Proceedings of the 61st International Association for Computer Information Systems Conference - October 6 - 8, 2021 - Virtual Conference

THE EFFECT OF BIG DATA ANALYTICS ON FIRM PERFORMANCE

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ABSTRACT

The emergence of big data analytics in industrial application has led to increased attention in academic research. While past research has proposed varied theoretical frameworks for big data, little has been done on the interaction of big data and lean and their respective impact on firm performance. This research attempts to fill the void by investigating the relationship among big data analytics, lean capability, and firm performance. We propose a conceptual model to examine the links among these constructs. Structural Equation Modeling (SEM) has been selected and utilized to estimate expected structural relationships. Based upon this model, research hypotheses have been developed. Our preliminary results show that lean capability has a substantial effect on firm performance and that a higher level of big data analytics practice leads to higher lean capability.

Keywords: Big Data Analytics; Lean; Firm Performance; SEM

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DOES THE SUPPLY OF COLLEGE GRADUATES MEET CURRENT MARKET DEMAND FOR BIG DATA ANALYTICS PROFESSIONALS?

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EXTENDED ABSTRACT

DESCRIPTION OF THE STUDY

E-business, e-education, e-government, social media, and mobile services generate and capture trillions of bytes of data every second about customers, suppliers, employees, operations, and other types of information. Such large pools of big data are now an important part of every sector of the global economy. For example, online retailers can track not only what customers bought, but also what else they viewed; how they navigated through the site; how much they were influenced by promotions, reviews, and page layouts; and similarities across individuals and groups. Traditional retailers simply couldn't access this kind of big data in such a timely manner. Obviously, using digital big data leads to better predictions; better predictions yield better decisions (Finch & Shockley, 2013; McAfee & Brynjolfsson, 2012). While businesses need professionals with skills and knowledge for mining big data and discovering insights, do universities and colleges supply enough graduates to meet the market demand for big data analysts? This research question is important for business and information systems educators to address.

BASIS OF THE STUDY

The McKinsey Global Institute (MGI) research report (Manyika, Chui, Brown, Bughin, Dobbs, Roxburgh, & Byers, 2011) found that big data can create significant value for the world economy by enhancing the productivity and competitiveness of companies and public institutions, thereby creating substantial economic surplus for consumers. For instance, MGI studied five sectors and reported that big data can generate significant financial value across sectors. McAfee and Brynjolfsson (2012) noted that big data analytics is a fundamental transformation of the economy and they have been convinced that almost no sphere of business activity will remain untouched by this big data movement. However, research showed a significant shortage of talent needed by organizations to take advantage of big data. For example, one-third of respondents of the IBM global survey of 900 business and information technology executives cited the lack of business analytics skills as the top business challenge impeding better use of big data analytics (Finch & Shockley, 2013).

A U.S. national data-mining study (Zhao & Zhao, 2016) reported that only a minority of a random sample of 215 AACSB-accredited U.S. business colleges offered business analytics programs at varied academic levels, with 21.8% providing it at the MS level, 18.6% at the BA/BS degree level, 16.3% offering graduate certificates, 8.8% providing MBA concentration, and only 3.3% offering

PhD degree with business analytics concentration. Such a finding implies that the capacity of the business analytics programs offered by the AACSB-accredited U.S. colleges of business was not able to prepare enough graduates for overcoming the shortage of business analytics professionals across industries and public institutions (Finch & Shockley, 2013).

To explore whether the AACSB-accredited U.S. business colleges now prepare enough graduates to meet the U.S. companies' and public institutions' current demand for business analytics professionals, we are conducting a 5-year follow-up replication of Zhao & Zhao's (2016) Web-mining study. This replication uses data mining techniques to automatically discover and extract information from Web documents and services. The Web content analytics is one of the dominant research methods used for assessing organizations' Web contents, deliveries, and strategies (e.g., Boggs & Walters, 2006; Campbell & Beck, 2004; Wilkinson & Cappel, 2005; Zhao & Zhao, 2010; Zhao & Zhao, 2015). Data are being collected and processed to discover information regarding the U.S. colleges offering business analytics programs by geographic regions, degrees, and significant differences of program or course offerings among geographic regions.

IMPLICATIONS

First, the findings of the study would inform companies and public institutions of the current available business analytics programs at BA/BS, MBA/MS, PhD, and graduate certificate levels so that they can approach those universities to hire interns and graduates. Second, the findings would enable students interested in big data analytics to select an academic program that meets their career goals. Finally, the findings of the study would enable business colleges to learn from one another about their business analytics program offerings for further improvement.

REFERENCES

Boggs, R. A., & Walters, D. (2006). A longitudinal look at e-government in practice. *Issues in Information Systems, 7*(2), 161-164.

Campbell, D. & Beck, A. C. (2004). Answering Allegations: The Use of the Corporate Website for Restorative Ethical and Social Disclosure, *Business Ethics,13*(2), 100.

Finch, G. & Shockley, R. (2013). Analytics: A blueprint for value - converting big data and analytics insights into results. *IBM Institute for Business Value*. Retrieve from: http://www-935.ibm.com/services/us/gbs/thoughtleadership/ninelevers/

Manyika, J., Chui, M., Brown, B, Bughin, J., Dobbs, R., Roxburgh, C., & Byers, A. (2011, May). Big data: The next frontier for innovation, competition, and productivity. *McKinsey Global Institute*. Retrieved from: h*ttp://www.mckinsey.com/insights/business_technology/big_data_the_next_frontier_for_innovation*

McAfee, A. & Brynjolfsson, E. (2012, October). Big data: The management revolution. *Harvard Business Review*. Retrieved from: https://hbr.org/2012/10/big-data-the-management-revolution/ar/1

Wilkinson, V. O. & Cappel, J. J. (2005). Impact of economic prosperity and population on e-government involvement. *Issues in Information Systems*, (6), 204-209.

Zhao, J. J. & Zhao, S. Y. (2010). Opportunities and threats: A security assessment of state e-government Web sites. *Government Information Quarterly, 27*(1), 49-56.

Zhao, J. J. & Zhao, S. Y. (2015). Security and vulnerability assessment of social media sites: An exploratory study. *Journal of Education for Business, 90*(8), 458-466.

Zhao, J. J. & Zhao, S. Y. (2016). Business analytics programs offered by AACSB-accredited U.S. colleges of business: A web mining study. *Journal of Education for Business, 91*(6), 327-337.

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CYBERSECURITY RESEARCH CHALLENGES – LOCATING CREDIBLE MATERIAL

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EXTENDED ABSTRACT

DESCRIPTION OF THE STUDY

The purpose of this study is to highlight the challenges of locating and accessing credible material for cybersecurity research. The challenges are often obscured due to the proliferation of new information focused on cybersecurity incidents in the news media such as ransomware and other data breach including phishing attacks. The study will spotlight the efforts of various sources from private to government which serve as the premier source of all things relevant for the latest cybersecurity information. The study will focus on the relevance and credibility of the various sources to minimize the efforts of learners and individuals seeking to obtain current, relevant, and credible cybersecurity information. The study is significant in the digital era in the advent of the recent increase of research efforts and information that are increasingly presented to sway the views of specific individuals or groups without the robust considerations of facts. The study is also practically significant because there is an increase of cyber incidents that results in the loss of tangible and intangible assets along with unquantifiable levels of damage to organizational and individual credibility such as is seen in the recent Colonial Pipeline ransomware attack involving the shutdown of 5,500-mile pipeline supplying most of the Eastern United States with diesel, gasoline, and jet fuel Kochman (2021).

BASIS OF THE STUDY

The main theoretical basis of the proposed study is the research finding by Chen and Ke (2017) positing that the public library is the basis of credible research and should be the main entry point for the modern cyber student or individuals. In further support of the credibility of the library, Salman, Mugwisi, and Mostert (2017) suggested that the data or instructions obtained from the library seek to create self and network capabilities. Yet modern sources, such as the Uber List of Cybersecurity Resources (2021), omitted the library as a crediable source, seeking instead to list cybersecurity sources in various categories based on popularity from news and opinion to include conferences; leaving the researcher to judge the credibility based on prior knowledge or popularity. While the above source opined that theirs is designed to minimize the effort of searching, it may be beneficial to cybersecurity research to consider more reputable and peer reviewed conferences and publications, such as IEEE and ACM digital libraries, government publications, ASIS International, DC3, and SANS Institute. Publications of opinions, comments, blogs with minimal or blurry methods and little scientific evidence would be misleading to cybersecurity research. Future cybersecurity research and development must be based on "the same systematic approach to discovery and validation" used in all scientific and technical disciplines with demonstrable and reproducible experiemental results to evaluate prior work while advancing the creativity and

knowledge in the field (Benzel, 2021). The collected data for this study will be processed through a synthesis of credible information collected from the various sources cited in the study. The data analysis is expected to show what sources are considered most credible to support a robust approach to cybersecurity research.

CONCLUSIONS AND IMPLICATIONS

There are numerous sources to retrieve current information concerning cybersecurity research – all are not equal in their credibility yet there is little acknowledgement of associated risks due to misinformation. One core item of concern with the issue as described above is the unverifiability of accurate information to inform key individuals in various organizations about the risks associated with the use of Information Technology to include the clear and increasing risks posed by direct or indirect human actions such as from computer hackers or others. The shift from traditional sources of credible information such as the library to social media sources such as blogs and white papers has blurred and obfuscate the need for information accuracy and research quality and credibility. This study will attempt to offer an insight into this issue and at least provide a basis for better decisions when seeking credible sources concerning cybersecurity information.

REFERENCES

Benzel, T. (2021). Cybersecurity research for the future. *Communications of the ACM, 64* (1), 26-28.

Chen, T., & Ke, H. (2017). Public library as a place and breeding ground of social capital: A case of Singang Library. *Malaysian Journal of Library & Information Science, 22*(1), 45-58.

Kochman, B (2021) Pipeline Cos. Ordered To Report Breaches After Colonial Hack. Retrieved from Pipeline Cos. Ordered To Report Breaches After Colonial Hack - Law360

Salman, A., Mugwisi, T., & Mostert, B. (2017). Access to and use of public library services in Nigeria. *South African Journal of Libraries and Information Science, 83*(1), 26-38.

The Uber List of Cybersecurity Resources (2021). Retrieved from https://www.cyberdegrees.org/resources/the-big-list/

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HIDDEN HANDICAPS OF DATA-DRIVEN BENCHMARKING: THE CASE OF SHAREHOLDER LITIGATION RISK EXPOSURE ESTIMATION

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EXTENDED ABSTRACT

PURPOSE OF THE STUDY

Within the confines of organizational management, it is hard to think of another informational tool that is as widely used as benchmarking, a broad approach to comparing process and performance outcomes with objective standards or best practices. When coupled with the relatively recent explosion of interest in data-driven decision-making and bolstered by the ubiquity of rich transaction and communication tracking data flows, a variant of benchmarking framed here as data-driven benchmarking is of particular interest to organizational managers. It is the purpose of this study to highlight a little-known challenge that often accompanies use of data-driven benchmarking, characterized here as *definitional contingency,* or the dependence of benchmarking derived norms or standards on the often-implicit definitional foundations. More specifically, the study leverages a proprietary database that tracks filings and settlements of shareholder class action lawsuits to show how the choice of industry taxonomy, or industrial classification scheme, can yield materially different benchmarking outcomes, ultimately suggesting different courses of action. The goal of this research is to draw attention to the importance of thoughtfully and carefully considering the manner in which benchmarking data are aggregated, and the extent to which seemingly inconspicuous choices can materially alter conclusions derived from data-driven benchmarking.

STUDY APPROACH & METHODOLOGY

One of the more common uses of organizational management related data-driven benchmarking is to inform risk management decisions, where aggregate benchmarks, best exemplified by risk type specific average incidence rates and cost, can offer meaningful starting points in risk mitigation and risk transfer (i.e., insurance coverage procurement) decisions. Those benchmarks are typically calibrated for peer groups defined by industry membership, which greatly enhances the applicability of those values to specific companies. Given the pivotal importance of data to efficacy of benchmarking outcomes a great deal of attention is paid to validity and reliability of the underlying data, yet quite often comparatively little attention is devoted to underlying definitional considerations, such as what constitutes an appropriate peer group. In fact, there is a widespread belief that the use of objective industry taxonomies essentially obfuscates that problem; however, that runs counter to the existence of multiple industry classification taxonomies, each producing markedly different industry structures. Hence it stands to reason that since data-driven benchmarking is rooted in pooling of company-level details, the choice of classification taxonomy will have material impact on benchmarking estimates, due to cross-schema company clustering logic differences. Ultimately, the choice of industry classification taxonomy may impact not only benchmarking values, but even the resultant conclusions. In view of that, it is the goal of this

research to empirically test that assertion in the context of shareholder class action litigation filings and settlements, a key driver of executive risk.

The study utilizes a proprietary database of 2,247 shareholder class action litigation filings and settlements, representing 2,076 individual companies, to test the impact of choice of industry classification taxonomies (NAICS vs. GICS vs. SEC) on benchmarking estimates. The analysis will proceed as follows: First, company mapping logic will be constructed leveraging information from publicly accessible sources, such as NAICS Association, the US Department of Labor, and S&P Dow Jones Indices. More specifically, each of the aforementioned 2,076 companies will be ascribed with three separate industry sector memberships, following which, mean and median settlement values will be computed for each industrial sector in each of the three taxonomies. Next, a series of random trials will be conducted as follows: For Taxonomy 1, a single company will be selected, at random, from each sector comprising Taxonomy 1 – for each selected company, the mean and median benchmarking values will be compared across all three industry classification taxonomies; the same selection and comparison logic will be carried out for Taxonomy 2 and Taxonomy 3, which will produce a matrix of benchmarking contrasts. The results are expected to show a persistent pattern of differences, thereby attesting to the dependence of benchmarking conclusions on the often-overlooked definitional considerations.

FINDINGS

The study is intended to highlight the importance of carefully evaluating the manner in which widely used data-derived benchmarks are derived. Faced with massive and informationally rich volumes of data, organizations are understandably focused on computational logistics, but even seemingly minor definitional considerations might have potentially profound consequences. With that in mind, the study outlined here aims to show that an organizational decision maker might draw materially different risk transfer (i.e., insurance procurement) and risk mitigation (e.g., organizational policies and practices amendments) conclusions based solely on the choice of benchmarking related industry classification schema. Stated differently, the same benchmarking data can precipitate materially different conclusions, depending on which of the widely used classification taxonomies are used.

REFERENCES

Ali, A. and Kallpur, S. (2001) "Securities Price Consequences of the Private Securities Litigation Reform Act of 1995 and Related Events', The Accounting Review, 76(3), 431–460.

Banasiewicz, A. (2019), *Evidence-Based Decision-Making: How to Leverage Available Data and Avoid Cognitive Biases*, Routledge.

Basak, S., Shapiro, A. and Tepla, L. (2006) "Risk Management with Benchmarking", *Management Science*, 52(4), 542–557.

Beck, J.D. & Bhagat, S. (1997) "Shareholder Litigation: Share Price Movements, News Releases, Settlement Amounts", *Managerial and Decision Economics*, 18(7–8), 563–586.

Cho, S-Y., Hagerman, R., Nabar, S., & Patterson, E. (2003) "Measuring Stockholder Materiality", *Accounting Horizons*, 17 (Supplement), 63–76.

Coupet, J., Berrett, J., Broussard, P., & Johnson, B. (2021) "Nonprofit Benchmarking with Data

Envelopment Analysis", *Nonprofit & Voluntary Sector Quarterly*, 50(3), 647–661.
Harvey, C.M. (1993) "Multiattribute Risk Linearity", *Management Science*, 39(3), 389–394.
Leibfried, K. H. J., & McNair, C. J. (1997) *Benchmarking: A Tool for Continuous Improvement* (1st ed.). Harper Business.
Levin, M. (2000) *Fundamentals of Sensation and Perception*, 3rd ed., Oxford University Press.
Meddis, R. & Lecluyse, W. (2011) "The Psychophysics of Absolute Threshold and Signal Duration: A Probabilistic Approach", *The Journal of Acoustical Society of America*, 129(5), 3153–3165.
Seybert, J. A. (2006) *Benchmarking: An Essential Tool for Assessment, Improvement, and Accountability*. Jossey-Bass.

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BOUNDED RATIONALITY: THE ROLE OF DATA IN MANAGERIAL DECISION MAKING

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EXTENDED ABSTRACT

Simon's (1957) theory of Bounded Rationality is in response to other economic theories that failed to consider decisional pragmatics; limitations of the human mind (e.g., cognition and computational capabilities), time available from which to decide, and degree of difficulty and clarity of the problem and problem statement claiming that individuals as rational beings, have practical limits to that rationality (bounds) even if the decision maker does not realize those bounds. In the 90's, scholarly literature began embracing bounded rationality as a driver for new theories in executive decision making focusing on how information is consumed and opinions that shape decisions are formed. Cristofaro (2017) chronicled the evolution of bounded rationality in the management literature in decade spans asserting that in the 90's, the management literature began embracing bounded rationality as a driver for new theories in executive decision making focusing on how information is consumed and opinions that shape decisions are formed psychologically and in the 2000s using neuroscience. This study of managers attempts to align the original concept of bounded rationality with big data to best understand how managers equip themselves to work within a new era of data at your fingertips and to identify whether managers are truly prepared to work within a data-driven decisional space from a knowledge, skills, and abilities perspective. Further, the study hopes to identify if decisions, even with strong data support, are made based on adequacy (what Simon called *satisficing*) as opposed to perfection or idealism and whether or not data drives more optimal decisions from a managerial perspective and whether or not the need for data, data interpretation, and data literacy poses a new set of potential limitations for today's manager.

With data existing in almost every organization and the expectation of leaders that decisions be data-driven, it could be said that decisions are now more rational using Simon's definition since computational powers now are quite impressive compared to the pen and paper models of the 1950's. However, Simon's work in the 1950's existed at a time before data, databases, and computers, as we know them. However, the definition of "bounds" is still relevant today since the

decisional pragmatics have not changed (e.g., short timelines, ambiguous problems, cognitive limitations, sufficient data but insufficient time to analyze that data, skill-based errors, etc.). What is markedly absent in even today's literature is any discussion on the role of big data, data-driven decision-making, evidence-based management, and how overwhelming volumes of corporate data fit within the context of bounded rationality and satisficing. While computational power has increased and many routine problems are solved with decision support systems, managers now have a disproportionate number of extraordinarily complex problems and overwhelming amounts of refined and unrefined data from which to help them solve those problems. Managers are expected to make decisions more quickly now, due to an erroneous assumption that "having the data" leads to an optimal decision, which the literature and anecdote suggest is not always the case.

The influence of big data on managerial decision-making can have enormous effects on organizations, both positive and negative. Even small decisions, cumulatively, if mismanaged, can have a large organizational impact in the near term. Understanding how data impacts managerial decision-making is an important factor for technologists to appreciate as they expand computational capabilities and determine effective ways for how data is delivered to consider how the end user uses and needs data from which to transact within the organization and what new limitations may exist within the bounds of rationality.

Data will be collected from self-identified managers who will complete a modified IS Impact Measurement Model (Gable, 2008). The goal is to obtain organizational demographics data, individual occupational demographics data, as well as the Gable constructs and identify the perceptions of managers who use data from which to make data-driven decisions. The Gable instrument is a widely accepted validated index on the impact of IS in different contexts. The additional demographics questions will allow cross-tabulation, between-group statistical analysis, as well as individual construct weighting. The instrument should help the authors understand how data is being used, how managers perceive their own ability to use data, and how data enhances or detracts from the decisional landscape. Once computed, the desired outcome is to illuminate what could be called modern bounds to a new era of data-driven decision-making through a better understanding of where the bounds are bringing forward Simon's concept into the data age.

Simon's (1957) original concepts presumed that the opposite of rationality was irrationality and that irrational decisions were not informed (e.g., intuition, guesswork, emotion, higher power, etc.). With data existing in almost every organization and the managerial expectation that decisions be data-driven, it could be said that decisions are now more rational using Simon's definition since computational powers now are quite impressive compared to the pen and paper models of the 1950's. However, this may be a false assumption. While Simon's work in the 1950's existed at a time before data, databases, and computers as we know them, managerial decision making remains bounded and the definition of "bounds" are still as relevant today as they were then, since the decisional pragmatics have not changed (e.g., short timelines, ambiguous problems, cognitive limitations, etc.). While computational power has increased and many routine problems are solved with decision support systems, managers now have a disproportional number of wicked problems (see McMillan & Overall, 2016 for a definition of wicked problem in a managerial

context) and overwhelming amounts of refined and unrefined data from which to solve them. It could be said that managers are expected to make decisions more quickly now than ever before due to an erroneous assumption that "having the data" leads to an optimal decision. Through a quantitative construct, completed by managers of all levels, this study will inform us of perceived insight into big data, decision-making, and bounded rationality and bring Simon's concepts forward into the 21st century.

REFERENCES

Cristofaro, M. (2017). Herbert Simon's bounded rationality. *Journal of Management History, 23*(2), 170-190. doi:http://dx.doi.org.ezproxy.libproxy.db.erau.edu/10.1108/JMH-11-2016-0060

Gable, Guy G., Sedera, Darshana, Chan, Taizan, (2008). Re-conceptualizing Information System Success: The IS-Impact Measurement Model. *Journal of the Association for Information Systems*, *9*(7) , Article 18. doi:10.17705/1jais.00164

Klaes, M. (2005). A conceptual history of the emergence of bounded rationality. *History of Political Economy, 37*(1), 27-59. doi:10.1215/00182702-37-1-27

McMillan, C., Overall, J. (2016). Wicked problems: Turning strategic management upside down. *The Journal of Business Strategy, 37*(1), 34-43 doi:http://dx.doi.org.ezproxy.libproxy.db.erau.edu/10.1108/JBS-11-2014-0129

Simon, H. A. (1957). *Administrative Behavior*. New York: The Macmillan Company.

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BLOCKCHAIN DOES NOT REPLACE FINANCIAL STATEMENT AUDITS: THE VERIFICATION ISSUE

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ABSTRACT

In a review of the IT, financial accounting, auditing, accounting information systems, and finance literatures from 2017 to 2020, this paper examines the features of blockchain technology from the viewpoint of those responsible for external financial reporting and their auditors. Accounting and auditing professionals acknowledge that advanced features of blockchain upgrade datasets. These financial professionals worry about the possible disconnect between digital and real-world transactions that can create potentially misleading illusions-of-truth. The largest objection surrounds the widespread assertion that the consensus verification may replace the financial statements or their required audit. The discussion explains why verified "on chain" data falls considerably short of audited financial statements.

This work contrasts the treatment of blockchain's consensus verification feature in IT and accounting literatures, showing a dramatic increase in this topic but little convergence between IT and financial communities on the problems with blockchain verification in auditing contexts. That is, only the non-IT literatures showing doubts about the consensus verification for reporting and auditing, revealing a potential blind spot from the technology community. Knowing the auditing community's concerns, as explored in this work, can help direct future developments in blockchain technology and target implementation suited to user needs.

Keywords: blockchain, distributed ledger, consensus verification, audit, accounting, databases

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DESIGNING MICROLEARNING MULTIMEDIA FOR HOW PEOPLE LEARN

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ABSTRACT

Although the term *microlearning* has been around since 2005 (Hug, 2005), it has just recently become more popular and in-demand as busy adults are on the move and have limited time to invest in lengthy courses or learning materials. Learners can benefit from short lessons that cover one topic or objective that can be mastered one at a time. In addition, whether it be in the workplace or in any level of education, microlearning lessons can be used as stand-alone learning objects or easily integrated into existing courses and professional development programs.

Videos are often included in micro lessons to help deliver the content. Other times, videos are, in and of themselves, the micro lesson as more advanced technologies allow designers to add interactivity and assessments in the videos. However, the question is, "how can we design microlearning materials so they can be processed more effectively by the learners" (Tufan, 2021)? Mayer's cognitive theory of multimedia learning conceptualizes the human mind as "a dual-channel, limited-capacity, active-processing system" and views multimedia as "not simply information delivery systems," but as "cognitive aids for knowledge construction" (Mayer, 2009, p. 14). As a result, Mayer's *Principles of Multimedia Learning* (2020) provide best practices for developing the video portion of a micro lesson.

This presentation will share the results of a preliminary study conducted in a higher education context to determine whether a micro lesson, re-designed using Mayer's (2020) *Principles of Multimedia Learning,* helps increase graduate students' knowledge of, and skills in a specific topic. An overview of microlearning and the *Principles of Multimedia Learning* will be addressed, as well as their benefits in higher education and professional learning environments.

REFERENCES

Hug, T. (2005). *Micro learning and narration: Exploring possibilities of utilization of narrations and storytelling for the designing of "micro units" and didactical micro-learning arrangements*. Paper presented at the International Conference "Media in Transition 4:

Mayer, R. E. (2009). Multimedia learning (2nd ed.). Cambridge, England: Cambridge University Press.

Mayer, R. (2020). *Multimedia learning*. Cambridge University Press

Tufan, D. (2021). Multimedia design principles for microlearning. In J. R. Corbeil, B. H. Khan, & M. E. Corbeil (Eds.), *Microlearning in the digital age: The design and delivery of learning in snippets* (pp. 58-79). Routledge. https://doi.org/10.4324/9780367821623

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DETERMINANTS OF CRYPTOCURRENCY EXCHANGES ADOPTION

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EXTENDED ABSTRACT

INTRODUCTION

Cryptocurrency exchanges are online platforms that allow buyers and sellers to trade cryptocurrencies for other assets like fiat and digital currencies (Corporate Finance Institute, 2021). Centralized exchanges (e.g., Coinbase, Gemini) act as intermediaries between the seller and the buyer, whereas decentralized exchanges (e.g., Unsway, Kyber) allow users to execute peer-to-peer transactions without intermediary. The use of cryptocurrency exchanges is growing word wide and, for the first time in history, the market capitalization of cryptocurrency tops 2 trillion USD in the first quarter of 2021 (CNBC, 2021). As of the beginning of 2021, Coinbase (the leading cryptocurrency exchange in the U.S.) that launched in 2012, has 56 million registered users of which only 6.1 million are active users that perform, at least, one transaction per month (Backinko, 2021). That is less than 11% of the registered users engaging in actual transactions. Why are very few registered users actively using cryptocurrency exchanges? A search of eLibrary database of the Association for Information Systems using the keywords "cryptocurrency", "cryptocurrencies adoption", and "cryptocurrency exchanges adoption" for articles published between 2010 and 2021 yielded only 34 articles. Even though one of the articles addressed cryptocurrency exchanges adoption (Saiedi, Broström, & Ruiz, 2021), none of the 34 articles specifically focused on identifying the factors of explaining cryptocurrency exchanges' adoption. Therefore, the need to undertake research that would help explain cryptocurrency exchanges' adoption.

METHODOLOGY

In this study, we used a multi-theory approach to identify the key factors of cryptocurrency exchanges' adoption and to develop a conceptual model that would have a potentially great explanatory power. The proposed model (based on the innovation resistance theory, the theory of reasoned action, the social influence theory, and the risk and technology readiness research streams) emphasizes the role of psychological innovation resistance, functional innovation resistance, technological readiness and trust, perceived risk and risk propensity, subjective norm, and critical mass of users. The model is discussed along with the research propositions it implies.

IMPLICATIONS

On the theoretical front, this study extends the research models, so far used in the IS field to explain cryptocurrency exchange platforms' adoption, by including and justifying the moderating effects of risk propensity and perceived critical mass. In terms of practical contributions, once the model is tested, it can help formulate better strategies for increasing the number of cryptocurrency exchange platforms' active users who engage in actual transactions.

REFERENCES

Backlinko (2021). Coinbase Usage and Trading Statistics. Retrieved on May 30, 2021 from https://backlinko.com/coinbase-users

Beldad, A. D. & Hegner, S. M. (2018) Expanding the Technology Acceptance Model with the Inclusion of Trust, Social Influence, and Health Valuation to Determine the Predictors of German Users' Willingness to Continue using a Fitness App: A Structural Equation Modeling Approach. *International Journal of Human–Computer Interaction, 34*(9), 882-893, DOI:10.1080/10447318.2017.1403220

CNBC (2021). Cryptocurrency market value tops $2 trillion for the first time as ethereum hits record high. Retrieved on April 12th, 2021 from https://www.cnbc.com/2021/04/06/cryptocurrency-market-cap-tops-2-trillion-for-the-first-time.html

Corporate Finance Institute (2021). Cryptocurrency exchanges. Retrieved on May 30th 2021 from https://corporatefinanceinstitute.com/resources/knowledge/other/cryptocurrency-exchanges/

Featherman M. S. & Pavlou P. A. (2002). Predicting E-services adoption: A perceived risk facets perspective. Proceedings of the 8th Americas Conference on Information Systems.

Kelman, H.C. (Ed.). (1965). *International behavior: a socio-psychological analysis.* Holt, Rinehart and Winston: New York.

Laukkanen P., Sinkkonen S., Laukkanen T. (2008). Consumer resistance to internet banking: postponers, opponents and rejectors. *International Journal of Bank Marketing, 26*(6), 440-445. doi.org/10.1108/02652320810902451

Saiedi, E., Brostrom, A. & Ruiz, F. (2021). Global drivers of cryptocurrency infrastructure adoption. *Small Business Economics, 57,* 353-406. DOI: https://doi.org/10.1007/s11187-019-00309-8

Rammile, N. and Nei, J. (2012). Understanding resistance to cell phone banking adoption through the application of the technology acceptance model (TAM). *African Journal of Business Management, 6*(1), 86-97.

Walton A., Johnston K. (2018). Exploring perceptions of bitcoin adoption: the South African virtual community perspective. *Interdisciplinary Journal of Information, Knowledge, and Management, 13,* 165-182.

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RECRUITING TRANSFER STUDENTS FROM RURAL COLLEGES IN IT/STEM PROGRAMS

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ABSTRACT

While the 2020 pandemic resulted in national decline in college enrollment, the demand in IT and other STEM specialists continues its steady growth. With the reduced enrollment, employers may face particular challenges in recruiting IT specialists in upcoming years. At the same time, universities and colleges face the need to attract the students to their IT/STEM programs, helping particularly the potential students who face certain barriers such as low income. Robert Morris University has been awarded a National Science Foundation (NSF) grant to support its efforts in recruiting low income, academically talented transfer students from rural colleges to its IT/STEM programs. During the past two years RMU has been successful in its recruiting efforts; however, the events of the past year showed that there is a need in changing its recruiting strategies. This research reports the results of a self-study targeted at developing such strategies.

Keywords: STEM, IT, community college, transfer students

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TOWARD A WEB SERVICE FOR NARRATIVE TEXTUAL ANALYTICS: THE CASE OF STORY ANALYZER

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EXTENDED ABSTRACT

This abstract describes Story Analyzer (SA), an application using Natural Language Processing (NLP) and data visualization to produce dashboards presenting major elements of narrative text. Narratives, or stories, involve characters (people or groups) interacting with one another at certain times and places. They also involve thematic and contextual elements. SA uses NLP and information extraction to identify these narrative elements, then presents this information in dashboards, such as the one shown in Figure 1.

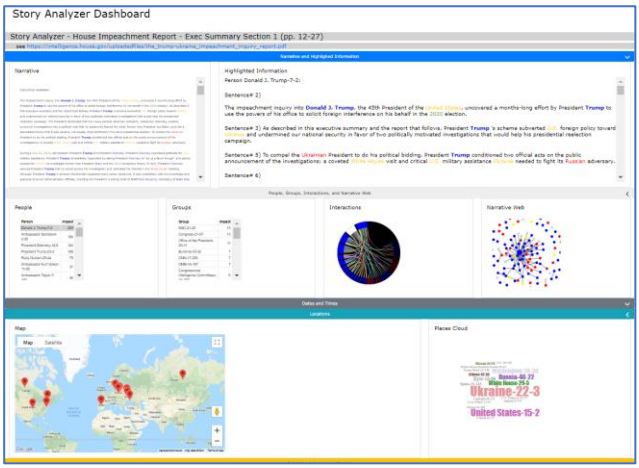

Figure 1: A Story Analyzer dashboard

SA uses Stanford's CoreNLP and JavaScript visualizations from d3 to produce its results. More information can be found at Mitri (2020) and at http://storyanalyzer.org/.

SA has been applied to many newsworthy topics, including news articles related to Covid, twitter feeds of presidential campaigns, and government documents such as the Mueller report, the House Impeachment report, the Horowitz report, and various documented impeachment-related testimonies. Dashboards of these documents can be seen via the above web site.

The overall architecture of SA is shown in Figure 2. Conceptually, it involves two pieces. The first an information extraction module that generates NLP results and identifies key elements (people, groups, places, times, contexts) from the story. The second is a visualization module that takes these results and constructs the visualizations for the dashboards.

SA was originally developed as a desktop application and is now being converted to a cloud-based web service, housed within Amazon Web Services (AWS). The main AWS services required for creating a computationally intensive multi-user web service are EC2, SQS, S3, and DynamoDB. Each of these are described below.

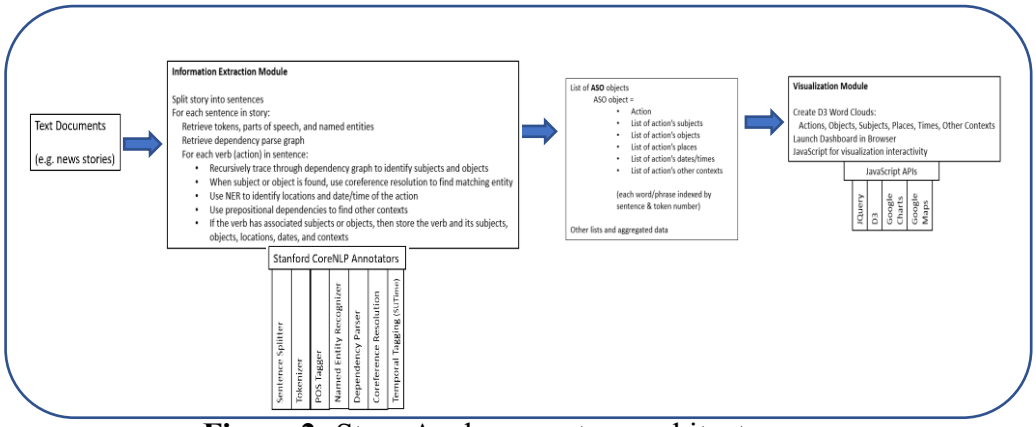

Figure 2: Story Analyzer system architecture

Simple Storage Service (S3) is AWS's main storage facility, where you can create buckets (like folders) to contain objects (like files). SA stores the data generated by its information extraction module (the SA extracts) as S3 objects. DynamoDB is a document-store NoSQL database, essentially AWS's version of MongoDB. SA uses DynamoDB to provide fast access to the S3-stored SA extracts and to cache data for servicing user requests. Elastic Compute Cloud (EC2) consists of commodity computers (complete with local storage and operating system) that can be reserved and devoted to a company's cloud-based applications. SA uses EC2 instances to house the web interface as well as doing the heavy lifting of NLP and information extraction work. Because multiple EC2 instances are needed, SA uses Simple Queue Service (SQS) to allow EC2 instances and their applications to communicate with each other. User requests are queued and processed as EC2 instances become available.

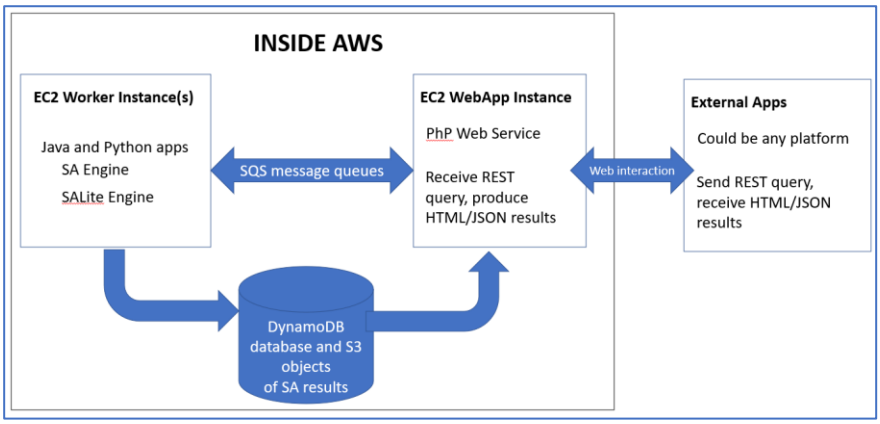

Figure 3: Story Analyzer's AWS environment

The IACIS presentation will include discussion and demonstrations of Story Analyzer in the AWS environment.

REFERENCES

Mitri, M. (2020). Story Analysis Using Natural Language Processing and Data Visualization. *Journal of Computer Information Systems.* https://www.tandfonline.com/doi/full/10.1080/08874417.2020.1774442

Keywords: Natural language processing (NLP), data visualization, information extraction, AWS services.

IACIS Proceedings of the 61st International Association for Computer Information Systems Conference - October 6 - 8, 2021 - Virtual Conference

BUSINESS ANALYTICS CAPSTONE PROJECT

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EXTENDED ABSTRACT

INTRODUCTION

Business analytics is becoming increasingly important to organizations that want to use data-driven decision making (Grubelesic, Coelho, and Jaklic, 2019). The number of analytics degree programs around the world has increased (Speier-Pero and Schoenherr (2020). Our business college, like many others, recently introduced a business analytics minor, concentration and major. The objective of our curriculum is to prepare students for business analytics careers. One way we do this is to have them work for a business client on an analytics project. These projects are very different from traditional MIS client projects and require a different approach. We report on our experiences and provide suggestions for future projects. This topic will interest to those who want to provide their analytics students with experiential learning.

BASIS OF STUDY

We work at a private, midwestern university. The University and college mission statements both include "experiential learning." Our MIS program has incorporated experiential learning for over 25 years. Students in the MIS capstone course built information systems, created web sites, designed databases, and developed e-commerce applications. Our business analytics program also includes a capstone course. Speier-Pero and Schoenherr (2020) argue that projects with practitioners are particularly valuable in developing students' analytics skills. Power et al. (2018) analyzed graduate business analytics programs and found that they focused on hands-on and real-world experiences. Clients for our traditional capstone came from word-of-mouth and Small Business Development Center (SBDC) referrals. However, we found small businesses have little understanding of information technology, and are not aware of business analytics.

We report on experiences with two different types of business analytics project. The first, in spring of 2020, was with a local restaurant chain that has four locations in the region. The client wanted a better understanding of student perceptions of the restaurant, and insights from its sales data. The students conducted a campus survey to get data on student attitudes. They used various tools, including spreadsheet and visualization tools, to analyze the results and provide insights to the owner. They obtained data from the organization's point-of-sale (POS) system, and analyzed sales by time of day and by product. The team obtained (publicly available) voter records, and provided a heat map of sales by voter precinct. The project was a success because the students demonstrated what data the restaurant chain had and how to use it for decision making. Their recommendations included how to attract college students, times the chain could reduce staffing, and the possible elimination of certain menu items.

The other two business analytics projects, in spring, 2021, involved working with a large regional healthcare provider, a client who understood the value of analytics. The organization had secured a grant to test different approaches for improving the rate of breast cancer screenings. They texted some patients, telephoned others, and invited a third group of patients to community events where healthcare workers would try to get the attendees to sign up for (breast cancer) screenings. The study had begun before the semester started and was still in progress when the semester ended. The client knew about healthcare and the need for the study but lacked analytics expertise. They asked each of the two student teams to prepare a short proposal explaining what analysis they planned to perform. The study involved healthcare patients, but students were not permitted access to any patient data because it could involve personally identifiable information (PII). One team proposed a market segmentation analysis. The other team struggled, then finally decided to do a cost/benefit analysis. The client enthusiastically supported both proposals. But each team needed to do academic research to better understand the context of the analysis they planned to do. The cost/benefit team also obtained cost data from an operations manager in the healthcare organization. Both teams provided useful analyses.

DISCUSSION AND IMPLICATIONS

These projects took place in spring semester of 2020 and 2021. There were no face-to-face meetings with the client. Students in the restaurant project obtained detailed data and provided useful analysis to the client while educating him on the value of business analytics in decision making. The healthcare teams were not able to analyze study data. They relied on other published healthcare studies to formulate their recommendations. The segmentation team found research that discussed usage of various social media among different age groups. They also used aggregated patient responses from the study. Their analysis included data visualizations and recommendations based on previous research and the response rates of the study group. They suggested ways the healthcare organization could analyze the final data using patient details. The cost/benefit team obtained actual costs from the study: texting costs, labor cost of phone calls, and the labor and promotion costs for community events. They had treatment costs related to the cancer stage (1-4) at which an individual was diagnosed. For example, detection at stage 4 involves more expensive treatment than a stage 1 diagnosis. The client was very satisfied with the analysis done by both groups. However, the students did not feel a sense of accomplishment. They did not get to use the tools and techniques they learned in their previous business analytics courses as they expected they would. Their projects required them to work more on the front end rather than analyzing final results. Analytics may involve everything from design to data collection, prep and cleaning, to storage and finally the analysis itself. But the students were fixated on the analysis and did not appreciate other aspects of analytics.

CONCLUSIONS

We plan to continue working with business clients for our business analytics capstone course. The experiential learning and client interactions are valuable to our students. We are exploring opportunities with larger organizations who may have their own analytics department but would be willing to involve our students in their projects, or clients who already have their data.

REFERENCES

Grublješič, Tanja; Coelho, Pedro Simoes; and Jaklič, Jurij (2019). The Shift to Socio-Organizational Drivers of Business Intelligence and Analytics Acceptance. *Journal of Organizational & End User Computing*, *31*(2), 37-64.

Power, D. J., Heavin, C., McDermott, J., and Daly, M. (2018) Defining business analytics: an empirical approach. *Journal of Business Analytics*, *1*(1), 40-53.

Speier-Pero, Cheri, and Schoenherr, Tobias (2020). Creating Impactful Student Learning in a Business Analytics Program Through Leveraging Scholar-Practitioner Engagement. *Decision Sciences Journal of Innovative Education*.

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THE INTERNET OF THINGS AND THE DISRUPTIONS OF INNOVATION

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EXTENDED ABSTRACT

The new era of technology also known as "The era of Internet of Things" (Nekit et al., 2020) has brought many breakthroughs in different sectors such as healthcare, infrastructure, computing. The Internet of Things is an evolution from the Internet that is creating a disruption in society. The impact is not only in the economical but in social inclusion, privacy, accessibility, and job functions. The literature discusses the industrial revolution of the Internet of Things and the changes and challenges that have created in society. How users have been affected by the changes during this new industrial revolution of the Internet of Things?

Project Description: According to O'Brien (2016) the Internet of Things consists of a third wave of the Internet. Other experts called this the Fourth industrial revolution (Shuo-Yan, 2019) the expansion of the Internet in society creating a disruption in innovations. Disruption consists of a technology that alters the way and the negative impact on individuals that have limitations to this technology. The Internet of Things creates innovations and disruptions, some innovations include 5G Broadband and smart watches, these two innovations provide users an improvement in connectivity, while the other one provides users with their health information. The disruption of these innovations were security breaches and collection of information from sites. According to Weber (2019) more than 4.7 billion customers have been affected in the past two years from security breaches. Users can take some actions to minimize the risk of breaches by using complex passwords and changing them every six months, monitor financial accounts constantly, use two factors of authentication and do not overlook non-financial accounts such as travel agencies and airlines accounts. A second disruption is the collection of information of sites without the knowledge of users. Current laws are helping on the clearness about data retention and users can be aware when it is enough, and they can extract or delete the data.

According to Lindqvist and Neumann (2017) IoT has many risks and vulnerabilities therefore some data is compromised and used without any consent. Hospitals and healthcare providers have been affected the most due to the usages of devices such as USB drives, laptops, EHR systems (Essa et al., 2019). Another way the Internet of Things is affecting users is in security and trust that consumers have to certain retailers. According to Blythe et al (2020) consumers are willing to pay more for security in IoT to reduce risks and crime.

After reviewing the literature, it can be determined that the Internet of Things provides an opportunity to improve current activities to users such as providing health, better connectivity but the downside of the new technology is security breaches and data retention. According to Hassan et al (2020) IoT is expanding rapidly and employs different devices detection, sensors which focus

is to improve user's optimization and safety but simultaneously this expansion brings challenges and opportunities.

Implications- The Internet of Things has a major challenge in the legal aspect to protect user's data, nowadays this is an ongoing process for outlining the laws that are necessary to protect data collection (Nekit et al., 2020). There is a lack of standards that protect users and companies. Some examples of current standards are the IEEE, draft standard for Architectural framework and ITU overviews of the Internet of Things. The challenge for these standards is that the line that divides users and devices is intangible and will affect national security (O'Brien, 2016). Efforts to regulate and assist users and companies in case of security breaches is an ongoing activity, experts from different sectors and industries would need to work together to minimize future threats.

Conclusion- The future of the Internet of Things is promising in diversified sectors such as Healthcare, Environmental, Commercial, Industrial, and Infrastructural. The downside of these fast revolutions is that each sector encounters different challenges. The common challenge is user's privacy and security and authentication (Hassan et al., 2020). Government has implemented new laws and amends other ones to cover the disruptions that the Internet of Things have created (Lindqvist & Neumann, 2017). Users need to be educated in essential cybersecurity tools, strong passwords, do not expose personal information on social media. The Internet of Things is becoming popular for every daily aspect of new applications such as self-driving vehicles, that are bringing new challenges for governments and laws and recommendations of best practices.

The current problems will be diminished but with any new tool there will be challenges, users need to be proactive and implement this Internet of Things in the most appropriate and responsible way. Technology will continue to evolve and mature, and users will experience the benefits, disruptions, and ethical issues that it will bring.

REFERENCES

Blythe, J. M., Johnson, S. D., Manning, M. (2020). What is security worth to consumers? Investigating willingness to pay for secure Internet of Things devices. *Crime Science, 9*(1), 1.

Burnett, G. (2008). Digital divide. In S. Clegg, & J. R. Bailey, *International encyclopedia of organization studies*. Sage Publications. Credo Reference:https://go.openathens.net/redirector/mga.edu?url=https%3A%2F%2Fsearch.credoreference.com%2Fcontent%2Fentry%2Fsageorgstud%2Fdigital_divide%2F0%3FinstitutionId%3D3733

Essa, Y. M., Hemdan, E. E.-D., El-Mahalawy, A., Attiya, G., El-Sayed, A. (2019). IFHDS: Intelligent Framework for Securing Healthcare BigData. *Journal of Medical Systems,43*(5), 124. https://doi.org/10.1007/s10916-019-1250-4

Hassan, R., Qamar, F., Hasan, M. K., Aman, A. H. M., & Ahmed, A. S. (2020). Internet of Things and Its Applications: A Comprehensive Survey. *Symmetry* (20738994), *12*(10), 1674. https://doi.org/10.3390/sym12101674

Lindqvist, U., Neumann, P. G. (2017). The future of the Internet of Things. *Communications of*

the ACM, 60(2), 26-30.
Nekit, K., Kolodin, D., Fedorov, V. (2020). Personal data protection and liability for damage in the field of the internet of things. *Juridical Tribune / Tribuna Juridica, 10*(1), 80–93.
O'Brien, H. M. (2016). The Internet of Things. *Journal of Internet Law, 19*(12), 1–20.
O'Brien, H. M. (2018). The Internet of Things: A Mosaic. *Journal of Multidisciplinary Research* (1947-2900), 10(3), 81.
Shuo-Yan Chou. (2019). The Fourth Industrial Revolution: Digital Fusion with Internet of Things. *Journal of International Affairs, 72*(1), 107–120.
Weber, R. M. (2019). Innovation and Disruption in Technology. *Journal of Financial Service Professionals, 73*(2).

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ETHICS AT THE INTERSECTION OF EMERGING TECHNOLOGIES: BIO-IMAGING + NANOTECHNOLOGY = BIG DATA

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ABSTRACT

All research projects need to consider several dimensions of ethics, i.e., research ethics, data ethics, and professional codes of conduct. Emerging technologies yield new considerations that may result from the combination of technologies, new types of data, disciplines, and societal expectations. An example is the use of nanotechnology in bio-imaging.

This paper is an exploratory attempt to identify the ethical issues for which researchers must be accountable. Bio-imaging is any imaging used in biology. Nanotechnology is the branch of technology that deals with dimensions and tolerances of less than 100 nanometers, especially the manipulation of individual atoms and molecules. When bio-imaging is performed with nanotechnology sensors, large amounts of data will be obtained.

This paper will discuss one unresolved issue: the protection of such data across networks, often in international jurisdictions.