SOFTWARE STRATEGIES

CIO Paper

New IBM Software Brings CIOs High Returns, Exploits Latest Mainframe's Advances

About this CIO Paper

Enterprise Information Technology (IT) solutions, based on advanced software, power most business transformations that deliver vital productivity gains. In 2009, Chief Information Officers (CIOs) must drive the radical IT-enabled improvements that enterprises so need – today, "business as usual" is not enough for these tougher times.

*In 2008, IBM delivered extraordinary software advances (in four domains) for its flagship System z mainframe, each enabling business-transforming solutions. This software complemented the new, spectacularly high-performance, System z10 mainframes (also shipped in 2008). With both, CIOs can now deliver breakthrough solutions, exploiting System z10 strengths as the enterprise-wide hub, for **Service Oriented Architecture (SOA)**, **Information On Demand (IOD)**, and **Business Service Management (BSM)**, with powerful new **Application Development/Enterprise Modernization (AD/EM)** tools for rapid development. The culmination of a $25B IBM Software Group investment over five years, these were truly game-changing advances that wise CIOs will move fast to adopt/exploit.*

This new CIO Paper reviews current business challenges, introduces the four crucial new IBM software domains, and briefly recaps the new System z10 generation, based on our in-depth research. It highlights why CIOs should now deploy these solutions, and where best to add new System z10s.

1. Wrenching 2009 Business Challenges Demand New IT Solutions

Tough Times in 2009 – Introduction

C-level business and Information Technology *(IT)* executives face tougher business challenges as they re-assess enterprise strategic directions in 2009. Credit/crunch-driven downturns have afflicted most economies and industries since mid-2008. Transforming enterprise business models, streamlining core processes, winning productivity advances, whilst sharply cutting costs, are all now vital to best position enterprises for recovery. Most transformations now depend upon new IT-solutions run on flexible, responsive, and efficient IT infrastructures. Such IT solutions are far the largest source of business productivity gains, yielding 50%+ of all gains *(per leading studies)*.

At many enterprises, radical changes to the "business of IT" are also needed. Wasteful, sprawling, distributed IT infrastructure pushed IT operational costs and power usage skywards this decade, and these must now be drastically consolidated.

Fortunately, dramatic enterprise IT infrastructure improvements can now be readily made, extreme virtualization allows massive IT consolidation, and far more flexible software development and integration models have now matured. New ways to deliver accurate, enterprise-wide information faster recently became a reality, and advanced, best practices-based IT process automation can sharply reduce IT operations labor and costs.

Recent Gartner forecasts showed average enterprise IT budgets running just under flat for 2009. More pessimistic, Forrester Research recently projected that global Information and Communications Technology spending would fall by 2.7% *(to $1,659B)* for 2009, before recovering by 8.7% in 2010. Both forecasters thus suggest resilient global IT spending for 2009, underlining ITs central importance to business improvement today.

IBM's powerful new System z software, plus the new IBM System z10 hardware, best enable CIOs to deliver business-transforming solutions...

Our research found that IBM's powerful new System z software, plus the new IBM System z10 hardware, best enable Chief Information Officers *(CIOs)* to deliver many such business-transforming solutions, as well as major "business of IT" gains, both now more vitally needed than ever before.

Why This New CIO Paper?

This climate raises major questions for CIOs, and their C-level board peers, as each optimize enterprise responses to 2009 challenges:

- What new, IT-enabled, business-transforming solutions offer the highest-proven, bottom-line benefits?
- How do IBM's new System z software domains help enterprises deliver such solutions?
- How should CIOs best exploit these important IBM System z software advances?
- What extra roles should IBM's new System z10 play? Where should new mainframes best be added?

This new CIO Paper addresses these strategic issues, summarizing top-line findings from our six 2008 research papers that assessed those IBM System z software and hardware advances in-depth. *(See page 11 for further details of these.)*

2009 Business Climate Demands Transformation Solutions

For five years, world business had enjoyed the economic "up" cycle *(since late 2002)* of healthy growth, with globalization in full swing. Those golden years saw modest inflation, moderate interest rates, ready credit for new investments, wide stock market gains, high growth in the fast-developing Brazil, Russia, India, & China, etc. economies, and an active mergers and acquisitions scene. 2008's credit crunch, triggered the banking/financial crisis, whilst then-rocketing oil, food, and commodity prices, all affected global business mid-year. By early 2009, worldwide trade, business volumes, markets, property values, and commodity prices, had all fallen sharply as the downturn took hold, painting the darker business outlook below:

- **Property Crashes *(USA, UK, Ireland, and Spain, etc.)*.**
- **Governments Rescue Banks, et al.**
- **Severe Lending Drought.**
- **Stock Markets Retreat.**
- **"Surprises" Punished Fast.**
- **Interest Rates at Lowest.**
- **Oil, Commodity Prices Way Down.**
- **Exporters Now Hard Hit.**
- **Other Industries Seek Aid.**
- **Recessions Declared.**
- **Economic Stimuli Needed.**
- **Deflation Now a Threat.**

Few nations, industry sectors, or enterprises are immune to these wide-ranging, interrelated global issues, although impacts vary. However, bigger government is back! Enterprise CIOs worldwide must now give urgent consideration to how their IT teams can now best deploy innovative IT solutions transformative to the business, to help it emerge stronger when recovery dawns.

These IT investments could not be more important, as enterprises reach for the vital business performance, productivity, and cost savings gains needed to overcome adverse conditions.

Our Analysis – Major Business Change-enabling IT Solutions Needed

We found fifteen IT-enabled business improvement solutions, listed in Figure 1 *(on page 3)*, accounted for most worldwide 2008 enterprise IT investment. For enterprises facing the challenges above, these IT solutions are prime candidates to help deliver radical business improvements.

We advise enterprises to maintain, or better to increase, investment into a best mix of such IT solutions through 2009. Only these firms will emerge ahead of competition when markets recover from current shocks.

How can a firm pinpoint their "best mix" of strategic IT solutions to invest in? Vertical industry priorities vary, and this "best mix" will depend on what the firm has already implemented. Many boards will already know where major improvements are needed.

IBM Global Business Services offers its compelling **Component Business Model *(CBM)*** approach to business strategy for each vertical industry. Each CBM graphically highlights the most important business processes, and supporting systems, needed in that industry for superior performance. An enterprise can be rapidly rated on relative strength/weakness of these critical processes/systems, versus industry peer-group best practice. *(From IBM's experience of helping many similar firms in that industry.)* CBM thus rapidly identifies the IT-enabled *(and other)* business improvements with the highest Return On Investment *(ROI)* and impact. We commend this well-proven, effective strategic business improvement project selection method.

Our extensive research *(see page 11)* found IBM's much-extended 2009 System z software stack *(see Section 2)*, on the latest IBM System z10 hardware *(see Section 3)*, now provides the most robust, most efficient, most secure, and most cost-effective enterprise hub IT platform. This unique, extraordinarily-advanced software/hardware platform combination, we found, is now best equipped to host the crucial strategic enterprise business improvement solutions highlighted in Figure 1.

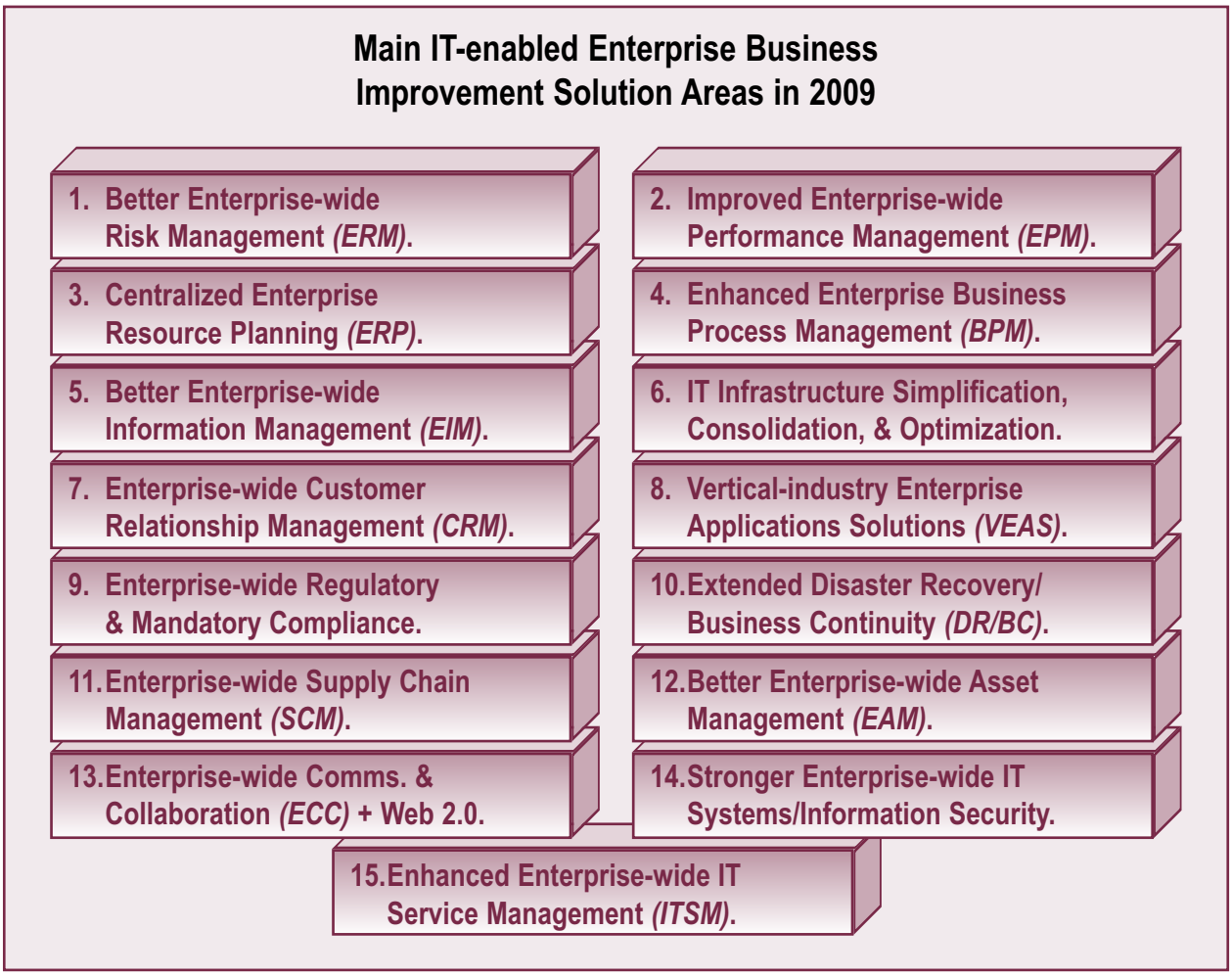

Figure 1: Main IT-enabled Enterprise Business Improvement Solution Areas in 2009

Combined, these can best deliver sharp business model improvements, higher performance and productivity, aids product/service innovation, radically improves processes for lower costs, and better-manage risks, whilst helping the enterprise preserve precious financial and human resources. CIOs must grasp the challenge to drive their "best mix" of such crucial initiatives.

2. Dramatic IBM System z Software Advances in Four Strategic Domains

Introduction

During 2008, IBM delivered highly-compelling System z software advances completing four truly industry-leading software domains for its flagship enterprise platform. These complemented the new-generation System z10 hardware *(and IBM's recent Dynamic Infrastructure vision)* reviewed. We assess these as IBM's most strategically important set of mainframe software advances in the platform's 45-year history. They were products of a broader, five-year IBM

...IBM's most strategically important set of mainframe software advances in the platform's 45-year history.

Software Group effort that saw a $25B total investment, including IBM acquisitions of more than 45 Independent Software Vendors *(ISVs)*, and sustained product developments by more than ten thousand IBM developers. Mainframe-significant ISV acquisitions included: Rational Software; Candle Corporation; CIMS Labs, Inc.; Micromuse, Inc.; Consul Risk Management, Inc.; Isogon Corporation; and MRO Corporation. Largest of all was IBM's 2008 $5B purchase of Business Intelligence/Enterprise Performance Management *(BI/EPM)* leader Cognos.

The four IBM System z software domains posting these major 2008 advances are introduced and positioned, and links indicated, in Figure 2. Each is briefly explained and assessed below, again based on our in-depth studies *(see page 11)*.

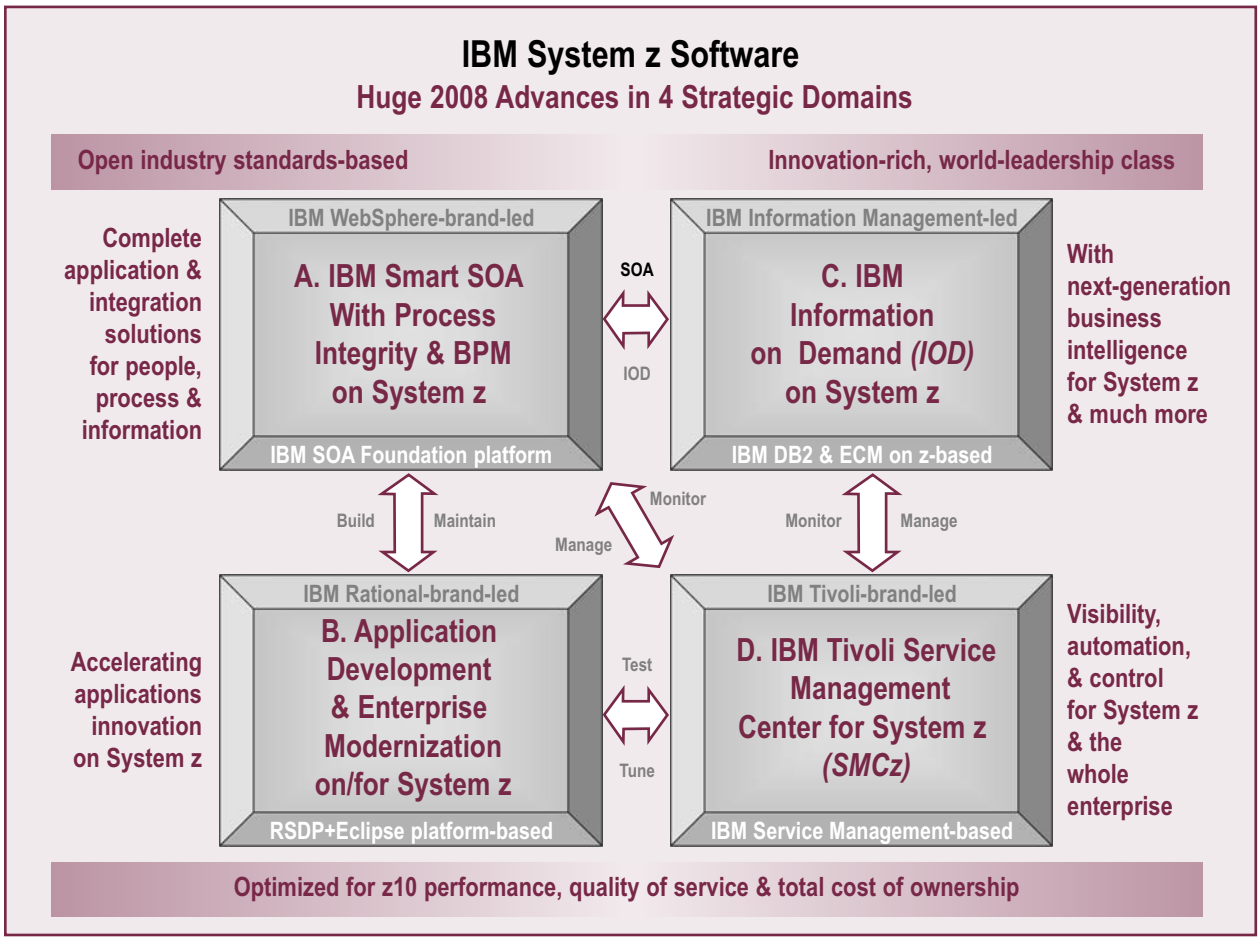

Figure 2: IBM System z Software – Huge 2008 Advances in 4 Strategic Domains

A. Smart SOA™ Adds Process Integrity & Enhanced Business Process Management (BPM) on System z

Enterprise Service Oriented Architecture *(SOA)* adoption topped 11,000 firms worldwide by end-2008. SOA is now the universal new business software architecture of choice to build, deploy, integrate, manage, govern, and to secure, more flexible, responsive enterprise applications that fully exploit open industry standards. With over 7,500 SOA customer engagements by end-2008 and a 64% SOA software market share *(Wintergreen Research 2008 SOA Report)* IBM dominates SOA. As 2009 begins, over 1,500 IBM SOA adopters *(mostly larger enterprises)* are already exploiting their System z mainframes in enterprise-wide SOA host roles. All reuse their wealth of mainframe applications, transactions, and database assets, in new SOA composite applications supporting sharply-improved business processes.

With some 15,000 mainframes *(at c. 10,000 leading enterprises)* in use worldwide today, these host assets are of immense value of several $T. One highly virtualized, energy-efficient System z10 mainframe can easily host scores of composite SOA applications and support thousands of users. These SOA applications access large mainframe DB2 or IMS databases, and CICS transactions, communicating "inside-the-box" at wire speeds, with highest levels of efficiency, with complete reliability and security, and at the industry's lowest Total Cost of Ownership *(TCO)* and cost per transaction.

Smart SOA™ *(rolled out from late 2007 through Q3 2008)* was IBM's third major wave of extended SOA and BPM software, adding rigorous **Process Integrity**, and further major advances in BPM, and in Business Event Processing *(BEP)*, support. A unique IBM SOA differentiator, Process Integrity allows reliable business activity be run on the totally secure, high-Qualities of Service *(QoS)*, and scalable System z SOA platform, with seamless synchronization between services, human tasks, information, domains, and end users. Extensive support for all SOA open industry standards, which allow SOA's far easier integration and inter-operation, has now been deeply engineered into IBM's entire mainframe SOA middleware stack.

Process Integrity added rigorous **Transaction Integrity**, **Information Integrity**, **Interaction Integrity**, extending the core transaction processing strengths of System z by adding innovative new Information On Demand *(IOD)* capabilities *(see C below)* for enterprise information integrity, and supporting all modern user interface/interaction styles *(including portals, dashboards, and Web 2.0-style mashups)*.

IBM's comprehensive Smart SOA™ software, plus the System z10, today provides the market's leading enterprise-scale SOA host.

IBM's comprehensive Smart SOA™ software, plus the System z10, today provides the market's leading enterprise-scale SOA host. Helping enterprises accelerate real business change and innovation to gain clear competitive differentiation through major business process improvement is IBM's business-value-focused, top-level SOA message. These big advances further extended IBM's SOA leadership, the culmination of the firm's 5-year, cross-company, several-billion-dollar, SOA efforts. IBM complements this SOA software with an extensive set of vertical industry SOA frameworks/solution content, numerous SOA accelerators and assets, and huge SOA services capabilities, based on deep, real-world experience from over 7,500 customer engagements *(to end-2008)*. *(See page 11, item 3.)*

B. Application Development (AD), Enterprise Modernization (EM) Tools on System z

In 1999, IBM's S/390 mainframe AD tooling was frankly weak, aged, and far outgunned by ISV AD offerings. Over 2008, IBM Rational completed a transformation of the firm's System z AD/EM tooling portfolio. This Smart SOA™-supportive, Rational Software Development Platform *(RSDP)*-based, System z tools portfolio is now modern, extensive, and world class. It has become a real asset to, and advantage for, the mainframe platform. The portfolio now supports all types of mainframe development, including traditional CICS, IMS and batch, plus modern SOA composite, integration, BPM-based, and/or Web 2.0 mashup applications. Traditional mainframe programming languages including COBOL, PL/I, and Assembler, plus modern C/C++ and Java Enterprise Edition™ *(Java EE™)* languages, are extensively supported by extensive Integrated Development Environments *(IDEs)* for System z, addressing:

- Reusing/extending existing, valuable mainframe software assets in new SOA composite applications.
- Supporting highly-skilled mainframe developers with a more productive and complete IDE.
- Enabling younger developers *(with newer AD skills)*, to quickly become productive as mainframe developers.
- Supporting new application styles via new tooling innovations, e.g. SOA integration, BPM-based, and Web 2.0 mashups.
- Improving collaboration, with advanced team development support facilities for mainframe developers.
- Adding business flexibility, with rapid and simple application change enabled across software lifecycles.

These Eclipse-platform-based, open-standards-supportive RSDP tools enable the building, testing, and maintaining of new SOA applications *(complementing IBM's Smart SOA™ runtime software discussed above)*. They also support modernizing/extending existing mainframe applications. All application styles *(including traditional third-generation language-based, new SOA, BPM-based, and Web 2.0 styles)*, all System z languages *(new and traditional)*, and diverse developer skill backgrounds, are all supported. Extensive RSDP software lifecycle, team development, testing, and AD process management support are now also available for System z users. The flagship IBM Rational Developer for System z V7.5 release, for example, provides a superior Eclipse-Windows Graphical User Interface *(GUI)*-based IDE, tightly coupled to, and well integrated with, IBM's entire System z software environment. This release also now offers the lower workstation footprint, and the performance, that developers needed. We assessed that these modern, well-integrated, comprehensive AD/EM advances place System z well ahead of other platforms for development tooling and team development support.

...these modern, well-integrated, comprehensive AD/EM advances place System z well ahead of other platforms...

C. Information on Demand on System z

IBM's ambitious **IOD** strategy has delivered an innovative, new generation of Information Management *(IM)* solutions since unveiled in February 2006 *(after three years' intense prior development)*. IOD lets enterprises **deliver trusted, reliable, accurate, consistent, and current information**, as-and-when needed *(both structured data and unstructured content)* to applications, business processes, and people, across the entire company. Today's diverse, demanding, and dynamic or real-time information needs can only be met with automatic "information on demand" delivered enterprise-wide, under stringent QoS and security *(not via the scores of piecemeal copy/extracts that most firms still use today)*. IBM successfully delivered its IOD vision in advanced software *(plus added-value solutions and services)*, and enjoyed higher 2008 IM revenue growth as a result. Over 25 significant ISV acquisitions were integrated, and c. $15B *(our estimate)* invested in IOD to end-2008, a huge effort even for IBM. IOD complements Smart SOA™ , and the two are closely linked through open standards. IOD feeds vital streams of accurate, up-to-date information into the new SOA composite applications.

In 2008, IBM Software's IM brand delivered a second, major IOD product wave, completing realization of the vision, including delivering the core IOD products on System z.

With new IOD software *(branded "InfoSphere")* a System z mainframe can now serve as an enterprise-wide "IOD central" hub, delivering dynamic, real-time data warehousing and world-class BI/EPM. IOD's software architecture has three layers. At the base is high-performance data management and content management. System z "crown jewels" of DB2 for z/OS *(V9.0)*, IMS *(V10 and V11)*, and ECM, populates this layer. Recent big advances, like DB2 eXtensible Markup Language *(XML)* support, DB2 dynamic data warehousing capabilities *(on System z)*, and the System z Integrated Information Processor *(zIIP)* database specialty processor, strengthened this foundation layer.

IOD's middle layer added the sophisticated IBM InfoSphere Information Server flagship for information integration, transformation, cleansing, aggregation and data warehouse loading *(DB2)*, plus metadata management. The mid-layer also added the innovative IBM InfoSphere Master Data Management Server, providing unified, enterprise-wide master data management for customer and product data, etc.

IOD's top layer offers elegant, comprehensive enterprise BI/EPM analysis and reporting, with the leadership IBM Cognos 8 offerings now fully integrated with IBM's IOD portfolio. *(Cognos was IBM's largest-ever acquisition at $5 billion, and closed in February 2008.)* The middle and top IOD software layers both run on the cost-effective System z Linux environment. A unified, all-new IOD data development tool, **IBM Data Studio**, was also introduced, and greatly complements all the IOD runtime servers.

On System z, IBM is now the only "complete IOD game in town".

These extensive IOD software advances plus the superb performance and economics from new System z10 hardware, is a winning combination, we found. We expect hundreds more customers per year will deploy high-performance, dynamic data warehouse solutions fully exploiting this leadership IBM Cognos 8 BI/EPM and IOD software, on System z10 mainframes yearly. IBM's huge IOD investments, and this successful delivery, have moved it well ahead of IM competitors *(Oracle, Microsoft, Sybase, Teradata, and Informatica, etc.)*. On System z, IBM is now the only "complete IOD game in town".

D. IBM Tivoli Service Management Center for System z (SMCz)

IBM Tivoli SMCz was launched *(with the z10 Enterprise Class mainframe)* in February 2008, with its new products shipping from Q2 2008 onwards. With SMCz, enterprises can now deploy **service management** across all IT platforms and operations processes, using their System z as the enterprise-wide hub to better integrate and manage real business services end-to-end. SMCz offers **powerful process automation** and **service management**, with proven best practice processes from the IT Infrastructure Library *(ITIL)* V3.

Powerful new SMCz IT financial management capabilities allow IT departments to accurately account, and recharge, for all IT resource usage, and to better manage all software licenses and IT contracts from their mainframe*(s)*.

Policy-driven processes, like **incident and problem management**, **change and release management**, **discovery**, and **business service management**, can now all be smoothly managed enterprise-wide from System z. SMC combines new IBM Tivoli-developed software, software from important IBM Tivoli ISV acquisitions, and enhanced releases of well-proven IBM Tivoli System z operational management tools.

SMCz brings enterprise-wide industrialization and automation of IT operational processes. This allows IT service performance to be tied directly to the business key performance indicator goals, allows IT operations costs to be cut sharply, enables tougher security, regulatory and compliance demands to be better met, and business-user satisfaction/alignment with IT to be improved.

Enabling this policy-driven IT process management are powerful new System z-based **service management platform** capabilities that discover, standardize, and share crucial IT operations information about the entire enterprise applications infrastructure. Included are impressive **Application Dependency Discovery and Relationship Mapping**, **Federated Configuration Archive**, and **Process Automation Engine**, capabilities. These enable operations staff to integrate, automate, and optimize information, people, workflows, and policies, for better IT-business alignment, including integrating/combining data from existing operational management products *(a rich set on System z)*.

The latter comprise the extensive IBM Tivoli System z tools portfolio covering **IT Performance Monitoring and Management**, **Operations and Production Control**, **IT Financial Management**, and **IT Security**. SMCz IT Financial Management capabilities are particularly advanced, and now enable IT to better manage its own financial business centrally on System z.

SMCz sharply improves IT/business-user relations, and cuts IT operating costs, which is vital in these tough times.

With SMCz, a central System z mainframe can now "service manage and automate" all business services enterprise-wide, from the one central management control point, with higher visibility, improved end-to-end services quality, better control, and more automated processes, whether these services run on distributed platforms, mainframes, or a mixture. SMCz sharply improves IT/business-user relations, and cuts IT operating costs, which is vital in these tough times. It provides a radical advance over old IT "resource silo" management approaches that fail these crucial needs. SMCz, we found, is a powerful offering that we warmly commend to mainframe CIOs and IT operations executives for these substantial benefits.

3. IBM Mainframe Again Leads Enterprise Computing

Resurgent Growth, Renewed Respect for System z in 2000 Decade

The four new System z generations that IBM delivered since 2000 set a blistering pace...

IBM's multi-$B, 15-year transformation won System z burgeoning new-to mainframe workloads, new enterprise-wide roles, swelling market resurgence, and the renewed respect of experts, over this decade. Advanced technologies, unique service qualities, specialty processor engines, leadership IBM z middleware/tools software, and radical price drops enabled this sharp System z growth. Enterprise customers in developed Western IT markets re-embraced and expanded their mainframe environments. System z also won many all-new footprints in China, Brazil, India, Russia, and other emerging growth, markets. The four new System z generations that IBM delivered since 2000 set a blistering pace of technology, software, and economic advances that no alternative enterprise platforms could match; with the latest System z10 a real tour de force.

System z is now deployed far beyond traditional spheres, workloads, and roles...

Figure 3 shows our striking proof-points of this dramatic System z growth and enterprise IT platform market leadership at end-2008. System z is now deployed far beyond traditional spheres, workloads, and roles, and now offers over 5,000 ISV software applications.

New Workloads & Roles Mainframe Growth Drivers

65%+ of post-2000 System z capacity growth was new-to-mainframe workloads, and new roles. These included new **Linux applications**, **mass-distributed server consolidation** *(with z Linux)*, new-generation **Java EE™ Web applications** *(now with Web 2.0 capability and SOA)*, and **enterprise-wide data serving** *(with System z DB2 & IMS databases)*. Centrally **deploying enterprise ISV applications** *(e.g. SAP, Oracle, plus vertical apps.)*, and implementing **IBM's IOD vision**, were others.

Extensive IBM middleware software, tools, hardware features *(e.g. specialty engines)*, operating systems advances, and radical economic gains over this decade enabled these important new workloads to run exceptionally well *(and cost-effectively)* on System z, their wide adoption sharply raising total Million Instructions Per Second *(MIPS)* deployed.

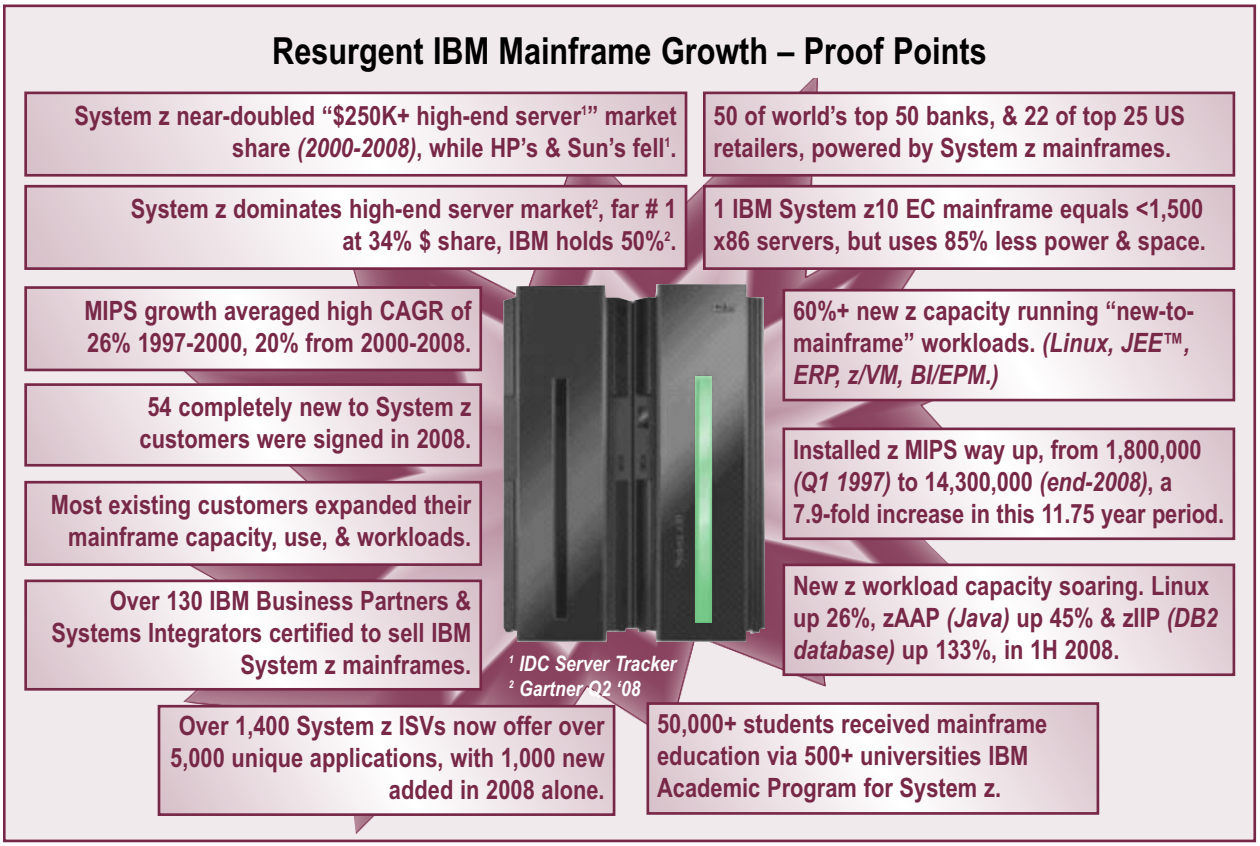

Figure 3: Resurgent IBM Mainframe Growth – Proof Points

2008 Mainframe Banner Year – New System z10, Four Software Domains Debut

2008 was truly a mainframe banner year, with successful rollouts of the spectacular new **System z10 generation** *(high-end and mid-range)*, and of four strategic **IBM System z software domains** *(detailed in Section 2)*. We recap the former below:

- **IBM System z10 – Stunning Advances:** The box headings in Figure 4 summarize System z10 highlights, with details below. **Extreme scalability/capacity**, **exceptional quad-core Micro-Processor Unit *(MPU)*-based performance**, **enhanced world-class middleware and tools software**, **"Gold Standard" virtualization**, and **35% price/performance gains**, are our five most notable z10 advances.
- **IBM System z10 – Stellar Performance Gains:** The z10's quad-core microprocessor and system architecture delivered the largest-ever processor performance jump of any prior new mainframe generation. With 1.7-times more system capacity, 2.0-times processor performance, 3-times the memory support, and 2.2-times the Input/Output *(I/O)* capacity *(all vs. z9 EC)*, the z10 added outstanding performance on processor-intensive commercial tasks, complementing the traditional fortes of transaction, I/O, and data intensive workloads. Users can now consolidate the former workloads off ageing, inefficient UNIX systems *(HP Superdome, Sun Enterprise, and Fujitsu PRIMEPOWER, etc.)* onto their z10s.
- **Broad z10 Benefits:** System z10 now enables both medium and large enterprises to sharply reduce costs, reduce energy use, and slash complexity in their data centers, exploiting the mainframe's "Gold-Standard" virtualization, dynamic policy-based management, and new "Just-in-Time" capacity on demand. With industry-best Disaster Recovery/Business Continuity *(DR/BC)* options, and far-lowest TCO for large commercial workloads, System z10 is today's most compelling enterprise platform.
- **IBM's "Dynamic Infrastructure *(DI)*" Hub:** System z10 is the cornerstone of the DI Hub, IBM's strategic new enterprise computing vision, which offers customers a roadmap to attain far more efficient, dynamic business computing. Starting with infrastructure simplification, it deploys extensive virtualization, management, and

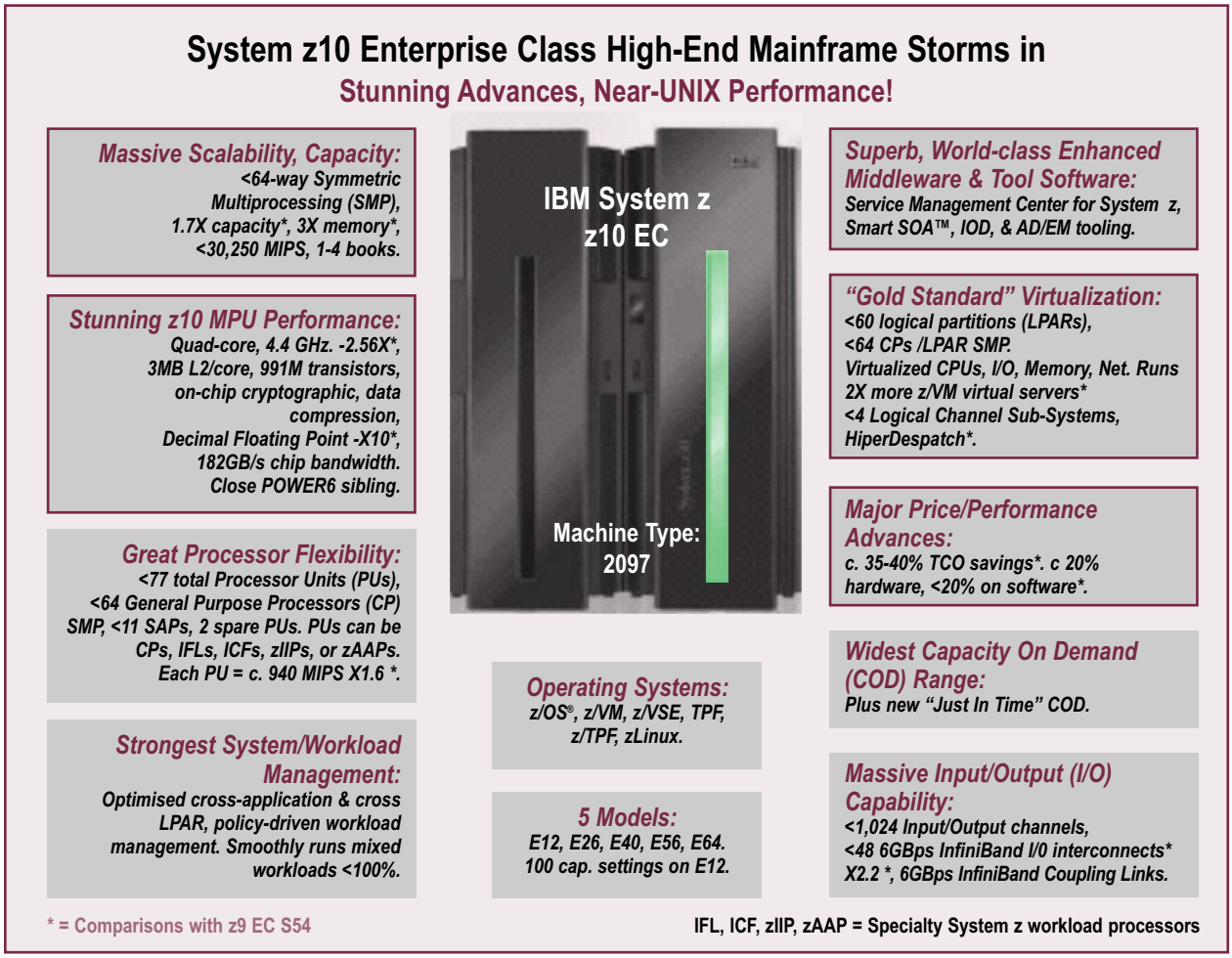

Figure 4: IBM System z10 Mainframe Storms in – Stunning Advances

automation end-to-end over the entire server, storage, and networking infrastructure. With System z10 at its hub, a new Dynamic Infrastructure that responds far faster and more dynamically to changing business needs can be created.

- **$3.5B Direct IBM Investment:** This System z10 generation alone took a direct IBM investment of $3.5B, and used 12,000 IBM staff for up to 5 years *($1.5B cost/5,000 people for hardware, $2.0B cost/7,000 people for direct software)*. These huge mainframe investments again show IBM's unwavering commitment to its again-market-leading flagship enterprise system.

Our Analysis – Escape Distributed Computing Nightmare

Scale-out distributed computing *(UNIX & Windows/Intel)* adoption saw the servers deployed soar from 6 million in 1996 to 32 million worldwide by end-2007. This server explosion drove global IT operations, electrical power and cooling costs up near-four-fold *(to c. $140B p.a. by 2007-IDC)*. Such outmoded distributed infrastructures *(some large users run 10,000+ servers)* have proved unmitigated economic, manageability, and environmental, disasters. Huge staffing, vast software costs, costly network gear and links, terrible 5-10% average hardware/software utilization, plus high power, cooling and data center space consumption, meant their real TCO was sky-high, as many studies showed.

Meanwhile, mainframe capacity soared, and hardware/software costs fell sharply. High-end capacity exploded *(from 66 MIPS** in 1994 to 30,2350 MIPS** in 2008, a 458-fold increase and a 70% CAGR*)*. Mainframe costs also fell sharply *(hardware from $19,000/MIPS** in 1994 to under $1,000/MIPS** in 2008, a 19-fold reduction and a 20.0% CAGR*, with similar falls for software since 2007)*. Open standards support, plus common middleware/tools software, fully opened up today's System z10 to run new workloads moved off distributed platforms, enhancing traditional mainframe strengths.

Many enterprises have been active in consolidating, simplifying, and virtualizing, their IT infrastructures, replacing their costly legacy of distributed server sprawls. The harsher climate of 2009 lends new urgency to these efforts. A great solution is to consolidate hundreds of *(suitable)* distributed server workloads onto one System z10 Linux-only mainframe, using the z/VM *(extreme virtualization hypervisor)*. With this legendary software, one top-end z10 can easily run 1,500+ beefy virtual servers, each hosting a distributed server's migrated workload, but using a small fraction of their staff, software licenses, space, power, and costs. Huge savings, up to a staggering $400M in IBM's own case, have been reported from large "to System z" consolidations.

Footnotes:
*CAGR = Compound Annual Growth Rate
**MIPS = Millions of Instructions Per Second

...an extraordinarily efficient platform, unrivalled in the industry, for both smaller/medium firms (z10 Business Class), as well as for large enterprises (z10 EC).

So System z10 mainframes, IBM now fairly argues, are the perfect cornerstones/hubs for enterprise-wide Dynamic Infrastructures. Each can host many different workloads, hundreds of applications, and tens of thousands of users simultaneously, with unequalled QoS levels, far the lowest electrical power/cooling, and at the lowest TCO. These System z strengths have now been extended to manage and optimize enterprise workloads across distributed platforms too. This is an extraordinarily efficient platform, unrivalled in the industry, for both smaller/medium firms *(z10 Business Class)*, as well as for large enterprises *(System z10 Enterprise Class)*. Even after the many delivered major advances overviewed here, the pace of mainframe development, far from slowing, is now further accelerating. February 2009 analyst briefings on IBM z roadmap directions revealed major further developments are still to come over the next several years.

4. Analyst Conclusions, User Recommendations

Based on our in-depth studies of IBM's four 2008 System z software domain advances and the z10, we drew ten conclusions/recommendations for enterprise IT user readers below:

1. **IT-Enabled Business Transformations Key:** In today's tough business climate, enterprises must sell more, spend less, speed business processes, and grab all efficiency gains. Only with real transformation can firms outperform and gain share over this economic dip, and most of these are IT-solution-enabled *(see Figure 1 on page 3)*. IBM's four System z software domains enable many such business-transforming solutions exploiting unique mainframe strengths, and many major solutions from top ISVs are now also available for System z.

...these four System z software domains place IBM's System z software stack at its "best-ever" capability.

2. **IBM System z Software "Best-ever":** In early 2009, these four System z software domains place IBM's System z software stack at its "best-ever" capability. Each domain, the Smart SOA™, IOD, and SMCz runtime middleware, as well as the AD/EM tooling, is now of clear industry-leadership level, enable many crucial business solutions, and are highly complementary. Full open standards support also eases integration. All are now fully ready for "prime-time", large-scale deployment. Our assessment found that System z users can now confidently and safely adopt/exploit all four of these strategic software domains as major business solution-enablers ordered according to their priorities.

3. **Fast ROI, Incremental Deployments:** All four software domains offer enterprise-wide capability, and yield the largest benefits, when fully deployed. However, adopters can also start small, for faster ROI at lower risk, with each domain. IBM offers flexible entry points, best-value scenarios, readiness assessments, free software sandboxes, proven methods/processes, and extensive services; all valuable accelerators. We recommend urgent business pain-points be targeted first, for early wins with fastest returns, then extending such starters for much wider benefits. The four domains are complementary, with increased synergy benefits when combined *(e.g. SOA is enabled by the AD/EM tools, SOA is extended by IOD data supply, and SMCz better manages SOA & IOD)*.

With these impressive 2008 software advances in four domains, IBM has sharply extended segment leadership.

4. **Software Domain Competitors Outdistanced:** With these impressive 2008 software advances in four domains, IBM has sharply extended segment leadership. In each domain, it now commands wide thought, technology, and market-share, leadership over middleware competitors *(Microsoft, Oracle, SAP, and HP)* by wide margins *(12-18 months)*. With each domain's software fully optimized for the new System z10, enterprise adopters can, we found, be confident that each domain's software is both market best-of-breed as well as best fit on System z.
5. **Extensive System z Applications Solutions:** The System z applications and ISV ecosystem again grew quickly up to the end of 2008, and now includes:
    - Over **5,000 applications**, up 600+ in 2008, a 13.6% increase in number of System z applications available.
    - Over **1,320 Linux applications**, up 220 in 2008, a 20.0% increase in System z Linux applications offered.
    - From over **1,400 ISVs**, up 100 in 2008, 7.1% more ISVs, each averaging 3.6 System z applications offered.

    System z ISV partners now include: ACI; ASG; Red Hat; Novell; SAS; SAP; Oracle; Information Builders; Beta Systems; BMC; Compuware; CA; Computer Corporation of America; e-Funds; Informatica; Fidelity Information Services; Metavante Banking Solutions; Stonesoft; and Pega. ISVs now provide a rich choice of System z-optimized business and infrastructure solutions that complement and/or run upon IBM's own System z software.
6. **Mainframe Skills Supply Healthy:** An Academic Initiative for System z helped 500+ universities worldwide teach more than 50,000 students mainframe skills so far: nearby System z sites quickly snapped up these young graduates. New mainframe workloads use widely-available modern software skills *(Java EE™, C/C++, and Linux)*, so younger staff trained in these can today easily work on System z. IBM's System z AD/EM tool advances support both such newer staff, as well as experienced z developers, with appropriately-tailored IDEs. IBM is also investing $100M *(over 5 years from 2007)* to further simplify mainframe interfaces. Fast adoption of the four new System z software domains already drew *(SOA)*, or will soon draw *(IOD & SMCz)*, thousands more IT staff *(from other platforms)* to help implement these exciting technologies at enterprise scale. Experienced mainframe staff in most job categories remain in demand, and with reasonable supply in most areas. Skilled resource supply for System z growth is thus healthy.
7. **Distributed Server to System z Consolidation Recommended:** 80% +/- of enterprise IT budgets *(on average)* is spent operating/supporting existing applications/systems. The worst culprits are wasteful, inefficient distributed server sprawls, which drove operating and IT energy costs sky-high, and can no longer be tolerated. We recommend consolidating hundreds to thousands of suitable distributed *(UNIX & x86/x64)* server workloads onto ultra-efficient System z10 mainframes running Linux under z/VM 5-year TCO savings in the $10M to $100M/customer range, valuable staff freed up, reclaimed data center space, and far lower energy use, are all big benefits. IT groups can use these huge savings to fund other business-transforming System z solutions.
8. **System z10 – Unrivalled Enterprise Server Leader:** IBM's System z10 questionably holds the crown of the most advanced, sophisticated, efficient, and cost-effective enterprise server. System z's success long ago killed-off traditional proprietary competitors. Later challengers, large UNIX and Wintel servers, have also faded as IBM scale-up systems *(z and p)* now dominate *(>50% of $250K+servers segment)*. No other platform approaches System z10's extraordinary capabilities. We reported z10's massive scale, higher performance, extreme virtualization, highest utilization, and great openness in Section 3. Reliability, security, and availability, remain legendary and lowest footprint, lowest power and cooling needs, lowest support staffing, industry-best DR/BC, and lowest TCO, are all unrivalled. These platform strengths complement the business value delivered by these four extensive new software domains.

9. **Huge System z10 Processor Performance Leap:** IBM long optimized System z for top data and I/O throughput, fast transaction responses, and excellent batch processing, performances. Now, with the latest System z10's quad-core, 4.4GHz. MPU, even throughput chip purists will be impressed by their largest-ever processor performance gains, and by their healthy price/performance improvements. Add cost-effective z10 specialty processors *(of equal high performance)* that run major workloads, ultra-high bandwidth InfiniBand I/O, 3-times more memory, and an extended System z10 Instruction Set Architecture. This puts more workloads into z10 hardware, running many-fold faster *(than other systems in slow software)*, including cryptography, data compression, virtualization, and new Decimal Floating-Point *(10-times faster "money math")*. System z10 is ultra-competitive at running common processor-intensive, as well as data and transaction-intensive, commercial workloads superbly.

10. **Where to Add New System z10 Mainframes:** System z10 generation hardware and economic advances, plus IBM's leadership System z software domains have reached a new pinnacle of power, capability, and value. We pinpoint 6 common situations where adding a new or additional System z10 can now be firmly recommended below:

    - To provide a major, all-new, **world-class enterprise IT infrastructure**. *(Or replace an inadequate legacy.)*
    - To deploy **major new enterprise-packaged applications** *(vertical or horizontal)* centrally and efficiently.
    - For **mass distributed server consolidation onto z/VM**, with multi $M savings.
    - Where **high-quality, enterprise-class DR/BC is essential** for important core applications/data.
    - To host and power new **enterprise-wide IOD hubs, dynamic data warehouses**, and **BI/EPM workloads**.
    - Where **large, new-generation, commercial SOA applications** are to be best production deployed.

In-depth 2008/09 Software Strategies Mainframe Research

1. **"2009 Strategic Competitive Analysis Retooling System z for SOA Workloads Growth – IBM's z/OS® Problem Determination Tool Suite Well Ahead."** New White Paper, January 2009, 58 p.p., 16 charts/tables.
2. **"Impressive IBM Tivoli Service Management Center for System z™ Delivers Enterprise-wide Service Management, Exploits Mainframe Strengths."** White Paper, September 2008, 82 p.p., 20 charts/tables. *(Deep-dive on same topic as paper 5).*
3. **"New IBM Smart SOA™, Enterprise Modernization, & AD Software Powers System z's Enterprise-wide SOA Role."** White Paper, July 2008, 72 p.p., 19 charts/tables.
4. **"Impressive Multi-billion Dollar 2008 System z™, Software Advances – Will Bring Thousands More Mainframe Sites."** Executive Paper, July 2008, 20 p.p., 10 charts/tables. *(Fuller-length version of current Paper.)*
5. **"Impressive IBM Tivoli Service Management Center for System z™ – Exploits z Strengths to Deliver Service Management Enterprise-wide."** Executive Paper, published May 2008, 18 p.p., 6 charts & tables.
6. **"System z™ Central to IBM's Burgeoning Information on Demand – Cognos Buy, New IOD Software Powering Strong Growth."** White Paper, March 2008, 62 p.p., 18 charts/tables.

About Software Strategies

Software Strategies is a specialist analyst firm focused on enterprise IT platform strategies and issues. Specialist expertise on mainframes, servers, operating systems, and on middleware software/tools, have been our common threads. Since 1997, we have worked closely with numerous industry leaders, including IBM; Unisys; Microsoft; Intel; Misys; Fidelity National Information Systems; CA; BMC; Stratus Computers; ICL; NetIQ; and others. Many tens of thousands of Enterprise IT users have benefited from our authoritative reports, white papers, and our presentations at scores of IT events, seminars, and conferences.

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This new CIO Paper was researched/written by Ian Bramley, Managing Director of Software Strategies, and was published in March 2009. The views expressed are those of Software Strategies alone, and are based on our extensive proprietary mainframe and software research. Ian founded Software Strategies in 1997. He is an experienced enterprise infrastructure analyst, has published scores of popular reports and white papers, and has served as a keynote speaker at many industry events. Previously, he was Director of Enterprise Platforms at Butler Group, and Founder/Chairman of the Enterprise NT Management Forum industry group from 1998 to 2001. Ian has held executive positions with four international software/services vendors over a 25-year, prior IT industry career.

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