

Accepted Manuscript

Essence of digital transformation—Manifestations at large financial institutions from North America

Himadri Sikhar Pramanik, Manish Kirtania, Ashis K. Pani

PII: S0167-739X(18)30895-1
DOI: <https://doi.org/10.1016/j.future.2018.12.003>
Reference: FUTURE 4624

To appear in: *Future Generation Computer Systems*

Received date: 14 April 2018
Revised date: 17 November 2018
Accepted date: 6 December 2018

Please cite this article as: H.S. Pramanik, M. Kirtania and A.K. Pani, Essence of digital transformation—Manifestations at large financial institutions from North America, *Future Generation Computer Systems* (2019), <https://doi.org/10.1016/j.future.2018.12.003>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



ESSENCE OF DIGITAL TRANSFORMATION – MANIFESTATIONS AT LARGE FINANCIAL INSTITUTIONS FROM NORTH AMERICA**AUTHOR NAMES AND AFFILIATIONS****Himadri Sikhar Pramanik**

Marketing Transformation - Research

Tata Consultancy Services

Plot No. C, Delta Park Eden Building, Block EP & GP, Sector V, Electronics Complex, Salt Lake City, Kolkata - 700091, India

email: himadri.pramanik@tcs.com

Manish Kirtania

Marketing Transformation - Research

Tata Consultancy Services

Plot No. C, Delta Park Eden Building, Block EP & GP, Sector V, Electronics Complex, Salt Lake City, Kolkata - 700091, India

email: manish.k@tcs.com

Dr. Ashis K. Pani

Dean and Professor Information Systems

XLRI - Xavier School of Management

Post Box: 222, C.H. Area (East), Jamshedpur – 831001, India

email: akpani@xlri.ac.in

ABSTRACT

There is focus among most leading academic institutions globally to understand digital transformation. While most operate on some common premise related with the construct of digital transformation there is no established definition yet. Existing descriptions cover a wide range of things from smart living, future of work, automation, industry convergence, and technology among others. These are sometimes fairly all encompassing, inconsistent and incomparable as a point of reference. Interestingly, major consulting firms, technology promoters, independent influencers, analysts promote transformation solutions, each with their own models, interpretation and descriptions.

In the paper, we develop a better understanding on what is the nature of demand for digital transformation. This is based on evidences of narratives from large financial institutions. We scoped our study on four large banks in North America to see - is there an essence of transformation when institutions adopt digital technology? The paper deals on key themes – drivers, benefits, perception of digital transformation, readiness of banks and deployment instances. Understanding how large financial institutions are adopting digital technologies is important for contemporary technology providers, institutions, researchers and analysts.

The study conducted is qualitative along with associated quantitative techniques and visual analytics. This is achieved by thematic based narrative analysis of the public disclosures from four large North American Banks across five years (FY'13 – FY'17). The research analyzes the relevant narratives to code them into logical themes thereby providing a view of the key focus and associations. Through the study - it is observed institutions are at varied levels in their ability to explore, adopt and exploit digital technologies. Analyzing the practices and manifestations of the institutions this research classifies standard and more advanced differentiating practices. This leads to an emergent structure for a Digital Transformation Maturity Model (DTMM). The authors believe these will serve as indicative

maturity guidance for digital technology adoption by financial institutions, in similar context and will also be beneficial to technology providers.

(I) INTRODUCTION

“Technology is a gift of god. After the gift of life it is perhaps the greatest of god’s gift. It is the mother of civilizations, of arts and of sciences.” —Freeman Dyson

In recent times there has been proliferations and applications of multiple digital technologies including - social, mobile, analytics, cloud, internet of things, artificial intelligence, 3D printing, blockchain, autonomous vehicles, wearables, and augmented reality. Perspectives from some researchers are indicative towards ushering in of a machine age [1] with digital technologies, hardware, software, and networks being at the core. The increasing trend of newer institutions / technology start-ups developing business models around digital technology as a principal resource is prevalent globally. These new institutions are not only growing in number – but also are generating innovations and economic value with great agility. [2] Continuous innovations disrupting traditional business models, extension of business eco-systems, prominence of financial technology (Fintech) start-ups, and customer’s preference for digital experiences make it imperative for traditional financial institutions to reckon with the prospects of digital technologies. Large banks cannot overlook how fintech competition is unbundling banking value-chain through specialized services. [3]

Large institutions harnessing digital technology resources may have many motives - meet stakeholder expectations including compliances, simplify processes, innovate, generate benefits, prepare for risks and competitions while improving business models among others. This qualitative research explores across narratives - the key motives and practices of four large North American banks as evidenced from their public disclosures (spanning five years FY’13 – FY’17). The paper provides an understanding on which the nature of demand and actual essence of digital transformation. The research deals on key themes – drivers, benefits, perception of digital transformation, readiness of banks and the deployment instances. Observed evidences have been codified into relevant themes, represented through visual analytics and classified as standard and matured practices. The analysis of narratives is aligned to existing literature, validated by expert technology practitioners - qualified by a grounded theoretical understanding of the context in which large institutions transform through adoption of digital technologies.

Understanding digital technology adoption by large institutions has many significant contributions. This study indicates the essence of transformation (if any) from the perspective of large banks in major economy (scope can be expansive and contrasted to observe variations). The findings on - drivers, benefits, perception, readiness and deployment instances bring out the real essence of transformation. Narrative analysis also indicates standard and advanced differentiating practices among institutions. This provides guidance in understanding maturity and varied levels of institutions – as indicated in the proposed Digital Transformation Maturity Model (DTMM). The findings of the research not only hold implications for technology providers to understand the demand perspective, the findings will also serve as guidance for institutions in similar context. It will provide relative benchmarks.

Beyond the introduction the manuscript is organized in five key sections. Section (II) deals with theoretical background and includes discussion on – technology adoption by institutions, digital business strategy, technology enabled transformation and digital transformation of banks. Section (III) includes discussion on the methodology of the research. Section (IV) includes the findings. This section includes understanding the narratives based on visual analytics followed by theme-based narrative analysis. Section (V) is dedicated to understanding the implications of the findings and how the findings may be further classified to understand maturity of digital transformation. We conclude the report with Section (VI) includes the potential of future research on this.

(II) THEORETICAL BACKGROUND

Technology Adoption by Institutions: This section explores technology adoption models relevant at an institutional level in information systems (IS) literature. Perhaps the three most popular models are Roger’s Diffusion of Innovation (DOI) [4]; Technology, Organization, and Environment (TOE) [5] [6] framework by DePietro, Russo, Warda, Edith & Fleischer, Mitchell Tornatzky and Fleischer (1990) and Iacovou’s Model (Inter-Organizational Systems – IOS) [7] studying the influence of Inter-organizational Systems. The DOI theory at firm level discusses how technology adoption and innovativeness is related to independent variables as individual (leader) characteristics, internal organizational structural characteristics, and external characteristics of the organization. Roger’s Diffusion of Innovation theory dwells on the individual leader characteristics as an influence

on organizational technology adoption. Our research analyzes multiple leadership narratives to assess this. The TOE framework identifies three aspects of an institution's context that influence the process by which it adopts and implements technological innovation as - technological context, organizational context, and environmental context. The TOE framework makes Rogers' innovation diffusion theory better able to explain intra-firm innovation diffusion. [8] This research includes initiative across multiple lines of business of the bank. There are multiple instances of research studies applying DOI and TOE models singularly; also in conjunction and along with other relevant models in instances to assess technology adoption. [9] One of particular relevance is Institutional Theory [10], [11] emphasizing that institutional environments are crucial in shaping organizational structure and actions, where decisions are not driven entirely by rational goals of efficiency, but also by social and cultural factors and concerns for legitimacy. In many cases decisions to adopt technology may not be purely internal motives; institutions are likely to be induced to adopt and use technology by external isomorphic pressures [12] from competitors, trading partners, customers, and government and other dominant actors of the institution's eco-system. Mimetic, [13] coercive, and normative institutional pressures and generic trends may influence disposition towards technology. [14] All these are likely to play out in relevant ways for digital technologies as well – given there is a significant promoter base of vendors, industry analysts, influencers and adopters. The institutional theory adds to the environmental context of the TOE framework. Iacovou et al analyze Inter-Organizational Systems (IOSs) characteristics that influences institutions to adopt technology. The framework is based on three factors: perceived benefits, organizational readiness, and external pressure. While perceived benefit is a distinct newer inclusion in contrast to TOE; organizational readiness may be seen as combination of the technology and organization context. It may be noted that these theoretical models explain technology innovation and adoption at an institutional level, have significant overlaps. Themes of study in our research - drivers, benefits, perception, and readiness are aligned and relevant to literature.

Digital Business Strategy – Beyond Technology Adoption: Institutions demonstrate focus towards emergence of digital business strategy - '*organizational strategy formulated and executed by leveraging digital resources to create differential value*'. Digital technologies are rendering capabilities and resources beyond solving discrete problems – it is enabling institutions to use technology resources to develop core-competencies and competitive advantage. Existing literature around institutional technology adoption does not include explicit considerations of a guiding digital business strategy. Institutions adopting digital technologies moderated through a digital business strategy are likely to evaluate and consider parameters of significance to any business strategy formulation. The construct of digital business strategy is emergent across institutions.

Emerging point of views around themes of digital business strategies may be categorized as (1) the scope of digital business strategy, (2) the scale of digital business strategy, (3) the agility of digital business strategy in terms of execution and continuity, and (4) the source of business value creation. [15] Key considerations for scoping digital strategy would be influenced by institutional eco-system, intent to leverage digital opportunities for value creation, integration of processes and functions. The scale and speed of digital strategy will consider leveraging networks and eco-systems to innovate. Business value creation is indicative through performance metrics, is likely to be variable, dependent on maturity and ability to track and attribute value generated from the digital initiatives.

Another theoretical perspective of digital business strategy indicates it as a set of strategic responses to the collective choices of industry competitors that is shaped by industry conditions leading to the construct of digital strategic posture (digital focus relative to the industry norm). [16] Although the term strategic posture is used in a general way to refer to "*crucial strengths and weaknesses from a strategic standpoint*" by Porter, the concept of digital strategic posture focuses attention on a particular institution's stance with respect to digital activities of peers in its industry environment. Digital strategic posture is viewed to complement other strategic postures including entrepreneurial posture, market orientation, consumer orientation, competitor, innovation and technology orientation. This research explores multiple narratives that brings out bank's strategic focus towards digital technology.

Transformation through a Digital Technology Exploitation: Institutions are at varied levels with regard to adopting digital technologies. Transformation is likely to be variable for institutions and is dependent partly on the level of maturity of technology adoption. Westerman et al. [17] attempts to define digital transformation as "*the use of technology to radically improve performance or reach of enterprises*". The study by Westerman identified that digital transformation touches institutions in three main areas - Customer Experience, Operational Processes and

Business Model¹. Another definition by Lankshear and Knobel [18] indicates transformation as ultimate level of digital literacy that “*is achieved when the digital usages which have been developed enable innovation and creativity and stimulate significant change within the professional or knowledge domain*”. Some attempts to define digital transformation relate to *digital citizens and smart living* – in a way indicating how institutions need to align with its customer and stakeholder expectations. Bennis points out that digital business strategy is an important transformational issue for leadership. [19] Digital technologies are transforming customer-side operations and institutions are increasingly looking for effective digital business strategies to leverage technologies. [20]

The essence of transformation is not only in implementing new age technologies but also in the ability of the institution to re-imagine possibilities including extension, interactions, convergence, modularization and integration of prevalent business with digital technologies. [21] The capability of institutions to re-imagine and exploit digital technologies to transform may be determined by many factors. The leadership focus towards a cultural shift, openness towards risk-taking and rigor towards formulation of a digital business strategy are particularly significant. [19] In a research [22] by IBM institute for business value the historic evolution of digital transformation is traced back to the 1990s² and beyond. Digital transformations are impacting industries along the physical-digital continuum in varying degrees – from a low-level in primarily physical (examples: agriculture, consumer products, industrial products, metals and mining); to moderate level in mixed digital and physical (examples: aerospace and defense, automotive, banking, consumer electronics, healthcare, medical devices, publishing, education, retail, telecommunications); to high level in primarily digital (example: financial markets, gaming, music, software). The industry environment influences the extent to which digital strategic posture has a convergent or divergent effect on an institution’s digital strategy [16] resulting in transformative outcomes.

Digital Transformation of Banks and Financial Institutions: Banks have high dependence on digital - consume both information and financial technologies. The financial institutions are fairly regulated and there has always been the need to change to meet regulatory compliances. Present legislations encourage increased openness of bank’s architecture, obliges systems and account transaction data accessible to card less, account-to-account payments systems and aggregation services. [23] Besides, regulations - the rapid proliferation of technologies like smartphones, artificial intelligence, big data, and analytics; emergence of new competitors—financial technology startups (FinTech); and changes in customer’s attitudes and behaviors are impetus for banks to transform and innovate. The pace of changes in financial services seems to be increasing—riding on the urge for the industry to react. [24]

Successful industry disruptors employ ‘combinatorial’ transformation levers in which multiple sources of value—cost, experience, and convergence among others are fused to create business models of exponential gains. [25] FinTech startups are unbundling financial products and services - seizing profitable business, while avoiding the regulatory entry barriers experienced by full-service banks. In other words technology led transformation of financial institutions is breaking up the value chain, forcing re-consideration of dynamic value points. The objective is to provide superior value while avoiding the capital investments, regulatory requirements, and other impediments with a new and different business model. Digitization of products, services, and business processes allow these disruptive players to deliver augmented solutions.

Patterns of digital transformation indicate how banks and fintechs are reducing the gap to meet customer’s expectations emphasizing on simplicity; transparency; self-service; ease of customer acquisition; ease of distribution, commercial attractiveness; and specialization. [26] Research indicates discussion on two constructs -

¹ **Customer Experience** includes understanding customers, growth through enhancing customer experiences and customer touch points providing integrated experience across digital touch points.

Institutions can also use digital technology to enhance and automate the operational processes. Westerman et al. divides the transformation of **operational processes** further down into three segments: process digitization, worker enablement and performance management.

Business Model(s): At its simplest form, digitalization can enable globalization and access to new markets and create new businesses. This also entails providing something new to existing businesses, in the form of value-adding services or augmenting the products or services with digital components.

² **Summary of Findings:** By the late 1990s digital products (music, entertainment) and infrastructure (telecommunications, software, IT) were generating limited degree of economic impact. By 2000s there was the emergence of digital distribution (usage in Government) and web strategy (e-commerce) – generating moderate degree of economic impact. 2010 onwards an onslaught is observed in digital transformation of business models (both in public and private institutions) manifested through mobile revolution, social media, hyper-digitization, powerful analytics and other new-age digital technologies.

customer orientation capability and customer response capability as key considerations for banks to differentiate. [27] Information quality has an impact on the customer service capabilities. The more sophisticated the customer service process are, the stronger is the relationship between information quality and customer service capabilities. Findings indicate that there is a direct impact of digital technologies on the customer service performance. [23]

It is also interesting that in this improvement driven transformation – humans may have a lesser role to play. With increased focus on automations, algorithmic decisions, hybrid or robotic interfaces, artificial intelligence, analytics, mobile, drive for self-service - it is not the humans who are competing for excellence against each other. [28] Humans are facing sophisticated technology innovations – giving rise to transformational paradigms of future of work. This impacts customers and employees and how human-machine, machine-machine work flows will transform. Discussions on the future of work, how banks would engage customers are increasingly relevant areas of discussion as financial institutions transform globally. Our research explored interesting narratives on this area.

There is a great deal of similarity among digital technology led transformation evident from financial institutions introducing similar, almost identical, competitive strategies. [29] Research indicates that digital transformation initiatives have commonalities - divided primarily into four different dimensions - use of technologies, transform value creation, change structures and focus on financials. [30] Despite focus on transformation - it is difficult to sustain the benefits from transformation. Financial product innovations are quickly replicated with minimal differentiations. Literature scan on the phenomena of technology led transformation of financial institutions indicates need for further research. Research focus is required on - How do companies in the financial service industry handle the challenges of transformation, new business model and disintermediation? How and where can digital technologies enable new business models? Where are the limits of digitization in terms of the return on investment? How do financial service providers balance between customers with technology affinity and 'traditional' customers? Indicative answers to some of these questions come up through our narrative analysis of the studied banks.

The research methodology that follows in section II is derived from qualitative narrative analysis of public disclosures over the last five years. It provides an ingenious way to discover what the 4 large banks are focusing on in a high technology embracing market - North America. This brings out the real essence of digital transformations as described in details through various themes that became evident in the findings (section IV). This research can be further generalized by including more financial institutions and assessing across geographical/market variances.

(III) METHODOLOGY

Identification of sample, data source and data collection: The research studies tenets of digital technology led transformation demonstrated by large financial institutions from North America. Four such institutions have been identified (indicated in this research as Bank 1 through 4) - all holding greater than one trillion USD in asset. All four banks have significant focus towards harnessing digital technology and are of global significance. [31] The narratives obtained from the public disclosures of the four banks detail out focus on digital technology through dedicated initiatives, research, innovation and leadership intent.

Annual statements and disclosures of public institutions are considered fairly reliable data sources [32]- indicates institutional focus, initiatives and performance among others. All the annual reports analyzed in the study were obtained from the respective institution websites available for public disclosure in investor relations section. These reports are mostly available in pdf format. The reports were scanned/searched for relevant narratives around a set of keywords³ aligned to the scope of study on digital technology adoption, transformation, institution's business models and strategy. The data from the banks disclosures has been captured across twenty financial reports over five years to understand continuity of observations. The annual public disclosures (for FY'13 to FY'17) of the

³ **Search Strategy (set of keywords):** Ability, Agile, AI, Analytical, Analytics, API, Artificial Intelligence, Automation, Augmented Reality, Benefit, Big Data, BI, Blockchain, Bots, Business Intelligence, Capability, Captives, Change, Channel, Cloud, Competition, Compliance, Context, Cost, Customer, CRM, Bots, Data, Digital, Disrupt, Disruption, Disruptive, Drones, Experience, Faster, Financial Technology, Fintech, Focus, Future, Growth, Efficiency, Idea, Imagine, Improve, Incentive, Infrastructure, Innovation, Internet of Things, IOT, Insight, Intelligence, Invent, Learn, Network, Mobile, Mobility, Model, Modify, Modification Multi-channel, Network, New-age, Omni-Channel, Open Banking, Partner, Payment, Platform, Predict, Process, Reach, Readiness, Ready, Real-time, Re-engineer, Regulations, Regulatory Technology, Re-imagine, Research, Risk, Robo-advisory, Robotics, Robotic Process Automation, RPA, Robust, Security, Share, Simplification, Smart, Social, Social media, Social Network, Strategy, Technology, Transformation, Transformative, Value, Vendor, Virtual Reality

institutions are considered for this longitudinal research. [33] We choose calendar year 2012 – 2018 mapping to FY'13 through FY'17 for the banks. Previous examples of annual statement based analysis contrast between two years to study differences in communication in response to external environmental variation. [34], [35] This longitudinal research design examines five years to include gradual and consistent emergence in technology and continued institutional focus. The time period of study is aligned with the period of increasing focus on digital technologies globally and emergence of specialized financial technology start-ups. [21] Twenty annual reports spanning five years indicates the four banks' response to their operating environment. [7], [6]

All communications as appearing in the annual statements with regard to digital technology are considered in the study. The relevant and associated narratives and visuals yielded from the keyword search strategy were collated in word-document. Multiple iterative keyword searches, done using the find feature in pdf, helped understand association, overlaps and stand-alone ideas among the narratives. While initial scan of the reports were limited to a few basic keywords on digital technology, a comprehensive list of keywords evolved through multiple search iterations by understanding associations and meaningful contexts of the narratives. The keywords were validated from experienced researchers and practitioners of digital technology to ensure comprehensiveness. In total around ~37984 words were considered relevant for narrative analysis. The words are discovered in context as parts of sentences, paragraphs, tables, visuals based on relevance to study. They were collated from twenty annual reports.

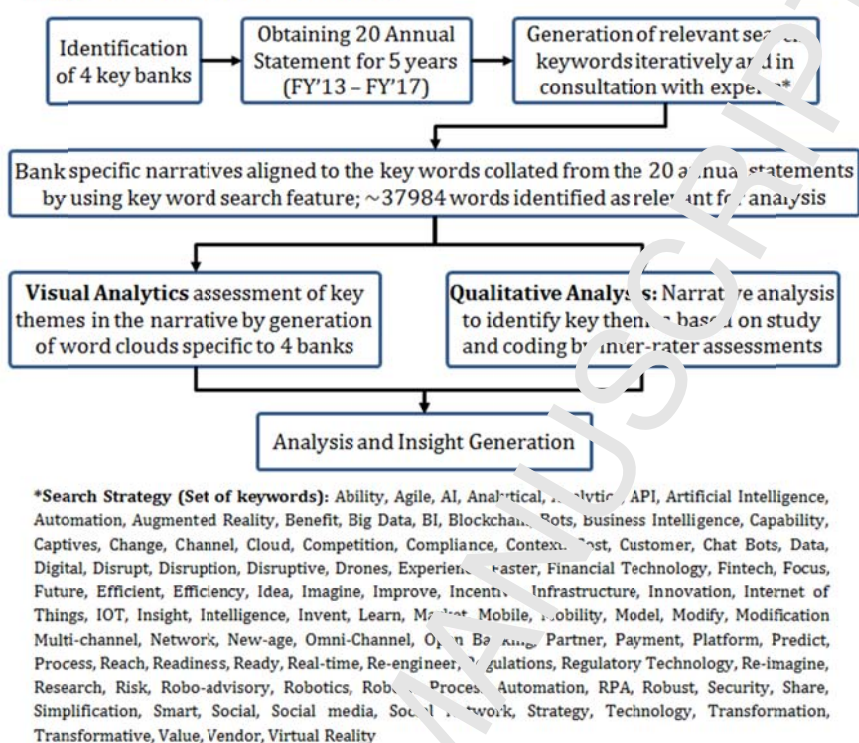
Data Analysis: This is achieved in a blended manner using (i) visual analytics techniques and by applying (ii) qualitative theme based narrative analysis⁴ as is shown in the *Figure 1. Overview of Research Methodology*.

- (i) The visual analytics involved development of four word clouds by including all the relevant narratives segregated for each bank. Word clouds are fairly established for visualizing narratives. A word cloud is defined as a set of words $W = f(w_1 \dots w_n)$, where each word is assigned a position $p = (x; y)$ on two dimensional plot and visual attributes including size, color and orientation (horizontal or vertical). Selection and size of words in a cloud indicates the importance of a word in a document denoted as weight. Typically term frequency is used as an input to develop the clouds. [36] Word clouds were generated using MS Office Software – Pro Word Cloud tool. The four word clouds generated one for each bank helped ascertain their prime focus areas around digital transformation.
- (ii) The narratives were coded applying theme based narrative analysis techniques for qualitative research [32]; further analyzed to present the findings and insights. Qualitative information in-addition to the narratives; included relevant pictures, graphs, and illustrative tables and if any dedicated specific section on digital technology focus was available in the annual reports. Such components play a very central role in corporate communication practices. [37], [38]

Figure 1: Overview of Research Methodology

⁴ **Narrative research** is a term that subsumes a group of approaches that in turn rely on the written or spoken words or visual representations. Narrative research can be considered both a research method in itself but also the phenomenon under study. Data collected as narratives can be coded to define the **core constructs and themes emerging** from the data. While some of the themes derived through the analysis may be **inductive** as it would be grounded by theory, it may also be **deductive** - we can discover some newly emerging themes.

Investigating the essence of Digital Transformation among large banks in North America



Data Coding Process: The research bases its coding process on categorization of the narrative disclosures into five broad themes of relevance and related sub-themes. These themes were arrived at through **three considerations**. The **first** being views on technology adoption from extant literature review and expert opinion. The **second** is from the exploratory study which factored identification of any new theme or particularly sub-themes emergent from the narratives itself. The **third** being the high frequency terms as identified from visual analytics – more from a validation perspective. Visual analytics was followed by theme-based narrative analysis to unearth contextual answers to key research questions (RQ):

RQ1: What are the external drivers influencing digital transformation of banks in North America?

RQ2: What are the observed benefits of adopting digital technologies?

RQ3: How do banks perceive digital transformation? Alternately – What is bank's attitude to digital technology?

RQ4: What is the banks readiness and intention to deploy digital technologies?

RQ5: What are the instances of usage and deployment of digital technologies?

These questions formed the themes and basis on which the coding and narrative analysis was conducted. Within each of the themes appropriate narratives have been identified as indicative manifestations. This is in context to four large banks from North America. Similar study may be extended to other geography and smaller banks. The process of codification of the narratives also factored in categorization by year of study to assess the continuity of themes for likely trends.

Relevance, Rigor and Robustness of Research Methodology: Choosing a single industry context in this research ensures that the business environment is consistent across the institutions within the geo-size segment. The banking financial services industry provides access to sufficient number of publicly listed significant institutions globally to make a usable sample for future research and more generalizing findings.

Narrative analysis of annual reports has been in practice and more so recently with the emergence of disclosure norms like International Integrated Reporting [39] it is important to study institutional communications. Impacts of external environment on such communication have been studied primarily to discover self-serving biases in some

instances. [40] While findings from such studies have been ambivalent [41] it remains a prime indication of institutional initiatives, priorities and the communication focus. This research analyzes the content and the form of communication as observed by North American banks indicating their responses, readiness towards digital, innovation led differentiation and likely technology disruptions among others. Irrespective of some limitations on self-serving biases, data sources as part of institutional public disclosure may be considered reliable. Annual statement disclosures are regulated and need to comply with disclosure expectations.

Other limitations of the narrative analysis relate to subjectivity in connection with the coding process. [42] Reliability can be ensured through a systematic and methodical analysis of the data by application of prescribed processes in analysis. [43] Guidelines relate to two separate considerations – (i) reliability of analysis, and (ii) verifying that the applied coding instrument is reliable. (i) is achieved by use of multiple coders (*In this research 3 authors separately evaluating the narratives and reporting minimal discrepancies between the coders*). With regard to (ii) authors ensured well-specified categories and rules for coding. Some previous instances of theme based narrative analysis indicates that application of a rigorous approach for (ii) reduces the need for multiple coders. [44] In this research, internal validity and reliability is secured through the application of a formal coding procedures. The narratives were assessed separately by the three authors towards arriving at a consensus. Ensuring process validity also denotes internal validity through adherence of a coherent methodology. [45] Moreover, the blended methodology enabled output comparison between visual analytics and qualitative theme-based narrative analysis. This indicated aligned finding in a way triangulating findings through mixed methods applied on the data set (*narratives from banks*).

(IV) FINDINGS AND ANALYSIS

Visual Analytics: Narratives from the four banks were segregated to develop four word clouds. This helped in understanding the primacy of communication indicating focus of the respective banks. The output of word cloud generated using MS Office Software – Pro Word Cloud tool is captured in *Figure 2*.

The primacy of the words ‘customers’, ‘clients’, ‘users’ across the 4 word clouds coupled with ‘experience’, ‘relationship’, ‘service’ clearly brings out *customer-centricity* as a key driver with regard to digital transformation. There is a high frequency of discussion around ‘technology’, ‘mobile’ and ‘digital’ – brings out the key *innovation-focus* of banks on hand-held and mobile devices. Other focus areas observed from the word cloud are ‘channel’, ‘ATM’, ‘payment’, ‘platform’, ‘branch’, ‘app’, ‘analytics’ among others – brings out banks’ *exploration horizon/manifestations of usage*. The clouds for the banks reveal words like – ‘speed’, ‘cost’, ‘faster’, ‘engaged’, ‘enhance’, ‘smart’, ‘agile’, ‘manage’, ‘increased’ as indicators of *experienced benefits* by the banks. The primacy of words like ‘transaction’ and ‘million’ across the clouds are indicative of *scale of operations* through digital technologies. These were validated by iterative checking of the context in which the words appeared in the disclosure narratives. The word clouds pointed towards three key areas of (i) drivers for digital transformation, (ii) technology exploration horizons (usage of digital technology) and (iii) experienced benefits from digital technology. Visual analytics was followed by theme-based narrative analysis to unearth contextual answers to the key research questions as introduced in section III.⁵

Figure 2: Word Cloud for the North American Banks based on relevant narratives collected from public disclosures (FY'13 to FY'17)

⁵ RQ1: What are the external drivers influencing digital transformation of banks in North America?

RQ2: What are the observed benefits of adopting digital technologies?

RQ3: How do banks perceive digital transformation? Alternately – What is bank’s attitude to digital technology?

RQ4: What is the banks readiness and intention to deploy digital technologies?

RQ5: What are the instances of usage and deployment of digital technologies?

- The density of high and moderate narrative instances on digital transformation clearly picks up from FY'15
- Banks demonstrate narratives to show their understanding of benefits from digital technology altering their attitudes before we see commentary around the other theme areas
- Banks demonstrate a progression in communication intensity over the years from limited to moderate and high. This may be indicative of the actual growing focus and initiatives they are taking towards digital transformation.
- Some banks demonstrate clearly greater instances of moderate and high intensity narratives. This may be reflective of commiserate focus, maturity and is dependent on public communication strategies of the banks
- Narrative classification helps isolate maturity of practices – this is discussed as implications of the study in the subsequent section to evolve an emergent framework for Digital Transformation Maturity (DTM).

Figure 3: Narrative intensity plot for the four North American Banks (1 to 4) across themes and years

Narrative instances from banks 1 to 4: 1 2 3 4 Classified as: Limited Moderate High
 Based on volume, relevance, context and importance of the evidenced narratives

		FY13	FY14	FY15	FY16	FY17
Theme 1: External drivers influencing digital technology adoption	1.1 Customer demand for digital technology	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	1.2 Advances and proliferations of digital technology	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	1.3 Associated risks of not adopting digital technology	1 2 3 4		1 2 3 4	1 2 3 4	1 2 3 4
Theme 2: Benefits of adopting digital technology	2.1 Business benefits derived through digital technology	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	2.2 Operational benefits derived through digital technology	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	2.3 Scale of growth by use of digital technology	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	2.4 Awards & accolades for achievement of digital technology leadership	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	2.5 Delivery of corporate citizenship by use of digital technology	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Theme 3: Attitude towards digital technology	3.1 Positive attitude towards digital technology	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	3.2 Digital technology to render human interaction focus on customer experience	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	3.3 Continuity of focus towards digital technology	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Theme 4: Readiness and intention to deploy digital technology	4.1 Digital technology as a strategic alternative	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	4.2 Focus on forward-looking /emerging technology	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	4.3 Technology and operation linkages to ensure leadership focus	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	4.4 Developing digital capabilities and promoting innovation culture	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	4.5 Significant collaborations and partnerships for digital technology	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	4.6 Ability to promote differentiated digital technology leadership	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Theme 5: Usage and deployment of digital technology	5.1 Usage and deployment and mobile technology	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	5.2 Usage and deployment of big data / analytics	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	5.3 Usage and deployment of cloud technology	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	5.4 Usage and deployment of social technologies	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	5.5 Adoption of forward-looking digital technology	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	5.6 Roll-out of digital technology innovations /operations at a global scale	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

Based on volume, relevance, context and the importance of the evidenced narratives we have coded narrative into limited, moderate and high communication intensity as mentioned. To assign this classification volume is ascertained by word count of the theme-related narrative. The others like relevance, context and importance of the narrative are based on qualitative assessment. This has been validated through inter-rater responses. The classification of the narratives are further coded to assign a numerical value against each sub-theme. While a high classification was assigned a value of 3, moderate and limited were assigned values of 2 and 1 respectively. This helped to quantify the communication intensity for the four banks on the themes across the year. Having numeric values, based on narrative classification a correlation was done revealing associations between communication areas. The correlations among the themes as presented in *table 1* is indicative of associated communication intensity.

Table 1: Correlation between the themes based on classifications of communication interactivity

	Theme 1: External drivers influencing digital technology adoption	Theme 2: Benefits of adopting digital technology	Theme 3: Attitude towards digital technology	Theme 4: Readiness and intention to deploy digital technology	Theme 5: Usage and implementation of digital technology
Theme 1	1.0	0.52	0.28	0.47	0.53
Theme 2		1.0	0.55	0.61	0.55
Theme 3			1.0	0.18	0.20
Theme 4				1.0	0.53
Theme 5					1.0

While most themes are fairly associated, it is observed that theme 3 shows low associations. Attitude towards digital technology is an internal orientation of the institutions. Moreover, this being a longitudinal study associations between attitude and understanding of external drivers, readiness and usage may not always be simultaneous. Articulation of benefits from digital technology and attitude demonstrate greater association.

The following section of the manuscript entails detailed findings, observed key narrative evidences across the themes /sub themes from the banks. This is organized into the five key theme areas and the associated sub-themes. This is tracked longitudinally from FY'13 to FY'17 for the banks to ascertain continuity and maturity. Actual narratives help readers understand the essence of digital transformation and establish association with theme areas.

Theme 1: External drivers influencing digital technology adoption: Three main sub-themes of external driver were revealed through narrative analysis of the sample data.

1.1 Customer demand for digital technology: There is a shift in how customers hope to interact with banks. Banks acknowledge a sense of keeping pace with customers by prioritizing investments in digital technologies. The pace of growing preference for digital experiences almost puts the banks into a sense of urgency to adopt digital technologies. For millennial customers digital capabilities of a bank are a key consideration. Included here are key narratives from the banks that point towards their customer demand for digital technology.

BANK 2: "Clients' expectations for seamless experiences are rising... In response to that reality, our consumer bank launched three times as many digital features in 2017 as we did in 2016, driving double-digit growth in digital and mobile clients worldwide." (2017)

BANK 3: "We've seen tremendous growth rates in customer adoption of our digital services." (2014); "Banking no longer is a sometimes activity – customers engage with us every day... Digital drives tremendous loyalty. Households that use our digital channels have credit and debit spend levels over 90% higher. Customers who are digitally engaged have higher satisfaction & retention rates" (2016)

BANK 4: "Consumer adoption of digital and mobile channels is staggering. In just the past three years, customer deposits made through self-service channels increased from 38% to 53%. The number of active mobile customers has more than tripled from 2010." (2015); "Increasing the digital offerings in branches so both bankers and customers can benefit from speed, convenience, and aggregated financial information"... "Once they (customers) understood what the feature is and what it could do for them, it was a real moment of excitement" (2017)

1.2 Advances and proliferations of digital technology: There is a demand for digital-centric experiences along with the availability and growth of newer digital technologies and capabilities. Banks consider it imperative to develop solutions that will help derive competitive advantage and differentiation. For this banks demonstrate agility and willingness to embark on necessary changes to the way they work and transform. Banks interestingly analyze how future technology and other variables are likely to impact business and markets.

BANK 1: "Technology is transforming financial services, fundamentally changing the relationship people have with their bank by delivering the best of high tech and high touch. Mobility, in particular, is dramatically improving access to financial services... That's why we've made changes in how we work with clients across every channel: when they come into a financial center, when they use their computer or mobile device, and when they call on the phone. Each of these avenues has been revolutionized by technology." (2016)

BANK 3: "Technology and globalization are the best things that ever happened to mankind... The world and most people benefit enormously from innovative ideas; however, some people, some communities and some sectors in our economy do not. As we embrace progress, we need to recognize that technology and globalization can impact labor markets negatively, create job displacement, and contribute to the pay disparity between the skilled and unskilled. The answer to these challenges is not to hold back progress and the magic of technology; the answer is to deal with the facts and ensure that public policy, public and private enterprise contribute to an inclusive economy." (2015)

1.3 Associated risks of not adopting digital technologies: Banks view threat from traditional and newer financial technology (fintech) organizations. Banks view risk in failure to respond in a timely manner to changing customer preferences, product obsolescence and technology developments. Inability to leverage

digital technologies may lead to depletion of market share as customer may switch to providers with better, easier and more convenient, specialized solutions. It may lead to loss of competitive advantage, leadership and differentiated position. Banks recognize how networks renders greater parity between individual, collective and institutional powers? – How negative communication on social channels may adversely affect the reputation of institutions? Banks acknowledge the need to understand ways of navigation through new technology and new competition. All banks assign prime importance towards data security. Banks indicate multiple technology and procedural measures relating to cyber-security and compliance, continuously upgrading them in preparedness.

BANK 2: “(Fintechs) attempt to use technology and mobile platforms to enhance the ability of companies and individuals to borrow money, save and invest. (The Bank) could be placed at a competitive disadvantage, which could result in loss of customers and market share” (2017)

BANK 3: “How do (we) intend to win in payments, particularly with so many strong competitors — many from Silicon Valley? While this topic does keep us up at night due to the talent and innovation of the competition that would love to make us obsolete.... So in this space, there is both risk and opportunity...Large technology companies ... are getting into the payments space, and every day, new companies are emerging to compete with sub-segments of our businesses ... It is unquestionable that FinTech will force financial institutions to move more quickly, and banks, regulators and government policy will need to keep pace. Services will be rolled out faster, and more of them will be executed on a mobile device. FinTech has been great at making it easier and often less expensive for customers and will likely lead to many more people, including more lower-income people, joining the banking system” (2017). “We expect these products to drive lots of customer interactions and make our payments offerings compelling, even as some very smart fintech competitors emerge.” ... “We are seeing fintechs have success simply by removing customer pain points that banks haven’t. Customers are showing us where we need to get better, and we are paying attention.” (2017)

BANK 4: “Continued technological advances and the growth of e-commerce have made it possible for non-depository institutions to offer products and services that traditionally were banking products...these and other competitive threats from existing and new competitors ... (bank) may be forced to sell products at lower prices, increase our investment in new business to modify or adapt our existing products and services, and/or develop new products and services to respond to our customers’ needs.. The proliferation of social media websites...the personal use of social media by our team members and others, including personal blogs and social network profiles, also may increase the risk that negative, inappropriate or unauthorized information may be posted or released publicly that could harm our reputation or have other negative consequences, including as a result of our team members interacting with our customers in an unauthorized manner in various social media outlets” (2015)

Theme 2: Benefits of adopting digital technology: The narrative analysis of the institutions reveals benefits that may be broadly classified into business benefits, operational benefits, growth through digital technology, awards and accolades received by institutions achieving digital technology leadership and ability to deliver greater social good through use of digital technology. Key narrative evidences on this theme are captured and discussed here.

2.1 Business benefits derived through digital technology: Banks improve customer acquisition, satisfaction, efficiency through digital technology. Banks realize savings and growth by streamlining, optimizing workflows leveraging digital technology. Banks attribute better performance to the ability to harness technology.

BANK 2: “Smart Banking continues to drive growth in client acquisition, improved satisfaction, and increases in speed of in-branch servicing, sales and brand recognition.”(2015); “With client engagement rapidly shifting to digital channels, mobile continues to be at the core of a simpler, better customer experience... dramatically accelerated speed to market and the number of new digital features, up 300 percent versus 2016, driving robust double-digit growth in the number of digital and mobile users globally.” ... “In addition to reaching clients where, when and how they want to engage with us, technology is enabling smarter, more efficient decisions about what products and services are best suited for them. By deploying machine learning and big data platforms, we are improving the effectiveness of the offers we provide ... driving significant improvements in response rates, efficiency, and retention of balances and spend.” (2017)

BANK 3: “One of the reasons we’re performing well as a company is we never stopped investing in technology – this should never change... The technology (digital) investments we made helped preserve our share in a declining market and positioned us for growth” (2016)

2.2 Operational benefits derived through digital technology: Operational benefits are linked to business benefits. Achievement of benefits like simplification, faster processes, reduction of errors, enhancing customer and employee experiences addressing ease of use and convenience, deployment of low cost channels using digital technology in many instances lead to better market share, financial performance (business benefits).

BANK 3: “Technology is enabling us to shorten client onboarding times, speed transaction execution and reduce trading errors... Digital also is a significantly less expensive way to serve customers – it costs us about half as much to serve a digitally centric customer than all other primary relationships... We are bringing the look, feel and experience of consumer technology into the enterprise environment to transform the way our ... employees work. More than 100,000 employees now use their personal mobile devices to securely access business applications, offering them the freedom and flexibility to be productive on the go. In addition, investments in real-time collaboration tools allow teams to communicate seamlessly across the globe. For example, this year, we engaged in more than 90 million minutes of video conferencing across 125,000 video-enabled endpoints.” (2015); “It costs us 3 cents to accept a deposit made from a smartphone and 8 cents for one at an ATM. With our new technologies, we have lowered our costs per deposit by ~50% versus 2007.” ... “Digitally-engaged customers are more satisfied

than all other households, with higher NPS (+19%), higher retention rates (+10 percentage points), and higher card spend (+118%)... Digitally-engaged established customers (using the bank) as their primary bank have 40% more deposits and investments.” ... “Clients will be able to provide information electronically, e-sign and upload documents digitally, and receive real-time support via online chat capabilities. This enables more comprehensive analysis of enormous data sets, faster and more optimal execution in portfolios, and seamless delivery” ... “Our shared technology infrastructure – our networks, data centers, and the public and private cloud – decrease costs, enhances efficiency and makes all our businesses more productive.” (2017)

BANK 4: “For years, we have focused on improving the customer experience, both in our financial centers and through our digital platforms ... we are following customer behavior to combine improvements in our financial centers and new digital capabilities to enhance overall customer experience however customers choose to engage with us. In addition to advances in our digital and mobile capabilities, which have resulted in digital sales comprising 30 percent of total sales, we are investing to refresh centers and ATMs ... The efficiency ratio in our consumer business improved by more than 4 percentage points in 2017 to 52 percent.” ... “Reducing the number of internal platforms and databases we manage, consolidating single-customer data from multiple businesses into one place, and improving fraud detection based on aggregated information. In addition to making us more streamlined and effective, data modernization also can increase the speed with which we bring innovative new products and services to market. In the end, we believe that using data and technology to help our customers better manage their finances will enable us to grow and build more long-term relationships.” (2017)

2.3 Scale of growth by using digital technology: Most banks promote growth in customer’s adoption of digital channels for varied reasons - including to impress upon the scale of operations through digital technology. Moreover, the growth of digital enabled operations validate banks initiatives.

BANK 1: “Each week, mobile customers send more than \$3 billion in payments from their phones. And last year, more than 11 percent of all consumer checks we processed were deposited through mobile devices.” (2015); “Our award-winning mobile platform, adding more than 5,500 users every day” (2015); “Nearly 22 million mobile banking users ... and mobile loans have increased 1,000 percent.” (2016)

BANK 2: “Collectively... Mobile and tablet surpassed \$113 billion in total transaction value processed across 90 countries in 16 languages and added key mobile functionalities ... launched a fully integrated mobile payment solution that allows 320 million credit card clients to make payments through their debit and credit cards.” (2015)

Bank 3: “We serve nearly 40 million digital customers” (2015); “Since 2014, we’ve reduced total teller transactions by ~130 million and increased self-service/digital transactions by ~180 million... In 2016, 70% of our 400 million teller transactions could have been performed through a self-service channel. We continue to work with our customers to help them understand how to complete transactions on their own if they so choose.” (2016); “On average, our digitally active customers login more than 15 times a month. Our active debit card customers average 32 purchases a month, and those who use our ATMs have an average of five monthly ATM transactions. Our active credit card customer average 21 transactions each month ... Our active digital customers grew to 47 million, and 30 million of them are active on mobile, the largest in our industry.” (2017)

BANK 4: “We were one of the first banks to offer a convenient mobile-payment option ... 14 million active users represent our fastest-growing digital market segment.” (2014); “In just the past three years, customer deposits made through self-service channels increased from 38% to 53%. The number of active mobile customers has more than tripled from 2010.” (2015); “27.4 million Digital (online and mobile) active customers... 19.6 million mobile active users” (2017); “35 million digital customers, including 25 million active mobile banking users. Importantly, these customers logged in to our mobile app more than 1.3 billion times.” (2018)

2.4 Awards and accolades for achievement of digital technology leadership: All banks promote digital technology leadership position to demonstrate capabilities, to earn trust and respect from customers and investor community. These promotions of digital practices validated through independent award agencies render greater credibility to the banks’ claims. Narratives highlight achievements in innovation, ranks in numerous global competition where banks and their digital solutions are judged alongside other global financial peers. These evaluations help banks understand expected standards and benchmarks. Categories of awards include – ‘best internet bank’, ‘best mobile bank and mobile app’, compatibility with multiple devices and relevant partners, ‘best social media’, ‘best sms’, ‘ease of use’, convenience, quality and availability of services on digital channels, use of forward looking technologies among others.

BANK 2: “Best Overall Global Digital Bank by Global Finance magazine. The awards drew 262 banks globally, assessed against a wide range of criteria focused on strategy, features and functionality in the online and mobile channels.” (2015); “In our institutional business, banking platform was ranked #1 for the twelfth consecutive year in the 2017 Greenwich Associates Digital Banking Benchmarking study” ... “World’s Best Digital Bank (Euromoney), Best Digital Bank in six Asia markets (Global Finance), #1 in engagement” ... “Excellence in Digital Banking across Corporate/ Institutional and Consumer Banking” (2017)

BANK 3: “Social Media Leader of the Year - Fund Intelligence” ... “Winner of Greenwich Excellence Awards in Middle Market Banking: cash management and mobile banking functionality.” (2017)

BANK 4: “Digital is playing a larger role in all of our channels, from our award-winning website and mobile banking experience to newer services at our bank locations, ATMs, and call centers.” (2014); “Best Corporate/Institutional Digital Bank in North America - Global Finance magazine; #1 in overall performance and best in quality, availability, and ease of use for providing a positive small business banking

experience through digital channels; #IMobile prowess in transfers, wallets, and security, providing customers the ability to temporarily disable debit cards and use a smartphone in place of a card at an ATM - Business Insider's Mobile Banking Competitive Edge Study" (2017)

2.5 Delivery of corporate citizenship by use of digital technology: Harnessing digital technology provides the North American banks a mechanism to address corporate citizenship, do social good. This mostly relates to multiple objectives from saving paper, education, greener channels to financial inclusion. Banks deploy digital networks to establish communities; engage in dialogue with stakeholders & customers for meaningful purpose.

BANK 1: "We delivered more than 445 million digital correspondences through online banking and other channels, and continued use of ATMs, electronic payments and an employee print reduction program, preventing the emissions of 36,500 metric tons of carbon dioxide equivalent (CO₂e)." (2013); "To help better serve our clients in low to moderate-income communities by providing the services and connections they need most, such as increased access to financial coaching and education that will help them stay financially on track we have deployed Digital Ambassadors to help them get the most out of our latest technology." (2016)

BANK 2: "Work with clients, NGOs, public sector, other stakeholders to deepen our understanding, create innovative financial solutions and programs that promote financial inclusion; funded East Asia Digital Financial Inclusion Program." (2017)

BANK 3: "Announced eight financial services innovators as winners of the third competition... focused on improving the financial health of overlooked populations... supported 26 fintech companies to improve financial health (of customers)." (2017)

BANK 4: "we added a text receipt option at our ATMs, becoming the first bank to offer customers ATM receipts by text and email, which is great for the environment." (2013); "We are beginning to offer customers the option to receive and acknowledge new deposit account terms and conditions on their mobile phones, instead of receiving lengthy paper disclosures, and instead of paper receipts for teller or ATM transactions, our customers can opt for email or text... And we continue to reduce the use of paper in other ways. For example, in 2014 we made substantial progress eliminating paper-transaction processing in our bank locations. Now, more than 4,500 bank locations have fully digitized processing of deposits, withdrawals, payments, and other teller transactions. For most transactions, customers make their selections on a touch screen interface, without filling out a paper slip. Tellers use high-speed scanners to process check deposits, eliminating the need for downstream paper processing." (2014); "We were the first bank to offer voice-enabled ATMs to assist our visually impaired customers, and these ATMs now speak in English and Spanish. We also offer credit card deposits in Braille." (2015)

Theme 3: Attitude towards digital technology: While all the banks in this study demonstrated positive attitude towards digital technology it clearly came out that banks believed that customers care for human interactions as well. Banks deploy digital technologies to render human interactions through cost effective channels. This ensures that customers experience human-centric interactions through digital designs. Another key aspect that is evident from the narratives is how banks continue their focus on digital, spanning over the period of study. There has been enhanced optimism and positivity around digital technologies among the large banks for the period of study.

3.1 Positive attitude towards digital technology: There is a range of views demonstrated by the banks. Most banks believe the use of digital technology will be beneficial for the institution and its stakeholders. Banks believe that digital technology will enable them build stronger connections with customers and communities. Banks believe that necessary technology investments will enable employees to serve customers better. Their commitment towards digital technology is continuous as demonstrated through the period of study and explicit narratives indicating future focus. At the other range of attitudes we observe that banks demonstrate a high-degree of reliance on digital technology – to the extent they believe technology is a key driving force. They believe that innovations will continue to improve processes. These banks view technology as an essential core competency and a key differentiator for growth. Investments in technology (up to ~9% of unit revenue in instances) are not only to run the business but to change and transform. Banks are driving objectives of simplification, agility, quality, efficiency, savings and convenience. There is a clear aspiration and sense of excitement that is evident from the narratives of these banks towards becoming *'the digital bank'*.

BANK 2: "Fueling Digital Innovation Worldwide to drive the next wave of innovations that will improve our customers' lives...Much of the resources we save will be reinvested in our businesses where the greatest returns can be generated — and, in particular, will be dedicated toward improving our technology and digital presence...Smart Banking branches and other innovations in our Consumer Bank, we have established the core around which we can fulfill our aspiration to become the world's digital bank." (2013)

BANK 3: "Technology continues to fuel everything we do...Technology is at the core of what we do. Advances in technology make us faster and safer and drive a more engaging customer experience, differentiating our businesses today and for the future. The pace of technology change is always increasing, and we challenge ourselves to think, innovate and deliver like a technology company. Our technology budget demonstrates our significant, ongoing commitment to technology investment. The scale and diversity of our businesses enable us to invest wherever we see opportunity or competitive advantage to do so effectively. We will continue to grow the share of our technology budget allocated to new investment and innovation by optimizing our existing technology environment. The reasons we invest so much in technology (whether it's digital, big data or machine learning) are simple: to benefit customers with better, faster and often cheaper products and services, to reduce errors and to make the firm more efficient....End-to-end digital banking... One of the best ways we can invest in our people is by

also investing in our technology.” (2016); “Digital is a more efficient way to serve our customers, and our digitally engaged customers are happier with us and are more likely to stay. Our goal is to be the easiest bank for customers to do business with.” “We should celebrate the benefits of technology, and we should also prepare for its challenges. Overall, technology is the greatest thing that has ever happened to mankind. People legitimately worry that technology will eliminate jobs as artificial intelligence replaces drivers, call center operators, etc. And this is no doubt true. But this has actually been happening for a long time. For instance, back in 1900, 41% of the U.S. workforce made their living in agriculture. Today, it is under 2%. We know technology has been a great force, and for the benefit of mankind, that force should be left unleashed. In the event that it creates change faster in the future than it has in the past – and the economy is unable to adjust jobs fast enough – the best protection is continual workforce training, education and re-education, supplemented by income assistance and relocation. Looking five to 10 years out, the pace of technological innovation will only quicken as artificial intelligence, robotics, machine learning, distributed ledgers and big data will all shape our future.”(2017)

BANK 4: “We are excited by the opportunity to leverage technology to create a banking experience” (2016); “One of the most exciting aspects of the financial services industry today is the use of technology to build stronger relationships with customers ... to simplify the way people connect to our services — whether at a branch, online, or through mobile, social media, or other channels. And we are thrilled” (2017)

3.2 Digital technology to render human interactions for customer focus: While banks enhance capabilities through technology – there is a reliance on human intervention and relationship. Despite the focus on technology enabled self-service, the ability to retain and establish human interactions in delivery of financial services is viewed as a differentiating capability by most banks. Banks deliver human interfaces through innovative digital channels like video banking – almost ‘*bringing banks to kitchen tables*’. Banks also use other digital technologies to humanize experiences for customers across service delivery channels. Towards deploying digital channels banks demonstrate a mechanism of measuring preferences of customers especially to understand - When? Where? And how would they like to interact with the bank? This helps banks offer options - technology enabled self-service; assisted services and human services. Banks are using robotic process automations and deploying chat bots enable machine and human interactions with customers.

BANK 1: “Our Digital Ambassadors are trained to help clients get familiar with the tools and features on our award-winning mobile and online banking platforms ... ATM with Teller Assist - This next-generation banking offering combines the technology and convenience of an ATM with the human touch of a teller (through live video technology).” (2015)

BANK 2: “We continued to calibrate our distribution network, utilizing a mix of smart banking formats, to ensure the right mix of bricks and clicks.” (2017)

BANK 3: “With advances in technology, customers will be able to complete 90% of teller transactions at our smart ATMs ... Customers aren’t choosing between digital and branches – they are using both ... We know that our customers still want to come into the branch when they need advice or support, but for a basic transaction they increasingly prefer to do it themselves.” (2014) “We want to be at the intersection of human and digitally enhanced advice.” (2017)

BANK 4: “Customer was delighted to see a Happy Anniversary message noting her 39 years as a customer. The personal message on the ATM screen - ‘evoked memories of my father who helped me open my first checking account before I went to college.’ It really showed how technology can humanize an ATM experience” (2017); “Customers can begin their transaction at an ATM, but if they need more assistance or if a transaction requires approval, a team member alerted on a wireless tablet and provides in-person assistance to complete the transaction. This assisted-service option allows us to deliver the best digital experience without compromising on personal service ... Technology should enable and enhance the relationships we’re building with customers.” (2014); “As phone-based mortgage consultants, we find that our role is growing every day as we preserve the human touch with customers while also using technology to shorten the distance between us. We have the ability not only to help customers walk through the process, but also to put more time into building relationships with them, which is just as important.” (2015); “Video banking is certainly much more efficient and cost effective. Team members enjoy the interactions, too. In developing a rapport – ‘I can’t say enough about the benefit of actually seeing the customer’... for consumers who are increasingly comfortable with online banking, video is seen as a natural extension of their online experience... personal touch makes video banking much more of an appealing experience.” (2016); “Our virtual financial assistant, leveraging artificial intelligence and data to better help clients live their best financial lives. Clients can interact ... through voice and text, and she will help with their banking needs, like transferring money, finding key account information such as routing numbers, and locking and unlocking debit cards. More importantly ... will provide proactive insights to clients about trends in expenses and notifications of upcoming bills ... has the ability to track transaction information such as how much customers spent, a subscription monitor to help them stay ahead of recurring subscriptions, card controls to proactively let them know where their card is being used for payments, and valuable insights on how to meet savings goals.” (2017)

3.3 Continuity of focus towards digital technology: Banks in North America demonstrate multi-year future focus towards spending on new-age digital technologies and on changing / transforming the bank with the help of technology. Technology spend is not a mere enabler or efficiency measure but is a strategic priority. Most banks demonstrate increase in technology spend over the period of study and acknowledge the digital technology spend as necessary. This is also adequately evident through multi-year narratives from the banks indicating continuity of initiatives across the themes/sub-themes.

BANK 2: “We also completed the first phase of a multiyear digital transformation initiative to build a single modular credit card marketing and servicing framework.” (2015)

BANK 3: “Strategic priorities have become even more embedded into our technology DNA and are the focus of our investment spend ... approximately 30% of the firm’s technology budget went toward new investment....we intend to shift even more dollars from ‘run the bank’ operational activities to ‘change the bank’ investments. Many of the new and exciting things we are doing center on technology, including big data and Fintech” (2015)

BANK 4: “New technologies could require us to spend more to modify or adapt our products to attract and retain customers... We are careful not to create new technologies in isolation; the value of innovation is when technology is aligned. This means that all of our distribution channels — locations, phone banks, ATMs, online, and mobile banking — work together, integrated with our products, to benefit customers.” (2014); “reinvested into our business to fund improvements in a range of programs, including those that are transforming and modernizing compliance, technology, risk management, cybersecurity, and data.”(2017)

Theme 4: Readiness and intention to deploy digital technology: Narratives reveal banks acknowledge technology as a strategic alternative to develop core-competency, service differentiation and achieve competitive advantage. A strong linkage between operations, core functions and technology units enables exploring, deploying technologies at an institutional level. Structural change is well demonstrated by most banks. The structural changes available from narratives indicate focus on harnessing new technologies and innovations. Such structural alignments are to promote a culture of innovation within the institutions leveraging across functional teams. Evidences from the narratives suggest banks are harvesting innovative ideas from within the institution and from extended eco-system. Banks are forging significant collaborations and partnerships with digital technology providers including both fintechs and established technology companies. There are ample evidences from the narratives that banks clearly communicate the focus on digital technologies to wider stakeholders through multiple promotions. This is perhaps with the intent of establishing a differentiated positioning of digital technology leadership and establish a sense of trust.

4.1 Digital technology as a strategic alternative: Institutions indicate technology innovation as a strategic priority. Institutions demonstrate strategic objectives and aspirations for becoming a digital bank by building capabilities in analytics, mobile technology, unified communication, cloud infrastructure security and control.

BANK 2: “focus on accelerating our mobile-first digital strategy.” (2016)

BANK 3: “Our strategic vision is to embrace a hybrid cloud model in which internal and external resources are made available on demand. We are partnering with leading providers to create a world-class environment without compromising our standards for security.” (2015); “As a firm, innovation is our top strategic priority. We take pride in our ability to differentiate ourselves through the development of new solutions and the adoption of emerging technology at scale.” (2016)

BANK 4: “To focus our transformation efforts, we have established six long-term goals” including innovation (2017)

4.2 Focus on forward-looking /emerging technology: Narratives indicate banks are preempting ‘What is next?’ for technology. There are instances of banks focus on forward-looking technologies the emergent digital capabilities. Banks interestingly view opportunity in shaping and contributing towards technology development. Focus on deploying forward looking technology is happening in phased manner through controlled pilots likely to provide banks first mover advantages like savings and efficiency. Evident technologies in focus are robotics, machine learning, artificial intelligence, cognitive computing, biometrics, natural language processing, advanced analytics, blockchain, wearables among others. Banks assess impact of future technology on business.

BANK 1: “We are preparing for the next generation of solutions, such as digital wallets, digital identity, blockchain technology and artificial intelligence. We are investing alongside technology startups to develop these innovations. The new technologies will complement our worldwide client access channel.” (2016)

BANK 2: “Initiated testing of a seamless, cardless ATM that uses iris-scan biometric technology for authentication and would enable customers to conduct transactions on their smartphones before visiting the ATM” (2015)

BANK 3: “Two emerging areas of innovation – robotics and machine learning – offer promising opportunities to drive new value through automation and insight. Robotic process automation is software that automates routine, repetitive activity that otherwise would be performed manually. Virtual “bots” are available 24/7 to efficiently execute simple processes without the risk of human error... we established an internal center of excellence to drive best practices around a growing pipeline of robotic process automation, including systems access administration, for which we expect to automate 1.1 million requests in 2017. We have line of sight into more than \$30 million run rate saves from robotic process automation ... This technology has the opportunity to deliver immediate benefit in several areas across the firm, helping us to position our workforce around higher value tasks and functions. Machine learning offers another opportunity to drive new capabilities for the firm and our customers and clients. Machine learning technology provides insights about data without needing to pre-program algorithms. Machine learning technology actively learns from data with the goal of predicting outcomes. The more these learning algorithms are engaged, the more effective they become at identifying patterns and relationships ... we established a center of excellence within Intelligent Solutions to explore and implement a growing number of use cases for machine learning applications across the firm ... We also use machine learning to drive predictive recommendations for Investment Banking ... We are initiating pilots for a broad range of machine learning use cases – from detecting anomalies for fraud and cyber-security, to generating targeted trading strategies to share with clients, to optimizing our client-servicing channels. We are

only at the very beginning of tapping the potential capabilities of machine learning and its benefits to our business. We also are excited about the prospects of cognitive automation, which combines both robotics and machine learning technologies to mimic human judgment. Cognitive automation has the potential to automate more complex, human-like processes, such as perceiving, hypothesizing and reasoning.” (2016)

BANK 4: “An innovative customer experience, is also expected to launch in 2018. With this digital banking feature, our customers will be able to view and manage the places where their card and account information is stored, including personal finance websites, digital wallets, retail sites, and other third parties.” (2017)

4.3 Technology and operation linkage ensures leadership focus: The narrative analysis reveals the technology functions at banks are not stand-alone but are linked with the key operations. This is demonstrated by the design of leadership positions and organization structures. This reinforces that decisions on digital technology adoption are driven by business operations and needs and not be taken in isolation. Some interesting designations including CEO – mobile enhancements, chief operations and technology officer, head of digital channels, the head of operations and technology and the head of productivity are evident across banks. There are also instances of dedicated initiatives that led to formation of technology and innovation cross-functional groups. Banks also have indicated presence of dedicated digital innovation laboratories.

BANK 2: “The Operations and Technology Committee oversees the scope, direction, quality and execution of ... technology strategies formulated by management, and provides guidance on technology” (2016)

BANK 3: “We are embedding technologists within our product groups and strengthening our partnerships with in-house teams to explore ways to broaden our use of newer technologies, such as distributed ledgers, machine learning, big data and cloud infrastructure.” (2015); “Intelligent Solutions group drives innovation across the firm by leveraging big data and advanced analytics such as machine learning” (2016); “We have assembled talented teams to drive innovation in artificial intelligence, blockchain technology, big data, machine learning and bots” ... “Agile technology generally means using new forms of technology. The concept of agile management goes hand in hand with this approach. Small teams of people responsible for products and services work with technologists to improve the customer experience. To do this, they must be given the necessary authority and resources. It is also important they understand that they can make mistakes without punishment.” (2017)

BANK 4: “we brought together team members ... to form a new Innovation Group, a cross-functional organization to help keep us at the leading edge of technological innovation. Key focuses of the Innovation Group include research and development, payment strategies, design and delivery, and analytics.” (2015); “As part of our focus on innovation, we formed a new business group — Payments, Virtual Solutions and Innovation... (It) brings together the next generation of payment capabilities and digital and online offerings” (2016)

4.4 Developing digital capabilities and promoting innovation culture: To be a digital bank; there is focus on building employee capabilities. Banks focus on improving workplace experiences through digital solutions. Some banks clearly indicate that attracting, retaining and developing top digital technology talent is important. Banks generate innovations from within the institution, as well as harvest ideas from wider ecosystem. Multiple instances are observed where banks are working alongside technology start-ups, hosting technology challenges globally to harvest new ideas. These demonstrate how banks are striving to break paradigms of conventional banking, to think on technology innovations, to transform practices, to become a digital bank.

BANK 2: “To accelerate speed to market with next generation mobile banking capabilities, we established a new unit ... This agile unit is charged with designing mobile banking solution that delivers a radically simple, connected customer experience across the full range of client services: Borrow, Pay, Save, Invest and Protect.” (2015); “... Announces winners of Smarter Worklife Challenge; leading tech companies propose digital innovations to enhance workplace” (2016)

BANK 3: “One of our growing teams is our digital group, including more than 400 professionals focused on product and platform design and innovation. In addition, the digital technology organization has over 1,200 technologists that deliver digital solutions, including frameworks, development and architecture ... building Financial Technology Innovation Centers, as well as launching a residency program and inviting startup firms to work with us on open, through, scalable technologies ... To best utilize our data assets and spur innovation, we have built our own extraordinary in-house big data capabilities – ... populated with more than 200 analysts and data scientists, which we call Intelligent Solutions.” (2015); “We reinforce a strong innovation culture and atmosphere to spark new solutions through open source projects and “hackathons” in which technologists collaboratively code to solve business problems ... we hosted a firm-wide global hackathon across 20 cities with over 2,500 developer participants. This led to 400 new product ideas, of which 130 were potential opportunities for patents ... Financial Solutions Lab, which in partnership with the Center for Financial Services Innovation, seeks to facilitate the next generation of fintech products ... has helped support more than 18 fintech companies” (2016); “We are building everything digital, both for individual customers and large corporations – from onboarding to idea generation.”... “As part of our technology culture, experimentation and failure are okay – it is encouraged, in fact, in order to achieve breakthroughs. It was only a few years ago that programmers and technology graduates seemed reluctant to build their careers in banks; that’s not the case ... Nearly 30% of our recent senior hires in technology came from non-financial services firms, and they’re working on solving solutions to some of the most complex issues in the field. Our technologists and our product people work side by side, in the same rooms and at the same tables. They’re fully assimilated. That way, the teams are able to work in tandem to build the next-generation systems best targeted to meet the needs of our clients and the business... We have assembled talented teams to drive innovation in artificial intelligence, blockchain technology, big data, machine learning and bots, with the objectives of improving our efficiency and enabling us to serve more clients with greater effectiveness, depth and sophistication.” (2017)

BANK 4: “Startup Accelerator invests in new companies that are developing banking technologies in areas such as payments, deposits, and fraud detection. The accelerator’s equity investments range from \$50,000 to \$500,000, identified through a semiannual application process.”(2014)

4.5 Significant collaborations and partnerships for digital technology: We observe specialized industry solutions being developed by banks in collaboration with Fintechs. Banks are working in close collaboration with established technology providers. In some instances banks play a role as connector beyond their core function in two /multi-sided markets. These are enabling networks of buyers and sellers. Banks are providing platforms and applications pushing innovative payments solutions and other arrangements beyond conventional functions. There are also multiple instances of banks co-developing new digital technologies in close alliance with fintechs and specialized technology providers. This provides banks first mover advantage towards shaping the future of applications with such technologies and bringing it up to scale.

BANK 1: “Making payments easier and safer through tokenization, more than 1 million customers have already signed up in six months. We will continue to develop ways to help our mobile customers make secure, convenient payments.” (2014)

BANK 2: “Retail Services is one of North America’s largest providers of private label and co-brand credit cards for retailers. In addition, the business delivers multi-channel retailing expertise, advanced data analytics and digital solutions to help premier retailers across an array of industries grow their businesses”(2015); “In Asia, we entered into promising partnerships with ride-hailing platform ..., hospitality pioneer ..., a leading online shopping and selling site.”(2016); “Utilized multi-channel expertise, advanced data analytics and digital solutions to help its retail partners grow their businesses.”... “Executed one of its most ambitious FinTech programs: The global open innovation competition, led in collaboration with public and private sector allies, sought to source innovation in a number of areas, including government transactions and procurement; culture, ethics and citizen engagement; reduction of red tape; and information security and identity.”... “We invested in the digital ecosystem to further enhance the client experience, sales trading and analytics capabilities and productivity ... actively identifying, evaluating and investing in FinTech firms and deploying innovations across all capital markets asset classes. In business intelligence and big data analytics, several leading data capabilities ... went live using natural language processing and investments were made in blockchain technology ... leverages the power of agile business and technology teams, bringing two software releases per day on average to our global client base”... “By partnering with leading digital ecosystems, we embedded our services in the platform our clients use every day, driving engagement. (2017)

BANK 3: “Our recent investment in a new blockchain startup, where we are partnering to explore opportunities for distributed ledger technology. We are developing solutions for multiple blockchain use cases, including single-name credit default swap settlement and internal network payments. We are founding members of the open source Hyperledger Project, collaborating across the industry to enhance distributed ledger capabilities globally ... We are perfectly willing to compete by building capabilities or to collaborate by partnering. Whether we compete or collaborate, we try to do what is in the best interest of the customer. We also partner with more than 100 FinTech companies – just as we have partnered over the past decade with hundreds of other technology providers.” (2015); “Most of our digital solutions will continue to be built in-house due to competitive and strategic importance. However, we have realized the complementary benefit of partnering with fintech companies to enhance select digital products and services. As a result, our strategy is a combination of build, buy and partner in order to continue delivering the best digital products and services at scale ... We have formalized a firm wide fintech strategy and ecosystem engagement model to identify and leverage partner relationships across all of our business areas ... Our relationships with the external technology ecosystem helped drive value across our technology focus areas, including next-generation data and analytics platforms.” (2016); “Blockchain Center of Excellence launched a payment network powered by distributed ledger technology. The objective is to use blockchain technology to process bank-to-bank transactions faster, alleviating situations where payments get held up due to mismatched information.”(2017)

BANK 4: “The first banks to offer ... a convenient mobile-payment option. We anticipate more payment options to come for our mobile customers, because these more than 14 million active users represent our fastest-growing digital market segment.”(2015)

4.6 Ability to promote differentiated digital technology leadership: Banks promote differentiated technology leadership to attract customers, demonstrate capabilities and build trust with investor communities. Capabilities are demonstrated to show how the bank is improving client experience, innovation and digitization and investing to improve payments, cyber-security and digital money. In some instances the banks also demonstrates the scale of the digital technology focus to emphasize on the capabilities. This is with intent to create the differentiated position that the customers can trust. Beyond narratives the annual reports include multiple use of explicit imagery indicating how the banks are deploying digital technology. These imageries are included as part of cover page and as special sections of the annual reports in multiple instances. Banks participate in independent contests where the digital services, use of digital technologies are assessed vis-à-vis the North American peers and global banks. On similar lines banks also showcase how credible market analysts have viewed their capabilities in innovation, effective use of digital, transactions around multi-channel.

BANK 1: “Our award-winning Mobile Banking app has 16.5 million users, 11 percent of all consumer deposits were made through our mobile platform.” (2014); “No. 1 in digital sales functionality, and we have the No. 1; online and mobile banking platform.” (2015)

BANK 2: “Efforts were recognized by Global Finance magazine with three awards, including Best in Mobile Banking, Best in Social Media and Best Consumer Internet Bank in North America. Mobile Commerce Daily named ... Mobile Bank of the Year ... Global Finance honored ... with five awards, including Best Consumer Internet Bank ... and Best Mobile Banking App in Mexico.” (2014); “The bank has begun a rollout of a futuristic ‘smart branch’ model, that jettisons the usual branch features in favor of digital services that are more in keeping with the atmosphere of an (technology store)”(2015)

BANK 3: "... Named us #1 in mobile banking functionality for the third consecutive year." (2014)

BANK 4: "Innovation leadership 22nd Best Digital Bank Most Admired Company in North America in the World (2015), Fortune (World's Best Corporate/ Institutional Digital Morningstar Inc. 2015 CEO of the Year Banks, 2015) Global Finance magazine Best Global and U.S. Bank (2015) The Banker magazine North America: Best in Mobile Banking, Best Investment Best Bank in the U.S. Services, Best Website (2012 – 2015) Euromoney Design, Best Information #1 in Overall Institutional Security Initiatives; Best in Social Media Financial Institutions (World's Best Corporate (2012 – 2015) Institutional Digital Banks Flmetrix Global Stats in North America, 2015) Global Finance magazine" (2015)

Theme 5: Usage and deployment of digital technology: Banks use digital technology with emphasis on customer experience emphasizing on simplification, ease of use, focusing on convenience and speed of transactions. There is an intent to realize efficiency and cost savings through innovative digital solutions. Banks improve workplace experiences for associates by providing enhanced digital capabilities, convenience, ease, simplification and agility. It is evidenced from the narratives that all banks are focused on launching digital platforms or applications. The platforms offer features like configurability and customer specific customizations. Banks leverage these as financial super markets for varied purposes. The applications render transparency to transactions mostly payment related. These are accessible through mobiles, tablets and similar devices. It is evident that digital technology is being used to allow customers greater control through ingenuity and self-service models. Banks promote, educate customers on digital services. By analysis of the narratives the key technology focus areas can be classified around - *data, infrastructure and experience, enabling automation, intelligence and security*. We observed instances of deployment of digital technology across multiple lines of business of the banks.

5.1 Usage and deployment of mobile technology: Mobile technology is perhaps the biggest consideration among banks. The banks recognize the capabilities of mobile technology and mobile enabled payments as revolutionary in multiple instances. The growth in terms of customer adoption of mobile based services particularly for payments is well evident across the narratives. Banks roll-out multiple applications of customer interface through mobile/ handheld channels and even wearables. Banks conceptualize customized use-case based solutions like splitting restaurant bills, medical healthcare bills, personal finance management including platforms for collaborations across industries and deriving value from such networks for itself and customers.

BANK 1: "We're making it easier for clients to send, receive and request money, allowing them to use the existing contacts on their mobile device to securely transfer money to (or request money from) almost anyone, regardless of where they bank. They'll be able to split expenses among multiple contacts or friends — such as a group dinner check — and they can even add a personal note along with the payment transfer or request ... Mobile banking goes far beyond checking balances and transferring money. Today, clients can deposit checks, manage their investments, and get an auto or home loan. Nearly nine in ten clients also use mobile banking alerts, helping them reduce fees, track their finances, manage spending and budgeting, and improve decision-making." (2016)

BANK 2: "A mobile-first strategic focus and deployment of a new, agile operating model fostered massive improvements in the design and delivery of digital features and in the customer experience. The implementation of a uniform technology platform was completed, and the franchise saw significant growth in the number of digital users, mobile downloads and digital engagement. We forged a number of digital payments solutions and partnerships — such as a group dinner check — and they can even add a personal note along with the payment transfer or request ... Mobile banking goes far beyond checking balances and transferring money. Today, clients can deposit checks, manage their investments, and get an auto or home loan. Nearly nine in ten clients also use mobile banking alerts, helping them reduce fees, track their finances, manage spending and budgeting, and improve decision-making." (2016); "Digital and mobile enhancements include instant lending via mobile, simplified authentication through a mobile token, fingerprint and facial recognition." (2017)

BANK 3: "Payments is one of the most interesting areas in our business as consumers are adapting to new ways to pay. We like our strategic position as both a bank that issues cards for consumers and a payment processor for merchants"... "Wallet will greatly simplify online and mobile shopping by allowing users to access all their credit and debit cards, in one digital wallet ... It will reduce the online/mobile checkout from about two minutes to roughly 30 seconds. It's more convenient and safer for customers, and online businesses should see increased sales and lower shopping cart abandonment." (2014); "Our customers will be able to withdraw cash using a PIN from their phone rather than a debit card" (2015) "We have introduced the digital equivalent to using a debit or credit card, which allows customers to pay online or in-store with their mobile phone. We also introduced a real-time consumer-to-consumer payments system, which allows customers to easily, safely and immediately send money." (2017)

BANK 4: "In 2013, our online banking presence also improved with a new tablet-friendly home page." (2013); "We launched ... digital advisors accounts for the next generation of investors. This offering combines innovative investing technology with phone-based advice, giving customers affordable access to personalized investment portfolios." ... "Digital banking used to be about convenience, now it's about mobility ... Our clients and their actions brought us to this inflection point. There are more customers who bank with us through mobile only than through desktop, and they are logging in at a rate of over 100 million sign-ins per week ... With the exception of dealing with cash, clients can do everything including make payments, deposit checks, and open accounts right from their mobile phone. In addition, there are many value-added features available to clients in mobile - lock and unlock debit cards, and set up an appointment to meet with one of our specialists ... We are living in a world dominated by voice interactions and the need for a paperless, cashless environment. ... new person-to-person (P2P) payment service in our Mobile Banking app that we introduced in mid-2017 makes it easy, safe and fast for clients to send, receive and request money

from almost anyone, with a bank account in the U.S. We saw total (such) transactions hit nearly 68 million.”... “plan to introduce a new low-cost mobile banking experience with tools geared toward those who may find budgeting a challenge, are new to banking (students), or have several income sources (freelancers)... is a combination of two accounts that work together: one for weekly spending, tied to a debit card, and one dedicated to saving and paying bills. Among its features are spending trends, personalized insights based on an artificial intelligence engine, and reminders to help consumers keep their spending on track to reach their financial goals. The experience is intuitive, personalized, and aligned to each applicant’s individual situation.” (2017)

5.2 Usage and deployment of big data / analytics: Investment in leveraging big data and generating insights are primarily to preempt risk scenarios and better service customers with innovative mechanisms of data visualization and predictive analytics.

BANK 2: “Working Capital Analytics, which is designed to support strategic decision making for a company’s treasury, procurement and shared service center organizations. The service combines diagnostic capabilities with innovative visualization technology and real-time interactive features to deliver enhanced visibility and insights across an organization’s complete supply chain.” (2014)

BANK 3: “Big data is one of the tools that is dramatically improving our analytics. Using big data and our innovative visualization tools, our portfolio managers can take historical data and combine it with predictive analytics ... Within the Consumer Bank, we use big data to improve underwriting, deliver more targeted marketing and analyze the root causes of customer attrition. In the Corporate & Investment Bank, big data is being used to analyze errors, thereby improving operational efficiencies....Our technology infrastructure creates an enormous amount of machine data from which we gain valuable operational intelligence. This information helps support the stability and resiliency of our systems – enabling us to identify little problems before they become big problems... Needless to say, these big data capabilities are being used to decrease fraud, reduce risk in the cyber world, and even monitor internal systems to detect employee fraud and bad behavior.” (2015); “To maximize the impact of these new data platforms, we have doubled our big data infrastructure consistently ... last year, we re-engineered our Market Risk platform, one of the largest in-memory risk analytics platforms in the world. The platform now manages over 1 billion risk sensitivities and provides visibility 17 times faster than the prior system while delivering a more granular and holistic view of the firm’s risk exposure.” (2016); “Our clients’ needs and behaviors are changing. Last year, we formed a new business, Intelligent Solutions, to help drive our efforts around digital transformation and big data. This group is unifying and optimizing our use of data analytics to transform how we apply these added insights efficiently and effectively in managing portfolios.” (2017)

5.3 Usage and deployment of cloud technology: Banks show limited focus on cloud technology perhaps in apprehension of data security issues and other risks.

BANK 3: “We continued to pursue a hybrid cloud strategy – leveraging a next generation internal, private cloud, as well as external, public cloud services – to further enable our developers through on-demand availability, pay-for-use and elastic scalability ... We launched a new private cloud platform ... designed to provide developers with rapid agility – so that they spend more time developing and less time provisioning infrastructure and application services ... we expect to more than double the number of applications hosted on the platform. Over the last year, we established a new cloud services function within Global Technology (Group) to accelerate our hybrid cloud strategy. Working collaboratively with public cloud providers, we have made significant progress developing a set of solutions that meets our rigorous risk and security standards. The public cloud reduces our peak infrastructure requirements by providing compute services during temporary fluctuations in demand. The public cloud also helps reduce long-term storage costs and accelerates developer access to new cloud services.” (2016)

5.4 Usage and deployment of social technology: Banks show varied level of adoption of social technologies. Banks focus on building relationship with the customers - use social channels for interaction including video banking through dedicated devices. Banks also identify risks to reputation incase inappropriate content is sent out through social channels. Banks acknowledge how institutional power and reputation can be challenged, altered through collective and individual interactions on social channels. Banks build networks through platforms offering newer services to the customers.

BANK 4: “We also continue to expand our presence on social media channels — Facebook, YouTube, Google+, LinkedIn, and Twitter — to connect and communicate with key stakeholders” (2013); “... personal use of social media by our team members and others, including personal blogs and social network profiles, also may increase the risk that negative, inappropriate or unauthorized information may be posted or released publicly that could harm our reputation and have other negative consequences, including as a result of our team members interacting with our customers in an unauthorized manner in various social media outlets.” (2017)

5.5 Adoption of forward looking digital technology: Observed were only some instances of banks realizing scale using forward looking technology. While banks keep watch on emergent technologies they mitigate associated risks collaborating with fintechs and technology providers. Banks mostly operate in pilot mode – experimenting with emergent technologies. There are some instances where banks are even contributing towards technology development. Emergent technologies in focus are robotics, machine learning, artificial intelligence, cognitive computing, biometrics, natural language processing, advanced analytics, blockchain, wearables, internet of things, APIs for interfaces among others.

BANK 2: “The app heralded a radically new visual and navigation style, based on a single-mindedly user-centric design ... begun a rollout of a futuristic ‘smart branch’ model” (2015); “By deploying machine learning and big data platforms, we are improving the effectiveness of the offers

While at the early stages, utilizing models that allow us to understand each individual's wallet is driving significant improvements in response rates, efficiency, and retention of balances and spend." ... "Partnered on the rollout of a pioneering application of blockchain and distributed ledger technology to facilitate and automate payment processing. This collaboration created a solution that integrates blockchain technology with API technology." (2017)

BANK 3: "Creation of a common API (application programming interface) store that allows customers to add simple, secure payments to their software." ... "Artificial intelligence, big data and machine learning are helping us reduce risk and fraud, upgrade service, improve underwriting and enhance marketing across the firm." ... "We are rolling out many new exciting products and have made several improvements around the customer's experience, including a fully mobile bank pilot (Finn), digital account openings, and facial recognition in our app, the Amazon Prime Rewards Visa card and a simpler online application for Business Banking customers." ... "Cybersecurity risk is an important, continuous and evolving focus. The security efforts are intended to protect against, among other things, cybersecurity attacks by unauthorized parties." (2017)

BANK 4: "Another important area of innovation is how we are improving information security to protect our customers, from consumer to commercial biometric options to leveraging artificial intelligence to strengthen our risk management and fraud detection capabilities." (2017)

5.6 Roll-out of digital technology innovations / operations at a global scale: The roll-out of digital services is well beyond North America with market specific solutions across the world demonstrating spill-over effects of innovation and scale through appropriate market contexts. Bank target digital roll-out in markets including Europe (Poland), Asia (Philippines, UAE, India), Latin America (Mexico, Brazil), and Australia among others. Attaining global scale by leveraging digital technologies is considered a tenet of transformation.

BANK 2: "Smart Banking branch locations opened in top cities, including Dubai, Mexico City, Monterrey, Moscow, New York, Rio de Janeiro, San Francisco, São Paulo, Sydney and Warsaw ... driving meaningful increases in client acquisition and satisfaction, speed of in-branch servicing, and sales and brand recognition." (2014); "Our business made notable strides digitizing key components of the mobile payments experience. We announced our own payments solution ... introduced in Australia and Singapore... In Asia, we continue to differentiate our value proposition across segments ... In Mexico, ... announced meaningful investments, including new "Smart" branches, 2,500 next generation ATMs, and technology platforms and infrastructure, reflecting the significant growth opportunity we see in the market ..." (2016); "a natural language chatbot on Facebook Messenger in Singapore and interactive, live video banking in India ... introduced P2P payments services in Hong Kong, Singapore" ... "Payment services capability expanded cross-border capabilities to 60 countries, global and digital cross-currency payments solution with service offered across a range of payment options in 135 currencies and 195 countries." (2017)

The narrative analysis reveals five key themes to understand how banks in North America are responding towards digital technology led transformations. Banks take note of the external drivers. They derive benefits from adoption of technology. There are varied influences on the attitude towards digital technology. Banks are driven to prepare, build capability and innovate towards deployment of digital technology. Optimal use of digital technology is likely to lead to more technology led benefits for the bank over time and through continuity of focus. The narrative analysis entailed coding a large volume of unstructured data including images to establish logical contexts. Both visual analytics (automated word clouds) and manual inter-rater thematic analysis of narratives indicated banks focus around the themes with regard to digital transformation. This helps in discovery of themes relevant for digital transformation – and is further used to propose a Digital Transformation Maturity Model (DTMM) in section V.

The findings from qualitative narrative exploration here is aligned to relevant IS literature. External drivers have been noted as external characteristics, external task environment and external pressures by DOI [4], TOE [5], [6] and IOS [7] models respectively. Attitude towards change / technology has been discussed through individual leadership characteristics in DOI. While leadership attitude is primary we believe adoption of digital technology is more inclusive involving multiple stakeholders of the institution including customers, associates, investors, open innovators and partners. This was clearly evident from the narratives. Perceived benefits for technology usage is an important construct for individual technology adoption (seen in TAM [47] and other individual technology adoption models) it is discussed in TOE model as well. For the banks analyzed here it is beyond perception of benefit; they demonstrate actual benefits realized from digital technology. Benefits realized may explain greater intention to use. Internal characteristics, Organization and Organizational readiness have been explored by earlier studies proposed by DOI, TOE and IOS models respectively. Intention and readiness to use is demonstrated through multiple instances of digital technology initiatives, deployment revealed in narrative analysis. Strategic orientation for digital transformation were evident across the banks. While there is an effort to promote and differentiate through digital technology leadership the research could not identify distinctly differentiated variations and unique positioning for transformation among the studied banks. They seemed fairly identical in their transformation trajectories – as revealed by the institutional communications. For further research institutional models of isomorphic change [12] may be considered to explain this behavior. But it was clearly evident from the narratives, some banks demonstrate more matured practices and manifestations vis-à-vis others.

(V) DISCUSSION AND IMPLICATIONS

In this section based on the evident narratives we have segmented more matured / advanced practices and the more common, more abundantly occurring instances. This we have done by analyzing frequency of instances in the narratives and from subject matter expert perspectives. The identified matured practice clearly demonstrates a sense of progression, and in many case can be achieved only when the standard practices are satisfied. The practice segmentation is based on instances observed across the banks. The findings of this research bear significance for institutions trying to navigate through strategic decisions on digital transformation. It provides perspectives and guidance on practices followed by institutions in reference, which can be extended further through future research.

While this may set normative behavior among similar institutions it will also help understand standard and differentiating advanced manifestations of digital technology as evident through varying practices. This establishes that institutions have varied levels of maturity with regard to digital technology transformation – even though their objectives may be similar and almost identical. This renders heterogeneity in benefit realizations – as well. A maturity framework developed from comparative practices and manifestation is in *Table 2* to guide institutions.

Table 2 captures our categorization into standard and differentiating advanced practices across the institutions as derived through the narrative analysis conducted. It outlines what are the emergent practices across the discovered themes and how they become more matured over time. This has been possible to identify because of the longitudinal design of the research to capture the real essence of transformation. A similar global study across banks, beyond North America, of different sizes and focus will render a more generalized understanding on the maturity model for institutions. The study may be extended to other industries as well. A **Digital Transformation Maturity Model (DTMM)** for guidance will be beneficial to institution to determine the course of their transformation trajectories. This will provide a ready reference of use cases and possible benchmarks. The framework for transformation maturity will help consultants, technology providers to assess maturity levels of institutions towards necessary steps.

Banks are likely to progress in maturity with their continued focus on digital transformation – as evident from this longitudinal research. While standard practices are followed by all banks we observed the differentiating practices are observed in one or few banks only. The narrative communication intensity around a focused theme also becomes high as the practice maturity increases. Authors believe the differentiating practices emerge when standard practices are satisfied. *Table 2* is a guiding catalogue of all such practices across the theme areas. Based on the narratives we studied the classification of practices has emerged. It is interesting to note that instances of advanced practices are demonstrated across the banks, not by any particular bank. In other words advanced practices are identified and harvested across banks for the themes of study. A particular bank may be demonstrating a blend of standard and matured practices. It is with time and continued focus practices reach higher level of maturity. The transformation maturity model here will become more robust by study of practices across more banks. The generalized catalogue of practices will be useful in assessing maturity of transformation and identifying focus.

Table 2: Catalogue of standard and differentiating advanced practices from narrative analysis across the themes

Standard Practices	Differentiating / Advanced Practices
<p>Customer demand for digital technology</p> <ul style="list-style-type: none"> Understanding of customer's expectations Developing digital capabilities aligned to customer expectations 	<ul style="list-style-type: none"> Understanding and measuring how expectations vary across customer segments. Measuring benefits of aligning to the customer expectations towards future digital technology focus
<p>Advances and proliferations of digital technology</p> <ul style="list-style-type: none"> Awareness on growth of digital technologies and associated capabilities Willingness to change and transform workflows, processes through digital technology intervention 	<ul style="list-style-type: none"> Assign strategic importance towards assessing how digital technology can impact business Ability to conceptualize digital solutions towards competitive advantage and differentiation
<p>Associated risks of not adopting digital technology</p> <ul style="list-style-type: none"> Ability to understand and act on most potential risks of not adopting digital technology Ability to understand and act on digital technology associated risks 	<ul style="list-style-type: none"> Continuous scan of traditional, emergent and technology and competitor's use of digital technology; Scan of emergent technology start-up organizations which are emergent competitors to the institution Continuous identification of potential risks that may arise through adoption of digital technology

2. Benefits of adopting digital technology

Standard Practices	Differentiating / Advanced Practices
<p>Business benefits derived through digital technology</p> <ul style="list-style-type: none"> Improve customer acquisition, satisfaction, efficiency, agility through digital technology towards brand recognition leading to better market share Realize savings and growth by streamlining, optimizing workflows and overall simplification leveraging digital technology 	<ul style="list-style-type: none"> Institutions are able to understand how investments in digital technology lead to better performance. Ability to attribute returns on investment from digital technology initiatives
<p>Operational benefits derived through digital technology</p> <ul style="list-style-type: none"> Achievement of benefits like simplification and faster speed of processes, reduction of errors, enhancing customer and employee experiences addressing ease of use and convenience and other value add Promoting self-service through redesign of interfaces 	<ul style="list-style-type: none"> Ability to understand how operational benefits lead to business benefits Ability to understand what are the opportunities to improve through digital technology interventions
<p>Scale of growth by use of digital technology</p> <ul style="list-style-type: none"> Institutions demonstrate a growth in adoption of the digital technology enabled services and offerings by the customers 	<ul style="list-style-type: none"> Continuous tracking and governance of growth; Establishment of key metrics to track continuously; Preparedness for decline in growth if any Ability to emphasize and focus on the more successful digital technology initiatives based on adoption and scale
<p>Awards and accolades for achievement of digital technology leadership</p> <ul style="list-style-type: none"> Institutions promote digital technology leadership position to demonstrate capabilities and earn customer trust. 	<ul style="list-style-type: none"> Ability to understand expected standards and global benchmarks Ability to establish a differentiated technology leadership position
<p>Delivery of corporate citizenship by use of digital technology</p> <ul style="list-style-type: none"> Demonstrates benefits of digital technology through paper-less green operations Digital technology driven financial inclusion 	<ul style="list-style-type: none"> Efforts to include differently abled customers through digital capabilities

3. Attitude towards digital technology

Standard Practices	Differentiating / Advanced Practices
<p>Positive attitude towards digital technology</p> <ul style="list-style-type: none"> Most institutions believe that use of digital technology will be beneficial in driving performance and improve experiences for its stakeholders including customers and employees Commitment towards digital technology is continuous 	<ul style="list-style-type: none"> High-degree of reliance on digital technology - to the extent they believe technology is the driving force. View digital technology as an essential core competency and a key differentiator to drive future growth There is a clear aspiration, a sense of excitement and passion towards becoming a digital technology-centric organization
<p>Digital to render human interaction for customer experience</p> <ul style="list-style-type: none"> While institutions demonstrate positive attitude towards digital technology they clearly believe that customers value human interaction, empathy and relationship. Education to customers on how to use digital enabled services 	<ul style="list-style-type: none"> Institutions deploy digital technologies to render human interaction through cost effective digital channels. Customers experience human-centric interactions through digital designs. Such digital channels deliver additional value-add experiences like ease of use, self-service, advisory and convenience among others
<p>Continuity of focus towards digital technology</p> <ul style="list-style-type: none"> Institutions demonstrate multi-year future focus towards spending on new-age digital technologies and on changing / transforming with the help of the technology 	<ul style="list-style-type: none"> Ability to prioritize and govern investments in technology not only to run the business but also to change the business - in order to leverage opportunities for driving simplification, agility, quality, efficiency, savings and other benefits

4. Readiness and intention to deploy digital technology

Standard Practices	Differentiating / Advanced Practices
<p>Digital technology as strategic alternative</p> <ul style="list-style-type: none"> Institution acknowledges technology as a strategic alternative to develop core-competency, technology and service differentiation and derive competitive advantage. 	<ul style="list-style-type: none"> Demonstrates clear strategic objectives and aspirations followed up with initiatives for becoming a digital institution Ability to develop and deploy digital initiatives in alignment other strategic objectives
<p>Continuous focus on forward looking digital technology</p> <ul style="list-style-type: none"> Analyze existing and emergent digital technologies to deploy them Ability to develop newer capabilities through innovation by use of existing and emergent digital technology 	<ul style="list-style-type: none"> Ability to understand – What is the next emergent digital technology? Ability to deploy such technologies and derive first mover advantages; including contributing to the technology and shaping-up how it scales up and becomes more mainstream
<p>Technology and operation linkage to ensure leadership focus</p> <ul style="list-style-type: none"> Embedding digital technology functions within core processes Assignment of digital technology responsibility to key leadership of the institution 	<ul style="list-style-type: none"> Formation of technology and innovation cross-functional groups Dedicated innovation labs to explore and exploit digital technologies working in close collaboration with business functions
<p>Developing digital capabilities and promoting innovation culture</p> <ul style="list-style-type: none"> Focus on building employee capabilities in digital technology Harvesting innovative ideas within the organization to understand improvement opportunities through digital 	<ul style="list-style-type: none"> Working in close collaboration with technology start-ups, hosting technology challenges globally to harvest new ideas. Motivating employees and other stakeholder to innovate and transform through intelligent use of digital technology
<p>Significant collaborations and partnerships for digital technology</p> <ul style="list-style-type: none"> Institutions clearly acknowledge that digital technology start-ups are emerging as competitors, offering similar services Development of specialized industry solutions in collaboration with digital technology start-ups and other established technology providers 	<p>Defined process and governances for continuous engagement with digital technology start-ups including tracking benefits of such collaborations</p> <p>Extending core capabilities and co-branding new digital services and offerings through partnerships with established technology providers and digital technology start-ups</p>
<p>Ability to promote differentiated digital technology leadership</p> <ul style="list-style-type: none"> Institutions promote differentiated technology leadership to attract customers, alliances demonstrate capabilities and build trust Participate in independent contests and reviews where the service use of digital technologies are assessed 	<ul style="list-style-type: none"> Ability to assess digital technology benchmarks Ability to create a differentiated position through stand-out innovations, notable technology enabled brand-recognition triggers and experiences, and collaboration with other technology brands and networks

5. Usage and deployment of digital technology

Standard Practices	Differentiating / Advanced Practices
<p>Usage and deployment of mobile technology</p> <ul style="list-style-type: none"> Usage and deployment of mobile technologies is perhaps the most important focus area among institutions Roll-out of multiple mobile application targeted at specific customer segments to cover a wide range of services 	<ul style="list-style-type: none"> Ability to understand key areas to deploy mobile technology Develop and deploy innovative solutions through proper branding activities towards differentiation Track benefits from mobile technology deployment Enable employees with mobile-enabled business processes
<p>Usage and deployment of big data / analytics</p> <ul style="list-style-type: none"> Investments in leveraging big data and generating insights are primarily to preempt risk scenarios and better service customers with innovative mechanisms of data visualization and predictive analytics. 	<ul style="list-style-type: none"> Deployment of advanced technologies like artificial intelligence, machine learning and cognitive to derive improved perspectives Usages of emergent technologies like virtual robots and automation to enable customer services and advisory based on data analysis and insights Enable employees by leveraging big data; providing insights for functions
<p>Usage and deployment of cloud technology</p> <ul style="list-style-type: none"> Limited focus on cloud technology Assessment of functions and capabilities that may be delivered through cloud platforms and associated risks if any 	<ul style="list-style-type: none"> Ability to derive cost savings through deployment of cloud technology Robust security measures on deployment of cloud technology
<p>Usage and deployment of social technologies</p> <ul style="list-style-type: none"> Institutions focus on building relationship with the customers use multiple social channels for interaction Ability to identify risks to reputation incase inappropriate content is sent out through social channels. 	<ul style="list-style-type: none"> While institutions focus on building relationship with the customers using social channels they demonstrate innovative use of technology including use of video channels through multiple hand-held devices. Institutions focus on branding and creation of communities; extending networks to partners offering extended exposure to customers
<p>Adoption of forward looking digital technology</p> <ul style="list-style-type: none"> Limited instances of institutions adopting forward looking technology Limited scale of deployment around emergent technologies Branding and promotion around emergent digital technology towards technology led differentiation 	<ul style="list-style-type: none"> Forming meaningful partnerships with emergent technology providers Focus on technologies like artificial intelligence, robotics, machine learning, cognitive computing and blockchain among others... Deploy technologies to derive first mover advantages - contributing to the technology and shaping-up how it scales up and becomes more mainstream
<p>Roll-out of digital technology innovations /operations at a global scale</p> <ul style="list-style-type: none"> Roll-out of digital technology innovations, enabled services and offerings at a global scale keeping in mind necessary markets contexts Special focus on emergent markets like LATAM, Eastern Europe and APAC 	<ul style="list-style-type: none"> Capturing innovative ideas for digital technology enabled improvement from global markets

(VI) FUTURE RESEARCH

While the present research is scoped around large banks in North America it may be extended to similar sized institutions globally (including Europe and Asia-Pacific regions) and to mid-sized financial institutions to observe variations across the studied geo-size segments. A global study across banks and other industries of different sized organizations and focus will render a more generalized Digital Transformation Maturity Model (DTMM) for institutions. Multiple cases will be useful towards conceptualizing a theoretical model on digital transformation maturity. [48]

Cases elaborating institutional responses towards digital technology can be developed including attributable characteristics of each segment. This will help in deriving generalized insights with regard to focus on digital technologies and serve as comparative case [49], [50] references of standard and differentiating practices as derived from institutional responses. For further research institutional models of isomorphic change may be considered to explain changes in banks with regard to adoption and deployment of digital technologies. The findings of this research is based on analysis of public disclosures and narratives can be further validated through observed cases on the institutions in scope.

A framework to assess transformation maturity will help institutions adopting digital technologies to prioritize focus. It will guide based on available benchmarks and use-cases. The framework for transformation maturity will help consultants and technology providers as well - to assess maturity levels of institutions towards necessary interventions.

REFERENCES

- [1] Erik Brynjolfsson, Andrew McAfee, *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*, W. W. Norton and Company, 2016.
- [2] World Economic Forum in collaboration with Accenture, "Digital Transformation of Industries," January 2016. [Online]. Available: https://www.accenture.com/t20170411T120729Z__w__/us-en/_acnmedia/Accenture/Conversion-Assets/WEF/PDF/Accenture-Media-Industry.pdf. [Accessed April 20, 2018].
- [3] CBInsights, "Disrupting Banking: The Fintech Startups That Are Unbundling Wall Street," Citi and Bank of America," CBInsights, 19 November 2015. [Online]. Available: <https://www.cbinsights.com/research/disrupting-banking-fintech-startups/>. [Accessed 13 September 2018].
- [4] Everett M. Rogers, *Diffusion of Innovations*, 5th Edition: Simon and Schuster, 2003.
- [5] DePietro, Rocco, Wiarda, Edith & Fleischer, Mitchell, *The context for change: Organization, technology and environment*, Lexington Books, 1990.
- [6] Tornatzky, L. G. and Fleischer, M, *The processes of technological innovation*, Lexington Books, 1990.
- [7] Charalambos L. Iacovou, Izak Benbasat, Albert S. Dexter, "Electronic data interchange and small organizations: Adoption and impact of technology," *MIS Quarterly*, vol. 19, no. 4, pp. 465 - 485, 1995.
- [8] P.F. Hsu., K. L. Kraemer, D. Dunkle, "Determinants of e-business use in us firms," *International Journal of Electronic Commerce*, vol. 10, no. 4, pp. 9 - 45, 2006.
- [9] Tiago Oliveira, Maria Fraga Martins, "Literature Review of Information Technology Adoption Models at Firm Level," *The Electronic Journal Information Systems Evaluation*, vol. 14, no. 1, pp. 110 -121, 2011.
- [10] W.R.Scott, *Institutions and organizations*, 2 ed. Thousand Oaks, CA,: Sage Publications, 2001.
- [11] W.R. Scott, S. Christensen, *The institutional construction of organizations: International and longitudinal studies*, Thousand Oaks, CA: Sage Publications, 1995.
- [12] P.J. Dimaggio, W.W. Powell, "The iron cage revisited - institutional isomorphism and collective rationality in organizational fields," *American Sociological Review* vol. 48, no. 2, pp. 147-160, 1983.
- [13] A. Soares-Aguiar, A. Palma-Dos-Reis, "Why do firms adopt e-procurement systems? Using logistic regression to empirically test a conceptual model," *IEEE Transactions on Engineering Management*, vol. 55, no. 1, pp. 120 - 133, 2008.
- [14] H.H. Teo, K.K. Wei, I. Benbasat, "Predicting intention to adopt inter-organizational linkages: An institutional perspective," *MIS Quarterly*, vol. 27, no. 1, pp. 16 - 49, 2003.
- [15] Anandhi Bharadwaj, Omar A. El Sawy, Paul A. Pavlou, N. Venkatraman, "Digital Business Strategy: Toward a next generation of insights," *MIS Quarterly*, vol. 37, no. 2, pp. 471- 482, 2013.
- [16] Sunil Mithas, Ali Tafti, Will Mitchell, "How a Firm's Competitive Environment and Digital Strategic Posture Influence Digital Business Strategy," *MIS Quarterly*, vol. 37, no. 2, pp. 511 - 536, 2013.
- [17] G. Westerman, C. Calzavara, D. Bonnet, P. Ferraris, A. McAfee (MIT Center for Digital Business and Capgemini Consulting), "Digital Transformation: A Roadmap for Billion Dollar Organizations," 2011. [Online]. Available: https://www.capgemini.com/wp-content/uploads/2017/07/Digital_Transformation__A_Road-Map_for_Billion-Dollar_Organizations.pdf. [Accessed March 30 2018].
- [18] C. Lankshear and M. Knobel, *Digital Literacies: Concepts, Policies and Practices*, Peter Lang International Academic Publishers, 2008.
- [19] Warren Bennis, "Leadership in a digital world: Embracing transparency and adaptive capacity," *MIS Quarterly*, vol. 37, no. 2, pp. 635 - 640, 2013.

- [20] Pankaj Setia, Viswanath Venkatesh, Supreet Joglekar, "Leveraging Digital Technologies: How information quality leads to localized capabilities and customer service performance," *MIS Quarterly*, vol. 37, no. 2, pp. 465-590, 2013.
- [21] G. C. Kane, D. Palmer, A. N. Phillips, D. Kiron, N. Buckley (MIT Sloan Management Review and D'Ardenne University Press), "Strategy, Not Technology, Drives Digital Transformation," 14 July 2015. [Online]. Available: <https://sloanreview.mit.edu/projects/strategy-drives-digital-transformation/>. [Accessed 17 Feb 2018].
- [22] Saul J. Berman, Ragna Bell (IBM Institute for Business Value), "Digital transformation: Creating new business models where digital meets physical," 2011. [Online]. Available: https://www-935.ibm.com/services/us/gbs/thoughtleadership/pdf/us_ibv_digital_transformation_0811.pdf. [Accessed June 2017].
- [23] Timo Cziesla, "A Literature Review on Digital Transformation in the Financial Service Industry," in *BLED 2014 Proceedings*, 18, <https://aisel.aisnet.org/bled2014/18>, 2014.
- [24] Allen N. Berger, "The Economic Effects of Technological Progress: Evidence from the Banking Industry," *Journal of Money, Credit, and Banking*, vol. 35, no. 2, pp. 141 -176, 2003.
- [25] Carmen Cuesta, Macarena Ruesta, David Tuesta, Pablo Urbiola (BBVA Research), "The digital transformation of the banking industry," 16 July 2015. [Online]. Available: https://www.researchgate.net/publication/291357544_The_digital_transformation_of_the_banking_industry. [Accessed 12 April 2018].
- [26] Matthias Eickhoff, Jan Muntermann, Timo Weinrich, "What do FinTechs actually do? A Taxonomy of FinTech Business Models," in *ICIS 2017 Proceedings*, 22, Seoul, Korea <http://aisel.aisnet.org/icis2017/EBusiness/Presentations/22>, 2017.
- [27] Anna Omarini (Munich Personal RePEc Archive), "The Digital Transformation in Banking and The Role of FinTechs in the New Financial Intermediation Scenario," 9 June 2017. [Online]. Available: https://mpra.ub.uni-muenchen.de/85228/1/M_PRA_paper_85228.pdf. [Accessed 23 June 2018].
- [28] Julian Schmidt, Paul Drews, Ingrid Schirmer, "Digitalization of the Banking Industry: A Multiple Stakeholder Analysis on Strategic Alignment," in *Twenty-third Americas Conference on Information Systems (https://www.researchgate.net/publication/319103682_Digitalization_of_the_Banking_Industry_A_Multiple_Stakeholder_Analysis_on_Strategic_Alignment)*, Boston, 2017, 2017.
- [29] Sabine Lautenschläger, "Digital na(t)ive? Fintechs and the future of banking," in *European Central Bank Fintech Workshop (https://www.bankingsupervision.europa.eu/press/speeches/date/2017/html/se170327_1.en.html)*, Frankfurt, 2017.
- [30] E Gardener, B Howcroft, J Williams, "The new retail banking revolution," *The Service Industries Journal*, vol. 19, no. 2, pp. 83 -100, 1999.
- [31] Financial Stability Board (FSB), "List of global systemically important banks (G-SIBs)," 21 November 2017. [Online]. Available: <http://www.fsb.org/wp-content/uploads/P211117-1.pdf>. [Accessed 3 May 2018].
- [32] V. Beattie, W. McInnes, S. Fearnley, "A methodology for analyzing and evaluating narratives in annual reports: A comprehensive descriptive profile and metrics for disclosure quality attributes," *Accounting Forum*, vol. 28, no. 3, pp. 205-236, 2004.
- [33] W. Aerts, "Inertia in the attributional content of annual accounting narratives," *The European Accounting Review*, vol. 10, no. 1, pp. 3 - 32, 2001.
- [34] R.A.D'Aveni, I.C. MacMillan, "Focus and the content of managerial communications: A study of the focus of attention of top managers in surviving and failing firms," *Administrative Science Quarterly*, vol. 35, no. 4, pp. 634 - 657, 1990.
- [35] T. Keusch, L.H. Bollen, H. F. Massink, "Self-serving bias in annual report narratives: An empirical analysis of the impact of economic crises," *European Accounting Review*, vol. 21, no. (3), pp. 623-648, 2012.
- [36] Quim Castellà, Charles Sutton, "Word Storms: Multiples of Word Clouds for Visual Comparison of Documents," in *International World Wide Web Conference (https://homepages.inf.ed.ac.uk/csutton/publications/castella14word.pdf)*, Seoul, Korea, 2014.
- [37] V. Beattie, A. Dhaliwal, M Jones, "Investigating presentational change in UK annual reports: a longitudinal perspective," *Journal of Business Communication*, vol. 45, no. 2, pp. 181 - 222, 2008.
- [38] A. M. Preston, C. Wright, J.J. Young., "Imag[in]ing Annual Reports," *Accounting, Organizations and Society*, vol. 21, no. 1, pp. 113 - 137, 1996.

- [39] Padmini Srinivasan, Srinivasan R, A. C. Marques, "Narrative Analysis of Annual Reports: A Study of Communication Efficiency," 30 January 2017. [Online]. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2611890. [Accessed 2 October 2018].
- [40] Brian A. Rutherford, "Genre Analysis of Corporate Annual Report Narratives - A Corpus Linguistics-Based Approach," *Journal of Business Communication*, vol. 42, no. 4, pp. 349 - 378, 2005.
- [41] B. A. Rutherford, "Obfuscation, textual complexity and the role of regulated narrative and financial disclosure in corporate governance," *Journal of Management and Governance*, vol. 7, no. 2, pp. 187 - 210, 2003.
- [42] J Unerman, "Methodological issues: reflections on quantification in corporate social reporting content analysis," *Accounting, Auditing & Accountability Journal*, vol. 13, no. 5, pp. 667 - 680, 2000.
- [43] Robert Weber, *Basic Content Analysis*, Sage Publications, 1990.
- [44] M. Milne, R. Adler, "Exploring the reliability of social and environmental disclosure content analysis," *Accounting, Auditing & Accountability Journal*, vol. 12, no. 2, pp. 237 - 256, 1999.
- [45] R.K. Yin, *Case Study Research: Design and Methods*, Thousand Oaks, CA: SAGE Publications, 2014.
- [46] U. Kayapınar, "Measuring essay assessment: Intra-rater and inter-rater reliability," *Eurasian Journal of Educational Research*, vol. 57, no. 2, pp. 115 - 136, 2014.
- [47] F.D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Quarterly*, vol. 13, no. 3, pp. 319 - 340, 1989.
- [48] Kathleen M. Eisenhardt, "Building Theories from Case Study Research," *The Academy of Management Review*, vol. 14, no. 4, pp. 532-550, 1989.
- [49] Heico van der Blonk, "Writing case studies in information systems research," *Journal of Information Technology*, vol. 18, no. 1, pp. 45 - 52, 2003.
- [50] K.J.Cha, T. Hwang, S. Gregor, "An integrative model of IT-enabled organizational transformation A multiple case study," *Management Decision*, vol. 53, no. 8, pp. 1755-1770, 2015.

]

Authors & Biography:**Himadri Sikhar Pramanik**

himadri.pramanik@tcs.com; Tata Consultancy Services Limited

Himadri is associated with Tata Consultancy Services (TCS) Limited - presently working on Marketing Transformation - Research; focused on managing global research for Banking, Financial Services & Insurance Industry. Himadri has worked in consulting roles with multiple global enterprises. His primary consulting skills include - Business Process Re-Engineering; Adoption of Macro Quality Models (TBEM, MBNQA); Strategy Deployment through Balanced Scorecard; Large Programme Management; Primary Research and Analytics; Benchmarking and Metrics Consulting. Himadri has guided global enterprises in banking and insurance to develop successful frameworks for technology adoption and strategy deployment. He is a certified Tata Business Excellence Model Assessor. Himadri also researches as an Executive Research Fellow at XLRI on technology adoption trends of global institutions. Himadri has a work experience of 14 years. Himadri has contributions to multiple thought leadership initiatives at TCS, conference participations, multiple speakerships and has applied for patent in data analysis. Himadri holds a Bachelor of Technology and a Master of Business Administration.

Manish Kirtania

manish.k@tcs.com; Tata Consultancy Services Limited

Manish heads Marketing Transformation - Research at Tata Consultancy Services (TCS) Limited providing intelligence on global trends, markets, technology and institutions. He has led research for mergers, acquisition and financial research in TCS. Manish is a certified Tata Business Excellence Model Assessor. Prior to TCS, Manish worked with Tata Steel. He was part of the core team with McKinsey & Co. part of organizational transformation program. He has been guest speaker for multiple conferences on Reengineering, Process Management, Strategic Thinking, Competitive Intelligence,

Balanced Scorecard, Defensive strategy. Manish is associated with TATA Group for more than 25 years. Manish holds a Bachelor of Technology in Mechanical Engineering & Post Graduate in Industrial Management from Indian Institute of Technology (IIT).

Ashis K Pani

akpani@xlri.ac.in; XLRI – Xavier School of Management

Professor and Dean at Xavier School of Management – XLRI. Dr. Pani is M.Tech from IIT Madras and Ph.D from IIT Kharagpur and is teaching and researching in academic areas - Production, Operations & Decision Sciences, Information Systems, Digital Transformation, Artificial Intelligence. Chairperson of the “Center for e-Business” - XLRI. He is recipient of multiple awards and scholarships including EURECA project award funded by European Commission, IBM’s best faculty award. Dr. Pani has over 20 publications in peer reviewed international journals, authored multiple scholarly books and chapters. He has refereed conference proceedings. Dr. Pani has participated across multiple global information science conferences. His research and teaching focus is on how institutions can effectively use technology.

