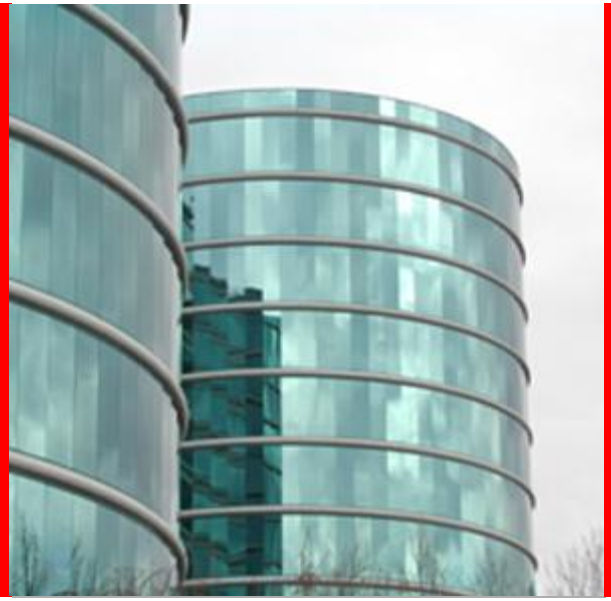

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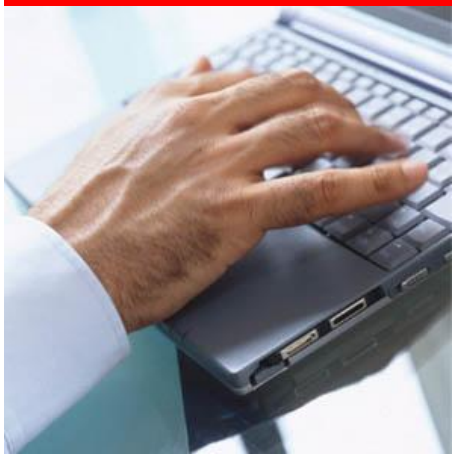
The Evolution Of Clinical Data Warehousing

Srinivas Karri
Principal Consultant

ORACLE
HEALTH SCIENCES

Agenda



- Value of Clinical Data
- Clinical Data warehousing &

  The Big Data Challenge
- The Impact of Omics Data
- The Future
- Questions

Value of Clinical Data

Value of Clinical Data

- 273

Value of the Opportunity

- 273Billion USD / yr realised though improved clinical decision support

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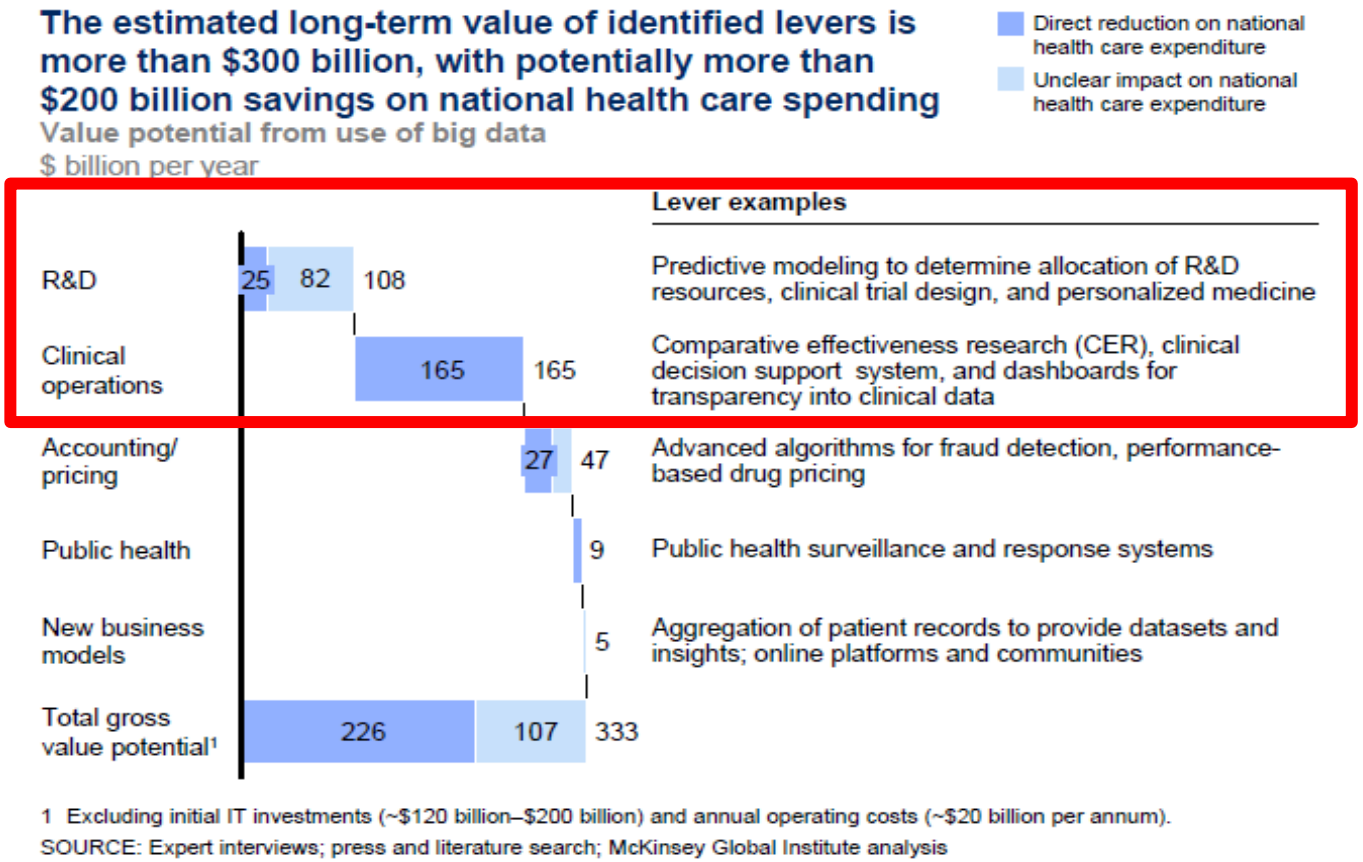


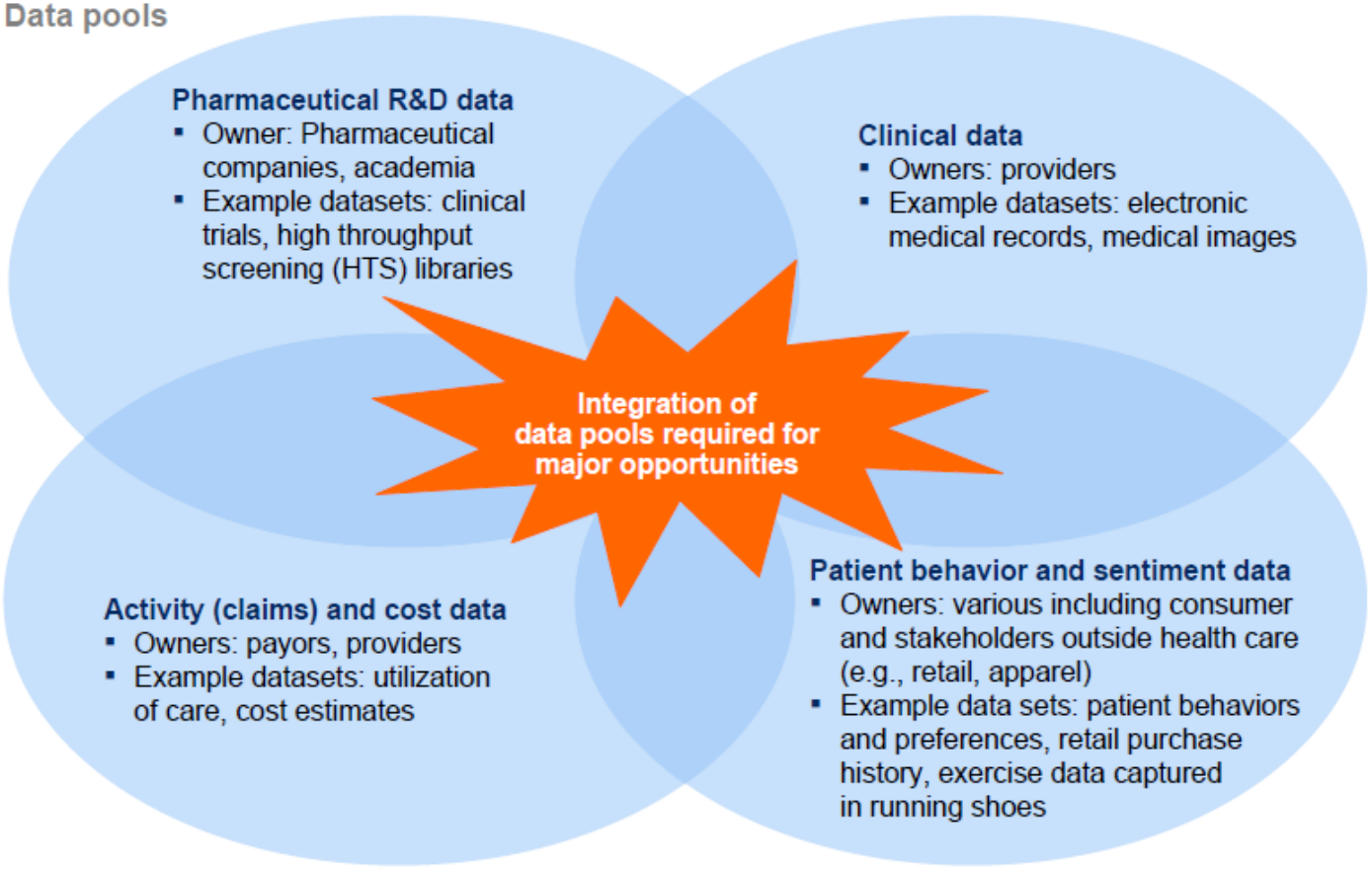
1 Excluding initial IT investments (~$120 billion–$200 billion) and annual operating costs (~$20 billion per annum).

SOURCE: Expert interviews; press and literature search; McKinsey Global Institute analysis

Integration Across the Data Pools

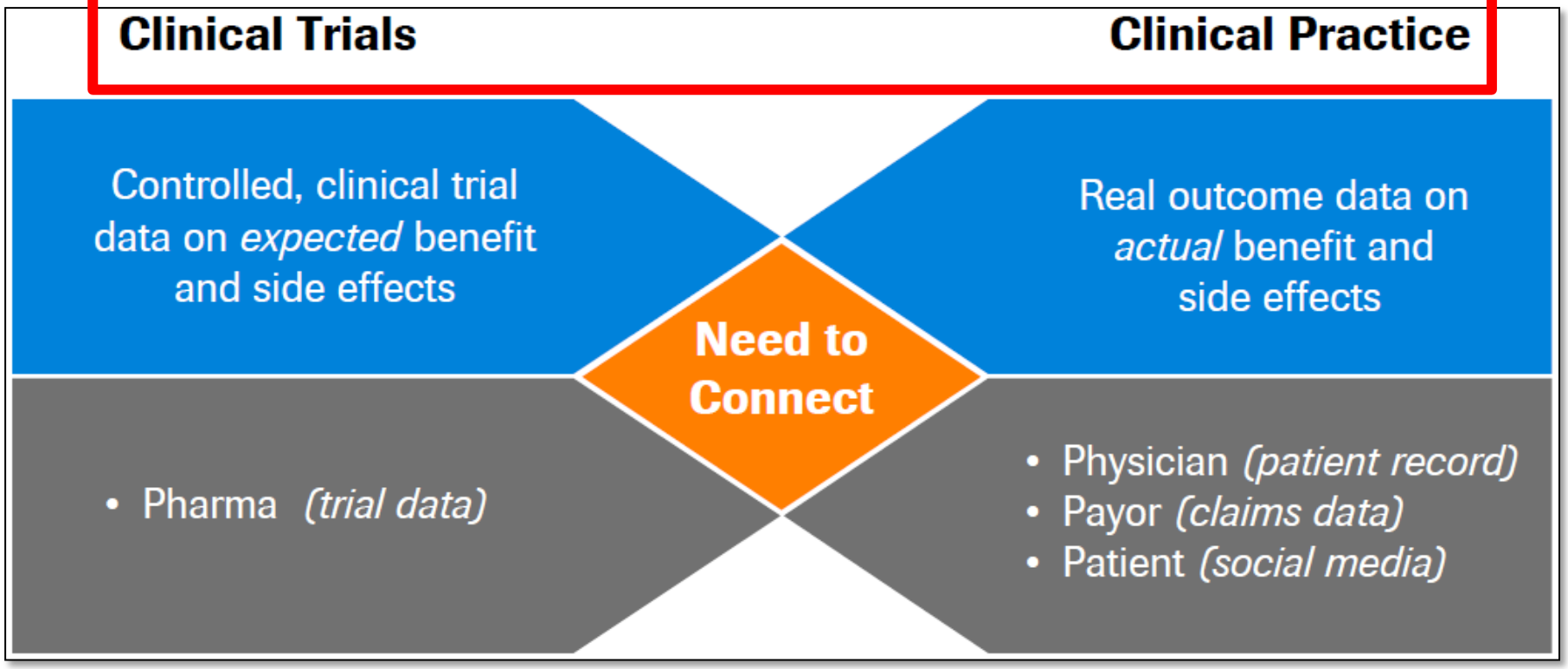
Four distinct big data pools exist in the US health care domain today with little overlap in ownership and low integration

Data pools



SOURCE: McKinsey Global Institute analysis

Connecting in Practice

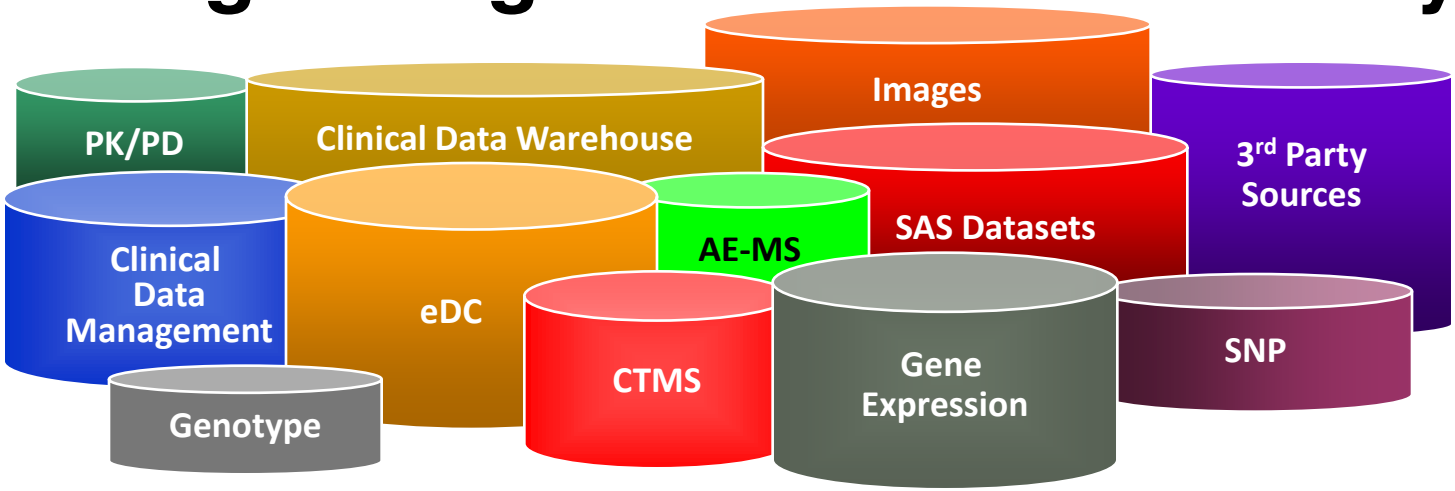


"At the moment data from clinical trials and data from clinical practice are separate entities, but it makes sense to bring these together."

– Severin Schwan, CEO, Roche

Clinical Data Warehousing

Having the right data available is key



Clinical data issues are a significant contributor

- Most companies hold large volumes of data that fuel your development projects, however different databases cover different domains of information and knowledge.
- Inefficient “hand crafting” of data aggregates for an alternate use such as data mining
- Diverse, inconsistent workflows and decision support processes
- Access to all information is critical if you are to be able to identify safety "signals" and manage patient risk.
- No easy way to classify and consolidate data with contextual information
- Access to legacy systems is often limited, although data are still required “on-line”

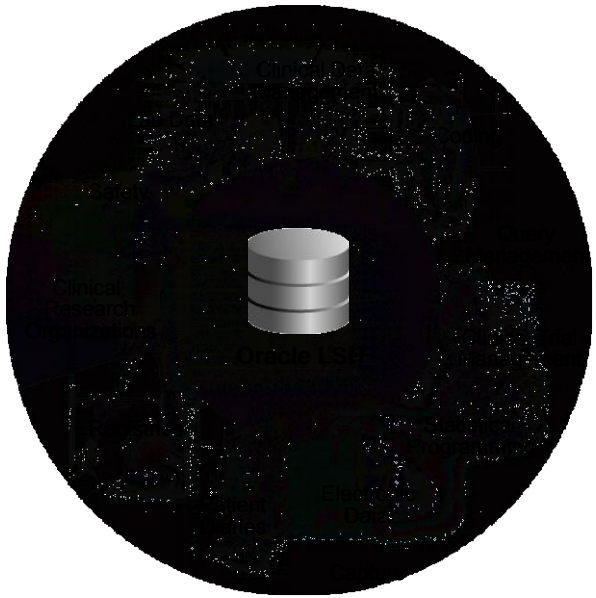
Current Approach

- Linkages between applications are often custom built, point-to-point, solutions that are hard to maintain – the spaghetti effect!
- Legacy data sometimes held in “near offline” archive systems, but context very often lost

The Vision

From

To



Multiple & redundant systems perform their focused job well. Data integration and cross system analysis is painful

A data integration hub, that gets data under control, increases availability and improves efficiency

2004 – Aspiration

- Streamline clinical development information management
- Reduce risk
- Simplify clinical integration
- Flexible and extensible architecture
- Rapidly embrace new standards
- Controlled application development
- Empower clinical researchers to make better decisions
- Achieve a single view of clinical data
- Improve productivity with self-service analysis and reporting
- Automate complex processes and approval chains
- Work with regulators to optimise approval processes
- Support ongoing regulatory reviews

2012 - Reality

- Streamline clinical development information management
- Reduce risk
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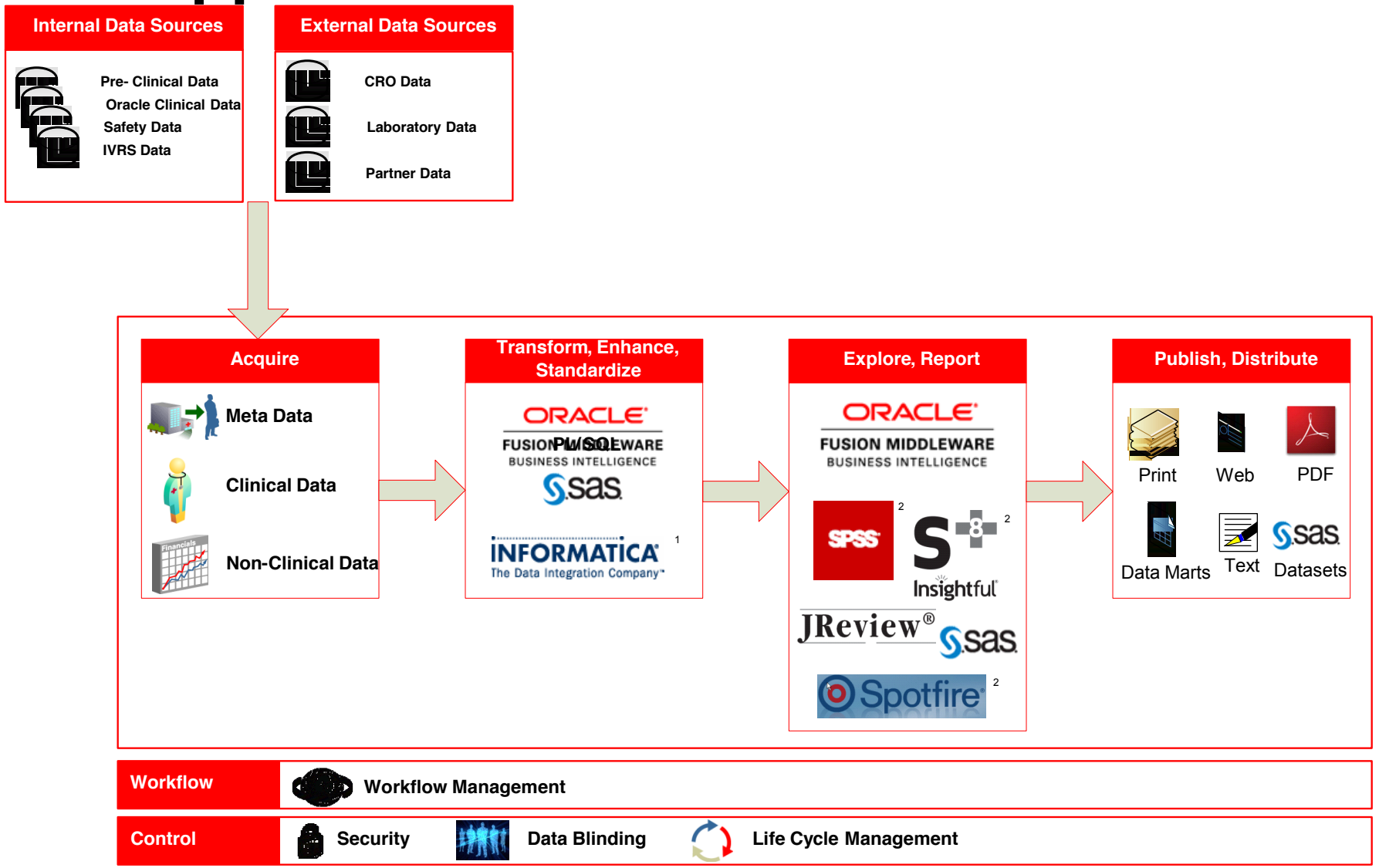
Supported Business Processes



Biostats

Supported Sample Use Cases

- **Core**
  - Run analysis programs program
  - Create analysis outputs
  - Create integrated summaries from SDTM pools
  - Distribute outputs

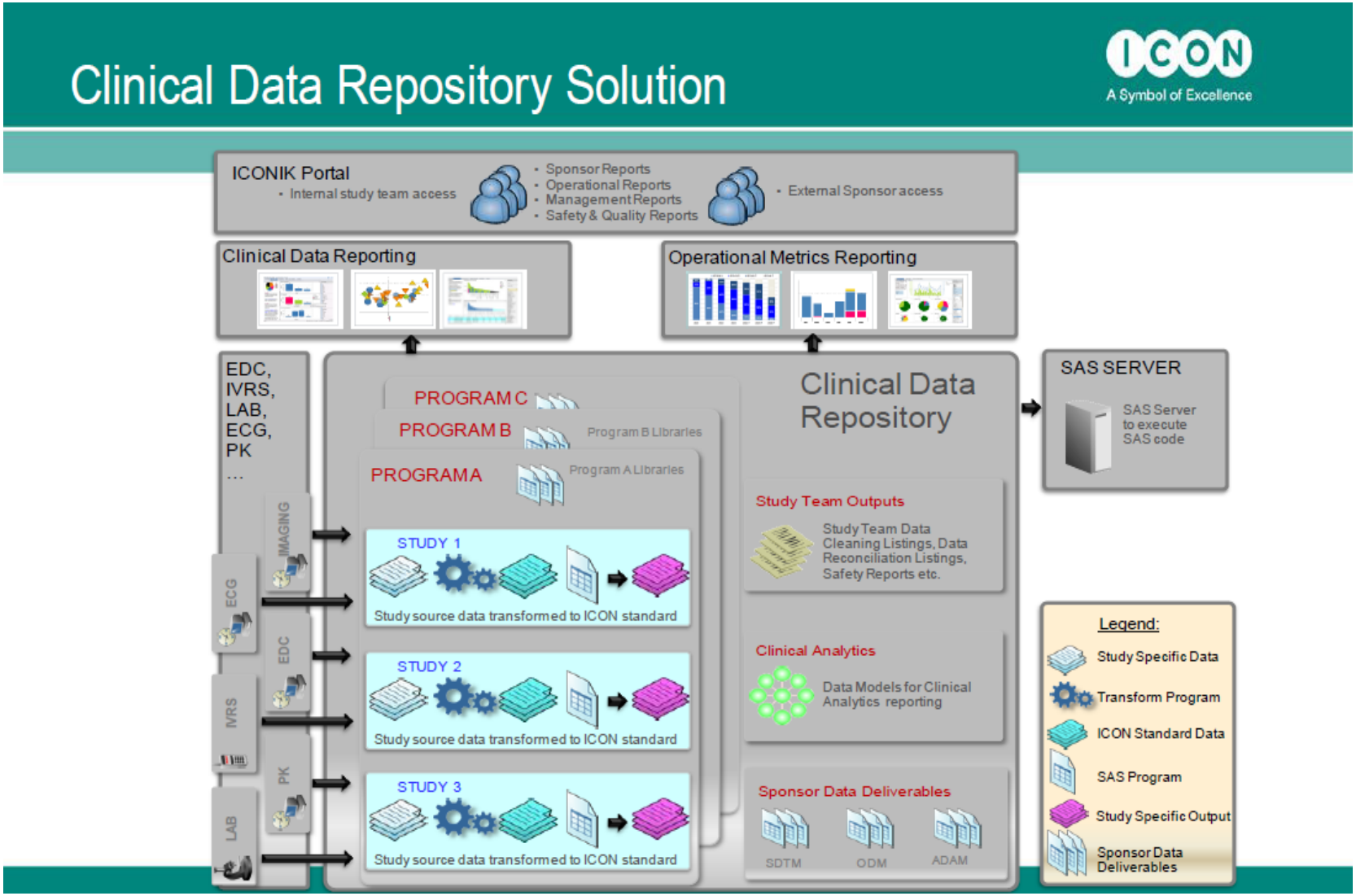
  - Develop SAS programs
  - Execute SAS programs
  - Schedule SAS programs
  - Copy SAS programs from a library

  - Split SAS datasets to view
  - View & Edit SAS dataset
  - Application bookmarks
  - Export SAS to Excel and data exchange
  - Parameterized macros
  - Meta data search

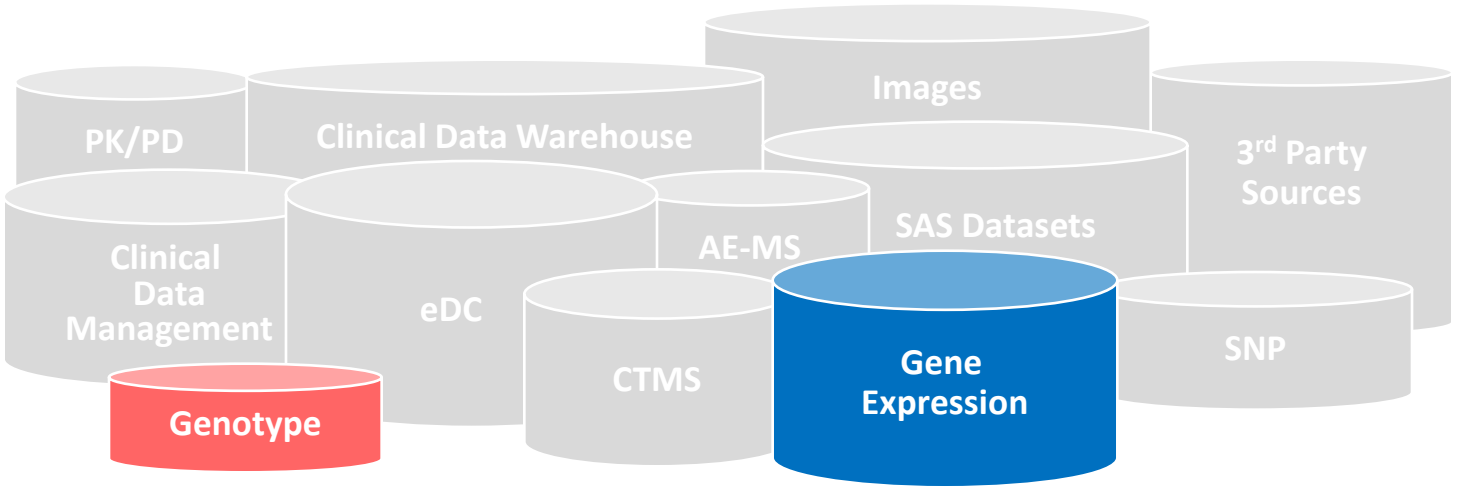
- **Options**
  - Hierarchy
  - Macro Libraries

- **Datamarts and Outputs**
  - Create/grant access
  - Allow application to access data

State of the Art



But Wait...What about Genomic Data?

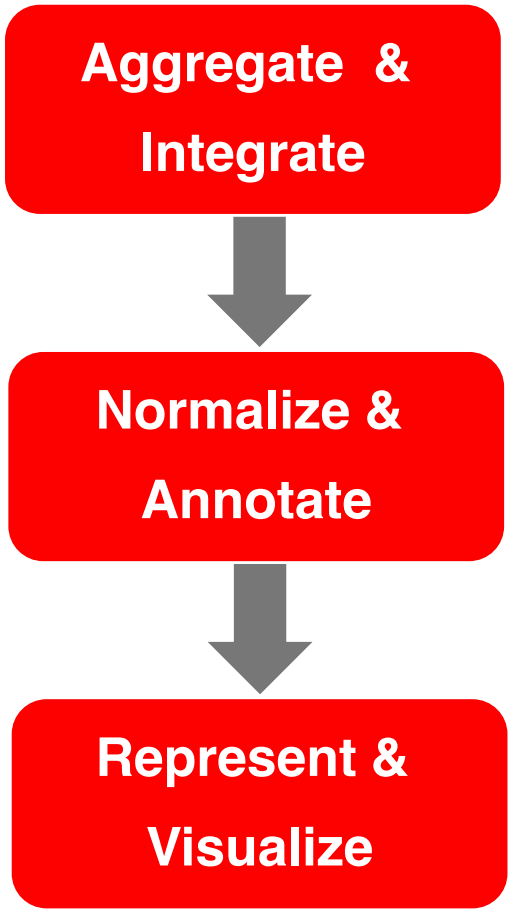


- Very Large Data Sets
- New Data Models
- New Visualization Tools

- New Business Processes

The Impact of Omics Data

New Business Processes



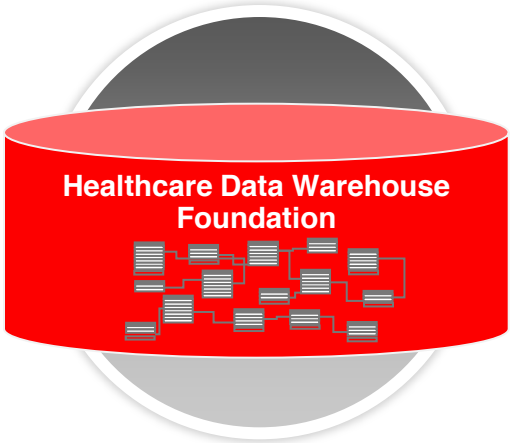
- **High quality standardized clinical data** with appropriate levels of security and access control
- Integration and analysis of **cross platform omics data** agnostic to scientific approach & technology

- Analysis of internal datasets in the context of ever increasing **large public domain data sets**
- Using public domain reference datasets, provides powerful **out of the box biological context ready for immediate query**

- Biomarker identification and validation through a **single integrated analysis ready view** of clinical and omics data

New Data Models - Healthcare

Integrated View of Clinical, Financial, Operational, & Research Data Across the Provider Enterprise



Clinical Domain

Patient
Encounter
Concern
Intervention
Case
Order
Specimen
Observation
Incident
History
Pharmacy
Care Site Scheduling and Utilization

Accounts Payable & Purchasing Domain

Purchasing
Accounts Payable

Inventory Domain

Inventory

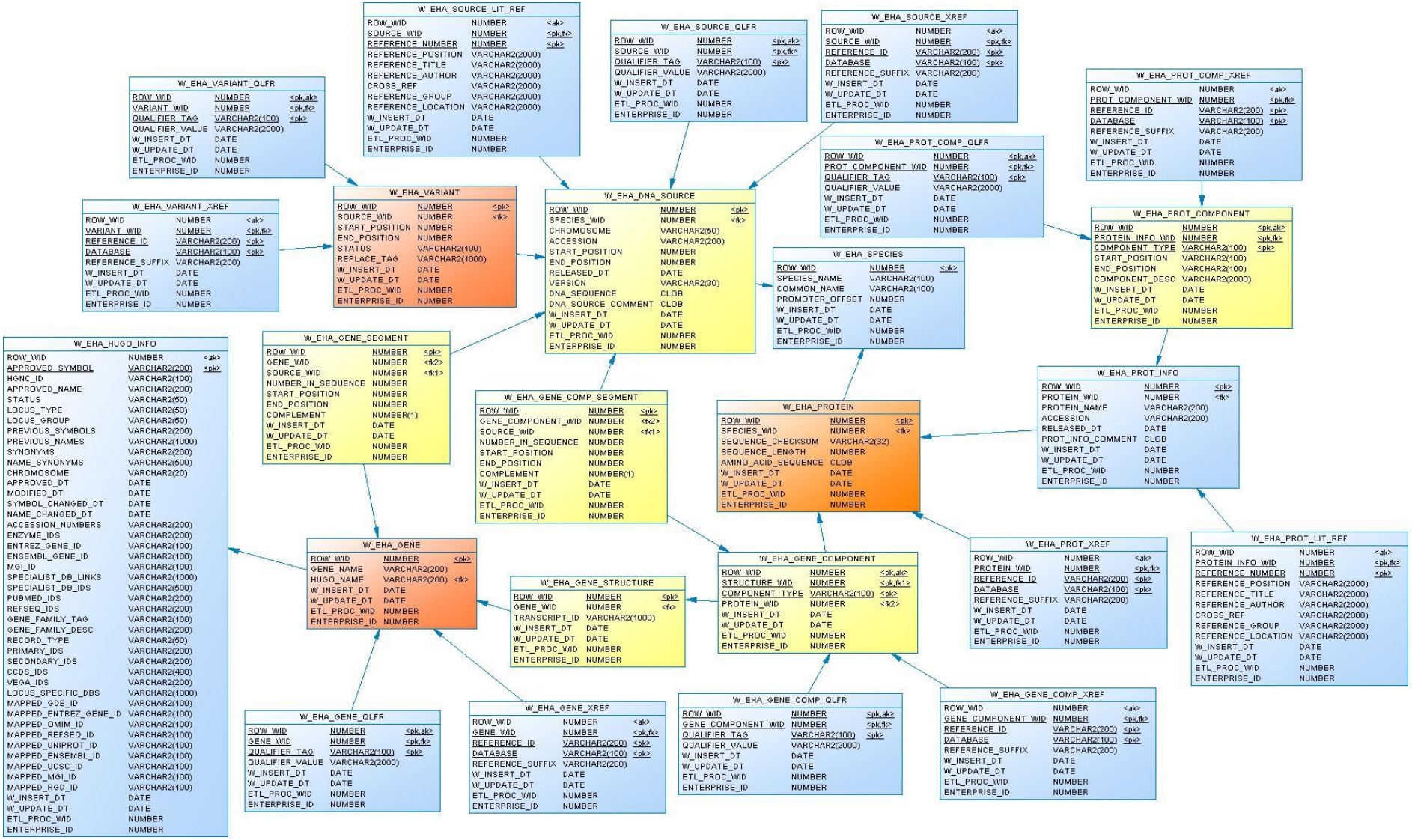
Administrative Domain

Cost Allocation
HR and Payroll
Survey
Advance Directive
Consent
Party
Roles
Facility
Master Catalog

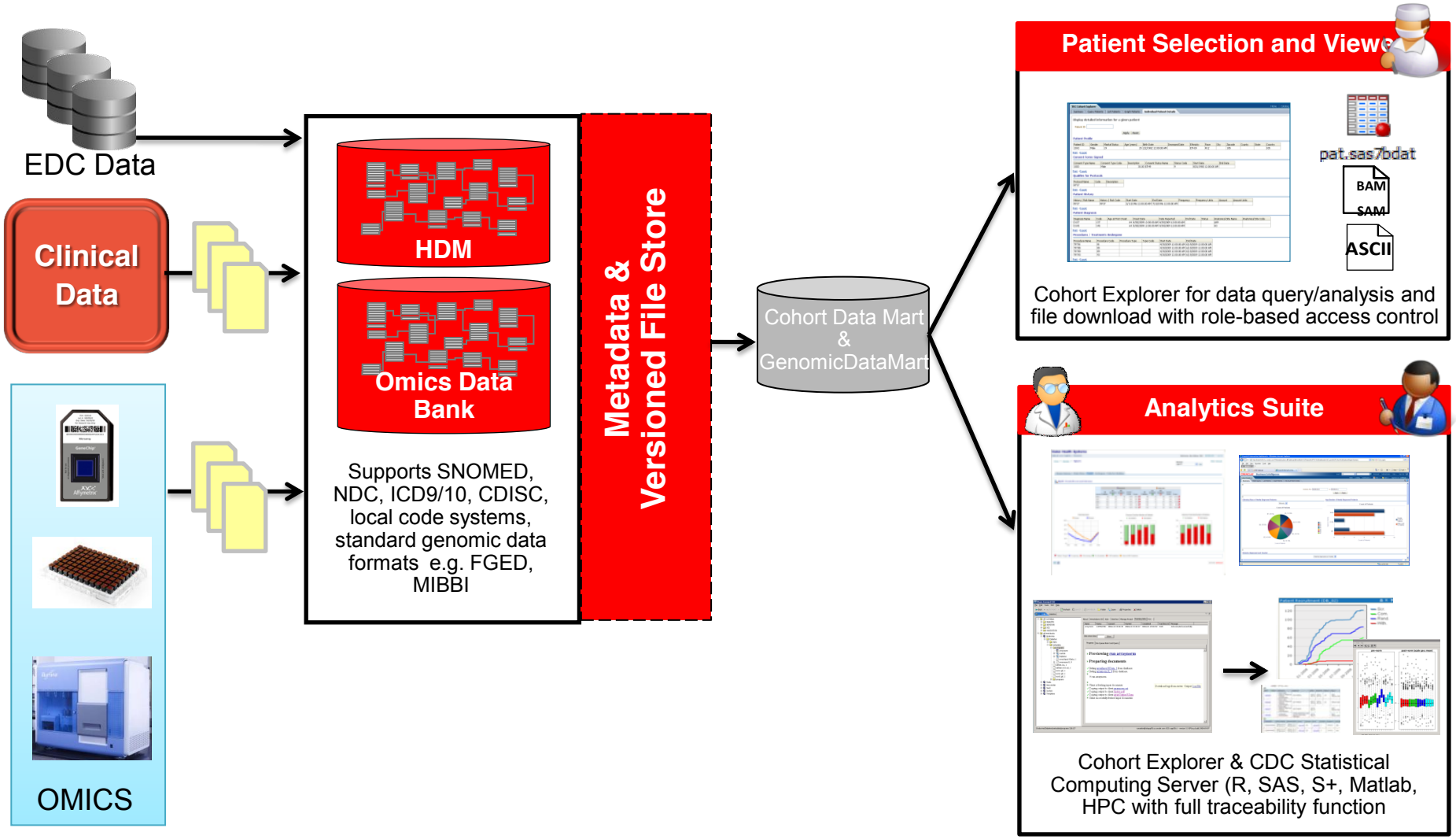
Accounting, Finance, and Revenue Cycle Domain

Accounting and Financial
Patient Financial Services
Billing
Claims
Charge Master

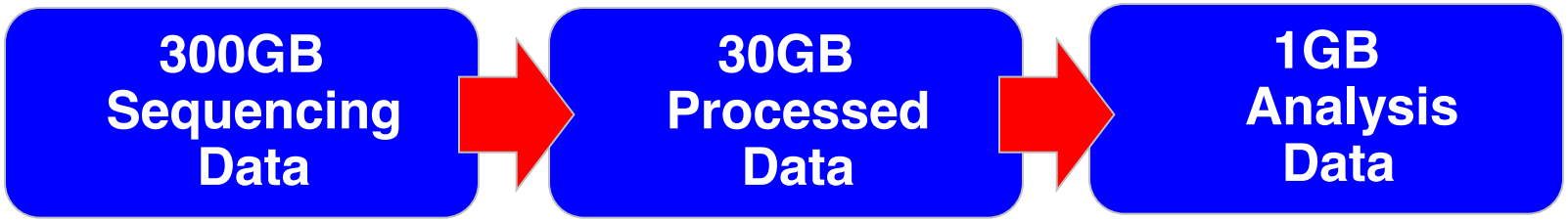
New Data Models – Omics Data Bank



Putting the Pieces Together

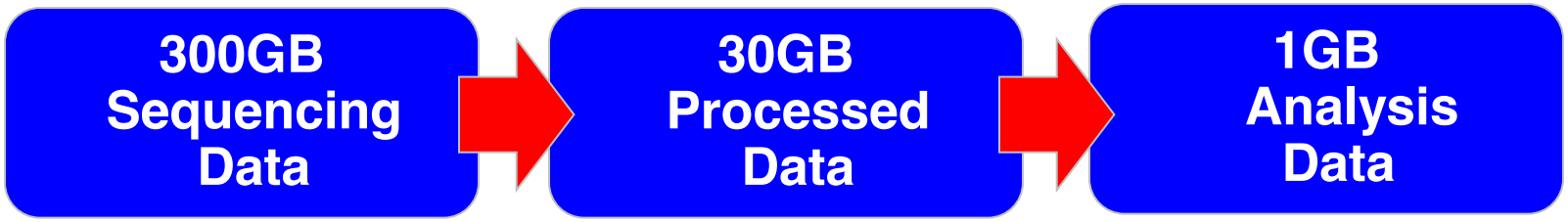


Big Data Challenges



- Per sequence, > 1
- Per patient
- Per population, >100,000

Big Data Challenges



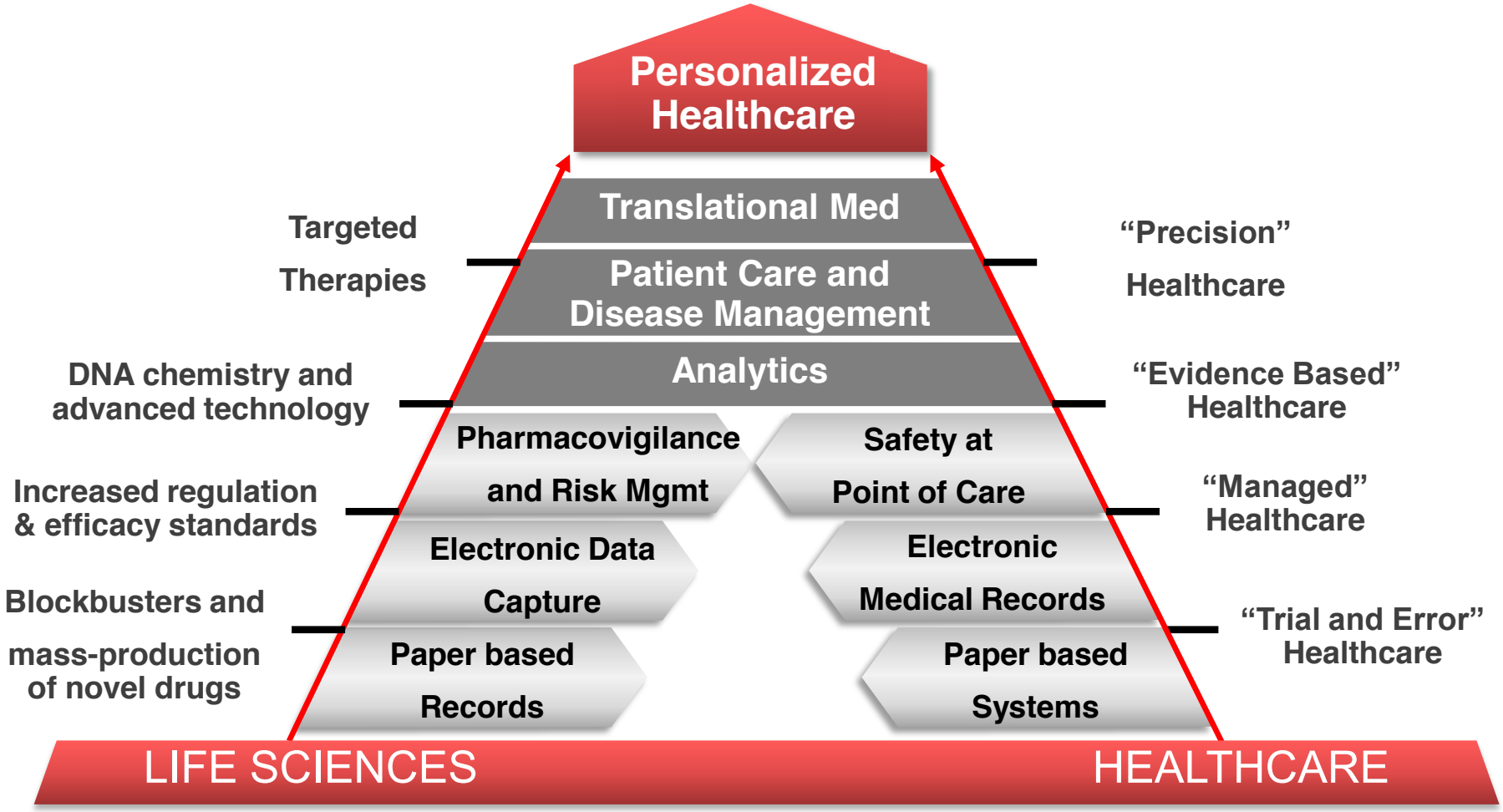
- Per sequence, > 1
- Per patient
- Per population, >100,000

- **30 Petabytes of data**
- Google processes approx 24petabyes /day

The Future

Life Sciences and Healthcare Converge

Predictive, Preventive, Personalized and Participatory Healthcare

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