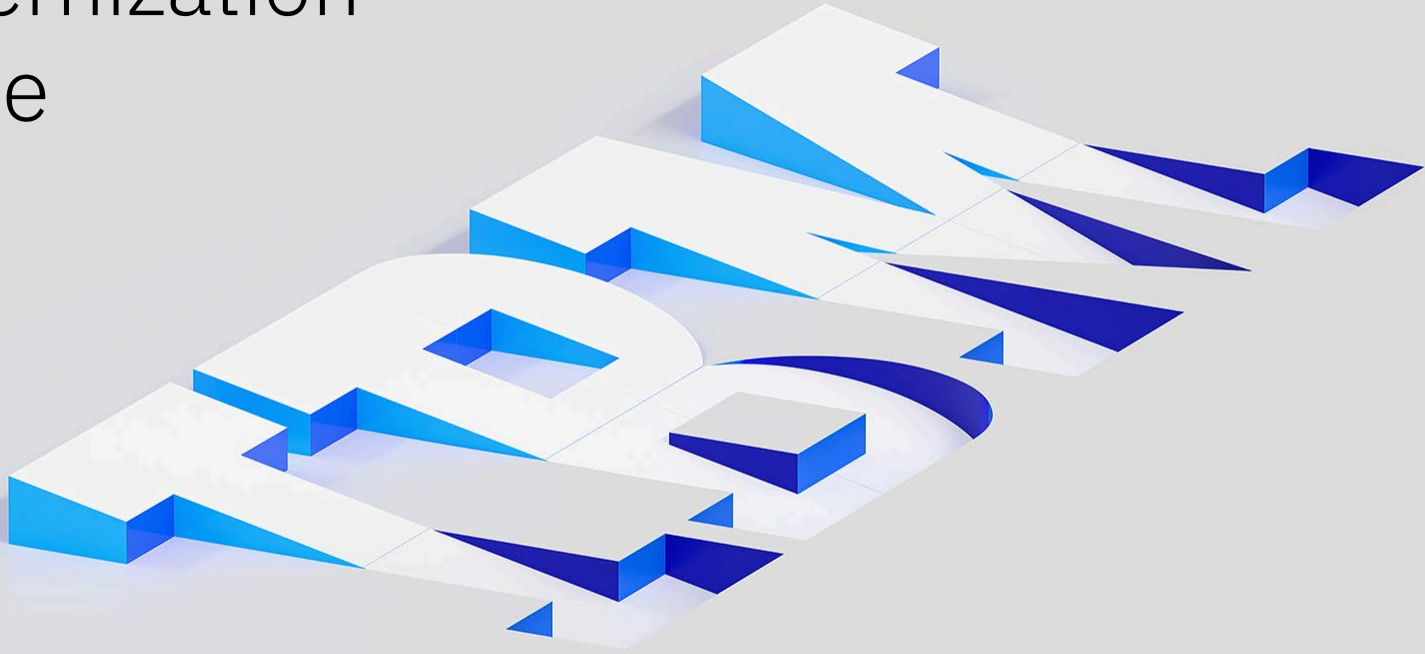


# Solving the modernization puzzle



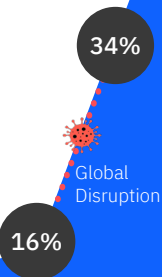
# Digital transformation turns to reinvention

**10 years** of digitization  
in under **one year**

Percent of business channels replaced by digital over the last decade

Enterprises that were slow to digitize were left behind

**9 of 10** have now sped business digitization



Urgency to build new businesses that create new advantage



Technological innovation



Customer-centricity



Ecosystem co-creation



Sustainability

## 6 in 10

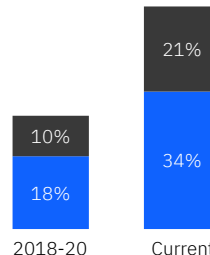
CEOs rank new business building as a top priority...

... agree business leaders must take responsibility for business impact on the environment

By 2026, half of revenue will come from businesses that do not exist today

Top priority

Top 3 priority



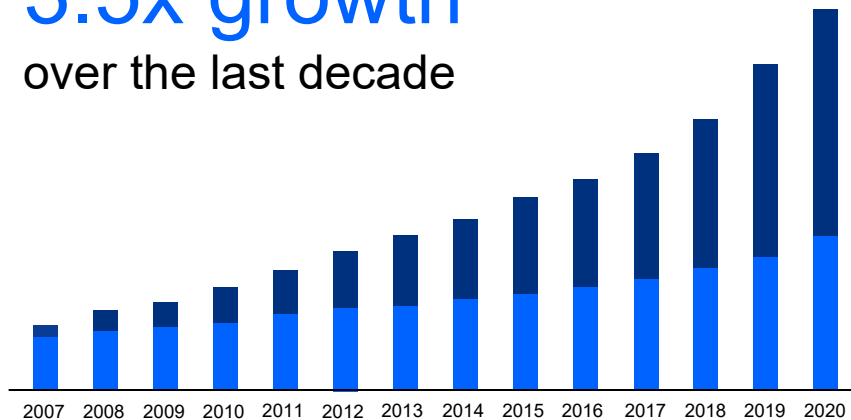
## 7 in 10

CEOs are driving large-scale change in value creation and ways of working

Source: IBM Strategy, McKinsey & Company, IBM Business Value (<https://ibm.co/virtual-enterprise>)

# IBM Z: Essential to hybrid cloud infrastructure and the digital economy

**3.5x growth**  
over the last decade



67 of the Fortune 100



45 of the world's top 50 banks



8 of the top 10 insurers



4 of the top 5 airlines

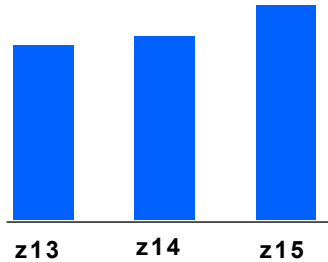


7 of the top 10 global retailers



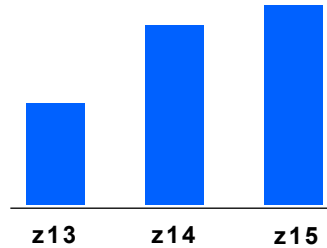
8 out of the top 10 telcos

# IBM Z: Momentum in the market and in IBM performance



z15 program  
revenue >100%  
previous system

through first  
2 years of program



Record setting  
IBM z15  
capacity shipped

fueled by hybrid cloud, Linux,  
and digital transformation



IBM z16

Most successful launch  
in last 22 years

Grew 77% YTY

# Major challenges to address

... as digital transformation accelerates, extends to mission-critical processes



## Manage increased complexity, given heterogenous IT/ clouds

- 76% users utilizing two+ public clouds<sup>1</sup>
- 70% workloads not on public clouds<sup>2</sup>
- 35B+ internet-connected devices by '25<sup>3</sup>
- 90% Enterprises planning to implement Edge Computing<sup>4</sup>



## Derive value from an explosion of available data

- 2-3x data by '25... with 'AI in use' higher than AI training<sup>5</sup>
- 5 in 10 CEOs setting priority to address data complexity<sup>4</sup> ... with AI (44% IT leaders<sup>4</sup>)
- AI need for decision making and automated operations<sup>6</sup>

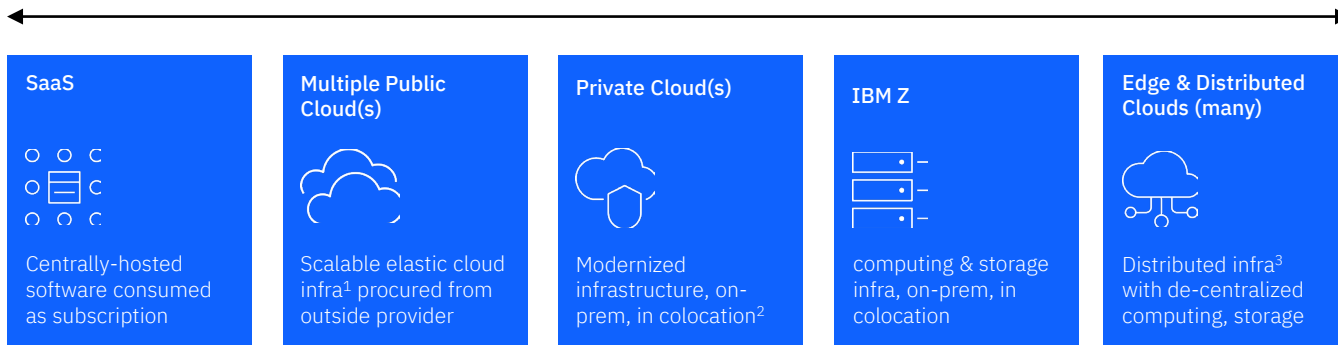


## Drive competitive operations, despite worker shortages

- 30% of innovation, client support, ecosystem and workforce, virtualized by '23<sup>4</sup>
- 80% Enterprise agree that intelligent automation can improve business results<sup>4</sup>

(1) 451 Research; (2) Industry Analyst Blend (3) Statista; (4) IBM Institute for Business Value; (5) IDC  
– AI in use = inferencing; (6) IBM MD&I Watson Perceptions Research; (7) OMDIA;

# Hybrid Clouds integrate and orchestrate enterprise workloads across multiple environments



Enterprises look for flexible, secure and open platforms... to operate and develop services consistently

Note: WLS= Workloads; (1) Includes IaaS, PaaS, Virtual Private Cloud (dedicated public cloud infra);  
(2) High degree of elasticity and automation; (3) incl. IoT, robots, vehicles, branch offices servers

# To be truly **Hybrid** you need to focus on 4 key areas

## Data Fabric

Interconnectivity of all data assets and AI Models

## Applications

Ability to run applications in fit for purpose location

## Development

Build once, deploy everywhere, automatically

## Operations

Optimize workloads and applications across a Hybrid Cloud landscape

# IBM zSystems excels at mission-critical transaction processing ... ... with unmatched throughput, availability, security

## Transaction Processing with full consistency at scale

- >200k encrypted transactions per second
- Full data consistency, as opposed to eventual consistency
- Vertically scale processing 100x+ without downtime
- Best-in-class clustering to extend scaling beyond single system without impacting SLA (speed of light limits scale of alternate architectures)

## Unparalleled High Availability

- **7x9s availability "for real" → 3 seconds** of downtime per year on average
- **15+ years (!)** of continued uptime at banking and insurance clients
- Feature of platform with very limited application effort required
- Near instantaneous time to recovery
- 24x7 individualized support in case of any downtime event

## Unmatched Security

- 100% encryption of data – at rest / in-motion and in-use
- Confidential computing at scale unmatched by competitors
- Advanced encryption standards: Quantum Safe, Fully homomorphic encryption
- Highest level of certification (FIPS 140-2 Level 4) for HSM

“Most enterprises view their mainframe as a strategic component ... given their **high processing and transactional capabilities and unmatched security**”

Forrester 2020

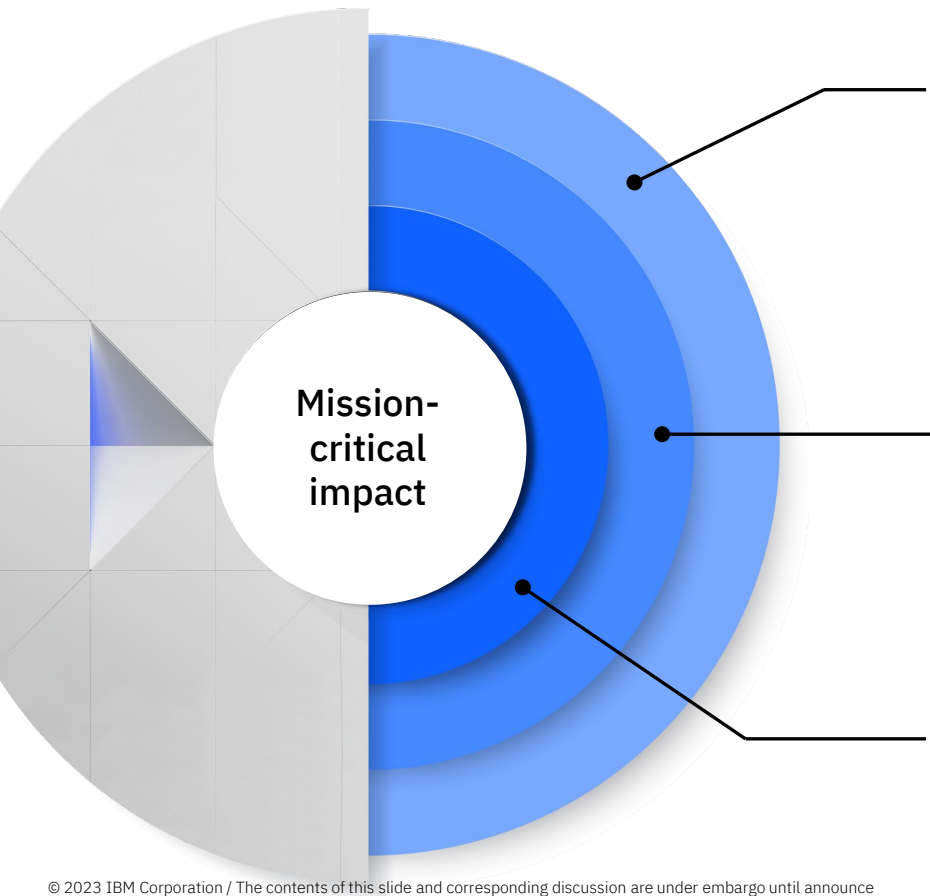
“By setting a standard [on IBM Z] that addresses the concern of **hosting highly confidential information**, we aim to drive the public cloud to a safety level that is unmatched”

CTO, Bank of America

**zSystems is fit-for-purpose in mission-critical  
transaction processing workloads**



# A mission-critical impact view



## System of Engagement Digital Channels



Failures have isolated impact to a single server affecting a small number of users.

## Operational Processing



- Dependent Applications
- Derivative Data
- Data Transformations and Reporting

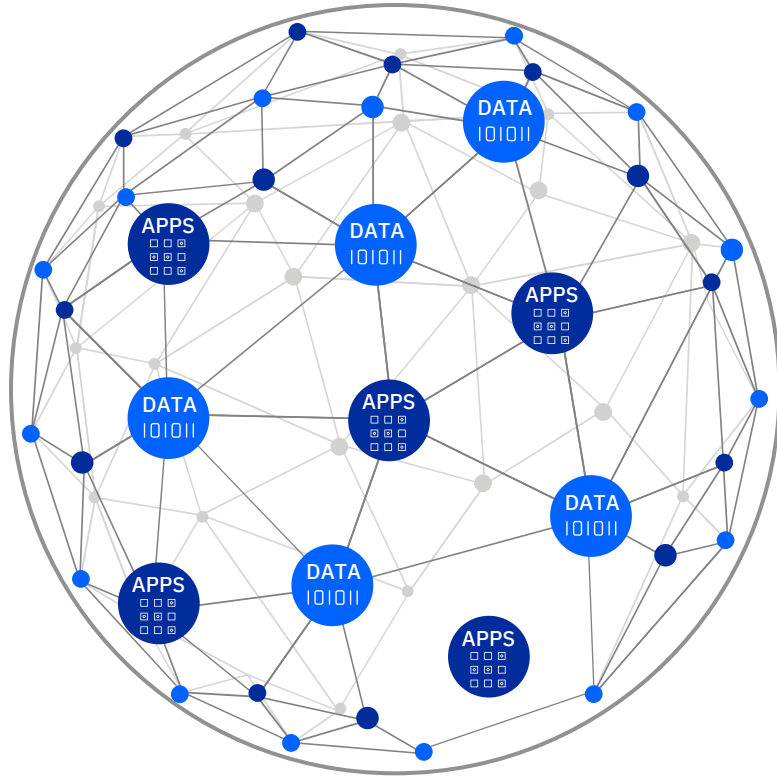
A failure or lengthy interruption in service has a more limited impact.

## Mission Critical Core Applications & Data



Business is stopped or is severely impacted by a failure or lengthy interruption in service.

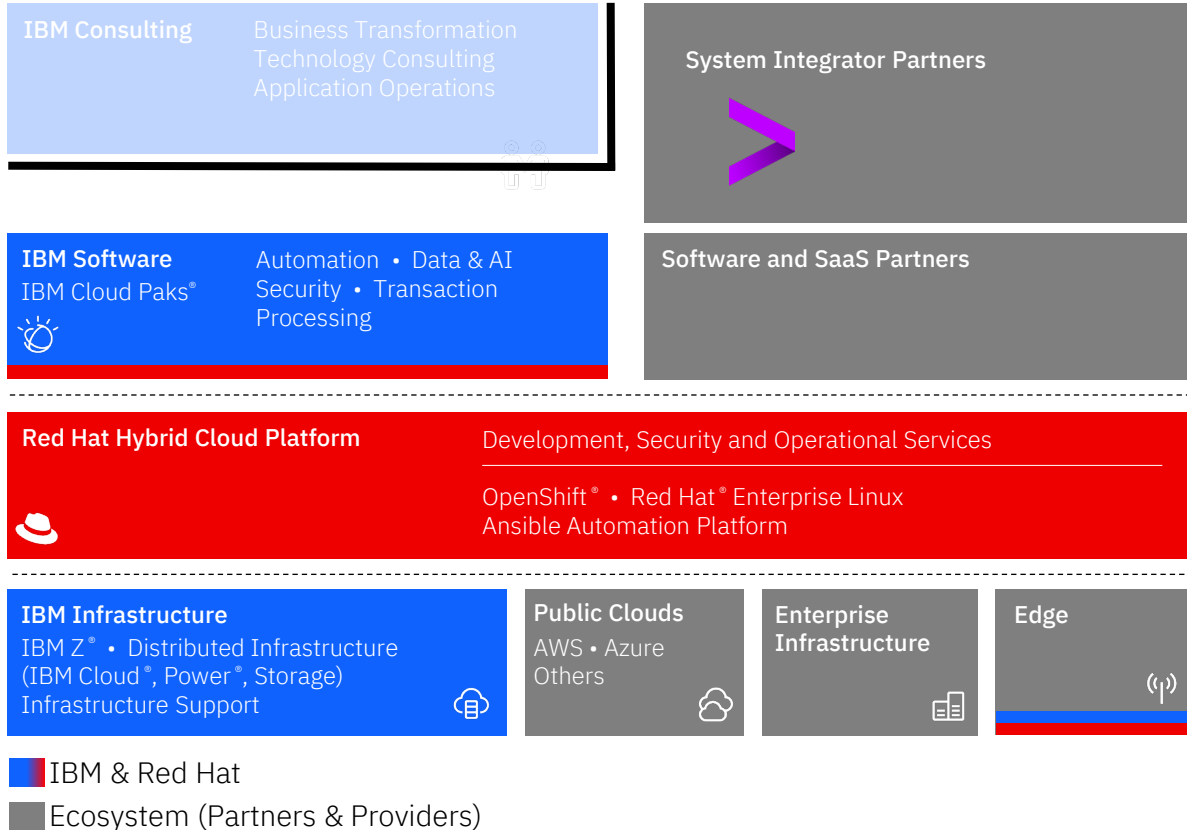
# Core business-critical applications and data are extremely interconnected



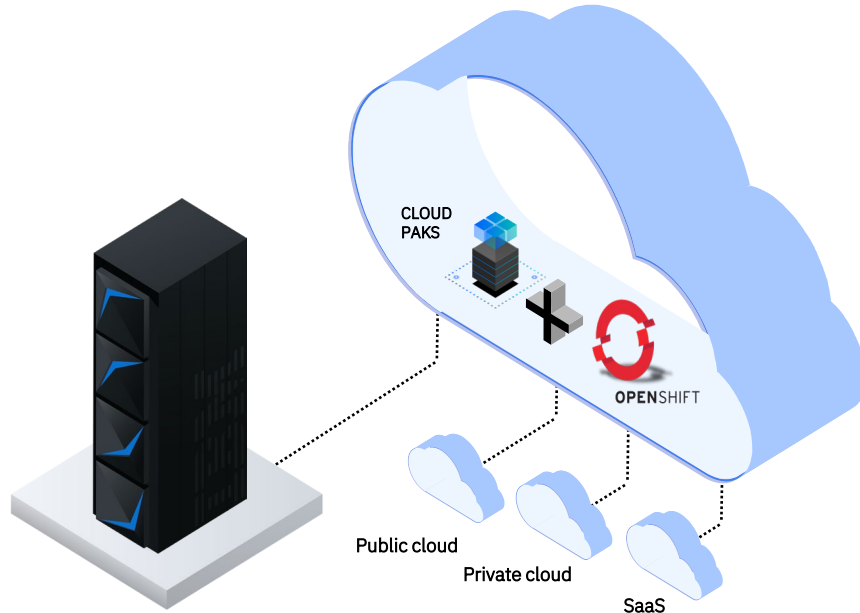
- Require isolation & separation
- Must deliver rapid, low cost, low latency interaction between these components
- Data access methods support continuous generation of derivative data forms
- Require the highest level of security
- Present a single-system image to users
- Require integrated and accelerated AI, security, compression with little or no impact to workloads

# IBM Approach for Hybrid Cloud and AI

Be the catalyst that  
makes the world  
work better



# The best of the mainframe and the innovation of Cloud



Significantly expand your talent pool

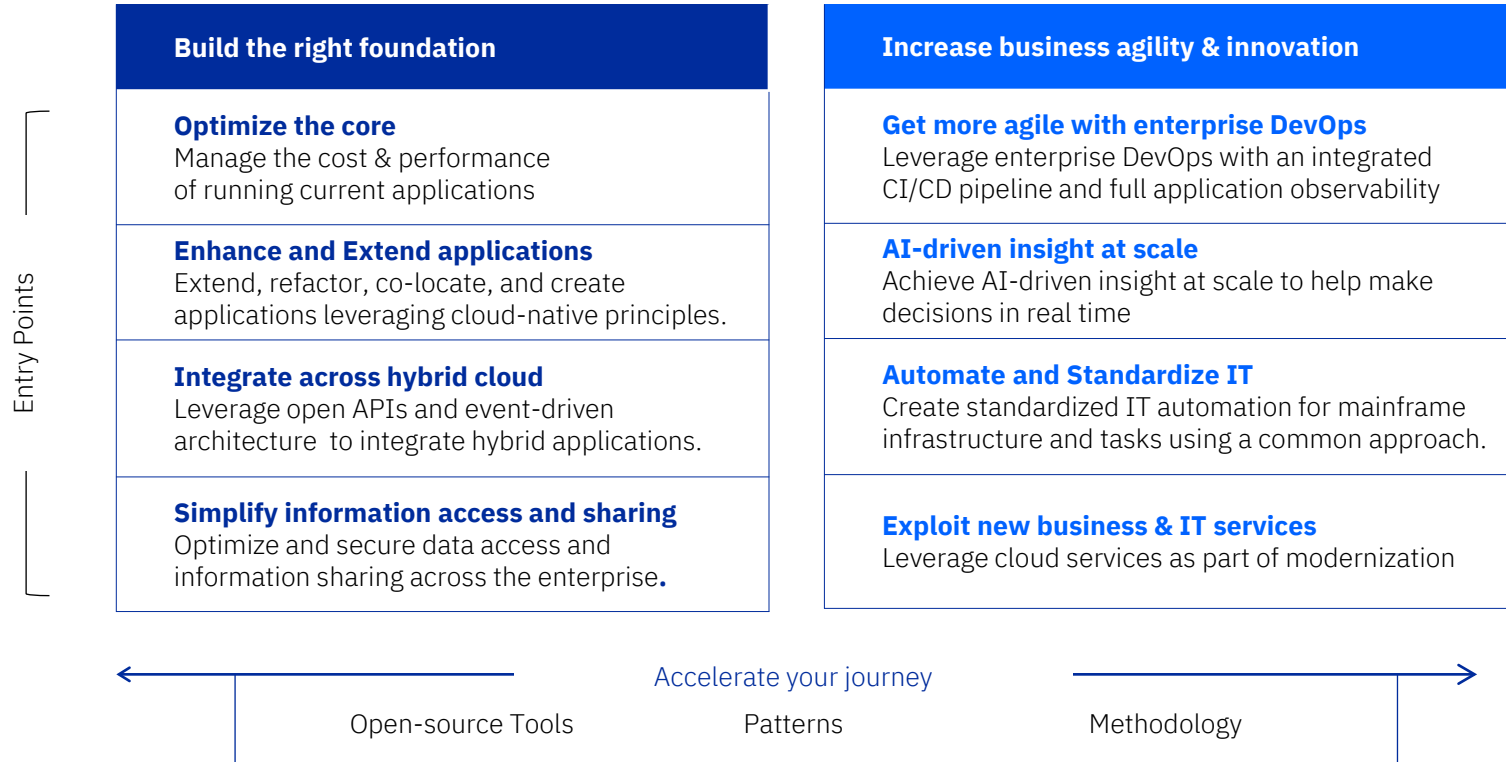
Bring an enterprise-wide DevOps practice

Easily access IBM Z data without moving off-platform

Optimize costs via consumption-based pricing

Maintain the option of repatriating cloud applications

# IBM's approach lets you **continuously modernize** applications & data on IBM Z and Cloud



# Modernizing applications on z/OS for Hybrid Cloud patterns ([link](#))


Optimize applications by staying current with latest zSystems hardware, z/OS, middleware and compilers

[Expose](#) APIs from existing applications. Access and manage them using industry-standard API management solutions

[Extend](#) core applications on z/OS with new language features and Open Enterprise languages

[Colocate](#) applications with existing IBM zSystems applications and data to optimize response time and throughput

[Enhance](#) selected functions by incrementally rewriting as cloud native



Hybrid Cloud  
Financial Markets

## How can you boost developer effectiveness in modernizing core banking applications written in COBOL?

With its core banking applications primarily written in COBOL on the [IBM zSystems](#) platform, [Atruvia AG](#) aimed to boost developer effectiveness in modernizing applications. The solution was to work with IBM to add [Java](#) to the platform alongside COBOL. Now, a larger pool of developers can capitalize on Java to incrementally modernize COBOL apps while also processing distributed Java workloads on [IBM zSystems](#) when it makes sense. As a result, [Atruvia](#) gains the best of both the Java and COBOL worlds.

Atruvia has already Java-enabled 85% of core banking transactions, around 400 million Java transactions per day with peak throughput reaching 12,000 transactions per second.

We see Java on [IBM zSystems](#) as a key technology in driving competitive advantage for our clients.

Pascal Meyer  
Senior Enterprise Architect, [Atruvia AG](#)

**Solution components:**  
IBM® IMS Solutions for Java Development  
IBM [zSystems](#)®

[Read the full story](#)

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## Impact:

- Efficient, low-risk modernization of core banking applications
- Not high-risk and high-cost “lift and shift” but optimizing the core and gradually extending core applications with Java using APIs while collocating with COBOL apps and data at the center of zSystems to maximize performance.

*“Java alongside COBOL preserves the best of both the IBM zSystems and distributed worlds”*

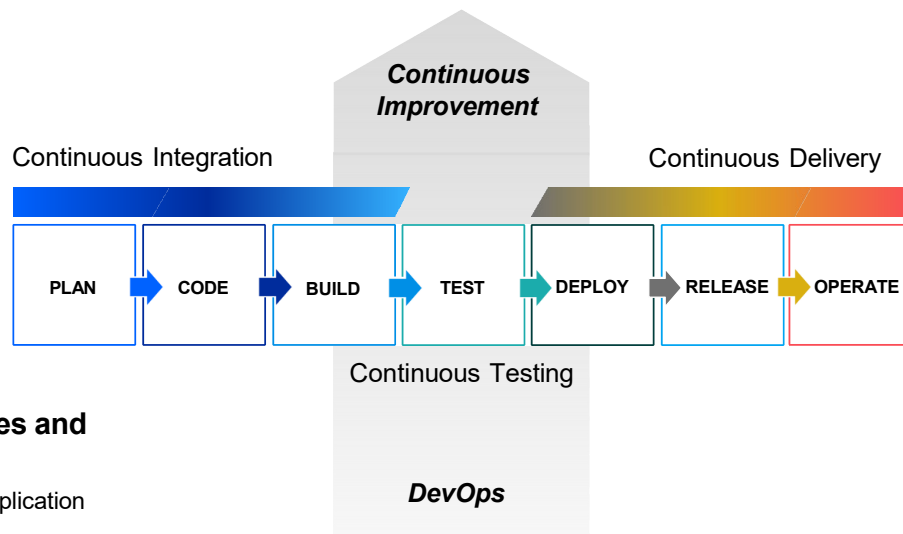
- Pascal Meyer  
Senior Enterprise Architect,  
Atruvia AG

[Read the full story](#)

# Get more Agile with Enterprise DevOps for IBM Z and Cloud

## Enterprise-wide Standardization

Platform neutral, continuous integration and deployment pipeline across the enterprise – on premises or on the cloud  
75% of enterprises recognize the benefits of as-a-service consumption<sup>5</sup>



## Modern Development Practices and Developer Autonomy

Self-service provisioning, advanced application intelligence, modern development IDEs

20-50% productivity benefits for typical development tasks<sup>1</sup>

## People and processes

Adapting the right tooling and processes for the right audience

## Automated Testing

Powerful and automated testing as part of a continuous delivery pipeline

50-90% time savings on test cycles<sup>2</sup>

Successful DevOps transformation results in  
7x lower software delivery change failure rate<sup>3</sup>

Strong Integration with Open Source → 84% of developers prefer to use open source over closed or proprietary tools<sup>4</sup>



Jenkins



Jira

OPEN TOOL  
CHAIN



ANSIBLE



# Successful businesses are executing application modernization strategies on IBM Z and Cloud

## State Farm

State Farm was able to **increase efficiency** and expand skilled resources through modern approaches on all platforms.

**Accelerate release of new digital services** by increasing standardization and simplifying access of business-critical applications to core systems and services

## M&T Bank

M&T Bank was searching for a faster, more efficient way to share core banking information with hybrid cloud applications—without impacting production systems

M&T collaborated with IBM on a Z Digital Integration Hub (Z DIH) engagement to modernize and better integrate their z/OS applications with downstream consumers

## ATRUVIA

Atruvia has already Java-enabled 85% of core banking transactions, around 400 million Java transactions per day with peak throughput reaching 12,000 transactions per second.



## BNP PARIBAS

BNP Paribas created a more efficient, agile, autonomous and user-friendly development environment. They became more **efficient** in development and testing resulting in time and money savings. They boost developer engagement and **code quality. Modernized environment and were able to attract new developers.**



# IBM z16 is built to build

We built a powerful and secure platform for business.  
Let's build the future of yours.



## Predict and Automate for Increased Decision Velocity

*Apply insights at speed and scale  
to create new value in every  
client interaction*

*Increase productivity and  
lower operational costs with  
automation and AIOps*



## Secure with a Cyber Resilient System

*Secure data and systems now  
and in the future with  
quantum-safe protection*

*Address ever-increasing regulations  
with automation for compliance*

*Plan and mitigate risk of  
potential future outages*



## Modernize with Hybrid Cloud

*Empower developers with agility  
to accelerate modernization  
of existing workloads*

*Enable integration of IBM z16  
workloads with new digital services  
across the hybrid cloud*

# LinuxONE Overview – World's Most Secured, Open and Sustainable Platform



Cut  
electricity  
**57%**

Cut  
software\*  
**80%**



## Cloud native

Build AI-infused services that are developed and deployed anywhere across your cloud with [Red Hat OpenShift on IBM LinuxONE](#).

## Encryption everywhere

Extend data privacy [from LinuxONE to your enterprise through policy controls](#).

## Cyber resilience

Minimize the impact of internal and external attacks by isolating workloads to ensure continuous service.

## Flexible compute

Use open servers designed for both startups and enterprises, for public, private or hybrid cloud

## Energy reduction

LinuxONE consolidation drives energy reduction and reduces carbon footprint

	TOTAL KWhr over 5 years	5 year CO2 emissions
LinuxONE	1,931,055	1,369
X86	9,011,588	6,389
Saving		5,020

\*Cut core-based licensed software when consolidating to LinuxONE from x86

Source: IBM IT Economics Consulting & Research

# IBM Z innovations – Driven by design principles

2017

2030

Drive innovation to remain the most secure, most reliable, most scalable transaction processing and data serving platform



IBM z14

14nm  
Accelerated Encryption  
Virtual Flash Memory  
High-Speed Synch I/O  
Secure Service Containers



IBM z15

14nm  
Accelerated Compression  
Accelerated Sort  
Secure Execution  
System Recovery Boost



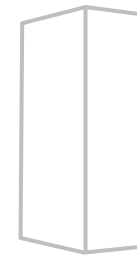
IBM z16

7nm  
Accelerated AI  
Quantum Safe System  
Secure Boot  
Memory Encryption  
Flexible Capacity for Cyber Resiliency



IBM zNext

5nm



IBM zNext +1



IBM zNext +2

2nm

Continuous Compliance

Foundation Models

AI for Security

Accelerated I/O

Enhanced Workload Isolation

Fully Homomorphic Encryption

Quantum Integration

IBM + Accenture  
Better together

