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Harnessing Collective Brainpower for Practical Excellence in Process Mining

**Synergizing Process Mining Wisdom with Industry
Leaders at ICPM 2023**

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Introduction

In the dynamic realm of business operations, organizations are actively pursuing cutting-edge strategies to reduce costs, elevate transparency, and boost resilience. A prominent driving force in recent years has been Process Mining – a data-driven technology at the intersection of data science and process science. Process Mining utilizes event logs to meticulously extract, monitor, and scrutinize organizational processes, empowering businesses to drive operational excellence, uncover bottlenecks and areas for enhancement (Martin et al. 2021; Van Der Aalst et al. 2012)

The current rise of Process Mining is not a passing trend; by 2025, the Process Mining market is projected to grow to \$2.3 billion, presenting organizations with unparalleled opportunities for process visibility and transformation (Mehta et al. 2021). With Process Mining, businesses gain unprecedented insights into workflows, enabling e.g., streamlined operations, optimal resource utilization, and heightened productivity (Suriadi et al. 2017). It facilitates the identification of deviations, allowing for proactive problem-solving and continuous improvement – becoming a gamechanger in today’s evolving data-driven landscape (Leemans et al. 2018). Yet, as organizations embrace Process Mining, a set of pressing questions emerges (Martin et al. 2021). For example, *how does a customer-centric perspective shape Process Mining? What role does Process Mining play in boosting organizational efficiency and driving innovation amidst escalating data volumes?* These questions underscore the evolving nature of Process Mining, emphasizing the imperative for ongoing research and innovation as well as the exchange between academia and industry.

In recent years, Process Mining has firmly established itself as a distinct market and discipline. To comprehend the evolution of Process Mining, we must trace its journey from its roots utilizing historical data to being at the forefront of AI-driven process optimization (Van Der Aalst 2020). In the past, businesses relied on statistical models and simulations for process enhancement. Process Mining disrupted this paradigm by introducing a dynamic, and data-driven paradigm (Marquez-Chamorro et al. 2018). Looking ahead, the integration of (Generative) Artificial Intelligence (AI) into process optimization will redefine the landscape once again (Dumas et al. 2023). The synergy between Process Mining and AI holds the promise of prescriptive and augmented analytics - enabling organizations not just to understand their current state but to anticipate and proactively address future challenges (Weinzierl et al. 2020).

This whitepaper navigates the current and future landscape of Process Mining, spotlighting insights from the *Industry Track* at the *International Conference on Process Mining 2023* in Rome, Italy. We start by illuminating key aspects of the conference and the distinctive features of the 2023 *Industry Track*. This whitepaper concentrates on the outcomes of two pivotal components of the event: the Focus Sessions – serving as a snapshot of the current state of Process Mining across six topics – and the MasterClass – offering a forward-looking perspective on Process Mining across three key themes: Navigating Process Mining at the Enterprise-level, Unveiling how Mega-Trends are Shaping Process Mining, and Demystifying the Evolution of Process Mining Technology

Industry Track of the International Conference on Process Mining 2023

In the previous years, Process Mining has swiftly gained traction globally and across industries. ICPM stands tall as an important gathering for vendors, consultants, end-users, and researchers. With its fifth edition in 2023, this platform attracted around 400 Process Mining experts and enthusiasts from academia and industry. Held in Rome from October 23 to October 27, this edition continued the tradition of delivering a rich scientific and practice-oriented agenda.

The Industry Track adds a practical dimension to the cutting-edge research and technical discussions of the conference. From its inception, ICPM has offered an industry track to foster the exchange between researchers and industry professionals, also creating a space for sharing practical insights across companies.

The Industry Track of ICPM 2023 included highly dynamic and interactive formats, shedding light on the latest aspects shaping the Process Mining landscape. Highlights included:

- An impactful **keynote** titled “Walking the Way from Process Mining to AI-Driven Process Optimization” by Marlon Dumas, Professor of Software Engineering & Information Systems at the University of Tartu as well as co-founder of Apromore.
- Various **Focus Sessions** led by industry experts, delving into the latest and most relevant Process Mining aspects (see Focus Sessions).
- An invite-only **MasterClass**, exploring the future of Process Mining with leading experts (see MasterClass).
- A **panel discussion** on the ‘Future of Process Mining’ featuring six Process Mining experts covering perspectives from vendors, consultants, and end-users, moderated by Büşra Zanner (Women in Process Mining) and Marc Kerremans (Gartner).

The Industry Track of ICPM 2023 was an immersive experience, designed to drive practical understanding and innovation, as well as to foster exchange across different industries. This paper dives into actionable insights derived from the dynamic discussions that took place in the six Focus Sessions and the MasterClass.

Focus Sessions

The Focus Sessions of the *Industry Track* at ICPM 2023 were a powerhouse of practical insights. Each session, carefully curated and led by two industry experts, delved into a pivotal facet of Process Mining, resulting in a total coverage of six distinct aspects. These experts brought vast expertise to the table, focusing intently on capturing the current state and present challenges of each topic. The goal? To equip participants with actionable insights and strategies to accelerate and enhance their Process Mining endeavors in the real world.

Figure 1 offers a breakdown of the Focus Sessions that took center stage. In the following, some of the main content discussed in the sessions is introduced.

Business Value Aspects hosted by Jean-Marc Eriean (MANN+HUMMEL) and Julian Krumeich (Software AG)

The session on business value aspects emphasized that merely generating process insights using Process Mining tools’ discovery capabilities isn’t sufficient for success. However, converting these insights into tangible business value is crucial. The discussion explored quantifying business value and strategies for generating and securing value from insights, exemplified by MANN+HUMMEL’s approach.

Participants recognized that business value extends beyond monetary metrics, encompassing objectives like customer and employee satisfaction. Challenges were identified in proving quantifiable value for certain Process Mining goals, such as system or process harmonization, prompting a need for further research.

Even though, participants agreed on the pivotal role of process change or transformation in realizing tangible business value. An ad hoc poll disclosed the underutilization of governance models and a lack of research on structurally generating value from Process Mining insights.

The consensus urged companies embarking on Process Mining initiatives to define clear value propositions with specific outcomes. The session advocated the mantra “stop starting, start finishing,” emphasizing the need for governance models integrated into Process Mining tools. This integration ensures a smooth transition from insights to managed process change, supported by a Process Mining center of excellence and business unit involvement, with the business driving value creation.

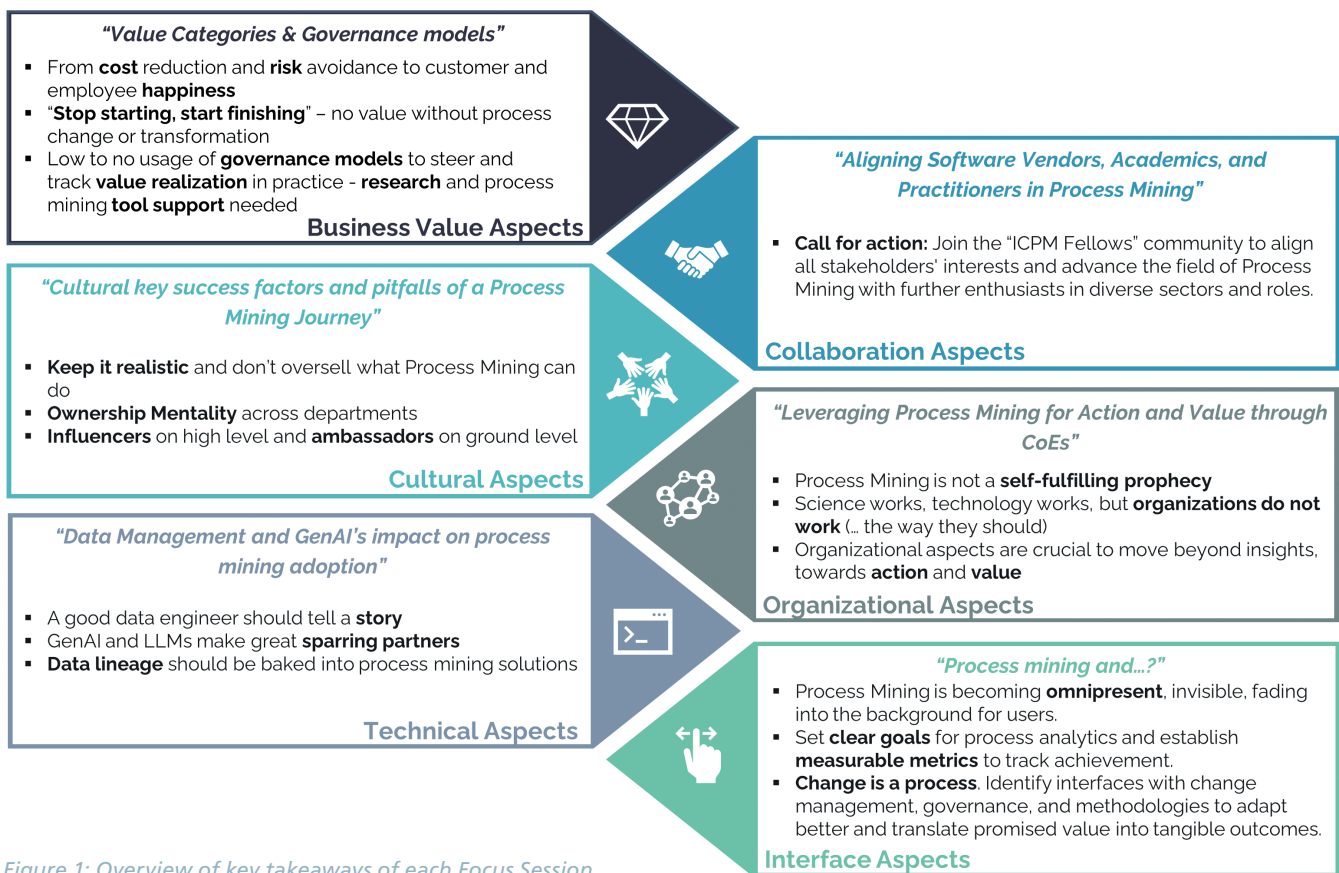


Figure 1: Overview of key takeaways of each Focus Session

Adopting these practices will enhance the effectiveness of Process Mining initiatives and foster real business impact through concrete changes.

Collaboration Aspects hosted by Dirk Fahland (Eindhoven University of Technology) and Dennis Preuss (EY)

In the session on collaboration aspects, participants were categorized into three key groups: software vendors, practitioners, and academia. The session kicked off with the identification of challenges in their collaboration, pinpointing regulatory and compliance issues, cultural and organizational differences, and resource allocation as key hurdles. Recognizing the complementary interests within each group was a crucial insight: Academia focuses on data access and insights derivation, software vendors emphasize operational continuity through innovation, and practitioners seek commercial benefits by seamlessly integrating Process Mining into their daily operations.

To tackle these challenges headon, brainstorming sessions were action-oriented, generating practical solutions. Proposals included implementing data-sharing initiatives within academia, establishing an innovation platform tailored for software vendors, and initiating cultural exchange programs for practitioners.

The session culminated with a proactive solution: the creation of the ‘ICPM Fellows’ community. This visionary community aims to appoint community members and representatives, formulate a community charter, define clear collaboration approaches, and present the tangible outcomes at ICPM 2024. The ‘ICPM Fellows’ community is envisioned as a dynamic force, strategically addressing the diverse challenges that hinder effective collaboration among the crucial groups involved in the dynamic landscape of Process Mining technology.

Cultural Aspects hosted by Leo Figge (Deloitte) and Christian Müller (Sanofi)

Initiating the session, hosts invited participants to share their perspectives and general associations on the cultural issues of Process Mining. This ignited discussions on universal themes resonating across companies and individuals, irrespective of their experience levels. Consensus emerged regarding the frequently underestimated significance of cultural aspects within Process Mining initiatives. Beside cultivating competencies around tools and technology, it is comparably crucial to foster a cultural maturity level around business processes to drive success. Setting the stage with open discussions, the hosts transitioned to a workshop format. Here, participants engaged

in silent reflection, and group exchanges, delving into key learnings from past projects and their impact on the success of Process Mining initiatives.

This dynamic discourse underscored, once again, the paramount importance of fostering knowledge exchange that transcends organizational boundaries. The participants, in unanimous agreement, distilled their discussions into five takeaways:

1. **Set Realistic Expectations:** Emphasizing the need to be realistic about what Process Mining can achieve and avoiding exaggeration of its capabilities.
2. **Ownership Mindset:** Advocating for a mindset of ownership across departments, urging all parties involved to take responsibility for the success of Process Mining initiatives.
3. **Influencers and Ambassadors:** Highlighting the critical role of high-level influencers and ground-level enthusiasts, emphasizing the need for Process Mining advocates at both operational and strategic levels.
4. **Addressing Cultural Dynamics:** Recognizing that many data issues stem from cultural factors, underscores the necessity of addressing cultural dynamics to effectively cleanse and refine data.
5. **Solution-Oriented Mindset:** Urging Process Mining enthusiasts to adopt a solution-oriented mindset, shifting the focus from viewing it as a standalone technology to crafting narratives aligned with actual business needs rather than fixating on tools.

This session was not just a discussion; it was a proactive exploration of actionable insights to drive success in the cultural landscape of Process Mining.

Interface Aspects hosted by Rafael Accorsi (Accenture) and Rudy Kuhn (Celonis)

The session on interface aspects delved into connecting Process Mining with other technologies or methodologies, emphasizing the importance of a robust framework for process improvement and transformation. The hosts initiated the session with a short impulse speech, sparking a dynamic discussion on existing interfaces, desired but missing interfaces, and reasons for their absence.

With that background, the session centred around three key points:

1. As Process Mining is slowly becoming a commodity in many organizations, it is starting to become invisible to end-users. This is because current tools have off-the-shelf accelerators to extract, prepare, and visualize data – so that the "real" mining, as known in the beginnings of the discipline – is no longer in focus. This doesn't mean "Process Mining is dead." On the contrary, it is more important than ever since

value-adding technical interfaces, like simulation and AI, and methodological interfaces, such as Lean & Six Sigma, build upon this foundation to generate value.

2. **Interfaces drive transformation and should be built and integrated with a focus on value.** Many current interfaces are built with the technical goal of connecting Process Mining with "something". The key aspect, however, is the purpose for which interfaces are developed and how they contribute to the value chain of Process Mining. For example, process simulation and Process Mining are complementary and fundamentally connected techniques, the former delivering an objective analysis of the scenarios for change and, in combination with the latter, forming a transformation roadmap. Yet, a toolchain enabling end-to-end, scalable mining and simulation is still unavailable.
3. **Interfaces encompass both technical and methodological aspects.** While the current discourse on Process Mining interfaces is predominantly technically driven, effective change requires a process or framework to generate value and transform successfully. Consequently, the focus should extend to change management and governance methodologies, ensuring the adoption of new ways of working and facilitating a comprehensive journey that considers people, processes, and technology. This emphasis is not only crucial for educating about Process Mining but should serve as the starting point of the journey, rather than an afterthought.

Organizational Aspects hosted by Lars Reinkemeyer (Celonis) and Elham Ramezani (KPMG)

In a focused exploration of organizational aspects, the session unfolded in two dynamic segments: an initial phase spotlighting insights from the speakers and a subsequent discussion phase immersing the group in two compelling case studies.

During the initial phase, hosts presented and dissected the findings of a study on Centers of Excellence (Reinkemeyer et al. 2022). Emphasizing the pivotal role of an executive sponsor, they navigated through various organizational structures, showcasing both centralized and hybrid models.

Transitioning to the subsequent phase, the group actively delved into a series of case studies. Here, they probed the challenges and opportunities inherent in diverse organizational setups. A clear realization emerged Process Mining isn't a self-fulfilling prophecy and its success hinges on the active involvement of key organizational components. The discourse delved deeper, acknowledging that while science and technology work, organizations often don't function as they should. This recognition prompted a collective contemplation on the importance of bridging the gap between theoretical knowledge and organizational realities. The session underscored that

organizational aspects are pivotal to go beyond insights and lead to actionable outcomes and value.

Drawing from the shared insights, participants collaboratively identified key takeaways. They stressed the imperative for organizations to view Process Mining not merely as a tool but as a company-wide approach that needs strategic alignment and active participation. Discussions echoed that meaningful outcomes involve navigating not only the technical aspects but also the intricate landscape of organizational culture and structures. The session was a pragmatic journey translating insights into actionable strategies for organizational success in the realm of Process Mining.

Technical Aspects hosted by Michal Rosik (Microsoft) and Silvio Arcangeli (SAP/Signavio)

The session focused on the technical aspects of Process Mining initiatives, drawing on a diverse audience, including academia, vendors, consultants, and end-customers. Surprisingly for some, the discussion unfolded into non-technical outcomes, emphasizing the diminishing boundary between technical aspects and the managerial and organizational side of every Process Mining project.

The introductory topic centered on the pivotal role of a good data engineer in the project pipeline. Participants agreed that a data engineer should not only handle data proficiently but also be a skilled storyteller. While the process analyst narrates the plot, the data engineer, to some extent, sets up the story environment. The discussion underscored the importance of translating technical details into a narrative that is easy to understand. Effective communication, even using different narratives for different audience levels, was highlighted in the realm of data engineering.

The concepts of Generative Artificial Intelligence (GenAI) and Large Language Models (LLMs) were discussed, emphasizing their role as excellent sparring partners in the technical landscape. Participants explored how these advanced technologies can complement and enhance the work of technical professionals, fostering a collaborative relationship between artificial and human intelligence. Establishing trust in technology was seen as crucial for widespread use, with questions arising about human capacity to test and verify GenAI outcomes.

The third key takeaway centered on integrating data lineage into Process Mining solutions. The group discussed the idea that understanding where data comes from and how it moves through processes is essential for effective Process Mining. This concept was framed as a foundational element, emphasizing the need to incorporate data lineage into the design and implementation of Process Mining solutions.

MasterClass

In addition to addressing contemporary topics in Process Mining in the Focus Sessions, it is also crucial to adopt a forward-looking perspective on aspects that formed the core of our MasterClass. Around 30 highly experienced thought leaders and seasoned managers in the field of Process Mining, including the authors of this white paper, actively participated in the MasterClass, infusing it with practical expertise and insights.

The MasterClass provided a deep dive into three pivotal topics:

- Navigating Process Mining at the Enterprise-level
- Unveiling how Mega-Trends are Shaping Process Mining
- Demystifying the Evolution of Process Mining Technology

Designed for hands-on exploration and leveraging the wealth of experience among participants, the cohort was divided into three groups, each comprising 8-10 individuals. This setup ensured a dynamic environment and engagement. The division allowed for a nuanced examination of each topic, with participants rotating through three rounds of discussions, each lasting 20 minutes. This interactive format not only enabled a thorough exploration of each theme by every participant but also fostered a diversity of perspectives and insights across all three topics.

This intensive exploration drew insights from industry leaders, fostering collaborative discussions and providing actionable strategies for navigating the evolving landscape of Process Mining. A summary can be found in Figure 2. In the following, the core threads discussed in the sessions are introduced.

Topic 1: Navigating Process Mining at the Enterprise-level

In the focused exploration of »Navigating Process Mining at the Enterprise-level«, we delved into the organizational implications of Process Mining. The goal was to distill practical and actionable tips for successful Process Mining implementation at the organization-level. Three key recommendations emerged for organizations utilizing Process Mining technology:

Approaching Process Mining Success: Organizations should kickstart at the C-level, emphasizing the essential link between

attention. Achieving tangible wins requires bridging the gap between strategy and execution, moving Process Mining from isolated projects to full-scale implementation across the entire organization. Organizations can benefit from recognizing the interconnectedness of Business Process Management, Process Mining, people, and change management, fostering purposeful dialogue among all stakeholders.

Exploring Inter-Organizational Process Mining: Organizations should develop an end-to-end view within the organization, especially when adventuring towards inter-Organizational Process Mining. Initially, it is possible to focus on a select group of organizations with the capability to leverage inter-Organizational Process Mining. As organizations progress, they should extend collaboration, and consider supporting suppliers in enhancing processes for enduring partnerships in the long term, using Process Mining as a key enabler.

Understanding Value in Process Mining: Organizations should recognize the diversity of value in Process Mining, acknowledging the absence of a one-size-fits-all enterprise-level value generation model. Understanding that enterprises have varied goals beyond financial metrics is essential. Therefore, organizations can explore alternative value metrics such as Environmental, Social, Governance (ESG) implications or customer hours saved in Process Mining implementations, leveraging data-driven decision-making.

These hands-on strategies are designed to drive practical change within the organization, translating Process Mining insights into concrete benefits that align with overarching long-term strategic objectives.

Topic 2: Unveiling how Mega-Trends are Shaping Process Mining

The discussion on »Unveiling how Mega-Trends are Shaping Process Mining« explored how Mega-trends profoundly shape and are shaped by Process Mining.

The rising emphasis on ESG factors underscores a shift toward responsible business practices, both environmentally and socially. Workforce dynamics are changing, presenting challenges in talent acquisition due to an aging society and heightened competition for skilled professionals. Uncertain supply chain dynamics have affected numerous businesses, highlighting the need for agility and the ability to pivot priorities rapidly in response to changes in the business landscape. Additionally, the recognition of the data explosion trend presents significant opportunities for businesses. However, navigating regulatory challenges emerged as a critical factor influencing various initiatives, offering both challenges and opportunities for industries.

Delving into these topics, we identified three pivotal ways in which Process Mining can effectively address the impact of mega-trends.

Data-Driven Digital Transformation: In the face of unprecedented data growth, organizations should capitalize on the opportunity for a holistic, process-driven digital transformation. This strategic shift aims to harness data and technology organization-wide, fostering efficiency, innovation, and agility. The move beyond isolated digital initiatives is essential to catalyze a thorough transformation of business processes, ensuring holistic organizational change.

Embedded Process Mining: Aligned with the prospects of autonomous process management and the emphasis on agility, organizations should position Process Mining as a standard technology integrated into the core infrastructure of the organization. This opportunity underscores the need to integrate Process Mining seamlessly into day-to-day operations, homogenizing practices across departments. This ensures a unified, standardized, and data-driven approach to process execution and optimization.

Resilience and Risk Management: In response to the growing complexity in regulatory frameworks, proactively measuring and managing resilience, as well as compliance, is possible and advisable with Process Mining. This involves enhancing process robustness and adaptability to unexpected changes. Additionally, organizations should focus on identifying and mitigating risks preemptively, contributing to a more resilient and risk-aware organizational framework.

These presented visions are designed to empower organizations to not just adapt but thrive in the evolving landscape, turning Mega-trends into tangible opportunities for Process Mining success.

Topic 3: Demystifying the Evolution of Process Mining Technology

The discussion on »Demystifying the Evolution of Process Mining Technology« centered on the expected technical advancements in Process Mining, unraveling common myths and assumptions. The aim was to provide practical insights and debunk misconceptions surrounding the evolving technology-focused landscape of Process Mining.

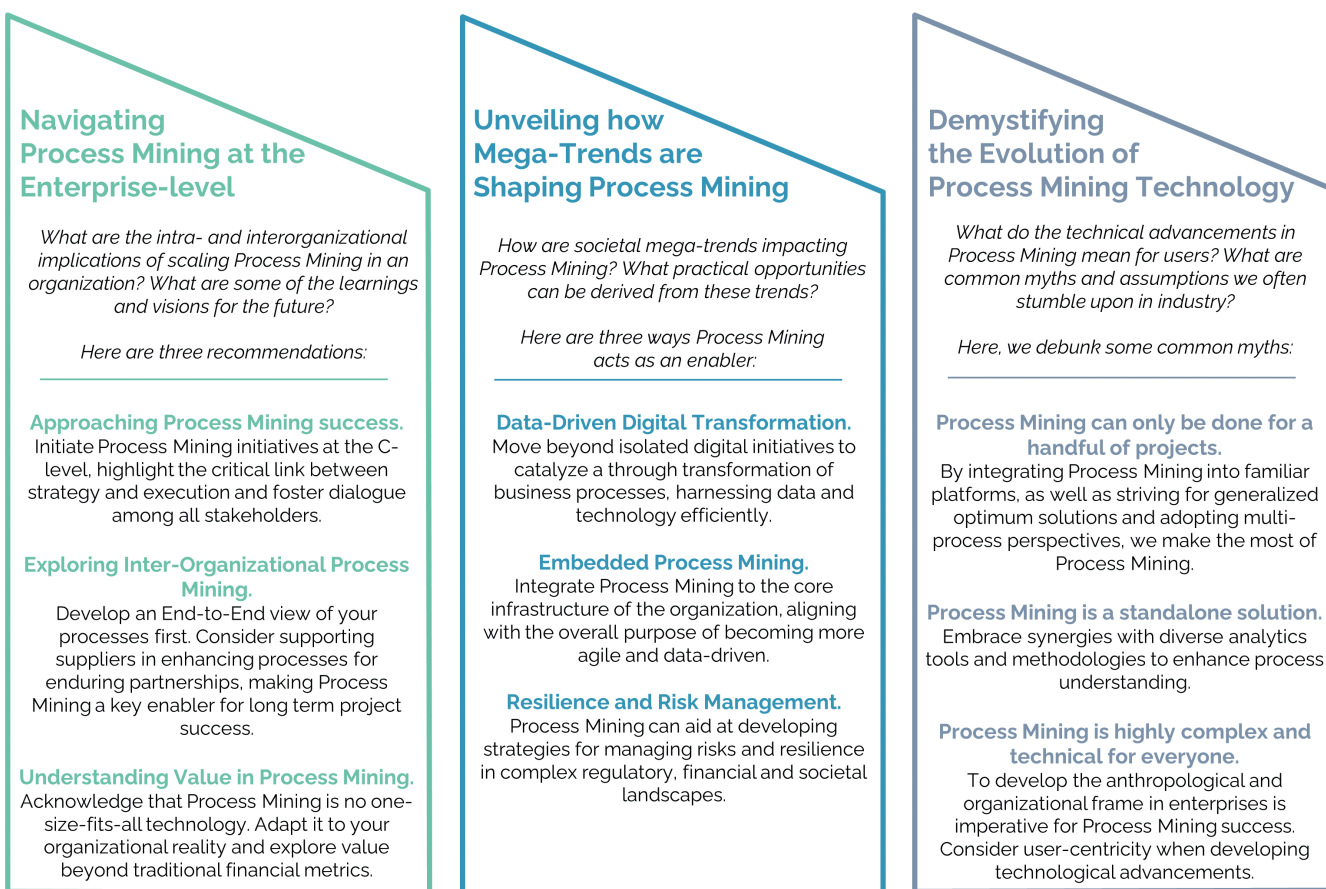


Figure 2: Overview of key takeaways of each MasterClass round table

Myth 1 – Process Mining can only be done for a handful of projects: Organizations should break away from the misconception that Process Mining is limited to isolated projects. Emphasizing its integration into familiar platforms, like Enterprise Resource Planning (ERP) systems, is essential to enhance user convenience and foster widespread adoption. Organizations can benefit from striving for general optimum solutions, adopting a multi-process perspective in Process Mining endeavors.

Myth 2 – Process Mining is a standalone solution: Organizations should move beyond the notion that Process Mining is a standalone technological endeavor. By embracing synergies with a spectrum of analytics tools and methodologies, the understanding of processes can be enriched. Organizations should focus on becoming outcome-oriented, supplementing the emphasis on discovering and analyzing tasks with a broader focus on optimization and embed Process Mining in continuous improvement efforts.

Myth 3 – Process Mining is always a highly complex and technical endeavor for everyone involved: Organizations should recognize the evolving landscape of Process Mining technology, harnessing its cutting-edge technological implications, while simultaneously not neglecting an integrated, user-centric perspective. Organizations can benefit from emphasizing the integration of customer-facing processes, moving beyond the focus on back-office operations. Adopting a multi-process and multi-system perspective, make the exploration of the seamless integration of Process Mining into human activity possible, considering anthropological and organizational considerations.

Conclusion

As we look back on a thoughtfully organized and highly impactful ICPM 2023, our heartfelt gratitude extends to all parties involved, from the dedicated organizing committee to each individual contributor who allowed the *Industry Track* to become a truly exceptional experience. Drawing insights from the *Industry Track* at ICPM 2023 we distilled a wealth of expertise into three core conclusions, offering actionable guidance for any Process Mining journey.

Set Clear Goals and Define Value Metrics: To implement Process Mining effectively, it is imperative to define explicit goals and metrics that align seamlessly with the overarching objectives of the organization. This requires clearly articulating how value is assessed within the specific context and establishing respective success criteria. Key to this is setting pragmatic expectations concerning efficiency gains, cost savings, or desired outcomes. Furthermore, it is essential to reassess the conventional definition of value, considering that it may not always be reliant solely on monetary metrics. Clear success criteria enable a results-driven approach, ensuring shared understanding and a broader, yet clear and effective, understanding of value.

Develop a Holistic Process Mining Strategy: Forge a comprehensive Process Mining strategy to ensure a smooth integration of Process Mining into existing workflows and realities in the organization. Engage stakeholders from the C-level, over champions and influencers to ground-level users, fostering open dialogue and a common sense of direction. Establish a governance model for accountability, making Process Mining an integral part of the organization. Cultivate an ownership mindset to drive successful adoption and standardize Process Mining as a core catalyst for positive change.

Integrate Process Mining Strategically into the Technological and Methodological Ecosystem: Harness the potential of data growth for a comprehensive digital transformation. By integrating Process Mining into everyday operations, decision-making processes, and broader technological initiatives, organizations can maximize its transformative potential and align it with emerging areas of interest such as AI, harnessing the potential of technologies jointly in a strategic manner. Ensure Process Mining is integral, not standalone, and get ready to transform insights into tangible, and valuable, outcomes.

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As a partner for digitization, Industry 4.0 and the Internet of Things, the Fraunhofer Institute for Applied Information Technology FIT has been developing IT solutions tailored to people and seamlessly integrated into business processes for 40 years. As a driving force of innovation, FIT not only provides guidance, but also shapes the digital transformation in business, the environment and society.

FIT's interdisciplinary R&D teams are drawn from our staff of around 350 scientists from computer science, social science, business administration, economics, psychology, and engineering. They bring their expertise in designing and implementing information technology systems to bear on problems and needs from different areas of life.

Our specific strength is our holistic approach to system development – from concept validation to implementation. We strategically evolve our expertise in IT, specific application fields, and our scientific excellence with the aim to be ahead of the market for our customers from industry and administration.

The **Branch Business & Information Systems Engineering (BISE)** of the Fraunhofer FIT, which is located in Augsburg and Bayreuth, includes the departments "Digital Business" and "Information Systems Engineering". Content-wise, the BISE competence at Fraunhofer FIT is characterized by a techno-economic perspective on issues of digitalization with a strong business focus. The ambition is to cover BISE topics comprehensively at the highest level, both in terms of content and methodology. Together with partners from business and society, the branch develops innovative solutions for individual problems with the help of the professional and technical expertise of its two departments.

The Branch is active in three business areas: Digital Business, Digital Transformation, and Digital Disruption. While the Digital Business department develops holistic approaches to mastering digital transformation, Information Systems Engineering focuses on the exploration of emerging technologies through hardware and software demonstrators and develops concepts for relevant management issues in the IT domain. The solutions developed always take an integrated view on all layers of the enterprise architecture and provide impulses for digitization strategies and transformative change processes in companies.

The Branch's competencies lie in particular in the areas of Applied Data Science, Customer Relationship Management, Digital Life, Digital Society, Digital Value Networks, Digital Innovation Management, Sustainable Energy Management and Mobility, Strategic IT Management and Value-based Business Process Management.

The **Fraunhofer Center for Process Intelligence (CPI)** serves as a focal point for the integration of business, organizational, and technical competencies in the field of Process Intelligence. The CPI assists organizations in the evaluation and selection of process intelligence technologies and provides support from initial application to enterprise-wide deployment and scaling. Clients range from mid-sized companies to international corporations. For more information, please contact cpi@fit.fraunhofer.de.

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