



CAS Seminar on Ratemaking

DT3: Best Practices in Data Mining & Data Warehousing for Actuaries

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Teradata
a division of  NCR

Agenda

You've never seen your business like this before.

- Teradata Insurance DW experience
- Actuarial Applications, Issues & Implications
- Best Practices in Data Warehousing
- Best Practices in Data Mining
- Funding/ROI
- EDW Roadmap



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Teradata Insurance Data Warehousing Experience

Teradata Div., NCR Corp.:



Teradata

- Over 1,000 data warehouse installations
- Over 100 new customers in 2001
- Over 300 CRM customers
- 6 of the world's top 10 airlines
- 10 of the top 13 global communications companies
- 5 of the top 10 global retailers, 25 of the world's leading 100 banks
- Over 25% of the Top 15 global insurance companies
- 5 of the top 10 global banks
- 7 of the largest US manufacturers



Annual Revenue

2001 Revenue
\$1.8 billion



Employee Base

- 3,713 full-time professionals worldwide

NCR

- The 5th largest service provider in the world
- The market leader in consumer interactive devices – 100 billion transactions a year
- Ranked 22nd in Software Magazine's Top 500
- 301 on Fortune 500 list



Annual Revenue

- A global \$6B company



Employee Base

- Nearly 33,000 employees worldwide

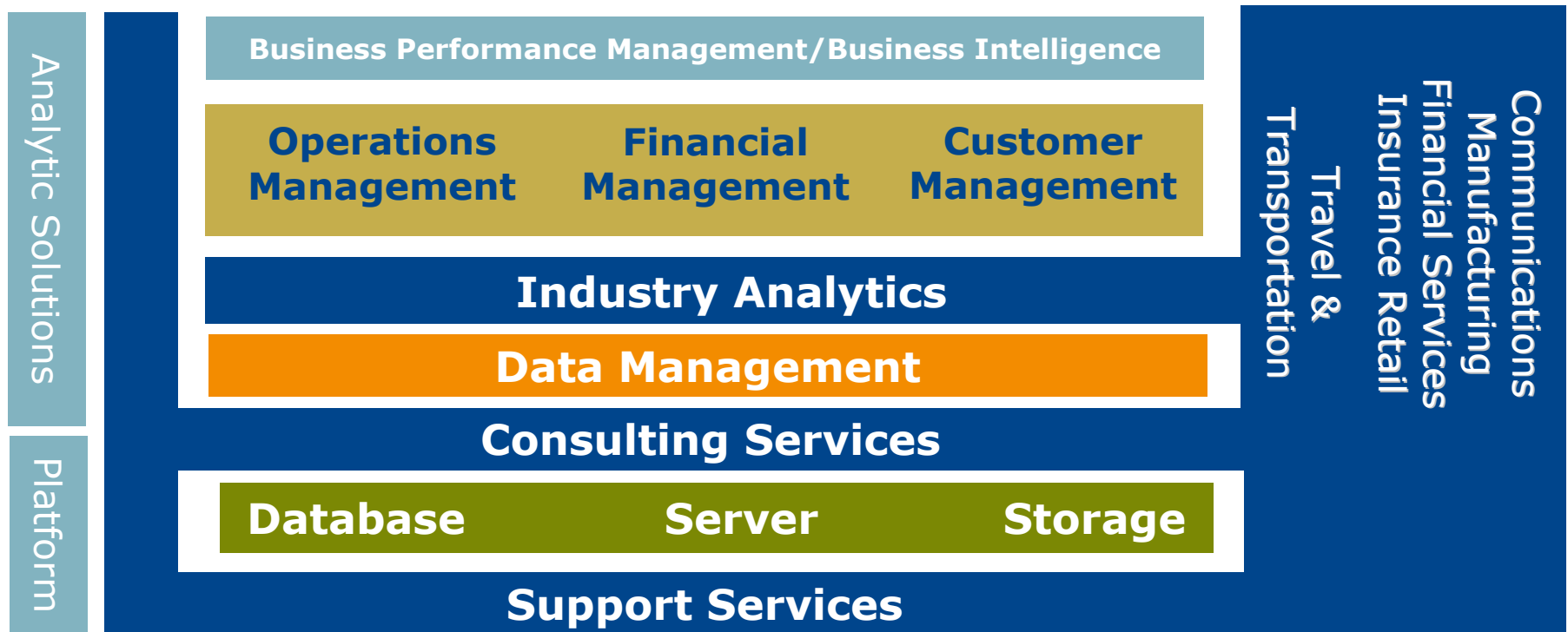


Teradata is a World Leader in Data Warehousing, Business Intelligence and Analytic Solutions



You've never seen your business like this before.

Sole focus is on *decision re-engineering*



Teradata's Presence in Insurance, Healthcare & Pharma Industries

You've never seen your business like this before.

5th largest US Group A&H insurer:
>Guardian Life

Five of the top ten US P&C Carriers
>Nationwide, Travelers, Hartford, CNA, Liberty Mutual

Largest US Disability Writer
>UNUMProvident

Largest AAA Affiliated Insurance Plan
>Auto Club of S. California

Three of the top five BC/BS Plans
>Anthem, HCSC, Highmark

Two of the Largest US Healthcare Networks
>HCA – The Healthcare Company, Kaiser Permanente

Largest US Pharmacy Benefits Management Company
>Medco Health Solutions

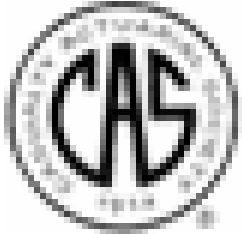
Two of the largest US Pharma companies:
>Bayer, Merck & Co.

Two of the most prestigious life science companies:
>Salk Institute, Windber Research Institute

Teradata Insurance, Healthcare & Pharma Industry Experience

You've never seen your business like this before.

- Over 15 years old
- Built 60+ Insurance, HC & Pharma data warehouses globally
- Leading insurance and healthcare industry customers
- Integrated industry solution portfolio built upon patented Financial Services Logical Data Model (fs-LDM)
- Cross industry fs-LDM (Insurance, Healthcare, Banking & Securities)
- Business driven Data Warehousing Solution Methodology
 - Business Discovery & Business Value Assessment
- Business Impact Opportunities (BIO) Analytic Framework
- Business Impact Models (BIMs) for ROI/business case
- Industry Business Consultants
- Data Warehousing professional services staff
- Industry Visual Roadmap Models



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Actuarial Applications, Issues & Implications

Current Actuarial Approach & Issues

You've never seen your business like this before.

Traditional Approach

- SAS extracts
- Access Database
- Excel Spreadsheets

Why

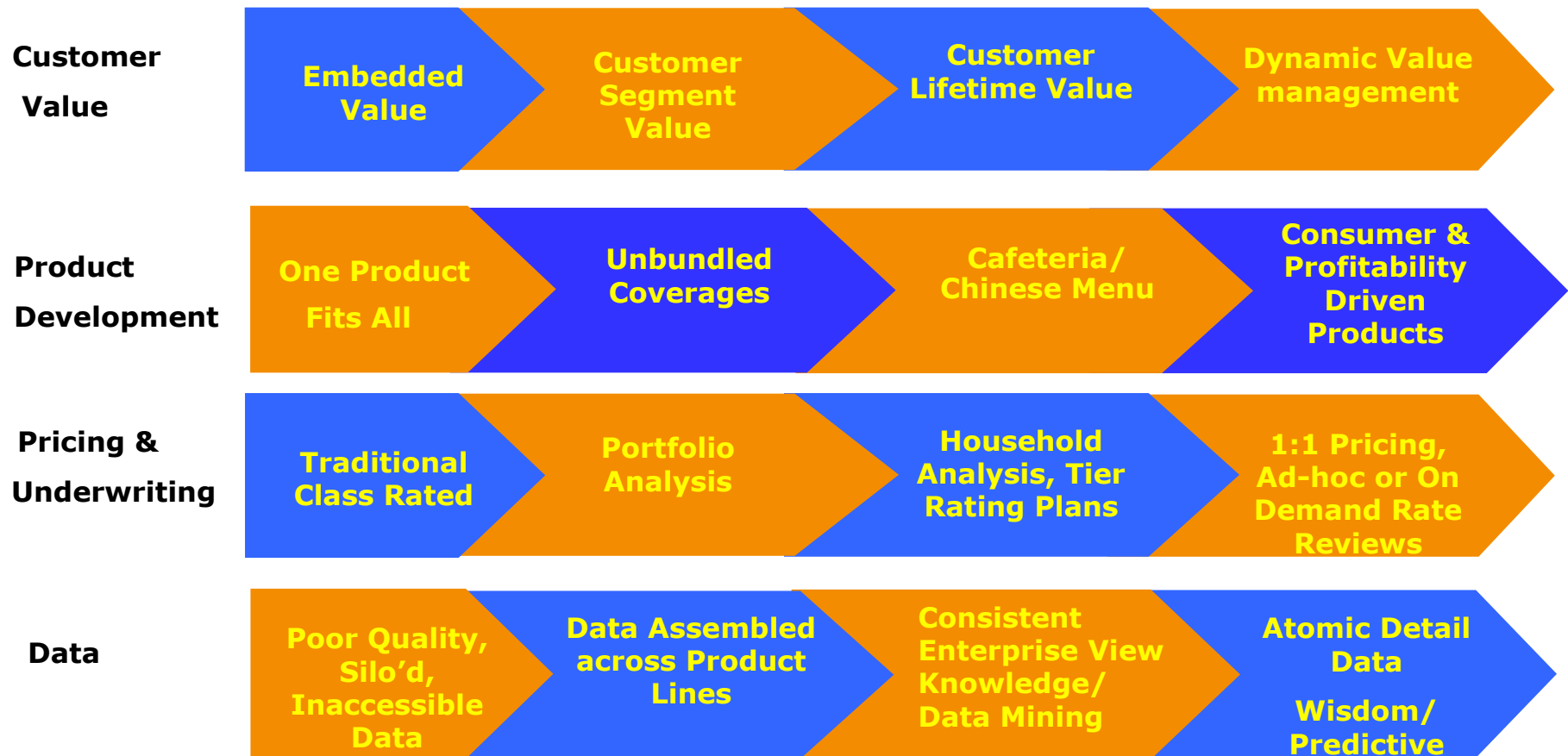
- Aggregation
- Flexibility
- Control

Issues

- Costly
- Data Integrity
- Spend 80% of time obtaining the data vs. analyzing it
- Analytic contention with operational systems
- Need more granular data for competition

The Actuarial Evolution

You've never seen your business like this before.



How much of your time is spent accessing or validating data Vs. analyzing it?

Data Warehousing & Data Mining Best Practices

You've never seen your business like this before.

- Moving toward an Enterprise Data Warehouse
- Data Governance process/metadata repository
- Granular/atomic vs. summary data
- Increased use of sophisticated data mining and techniques
- Move data mining tools to the data
- Still using SAS, but not for extraction
- Still using Excel, for smaller data sets
- Storing derived scores/factors in data warehouse for leverage by other users
- Creating common data set for integrated analysis across functions/departments/SBUs

Case Study: Integrated Product, Premium & Loss Data

You've never seen your business like this before.

- Auto product policy, premium and loss data
- Actuarial pricing analysis
- Power users in actuarial pricing area
- Additional users include Claims, Underwriting & Product Management
- **Benefits**
 - Reduced **Time to Market** (from 12 months to 90 days)
 - Increased **Productivity** in report production/analysis (reduced from 2-6 months to 1 day)
 - Improved **Data Quality** (20% 'dirty data')
 - Prevented **Adverse Risk Selection**
 - Implemented **Underwriting Guidelines**
 - Identification of **new rating variables**
 - Ability to bring entire **book of business to current rate levels**, policy by policy

Case Study: Integrated Claims, Underwriting, Marketing & Pricing Analysis

You've never seen your business like this before.

- Auto and home policy, premium and loss data
- Claims, underwriting, marketing & pricing analysis
- Power users in all areas
- **Benefits**
 - Increased premiums based on claims experience from 2% to 20%
 - Increased speed of rate increase filings from months to weeks
 - More tightly controlled underwriting process through access to more timely, detailed, integrated data resulting in reduction in Combined Ratio

Case Study: Integrated Premium, Loss, Producer & 3rd Party Data

You've never seen your business like this before.

- Commercial Lines portfolio analysis
- Premiums, Losses, Producer data, 3rd party data
- Power users in Actuarial & Market Research/Product Development
- Applications:
 - Ranked the **relative profit potential** of current customers and prospects
 - Book of business profiling on **Inforce Book**
 - Book of business profiling on **Transfer/M&A/Alliance** business
 - **Lead generation/acquisition** of new business
 - Catastrophe mappings
 - **Direct mail response and conversion** predictive modeling
 - **Producer analysis** for profitability and productivity
 - Predictive **risk scoring** model
 - **Terrorism portfolio analysis** (geographic concentrations)

Case Study: Improved Data Quality for Rate Filings

You've never seen your business like this before.

- Individual and group A&H business
- Premium, claim data
- Power users in actuarial
- Applications:
 - Decreased effort and time to file rates
 - Increased # of filings
 - Improved quality of rate filings
 - Rate filings approved with **no request for additional data**



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Best Practices In Data Warehousing

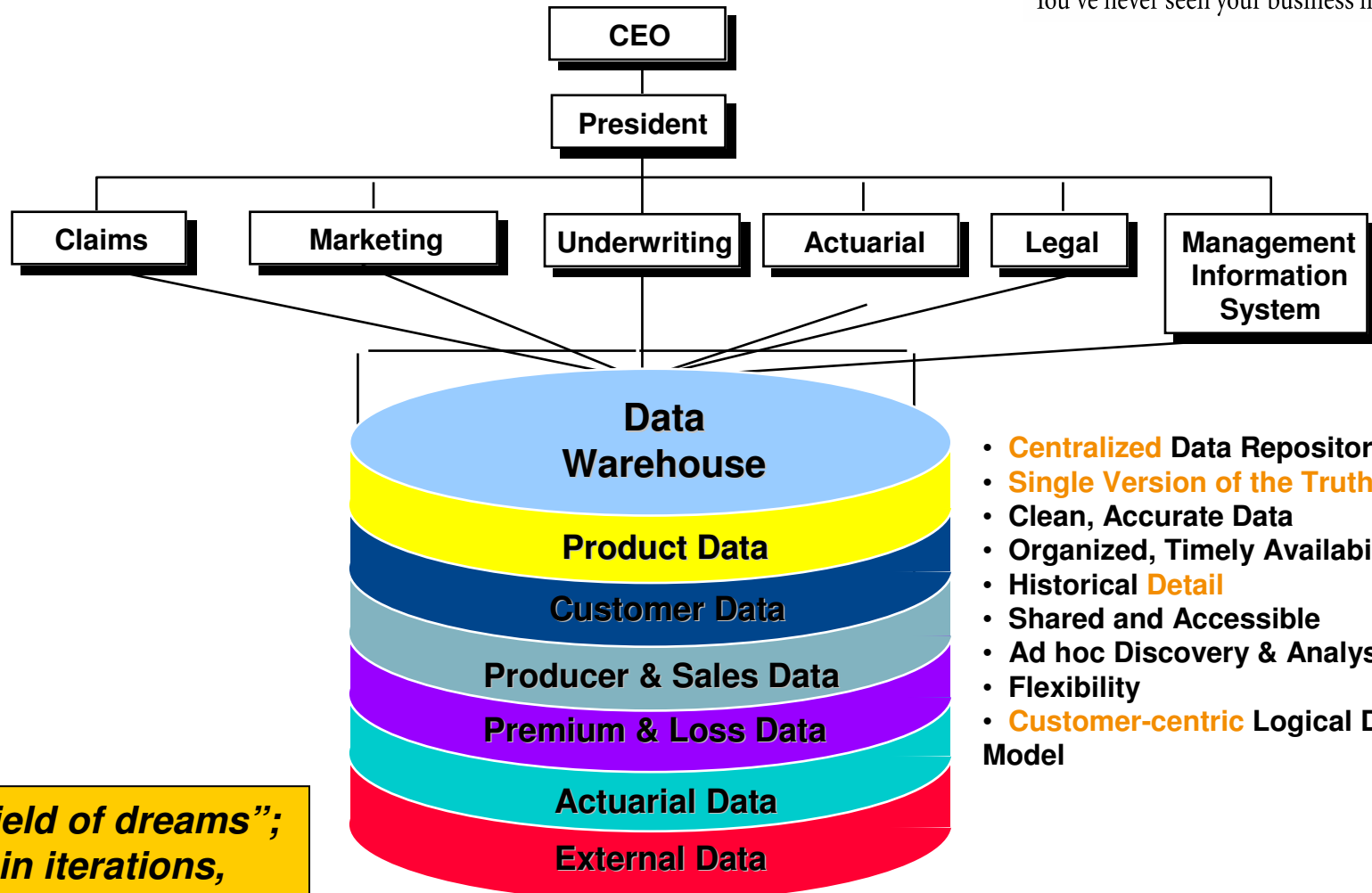
Keys to Data Warehouse Success

You've never seen your business like this before.

- **Specific business problem** to be solved
- **Executive Support**
- **Alignment** of business users and IT
- A well-defined **Plan**
 - **Short-term** deliverables (90-120 days)
 - **Continual** enhancements
- Clear **Return on Investment (ROI)**
 - Pre-implementation Business Discovery
 - Post-implementation Business Value Assessment
- Utilizing **proven Methods and Technology**
- **Experienced** personnel

Data Solution: EDW Single Source of the Truth

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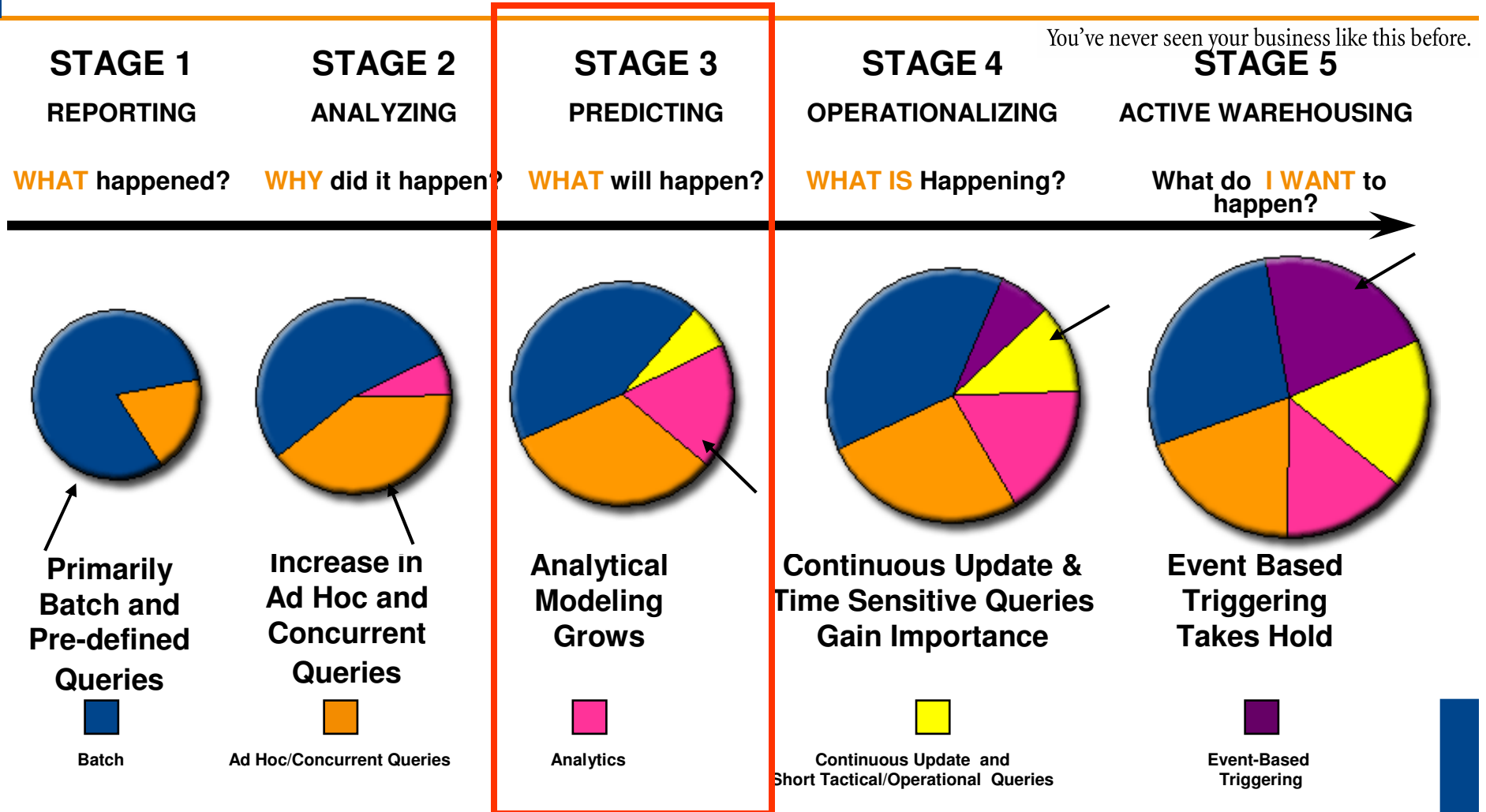


- **Centralized** Data Repository
- **Single Version of the Truth**
- Clean, Accurate Data
- Organized, Timely Availability
- Historical **Detail**
- Shared and Accessible
- Ad hoc Discovery & Analysis
- Flexibility
- **Customer-centric** Logical Data Model

*Not a "field of dreams";
build in iterations,
based on business value*

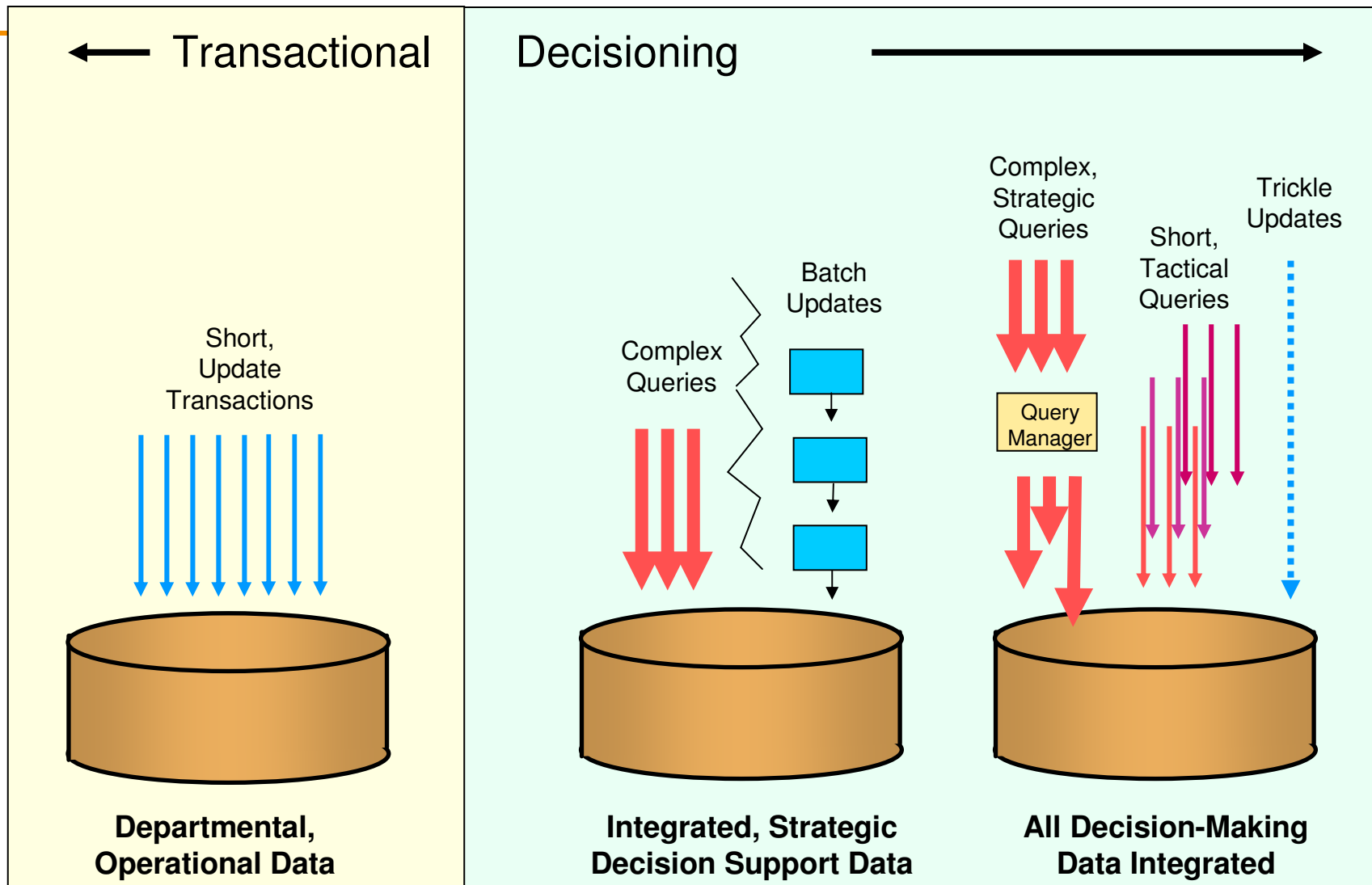
Information Evolution In a Data Warehouse Environment

You've never seen your business like this before.



OLTP versus Data Warehousing

Mixed Workloads in the Data Warehouse



is before.

Data Mart Environment The Terrible Toos --

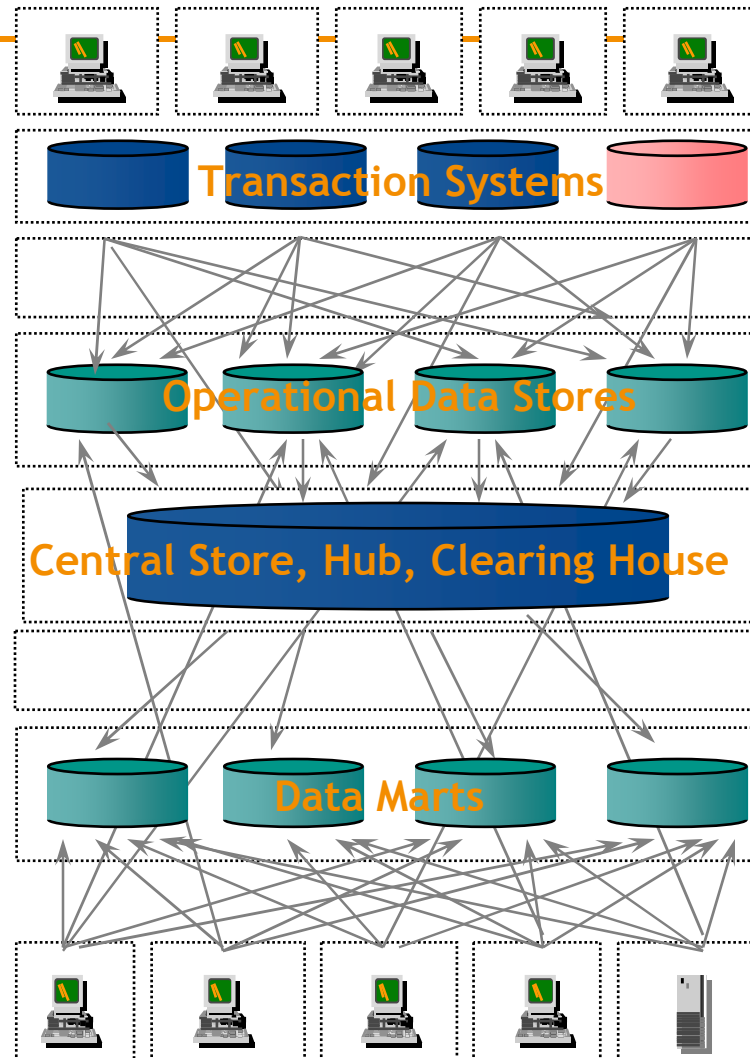
You've never seen your business like this before.

1. Too many copies of the data

- Will they all be the same?

2. Too much latency

- Takes too long to get the data to the people who need it.
- Everyone sees different inconsistent points in time



3. Too complex

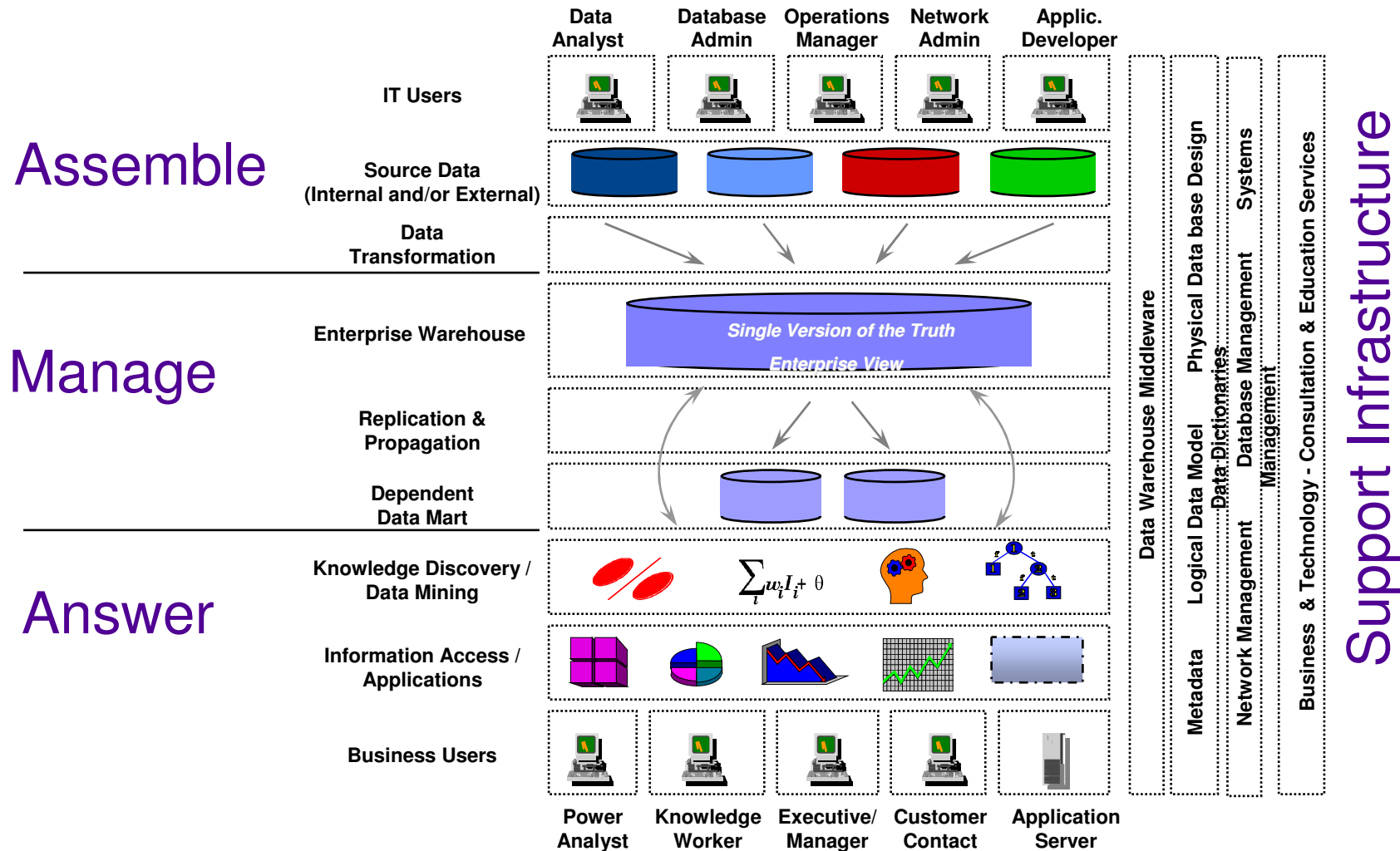
- Every line on the chart represents an ETL process that requires Life Cycle Maintenance

4. Too expensive

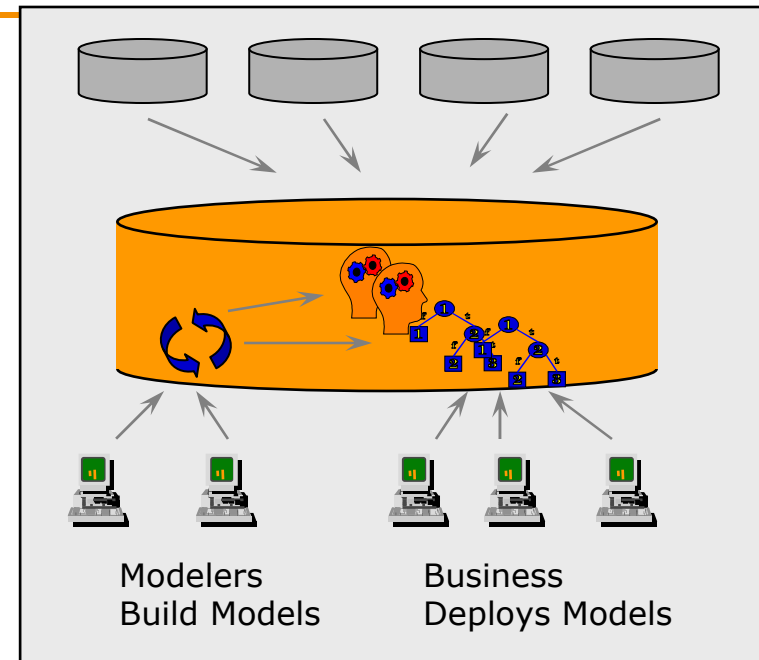
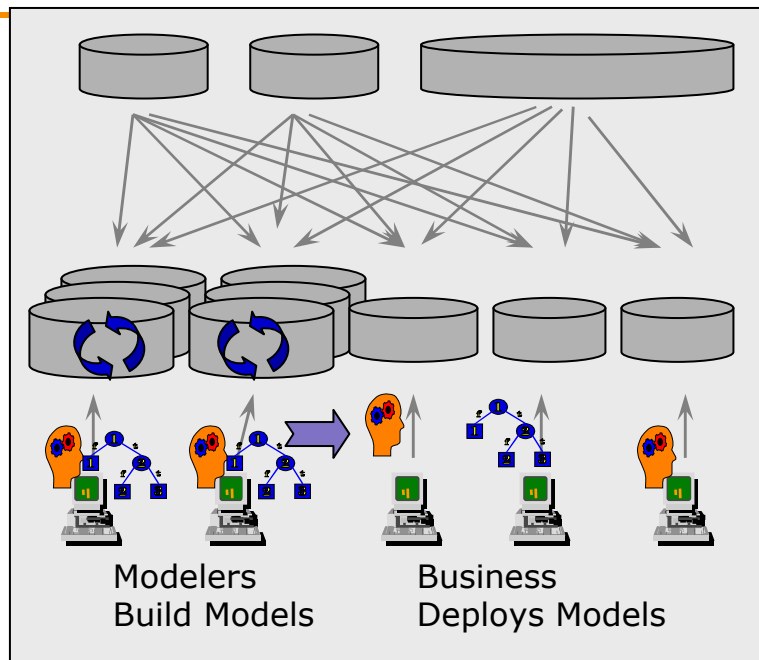
- There are numerous components that lead to increased costs.
- Costs often hidden in distributed organization.

Teradata Enterprise Data Warehouse Framework

You've never seen your business like this before.



Centralized Data Mining



this before.

Distributed Data Mining

- Requires Immediate Sampling
- Requires Data Movement
- Redundancy/Metadata Issues

Centralized Data Mining

- Performance & Scalability
- No Data Movement
- Shared Metadata

***Less chance for data error!
Shifts time from obtaining data to analyzing data.***



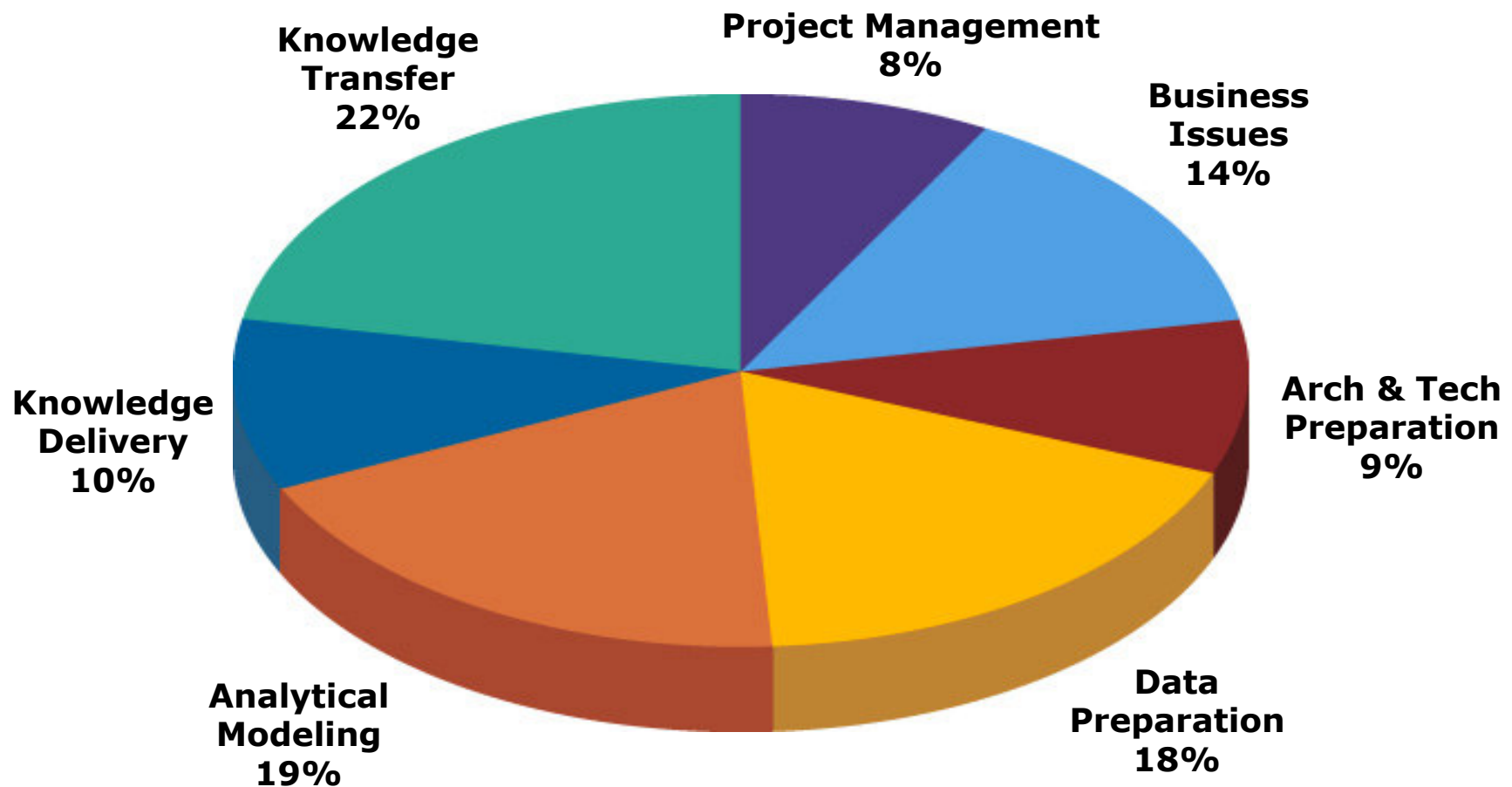
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Best Practices in Data Mining

Data Mining ...Where the time goes

Percent of Total Time

You've never seen your business like this before.



Data Mining Method

You've never seen your business like this before.

Project Management

Business
Issues

Architecture
& Technology
Preparation

Data
Preparation

Analytical
Modeling

Knowledge
Delivery &
Deployment

Knowledge Transfer

Data Mining Method

You've never seen your business like this before.

Project Management

Business Issues

- **Discover business problems** and clearly document the business objectives associated with each of them.
- **Clarify, operationalize, and prioritize** business problems for purposes of data mining.

Why Data Mining Fails

You've never seen your business like this before.

Project Management

Business Issues

- Most initial data mining exercises **will be directed** (they will begin with a hypothesis)
- Directed exercises begin **at the business**
- The more business users that have access to data, the **more hypotheses** will emerge
- More hypotheses = higher chances of **FINDING the WOW!**

Get your Data in the Hands of the Business!

Data Mining Method

You've never seen your business like this before.

Project Management

Business
Issues

Architecture
& Technology
Preparation

- **Define, design, and build** the environment to enable the initial data mining project.
- Enable **business wide access** to data
- Whatever you have today, you will change, augment, tweak, adjust or modify to **accommodate new** mining exercises.
- Number of users, amount of data, and sophistication of queries will increase, so **build for scalability**

Data Mining Method

You've never seen your business like this before.

Project Management

Business
Issues

Architecture
& Technology
Preparation

Data
Preparation

- Conduct Initial **Data Examination**.
- **Extract Data Sample** (if appropriate).
- Determine **Analyzability** of Data Sample.
- **Condition** the Data Sample.

Data Mining - How?

You've never seen your business like this before.

Project Management

Business
Issues

Architecture
& Technology
Preparation

Data
Preparation

Analytical
Modeling

- Conduct **Exploratory Data Analysis**.
- Build **Analytical Models**.
- Validate the **Analytical Approach**.
- **Interpret and Document** the Analytical Models and Results.
- Develop **Production & Monitoring** Processes

Data Mining Method

You've never seen your business like this before.

Project Management

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Issues

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Data
Preparation

Analytical
Modeling

Knowledge
Delivery &
Deployment

- Communicate exercise results to the **business users**.
- Work with the business users to provide **interpretation**.
- Define, design, and build business **user applications**.

Data Mining Method

You've never seen your business like this before.

Project Management

Business
Issues

Architecture
& Technology
Preparation

Data
Preparation

Analytical
Modeling

Knowledge
Delivery &
Deployment

- **Transfer** Modeling Knowledge.
- **Transfer** Production and Monitoring Processes Knowledge.
- **Empower** the Business Users

Knowledge Transfer

Trend: Data Mining Centers of Excellence

Data Mining ... Next Steps

You've never seen your business like this before.



- Data Mining **WILL** uncover interesting information, but it's what you **DO** with that information that counts...
 - Change UW guidelines?
 - Add/change products &/or policy forms?
 - Revise internal business processes?
 - Improve rate structures?



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Funding/
Return on Investment

Business Improvement Opportunities (BIOs): Insurance

Key Business Processes	Business Improvement Opportunities (BIOs)				
Distribution Management	Channel Strategy Rationalization	Channel Usage, Preference & Profitability	Channel Management, Recruitment & Retention	Sales Reporting & Performance Analysis	Channel Communications
Operations Management	New Business Processing	Utilization Analysis	Claims Analysis	Provider Network Management	Customer Service Management
Risk Management	Reserves Analysis	Product Development & Pricing	Portfolio Analysis	Fraud and Abuse	Underwriting Risk Analysis
Customer Management	Customer Communication Strategy	Cross-sell Up-sell	Product and Customer Alignment	Customer Retention	Customer Acquisition
Financial Management	Profitability Analysis	Expense Analysis	Budget, Planning & Forecasting	Mergers & Acquisitions Analysis	Regulatory Compliance & reporting
Data Management	Enterprise Data Architecture (DMC)	Data Quality & Stewardship	Privacy and Data Security	Business Continuance	Accessibility and Performance

Funding an EDW

You've never seen your business like this before.



Data Mart Consolidation Reducing Total Cost of Managing the Data

You've never seen your business like this before.



ROI from Data Mart Consolidation

You've never seen your business like this before.

Consolidating 22 Data Marts
Timeframe = 8 Months
Started Mid November '01

Cost to consolidate = **\$25 Million**
Savings within Same Period = **\$24 Million**

Support Costs:

\$9.0M per Quarter (22 Data Marts)

\$3.0M per Quarter (New Consolidated System)

\$6.0M Savings per Quarter

56 More
Data Marts
Possible...

The FS-LDM accelerates DMC!
Provides the Blueprint for how
to consolidate the data.

Product Pricing & Development Illustration

Objective

- Assure premium relates to accepted risk
- Enhance new product development and pro-actively adjust products and pricing
- Increase the speed to market for new rating plans and products

Actions

- Create products and pricing based on refined loss/cost data
- Develop pricing features based on contributions
- Refine rate classifications based on more complete and accurate detail data

Results

- Introduction of better pricing structures
- Improved response to competitive actions
- Increased speed to market for rate plan changes and new products

Product Pricing & Development BIO



ROI

Analysis (Business Questions)

- What is my loss experience by segment?
- What is my "hit" ratio for business quoted?
- How is my new business performing relative to my existing book?
- Are there new characteristics driving the loss ratio?
- How can I segment my book differently than my competitors?
- Are the discounts appropriate relative to the loss experience?
- What product enhancements are needed to meet the future needs² of my customers?

Data Sources:

- Policy and Application data
- Premium History
- 3rd Party Credit Scores
- Producer Data
- Claims Data
- Campaign Data
- Risk Group Data
- Billing and Payment Data

Portfolio Analysis Illustration

Objective

- Diversify portfolio to reduce risk and maximize return on invested capital

Actions

- Plan strategies to reduce risk
- Align products to increase risk classifications and spread risk
- Adjust portfolio based on detailed customer behavior

Results

- Portfolio that spreads the risk and increases profit
- Pricing that accurately reflects risk
- Increased attractiveness to reinsurance markets

Portfolio Analysis BIO

Set / Refine Objective

Perform Analysis

Take Action

Measure Results / ROI

Analysis (Business Questions)

- What is my concentration of risk by market segment?
- What is the total risk exposure within a geographic area?
- What is the persistency of this book; How long has the average insured been with us?
- How do my current risks perform as compared to my historical losses?
- What underwriting policy changes are impacting the makeup of the book?
- What are the expenses associated with writing and servicing policies in this state?
- Do current rate levels charged by competitors allow for profit in this state / territory?

Data Sources:

- Policy and Application data
- Premium History
- 3rd Party Credit Scores
- Producer Data
- Claims Data
- Reinsurance Data
- Provider Data
- Risk Group Data
- Billing and Payment Data

ROI



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Getting There: The EDW Visual Roadmap

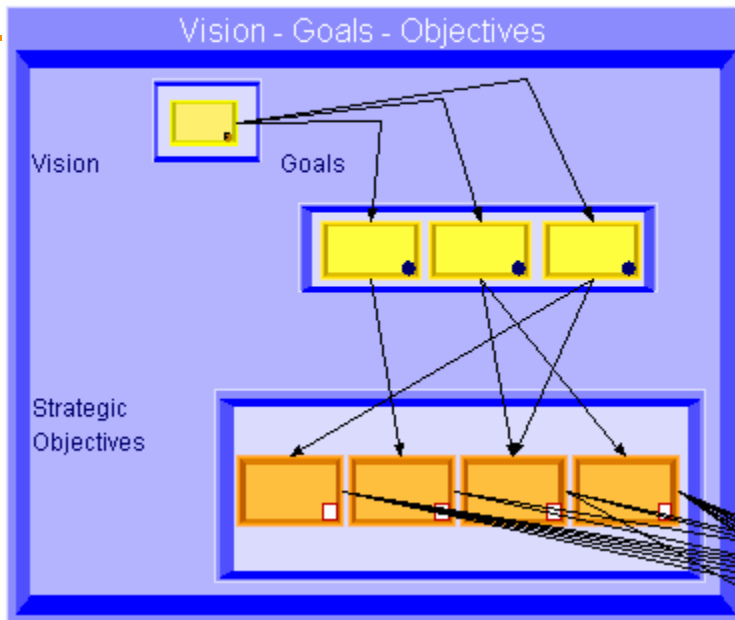
EDW Roadmap

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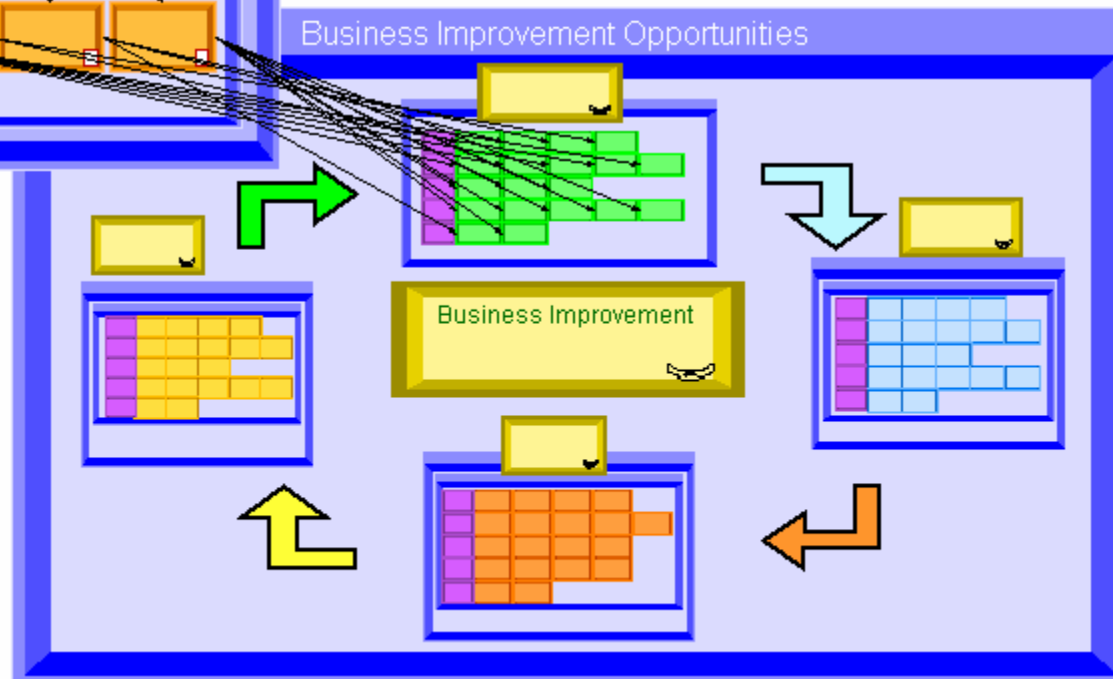
- A **visual modeling tool** to plan the direction, priority and growth path for an EDW
- Ties together all of the key components of an EDW:
 - **Goals & Objectives** of the organization
 - The relevant **Business Improvement Opportunities (BIOs) and/or initiatives**
 - The **data** that an organization actually has
 - The **Business Questions** that can be answered...
... (and those that cannot!)
 - The **Key Performance Indicators (KPIs)**
 - The **Logical Data Model**
 - The **business value/ROI** potential
- Acts as a repository for the environment
 - **Communication** tool
 - **Planning** tool

MAP

Vision-Goals-Objectives

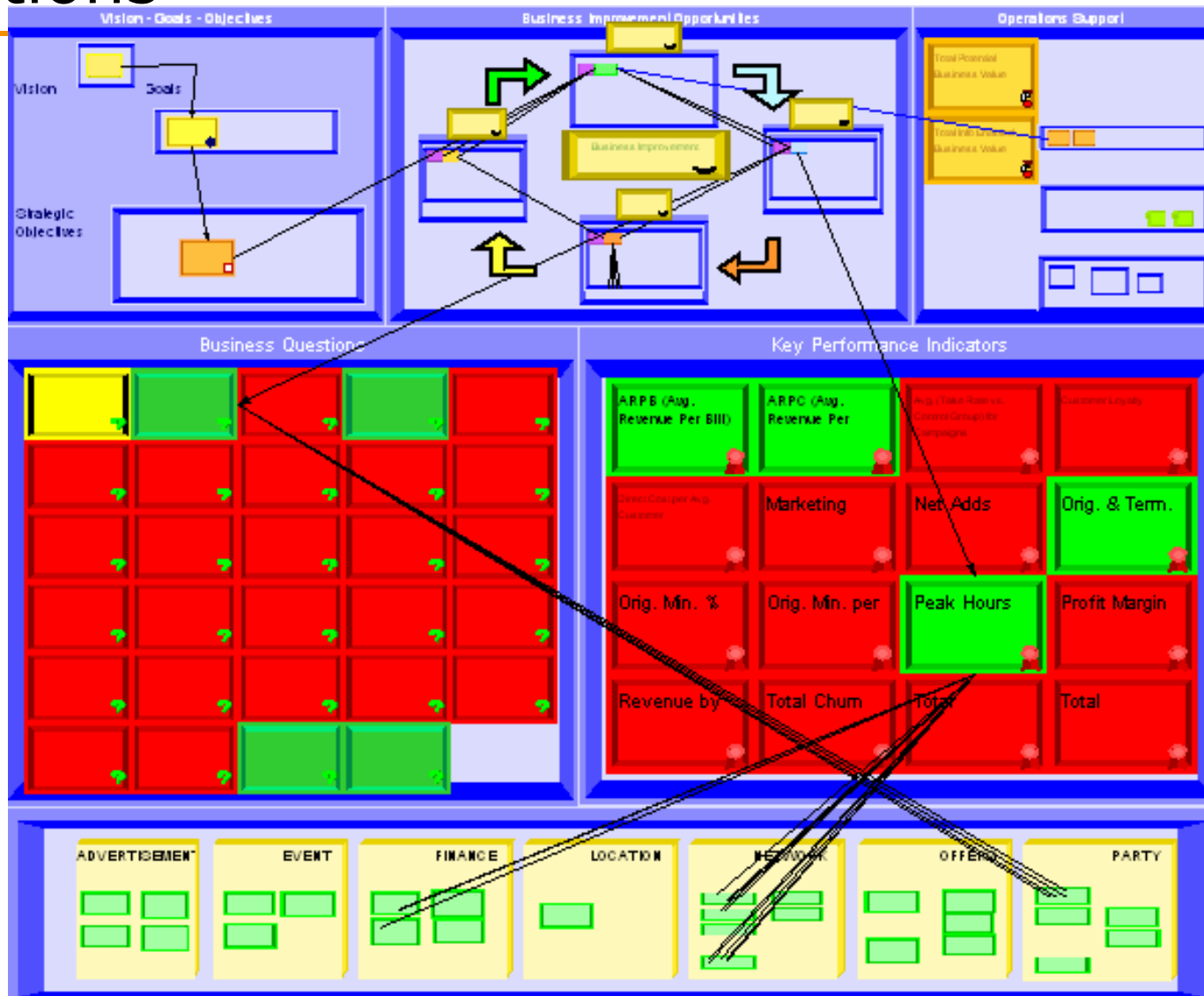


TO Business Improvement Opportunities



ness like this before.

Connecting the dots... between industry LDMs, BIOs, Solutions



Business like this before.



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Q&A

For additional information contact:

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