizations deliver exceptional care while optimizing resources across multi-facility organizations. The company's solutions are scalable to meet

the unique needs of hospitals and imaging centers and are accessible throughout the enterprise anytime and anywhere. For more information, visit [www.vitalimages.com](http://www.vitalimages.com), or join the conversation on Twitter, LinkedIn, Facebook and YouTube.

**V i T A L**

[www.vitalimages.com](http://www.vitalimages.com)



# About PCP Imaging

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We are a team of passionate healthcare professionals with more than 100 years of collective clinical, technical, and business leadership experience within the healthcare IT and imaging fields. Each partner contributes a unique set of skills that together guide collaborative efforts to unify and improve healthcare delivery alongside our care provider and vendor partners.

Offering a wide variety advisory, consultative, and professional services for healthcare organizations and industry vendors our experts can bring relevant experience to your unique situation to augment your team, accelerate success, and increase your return on investment.



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