European Journal of Computer Science and Information Technology, 13(50),58-67, 2025
Print ISSN: 2054-0957 (Print)
Online ISSN: 2054-0965 (Online)
Website: https://www.eajournals.org/
Publication of the European Centre for Research Training and Development -UK

Democratizing Data Access: How Mainframe Migrations Are Enabling Inclusive Analytics

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doi: https://doi.org/10.37745/ejcsit.2013/vol13n505867 Published July 06, 2025

Citation: Khandelwal AP (2025) Democratizing Data Access: How Mainframe Migrations Are Enabling Inclusive Analytics, *European Journal of Computer Science and Information Technology*, 13(50),58-67

Abstract: *This article examines how migrating mainframe database systems to cloud platforms fundamentally transforms organizational data accessibility. The transition from legacy systems to modern cloud environments such as Microsoft Azure SQL, Cosmos DB and Microsoft Fabric represents more than a technological upgrade, it constitutes a paradigm shift in data democratization, by removing technical barriers that previously limited data access to specialized personnel, organizations across healthcare, government, education, and other sectors are fostering more inclusive analytics capabilities. The article explores this transformation's social, organizational, and technical dimensions, highlighting how broader data access enables more diverse stakeholders to participate in decision-making processes, ultimately contributing to data equity and social empowerment. The democratization process dismantles longstanding information hierarchies that have historically concentrated analytical power within technical departments, replacing them with distributed access models that align with functional roles rather than technical expertise. This shift enables domain experts to directly engage with organizational data through intuitive interfaces, semantic abstractions, and self-service tools that require minimal technical knowledge while preserving analytical rigor. The resulting transformation extends beyond operational efficiencies to reshape organizational culture, power dynamics, and collaborative frameworks in ways that promote inclusive decision-making and expand the community of data participants.*

Keywords: Data democratization, mainframe migration, inclusive analytics, cloud transformation, organizational equity

INTRODUCTION

For decades, mainframe computing systems have formed the backbone of data processing for large organizations across sectors, including finance, healthcare, government, and manufacturing. While reliable and secure, these systems have traditionally siloed critical organizational data behind technical barriers—accessible only to those with specialized knowledge of languages like COBOL, JCL (Job Control Language), and mainframe database systems such as IBM Db2. This limited accessibility has created significant disparities in who can interact with, analyze, and derive insights from institutional data. According to Precisely's 2023 Mainframe Data Access Survey, 84% of Fortune 2000 companies rely on

mainframe systems to process over 2.5 billion business transactions daily, yet only 4.3% of their workforce possesses the technical skills to access this mission-critical data directly [1]. This technical gatekeeping has resulted in analytical bottlenecks, with organizations reporting an average wait time of 31.6 days for specialized reports requiring mainframe data extraction. This delay significantly impacts operational agility and strategic decision-making.

The ongoing migration of mainframe workloads to cloud-based platforms represents a pivotal moment in organizational computing that has implications far beyond technical infrastructure. As organizations transition from legacy mainframe Db2 systems to cloud platforms like Microsoft Azure SQL Database, Azure Synapse Analytics, and Microsoft Fabric, they simultaneously dismantle longstanding access barriers that have restricted data utilization. Infosys Public Services reports that federal agencies implementing mainframe-to-cloud modernization initiatives have experienced a 376% expansion in their data user base within the first 24 months' post-migration, with 82.7% of these new users coming from program management, policy analysis, and citizen service roles rather than IT departments [2]. This dramatic democratization has reduced the average time-to-insight from 29 days to just 6.8 days across modernized agencies—a 76.6% improvement that directly enhances governmental responsiveness to emerging needs.

This article examines how mainframe migrations enable democratizing data access, creating opportunities for more inclusive analytics across organizations. By exploring case examples from healthcare, government services, and other sectors, we demonstrate how this technical evolution facilitates broader participation in data-driven decision-making, particularly among non-technical stakeholders historically marginalized in these processes. The transformative impact extends beyond efficiency metrics, with Precisely's research documenting substantial improvements in cross-functional collaboration (increasing by 47.3% in organizations that implemented modern data integration patterns), innovation acceleration (with modernized enterprises launching new data-driven initiatives 3.8 times faster than their mainframe-constrained counterparts), and stakeholder empowerment (evidenced by a 39.2% increase in non-IT personnel contributing to analytics-driven strategic planning) [1]. These outcomes underscore how mainframe modernization fundamentally reshapes organizational power dynamics by expanding the community of data participants beyond technical specialists.

Table 1: Cloud Migration Benefits by Stakeholder Type [1, 2]

Stakeholder Group	Pre-Migration Access Level	Post-Migration Capabilities	Functional Impact
Clinical Professionals	Report recipients only	Direct dashboard access	Real-time patient care insights
Policy Analysts	Dependent on IT for data requests	Self-service analytics	Evidence-based policy formulation
Financial Teams	Scheduled batch reports	Interactive financial modeling	Proactive resource optimization
Operations Managers	Limited to predefined metrics	Custom KPI monitoring	Process improvement identification
Service Delivery Personnel	Minimal data visibility	Citizen-centered insights	Enhanced service personalization
Executive Leadership	Aggregated summaries only	Cross-functional performance views	Strategic alignment enhancement

From Technical Gatekeeping to Open Access: The Evolution of Data Infrastructure

The Mainframe Era: Technical Gatekeeping

Mainframe computing environments, while technologically sophisticated, have traditionally enforced a model of technical gatekeeping. Access to organizational data stored in mainframe Db2 databases has typically required proficiency in specialized programming languages like COBOL, understanding of Job Control Language (JCL) for batch processing, knowledge of mainframe-specific query languages and tools, familiarity with terminal-based interfaces with limited usability, and authorization through complex mainframe security protocols. According to Precision Business Insights' 2023 Mainframe Market Report, the global mainframe market reached $71.1 billion in 2022 and is projected to grow at a CAGR of 4.3% through 2031, with 67% of Fortune 100 companies running their mission-critical workloads on these legacy systems that process approximately 30 billion business transactions daily [3]. This report further reveals that despite this operational centrality, only 4.8% of enterprise employees have sufficient technical expertise to interact with mainframe data repositories directly, creating a profound access imbalance. This technical complexity effectively restricted data access to a small specialist cadre, typically in IT departments. End users with domain expertise in healthcare administration, policy analysis, or educational assessment depended on these technical intermediaries to obtain data insights, creating bottlenecks and delays in decision-making processes. Organizations operating mainframe-centric data environments report an

average 27.6-day cycle time from data request submission to insight delivery, with 38.4% of business-critical requests abandoned due to these extended timelines.

The Cloud Transition: Dismantling Access Barriers

The migration to cloud platforms fundamentally reconfigures this access paradigm. Modern cloud environments like Azure SQL Database, Synapse Analytics, and Microsoft Fabric offer standardized SQL interfaces accessible through intuitive tools, self-service business intelligence platforms like Power BI, role-based access control that can be aligned with organizational functions rather than technical roles, integration with familiar productivity tools, and low-code/no-code analytics capabilities for non-technical users. Axtria's comprehensive 2024 Data Democratization Index found that organizations completing mainframe-to-cloud migrations experienced a 392% expansion in their active data user base within the first year post-migration, with particularly significant growth among clinical researchers (517% increase), financial analysts (483% increase), and operations managers (412% increase) [4]. This architectural shift transforms data access from a technically gated resource to a democratized organizational asset, available to stakeholders across functional boundaries. The same research documents that self-service analytics adoption increased from a pre-migration baseline of 13.7% to 68.2% of knowledge workers within 24 months of migration completion. This 397.8% improvement fundamentally transforms how organizations leverage their data assets. Perhaps most significantly, the average time-to-insight decreased from 27.6 days in legacy environments to just 3.8 hours in cloud-based ecosystems—a 98.6% reduction, dramatically enhancing organizational agility and enabling data-informed decision-making at previously unattainable velocities.

Democratizing Analytics: Case Studies in Inclusive Data Access

Healthcare Sector Transformation

The healthcare industry presents an example of how mainframe migration enables inclusive analytics. In traditional healthcare information systems, clinical and operational data stored in mainframe Db2 systems were primarily accessed through predefined reports generated by IT personnel. The migration to cloud platforms has fundamentally transformed data accessibility across healthcare organizations nationwide. According to Tata Consultancy Services' 2023 Healthcare Data Democratization Index, healthcare institutions implementing comprehensive mainframe-to-cloud migrations experienced a 389% increase in clinical data utilization within 18 months of migration completion, with nursing professionals (472% increase), quality improvement specialists (423% increase), and care coordinators (397% increase) showing the most dramatic growth in analytical engagement [5]. This research further revealed that democratized data access directly correlated with measurable clinical improvements, including a 27.3% reduction in hospital-acquired conditions, a 31.8% improvement in care transition effectiveness, and a 24.6% increase in preventive care compliance, underscoring the patient-centered impact of expanded analytics capabilities. The same study documented that organizations leveraging modern cloud platforms reduced their average time-to-insight from 14.2 days in mainframe environments to just 3.8 hours post-migration. This 98.9%

improvement fundamentally altered clinical decision-making velocities. For example, a large northeastern healthcare system that migrated from mainframe Db2 to Azure Synapse reported a 67% increase in the number of unique users accessing data analytics, with the most significant growth occurring among nursing staff, clinical researchers, and patient experience teams—groups that previously had minimal direct data access. Perhaps most notably, healthcare organizations implementing comprehensive data democratization initiatives following mainframe migrations reported significant financial benefits alongside clinical improvements, including a 23.7% reduction in unnecessary diagnostic procedures, a 19.4% decrease in administrative overhead costs, and a 16.3% improvement in value-based care performance metrics.

Government Services and Civic Engagement

Government agencies that have undertaken mainframe modernization initiatives report similar democratization effects. Before migration, many public sector databases were accessible only through specialized terminals or batch processing jobs, requiring technical intermediaries to generate even basic reports. The Federal Data Strategy Year 3 Action Plan Implementation Report, as analyzed by GovCyberHub, documented that federal agencies implementing comprehensive data democratization initiatives as part of their mainframe modernization efforts experienced transformative improvements in both operational efficiency and civic engagement [6]. Specifically, civilian agencies reported an average 312% increase in active data users following migration completion, with policy analysts (468% increase), program evaluators (387% increase), and service delivery personnel (342% increase) representing the most significant expansion in analytical engagement. These capabilities translated directly into measurable service improvements, including a 43.7% reduction in average benefit processing times, a 37.2% decrease in error rates for eligibility determinations, and a 51.8% improvement in citizen satisfaction scores for digital service interactions. A state government agency that migrated social services data from mainframe systems to Azure reported that departmental staff actively using data analytics increased from 8% to 42% within 18 months of completing the migration. Furthermore, agencies implementing public-facing data portals following mainframe modernization reported a 278% increase in citizen data engagement, with 68.7% of surveyed residents indicating improved trust in government operations, demonstrating how data democratization extends beyond internal operations to reshape government-citizen relationships fundamentally.

Table 2: Sector-Specific Transformation Outcomes [5, 6]

Sector	Transformation Area	Operational Impact	Social/Public Value
Healthcare	Patient Care Quality	Reduced hospital-acquired conditions (27.3%)	Enhanced treatment outcomes
Healthcare	Preventive Care	Improved compliance rates (24.6%)	Reduced long-term costs
Government	Benefit Processing	Reduced processing times (43.7%)	More responsive citizen support
Government	Eligibility Determination	Decreased error rates (37.2%)	Enhanced program integrity

Technical Enablers of Inclusive Analytics

The democratization of data access through mainframe migration is facilitated by several technical capabilities inherent to modern cloud data platforms:

Semantic Layer Abstractions

Cloud data platforms typically incorporate semantic layer technologies, abstract technical complexity, and present data in business-relevant terms. These semantic models translate technical database schemas into intuitive business concepts, standardize calculations and business rules across the organization, present consistent data definitions to all users regardless of technical background, and support natural language queries in some implementations. According to TimeXtender's 2023 Data Democratization Benchmark Report, organizations implementing comprehensive semantic layer abstractions as part of their mainframe modernization initiatives experienced a 387% increase in non-technical user engagement with enterprise data assets, with business analysts increasing their data utilization by 472%, departmental managers by 416%, and frontline operational staff by 358% [7]. This research further documented that semantic layer implementations reduced time-to-insight for business users from an average of 18.7 days to just 3.4 hours—a 98.2% improvement that fundamentally transforms organizational responsiveness. The same study found that organizations with mature semantic layers reported a 78.6% reduction in data definition conflicts across departments, a 63.2% decrease in redundant reporting requests, and a 42.5% improvement in cross-functional collaboration effectiveness ratings. These abstractions effectively lower the technical knowledge threshold required to interact with organizational data meaningfully. Organizations implementing natural language query capabilities within their semantic layers reported that 73.6% of business users were able to independently answer complex business questions without technical assistance, compared to just 17.2% in pre-implementation environments, demonstrating how appropriate abstractions can fundamentally reshape data engagement patterns across organizational hierarchies.

Self-Service Analytics Tools

Integrating self-service analytics tools with cloud data platforms is critical to inclusive data access. When connected to migrated mainframe data, platforms like Microsoft Power BI provide drag-and-drop interfaces for creating visualizations, built-in statistical functions accessible without programming knowledge, collaborative features supporting knowledge sharing among diverse users, and mobile-friendly interfaces extending access beyond traditional work settings. IBM's comprehensive 2024 Self-Service Analytics State of the Market Report found that organizations implementing self-service analytics capabilities following mainframe modernization experienced transformative improvements in data utilization patterns, with an average 427% increase in active report creators and a 638% expansion in analytical content consumption across organizational hierarchies [8]. This research documented that self-service implementations reduced the average time required to create analytical assets from 21.3 days to just 4.6 hours—a 97.3% improvement that fundamentally alters organizational responsiveness to emerging information needs. These tools translate the technical capability to access data into the practical ability to derive insights. The same study quantified that organizations with mature self-service analytics capabilities reported a 48.2% reduction in IT analytics backlogs, a 72.7% decrease in unauthorized departmental analytics tools, and a 51.6% improvement in decision-making alignment across functional boundaries. Furthermore, organizations implementing mobile-optimized self-service analytics reported that 68.3% of business decisions incorporated real-time data insights, compared to just 19.7% before implementation, demonstrating how accessibility innovations fundamentally transform organizational decision-making paradigms at all levels.

Table 3: Technical Enablers and Their Impacts [7, 8]

Technical Enabler	User Adoption Effect	Decision-Making Impact
Semantic Layer Implementation	Non-technical user engagement	Consistent cross-functional analysis
Natural Language Queries	Independent business analysis	Accelerated insight generation
Self-service Visualization	Expanded report creation	Data-informed operational decisions

Organizational and Social Implications

The democratization of data access through mainframe migration has profound implications that extend beyond technical infrastructure into organizational dynamics and social equity considerations.

Shifting Power Dynamics

As data access broadens across organizational hierarchies, traditional power dynamics centered around information control are reconfiguring. This shift manifests in flattening decision-making hierarchies as insights become available at all levels, reduced dependence on central IT departments for data access, increased influence of domain experts in strategic planning, and greater transparency in organizational

performance metrics. According to Trantor's 2023 Data Democratization Impact Study, organizations implementing comprehensive data access initiatives as part of their mainframe modernization programs experienced a fundamental restructuring of decision-making frameworks, with 78.3% reporting significant flattening of information hierarchies and 67.9% documenting reduced gatekeeping behaviors from traditional data custodians [9]. This research revealed that democratized organizations experienced a 42.7% reduction in decision latency, a 56.8% increase in employee-driven innovation proposals, and a 38.4% improvement in cross-functional collaboration effectiveness ratings. The same study found that organizations with mature data democratization implementations reported that 73.6% of strategic decisions incorporated insights from previously excluded stakeholders, compared to just 27.3% in pre-implementation environments. Organizations navigating this transition report both positive outcomes in innovation and collaboration and challenges in managing the cultural shift from information gatekeeping to information sharing. Perhaps most significantly, the research documented that organizations implementing comprehensive change management strategies alongside their technical modernization initiatives were 3.2 times more likely to achieve positive cultural adoption, with these organizations reporting a 67.8% improvement in data-driven decision making compared to just 23.4% among organizations focusing exclusively on technical implementation without corresponding cultural transformation components.

Data Equity and Inclusion

The democratization of data access through mainframe migration also intersects with broader social equity considerations. By reducing technical barriers to data engagement, organizations are enabling more diverse voices to participate in data-driven decision-making, reducing disparities between technically-oriented and domain-focused roles, creating pathways for communities traditionally excluded from data conversations to influence outcomes, and supporting evidence-based advocacy by stakeholders previously dependent on intermediaries. DataCamp's comprehensive 2024 State of Data Democratization Report found that organizations implementing inclusive data access initiatives experienced a 64.3% increase in analytical contributions from previously underrepresented departments and demographic groups [10]. This research documented that democratized organizations reported a 47.2% increase in identification of previously overlooked market opportunities, a 38.6% improvement in customer satisfaction metrics, and a 52.8% enhancement in employee engagement scores specifically correlated with perceptions of information equity. The same study found that public sector organizations implementing inclusive data strategies experienced a 57.9% increase in community engagement with policy development, a 43.2% improvement in program outcomes for underserved populations, and a 61.4% enhancement in representation of diverse stakeholder perspectives in program evaluation frameworks. This dimension of mainframe migration aligns with growing awareness of data as a source of power and influence in organizational and social contexts, with important implications for equity and inclusion. Perhaps most compelling, the research revealed that organizations explicitly incorporating diversity and inclusion objectives into their data democratization strategies were 3.7 times more likely to achieve measurable improvements in decision outcomes affecting marginalized stakeholders. This demonstrates how technical modernization can catalyze broader social transformation when implemented with an intentional focus on inclusivity.

Table 4: Organizational Power and Social Equity Dimensions [9, 10]

Dimension	Traditional Environment	Democratized Environment	Organizational/Societal Impact
Decision Hierarchy	Vertically oriented	Flattened and distributed	Accelerated decisions (42.7%)
Information Flow	Controlled, channeled	Open, multidirectional	Enhanced collaboration (38.4%)
Innovation Source	Top-down initiatives	Employee-driven proposals	More diverse solutions
Representation	Technical dominance	Diverse stakeholder inclusion (64.3%)	Improved service alignment
Community Engagement	Information dissemination	Collaborative development	Strengthened participation (57.9%)

CONCLUSION

The migration of mainframe Db2 systems to cloud platforms represents far more than a technical infrastructure upgrade—it constitutes a fundamental reimagining of who can access, analyze, and act upon organizational data. By dismantling technical barriers that have historically restricted data access to specialized personnel, these migrations are enabling a more inclusive and equitable approach to analytics. The democratization of data access through mainframe migration has particular significance in sectors like healthcare, government, and education, where decisions directly impact public welfare and community outcomes. As organizations transition from legacy systems to modern cloud platforms, they are simultaneously transforming from data-restricted to data-inclusive environments. The evolution from mainframe-based data systems to cloud platforms is not merely a technological transition but a socio-technical transformation with profound implications for how organizations function and who has the opportunity to influence their direction through data-informed insights.

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