

# The Future of Personalized Medicine



“Every patient is different; every patient has a unique story. This comprehensive analytics approach will enable us to treat each patient in a personalized way to produce the best possible results.”

**Steven D. Shapiro, M.D.**  
Chief Medical and Scientific Officer, UPMC

## UPMC – Life Changing Medicine

Over the last 20 years, UPMC has evolved from a single psychiatric hospital into a \$10 billion integrated global health enterprise. UPMC is a world-class healthcare delivery provider, with more than 20 hospitals and 400 clinical locations, encompassing long-term care and senior living facilities, as well as a growing international and commercial segment. As a healthcare delivery organization, UPMC is like thousands of healthcare institutions across the country, striving every day for accountable, cost-efficient and patient-centered care. And like many other institutions, UPMC is growing rapidly via mergers and acquisitions, while facing constant changes in regulations and new business models.

In addition to providing healthcare delivery in Western Pennsylvania, UPMC has a broader mission. UPMC is closely affiliated with the University of Pittsburgh, which has ranked among the top 10 recipients of National Institutes of Health research funding

since 1997. UPMC is at the forefront of “Life Changing Medicine” which translates science into cures. In this era where genomic sequencing will soon cost a few hundred dollars, and the promise of personalized medicine tailored to each individual will soon be a reality, UPMC is a cutting-edge leader in harnessing the power of technology and accelerating innovation.

## Unleashing Information Potential

UPMC estimates that the vast majority of its spend is made on a fraction of its patients. Advanced analytic and predictive modelling applications for clinical and financial decision-making are expected to produce better patient outcomes while reducing costs. One focus area is the creation of “longitudinal records” for the true cost of providing particular types of care. For example, to understand

the cost of a spinal surgery, UPMC must look beyond the cost of surgery, accounting also for the pre-surgery care and recovery-related costs. By bringing together data from hundreds



### Business Initiatives

- Improve research outcomes in search of cures to cancer and other diseases
- Determine true cost of providing care with longitudinal patient records
- Examine clinical practice variations to benchmark and improve future procedures

### Technology Strategy

- Integrate clinical, financial, administrative, genomic and other information
- Create self-service environment, putting data in the hands of business decision-makers
- Strengthen information security, privacy, and compliance capabilities

### Inside the Solution

- Informatica PowerCenter® Advanced and Real-Time Editions
- Informatica PowerExchange®
- Informatica Data Quality
- Informatica B2B
- Informatica Master Data Management
- Informatica Data Masking
- Informatica Complex Event Processing
- Informatica Professional Services

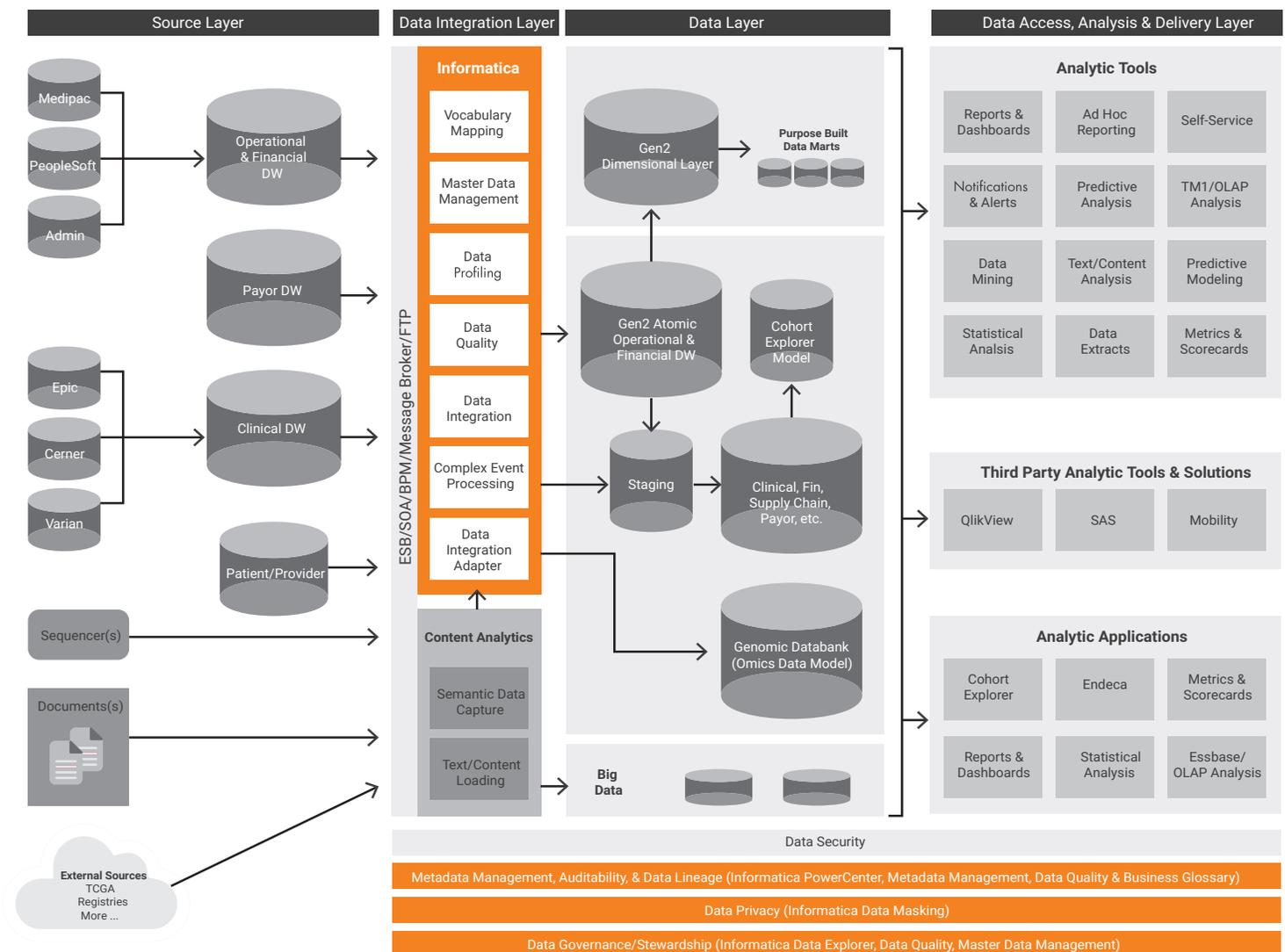
of sources of information across UPMC and outside entities, including labs and pharmacies, UPMC creates an accurate and comprehensive view which can be used to benchmark future procedures. Whether the goal is to create longitudinal records, develop a single patient problem list, or examine clinical practice variations, the capabilities required to unleash information potential are the same: trustworthy and authoritative data, connected across a huge number of sources, which can be accessed with agility and ease.

In October 2012, UPMC announced that it made a \$100 million investment in a sophisticated enterprise analytics

initiative which brings together clinical, financial, administrative, genomic and other information which has historically been extremely difficult to integrate and analyze. UPMC has more than 1200 applications they are looking to eventually manage with data integration, master data management and complex event processing capabilities. A small data governance leadership team manages data integrity improvements, ensuring that trusted data populates enterprise analytics and provides transparency into data integrity challenges. The broader data governance effort at UPMC empowers 200 people across the organization.

In the long run, self-service across UPMC's employee base is a key element of the organization's strategy, putting data in the hands of the people that understand the decisions that need to be made. According to Terri Mikol, an IT leader on key aspects of the project, "We can't have people coming to IT for every information request. We're never going to cure cancer that way." When the first phase of the multi-year project is completed, many researchers, clinicians and administrators will have secure, real-time access to data and analytic tools via self-service tools, fitting their particular interests and needs.

## Inside the UPMC Enterprise Analytics Platform



UPMC's Enterprise Analytics initiative is putting powerful data mining and analysis tools into the hands of clinicians, researchers, and administrators across the healthcare system. At the center of the initiative is a sophisticated data integration platform – now being rolled out – that collects and cleanses data from hundreds of sources and organizes it into repositories that enable fast, easy analysis and reporting by end users. The platform, illustrated above, is comprised of four layers.

**Sources.** The platform pulls clinical and operational data from a broad range of sources, including systems for managing hospital admissions, emergency room operations, patient claims, health plans, electronic health records, as well as external databases that hold registries of genomic and epidemiological data critical to crafting personalized and translational medicine therapies. More than 200 sources and more than a thousand applications will eventually be included in the platform.

**Data Integration.** Informatica plays an essential role here, allowing UPMC to efficiently integrate and quality-check source data and distribute it to data warehouses in accordance with industry-standard healthcare information models such as HL7 and ICD-10. Informatica solutions including Data Integration, Data Quality and Master Data Management enable UPMC to manage these transformations and enforce consistent definitions of patients, providers, facilities and medical terminology.

**Data Layer.** UPMC's data warehouses and data marts store clinical and operational data that is accessed by clinicians, researchers, and administrators. The cleansed and harmonized data is organized in granular form in the IDFS Atomic warehouse, in specialized genomics databases, and in multidimensional warehouses and data marts. Plans for big data capabilities to handle unstructured data and natural language processing are in progress.

**Access, Analysis, and Delivery.** UPMC is deploying a broad set of analytical tools that allow end users to exploit the vast amount of data available on the Enterprise Analytics platform. The tools drive all kinds of applications, many of them self-service, including predictive analytics, cohort tracking, and business and compliance reporting.

**Data Security.** Throughout the process, UPMC relies on Informatica and other solutions to facilitate data audits and support sound data governance practices. Informatica's Dynamic Data Masking solution ensures data security and privacy.

## Results

Only eight months into the five-year project, UPMC started to see the potential of this initiative in the research arena. With the foundational architecture of UPMC's new enterprise data warehouse in place, researchers recently were able to electronically integrate—for the first time ever—clinical and genomic information on 140 patients previously treated for

breast cancer. Traditionally, these data have resided in separate information systems, making it difficult—if not impossible—to integrate and analyze dozens of variables. The researchers found intriguing molecular differences in the makeup of pre-menopausal vs. post-menopausal breast cancer, findings which will be further explored. This initial cancer insight is just the start of UPMC's effort to mine massive amounts of data in the pursuit of smarter medicine.

## The Role of Informatica

To develop the analytics platform, UPMC studied the market and chose vendors that had specific capabilities. UPMC chose Informatica chiefly for the end-to-end solution provided. "Informatica offers UPMC a single, unified platform for data integration, data governance, and master data management," according to Terri Mikol. UPMC is not aware of any other vendor that can do that. Another reason for the Informatica choice was simplicity. Informatica was perceived as much easier to scale to business users. Says Mikol: "The data governance teams are comprised of business analysts and they are entirely comfortable using Informatica." Informatica was chosen for its ability to access virtually any application, foster IT and business collaboration via rapid prototyping, and the ability to provide transparency via Informatica's unique metadata management capabilities.



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