

Editorial

Transitions – IEEE Engineering Management Review in 2023

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It was over five years ago that I (Joe Sarkis) came on-board as an Editor-in-Chief for the *IEEE Engineering Management Review* (EMR). At that time, my purpose was to develop the journal as one that published only original content material—full papers, short papers, and Technology Manager’s Notebook (TMN) articles.

The journal’s goal has been and continues to publish high-quality, practical, and evidence-based articles. During this period, IEEE EMR published more than 400 articles. We have evidence that these original contribution articles were read with hundreds of thousands of downloads and thousands of citations.

The growth in articles, downloads, and citations has greatly improved the journal’s quality and could only have occurred with the contributions of our associate editors, the support of the Technology and Engineering Management Society (TEMS), our reviewers, and most importantly, the contributors. We would be nowhere without them willingly seeking to provide their insights and experiences.

Although we have built up a community around the journal, and it continues to grow and improve, much more work must be completed. It is a labor of love of knowledge and learning that keeps us (the ongoing editors). But, now it is time for transition.

Transition planning is critical for any organization. Transition is critical so that the performance of the organization or project is not disrupted and can continuously improve. Transition planning is a capability that many organizations and entities do not do well. Usually, some disruption occurs, and minimizing this disruption is a goal. In the transition for this journal, we decided to continue older submissions under the old editor, and the new editor (Alexander Brem) would then continue.

Different leaders will have different perspectives and hopefully new and interesting ideas. In this way, a transition is very good for an entity because it allows for introducing new ideas. These ideas include new content, goals, editorial board members, and processes. Publishing is in great upheaval from issues related to digitization, open access, artificial intelligence (AI), and integration of publishers, to name a few issues. There are broader disciplinary concerns related to relevance versus rigor and publication ethics that also arise that need to be carefully managed—for example, concerns of equity and inclusion in various viewpoints.

Whether theoretical or practical research and publication—as is IEEE EMR—requires careful attention to social, economic, and cultural evolutions. For example, sustainability topics have become more popular, and supply chain topics

have emerged or re-emerged in terms of importance. This transition goes beyond new technologies but also requires social innovation. As editors and leaders of the journal, we need to be aware of these broader concerns and emergent issues.

We were here for the Industry 4.0 revolution/evolution, the growth of AI, and the ability to respond to the COVID crisis. Each of these somehow required and influenced the transition of IEEE EMR (and the world). As an interested reader, you may want to consider this editorial as an invitation to contribute your research insights to our broad audience of engineering managers.

In the broader scope of society, our transition is not very large. We also wish to keep it small to make it seamless with the journal leadership shifts. Alexander Brem will introduce new people, topics, conference linkages, and many other transitional views. He will find out what works and what does not and act appropriately. Joe Sarkis is looking forward to seeing the new and reinvigorated IEEE EMR! And if you want to be a part of it, feel free to contact one of us.

As usual, the remainder of the editorial will introduce this issue Volume 51, Number 1, of EMR.

SPECIAL ISSUE ON AI

Usually, the first section of articles for IEEE EMR is the Technology Manager's Notebook contribution. In this case, we begin this issue of IEEE EMR with a special issue topics section. The special issue topic is titled "AI-Driven Decision Making: Managerial and Organizational Promise and Potential."

In this section, we begin with a guest editorial by the international guest editorial team of Yassine Maleh, Justin Zhang, and Ahmed Abd

El-Latif. The major driving force of the special issue is that businesses and society have adopted multiple and varying AI capabilities. This special issue topic editorial and submissions were before the contentious debate around the ChatGPT AI system that incorporated some of the latest natural language processors, with AI, with the information available on the Internet. In fact, *This Week with John Oliver*—an award-winning HBO channel opinion and entertainment program in the United States—recently devoted a large part of its program on the implications for AI in society. AIs popular media and social awareness have never been higher.

We had previously published some topics related to AI and education in which ChatGPT has seen significant application (see [1], [2], [3], and [4]). These articles were representative of development-stage companies and ideas. Within a short period of time, the writing and education community has felt a significant disruption and needs to consider transitioning to a new environment. Institutions of higher learning were thrown into confusion as how to deal with this issue, the debate will likely continue and maybe a topic for a future special issue.

For this special issue, the focus shifts back to AI-supporting business strategy and decisions. IEEE EMR publications have also covered these issues previously (e.g., see [5] and [6]). The special section topics show the breadth and level of interest and application of AI. We will not go into each article, but multiple disciplinary fields are represented, namely, healthcare, education, marketing, manufacturing, and information technology. Although with only six articles, the special section provides insight into the various areas. A whole and lengthy literature review for just one topic on smart grids shows AIs deep pervasiveness. The reviews could have been as in-depth for hundreds of areas.

This special section continues the conversation on AIs role in society and business.

REGULAR ISSUE PAPERS

We now describe several other papers that appear in our regular issue of IEEE EMR. We essentially have technology and supply chain management topic papers. The first papers represent a good segue from the AI special issue to the regular issue papers on AI and learning—a critical aspect of AI.

TECHNOLOGY MANAGEMENT

The first paper is the regular issue by Chung, which considered AI entrepreneurs focused on Industry 4.0 and manufacturing AI. They use a broad set of variables related to "human capital" regarding domain knowledge and education and relationships to performance. The results found that the domain knowledge level made for a more successful and reliable transition to an on-going enterprise (performance). They also found that moderation comes into play depending on the type of business model. They investigated the perspective on whether specific (vertical) or general (horizontal) business models for their AI played a role in the outcomes, with various outcomes occurring for both. The implications on organizational and human capital considerations for whether an AI manufacturing startup is successful were relatively evident—each has an impact on a successful transition.

The next article by Lemmetty shifts the learning and knowledge in manufacturing from AI to individuals and self-directed learning. Lemmetty argues that in technology-oriented companies, change and transition are constant. To function during transitional periods as technologies evolve, different learning styles—many of

which are dependent on on-the-job learning, are evaluated.

Learning can occur through at least four approaches: self-directed, self-determine, autonomous, and informal learning. The article carefully dissects the similarities and differences between these types of learning.

A part of this dissection includes evaluating the benefits and limitations of learning styles. This article is short but packed with knowledge and insight that is important for technology-oriented companies.

Society is transitioning. People are getting older and living longer, and in some places, such as Japan, the population is decreasing and getting older. In response to this aging population, there will be a greater reliance on healthcare technology. Healthcare 4.0 [7] has been mentioned as a possible solution to various healthcare services, and this technology is something that can further care for an aging population.

Watanabe and colleagues evaluate this healthcare technology environment through various case studies; some of them were startups that can build on previous publications in this field published in IEEE EMR [8], [9]. The authors of this article evaluate various healthcare technology characteristics, including business-to-business and business-to-consumer relationships and the characteristics of the technology. They are viewed as integrative technologies and range from robotics to information systems. The case studies and evaluation result in two major issues: required actions for technology integration and the differences in these actions that are unique to the situations.

Not only is society transitioning and technology responding but also

technology itself is transforming and transitioning. Digital transformation has been occurring for a few decades as most technologies, and especially manufacturing technologies—typically focused on hardware—are further digitally transforming. It is this environment that the next article by Carreiro-Santos and colleagues addresses.

In this article, the decision and selection of manufacturing technologies are the focus. They are informed by a real-world situation facing automanufacturers and review the literature for various best practices for manufacturing technology selection in a digital transformation environment. The authors introduce a decision-aid methodology that includes developing a technology roadmap (assuming that the technology will transition) and seeking the objective of manufacturing performance success. They define these variables, and looking forward to potential transitions is important in technology selection so that obsolescence is not premature in the selected technology.

Considering upgrades and when to upgrade in times of technology and systems transition is an important decision and has existed for decades as manufacturing systems can be flexibly upgraded (e.g., [10]). More broadly, upgrading systems can be supported by the modularity of systems, where portions of the system are designed to be updated with improved features integrated into a module. This decision to determine when to upgrade modules is addressed in the article by Broas and colleagues.

Broas and colleagues introduce an optimization model to aid in this decision. They observe that the decision is a part of a larger process and framework to upgrade a module. The decisions are based on some

form of breakeven optimization analysis. With some optimization models introduced, examples are presented and are quite accessible to practitioners.

PROCESS AND SUPPLY CHAIN MANAGEMENT

The final section of articles in this issue of IEEE EMR focuses on organizational and interorganizational (supply chain) processes. Organizations transition and may be driven or transition through technological development, new product introduction, market evolution, or, amongst many other dimensions, process transitions.

Transitions in processes may occur through business process re-engineering efforts. These efforts require—at a minimum—data for analysis [11] and strategic justification [12] and could be completed and evaluated through AI [6]. A major tool for business process re-engineering—which includes “as-is” and “to-be” business process transitions—is a system’s analysis and design technique called IDEF0.

Collier and colleagues use IDEF0 to develop a best-practice business process model for a semiconductor industry manufacturing risk assessment process. Identifying risk in manufacturing semiconductors is presented with various higher level and lower level aspects and dimensions of risk presented. They realize that once a high level of unnecessary risk is identified—with the uses of other tools, such as failure modes and effects analysis [13]—some transition in the process will eventually be required.

Social transitions will influence organizational transitions. Major social transition decades in the making are the forces of managing for sustainability—a topic well covered in

organizational (e.g., [14]) and supply chain (e.g., [15]) articles published in IEEE EMR. Ghosh and colleagues investigate some managerial issues related to making decisions for sustainable supply chains in India—a country under severe sustainability pressures, as are many emerging economies.

Ghosh and colleagues investigate which factor's managers in various case organizations in the steel manufacturing industry in India would consider important for sustainability. Interestingly, the ones viewed as most important from the factors presented and using their ranking technique (which is described in detail) are recycling initiatives. Recycling is critical to circular economy practices [16], [17]. It is also not surprising since recycling initiatives offer economic, environmental, and social benefits. Overall, the study's methodology, factors, and insights are useful for managers and organizations with sustainability on their radar.

The penultimate article in this issue of IEEE EMR considers the potential for centralized versus decentralized supply chain planning. The article by Franceschetto and colleagues considers transitioning to a hybrid approach similar to an ABC inventory analysis. In this case, they recommend considering a decentralized (local) approach to managing materials that are less critical. More critical materials and products should be managed in a centralized fashion.

Using automotive processes and supply chain activities (mostly

internal processes) show the performance on various performance metrics. They closely link the processes and designs to a very common tool in manufacturing—the bill of material. This practical relationship in their study shows the immediate application and accessibility to manufacturing and supply chain managers. Substantive performance outcomes result from the careful transition to the best strategy, showing how this can occur in a real-world setting.

The final article in this issue of IEEE EMR is by Khakdaman and colleagues and focuses on transportation management within supply chains. Most of the previous articles in this issue focused on transitions in technology and some management innovations. The authors felt these innovations and their transitions were relatively well studied. Instead, they investigate new transportation service transitions, including operational control of transport mode, service flexibility, and ancillary value-added services.

Managerial relationships from perspectives (factors) of choice of service, including supply chain strategy, demand volatility, internal flexibility and industry type, and their relationships to transportation services, are provided. Demand management and various transitions in this demand play very significant roles, according to their survey-based study of logistics service providers. Maintaining flexibility is also a critical attribute. Flexibility and adaptability are always important in any transitory phase.

CONCLUSION

Transitions is the theme of this issue of IEEE EMR because of a transition in the journal's Editor-in-Chief position from Joseph Sarkis to Alexander Brem. We coauthored this editorial as a "baton" in this transition. There will be an evolution, innovations, and progress to be made. We encourage our stakeholders—members of the editorial boards, authors, reviewers, TEMS governance, and our readership—to provide us feedback and contributions to make this progress effective for our community.

We also provided examples of how transitions play a role ranging from the special issue on AI to supply chain process management. Technologies, society, and organizations are always undergoing change and transition. IEEE EMR seeks to help managers and their organizations function in these rapidly transitory periods. It also helps to provide insights to researchers and learners to manage in times of great turbulence and change.

We would like to hear your stories of transition and insights, so communicate with us and let us know if you wish to share. We also hope you enjoy the insightful articles in this IEEE EMR.

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