Smarter Computing

Dr. Gururaj Rao
IBM Fellow, Systems & Technology Group

August 9, 2011

Three years ago we started describing the Smarter Planet we saw emerging, ***fueling innovation across industries.***

Neonatal Care

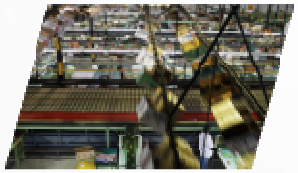
Law Enforcement

Telecom

Fraud Prevention

Resource Management

Traffic Control



Manufacturing

Trading

On a ***Smarter Planet,*** successful enterprises are taking a new approach to designing their IT infrastructure to create ***new opportunities.***

Create new markets in a fraction of time

Università di Bari

Reduced time to market for fishermen and farmers with cloud-based solution for real-time trading.

Identify new trends before competition

Acxiom

Improved capacity five-fold with no new floor space with cloud-based model improving customer retention and capturing new business.

Deliver new services more quickly

Citigroup

Reduced provisioning times from 45 days to 20 minutes, improving ability to deploy new banking services to clients.

Utilize IT resources more efficiently

City of Norfolk

Improved storage performance by 40% and cut power consumption in half, enabling it to deploy automated parking systems and police in-car video surveillance.

To realize the promise of a Smarter Planet, enterprises must address the IT conundrum

Meet the insatiable demand for new service….

32.6 million servers worldwide
- **85% idle** computer capacity
- **15%** of servers run 24/7 without being actively used on a daily basis

1.2 Zetabytes (1.2 trillion gigabytes) exist in the "digital universe**"**
- **50%** YTY growth
- **25%** of data is unique; **75%** is a copy

Between 2000 and 2010
- servers grew **6x** ('00-'10)
- storage grew **69x** ('00-'10)
- virtual machines grew **51% CAGR** ('04-'10)

Data centers have **doubled** their energy use in the past five years
- **18%** increase in data center energy costs projected

Internet connected devices **growing 42% per year**

Since 2000 security vulnerabilities grew **eightfold**

…while IT budgets are growing less than 1% per year.

IT leaders must address the vicious cycle of sprawling IT, inflexible IT and incomplete data to overcome the IT conundrum

Sprawling IT:
Every IT investment leads to more sprawl which drives up infrastructure and management costs.

Inflexible IT:
Inflexibility of infrastructure limits integration across silos and responsiveness to customer demands.

Incomplete Data:
Decisions are made on incomplete data,
big ideas are seen as risky, and small decisions are not optimized.

Through Smarter Computing, an enterprise can reverse this cycle and double their capacity for IT service on a flat budget

Reduce cost to improve IT economics

- Server acquisition cost by up to 56%
- Database costs by 68%
- Floor space by up to 90%
- Power consumption by 80%

Reinvest in innovation

- Deliver new services more quickly
- Identify new trends more quickly
- Create new markets
- Utilize IT resources more effectively

Smarter Computing

Efficient and Innovative IT for Improved Economics

What is Smarter Computing?

Smarter Computing is realized through an IT infrastructure that is designed for data, tuned to the task, and managed in the cloud

Smarter Computing
The IT Infrastructure that Enables a Smarter Planet

Designed for data
Harness all available information - **89% of CEOs** want better insight via Business Intelligence and analytics

Managed with Cloud Technologies
Reinvent IT - **60% of CIOs plan to use cloud technologies** and **55% of business executives** believe cloud enables business transformation

Tuned to the task
Drive greater performance and improve IT economics - **total cost per workload can be reduced up to 55%** with optimized systems

Tuned to the Task

Optimized Systems for superior economics

Tuned to the task means:
Matching workloads to systems that are optimized for the workloads' characteristics

Transaction Processing and Database

- Thousands of online users
- Large transactional databases
- 24x7 operation

Business Intelligence and Analytics

- Fewer users
- Complex queries
- Multiple data sources
- Large data warehouse

Business Process Management

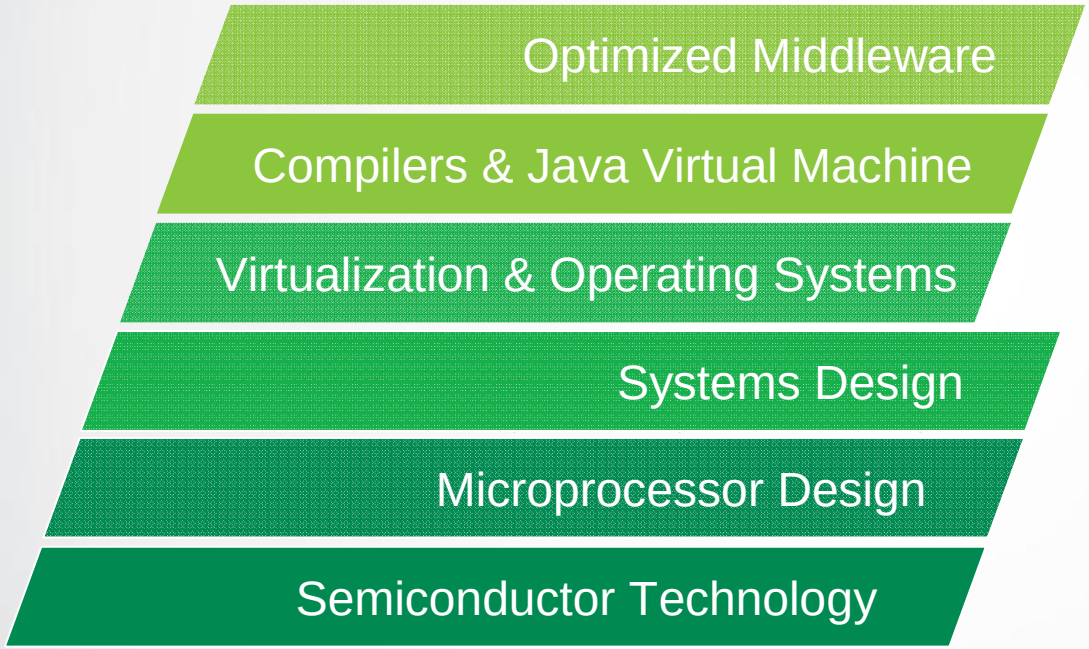
- Unite content, people and process flows
- Orchestrate multiple services
- Empower business users

Watson demonstrates how systems can be designed to optimize workloads

A System Designed For Answers:

- Designed to answer the questions of today and tomorrow using deep QA Architecture
- Addresses natural language questions with accuracy and confidence in seconds not hours or days
- Processes massive array of information including unstructured “Big Data”
- Built on a cluster of commercially available Power 7 servers, optimized for complex analytic workloads and used by thousands today.

Three elements are required to design an Optimized System



1) Domain Knowledge

- Workload Characteristics
- Workload interdependencies
- Architecture options

2) Software

- Full Stack integration
- Middleware tuned for hardware
- Integrated management across architectures

3) Hardware

- Multi-core architectures
- Advanced threading
- Low latency

Clients require a range of workload optimized systems

	Client-built with Optimized Components	Integrated, Optimized Systems	Appliances
			 
Example	IBM DB2 & WebSphere on IBM Power Systems	IBM Smart Analytics System	IBM Netezza TwinFin & IBM DataPower
Characteristics	Need flexibility to deploy multiple workloads of different types - e.g., data management, messaging, web facing	Requires moderate flexibility to tune small number of workloads – e.g., data management and analytics	Flexibility not required -need high performance at low cost for a specific workload

Matching workloads to the right system can deliver superior performance and economics

System z

Freedom by Design

Achieve up to 55% lower TCO per workload

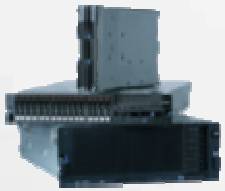
Power Systems

Performance Redefined

Power Systems running DB2 as low as 1/3 the cost of Oracle Database*

System x

Defining the Next Generation of x86 Servers



Industry-leading Intel performance and lower management cost by 50%

IBM Storage

Storage Reinvented

Reduce power, operating and cooling costs by up to 60%

Source: Based on IBM internal studies
*Pricing comparison based on US list prices of IBM DB2 Advanced Enterprise Edition and the Oracle software with analogous capabilities: Oracle Database Enterprise Edition, Advanced Compression, Active Data Guard, Label Security, Partitioning, Oracle Enterprise Manager, Internet Developer Suite, Diagnostics Pack, Oracle-to-Oracle Federation, Golden Gate. All list prices based on US and valid as of 01/26/2011.

IBM zEnterprise system introduced the first hybrid computing technology enabling clients to:

- Optimize the deployment of workloads by utilizing the best fit technology and operating environment
- Deploy enterprise private clouds that are ready for mission critical applications
- Establish a common management infrastructure for both mainframe and distributed-systems
- Take actionable insight based upon real time analytics

Storage Efficiency and TCO Reduction

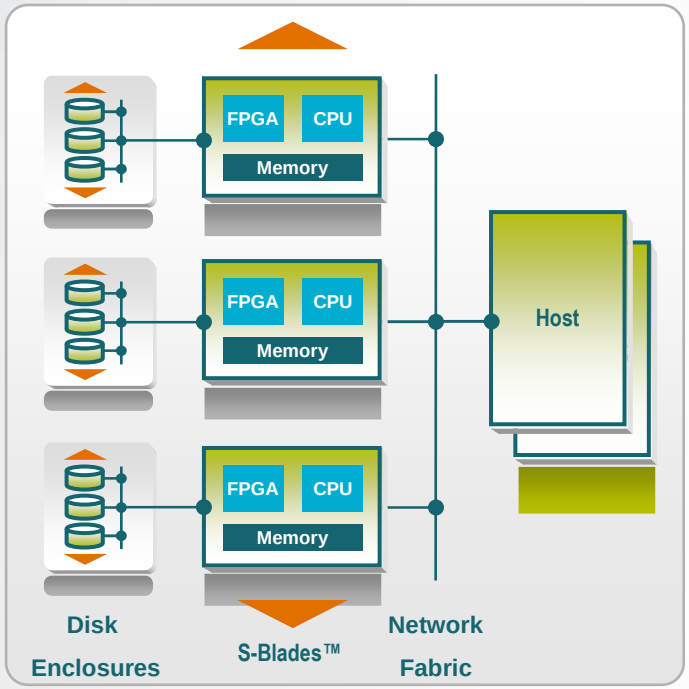
1. Information availability and security
   - Advanced replication services integrated with High Availability software
   - Data encryption with key life cycle management
   - Role based control and multi-tenancy support
   - E.g. Metro mirror, global mirror, metro=global mirror, hiperswap, disk encryption. TKLM

2. Data retention, protection and compliance
   - Efficient storage for back up and for long term preservation
   - WORM including full compliance, policy-based management, integration with the IBM content managers,
   - E.g. SONAS, Information archival, LTFS, tape

3. Storage efficiency
   - Virtualization to improve storage utilization
   - Automated tiering architecture to improve performance and cost
   - Data reduction technology to reduce the volume of data
   - E.g. Easy tier, SVC, Compression, deduplication

4. Storage scalability and performance
   - Efficiently leveraging flash storage to improve storage performance
   - Scale out file system and storage clusters for big data consolidation and cloud
   - E.g. DS8000, Storwize V7000, XIV, SONAS

Consider another example – Netezza appliances are “tuned to the task” for data warehousing and analytics workloads



Netezza AMPP Architecture

- Asymmetric Massively Parallel Processing (AMPP) architecture leveraging Massively parallel processing streams to deliver dramatic performance improvements
- Field Programmable Gate Arrays (FGPAs) filter extraneous data, reducing processing loads on CPU, memory and network
- Netezza hosts compile SPL queries into executable code segments (snippets) and distributes these to the S-Blades for execution
- Disk enclosures are RAID protected and connected to S-blades via a high speed network enabling data streaming at the maximum rate

enabling 10x-100x improved performance, while reducing total cost of ownership

Our integrated offerings and appliances can accelerate the path to Smarter Computing.

Integrated, Optimized Systems

- Deploy systems in days vs. months
- Reduce storage costs by 40%
- Lower energy consumption by 70-90%

IBM Smart Analytics System

IBM CloudBurst

Appliances

- Wire speed processing
- Data security, 5X less time
- Up in 24 hours or less

IBM WebSphere Data Power

IBM InfoSphere Guardium

IBM Netezza

Clients that have deployed Optimized Systems have ***realized value along multiple dimensions.***

Reduce Total Cost of Ownership

Europe Airpost

Reduced TCO by 60% and reduced power consumption by 55%

Avoid costs

UPMC

Doubled IT capacity while holding costs flat, eliminating the need for a $80M data center and additional space

Reduce time to market

China Telecom

Reduced time to market for new applications from 3 months to 3 days

Improve infrastructure reliability

North American Construction Group

Improved system reliability to reduce the daily ERP related system issues from 60 to a negligible level

Key Considerations for leveraging Optimized Systems

Architecture

Create a strong architectural foundation to address Business needs

- Selection of operating system, server and storage platform
- Middleware exploiting the hardware architecture
- Security, Reliability, Availability and scalability characteristics
- New workloads eg. analytics leveraging Big Data
- Consolidation and virtualization leading to private clouds

Economics

Optimize Total Cost of Ownership

- Energy costs
- Facility costs
- IT administration labor costs
- Hardware, Software licensing cost
- Storage costs
- Networking costs

Performance

Align performance Requirements with business needs

- Policy based resource allocation
- Single pane of glass management of the entire infrastructure

Clients are deploying projects based on Optimized Systems Entry points

Consolidate Workloads

Large scale server consolidation on Linux using zEnterprise, zLinux, IBM Server Optimization and Integration Services

Bank of Russia deployed IBM System z to consolidate from 200 distributed servers to 4 mainframes, reducing technical staff workload by 85%

Re-deploy Existing Workloads

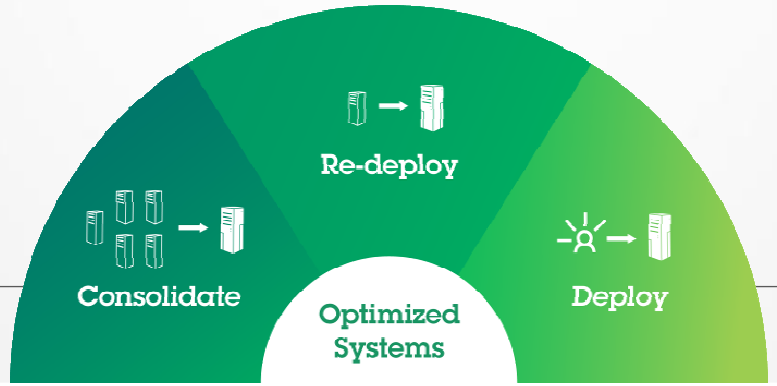
Storage Upgrade / Optimization using Storwize V7000, SVC, EasyTier, IBM Implementation Services for Disk Systems, IBM Information Lifecycle Management Services—intelligent storage services catalog

Sprint deployed IBM SAN Volume Controller with XIV, realizing 60% reduction in storage maintenance costs, doubling storage utilization and reduction in both space and power requirements

Deploy New Workloads

Deploy new data warehousing/ analytics workloads on IBM Netezza appliances

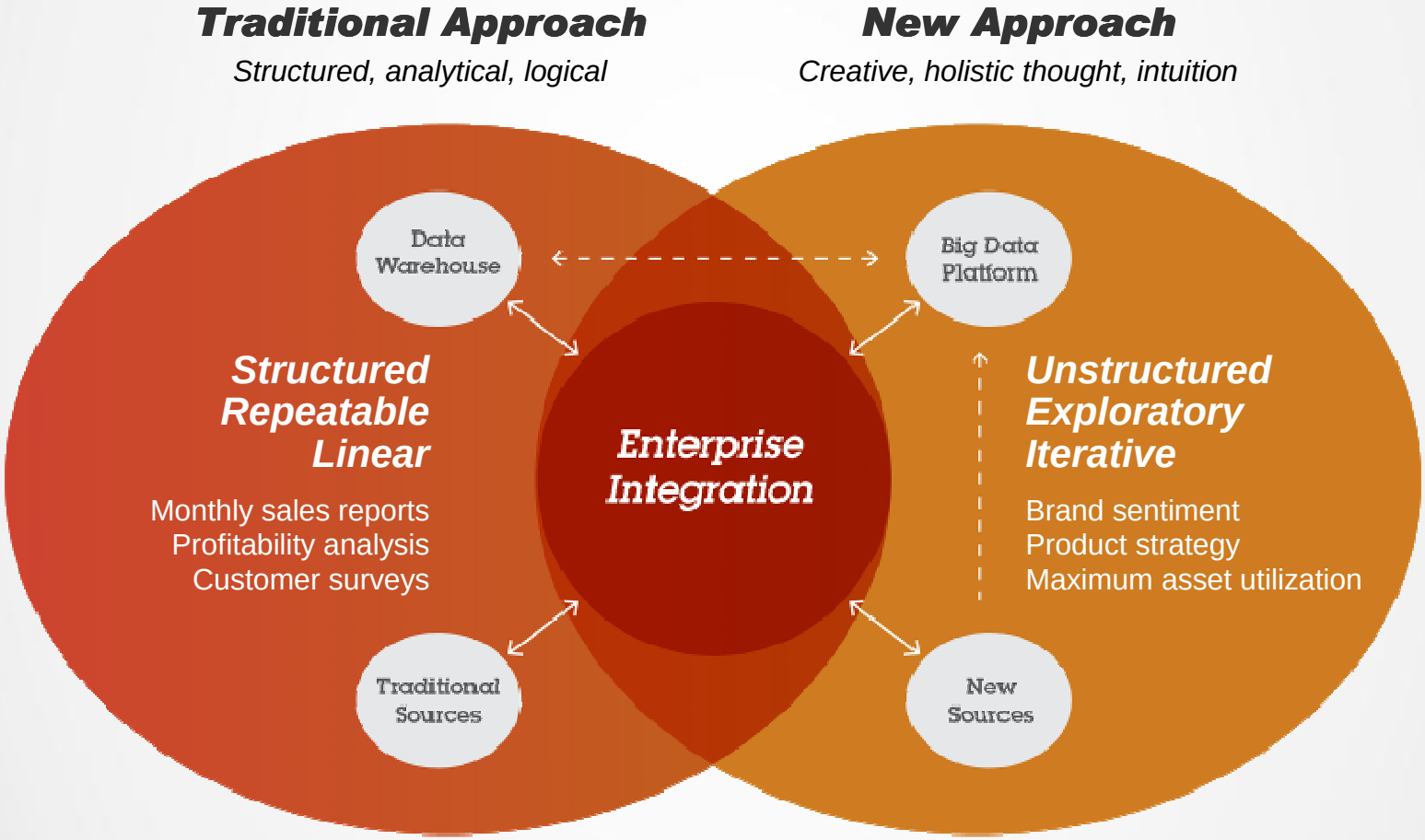
Deployed new workloads on POWER7 and re-deployed existing Cognos workloads from x86 to z196 for scaling



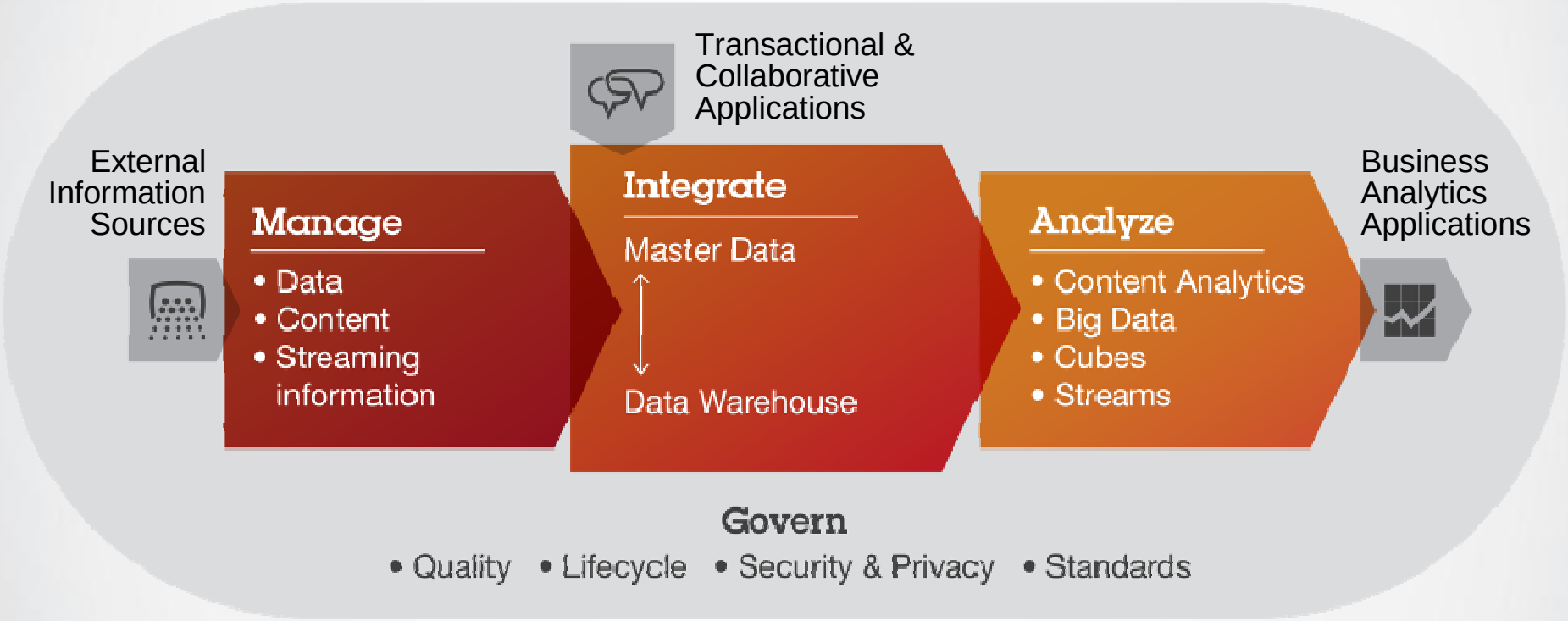
Designed for Data

Big Data and Integration for better decision making

Designed for Data Means:
Extending beyond traditional sources of data to generate insight by leveraging new forms of information



All forms of information can be incorporated into an enterprise's information supply chain and storage infrastructure.



Clients are deploying projects to leverage Big Data capabilities

Manage

Consolidate databases using DB2 on POWER7 or System z and IBM IT Transformation Strategy & Design services

BORÇELİK

Borçelik cut software licensing and maintenance costs by 25% by moving their SAP applications to IBM DB2 and Power Systems.

Integrate

Master a single version of the truth using InfoSphere MDM on POWER7 and eX5 to reduce the cost of data integration projects up to 90%

SUNCORP

Suncorp Metway leveraged IBM Initiate Master Data Service to integrate data from 23 sources into a single master data hub, saving $10 million per year in storage.

Govern

Manage data lifecycle to cut storage costs up to 80% using IBM InfoSphere and IBM Information Protection Services.

BlueCross BlueShield of North Carolina

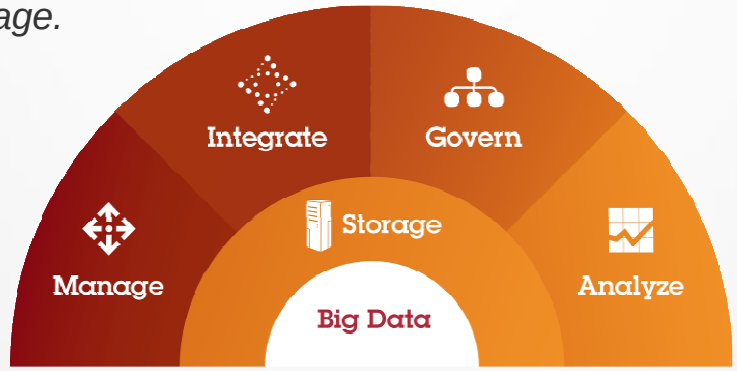
BlueCross BlueShield of North Carolina used IBM Optim Data Growth Solution Software to reduce storage costs 40% to 50%, saving $2 million annually.

Analyze

Replace existing data warehouses with data ready systems and high-performance appliances using IBM Smart Analytics System and IBM Netezza

CATALINA®

Catalina Marketing used predictive analytics on IBM Netezza, providing a retailer with a 30% increase in coupon redemption rates.



Westpac New Zealand

Uses predictive analytics to get proactive in the fight against fraud

The Need:

With fraud growing in volume and complexity worldwide, Westpac New Zealand – one of the country's largest full-service banks – sought to become more proactive in indentifying risks and protecting its customers. The bank faced the challenge of hitting a moving target – fraudsters have proven to be adaptive and opportunistic, continually probing for points of vulnerability.

The Solution:

Westpac New Zealand deployed a proactive risk management and fraud detection system that spans all lines of business and channels. The system embeds fraud detection into the bank's authorization processes to identify risks in real time, applying expertise-based rules to track unusual events or transaction activity and generate alerts.

What Makes It Smarter:

- Combines predictive analytics with expertly defined rules, allowing Westpac New Zealand to respond with accuracy and flexibility to changing fraud patterns – helping the bank stop fraudulent activity before it happens
- Provides significant reductions in fraud-related losses and lower administrative costs associated with rectifying compromised accounts
- Enables greater responsiveness that helps Westpac New Zealand avoid damage to the brand while strengthening customer relationships

"The intelligence and flexibility we gained with our new fraud solution has dramatically improved Westpac New Zealand's ability to identify – and ultimately neutralize – new fraud schemes as they emerge."

— Patrick Cattermole
Manager of the Card Fraud Team
Westpac New Zealand

Solution Components:

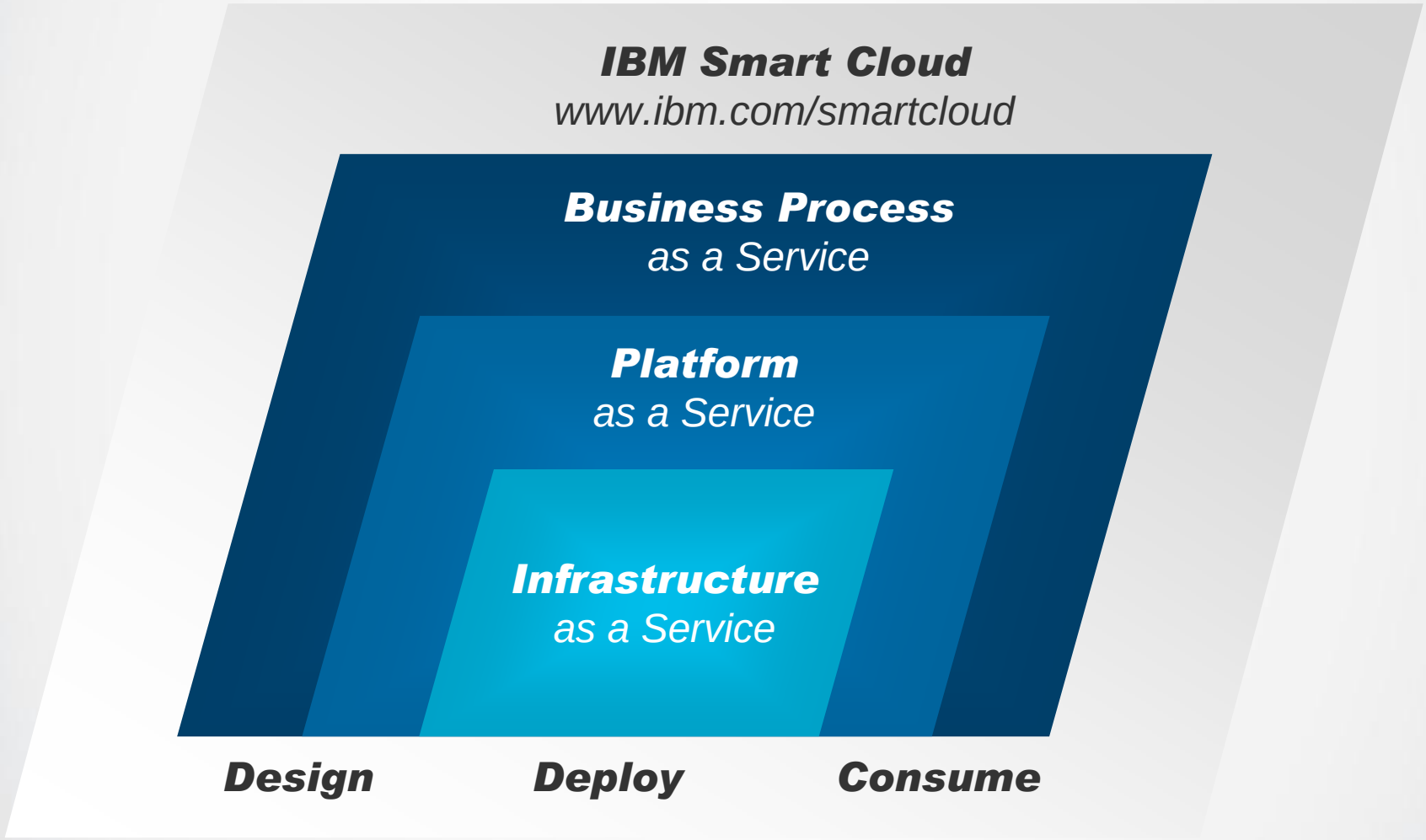
- IBM DB2® for z/OS®
- IBM WebSphere® MQ
- IBM System z®
- IBM Global Technology Services
- ACI Proactive Risk Manager
- IBM Business Partner ACI Worldwide

Westpac
Making the most of life

Managed in the Cloud

Cloud to reinvent business processes
and drive innovation

Cloud capabilities can be leveraged in a variety of delivery models.



IBM delivers prescriptive, repeatable cloud solutions for our clients' most pressing priorities

Cloud Enabled Data Center

Optimize and manage virtualized infrastructure for up 45% increase in system administration productivity and up to 90% reduction in software costs

China Telecom implements Power Systems for improved utilization and hardware cost reduction of over 50%. They slashed time to market for new applications from 3-4 months to 2-3 days.

Cloud Platform Services

Automate infrastructure management to save up to 50% on costs and gain faster time to market

By using IBM Cloudburst Technology, Citi reduced provisioning times from 45 days to 20 minutes and increased systems admin support from 50 physical servers to 600 servers in the cloud.

Cloud Service Provider

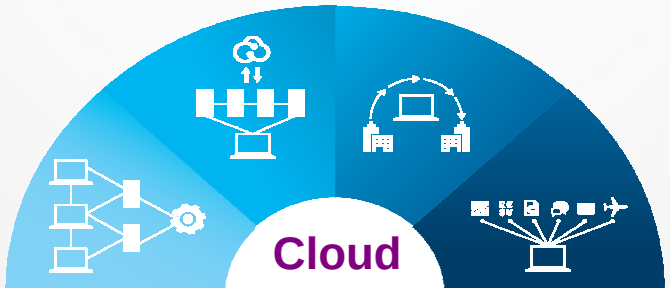
Implement individual customer environments in weeks rather than months and grow customer base without needing increased floor space

Acxiom deployed dedicated cloud environments for clients by leveraging the eX5 platform to deliver 5 times the performance of the previous dedicated servers at 15 times less cost, while reducing power requirements by more than a megawatt.

Business and IT as a Service

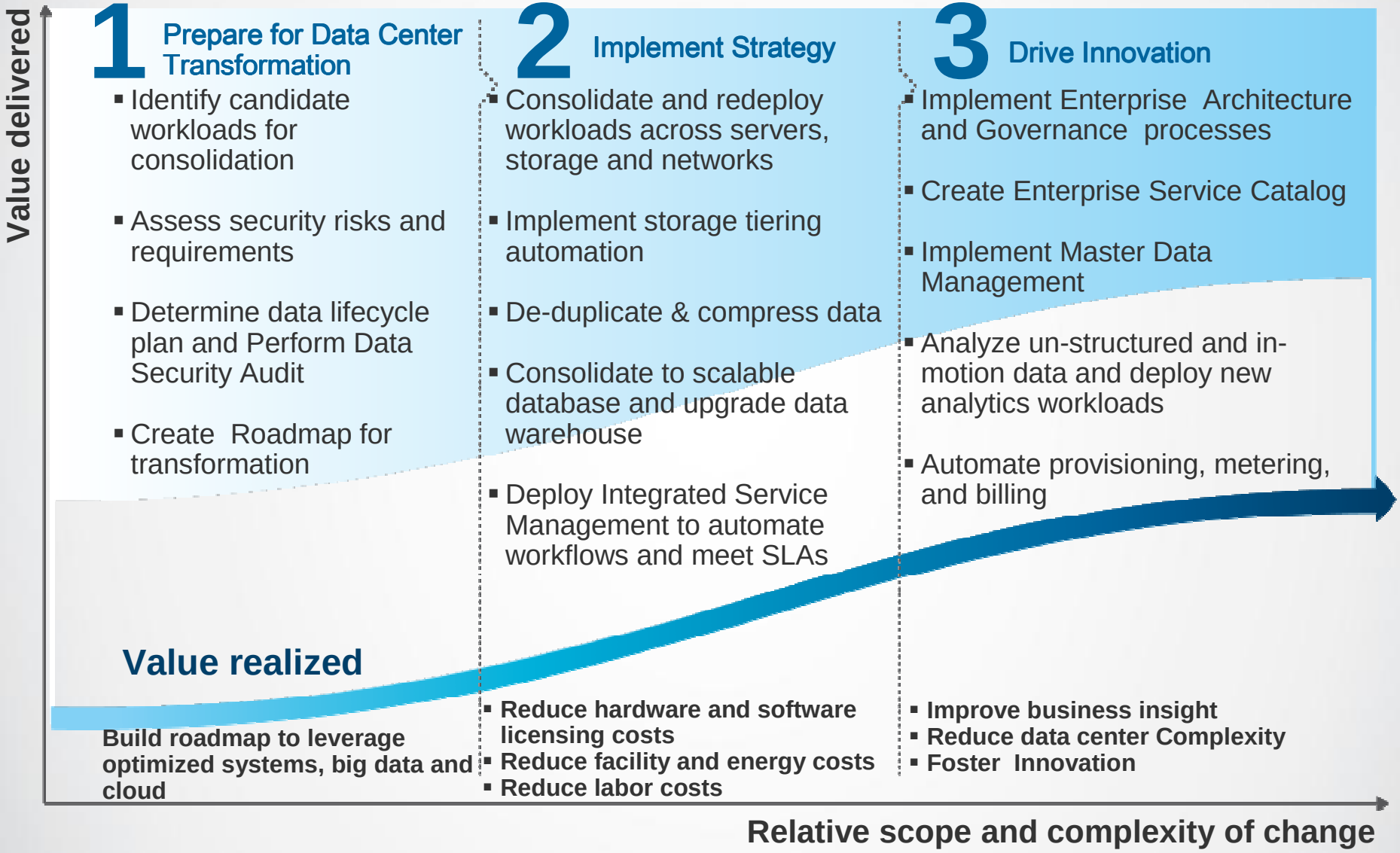
Consume services through IBM Smart Cloud Services to reduce costs up to 50% and a return on investment in months

United States Golf Association uses IBM Smart Cloud to economically and securely protects 590GB of mission critical data daily and ensures availability of core business functions.



How can you proceed to realize Smarter Computing?

IBM has identified projects that enable any client to start their Smarter Computing journey



IBM's Internal Transformation Demonstrates the Potential of Smarter Computing

- Consolidated and virtualized over 3,900 server images onto 30 System z mainframes
- 80% less energy used
- 85% less floor space … a 16,500 sq. ft. reduction
- Cumulative benefit yield of ***$ 4.1B over the last 5 yrs***

	1997	Today
Host Data Centers	**155**	**7**
Web Hosting Centers	**80**	**5**
Network	**31**	**1**
Applications	**15,000**	**4,700**

Leading IT organizations are engaging with IBM to succeed in the new era of Smarter Computing.

Our approach is inclusive — ***no "rip and replace"***

IBM and our partners can deliver the ***experts and expertise*** required

IBMers are extending our portfolio to **address the *biggest challenges*** in computer science

Proven ***innovator*** for 100 years