Bringing Analytics to the Data

Meeting the Business Analytics and Data Warehousing needs of your users

Beth Hamel

hameleb@us.ibm.com

IBM Corporation, STSM, System z New Workloads

Agenda

- **The role of System z in today's Business Analytics**

- **System z Solutions**

- **In depth look at the IBM DB2 Analytics Accelerator**

- **Customer Case Studies**

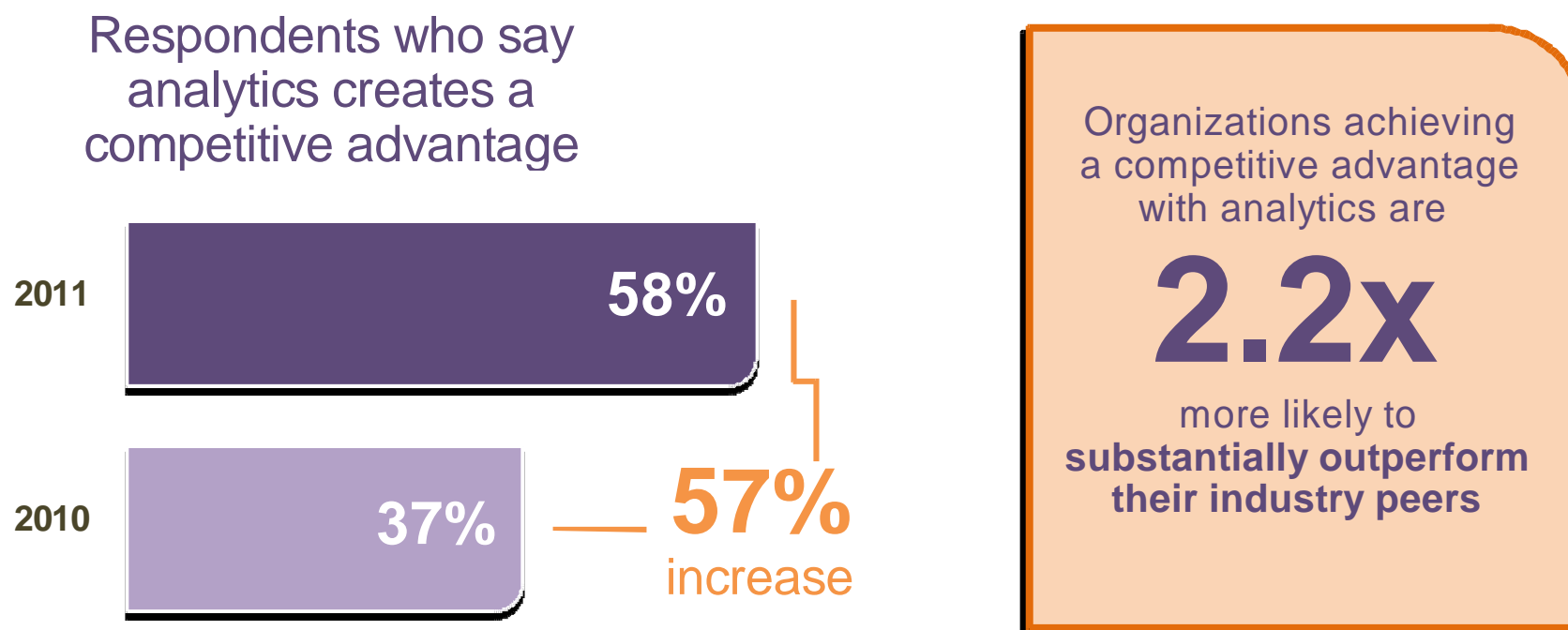Knowing what happened is no longer adequate.

Business leaders need to know

what is happening now,

what is likely to happen next and

what actions they should take.

The ability to create competitive advantage using analytics surged dramatically in 12 months; the bottom-line impact is clear

Respondents who say analytics creates a competitive advantage

2011 — 58%

2010 — 37%

57% increase

Organizations achieving a competitive advantage with analytics are

2.2x

more likely to **substantially outperform their industry peers**
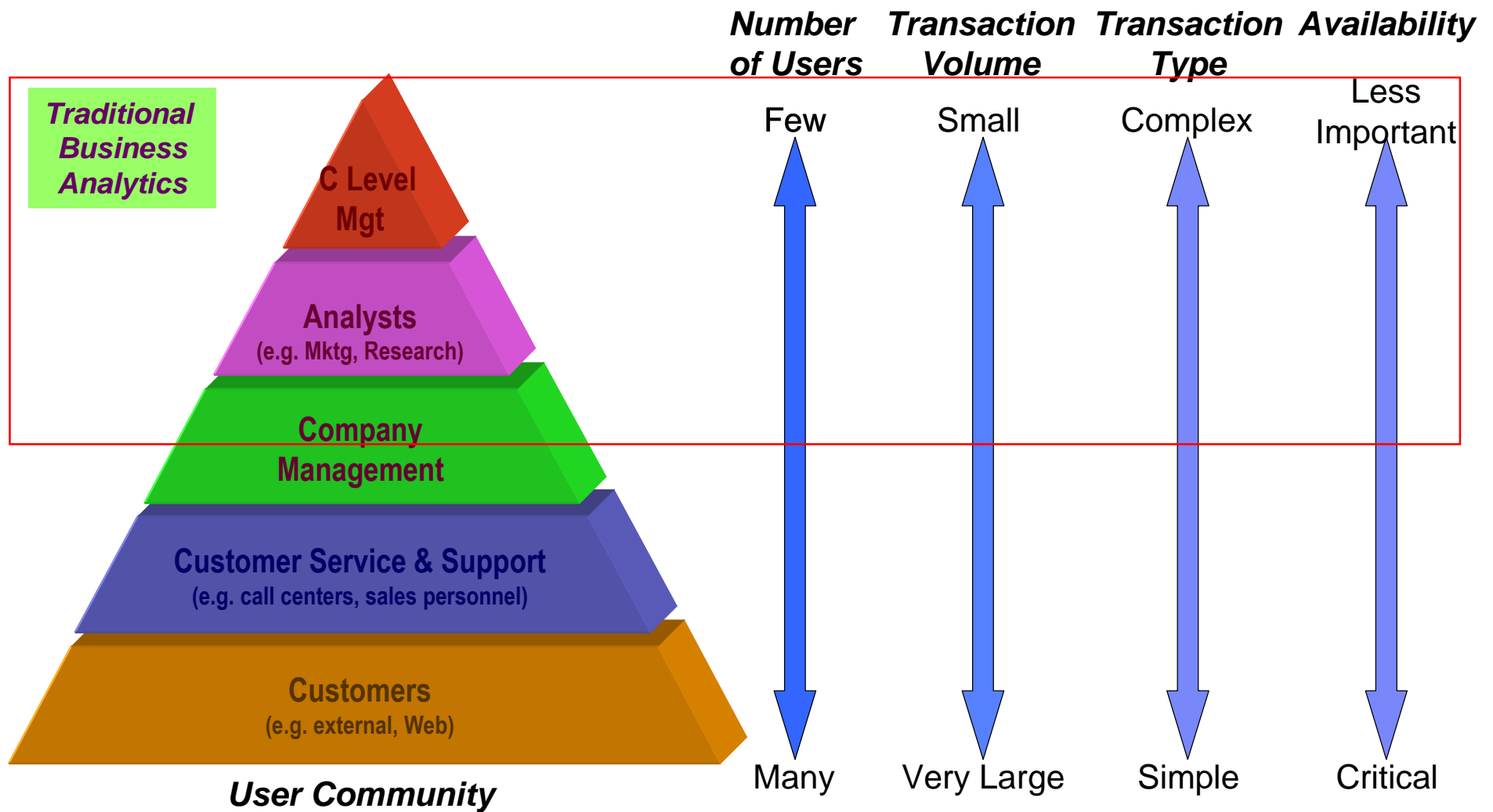
Source: The New Intelligent Enterprise a joint MIT Sloan Management Review and IBM Institute of Business Value analytics research partnership. Copyright © Massachusetts Institute of Technology 2011.
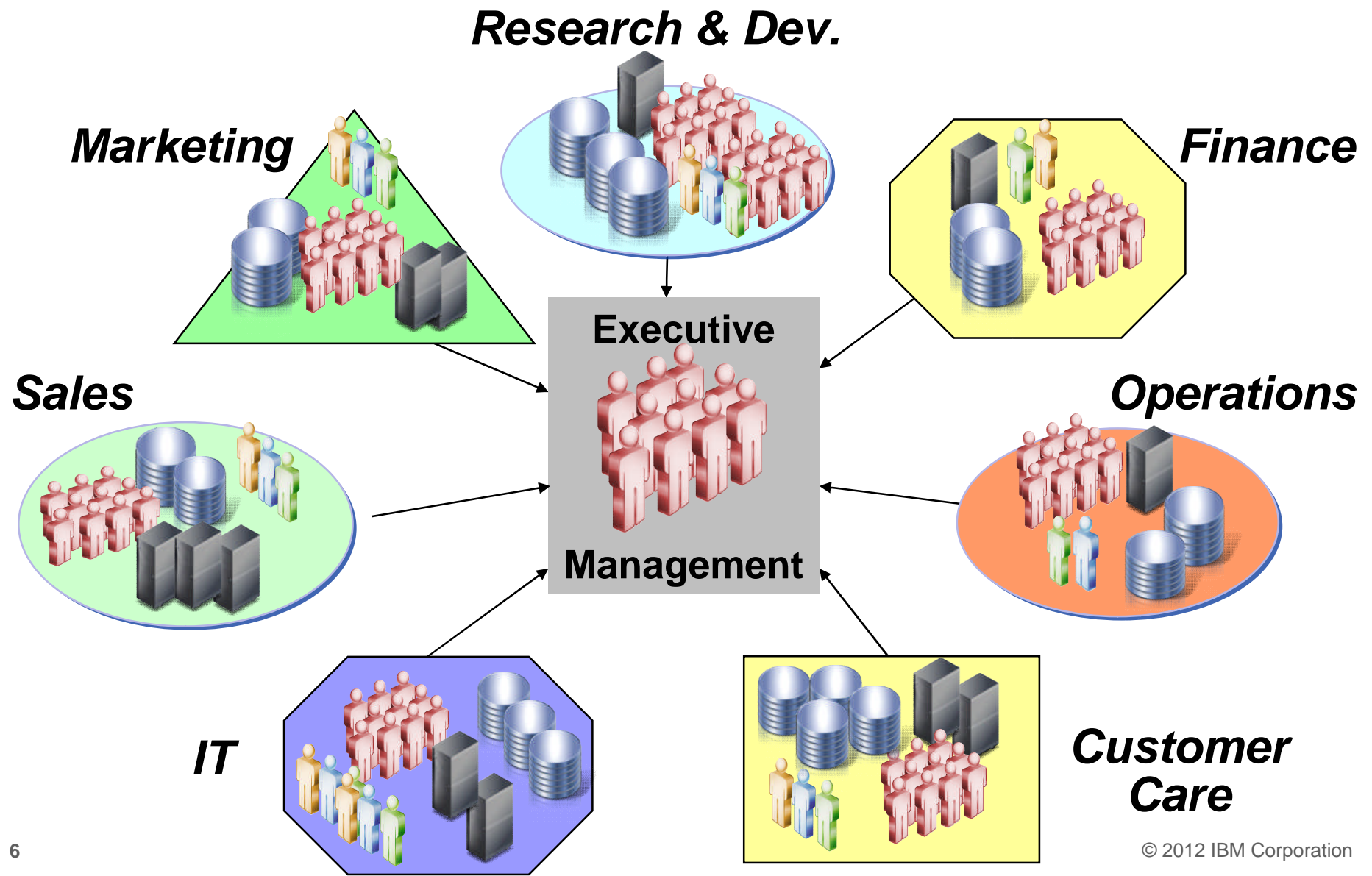
Traditional Business Analytics and Data Warehousing Market

	Number of Users	Transaction Volume	Transaction Type	Availability
	Few	Small	Complex	Less Important
	↕	↕	↕	↕
	Many	Very Large	Simple	Critical

Traditional Business Analytics

C Level Mgt

Analysts (e.g. Mktg, Research)

Company Management

Customer Service & Support (e.g. call centers, sales personnel)

Customers (e.g. external, Web)

User Community

Executed by Department

Research & Dev.

Marketing

Finance

Executive Management

Sales

Operations

IT

Customer Care

Getting analytics out to frontline workers is more critical than ever…

- *More informed customer interaction = higher customer satisfaction*

- *Higher customer satisfaction = improved business performance*

- **A dissatisfied consumer will tell between 9 and 15 people about their experience. About 13% of dissatisfied customers tell more than 20 people.**

  Source: White House Office of Consumer Affairs, Washington, DC

- **86% of consumers quit doing business with a company because of a bad customer experience, up from 59% 4 years ago**

  Source: Harris Interactive, Customer Experience Impact Report

- **For every customer complaint, there are 26 other customers who have remained silent**

  Source: Lee Resource Inc

- **Happy customers who get their issue resolved tell about 4 to 6 people about their experience.**
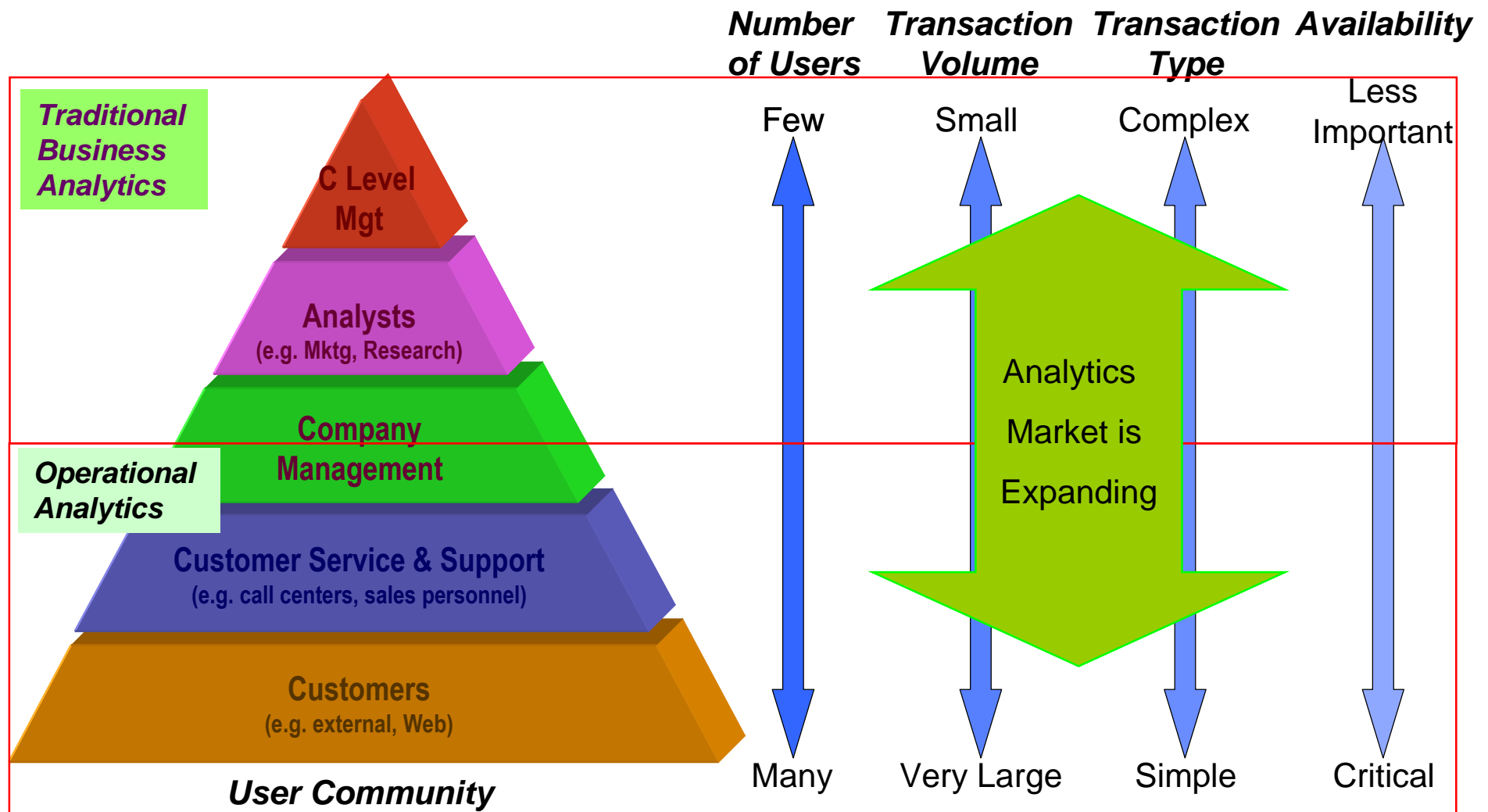
  Source: White House Office of Consumer Affairs, Washington, DC

- **Attracting a new customer costs 5 times as much as keeping an existing one**

  Source: Lee Resource Inc.

Current Analytics Market is expanding

Traditional Business Analytics

Operational Analytics

C Level Mgt

Analysts
(e.g. Mktg, Research)

Company Management

Customer Service & Support
(e.g. call centers, sales personnel)

Customers
(e.g. external, Web)

User Community

Number of Users	Transaction Volume	Transaction Type	Availability
Few	Small	Complex	Less Important
	Analytics Market is Expanding		
Many	Very Large	Simple	Critical

Elevated Demand for Business Analytics

**More Users
with
Higher
Expectations**

- Needs to be employed in every function and department and *shared* internally as well as externally with customers and suppliers

- Needs to support strategic, *tactical and operational decisions*

- Must be timely, accurate and *integrated across the enterprise*

- Must be protected with *stringent levels of security*

New Requirements have Emerged

More Aggressive Requirements

- Enterprise-level scale & performance
- Mission critical availability
- Faster access to Operational Data
- Rapid, cost effective deployment & expansion
- More integrated view of data across the environment

Driving New Focal Points

- Modernization
- Standardization & Consolidation
- Operational BI
- Data Governance
- Cloud Computing

What role can System z play to help meet these requirements?

- Help meet new requirements by *extending the characteristics of the transactional systems to data warehousing and business analytics*

- Enable operational business analytics by moving data warehousing and business analytics closer to the transactional data

- Help minimize cost and reduce complexity by supporting a centralized, scalable infrastructure

- Respond quickly to data warehousing and business analytic needs by enabling rapid deployment and expansion

System z offers a Complete Analytics Platform

The Core Database Platform:

- DB2 for z/OS Data Sharing
- Temporal Data
- Highest Qualities of Service
- Smart Analytics System 9700 pricing
- And Now Accelerated by Netezza!!!

DB2 for z/OS
Data
Warehouse

SPSS	InfoSphere Warehouse on System z SQW and Cubing Services	Cognos
Statistics and Modelling		BI and Reporting
Linux on System z	Linux on System z	z/OS, Linux System z
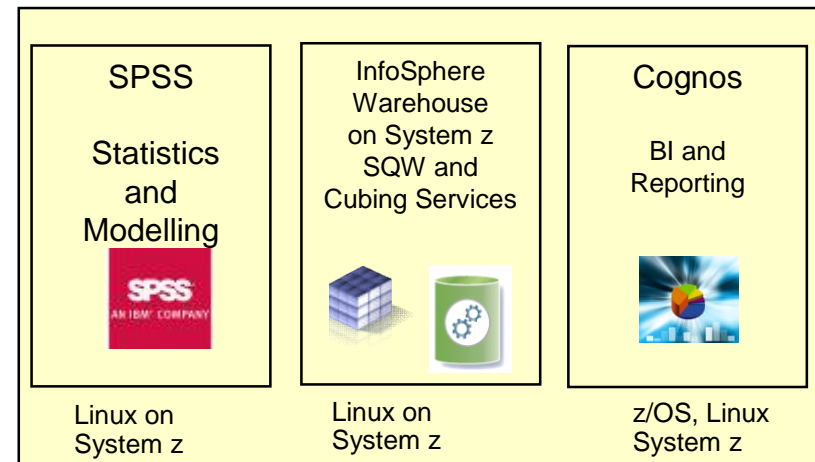
The Application Features:

- SPSS Statistics and Data Mining
- InfoSphere Warehouse Data Management
- Cognos Reporting and Data Presentation
- Ease of Management through Consolidation and Virtualization

Cognos BI on System z

▪ **Delivers information where, when and how it is needed**

- Self-service reporting and analysis
- Individualized by user
- Automated delivery of information in context
- Author once, consume anywhere

▪ **Full range of BI capabilities**

- Query, reporting, analysis, dashboarding, real-time monitoring

▪ **Purpose-built SOA platform**

- Fits client environments and scales easily

Query Management Facility Version 10

- **Business Analytics is a key area of interest to any enterprise - QMF now offers:**

  - Graphical queries, reports

  - Dashboards and KPIs

  - Advanced analytic functions and analysis

  - JDBC access to any RDBMS (zAAP eligible for System z), JDBC access to IMS

  - Multi-dimensional analysis and OLAP support via XMLA

  - Operational Business Analytics

  - Heterogeneous database access

  - Federated data

  - Mobile device support

- Enhanced and easier installation, maintenance, administration.

- Enhanced ease of use and compatibility with existing QMF infrastructure, objects and workflows.
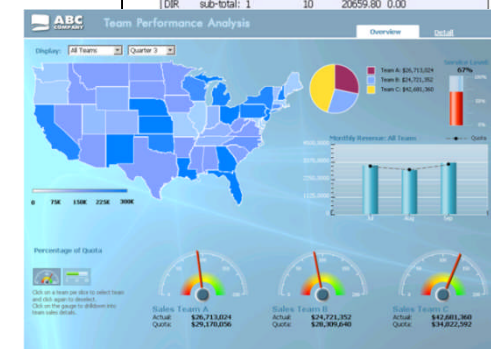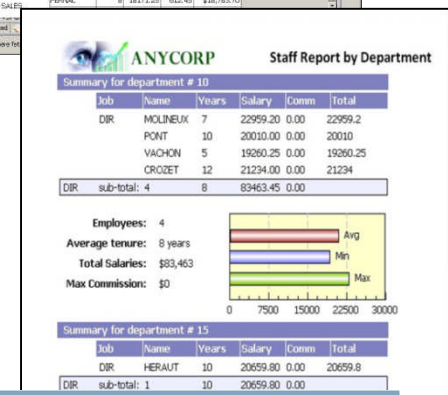
IBM SPSS for Linux on System z

- Full breadth of predictive analytics

  – Data collection, statistics, data mining, predictive modeling, deployment services…

- Putting prediction in hands of the business
  – Decision Management

- Driving better business outcomes

  – Attract and retain more profitable customers

  – Detect and prevent fraud

  – Improve resource allocation

Real time scoring with DB2 for z/OS and SPSS Modeler 15

- **Delivers better, more profitable decisions, using the latest data, at the point of customer impact**
  - Enables more informed customer interaction
    - Improves customer service
    - Increases revenue per customer ratio
    - Heightens customer retention
  - Improves fraud identification and prevention
    - Reduces risk and exposure

- **With improved accuracy, speed and performance while reducing cost and complexity**
  - Improves accuracy by scoring new and relevant data directly within the OLTP application
  - Scales to large data volumes to improve accuracy of data models
  - Delivers the performance needed to meet and exceed SLAs of OLTP applications
  - Minimizes demand on network, HW, SW and resources

Customer Interaction

Data In

Real-Time Score/ Decision Out

Part of an extensive Business Analytics solution on System z!

Applications of Real Time Scoring Methods

Faster, More Comprehensive, Less Expensive

Approve a loan at time of application	**Detect and react to fraud & abuse**	**Predict and up-sell on intent to purchase**
Anticipate crime and threats	**Identify demand before it exceeds resources**	**Understand supply chain vs current orders**

DB2 Analytics Accelerator

Accelerating decisions to the speed of business

Blending System z and Netezza technologies to deliver unparalleled, mixed workload performance for complex analytic business needs.

Get more insight from your data

- Fast, predictable response times for "right-time" analysis

- Accelerate analytic query response times

- Improve price/performance for analytic workloads

- Minimize the need to create data marts for performance

- Highly secure environment for sensitive data analysis

- Transparent to the application

Deep DB2 Integration within zEnterprise

Applications	DBA Tools, z/OS Console, ...
Application Interfaces (standard SQL dialects)	*Operational Interfaces* (e.g. DB2 Commands)

DB2 for z/OS

Data Manager	Buffer Manager	. . .	IRLM	Log Manager

IBM DB2 Analytics Accelerator

Superior availability reliability, security, Workload management

z/OS on System z

Superior performance on analytic queries

Netezza

Query Execution Process Flow

DB2 for z/OS

IDAA

Application Interface

Optimizer

Heartbeat

IDAA DRDA Requestor

Query execution run-time for queries that cannot be or should not be off-loaded to IDAA

Application

SMP Host

SPU — CPU — FPGA — Memory

SPU — CPU — FPGA — Memory

SPU — CPU — FPGA — Memory

SPU — CPU — FPGA — Memory

Queries executed without IDAA

Queries executed with IDAA

Heartbeat (IDAA availability and performance indicators)

Performance & Savings

Accelerating decisions to the speed of business

http://www.youtube.com/watch?v=xkcp_pJxT5E

DB2 Analytics Accelerator: "we expect ROI in less than 4 months"
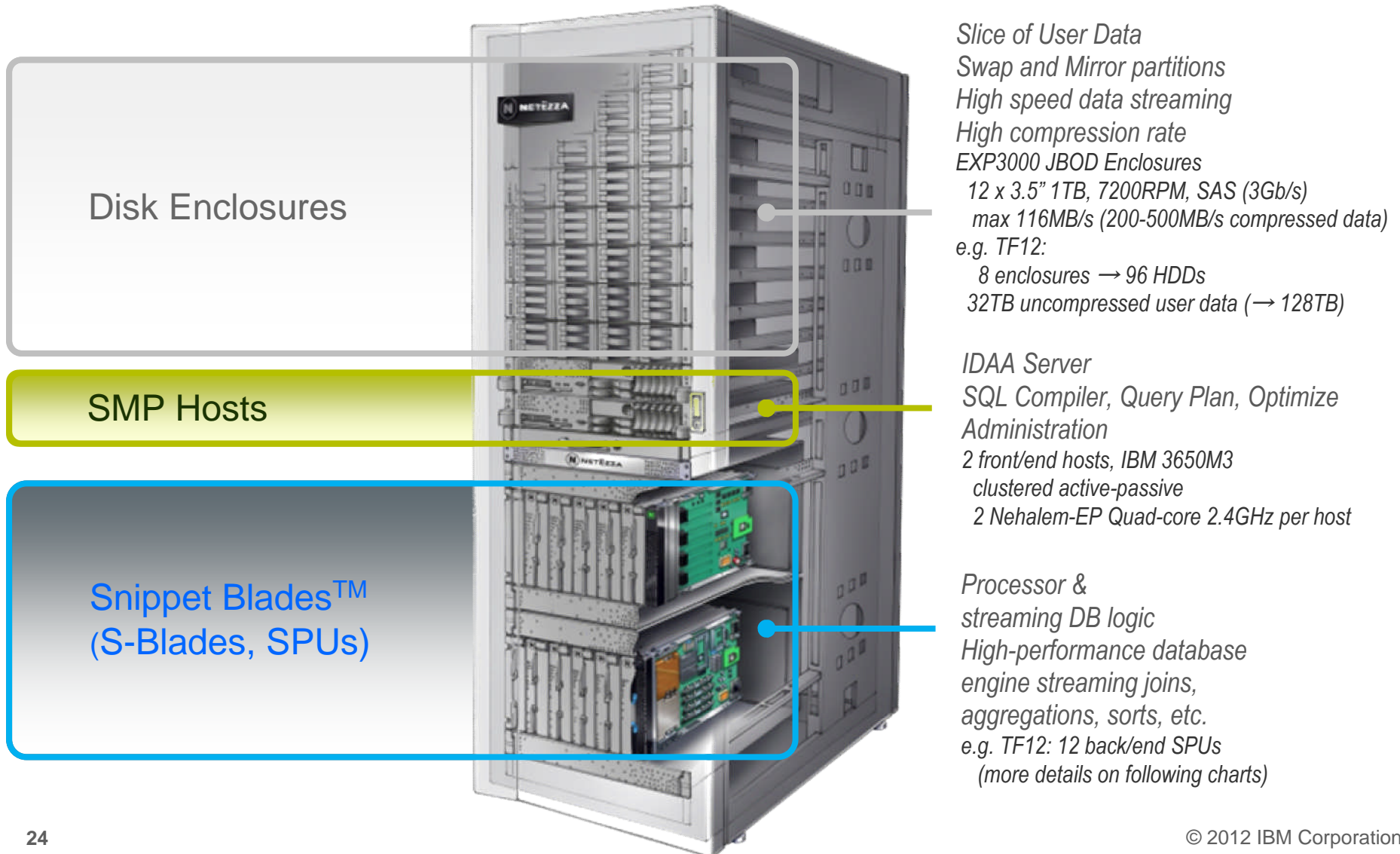
Performance Benchmark Results

Query	ISAS 9700 Only (sec)				ISAS 9700 with IDAA (sec)				IDAA Improvement			
	Class 1 Elapsed Time	Class 1 CPU Time	Class 2 Elapsed Time	Class 2 CPU Time	Class 1 Elapsed Time	Class 1 CPU Time	Class 2 Elapsed Time	Class 2 CPU Time	Class 1 Elapsed Time	Class 1 CPU Time	Class 2 Elapsed Time	Class 2 CPU Time
1	13.52	87.88	13.35	87.71	2.10	0.49	1.92	0.32	6x	179x	7x	274x
2	13.11	97.98	12.94	97.61	1.82	0.46	1.66	0.30	7x	213x	8x	325x
3	10.57	87.77	10.43	87.63	1.95	0.39	1.81	0.25	5x	225x	6x	351x
4	10.88	81.87	10.74	81.72	1.90	0.40	1.75	0.26	6x	205x	6x	314x
5	11.29	58.29	11.12	58.12	1.92	0.47	1.76	0.31	6x	124x	6x	187x
6	12.32	133.51	12.30	133.51	1.50	0.01	1.49	0.10	8x	13351x	8x	1335x
7	13.48	146.84	13.46	146.83	1.36	0.01	1.35	0.10	10x	14684x	10x	1468x
8	12.36	127.59	12.35	127.58	1.38	0.01	1.37	0.10	9x	12759x	9x	1276x
9	12.20	131.73	12.19	131.73	1.20	0.01	1.19	0.10	10x	13173x	10x	1317x
10	14.43	172.12	14.52	172.11	1.49	0.01	1.48	0.10	10x	17212x	10x	1721x
11	22.45	211.57	22.44	211.56	2.20	0.01	2.19	0.00	10x	21157x	10x	52890x
12	440.53	2985.55	440.51	2985.41	11.69	0.03	11.67	0.02	38x	99518x	38x	149271x
13	543.42	3361.26	543.41	3361.25	30.94	0.02	30.93	0.01	18x	168063x	18x	336125x
14	671.43	4406.00	671.41	4405.99	36.85	0.02	36.84	0.01	18x	220300x	18x	440599x
TOTAL	1801.99	12089.96	1801.17	12088.76	98.30	2.34	97.41	1.98	18x	5167x	18x	6093x

IBM DB2 Analytics Accelerator V2 Product Components

zEnterprise

Netezza Technology

CLIENT

Data Studio
Foundation
DB2 Analytics
Accelerator
Admin Plug-in

OSA-Express3

10 GbE

Network
Primary

10Gb

Backup

**Users/
Applications**

Data Warehouse application
DB2 for z/OS enabled for IBM
DB2 Analytics Accelerator

IBM DB2
Analytics
Acelerator
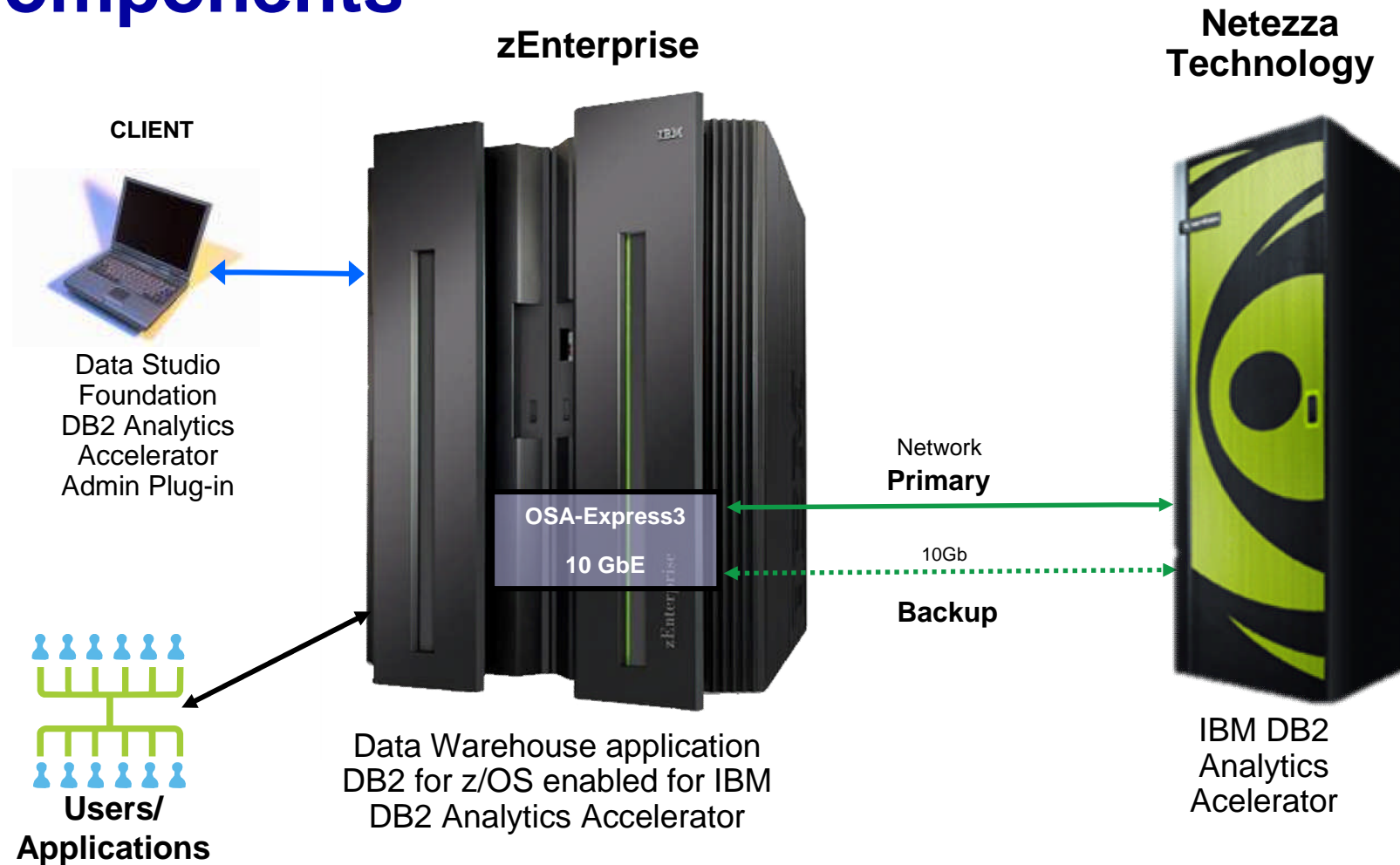
DB2 Analytics Accelerator V2

Powered by Netezza 1000 Appliance

Disk Enclosures

SMP Hosts

Snippet Blades™
(S-Blades, SPUs)

Slice of User Data
Swap and Mirror partitions
High speed data streaming
High compression rate
EXP3000 JBOD Enclosures
  12 x 3.5" 1TB, 7200RPM, SAS (3Gb/s)
  max 116MB/s (200-500MB/s compressed data)
e.g. TF12:
  8 enclosures → 96 HDDs
  32TB uncompressed user data (→ 128TB)

IDAA Server
SQL Compiler, Query Plan, Optimize
Administration
2 front/end hosts, IBM 3650M3
  clustered active-passive
  2 Nehalem-EP Quad-core 2.4GHz per host

Processor &
streaming DB logic
High-performance database
engine streaming joins,
aggregations, sorts, etc.
e.g. TF12: 12 back/end SPUs
  (more details on following charts)

The Appliance Connected to a System z

FPGA CPU
Memory

FPGA CPU
Memory

FPGA CPU
Memory

Host

Disk Enclosures   **S-Blades™**   **Network Fabric**

Netezza Appliance
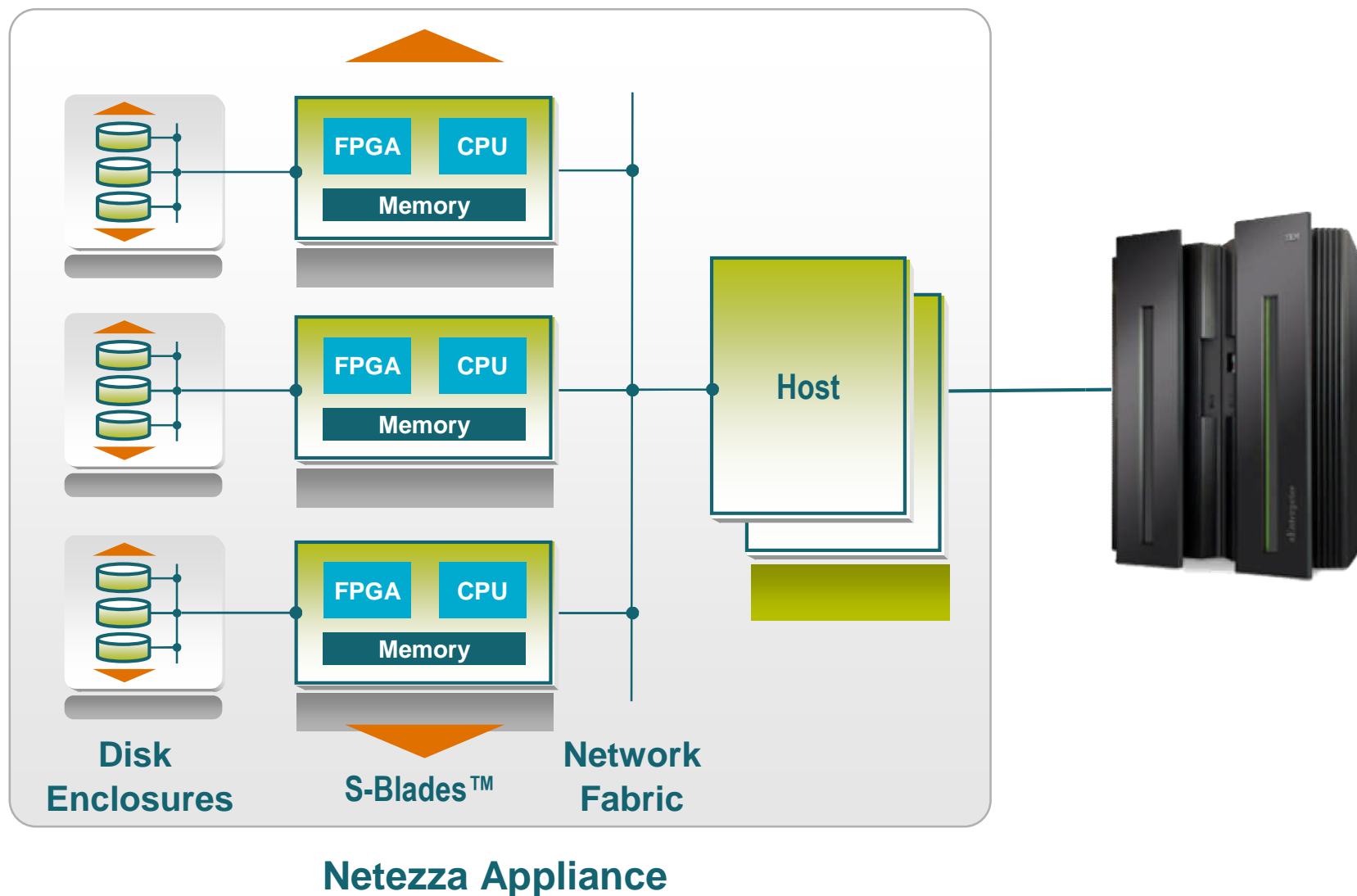
The Key to the Speed

```
select  DISTRICT,
        PRODUCTGRP,
        sum(NRX)
from    MTHLY_RX_TERR_DATA
where   MONTH = '20091201'
and     MARKET = 509123
and     SPECIALTY = 'GASTRO'
```

FPGA Core

CPU Core

Uncompress   **Project**   **Restrict, Visibility**

Complex Σ Joins, Aggs, etc.

```
Slice of table
MTHLY_RX_TERR_DATA
(compressed)
```

```
select  DISTRICT,
        PRODUCTGRP,
        sum(NRX)
```

```
where  MONTH = '20091201'
and    MARKET = 509123
and    SPECIALTY = 'GASTRO'
```

```
sum(NRX)
```
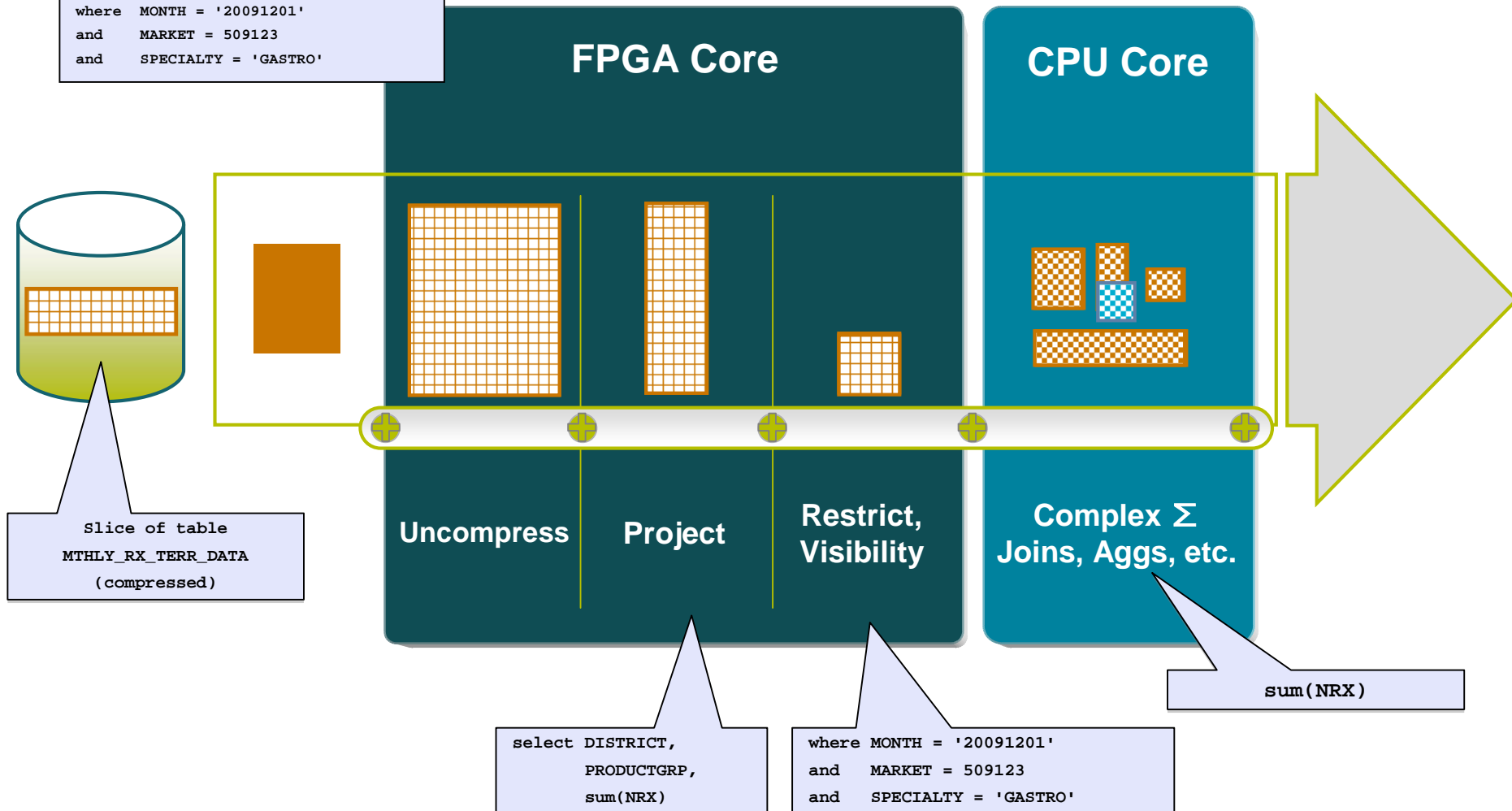
IDAA Scalability

	1000-3	1000-6	1000-12	1000-24	1000-36	1000-48	1000-72	1000-96	1000-120
Cabinets	1/4	1/2	1	2	3	4	6	8	10
Processing Units	24	48	96	192	288	384	576	768	960
Capacity (TB)	8	16	32	64	96	128	192	256	320
Effective Capacity (TB)*	32	64	128	256	384	512	768	1024	1280

Predictable, Linear Scalability throughout entire family

Capacity = User Data space
Effective Capacity = User Data Space with compression

*: 4X compression assumed

Connectivity Options

Multiple DB2 systems can connect to a single IDAA

A single DB2 system can connect to multiple IDAAs

Multiple DB2 systems can connect to multiple IDAAs

Better utilization of IDAA resources
Scalability
High availability

Full flexibility for DB2 systems:

- residing in the same LPAR
- residing in different LPARs
- residing in different CECs
- being independent (non-data sharing)
- belonging to the same data sharing group
- belonging to different data sharing groups

Tailored to your needs

A Hybrid Solution

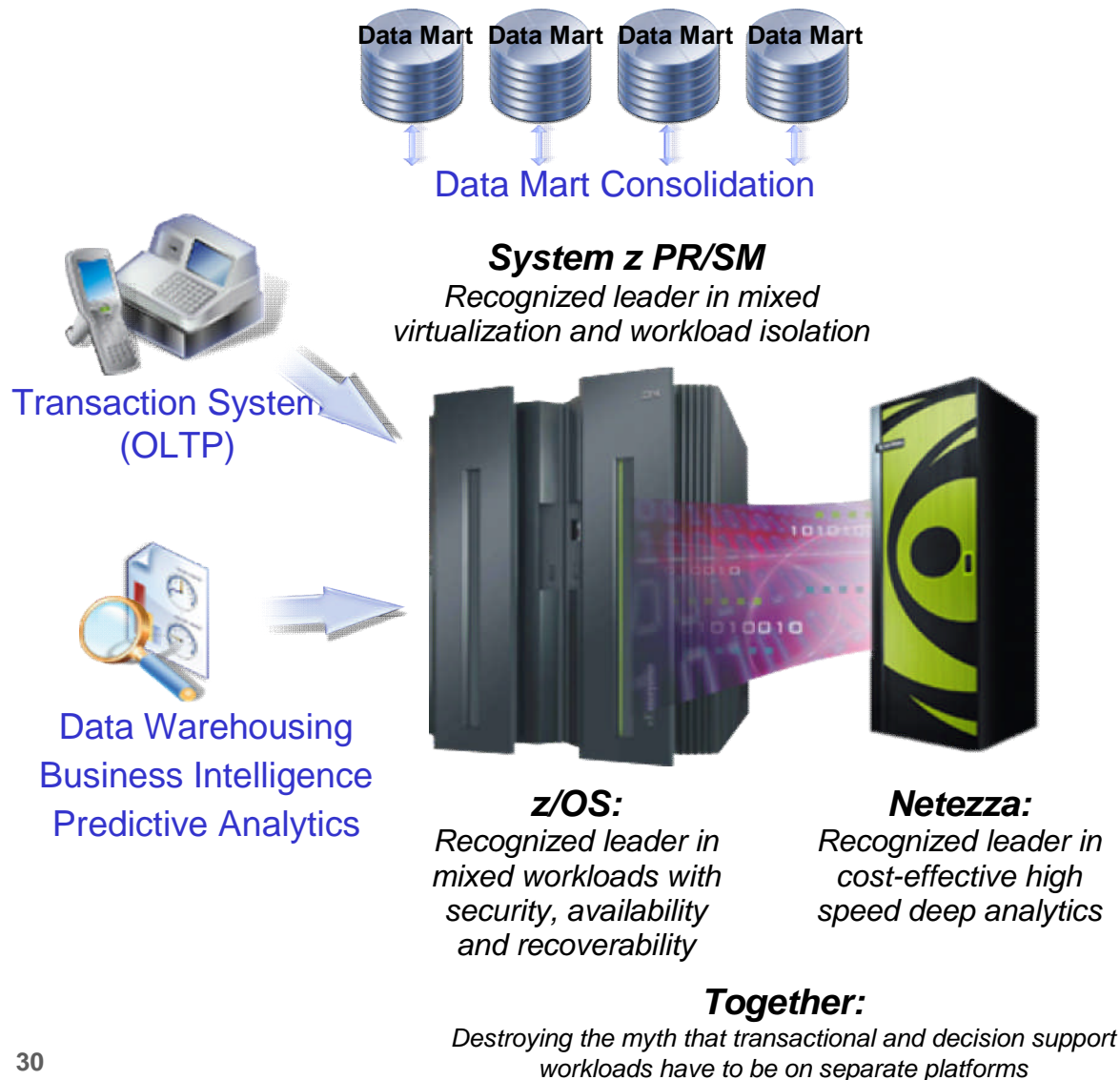| **IBM Netezza**	**IBM System z** with **IBM DB2 Analytics Accelerator**
Focused Appliance	**Mixed Workload System**
• Appliance with a streamlined database and HW acceleration for performance critical functionality • Price/performance leader • Speed and ease of deployment and administration • Optimized performance for deep analytics, multifaceted, reporting and complex queries	• Mixed workload system z with operational transaction systems, data warehouse, operational data store, and consolidated data marts. • Unmatched availability, security and recoverability • Natural extension to System z to enable pervasive analytics across the organization. • Speed and ease of deployment and administration

Simplicity   *The right mix of simplicity and flexibility*   **Flexibility**

The Ultimate Consolidation Platform

Data Mart **Data Mart** **Data Mart** **Data Mart**

Data Mart Consolidation

Transaction System
(OLTP)

System z PR/SM
*Recognized leader in mixed
virtualization and workload isolation*

Data Warehousing
Business Intelligence
Predictive Analytics

z/OS:
*Recognized leader in
mixed workloads with
security, availability
and recoverability*

Netezza:
*Recognized leader in
cost-effective high
speed deep analytics*

Together:
*Destroying the myth that transactional and decision support
workloads have to be on separate platforms*

Bringing it all together

- *Better Business Response*

- *Reduced Costs*

- *More Available*

- *More Secure*

- *Reduced Data Movement*

- *Better Governance*

- *Reduced Data Latency*

- *Reduced Complexity*

- *Reduced Resources*

Flexible Deployment Options

Smart Analytics System 9700

- *Integrated solution of HW, SW and services based on zEnterprise 196 platform*
- *Enables customers to rapidly deploy cost effective game changing analytics across their business.*

Smart Analytics System 9710 *(NEW!)*

- *Integrated solution of HW, SW and services based upon the new zEnterprise 114 platform*
- *Delivers the quality of service of System z at an entry level cost*

IBM Smart Analytics Cloud

- *IBM Smart Business - services with industry leading hardware & software*
- *A private cloud computing solution for business intelligence (BI) & analytics*

Private Cloud

Florida Hospital
Strengthens Data Warehousing Strategy with DB2 for z/OS

- Created a clinical dimensional data warehouse that incorporates **billions of patient diagnostic records** used by researchers and clinicians

- Delivers the **high performance and 24x7 availability** vital to hospital processes

- Meets requirements for **consistent uptime, superior scalability and recoverability**

FLORIDA HOSPITAL
The skill to heal. The spirit to care.

*"System z is a very **agile platform** for us. We have the **highest-performance utilities** in the world, we have a **platform that will scale**, and the best disk in the world. It's just not fair to the other platforms, but that's **where you want to be** if you need to respond **in the warehouse space**."*

Bob Goodman, Senior Database Administrator, Florida Hospital

Zürcher Kantonalbank

IT staff relies on IBM DB2 for z/OS data warehousing to improve operational efficiencies

- DB2 for z/OS is central to ZKB's strategy to **securely deliver information** to branches and customers

- System z supports a **timely, accurate, state-of-the-business data warehouse** while running more than 4,000 batch jobs during the day and 8,000 in the evening

- Extensively leverages workload management facilities to **meet business critical requirements for timely, accurate information**

*"Running our data warehouse platform on System z allows us to achieve **consistent performance and reliable uptime**, which are crucial for maintaining the **highest degree of customer confidence** in the bank and its services."*

Hermann Schelling, Head of Database Engineering, Zürcher Kantonalbank

Miami-Dade County

Selects IBM System z platform to expand their IBM Cognos 8 BI enterprise infrastructure

- **Deployed rapidly** from a distributed model to a System z environment in just over a week

- **Reduced complexity and cost** of Business Intelligence deployments by consolidating onto a single platform

- **Consolidated multiple disparate data sources** onto a single platform to enhance ROI

- Significantly improved **availability and disaster recovery** capabilities

*"We are now able to expand the usage of our Business Intelligence reporting. We have users from over 42 county departments with **over 1500 users creating and consuming reports with stable environments on System z."***

Jaci Newmark, Project Lead,
Enterprise Business Intelligence Architecture, Miami-Dade County

Marriott International

Leverages predictive analytic content within their operational environment

- Matches room prices to availability and customer type **using IBM zEnterprise**

- **Maximizes inventory yield** for room bookings

- Delivers best price, best yield for both Marriott and the customer **in less than one second**

"The goal is to book inventory down to the last room available to maximize yield. We can expeditiously do this from a centralized reservations system, no matter where in the world the reservation is requested."

Misha Kravchenko, Vice President, Global Enterprise Mainframe Systems for Marriott International

Source: Transworld Data Research