EXPLORING THE NATURE OF RISK IN DIGITAL TRANSFORMATION: A PROBLEMATISATION PERSPECTIVE OF LOW-CODE/ NO-CODE PLATFORM RISK

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Abstract

Low code/no code (LCNC) enterprise solutions present a new dimension to digital transformation through supporting stakeholders in developing new capabilities in-house without a traditional IS development background. In addition to the widely cited benefits however, are inherent risks to introducing these platforms within a wider organisational digital transformation. The risks and their impacts on digital transformation have not been explored to date. As these platforms introduce several unique characteristics which challenge the current understanding of risk as a concept, this study presents a critical perspective on several assumptions which have impacts on the viability of LCNC-enabled digital transformations. In doing so, we present a foundation for future research in leveraging these solutions for more successful transformations through managing the inherent risks in LCNC platforms.

Keywords: Low-Code/No-Code, Digital Transformation, Risk, Problematisation.

1 Introduction

With the proliferation of low-code/no-code (LCNC), organisations are seeking to augment digital transformation by leveraging these platforms as mechanisms for citizen development (Sanchis et al. 2020). The benefits have been widely documented within prior studies such as: reducing effort on local information technology (IT) teams (Carroll and Maher, 2023), optimising manual workflows through automation (Elshan et al. 2024), improving customer or employee experience (Carroll and Maher, 2023) and enhancing collaboration across teams and business units (Novales & Mancha, 2023). In spite of these benefits, LCNC, as with all major socio-technical changes triggered by digital transformation at large, presents a major risk to the transforming entity. Introducing new entity-wide enterprise platforms is an inherently risky endeavour but these risks are catalysed by the additional requirements and unique characteristics of digital transformation. Therefore, although transforming entities and vendors introducing LCNC solutions may be concerned with the potential functional risks associated with all information system (IS) developments and implementations such as budget overrun (Maruping et al. 2019; Tuunanen et al. 2023), scope creep, missed deadlines and misaligned functionality (Tian and Xu, 2015; Wessel et al. 2021), we posit that the post-implementation socio-technical threats introduced by these platforms poses an even greater risk to transformation success. Risk factors such as change rigid cultures, goal misalignment, skill gaps and service cannibalisation as described by Brosnan et al. (2023) threaten the success of the transformation at large even after the successful delivery of the LCNC platform. Although risk is one of the foundational concepts of IS literature with nearly four decades of research published on the positive and negative implications of risk within IS, the unique characteristics of LCNC and digital transformation mean that several assumptions and unqualified axioms still permeate the collective understanding of risk within these new contexts. Therefore, this study uses Alvesson and Sanberg's (2011) problematisation approach on three of the assumptions that obfuscate

risk scholarship within the context of digital transformation. With a particular focus on the unique characteristics of LCNC platforms enabling digital transformation, the study problematises the assumptions that (i) generic risk management approaches and tools from early IS development studies are suitable to manage risk within complex LCNC initiatives, (ii) that LCNC risks can be understood and acted upon within common logics and organisational environments in addition to (iii) that non-project actors have no impact on risk action or inaction within LCNC-enabled digital transformations. Through problematising these assumptions, alternative assumptions are positioned to be validated in future primary research, developing the collective understanding of LCNC risks and by extension, digital transformation.

2 Background Literature

2.1 LCNC within Digital Transformation

LCNC solutions are defined as the subset of application platforms that are used to rapidly develop and run custom applications by abstracting and minimising the use of programming languages (Gartner, 2024). As they pertain to digital transformation, LCNC usually refers to citizen development which is when stakeholders without programming experience build new applications or functionality within LCNC platforms, generally with the aim of introducing new capabilities to an organisation or line of business without requiring support from the IT unit or a third-party vendor (Sanchis et al. 2020). This development has given rise to a new dimension of digital transformation in which individual lines of business or non-technical stakeholders are incentivised to develop new capabilities in-house (Carroll and Maher, 2023). This enables continuous delivery of the digital transformation strategy in addition to embedding new capabilities which are tailored to the requirements of an individual line of business or stakeholder group using high-quality and governable digital toolkits (Novales and Mancha, 2023). This most notably led to transformation success within Shell in which a suite of Microsoft LCNC applications were made available and accessible to employees, along with training and incentives to support citizen development. This reduced in-house development requirements as part of a wider transformation (Carroll et al. 2021). Although a successful transformation through LCNC capabilities, one potential limitation in their preparation for citizen development was placing a strong emphasis on ensuring that the technical controls were in place to support LCNC introduction to business units such as application ownership, data integrity checklists and access controls which were mapped before implementation. There was also an emphasis placed on the social component of introducing this solution such as stakeholder buy-in and training. One dimension that seems to be less considered was the post-implementation phase. This is a dimension of risk that is not widely considered within traditional IS development approaches but requires concerted consideration as a successful LCNC implementation does not necessarily prevent the transformation risks of LCNC from materialising. Rather, LCNC introduces unique risks to the digital transformation which continue to evolve post-implementation such as embedding a change culture, revising and enforcing governance in addition to ensuring continued alignment with organisational strategy (Carroll et al. 2023a; Sanchis et al. 2020).

2.2 Risk within Digital Transformation

Digital transformation has been documented as being an integral component of organisational strategy, value definition and innovation management with 84% of Chief Information Officers (CIOs) classifying it as integral to organisational survival and 82% of organisations having already undertaken DT initiatives (Chanias et al. 2019). We defer to the definition of digital transformation as: "a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies" (Vial, 2019: 121). Unfortunately, the reality for the majority of organisations undertaking a digital transformation is an estimated failure rate of between 63-90% (Libert et al. 2016; Ramesh and Delen, 2021; Wade and Shan, 2020). This has sparked significant research within the IS community to investigate the inherent risks and sources of failure in digital transformation such as Rowland et al. (2022) who called for

understanding the root causes of why digital transformations fail to achieve their intended outcomes through a case study. Additionally, Brosnan et al. (2023) systematically identifies and maps the sources of risk within 117 primary digital transformation studies and call for future research on understanding the nature and impact of risk within digital transformation contexts. Carroll et al. (2023a) call for research on reporting the risks associated with digital transformation with a focus on governance, risk management and compliance while Olupado et al. (2024) conduct a bibliometric assessment to explore the technology, management, innovation and IS factors which lead to digital transformation failures. These studies highlight how digital transformation is an inherently risky initiative which introduces several new opportunities and sources of value to an entity but also introduces significant potential downsides, both social and technical, if risk is allowed to materialise (Ramesh and Delen, 2021). There is also a high degree of interdependence across digital transformation, with successes in one component generally benefiting other components of the transformation, while the materialisation of a risk in one component of the entity will usually lead to cascading impacts across the entity. With the study of digital transformation risk still emerging within information systems research, we defer to Lyytinen et al. (2023: 275) who define digital transformation risks as: *"the variation in the distribution of possible outcomes, their likelihoods, and their subjective values."* Using this definition as a lens, risk can be identified across digital transformation contexts in order to better understand and manage the phenomenon, including within LCNC-centred digital transformations.

3   Approach to Problematising Assumptions

A selective, systematic approach was adopted in order to support the transparency and replicability of this study's problematisations. This was undertaken as per the Okali (2015) approach for systematic reviews. The objective was to understand how digital risk as a concept evolved within published research across decades and disciplines. This was to understand how the unique characteristics of risk within the contemporary era of digital transformation and by extension, LCNC, are different from those explored in prior risk research. Thereafter, Alvesson and Sanberg's (2011) problematisation technique was used to analyse and evaluate the unqualified assumptions and contradictory axioms that permeate the risk domain with implications on LCNC-enabled digital transformation.

3.1   Planning

Scopus and the AIS eLibrary (AISeL) were chosen as the databases on account of the high volume of quality, multi-disciplinary risk studies over several decades. Following selection, a search string was developed to return studies which explored the dimensions of risk such as risk management, identification and analysis within their title-keywords-abstract (TAK) (Figure 1). The second part of the string was designed to return studies on the risk unit of analysis such as IT or IS development projects in addition to types of transformation such as digital or IT-enabled. Full and published journal articles, written in English were selected within the Business, Management and Accounting category on Scopus although no timeline was applied to the string in order to provide a longitudinal perspective on the evolution of risk. As the AISeL does not have an advanced search string search function, the string was broken into each individual component and searched using the 'advanced search' function and manually validated against the research protocols thereafter.

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"Risk Manag*" OR "Risk Assess*" OR "Risk Ident*" OR "Risk Analysis" OR "Risk Priorit*" OR "Risk Reduc*" OR "Risk
Monit*" OR "Risk Evaluat*" OR "Risk Mitig*" OR "Risk Control" OR "Project Risk" OR "Risk Assess*" OR "Risk
Ident*"OR "Risk Priorit*" AND "Information Technology" OR "Information Communication Technology" OR
"Information Systems" OR "Information Management" OR "Digital Trans*" OR "IT-Enabled Trans*" AND ( LIMIT-
TO ( SRCTYPE , "j" ) ) AND ( LIMIT-TO ( PUBSTAGE , "final" ) OR LIMIT-TO ( PUBSTAGE , "aip" ) ) AND ( LIMIT-TO (
DOCTYPE , "ar" ) ) AND ( LIMIT-TO ( SUBJAREA , "BUSI" ) ) AND ( LIMIT-TO ( LANGUAGE , "English" ) )
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Figure 1: Search String for Critical Review

3.2   Extraction

Following the execution of the search string on both databases, the 1,227 Scopus and 1,248 AISeL studies were exported to a spreadsheet where they were filtered against the Chartered Association of Business Schools (CABS) rankings to only include studies from journals ranked 2-4* in order to maintain high quality studies within the sample. To account for the multi-disciplinary nature of risk, studies from across nine CABS categories of business were included (Appendix 1). In addition, studies exploring the construction, impact and mitigation of risk within digital contexts were included to support a wide and inclusive working bibliography. Critically, with such a broad range of risks explored in academic research, the search strategy focused on including studies which explored risk within digital contexts such as the development, deployment or utilisation of digital technologies by organisations or their stakeholders. However, organisational risks at large such as supply chains or financial risks were excluded in addition to studies which explored risk from solely the stakeholder perspective without a direct connection to the organisation such as technology addiction. In this sense, studies were included if they could reasonably provide context on risk within a digital transformation context. For example, a study exploring supply chain risks would be excluded but a study exploring risks in a supply chain system development would be included. In revising the sample, duplicate studies were also removed to reduce the sample to 424 studies. Thereafter, a manual TAK review was conducted to gauge if the study responded to the research question and objectives in addition to removing any anomalies returned from the database such as incomplete studies, studies not written in English or studies which did not contain keywords from the search string. Following the exclusion of these in addition to irrelevant studies, a working bibliography of 250 studies, ranging from 1986-2024 was selected for a full review. This range allowed for the unique characteristics of risk within the contemporary era of LCNC-enabled digital transformations to be distilled within the expansive volume of risk literature across nearly four decades of research.

3.3   Execution

The working bibliography was critically reviewed between January to April 2024. This involved problematising implicit or poorly articulated assumptions which permeated the decades of research. This was enabled through adapting Alvesson and Sandberg's (2011) methodological principles for problematisation (Table 1):

Methodological Principle	Description
Identifying a domain of literature	An extensive review of risk literature across the timelines, disciplines and research protocols outlined in the search strategy was undertaken. Studies were included if they provided a view on the evolution of risk literature with implications for contemporary LCNC-enabled digital transformations.
Identifying and articulating assumptions underlying this domain	Assumptions were defined as axioms or widely cited statements within risk research which have been weakly articulated and have not been justified through primary research or an original citation referring to primary research. These were contextualised through Alvesson & Sandberg's Typology as:

	• **In-house assumptions** in which particular schools of thought within risk literature which are viewed as unproblematic by its advocates were in contradiction with the sets of ideas held by other theoretical schools. This could be seen through the schools which present alternate views on the effectiveness of fuzzy descriptors in communicating the nature and status of risk within IS development (Adeleye et al. 2004; Chen and Cheng, 2009; de Bakker et al. 2012). • **Root metaphor assumptions** where broader images about the risk are viewed as constructs of a unitary set of values. For example, the assumption that risk is the function of the probability and impact of a negative event occurring can lead to ambiguity in how risk managers can leverage risk to support positive outcomes as opposed to solely trying to prevent a negative outcome from materialising (Scott and Barrett, 2005). • **Paradigmatic assumptions** emerged from challenging the ontological, epistemological and methodological characteristics that underpin the choice of research design or questions. This could be seen in how an author designs a study to evaluate the effectiveness of fuzzy descriptors in communicating risk. For example, an interpretive study may identify shortcomings in the use of fuzzy descriptors in retrospect (Dey et al. 2013) while an action-design study may observe the effectiveness of the same descriptors through how it was constructed within the context of the study (Liang and Li, 2023). • **Field assumptions** were the broader set of assumptions on the subject of risk across paradigms and disciplines. For example, some academic disciplines study risk within the context of theory while others adopt a more practitioner-orientated lens. This can lead to contradictions in how risk is understood across disciplines.
Evaluating the assumptions	The longlist of assumptions were considered and problematised within the typology with respect to how their interpretation may impact a reader's understanding of risk within an LCNC-enabled digital transformation. In this sense, the theoretical and practical implications of these assumptions were considered.
Developing an alternative assumption ground	Alternative assumptions were developed by identifying and evaluating contradictions within the problematised assumptions. Alternative assumptions were ideated through statements that did not propose a binary alternative but rather explored conditions in which these contradictions could exist and operate in tandem.
Considering the phenomenon in relation to its audience	These alternative assumptions were considered within the context of a digital transformation and how a study may be designed to not only evaluate the alternative assumption but also provided insight for digital transformation and LCNC risk scholarship going forward.

Evaluating the alternative assumption ground	This principle was considered through the design of a future research agenda in which the ways that the alternative assumption could be supported through a research study was delineated. In this sense, by considering how these studies would be designed, the authors considered the utility of the alternative assumption in future LCNC-enabled digital transformation risk research.

Table 1: Adapting Alvesson & Sanberg (2011) Methodological Principles for Problematisation

Following the critical review of the working bibliography, the problematisations were carried out on the identified assumptions. These are explored in order to provide context on the assumptions as they pertain to LCNC-enabled digital transformations.

4 Problematising Assumptions

Through the aforementioned methodological principles, the various assumptions pertaining to risk within LCNC enabled digital transformations were identified, articulated and evaluated. Thereafter, the alternative assumptions were developed, considered and evaluated to support future research in understanding risk within digital transformation going forward, particularly with regards to the utilisation of LCNC platforms.

4.1 Approaches to Managing Digital Transformation Risk

Assumption: Risk management tools and methodologies that have been deployed successfully within other risk-related research streams can be successfully used to mitigate the risks in LCNC-enabled digital transformations.

The deployment of generic risk management tools and methodologies have contributed to the development of this in-house assumption. This likely stems from convenience and deferral to what the organisation or stakeholder are already familiar with as much as to the absence of a viable alternative at present with generic risk registers, budget trackers and weekly status reports largely failing to address and mitigate the living, subjective and often paradoxical nature of the risks within LCNC-enabled digital transformation (Moeini and Rivard, 2014; Novales and Mancha, 2023). Embedding LCNC platforms to enable digital transformation entails to a complex socio-technical change to the technology, people and process components within and across organisations (Baiyere et al. 2020; Carroll and Maher, 2023; Wessel et al. 2021). As a concept, it presents a large number of variables and intangibles that would not have necessarily posed a risk within software development, change management or innovation projects that would have previously been explored within the literature (Chen and King, 2022; Kaganer et al. 2023; Vial, 2019; Wiener et al. 2019). For example, the start and end-point of a digital transformation is significantly less clear than a traditional software or IS development which generally incorporates a pre-defined start point from initial through to a widely-understood end-point such as the handover of a new system from IT to the business unit (Carroll et al. 2023b; Ologeanu-Taddei et al. 2023; Tallon et al. 2022). This assumption is particularly evident within LCNC initiatives as the initiation phase requires a risk management approach and philosophy generally seen in software or IS development, followed by process risk management following go-live in which risk managers must ensure that new workflows and capabilities continue to be developed and managed safely within the organisation (Carroll and Maher, 2023). This is in area that requires further concerted attention with Carroll et al. (2023a) calling for research on the final states of a digital transformation. In this sense, a digital transformation may not have clear indicators of success or failure and may be a lot more nuanced. Digital transformation represents a more fluid state in which organisations are encouraged to incorporate generativity and undertake a high degree of unprompted socio-technical change within business units or departments which may not necessarily have a direct impact or visibility on the organisation's digital transformation vision, mission or strategy as a whole (Baiyere et al. 2020; Kappelman et al. 2018; Lorenz and Buchwald, 2023; Soluk and Kammerlander, 2021). Also, by its nature, digital transformation is often

less focused on a single project or clearly defined group of projects in delivering a specific goal (Eden et al. 2019; Gangi and Johnson, 2022; Noesgaard et al. 2023; Scott and Orlikowski, 2022). Rather, digital transformation can often look to develop a set of capabilities or shared assets to enable the organisation to undertake change at a more local level such as through the establishment of communities of practice, development of LCNC capabilities within business units or deep structural changes can often cause risks to the organisation through major digital initiatives having little alignment with the expectations or ambitions of individual business units or stakeholders (Baiyere et al. 2020; Carroll et al. 2021; Novales and Mancha, 2023). As such, there are evidently causal components of a digital transformation that may be more susceptible to being impacted by risk that would have otherwise been protected within a more rigidly defined and focused software or IS development project. Consequently, the tools and methodologies to mitigate risks within these projects would likely not be suited to an LCNC-enabled digital transformation initiative. These factors have contributed to the development of an alternate assumption: *digital transformation presents a significant revolution to digital organisational structure, models and ways of working. This presents risks that cannot be mitigated using the same tools and methods as other IT change digital phenomena.*

4.2 Perceptions of Risk within Digital Transformation

Assumption: LCNC-enabled digital transformation risks are perceived and responded to within shared logics and environments.

Risk mitigation actions taken within the context of a digital transformation often presents a generic approach to identifying, mitigating and evaluating risks which does not consider the roles, seniority or psychological perceptions of the risk owners and responders. This paradigmatic assumption is amplified within LCNC initiatives in which traditional operating models, capabilities and responsibilities are often obfuscated. On the whole, organisations often use very visual and comprehensible risk registers and trackers within projects (Barki et al. 2001; Heemstra and Kusters, 1996; Moeni and Rivard, 2014; Taylor et al. 2012). These often incorporate easily interpretable qualitative notation called 'fuzzy descriptors' such as ranking the impact or probability of a risk from 1-5 to highlight severity or the use of colour to highlight risk status such as the use of red, amber, green (RAG) (Heemstra and Kusters, 1996; Kummer and Mendling, 2021; McKeen and Smith, 2009). Within the LCNC transformation of Shell, a 2 X 2 Matrix was used to map risk probability and impact which was effective in communicating the current status of the priority risks to a wide audience which had little time to interpret complexity (Carroll and Maher, 2023). However, this notation often fails to convey the dynamic and complex nature of the risk being reported such as the aforementioned uncertainties and dualities in addition to other dependencies, long-term impacts or lessons learned which may provide more clarity for stakeholders and decision-makers (Barki et al. 1993; Lyytinen et al. 1998; McKeen and Smith, 2009). While previous studies have leveraged *paradox theory* (Wimelius et al. 2021) and *real options theory* (Chen et al. 2009) to evaluate how organisations make decisions under uncertainty and in the face of contradictory but interrelated elements, risk studies have continued to contextualise risk within objectivist and universal terms without regard for the role of perception or subjectivity. Indeed, while an argument may be made that this notation is effective in communicating complex topics of risk to a wide audience to enable alignment and high-level consensus on a day-to-day basis, this notation is not effective in communicating the relative, dynamic and complex nature of risk across stakeholder groups, levels of seniority and lines of business who are expected to take action to mitigate said risks (Barki et al. 1993; Drummond, 2011; Lyytinen et al. 1998; Tian and Xu, 2015). This is particularly evident for senior leadership whose interpretation of risk is often only through visualising these generic risk management tools which can provide an unclear picture of the nature of the risks and may result in a misinterpretation of likelihood, dependencies or severity until after the risk has taken effect.

Not only do these generic methods and tools for mitigating risks reduce the stakeholder's visibility of the risk and its nuances but also fails to leverage the stakeholder's insight or perspective on the topic to inform a decision while also allowing agential biases or perceptions to impede the risk management process such as failing to allay the emotional, metacognitive and psychological factors that sway

stakeholders' perceptions and responses to risk (Drummond, 2011; Lim et al. 2011; Shirish et al. 2023). Lee et al. (2019) discuss the role of psychological distance in relation to risk where generational, cultural or temporal factors can shape the ways in which an individual or group views a risk and shapes their response. Although it has been extensively documented that individuals and groups bring their own perspectives, value, agential logics, goals, challenges and biases in interpreting and responding to a risk, there has been an absence of research in developing tools or strategies to either overcome or leverage these factors (Noesgaard et al. 2023; Rowe, 2018; Tsai et al. 2023). As such, although a citizen developer, project manager and project sponsor each bring different perspectives and biases with regards to interpreting and responding to the risks that arise in a digital transformation project, there remains an expectation that they continue using common or generic risk management approaches or tools during the risk mitigation process (Markus and Rowe, 2021). With the philosophy of LCNC predicated leveraging the perspectives and capabilities of wide audiences of citizen developers, it is a potential limitation that this diversity is not factored within the risk management approach. Although further research is required in what a more interpretive or tailored approach may entail, as an initial step, an alternative assumption in more accurately interpreting this phenomenon may be: *Individual and group logics or values shape their views and actions with regards to LCNC-enabled digital transformation risk.* These should be understood and factored within an approach or methodology to address these risks.

4.3   Role of non-Project Actors in Digital Transformation Risk Management

Assumption: Digital transformation risk perception and management is influenced solely by stakeholders acting within the governance structures of the LCNC initiative.

A field assumption on account of it being shared about the risk and wider digital transformation phenomena across the different schools of thought across IS, management, economics and psychology, there has traditionally been an implicit assumption that project risks are shaped by actors within the project (Nuijten et al. 2018). The role of non-project actors has not been examined within risk management research or practice to date within tools like the Responsible, Accountable, Consulted and Informed (RACI) Matrix (Jiang et al. 2002), Stakeholder Maps and Business Scorecards (Benaroch et al. 2006; Neumeier et al. 2018) or Project and Program Governance Structures (Chen et al. 2009; Pich et al. 2002). These tools during development traditionally assess the influence, impact, authority and control of actors directly involved in the project, programme or initiative such as the Development Team (Maruping et al. 2019), Contractors (Wu et al. 2013), Project Manager (Liu and Wang, 2016), Project Sponsor (Drummond, 1996) or Steering Board (Verville et al. 2007). They can also consider actors that are not directly involved in the development or deployment of a project but have a vested interest or stake in the outcome such as End-Users (Tiwani and Keil, 2006), Regulators (Spears et al. 2013), Project Auditors (Taylor, 2005) and stakeholders on other in-progress developments with interdependencies on the initiative in question (Maytorena et al. 2007).What is less considered is the influence of actors who may not be traditionally considered when conducting stakeholder analysis but can influence the perception of risk within the initiative which can in turn shape the actions or inactions of the initiatives' actors such as the decision to implement stage gate controls or terminate an LCNC initiative which fails to materialise the anticipated benefits. This could include senior actors within the transforming organisation who although not involved with the initiative, may be consulted by the Project Manager or Sponsor to provide a perspective. Additionally, the experiences of past initiatives through reviewing lessons learned, status reports or other project documentation may also influence how actors within an initiative perceive risk (Neumeier et al. 2018). These influences could be factored into the aforementioned stakeholder documents but it is likely that there is an additional category of stakeholders who influence the perception of risk in a way which has not yet been quantified or analysed in research. For example, informal 'water cooler' conversations with non-project actors within an organisation, proposed approaches or sales pitches by unsuccessful tendering vendors or the informal consultation of online resources may shape the perception of risk within the initiative, even if the influencing party lacks a clear stake and cannot be held accountable. It is already understood that risk is subjective and constructed by various psychological, temporal and meta-cognitive factors which can be difficult to account for even among project actors (Lee et al. 2019). It is also understood that risk is often shaped

by intangible factors which are not effectively accounted for within traditional project or risk management approaches (Brun et al. 2006; Dey et al. 2013). With LCNC-enabled digital transformations now encompassing a much wider organisational change than previous digital phenomena which engenders a wider range of interested parties, risk management approaches may need to expand the stakeholder groups which are considered during stakeholder analysis. A more accurate alternative assumption may be that: *risk is perceptive and often influenced by actors that would not normally be considered under the traditional RACI categories of risk management.*

5   Discussion and Future Research

In taking a critical perspective to understanding the risk implications of LCNC platforms on digital transformation through problematising assumptions, the study sets of foundation for future research to evaluate and develop alternative assumptions in order to enable successful risk management within LCNC-enabled digital transformations.

5.1   Understanding the Unique Characteristics of LCNC on Digital Transformation Risk

Digital transformation introduces unique sets of characteristics which mean that traditional tools and methodologies of managing risk are ineffective in enabling successful transformations (Brosnan et al. 2023). This is particularly evident with regards to LCNC platforms and the associated socio-technical changes that this introduces to transforming organisations (Carroll and Maher, 2023). However, with both LCNC and wider digital transformation still nascent areas of research, there is an imperative to understand their unique characteristics before positioning a new methodology, framework or tool as a way of enabling successful transformations. LCNC introduces complexity to digital transformation through the imperative to introduce a platform within strict timeline and budgetary thresholds as is applicable for the majority of digital initiatives (Tuunanen et al. 2023). However, it also introduces additional requirements which mandate a slower, deliberate and human-centric change management approach which cannot necessarily be factored into a timeline before or given a monetary price to enable (Carroll et al. 2023a). There is still ambiguity as to what a digital transformation actually is with myriad definitions and core concepts that need to be delineated before a comprehensive risk management tool or methodology can be introduced (Baiyere et al. 2020; Carroll et al. 2023b; Vial, 2019; Wessel et al. 2021). For future research exploring digital transformation risk, a typology of what is and is not considered to be a digital transformation is a prerequisite to ensure that deviations and contradictions from prior published risk research can be examined.

5.2   Digital Transformation Risk Research Design

Risk research features a rich methodological diversity over the past four decades. However, in the context of LCNC, the findings suggest that there has been a reliance on surveys and short case studies (Ammirato et al. 2019; Lee et al. 2019; Venkatesh et al. 2018). This has limited the extent with which risk can be interpreted longitudinally within live project environments. As discussed herein, digital transformation and LCNC risks can materialise even following a successful implementation. However, this may not be evident if the research design has only considered the design and development phase. Therefore, when exploring the unique characteristics of risk within LCNC and wider digital transformation initiatives, studies should be positioned to interpret how risk perception by both internal and external actors within the LCNC, impact the associated actions and inactions. These studies should adopt a longitudinal philosophy as argued by Carroll et al. (2023a). This will allow the evolution of all dimensions of risk to be observed and examined. Furthermore, future studies should also consider adopting an action-oriented approach to risk management research as was utilised extensively in early risk research (Akomode, 1999; Heemstra and Kusters, 1996; Straub and Welke, 1998). In this sense, studies can identify the risks at play within LCNC and digital transformation initiatives before developing artefacts to support organisations in managing these risks (Baskerville and Stage, 1996).

Finally, the variety of stakeholder groups and perspectives within LCNC-enabled digital transformations should be welcomed through more inclusive research designs. For example, the utilisation of stakeholder-focused units of analysis such as through the use of *theory of planned behaviour, framing theory* and *control theory* could provide researchers with the perspectives required to assess how different stakeholder's psychological, meta-cognitive and temporal perceptions of risk shaped their associated actions and inactions. These approaches would support with understanding the unique characteristics of risk that impact contemporary digital initiatives in addition to developing ways to support organisations and researchers in managing these risks. This should support with enabling more successful risk management for digital initiatives.

6   Conclusion

In conclusion, the study presents a critical perspective on risk within LCNC and wider digital transformation contexts. Through the problematisation of several unqualified or poorly supported assumptions within the risk domain, the study provides alternative assumptions to provide a foundation for future risk research within the contemporary digital era. Through being open on the nature of risk within LCNC-enabled digital transformations and through encouraging more critical perspectives in relation to these initiatives, it is expected that researchers and organisations at large will be better equipped to manage the associated risks and enable more successful outcomes.

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Appendix 1: CABS Categories Included in Sample

- Ethics, CSR & Management

- Human Resource Management & Employment Studies

- Information Management

- Operations & Technology

- Operations & Management Science

- Psychology- General

- Psychology

- Public Sector

- Strategy