How to Improve Efficiency and Quality in Hospital Healthcare

Advanced and Predictive Analytics for Professionals in the Healthcare Industry
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Advanced data analysis for more efficient healthcare

An increase in the healthcare services portfolio, combined with population growth, ageing, and the progressive sophistication of treatments are making healthcare in hospitals increasingly more complex. Projects aimed at improving the efficiency and quality of healthcare need to integrate massive volumes of internal hospital information coming from heterogeneous sources, to verify the quality of this information and to make it available for analysis.

Analysts require tools that enable them to improve data quality, to generate knowledge from data, and to exploit it quickly in order to respond quickly to information requests. They also need to leverage the analytical potential of a variety of both external and internal data sources, such as primary health care assistance, clinical trials, health cards, environmental data or social and demographic data. These sources produce billions of records that must be classified, explored and analyzed to get the most out of data.

The ability to extract knowledge from integrated sources through analysis represents a big step forward in terms of efficiency, rationalization, and disease prevention, as well as the capacity to ensure a population's health and the professional development of its healthcare providers.

The Challenge: extract the most value out of data, while ensuring its reliability and security

Many specialized healthcare processes are already digitized, and thus generate vast amounts of information. It is possible to compile data regarding physician orders, medicine prescribed or files containing clinical information, but the data quality often suffers, particularly when coming from heterogeneous sources. Electronic health records can provide many benefits for providers and their patients, but the benefits depend on how they are used. For those hospitals willing to attain the Meaningful Use defined by the Centers for Medicare & Medicaid Services (CMS) Incentive Programs in order to be eligible to earn incentive payments, data quality is essential. Because it is so important and difficult to achieve, companies often must enlist engineers to do the work.

But health care professionals need to be able to access and analyze high-quality data autonomously. Instead of depending on engineers and IT departments, healthcare professionals themselves must gain maximum autonomy to clean data, build validation rules, define indicators, decode, enrich models, analyze instantly and produce relevant information, while ensuring adherence to data protection laws and handling corporate and personnel data with discretion and security.

Management involves measuring. In healthcare this means the balanced scorecard, with activity and results indicators that span all aspects of hospital healthcare, including care (hospitalization, emergencies), financial management (consumption, budget monitoring) and HR factors (shifts, replacements), so that goals related to efficiency and scheduled contracts can be evaluated. Healthcare directors are preparing to equip their facilities with new and innovative tools and technologies that maximize knowledge and professional development, and enable them to deliver all citizens high quality health care, even as the system rapidly changes and increases its demands.
Gain global insight into data with BIRT Analytics

Below are just some of the ways customers in Healthcare apply BIRT Analytics to get the most value out of their data.

**Healthcare**
- Analyze changes in hospital room occupancy according to pathology.
- Identify profiles of diagnoses most likely to incur stays in the ICU.
- Readmissions: identify patients likely to enter the ICU more than once and identify pathologies most likely to produce re-stays.
- Analyze the number of actions performed on each patient.
- View intermediate stays per different services.
- Understand the impact of new treatments on average hospital stay time.
- Analyze the geographic origin of patients.
- Understand the impact of hospitals on the population.
- See the impact of new hospital openings in terms of income generated in the surrounding area.
- Analyze a hospital's surgery ward to profile patients in zones of frequent surgeries.
- Determine the number of hospitalization processes per patient.
- Analyze specific procedures by cases and patient profiles.
- Waiting list analysis: calculation, obtaining 83rd percentile, foreseeing and behavioral analysis.
- Analyze the seasonality of emergencies.
- Identify and analyze unnecessary removals, unsuccessful cases and stays.
- Analyze emergencies during a particular period of time, especially where patients are readmitted within a month.
- Simulate best service quality indicators: readmissions, stays, etc.
- Create a distribution curve of attended patients.
- Perform on-the-fly epidemiology research.

**Hospital Pharmacy**
- Analyze the effectiveness of active principles in different clinical areas.
- View pharmaceutical expenses by area, pathology, patient, etc.
- Analyze the effectiveness of active principles in specific treatments.
- Research the adhesion of external patients.
- Identify patients whose treatment will end within a certain time period.
- Analyze patients who received treatments for the same episode using different medications.

**Administration and HR**
- Define indicators for the integrated balanced scorecard to monitor hospital activity.
- Perform detailed, comparative analysis of the second chapter: per supplier, service, pathology, physician, visit, population, income, etc.
- Predict substitutions and improvements in shifts.
- Project staff growth.
- Profile absenteeism by shift, seniority, department, type of contract, work day, age, sex, etc.
- Analyze quotes and identify "abnormal" patterns.

**Research**
- Identify relationships and common features among different diagnoses and causes of mortality.
- Identify causes of risk related to specific pathologies.
- Analyze the impact of weather and environmental conditions on pathologies.
- Establish the main causes of mortality for a specific profile.
- Analyze the values of a specific variable within a reference population.
- Analyze the level of instruction required for different pharmaceutical products.
- Evaluate different hospital management models.
Laboratories
- Perform time analysis on specific lab tests and analyze time variations for different patient populations. Determine if the concurrence of tests from different requesters can be avoided by improving service quality.

Blood Banks
- Integrate data from different entities.
- Validate data.
- Standardize forms and codes per different entities that deliver information.
- Treat information on an annual basis.
- Identify new donor profiles.
- Identify profiles of recurring and typical donors.
- Profile donors who discontinue donating.

Hospital Information Systems
- Integrate data from miscellaneous sources (labs, pharmacies, EHR, ID 10, Medicaid, clinical trials, etc.)
- Perform data audits: ensure data is consistent and reliable.
- Eliminate duplicate clinical files, orphan data, patient files with no related hospital stay, files with clearly incorrect data regarding age, gender, or diagnosis.
- Design and logically prep databases.
- Integrate different databases.
- Respond to requests and prepare reports on the fly.
- Integrate data: information scorecard across departments that share data via interfaces.
- Support the migration of applications.
The BIRT Analytics Solution

Fast, secure, advanced and predictive analytics for data integration, cleansing, enriching and deep analysis

BIRT Analytics allows users to quickly and easily leverage information to improve all stages of the data exploitation cycle:

**Secure Management of Users and Data:** Compliance with data protection laws, access logs, security matrix, restrictions for accessing functions, tables, fields and specific contents (HIV test data, quotes, specialized treatment, etc.)

**Fast, Easy Integration of Massive Data:** Up to 60 Gb/h minimum speed on data from any source (Oracle, MSSQL, Excel, Access, txt, ODBC, OLEDB, etc.)

**High-Performance Analytical Repository:** Performs 1000x faster than traditional databases with no need for cubes or modeling. Enables physicians and analysts to work self-sufficiently to enrich models, calculate length of stays per prognosis or average cost per procedure, identify polymedicated patients or hyper-prescribers per specialization, re-code diagnoses and procedures, analyze changes in geographical codes, new age ranks, etc.

**Physical and Logical Data Auditing:** Explore data intuitively, apply validation rules, establish consistent relational models, detect duplicated and/or orphan records, values out of rank, inconsistent values (e.g. medical recommendations to patients of a certain age or sex), generate reports on inconsistencies.

**Advanced and Predictive Analytics:** Use Venn diagrams, mapping, profiling, clusters, pivot tables, decision trees or association rules to instantly cross data and see results. Integrated tools in BIRT Analytics not only perform basic statistics—such as average, maximum and minimum values, kurtosis, asymmetry, quadratic addition, percentile distribution—but also enable complex selections on the fly, with no previous preparation required, no cubes, and no volume limits. Research can be complemented with other tools via direct connection with SPSS, Excel and other standard tools.

**Instant Reports and Balanced Scorecards:** Some research must be duplicated or distributed inside or outside the BIRT Analytics environment. Any analysis can therefore be instantly transformed into a report, enabling analysts to work self-sufficiently, creating reports, indicators and balanced scorecards on the fly, all within a secure environment and with no dependence on IT teams.
Quick setup of the analytical environment

BIRT Analytics loads data from any source, at an average rate of 60 Gb/h through its dynamic loading component. Data is simultaneously indexed while being loaded, without slowing down loading speed. The data takes up minimum space and is stored in a hybrid technology-based analytical repository (Column Data Base + In-Memory). Data is ready for immediate exploitation.

These features allow IT departments to build analytical environments in record time, allowing for maximum granularity of data, with performance that is thousands of times faster than that of traditional relational databases.

In order to maximize the value of data, analysts need to be able to fully exploit it as quickly as possible, using tools that enrich the data by turning out metrics, aggregates, quantiles, phases, ranks, and other analytic components. This is exactly what BIRT Analytics enables organizations to do.

Analysts benefit from the depth and immediacy of BIRT Analytics. Its feature set enables them to respond immediately to data requests with minimum effort. BIRT Analytics optimizes time spent on analysis and therefore enables more efficient knowledge development.

Secure environment and strict data control

The Healthcare industry data analysis environment is highly sensitive and requires stringent security protocols. The BIRT Analytics management console enables strict control of objects, groups and access profiles. It also delivers maximum control of data accessibility and availability down to the content field level.

A matrix of permissions is easily configured upon deployment, from minimum privileges to functionalities that can be enabled or restricted per user, to access to field-level data per user or group of users.

BIRT Analytics permits the definition of highly sensitive data in its access and usage registers that enable it to meet data protection legislation. It logs all actions in a detailed record, so handling of data is always transparent. It also includes advanced permissions and password management, with rules for content script, length, validity and control through Active Directory.

Analysts benefit from the depth and immediacy of IT departments benefit from the ability to maintain strict security and keep data and users under control at all times.

Dynamic interaction with data

What makes BIRT Analytics a unique tool is its ability to allow users to interact with data in a way that is dynamic, intuitive and generates insights. Its analytical repository is not limited to traditional data models (there is no need to create dimensional cubes, metadata, dimensions, measures, etc.) so it maximizes the free exploitation of data, making analysis easy and unlimited.

Business users easily exploit data, down to minute details, by simply dragging and dropping. They can create groups, apply logical operations, calculate statistics, use mathematical functions, and a wealth of other options. Results are displayed as grids and graphics, so interpretation is fast and easy.

BIRT Analytics integrates a wide range of advanced and predictive techniques, including easy-to-read pivot tables, for dynamic crossing of data, Venn diagrams that establish relationships across data, profiling to identify common features and patterns, group analysis to uncover trends with bubble graphs, as well as geographical mapping, decision trees, association rules, and forecasting techniques.
Easy deployment and user self-sufficiency

The benefits of BIRT Analytics go well beyond its dynamic data analysis technology to providing users with a full self-service, web-based (multi-browser), agile analytical platform. It is well-suited to organizations that are tasked with handling complex data and sensitive information, and need to do very deep analysis. Its structure minimizes deployment costs and reduces IT maintenance efforts.

With BIRT Analytics, analysts can browse, explore and investigate as quickly as they can think. The tool is highly intuitive and has a minimum learning curve.

BIRT Analytics customer testimonials

“We were very surprised, and hadn’t expected to achieve results so quickly. We’ve never had such a powerful and dynamic tool.”
Xavier Salvador, Analyst, Government of Catalonia Health Department

“It is a tool that opens our minds to information that was previously hidden.”
J. P. Martínez, Health Services Analyst, Government of Catalonia

“BIRT Analytics has exceeded our expectations. The platform has delivered a lot of value and helped us to change our work rhythm.”
G. Carmona, Epidemiology Director, Catalonian Government

“It has not only integrated our information, but also our organization’s departments, resolving previously unresolveable questions and issues.”
J.M. Munné & R. Salvatiego, IT Department, Government of Catalonia

“Without a doubt, BIRT Analytics’ main value is its speed and agility when working with big volumes of data. We were amazed. It’s a very fast and user-friendly tool.”
CMBD Analyst, Health Services of Andalusia

“We have never seen a tool that loads data with such performance and speed as BIRT Analytics.”
J.M. Ayra, IT Director, Assistència Sanitària Col.legial (ASC)

“It has resolved our need to quickly exploit and analyze data.”
Dr. R.M. Delgado, Control Department Director, ASC

“With BIRT Analytics, our department has seen a turning point; nothing is the same since we started to use BIRT Analytics.”
Laura Facerias, Control Department, ASC

Want a customized demonstration using your organization’s data? Just contact us at BIRTAnalytics@actuate.com
BIRT Analytics: Depth, Speed and Autonomy

BIRT Analytics is an agile, self-service analytical platform that makes advanced analytics and predictive analysis techniques available to business users. It is simple, easy to use, and requires no special mathematical or statistical expertise. BIRT Analytics is a dynamic, high-performance tool that enables organizations with big volumes of data to detect opportunities faster and reduce risks and costs in a self-service way, and with maximum ease of use, therefore reducing IT workloads.

Advanced and Predictive Analytics

Users extract more value from data in less time and respond to business questions and queries as soon as they arise.

No cubes, models, measures or metadata are required to perform advanced and predictive analytics. Users gain accurate business insight and quickly identify opportunities, anticipate risks, automate actions and optimize processes.

Depth and Business Insight

Data is easily explored, filtered and visualized in maximum granularity, bringing high-level knowledge. Users simply drag and drop to cross information, easily applying a range of techniques, such as comparison diagrams, behavioral profiling, clustering, mapping and multi-dimensional crosses. No advanced technical skills are required.

Add Value to Data

BIRT Analytics allows users to work autonomously with data, without having to reload databases. It lets them continually enrich the original data with stretches, ranks, quantiles, decodings and metrics that bring fresh insight, so data gains scope and value.
Instant Availability and Ease of Use

BIRT Analytics requires no modeling, no dimensional cubes or metadata. Its unique logistics allow for immediate analysis with intuitive tools as soon as data is loaded.

User Autonomy

Users can work with complete autonomy, putting business knowledge into practice as they exploit, explore, investigate and simulate with full self-sufficiency and no need for IT assistance.

“BIRT Analytics itself is very impressive when demonstrated. It manages to effectively make predictive analytics available to an end user in a consumable form. Many vendors are trying to do this, but in our view BIRT Analytics comes closest to getting it right, by surfacing the results of a predictive routine but not requiring the user to select algorithms.”

Actuate Forges Ahead in the Race to Visualize Big Data: Here Comes BIRT Analytics. IDC Research by Alys Woodward and Jose Curto. February 13th, 2013