Dealing With All That Data

Government Technology Conference

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Dealing With All That Data

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Objective

Explore and discuss how Information Management, Data Warehousing, and Business Intelligence techniques can be used by government to achieve greater efficiencies, reduce fraud and abuse of government programs, and increase the quality of services to citizens.

Agenda

- What is Information Management?
  - Terms & taxonomy
  - BI evolution: a converging, evolving space
  - Maturity context: Context for self-evaluation
  - Reference architecture
- What does success look like?
  - Hawai'i Health Data Warehouse
  - Other Examples
- How do I Get There?
  - Why is it Important to My Agency?
  - Approach and success factors
- Questions & Answers

What is Information Management?

Terms and taxonomy

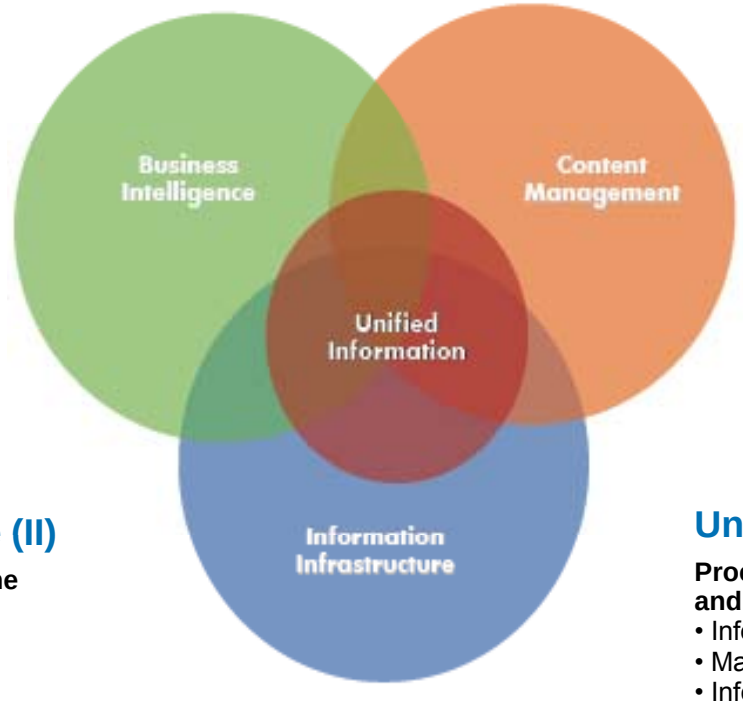
Information Management Components

Business Intelligence (BI)

Enabling analysis of structured data
- Information Integration
- Data Warehouse/Marts/Hubs
- Information Delivery
- Advanced Analytics

Content Management (CM)

Enable capture of and analytics from unstructured information
- Document Capture
- Content, Document and Records Management
- Output Management
- Application and Content Globalization



Information Infrastructure (II)

Technology used to capture/store the information
- Archiving and Retention
- Data Integration
- Data Migration
- Data Optimization

Unified Information (UI)

Processes and Tools for managing information and optim`izing it's quality and effectiveness
- Information Governance
- Master Data Management
- Information Quality Mgmt
- Information Synthesis and Delivery

Defining business intelligence

A broad, inclusive stance

Business Intelligence : Enabling visibility, insight, and decision-making across the organization for improved business performance and productivity

Business Intelligence…a converging, evolving area of

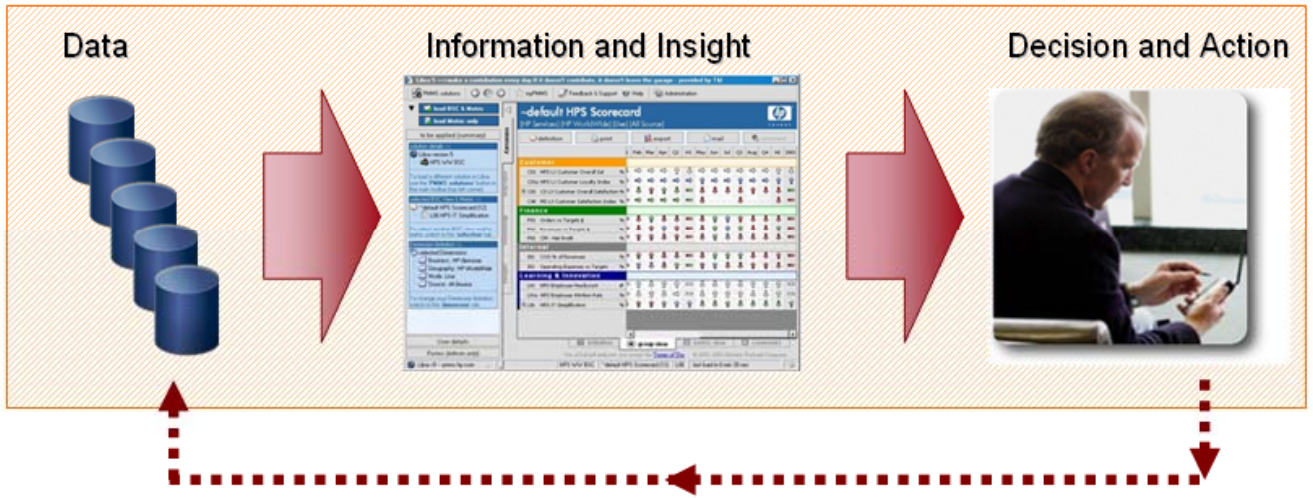
- Business disciplines/needs
  - Business performance management (BPM)
  - Business process analysis (BPA)
  - Business activity monitoring (BAM)
  - Risk and compliance management
- Information management disciplines/solutions
  - Information quality
  - Data integration
  - Data warehousing
  - Information delivery
  - Content management

Better information, smarter business decisions

What is Business Intelligence?

An organization's ability to transform **data** into **information,** information into **insight,** and insight into **action**

… all to better meet your mission !!!



For example, on Monday morning you can have an on-demand view of the past weeks tax collections activity PLUS updated forecasts AND identified major audit candidates

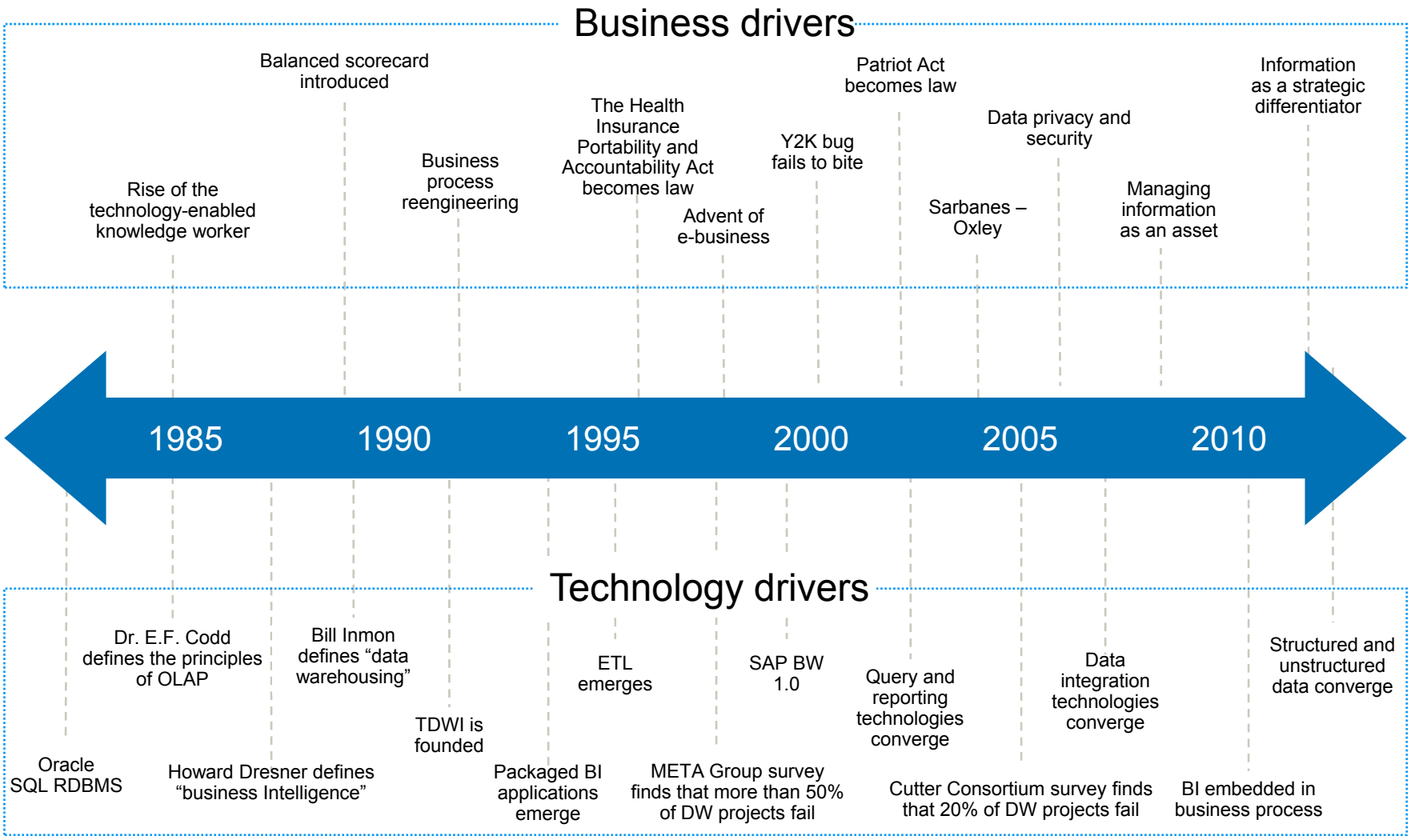
BI: It's all about enabling the organization

- Visibility : Management of performance
  - Aligning the organization through objective-based key performance indicators (KPIs)
  - Monitoring the health of the organization from strategy through operations
- Decision making : Monitoring, analyzing, and improving processes
  - Across all functions and decision makers
  - Process optimization
- Innovation : Doing things differently
  - Innovating processes through the application of integrated information and intelligence
- Productivity : Empowering people with focused, relevant information
  - People productivity from directors to frontline workers
  - Delivering insight through prescriptive, embedded analytics
- Transparency : Mitigating risk, enabling compliance
  - Auditability and control
  - Visibility to material events

What is Information Management?

BI market evolution: A converging, evolving space

Over the past 20 years, BI has evolved from the tactical to the strategic

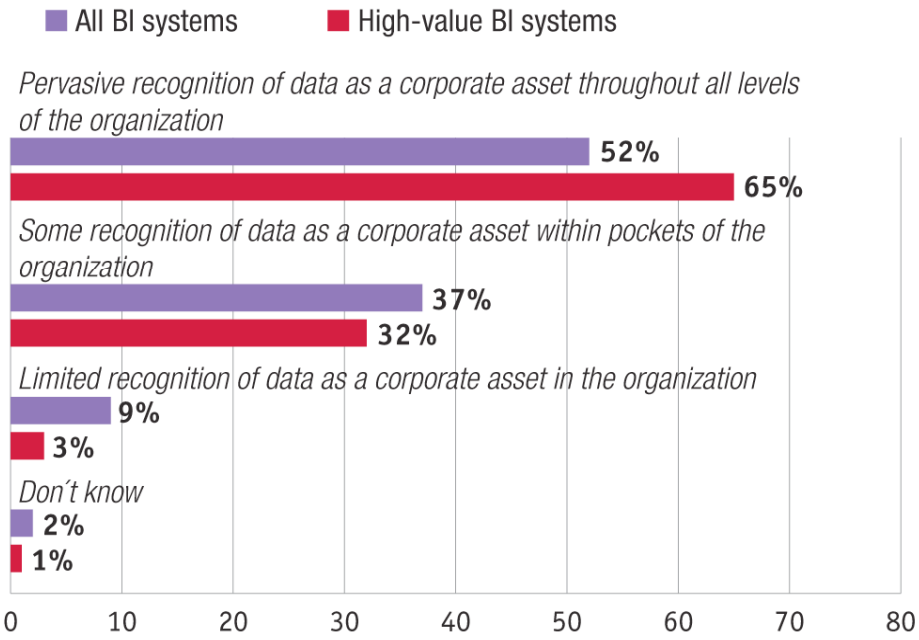


Companies now treat data as a corporate asset

- A BusinessWeek Research Services study conducted in 2006 found more than half the companies surveyed say that they pervasively recognize data as a corporate asset throughout all levels of the organization
- Another 37 percent say that recognition of data as an asset is emerging in parts of the enterprise
- The study also found that companies who view data as a corporate asset are more likely to say they receive value from their BI implementations

Data Is a Corporate Asset

When asked to describe the extent to which their organizations view data as a corporate asset, this chart shows how many respondents consider data a corporate asset. Also note that the companies with high-value BI systems are much more likely to view data as a corporate asset.

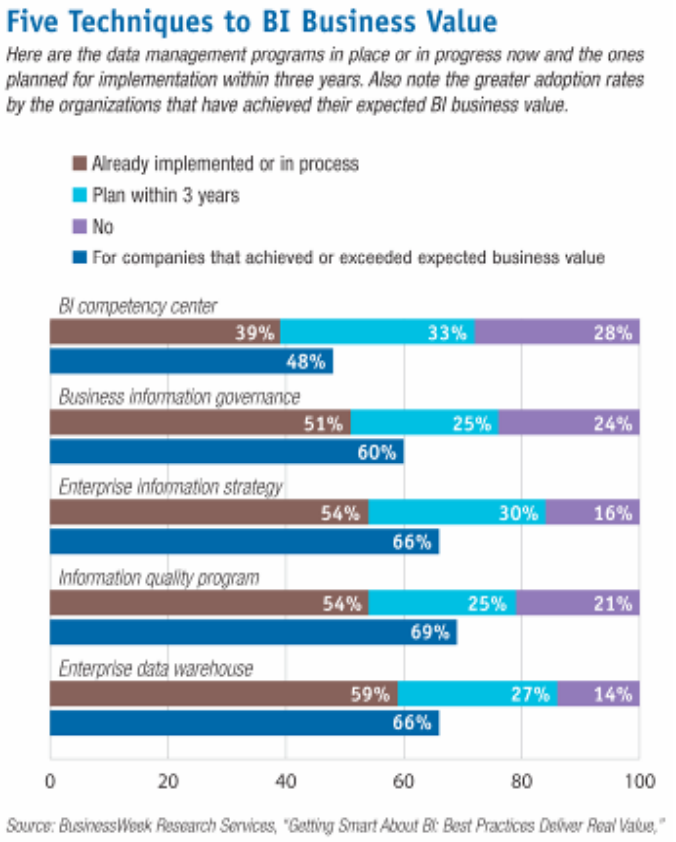


Source: BusinessWeek Research Services, "Best BI Implementation Practices," May 2006

Companies are entering

The next phase of BI programs

- The 2006 BusinessWeek Research Services study also found that companies are already adopting advanced data management programs in significant numbers
- Many of those who haven't already undertaken programs like enterprise information strategy and information quality are planning to do so within the next three years
- The study demonstrated that companies that have matured their data management programs are more likely to achieve business value from BI efforts



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Emerging topics will shape the future of BI programs

- The strategic business impact of BI will continue to increase
  - Enterprises will achieve closer alignment and integration between BI and business performance management strategies and systems
  - Executive management will become more involved in BI decisions, sponsorship, and reliance
  - Enterprise data transparency will continue to become a key enabler of regulatory compliance
  - The role of the chief analytic or performance officer will emerge to steer companies in the decision-making process
- Advanced methods of information delivery and analysis will change the way users work
  - Analytics will continue to be integrated with, and embedded within, core systems and workflow
  - Data visualization technologies will make BI more accessible and actionable for a broader range of users

What is Information Management?

Maturity Model: Context for self evaluation

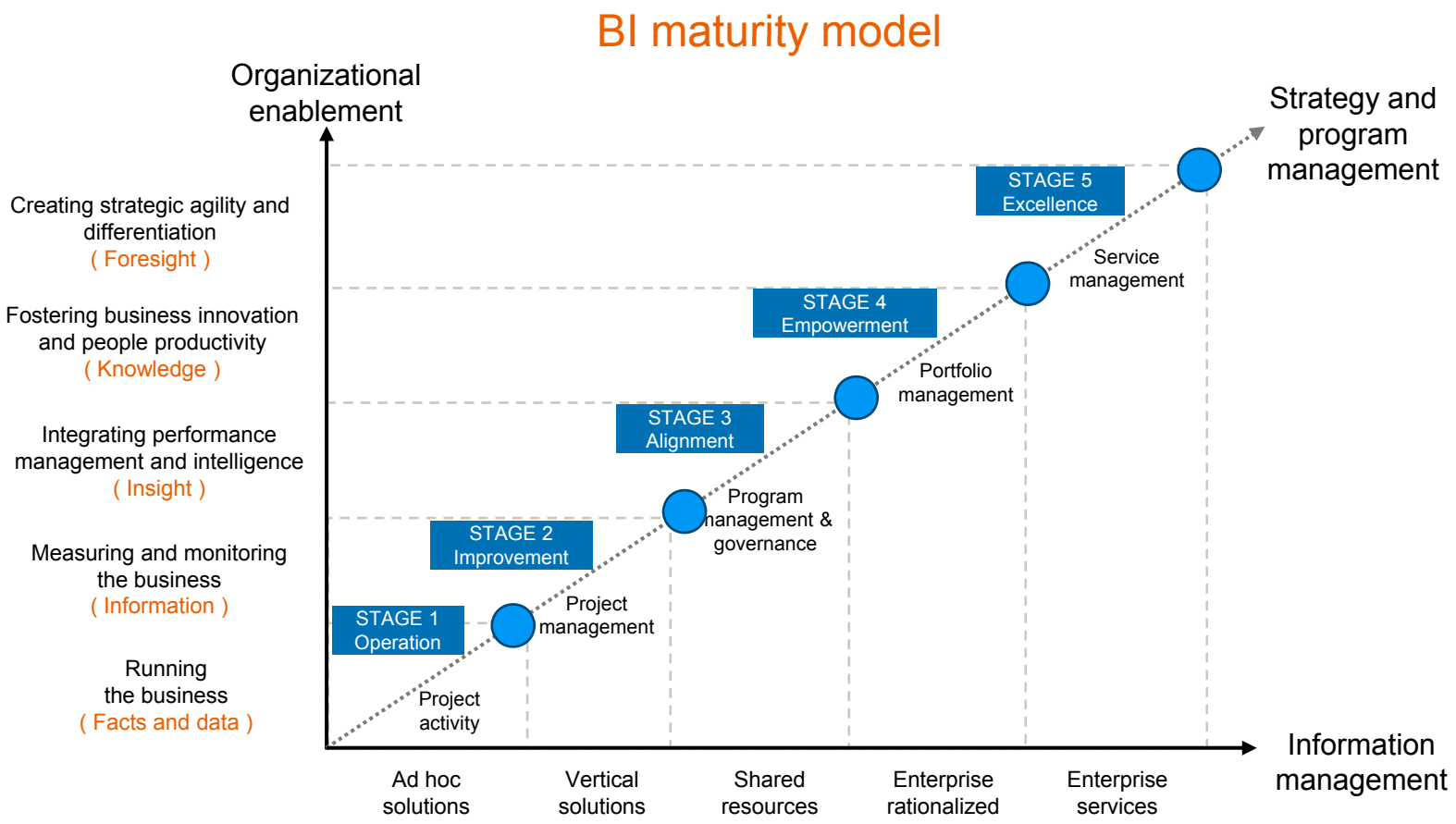
BI maturity model

- A context for describing the evolution of our clients' BI capabilities
- Represents a formula for long-term success that is a function of three fundamental capabilities
- Outlines a path forward as companies work toward closer alignment across business and IT organizations
- Helps our clients connect the dots across a variety of terms and topics
- Highlights a critical emerging need for a new breed of talent and leadership with a balance of breadth and depth

- "Simplified, yet comprehensive" – HP Client

BI maturity model

Describing a journey with **B**usiness Intelligence



Success = fn (Organizational enablement, information management, strategy and program management)

BI maturity model

Describing a journey with business intelligence

BI maturity model – key

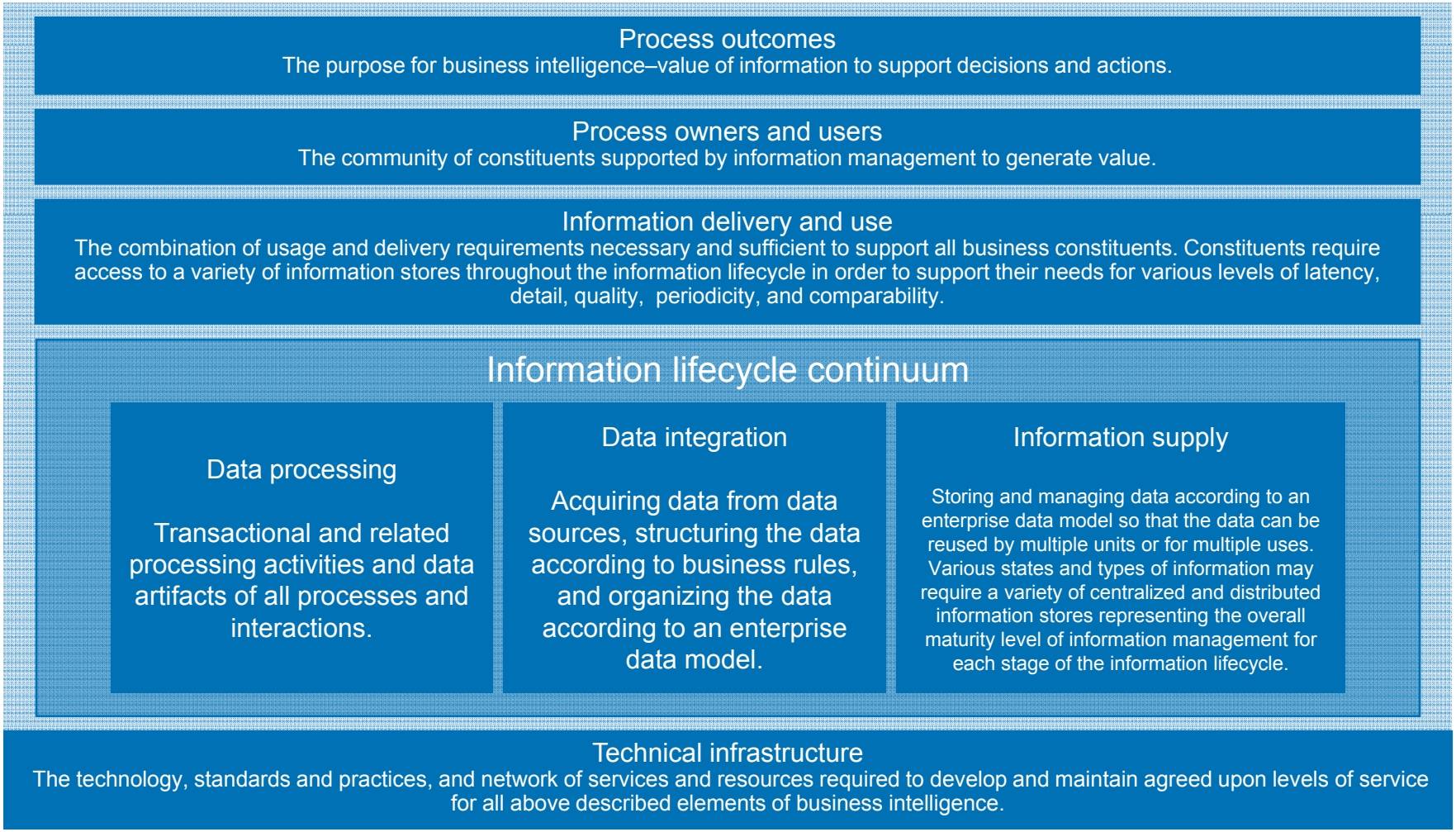
	Stage 1 operation	Stage 2 improvement	Stage 3 alignment	Stage 4 empowerment	Stage 5 excellence
Business enablement	Running the business	Measuring and monitoring the business	Integrating performance management and intelligence	Fostering business innovation and people productivity	Creating strategic agility and differentiation
	• Reporting and spreadsheets commonplace • Consumers: Focus on executives, managers • Periodic, quarterly, monthly	• Enhanced reporting • Basic dashboards; scorecards • Planning, budgeting and forecasting • Periodic, monthly, weekly	• Aligned, integrated reporting • Balanced scorecards • Streamlined KPIs • Periodic, right time	• Integrated analytics • Role-based intelligence • Consumers: Focus on frontline workers • Activity monitoring • Transparency	• Differentiation through highly integrated, synthesized information and intelligence • Business model flexibility enabled by information agility • Systemic, dynamic business modeling for competitive advantage
Information management	Ad Hoc solutions	Vertical solutions	Shared resources	Enterprise rationalized	Enterprise services
	• Early ETL • Early DW solutions • Early OLAP solutions • Manual solutions	• Subject-area ODS • Subject-area DW • Functional/domain data marts • Web-based reporting • ERP BI applications	• Early MDM • Data quality programs • Data governance • DW consolidation • Web portal delivery • ERP-integrated BI Suites	• Advanced MDM • Robust data quality program • Integration with content management • BI fully integrated within enterprise portal environments	• Integration and synthesis of unstructured content with structured • Service-based architecture • Advanced BI fully embedded within processes, systems, workflow
Strategy and program management	Project activity	Project discipline	Program management and governance	Portfolio management	Service management
	• Limited project management discipline • BI skills limited • Small-scale projects, intra-departmental • Limited C-level involvement	• Project management as a recognized skill set • Project-based roles/skills identified • Business benefits identified • BI Project managers; inter-departmental • Limited C-level involvement	• Vision and roadmap in place • Governance model adopted • BICC • BI PMO • Business case discipline • BI program managers in place • Risk management in place • Early leverage of three-tier delivery model to optimize costs and resources • C-level endorsement of BI investments	• BI PMO integrated within broader strategic PMO • Benefits realization • BI portfolio managers • Advanced governance model • Robust, flexible resource delivery model • C-level sponsorship of BI portfolio	• Value realization • Advanced BI portfolio management- integral to strategic imperatives • Shift to BI innovation; BI core theme in R&D investment portfolio • BI embraced and leveraged as a strategic lever across the C-level suite

What is Information Management?

Reference architecture

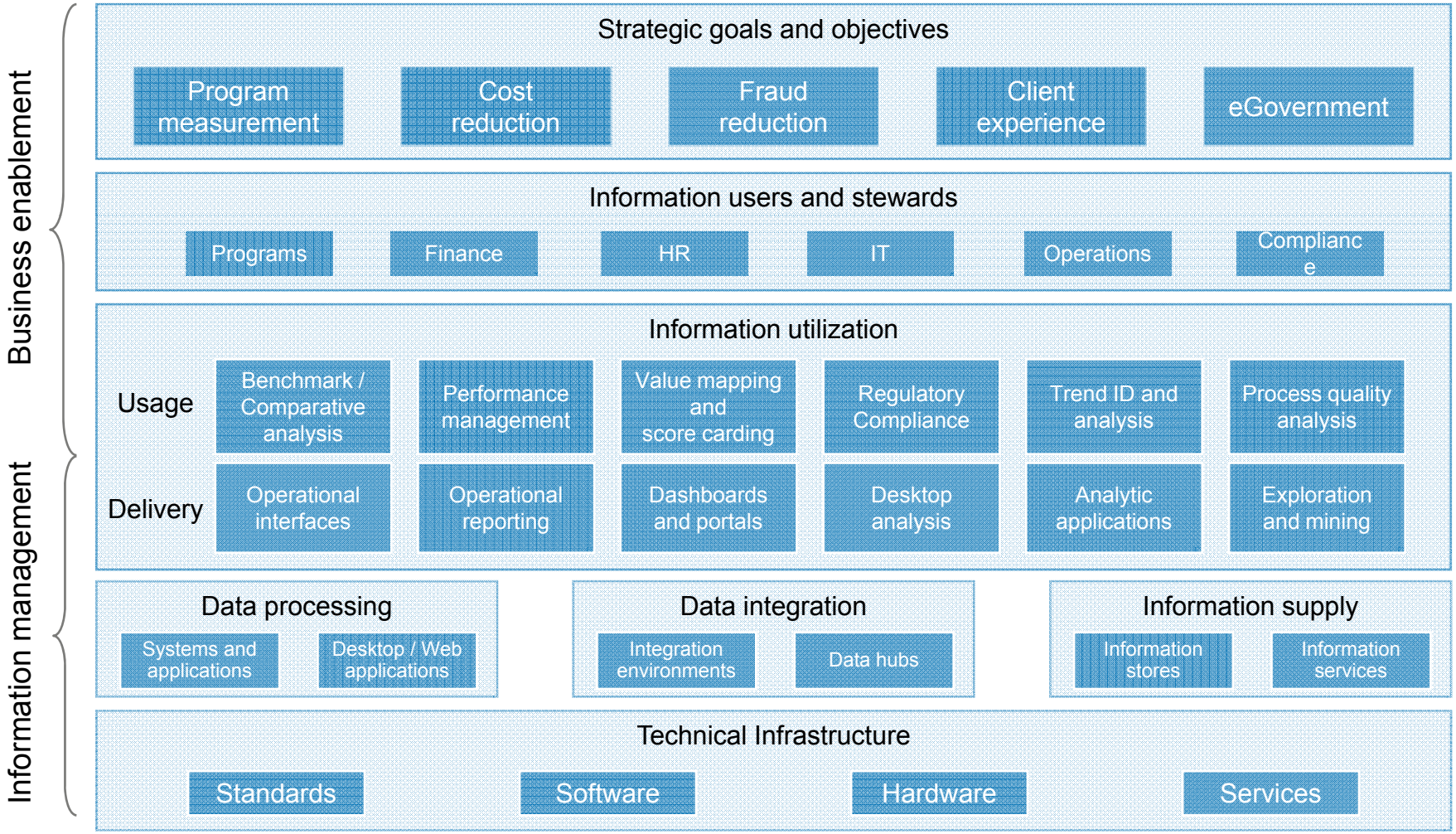
BI reference architecture

Contextual view



BI reference architecture

Functional view



What does success look like?

Client Profile

- Hawai'i Health Data Warehouse
  - Non-for-profit institute founded by
    - State of Hawai'i Department of Health
      - Funding source
      - Primary user
    - University of Hawai'i School of Medicine
      - Oversight and Administrator
- State of Hawai'i Department of Health
  - Major Services
    - Family Health Services (i.e., WIC program)
    - Disease Outbreak & control
    - Emergency Medical Services and Injury Prevention
  - Provides all services state-wide
    - No city/county health departments
    - Behavior Health
    - Environmental Health
    - State Labs

Client Organization Objectives

- To standardize the collection and management of Hawaii's health data and support the goal of the Healthy People 2010, the Department of Health (DOH) established the Hawaii Health Data Warehouse Project in 2000 as a part of the Healthy Hawaii Initiative (www.healthyhawaii.com).
- The data warehouse, through www.healthyhawaii2010.org, gives citizens, public health professionals, and policy makers instant access to public health data and reports to support the overall improvement and expansion of health and services for the people of Hawaii.

Key Drivers & Needs

- Greater quantifiable insight into program effectiveness through a standard means of data collection, analysis and reporting
- Assist DOH staff and communities in evaluating health outcomes based on timely and consistent data
- Enable a self-service model of health information for the public, researchers, and DOH staff

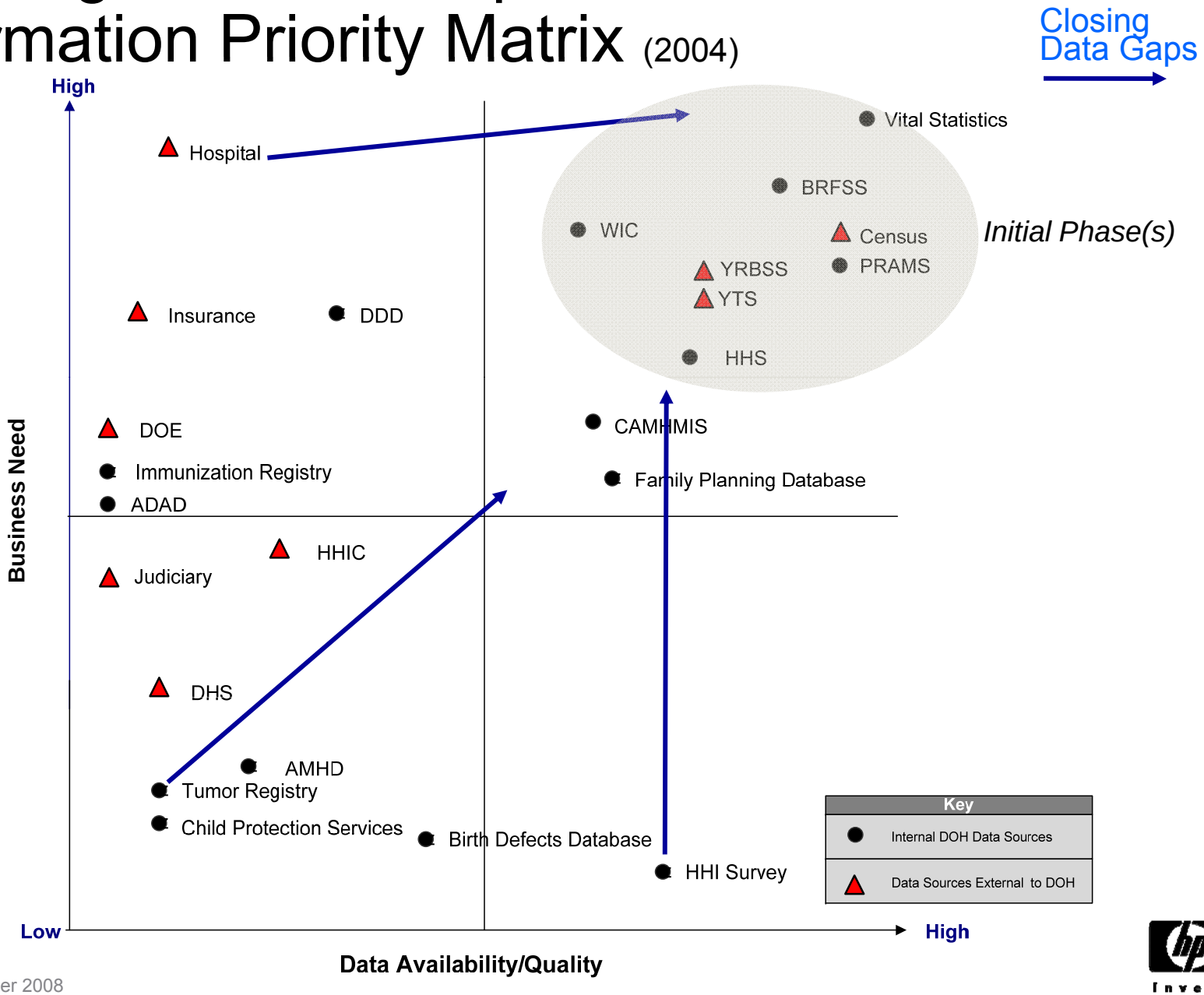
Challenges

- Data requests have long cycle times
- Significant staff time dealing with public and research data requests
- Wide range of technical skills among staff
- Redefinition of staff roles
  - Become Knowledge Workers
  - Relinquish control over “their” data
- Siloed and aging technical environment
- Data quality and consistency issues

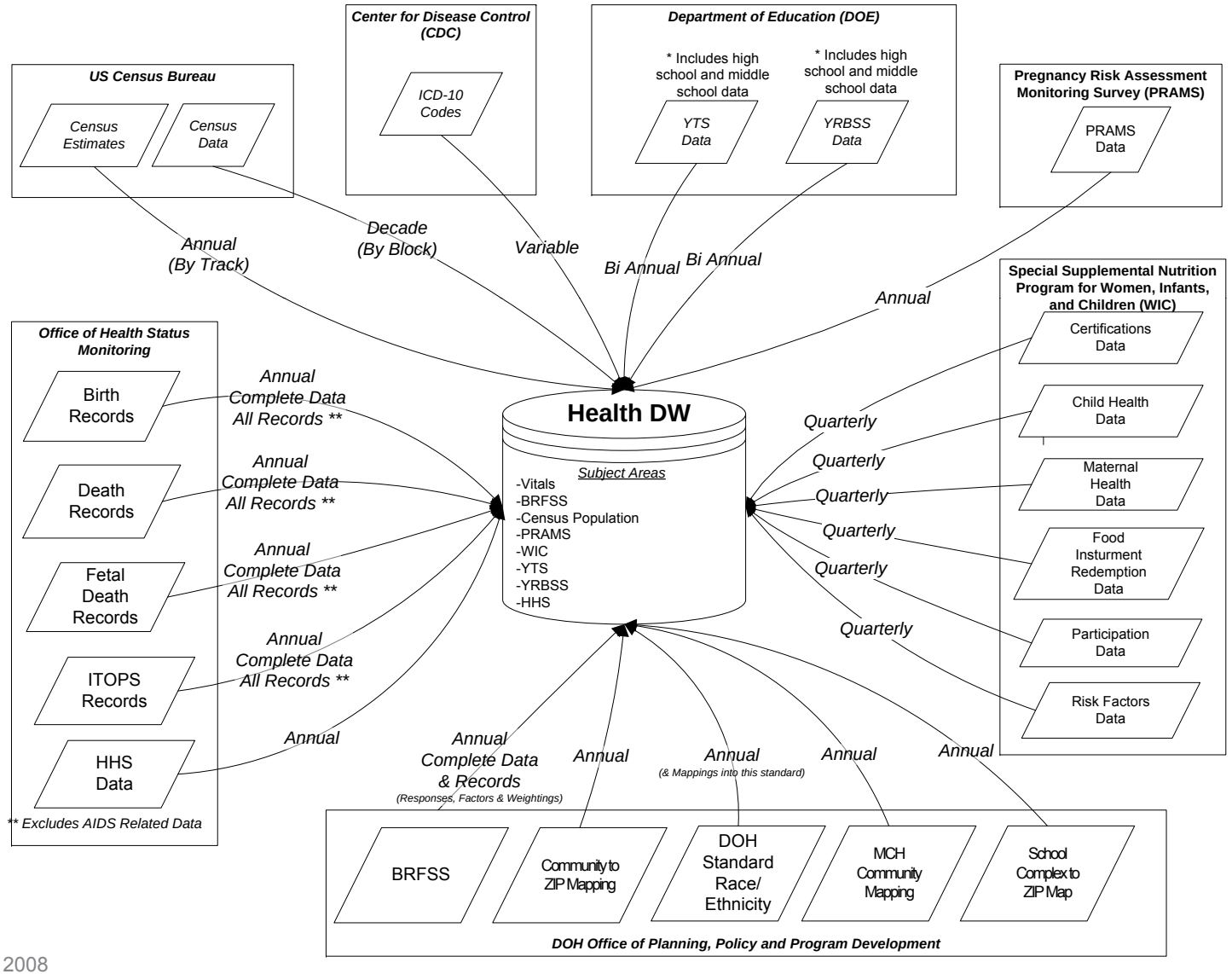
Approach

- Develop a Business Intelligence Strategy & Roadmap that:
  - Identified key stakeholders and information needs
  - Prioritized reporting & analysis requirements
  - Assess current BI tools and capabilities
  - Identify gaps in data availability and quality
  - Established a high-level technical architecture
  - Defined a phased implementation roadmap
- Implement Phase 1
  - Centralized information repository of key shared data
  - Centralized reporting web portal for DOH staff
- Implement 2-4 phases of new functionality over subsequent 1-2 years
- Reassess the BI Strategy to expand support to other divisions and data sources not initially targeted
  - Assess feasibility of syndromic surveillance

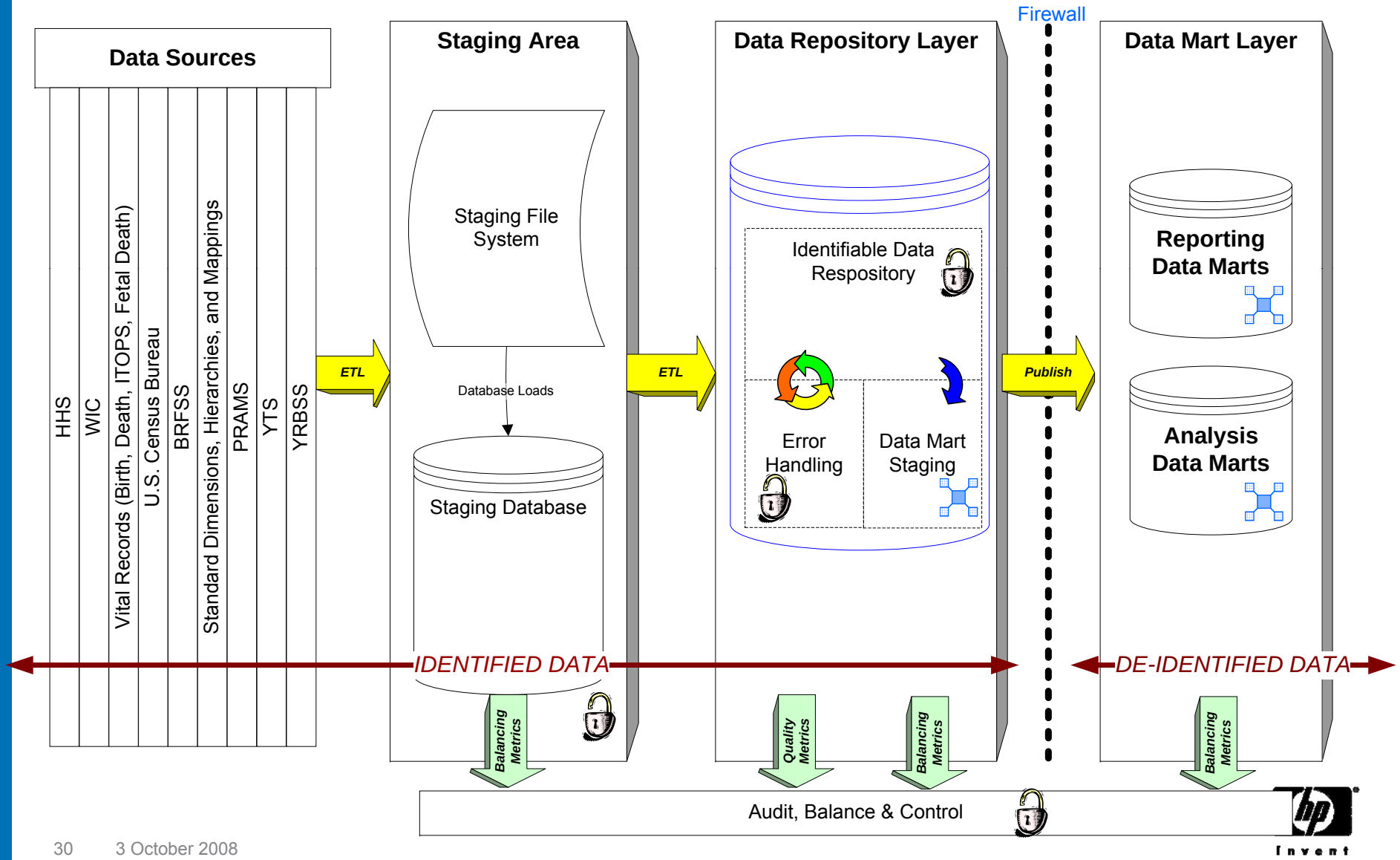
Defining the Roadmap
Information Priority Matrix (2004)



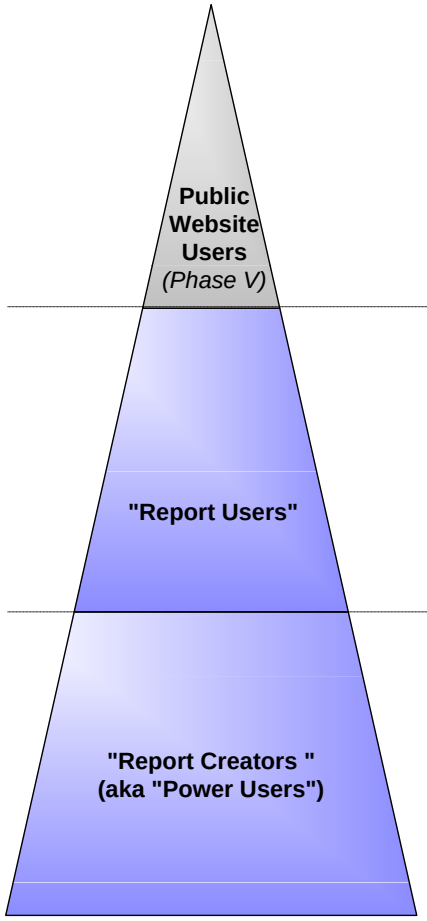
Data Sources (Phases 1 & 2)



High-level Technical Architecture



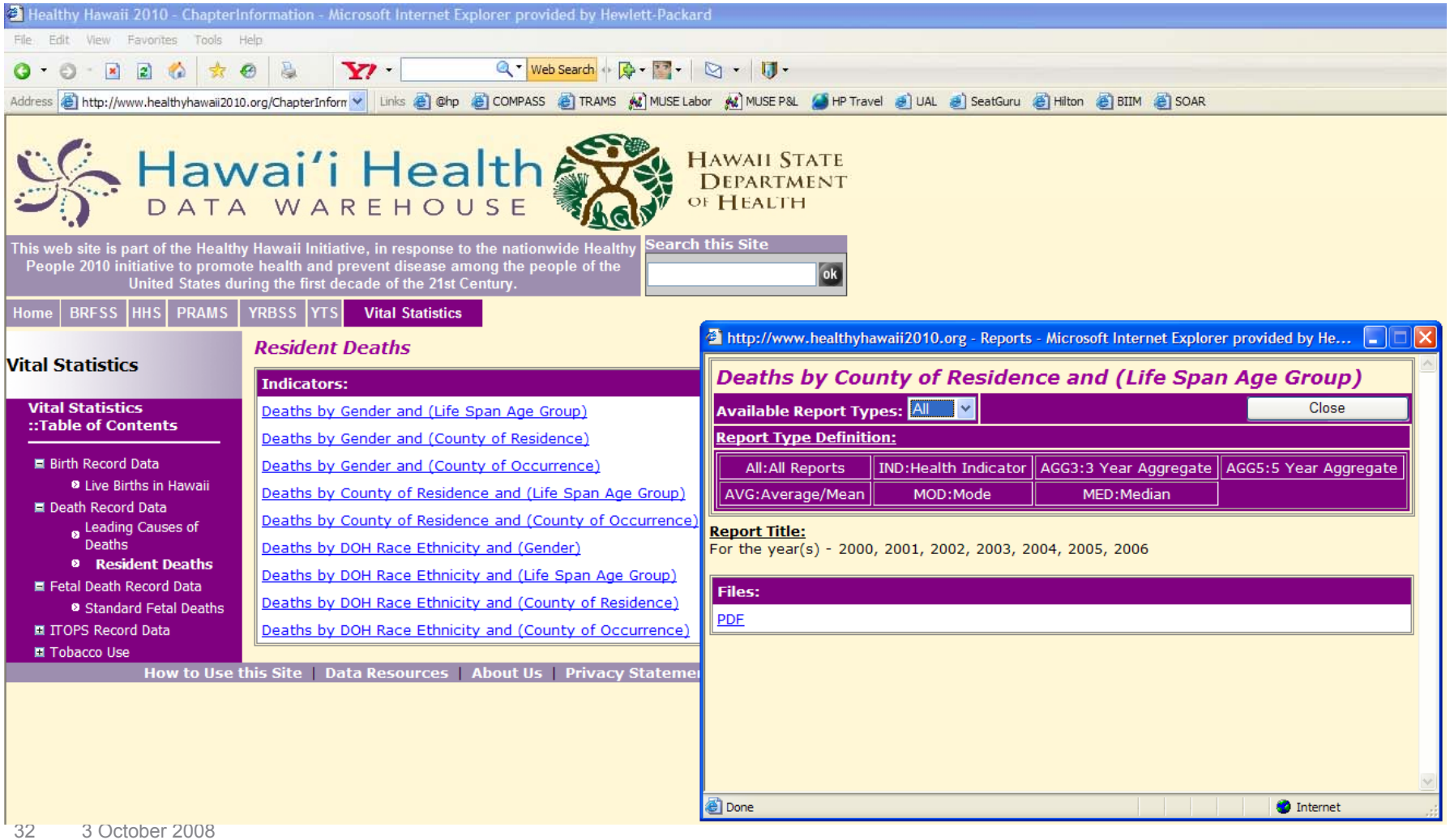
End-User Strategy



Ease of Use	Summarization of Data	Power and Functionality
o Static web-based reports in HTML or PDF o Users navigate using report tabs or indexes	o Same as “Report Users” o Documentation to ensure proper interpretation of data	o Limited filtering capabilities based on predefined tabs or indexes
o Web-based access o Existing report templates o Dropdown boxes/ prompts o Modification of WEBi reports	o Summarized health indicators o Summarized Vitals numerators and Census denominators o Detailed data not accessible	o Individual indicator reporting o 2x2 Health indicator reporting o Cell size restrictions
o Web-based and "Full Client" access o Advanced adhoc reporting	o Detailed data access o All DW detailed and summarized tables	o Analysis of complete data o Creation of new indicators o Advanced adhoc reporting

Public Users – Example Interface

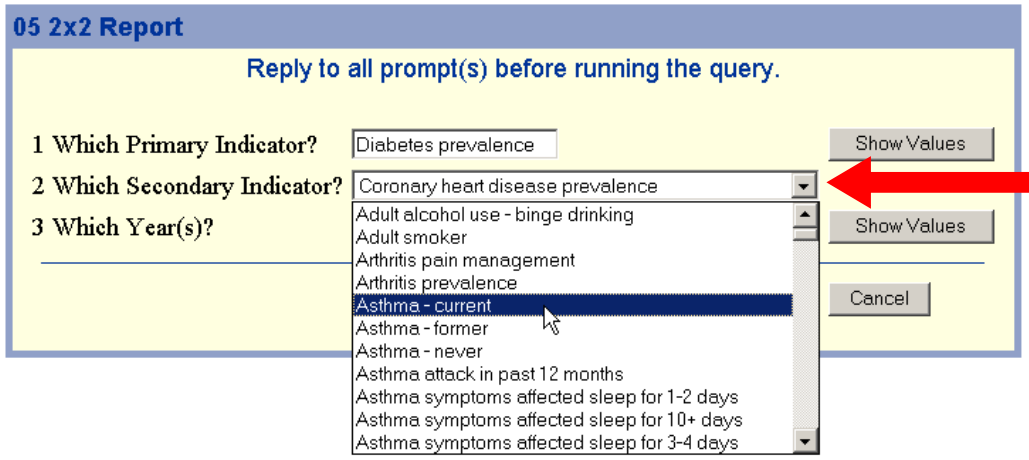
http://www.healthyhawaii2010.org/



Report Users – Example Standard View

2x2 analysis of the population with multiple health Indicators

Example analysis of the correlation between Diabetes and Heart Disease.



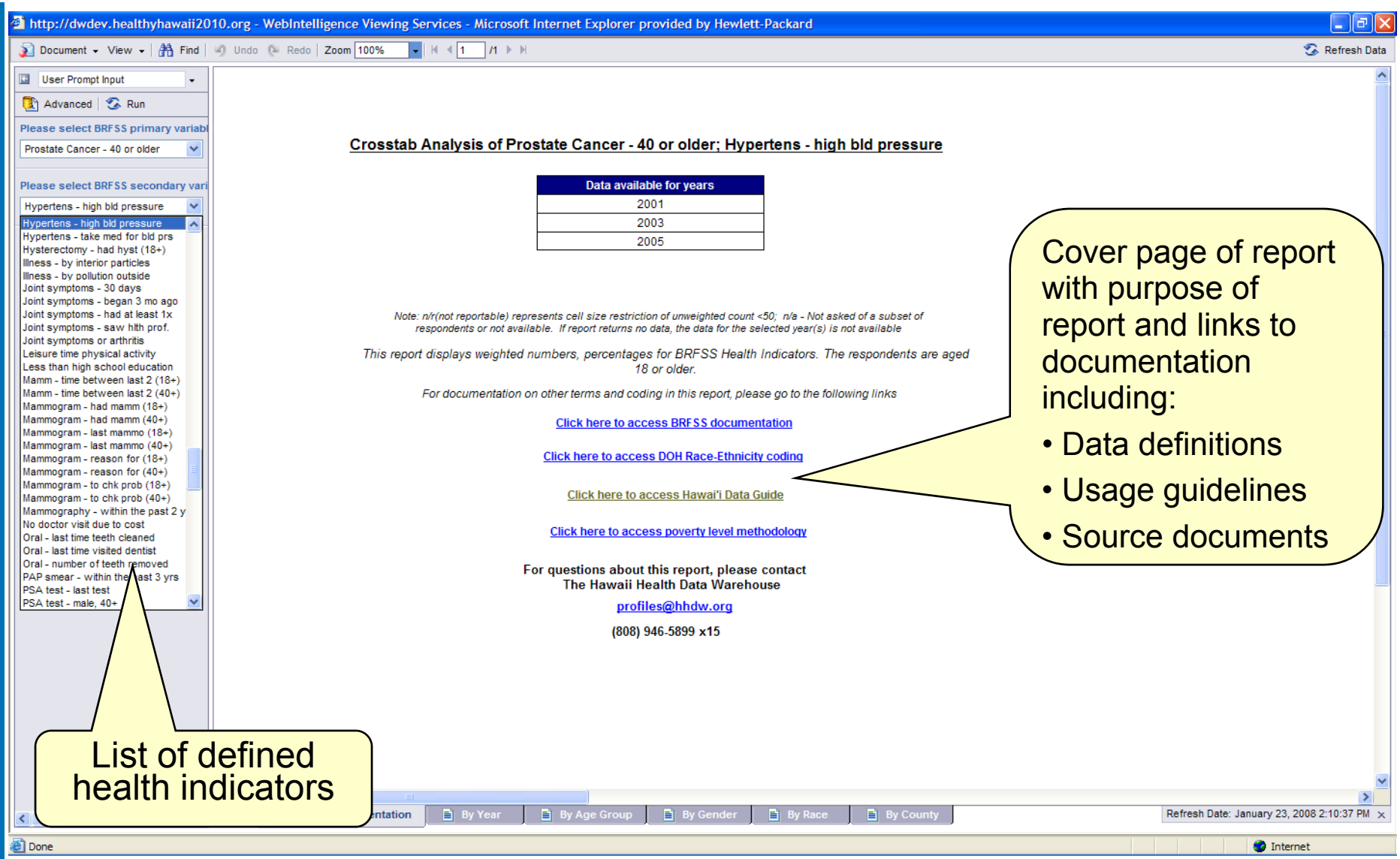
1. Choose the desired Primary and Secondary Indicators from the list.

2. Analyze the results.

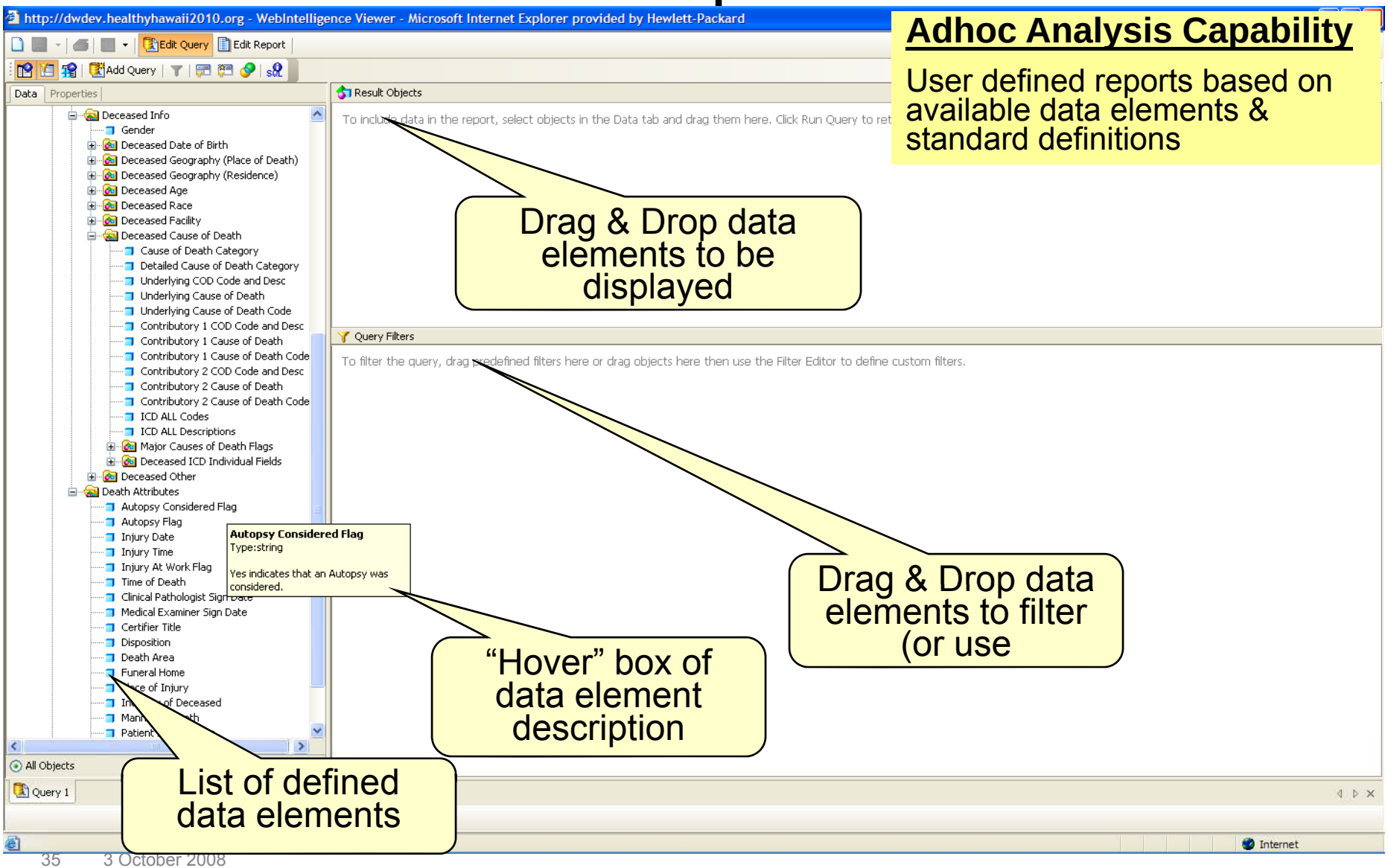
[do not edit table]

			Diabetes prevalence [Unweighted]		
			Yes	No	Totals
Coronary heart disease prevalence [Unweighted]	Yes	N	23	86	109
		Col %	7.5 %	2.2 %	2.5 %
	No	N	282	3,906	4,188
		Col %	92.5 %	97.8 %	97.5 %
	Totals	N	305	3,992	4,297
		Col %	100%	100%	100%

Report Users – Help & Guidance



Power Users – Example Interface



Adhoc Analysis Capability

User defined reports based on available data elements & standard definitions

Project Value & Results

- Quantification of program results
  - Stronger legislative support of successful and new programs
  - Support grant applications and compliance for programs
- Enables data exploration and analytical thinking using *all* available data sources
  - Analyses of data from multiple programs (as policy allows)
    - Birth Certificates to Death Certificates (Infant Mortality)
    - WIC to Birth Certificates (Birth outcomes for WIC vs. Non-WIC babies)
  - Research base for University and private researchers (subject to IRB approval of research requests)
- Centralizes and speeds internal reporting processes
  - Hours instead of weeks or months
- Reduces staff time spent on fulfilling public and research requests
  - Public users have a “self service” model for much of the data

What's Next For HHDW

Building on the foundation

- Syndromic Surveillance
  - Hospital Encounters
  - Over The Counter drug sales
- Neurotrauma Registry
  - Identify cases for possible outreach
- Hawai'i Tumor Registry

Other Examples

State Department of Revenue -- Tax Audit Optimization

Objective	Approach	Outcomes
• The Department of Revenue (DOR) recognized the need for a solution to improve and help enforce compliance with tax codes. • Audit Division Assistant Director notes, "Sending out auditors is the single most expensive educational method for correcting taxpayer errors. We would like to use the results of the data warehouse to help improve our audit selection techniques and allow the agency to develop the best educational strategies to improve taxpayer compliance."	• HP developed a data warehouse to identify under-reporters and businesses who have not registered. • The resulting data warehouse integrates data from multiple underlying applications and incorporates third party data by soft matching data (i.e., comparing data that is similar but not necessarily identical) from government sources to create a database that determines non-payment, or underpayment, of taxes.	• Improved accurate tax collection by identifying unregistered businesses and businesses that under-report tax. • Measurable improvement in tax collection and enforcement on time, within budget constraints.

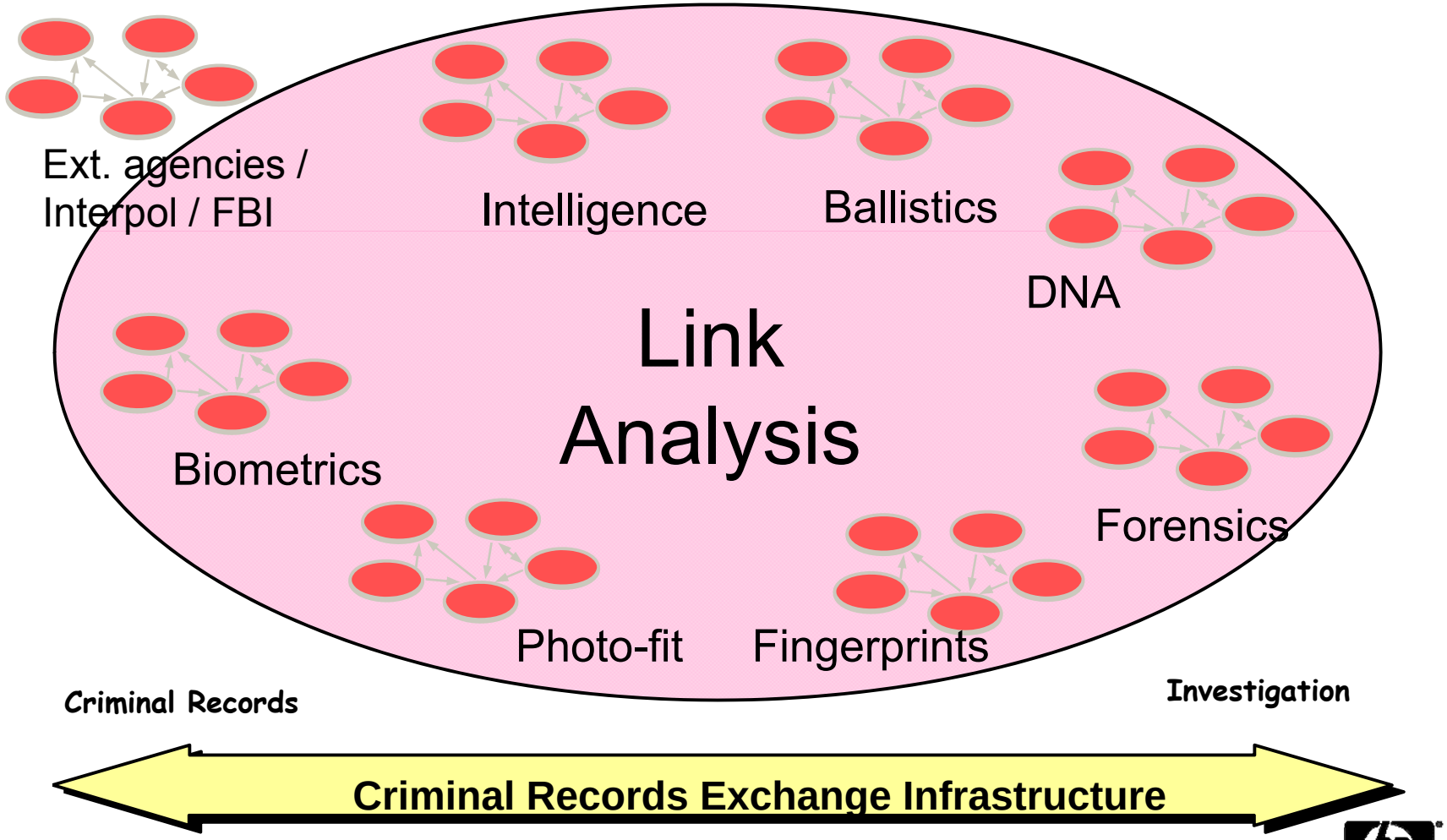
Other Examples

State/Local Tax Organization -- License Fee Compliance

Objective	Approach	Outcomes
• The organization did not have a responsive query and reporting capability to understand local residents' and companies' tax and license fee compliance status. They also lacked a quick and flexible method for collecting and integrating multiple sources of revenue and tax information.	• HP's IM Practice, formerly Knightsbridge, designed a collection, warehouse, and reporting system for this organization that will meet both their current and future storage and reporting needs. • HP redesigned the ETL architecture and designed a centralized data warehouse to meet both batch and near-real time reporting requirements..	• Near real-time availability of customer compliance with tax and license fee obligations. • Lower cost and increased speed of incrementally adding revenue and tax information sources. • Ability to analyze trends and mine data for causes of non-compliance.

Other Examples

Integrated Booking & Criminal Investigation Systems



Other Examples

Situational Awareness

1. **Video Surveillance and Security**
   - Electronic Fence, Unattended Baggage, Loitering
   - Real-Time Screening
   - Physical Access
2. **Sensors**
   - Acoustic
3. **Transportation Awareness**
   - Port Awareness – Maritime Domain Awareness
   - Cargo Container Tracking / Breach
   - Hazmat Vehicle Tracking
4. **Incident Management**
   - Emergency Notification
5. **Video Planning**
   - Camera Placement
   - 3D Video Stitching
6. **SA Backbone**
   - Public Safety Event Tracking
   - SOA Infrastructure
   - City-wide Security and Authentication

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How Do I Get There?

Why is Information Management Important to My Agency?

Business intelligence

Transforming organizations amidst the information economy

- Thriving in the information economy
  - The heightening of expectations as information access becomes more commonplace
    - Legislators
    - Management (Directors & Deputies)
    - Workforce
    - Constituents
- The role of BI today
  - An integral part of most strategic imperatives
  - No longer an “optional” element of new initiatives

When to consider BI?

"We can't access key information in a timely manner"

"We don't know who our customers (constituents) are"

"We don't have an integrated view of our constituents, their status, and all the services we deliver to them"

"We have multiple (and inconsistent) versions of the truth"

"We do not have the right data and reports to efficiently meet regulatory and legislative compliance requirements"

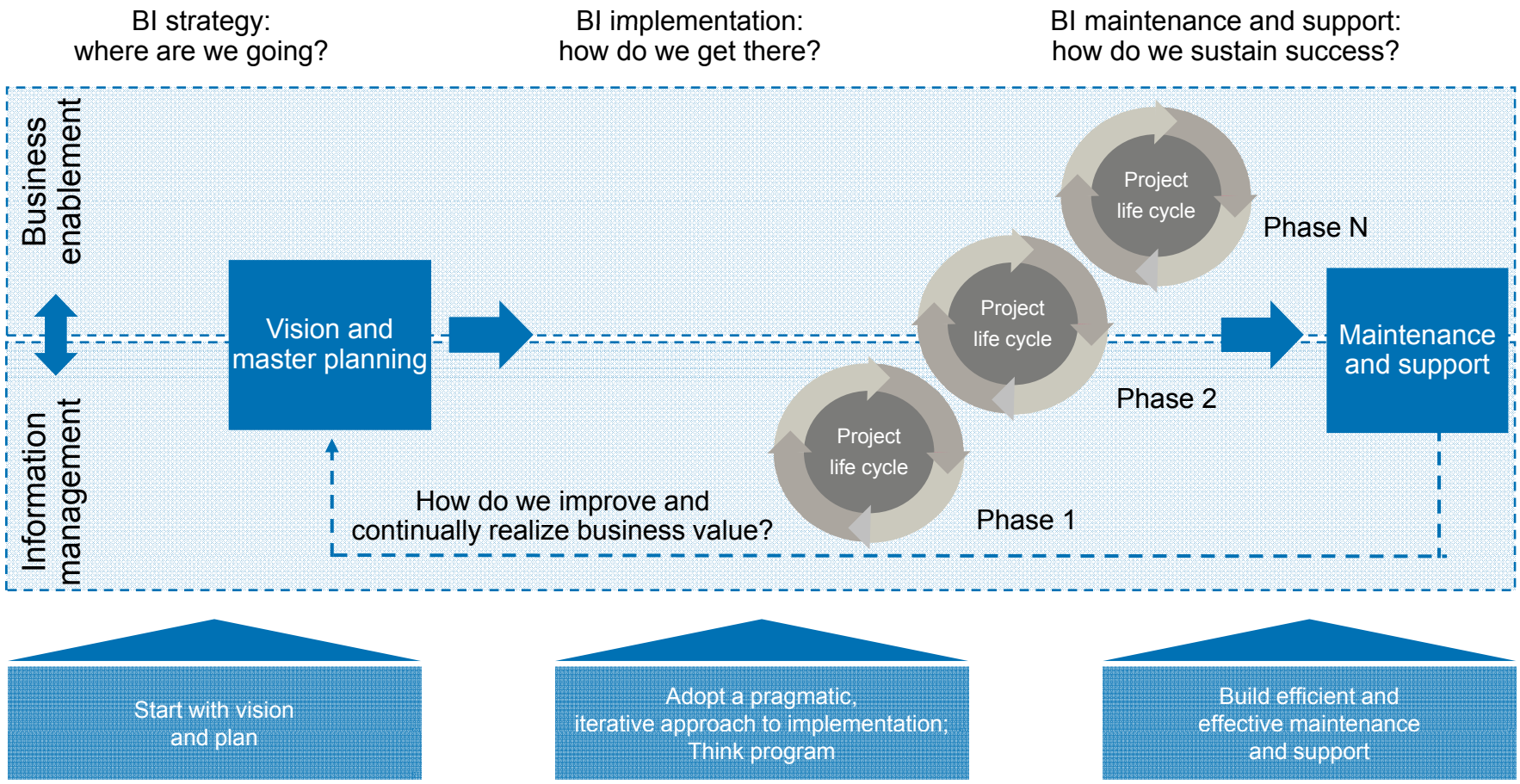
"We do not have the right data to articulate our results and justify funding and resource needs"

"We cannot consistently and efficiently validate data across programs, agencies, or other data sources to detect potential fraud and abuse"

How Do I Get There?

Approach and success factors

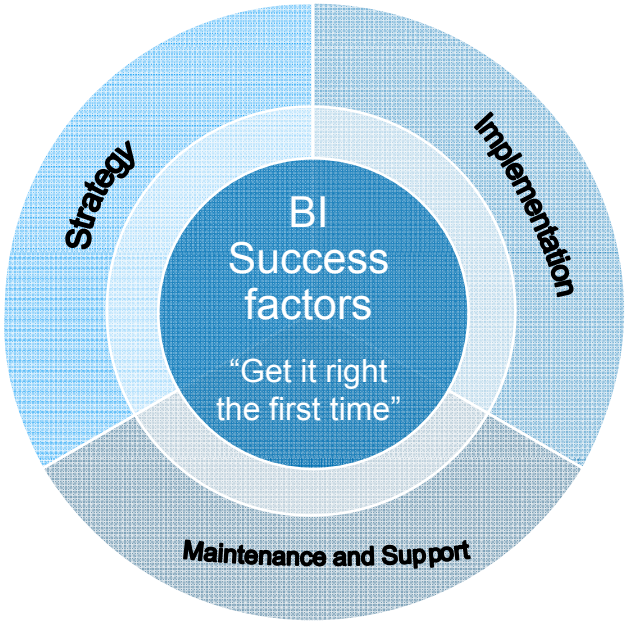
Manage your way to success



Key Success Factors

Strategy

- Establish a clear vision and master plan: Key to setting direction
- Facilitate business/IT cohesion: Sponsorship, involvement, alignment
- Plan accordingly and avoid common BI project risks



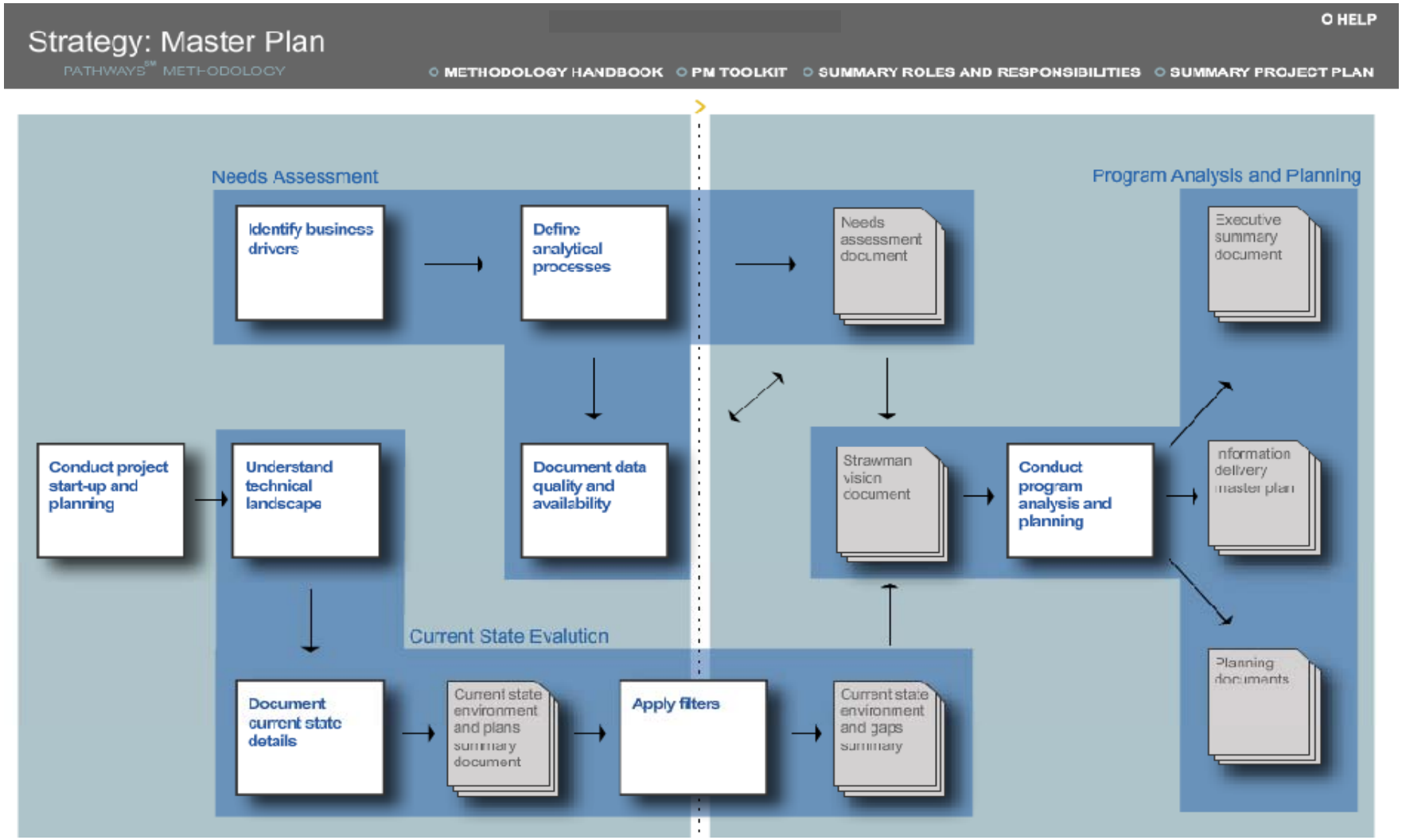
Implementation

- Leverage a BI-specific, best practice methodology
- Establish a BI center of competence: Breadth and depth is key
- Leverage an IM operating Model to manage information complexity
- Pick the "best fit" BI technologies
- Design robust architecture via broad BI disciplines

Maintenance and support

- Leverage a flexible delivery model: The most advantageous combination of resources
- Adopt proactive production support and operations
- Transfer and adopt knowledge via a comprehensive and measurable method

Establish vision and master plan : Key to setting direction



Facilitate business/IT cohesion: Sponsorship, involvement, alignment

Sponsorship

- Business leadership and governance
  - Executive sponsorship
  - Governance and prioritization
  - Divisional business management support
  - Assign and commit resources
  - Multiyear funding

Sponsorship

SUCCESS

Involvement

Involvement

- Business user involvement
  - Input to requirements gathering
  - Naming conventions, business rules, and data context
  - Testing
  - Data stewardship
  - Training and adoption
  - Advocates for BI solution

Alignment

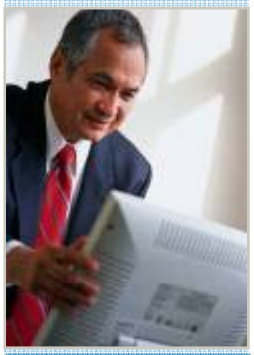
Alignment

- Information technology (IT) partnership
  - Full-time resources for key roles
  - Aligned with business resources
  - Business enabling mindset
  - Specialized BI skills

Plan accordingly and avoid common BI project risks

A failure to plan is a plan for failure

Expectation setting with business is critical



Business leadership

- Document and communicate
  - What are the business objectives?
  - Who owns achieving these goals?
  - What is to be delivered and when?
  - What resources are required?
  - What is the schedule and costs?
  - How are we going to plan?

Business users

Agreement

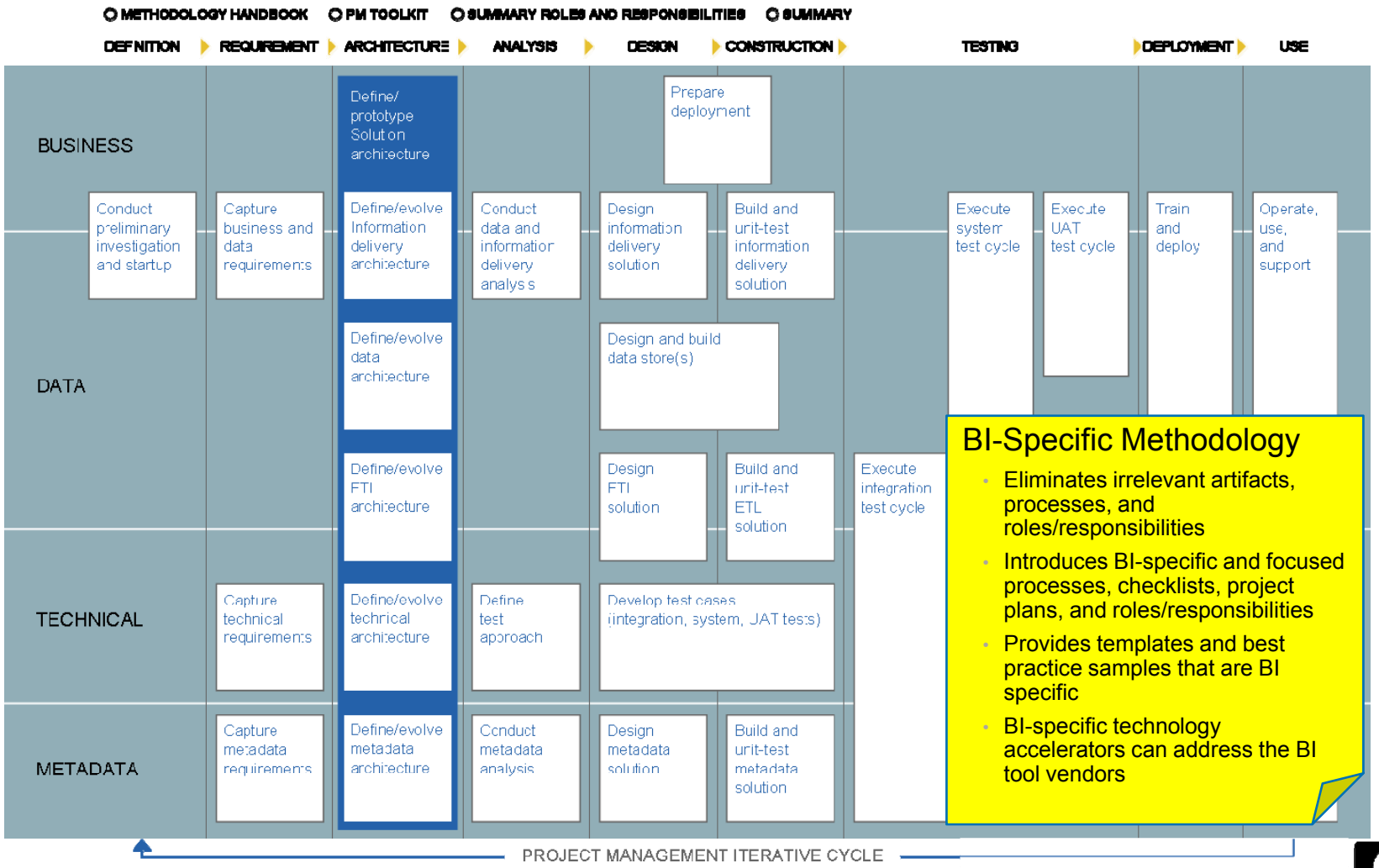
Information technology

Agreement

Avoid common BI project risks

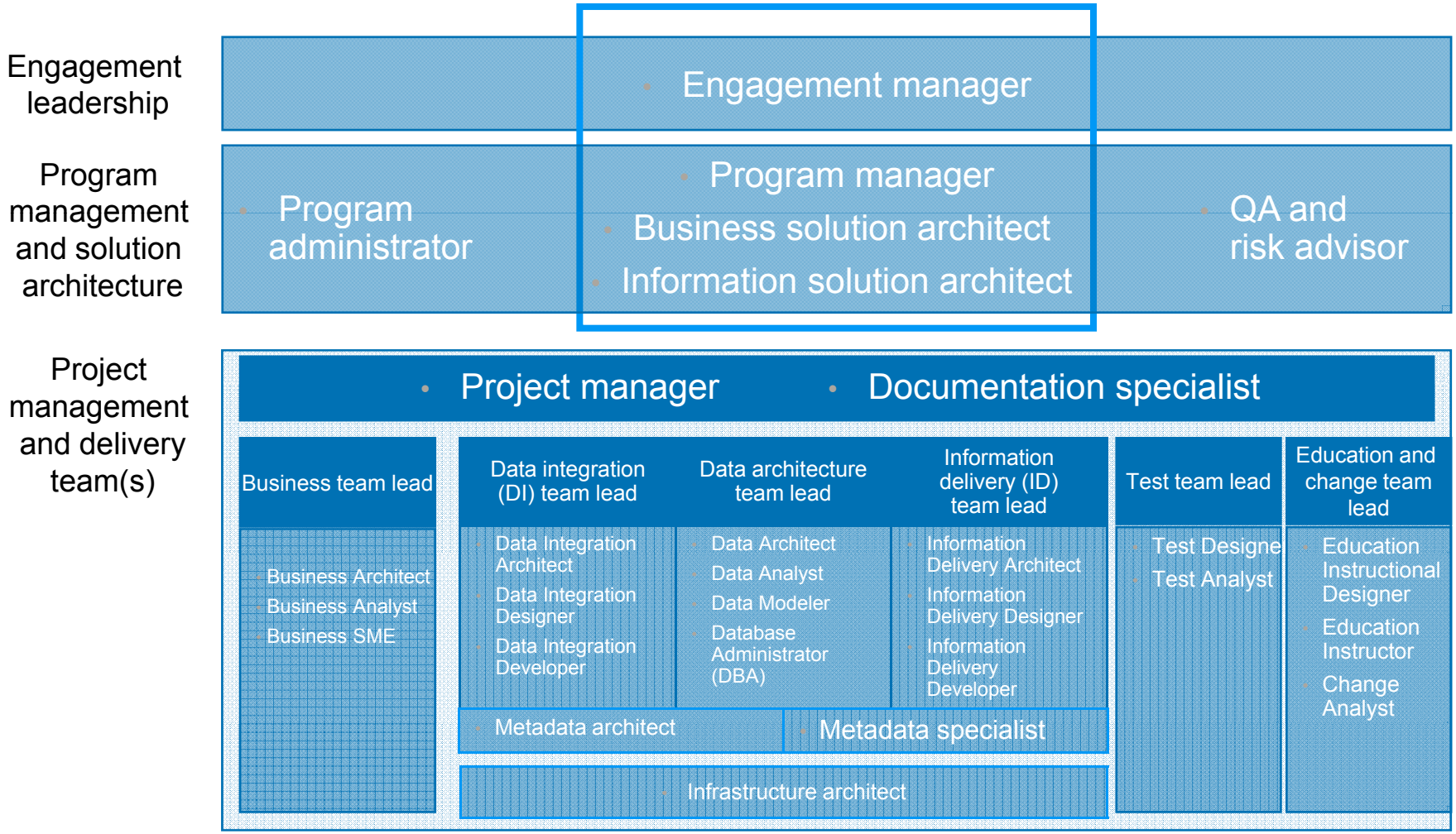
- Common BI Project Risks
  - Business rule complexity underestimated
  - Business and IT SMEs do not have sufficient dedicated time allocated
  - Business value expectations are hard to manage
  - Historical data conversion is often underestimated due to business rule changes over time
  - Scope expansion comes in various forms, such as hidden data sources, entire subject areas added when only field data elements needed, and requirements added late during in user acceptance testing (UAT) process
  - Production operational support is usually weak and different than traditional operational systems support

Leverage a BI-specific best practice methodology



Establish a BI center of competence

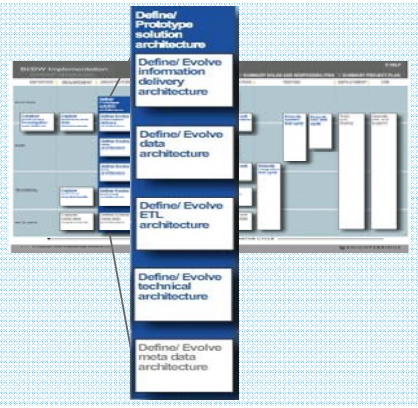
Breadth and depth is key



Design robust architecture

Meeting business expectations

Methodology with BI architecture focus

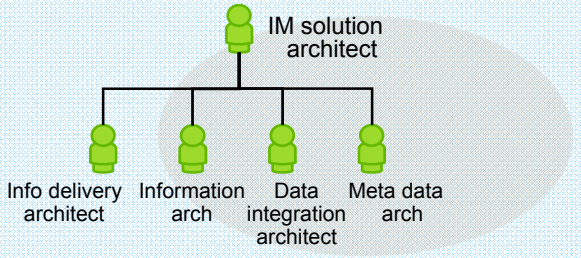


- User Satisfaction
  - Stable BI application
  - High performing, quick responses
  - Ability to change with business

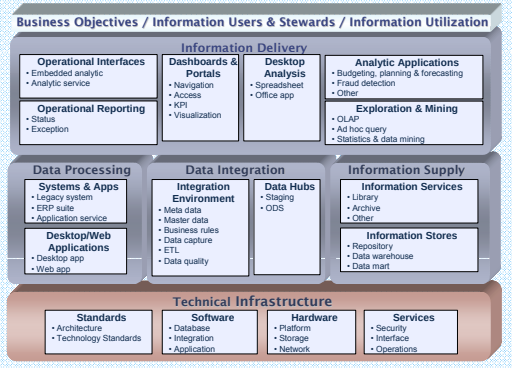
Best-fit and best-of-breed bi technology

Robust Architecture

BI - Specific architecture expertise



Comprehensive BI reference architecture



Leverage an IM operating model

Effectively manage information complexity

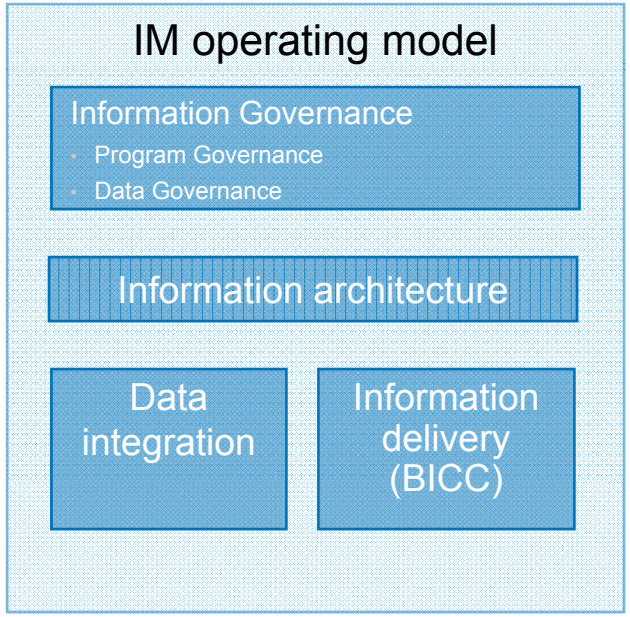
Information governance

- Program governance provides oversight and management of the IM program and its constituent projects
  - Prioritization, budgeting, portfolio planning
- Data governance focuses on definition and management of client's "information assets"
  - Data stewardship, ownership, and definition

Information architecture

- Information architecture group defines and imposes the vision and architecture for the enterprise information management (EIM) technical framework
  - Enterprise data model, architecture standards, and tools

IM operating model



Data integration

- Produces and delivers foundational information components to the overall solution
  - Enterprise data warehouse, data hub, ODS, MDM, data integration

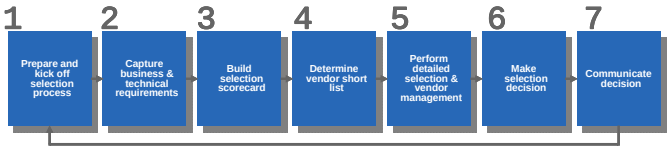
Information delivery

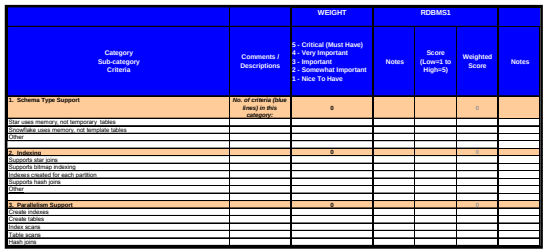
- BICC produces and delivers the actual information required by the business
  - Reports, dashboards, KPIs, analytics, and decision support

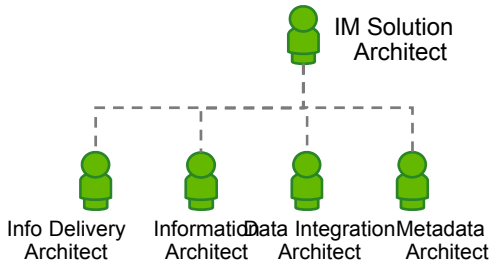
Pick the “best fit” BI technologies

User representation and functional needs are key

- Follow BI tool selection process
- Best-in-class technology
  - Balance current investments and
  - Best in class technologies
- BI-specific scorecards
  - Information delivery tools
  - Databases
  - ETL tools
- BI-competent technologists







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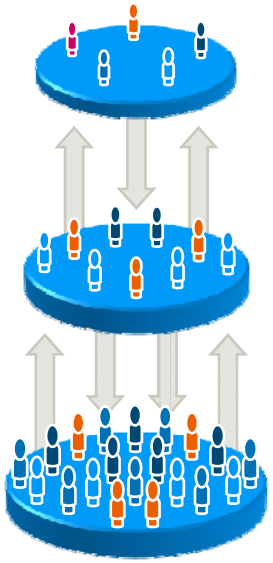
Leverage a flexible delivery model

- Use most advantageous combination of resources
  - ***Train*** existing staff
  - ***Hire*** new staff with needed skills
  - ***Retain*** consultants for major projects
- Consider virtual teams
  - ***Onsite*** for face-to-face responsiveness
  - ***Onshore*** for added flexibility
  - ***Offshore*** for the economic advantages of a skilled development and/or support team

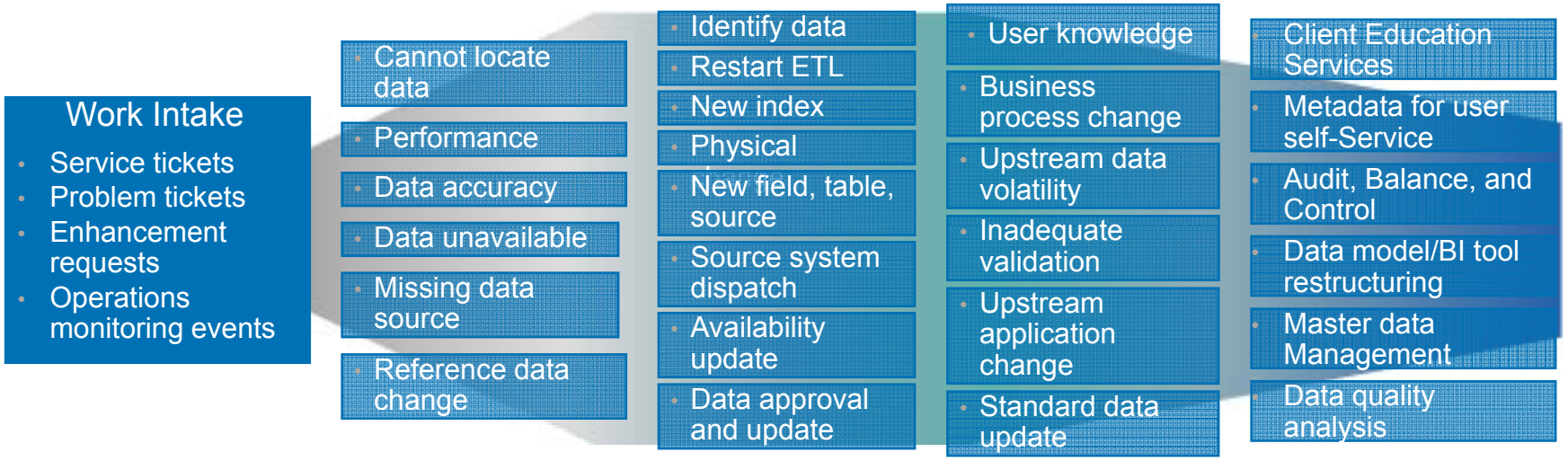


Service distribution criteria	Onsite	Onshore	Offshore
Skill requirements	X	X	X
Business location synergy	X	X	
Data security/legal	X	X	
Peak load balancing		X	X
Client skill building	X		
Support efficiencies		X	X
Language (Non - English)		X	X
Cost optimization		X	X
Time to market	X	X	
24/7 Requirements		X	X

Adopt proactive production support and operations

Design production support processes for rapid resolution with ongoing analysis to reduce overall work requirements and costs

Identification	Diagnosis	Tactical Resolution	Systemic Analysis	Strategic improvement
Initial response, prioritization, and dispatch	Analysis of issue, cause, and solution alternatives	Solution delivery, testing, and implementation	Stratification and root cause analysis	Identification and analysis of Issue



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Q & A