



STRATEGIES FOR INTEGRATING BIG DATA ANALYTICS AND BUSINESS PROCESS MANAGEMENT

Abstract

Data generated by business systems has grown exponentially, but BPM has been slow to put the data to use. Integrating big data with BPM allows organisations to define efficient process models by extending process data to include contextual and process-enactment data to create the process footprint. Big data analytics reveal hidden process patterns, divergences, and linkages that can detect deviations, inefficiencies, bottlenecks, and their root causes. Incorporating AI tools into the big data platform empowers BPM to transform business operations to be proactive and optimal. Merging Big data and BPM helps businesses to better understand, optimise, and innovate their processes, driving growth and ensuring sustainability.



Introduction

The digitalisation of businesses has led to an unprecedented amount of data being generated. IoT, automation, cloud and edge computing, social media, and traditional sources like enterprise databases, transaction logs, and business correspondence have created massive data repositories for organisations. This exponential growth has further augmented big data analytics (BDA), generating value-added insights that lead to better decisions. BDA has been applied across sectors to services like risk mitigation, personalised recommendations, teacher effectiveness, and traffic congestion management. Different kinds of big data processing systems exist – general purpose, SQL, graph processing, and stream processing. They differ in the type of data processing that they specialise in. Business process management (BPM) optimises business processes to make them cost- and time-efficient through

process mining. Process mining develops process models based on process event data, and these models support the design, enactment, and monitoring of business processes. Most BPMs are yet to take full advantage of the availability of the large volume of business data and, therefore, lose out on the opportunity to better the processes with an expanded and comprehensive understanding of the intricacies of business process instances. Traditionally, BPMs consider process data to be the event data that holds the details of the running case, like the various task stages of the case and the data items produced by the task. This data usually is not large enough to fall under the ambit of big data. This definition of process data needs to be extended to include contextual data like sensor data, social media interaction, and customer communication that gets co-created within the frame of reference of the running

process instance. The combined process-enactment generated and contextual data can be considered the process footprint. The quality of derived insights corresponds directly to the amount and quality of the process footprint.

A big data approach is needed when the co-created contextual data that is part of the process footprint comes within the purview of process mining. The process footprint can consist of the process model used to run the case, event logs reflecting case evolution, and database records impacted by the case. Additionally, the footprint includes email interactions within the case, sensor data, customer queries and feedback, and intra-organisational communication among process participants over social media. The process footprint has process data at three levels: process model level, process execution level, and systems and people level. Process data at the three levels must

be correlated to create the footprint. This correlation is complex with a large volume of data processing and will need big data processing. Once the footprint is created, the phases of BPM, like business process model discovery, conformance checking, runtime compliance monitoring, model enhancement, and predictive monitoring, are all data intensive. Integrating the event and contextual data is essential but challenging in highly distributed environments with hundreds of millions of linked records. A centralised system will be inefficient and hinder collaborative BPM. This hurdle can be overcome by implementing the BPM platform on cloud-based infrastructure, allowing ease of access and coordination.

Big data enables the integration of new data sources for process mining, bringing more depth and detail to the model discovery phase. BDA empowers the combining of vast data repositories to reveal hidden process patterns, divergences, and linkages, that are otherwise indiscernible. Big Data systems are powerful enough to do a real-time analysis of event logs and facilitate immediate detection of deviations, inefficiencies, or bottlenecks. These systems can conduct root cause analyses to probe deeper into the data to uncover the origin of process bottlenecks or inefficiencies, in addition to unearthing them. Risk mitigation is more efficient and effective as deviations and concerns are

spotted earlier, allowing a larger window to take corrective action and preventive measures. The conformance-checking stage, which checks whether actual process behaviour adheres to the process models, is more nuanced and granular with the availability of far more data points. The supplementary data points ensure better compliance with business models and regulatory standards. Big data brings nimbleness and flexibility to the organisation due to the in-depth understanding of process dynamics. This increased agility makes for swifter adaptation to market or operational changes. There is transparency in processes, and the clarity derived from big data provides a better understanding of the value brought in by each department. Enhanced inter-departmental collaboration leads to a synergetic and collective approach to process improvement. The multi-source data provided by big data captures a comprehensive and holistic view. This all-encompassing outlook prevents peripheral but significant aspects from being overlooked. Big data's panoramic reach identifies and helps solve process inefficiencies and redundancies, achieving considerable cost savings in the long run. The data-enabled zoomed-in observation of the process nitty-gritty helps understand and resolve the process design issues that have a direct bearing on customer experience, thus, paving the way for a

seamless customer journey. Big data platforms can handle vast amounts of data and scale as the business does, keeping the BPM system's robustness intact.

When applied to big data, AI-enabled tools can take BPM to a new level of visualisation and proactiveness. AI technologies such as Natural Language Processing (NLP), machine learning, and computer vision have ushered in automation to handle unstructured data. These AI advancements extend to automating video analysis, serving as input to algorithms for process discovery. Intelligent predictive analytic tools forecast process instances' runtime behaviour, performance, and outcome. This advance notice allows businesses to build preventive mechanisms to circumvent issues and optimise resource allocation.

Business data throws up some unique challenges of large-scale generation, integration, and analysis. Big data collects, stores, and analyses the speedily generated, high-volume, and heterogeneous data to enhance efficiency and guide strategy and decisions. Incorporating big data analytics into process mining provides new opportunities for evidence-based business process management. Merging Big data and BPM helps businesses to understand, optimise, and innovate their operations, driving growth and ensuring sustainability.



* For organizations on the digital transformation journey, agility is key in responding to a rapidly changing technology and business landscape. Now more than ever, it is crucial to deliver and exceed on organizational expectations with a robust digital mindset backed by innovation. Enabling businesses to sense, learn, respond, and evolve like a living organism, will be imperative for business excellence going forward. A comprehensive, yet modular suite of services is doing exactly that. Equipping organizations with intuitive decision-making automatically at scale, actionable insights based on real-time solutions, anytime/anywhere experience, and in-depth data visibility across functions leading to hyper-productivity, [Live Enterprise](#) is building connected organizations that are innovating collaboratively for the future.

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