



Technical briefing: Picis Perioperative Dashboard

Introduction

Picis Perioperative Dashboard, part of the CareSuite® family of high-acuity solutions, helps you increase the efficiency in your operating rooms one day at a time. It allows you to assess the impact of issues as they arise throughout the day. Real-time queries resulting in cross-facility visual indicators cover key aspects of perioperative efficiency such as delays and turnaround time analysis, as well as quality aspects such as care initiative compliance and patient satisfaction. Nursing staff can proactively use this information to positively impact the day's schedule; nursing directors can view incomplete documentation and billing readiness; and surgeons and anesthesia providers can check on how a delay will impact their case start.

This paper discusses where Picis Perioperative Dashboard fits on the continuum of business intelligence (BI) and its technical architecture.

The business intelligence continuum

Operational reporting

Operational reporting provides key information about what has happened recently. These reports tend to be tabular, displaying raw data from the transactional workflow documentation systems together with summaries and basic averages. Usually an operational report is regenerated daily or weekly, and is printed or saved to a portable document format (PDF). The report consumer is a functional person, but the author is typically someone in the IT department with skills in the reporting writing tool.

Picis uses Crystal Reports from Business Objects as its primary operational reporting tool. Operational reports are delivered with the implementation of the following perioperative and critical care applications: Picis OR Manager, Preop Manager, Anesthesia Manager, PACU Manager, and Critical Care Manager. Picis also has professional services focused on authoring operational reports to a hospital's unique specification. For more information about this, contact reports@picis.com.

Typical operational reports from the Picis perioperative and critical care applications include:

- Scheduled pre-admission testing exceptions
- Daily OR schedule
- Length of stay in PACU
- Mortality in ICU

Management reporting and analysis

Management reporting focuses on trends and comparisons to some form of benchmark. The benchmark is typically internal, and usually involves analysis over time and organization. Thus it has a broader retrospective sweep, comparing current results with what happened last week, last month, or last year; or looking at the year-to-date results. It also compares similar departments against each other and in aggregate. Derived metrics or statistics are often included, and the information is presented in the most appropriate way, often using graphs.

Typically the same set of management reports are regenerated each week, each month, and each quarter, but they are usually the starting point for analysis. The report consumer will compare this month against last month, or this month against a plan for this month, and spot excessive variances. He or she will then drill down into more detail for that variance to understand what caused it to happen and what the implications are. Therefore, while some are static reports generated by a tool such as Crystal Reports, the more common tool for management reports makes it easy for management to create, change or analyze the reports on their own without the need for a report writer from the IT department.



These types of analysis queries and statistics require intensive processing of the raw data, and often involve multiple data sources. Furthermore, workflow documentation systems are optimized for capture of transactions rather than for reporting. Therefore, most management reporting is done from a data mart or data warehouse, where multiple data sources can be combined together, where the nightly updates can prepare frequently-used metrics and statistics, and where the data structures are optimized and include sufficient metadata for reporting and analysis.

Picis Extelligence[®], part of the CareSuite family of high-acuity solutions, offers management reporting and analysis solutions for the perioperative and critical care areas. Incorporating a predefined data mart with data structures organized for clinicians and administrators, and a library of predefined reports, Extelligence uses BusinessObjects[™] Enterprise as its platform and BusinessObjects Web Intelligence as the user interface. This not only allows clinicians and administrators to analyze from the reports in the library, but also enables them to create new reports without requiring the IT department's involvement. There are three solutions available: Extelligence OR, Extelligence Anesthesia, and Extelligence Critical Care.

Sample management reports from Extelligence include:

- Case supply cost analysis
- Block utilization analysis
- Complications analysis
- Mortality analysis

Ad hoc queries

During any day, clinicians and administrators ask questions about the current environment for which no operational report has been previously prepared. If these questions become routine, an operational report will usually be created. However, most ad hoc queries need to be answered immediately.

Picis QuickQuery[™] is the ad hoc query solution for Preop Manager, Anesthesia Manager, PACU Manager, and Critical Care Manager. OR Manager has its own ad hoc query interface built in, the Manage Routines. Both of these run against the transactional database providing real-time queries against the operational raw data. The user needs to be somewhat familiar with the transactional database field structure, and the results are displayed in a tabular format.

Dashboards and scorecards

Dashboards and scorecards are visual representations of information.

Dashboards

Dashboards focus on the operational: what's happening, and particularly on the exceptions: what's going wrong. They are departmentally-focused, and have two implementations:

- Personal dashboards, where each user sees a one-screen view of everything that's going on in their realm, focusing on the things he or she needs to do something about;
- Public dashboards, which are displayed on the wall of a department and enable everyone to see current status.

Dashboards are more useful if they allow the user to drill into more information to identify what is causing the problem and if they show information that support decision-making about the problems they are highlighting.

Scorecards

Scorecards, while similar to dashboards, focus on strategy and current performance against targets: how am I doing. They display key performance indicators (KPIs), which are usually drawn up by the executive team as measures of effective execution of the corporate strategy to reach the organization’s goals.

The KPIs are quantitative, and are often highly derived statistics, not simple raw counts. There are several standard methodologies used to determine them. Most well-known is the Balanced Scorecard methodology developed by Kaplan and Norton. This performance measurement framework incorporates strategic non-financial performance measures with traditional financial metrics to give managers and executives a more 'balanced' view of organizational performance.

Scorecards usually allow drilling into more detail to analyze performance, and may drill down to metrics that are on somebody’s dashboard.

Key differences between dashboards and scorecards

Dashboards	Scorecards
Focus on today, the immediate past, the immediate future	Focus on how the organization is performing against targets
Focus on the problems: expect to see more red and yellow	Focus on performance: expect to see red, yellow, and green; show whether performance is improving or degenerating over time
Define scope as the department’s operations	Define scope as the entire organization
Target individuals in a department	Target executives
Drill down to transactions	Drill down to departmental metrics
Ideally show repercussions of problems and information to support decision-making	Ideally include external benchmarks

Picis Perioperative Dashboard

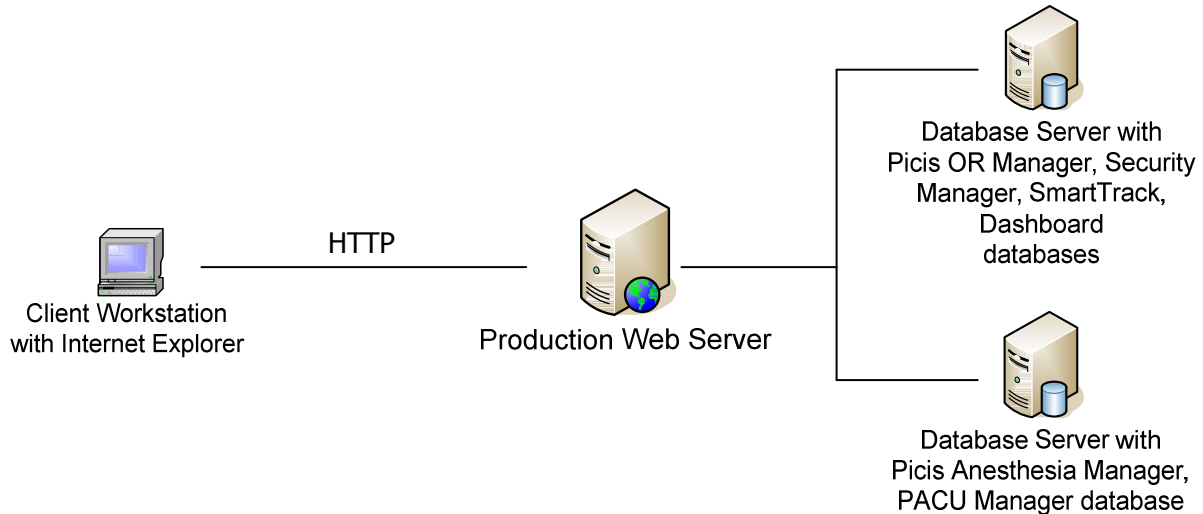
Picis Perioperative Dashboard is a business activity monitoring (BAM) solution for the perioperative suite. Gartner, the industry analyst firm, defines BAM as providing real-time access to critical business performance indicators to improve the speed and effectiveness of business operations¹. Unlike traditional real-time monitoring, BAM draws its information from multiple application systems and other internal and external (interenterprise) sources, enabling a broader and richer view of business activities.

It includes indicators that cover key aspects of perioperative management, including throughput, quality, documentation completeness, and billing readiness.

It highlights the things that are not going as planned, helping clinicians and administrators to anticipate consequences. Being armed with that timely information enables them to actively manage the rest of the day, taking corrective action where necessary, rather than blindly reacting to situations. It includes a library of indicators, which will be updated regularly in response to clinical initiatives and performance best practice.

¹ Gartner: “Business Activity Monitoring: The Promise and Reality”, 11 July 2001

Architecture



Picis Perioperative Dashboard is a web-based application that snaps onto existing Picis perioperative infrastructure. It has a 3-tier deployment, described below. There is a library of predefined indicators, which query data from OR Manager, SmarTrack, Anesthesia Manager, and PACU Manager. Several of these indicators require configuration from a Picis Perioperative Dashboard administrator. In addition, the Picis Perioperative Dashboard administrator can create up to five hospital-designed indicators. Users access their personal dashboards through a web browser.

Database tier

The database tier resides on the same server as OR Manager, and comprises a small Microsoft SQL Server database that holds only the definitions of the stored procedures for the indicators.

Application tier

The ASP.NET dashboard application relies on the Microsoft Internet Information Services (IIS) web application server. This can be installed on the same hardware as the OR Manager and dashboard database, on the Extelligence server, or on a different server.

The application manages the dashboard for each user, executing the stored procedures for the indicators against the OR Manager, SmarTrack, and Careman databases. Indicators are rendered using predefined Adobe Flash objects that were created using Crystal Xselsius from Business Objects.

Client tier

Users access the application through a Microsoft Internet Explorer web browser. Each client needs Adobe Flash in order to render the indicators. Once a user has logged in, the application uses a cookie in order to avoid fetching the user name each time the page is refreshed.

Security

Two types of security are considered: functional security and data security. The dashboard integrates with Picis Security Manager for user names, passwords, and facility access.

Functional security

Functional security governs which capabilities a user has within the dashboard application. There are three types of user:

- **Picis Perioperative Dashboard user**
Each user chooses which indicators to include in his or her personal dashboard and the layout of the indicators on the screen. He or she can also define up to five bookmarks to include in the dashboard. To refresh the data in the dashboard, he or she refreshes the browser.
- **Picis Perioperative Dashboard public user**
The public user has access to the same functionality as the user, but instead of refreshing the data on demand, the queries are automatically executed every 60 seconds. This user type is designed to allow a dashboard to be displayed on a wall, for example by the charge nurse's station or in the ORs.
- **Picis Perioperative Dashboard administrator**
The administrator configures the indicators (for example, to state which field in the transactional system is used for delay reasons), and grants each user access to indicators. He or she can also create up to five hospital-designed indicators by associating a stored procedure with an Adobe Flash object.

Thus indicator security is managed by the Picis Perioperative Dashboard administrator. Each user has access to no indicators until the administrator has granted access explicitly.

Data security

Picis Security Manager manages the facilities to which each user has access. When a user refreshes his or her dashboard, the stored procedures for the indicators are executed against only those facilities to which he or she has access.

Performance considerations

The stored procedures that return data to each indicator are executed against the transactional perioperative databases. Only the stored procedures for the indicators currently included in a user's dashboard are run. This, combined with the fact that the queries are stored procedures, insulate the transactional system from performance degradation.

There are two exceptions to this. The stored procedure for the ticker executes every 60 seconds while a dashboard is open. All the stored procedures for the indicators included in the public dashboard also execute every 60 seconds.

Logging and tracing

The logging system is based on Microsoft Enterprise Library Logging Application Block. There are three trace categories:

- **Information:** This trace logs any user action and can be used for audit purposes.
- **Error:** This trace logs any error condition, and adds a description for exceptions.
- **Debug:** These are low-level messages intended for troubleshooting.

Initially, Information is disabled, Error is always enabled (with messages sent to the Event log), and Debug is disabled.



Installation

Installation comprises the following steps:

1. Install Microsoft IIS web server.
2. Run a setup executable for Picis Perioperative Dashboard and enter the connection strings to the transactional databases for OR Manager, SmarTrack, and Anesthesia Manager.
3. Log into Picis Perioperative Dashboard using the Picis Security Manager credentials:
 - a. Configure the indicators by completing parameters: these reside on a single page.
 - b. Specify the dashboard users and grant them access to the indicators.
 - c. Choose the indicators you want to include in your own dashboard and the layout.
 - d. Optionally, create up to five hospital-designed indicators by specifying a stored procedure and associating it with an indicator type.

Content updates and maintenance

The application is metadata-driven, so that content updates can be downloaded without downloading a new version of Picis Perioperative Dashboard.

New indicators will be issued periodically. These will be available as a download from a secure Picis web site. Installing the content update will install the new Adobe Flash objects and update the dashboard database for the new indicator metadata and stored procedures.

Maintenance of the dashboard application will usually involve an update to the application only.

Certifications

The following component versions are certified with Picis Perioperative Dashboard 1.0:

Database server

Operating system	Windows 2003 Server
Database	SQL Server 2000, SQL Server 2005
CareSuite applications	OR Manager 7.5, 8.0, 8.1 Anesthesia Manager 7.5, 8.0, 8.1 PACU Manager 7.5, 8.0, 8.1 SmarTrack 7.5, 8.0, 8.1

Web server

Operating system	Microsoft 2003 Server
Web server	Microsoft IIS 6.0

Client

Operating system	Microsoft Windows XP
Web browser	Microsoft Internet Explorer 6.0, 7.0

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