Refining integrated thinking

Warren Maroun, Dusan Ecim and Dannielle Cerbone
School of Accountancy, University of the Witwatersrand, Johannesburg, South Africa

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Abstract

Purpose – Integrated thinking involves a holistic, multi-capital approach to decision-making and operations to promote value creation and sustainability. This paper aims to outline a schematic which can be used to gauge the levels of integrated thinking by organisations.

Design/methodology/approach – The researchers partnered with an independent consulting firm ("Sustain-X") which has developed a tool for evaluating integrated thinking. A two-stage mixed-method design is used to evaluate the tool. Firstly, in keeping with the exploratory nature of the paper, the tool's integrated thinking principles and indicators are contrasted with findings from an extensive review of the integrated thinking research and interviews with experts on how integrated thinking is understood and operationalised. Secondly, the tool was applied to a sample of South African listed firms' integrated reports and used to generate integrated thinking scores. These scores are evaluated by testing the strength of their association with other generally accepted proxies for integrated thinking.

Findings – The principles of the schematic include integrated awareness and understanding; integrated leadership commitment and capability; integrated structures; integrated organisational performance management; and integrated external communication. Empirical results show that the integrated thinking measures generated using the Sustain-X schematic are aligned with integrated report quality scores and ratings of the sophistication of organisations' accounting, management and governance structures.

Research limitations/implications – A combination of earlier research findings, detailed interviews (conducted independently of Sustain-X) and a battery of quantitative tests have been used to evaluate the schematic, but more refined testing using additional case studies or ethnographies has been deferred.

Practical implications – The tool offers a practical means for stakeholders to evaluate integrated thinking. It is flexible enough to be used with data collected during private engagements with companies or only publicly available information.

Social implications – The schematic is one of the first to outline the dimensions of integrated thinking and should be useful for academics and practitioners concerned with the development and application of integrated thinking.

Originality/value – This paper adds to the literature on integrated thinking and answers the call for further research to evaluate integrated thinking practices.

Keywords Integrated thinking, Integrated reporting, Sustainability, Report quality, IIRC, Multi-capital

Paper type Research paper

1. Introduction

According to the *International Integrated Reporting Framework* (the Framework), integrated reporting is underpinned by the concept of integrated thinking (International Integrated Reporting Committee [IIRC], IIRC, 2021). This is defined as:

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> [. . .] the active consideration by an organization of the relationships between its various operating and functional units and the capitals that the organization uses or affects. Integrated thinking leads to integrated decision-making and actions that consider the creation, preservation or erosion of value over the short, medium and long term (IIRC, 2021, p. 3).

When an "integrated thinking logic" takes hold (Cerbone and Maroun, 2020; De Villiers *et al.*, 2020), "value" is generated not only by realising financial gains for investors and creditors but by addressing concurrently economic, environmental and social considerations (De Villiers *et al.*, 2020; King and Atkins, 2016). The management of an organisation [1] informed by integrated thinking should culminate in high-quality reporting to stakeholders characterised by reliable, complete, comparable, balanced and transparent disclosures (IIRC, 2021). High-quality reporting reduces information asymmetry and enables accountability for economic, environmental and social performance because of the nexus between strategic, operating and management activity on the one hand, and the nature, timing and extent of the information reported to stakeholders, on the other (Alrazi *et al.*, 2015).

Against this backdrop, the extent and quality of integrated report disclosures have been examined extensively (Malola and Maroun, 2019; Beck *et al.*, 2015; Haji and Anifowose, 2016). Related studies evaluate the value-relevance of integrated reporting (Barth *et al.*, 2017; Churet and Eccles, 2014; Zhou *et al.*, 2017), its inherent limitations (Flower, 2015; Thomson, 2015) and alignment with different theoretical frameworks (Rinaldi *et al.*, 2018). In contrast, there is limited information dealing specifically with integrated thinking (see, for example, Rinaldi, 2020; Stacchezzini and Lai, 2020) including how integrated thinking is understood by organisations and how stakeholders can evaluate the extent to which integrated thinking is implemented.

Without a generally accepted approach for evaluating integrated thinking, researchers rely on different proxy measures (Serafeim, 2015; Busco *et al.*, 2019; Malafronte and Pereira, 2021). The assumption is that the scores capture how economic, environmental and social factors are integrated into internal management and decision-making processes and, in turn, indicate the level of integrated thinking (Serafeim, 2015; Venter *et al.*, 2017). Existing proxies have not, however, been developed with the provisions of the Framework in mind or specifically to gauge integrated thinking. A more refined integrated thinking measure is required, grounded in the academic research and experiences of practitioners and report users with a working knowledge of integrated thinking.

Ideally, detailed case studies would be conducted to understand how an organisation's strategy, risk management, operating practices and governance systems are informed by an integrated thinking philosophy (De Villiers *et al.*, 2019). Formal reviews can be done to identify disconnects between a firm's activities and decision-making and what is included in policies, mission statements and publicly available reports. This approach will yield the most persuasive evidence on the extent to which an integrated thinking logic has taken hold at an organisation but will be costly and impractical when dealing with many firms. Even if this was not the case, organisations are not obligated to grant stakeholders access to their operations and internal records. Opinions provided by external assurors of integrated or sustainability reports can provide some insights, but these seldom deal with the internal dynamics which must be observed and tested to conclude on the levels of integrated thinking. As a result, any integrated thinking schematic should be flexible enough to be used with information collected from, for example, private meetings with companies *and* public sources.

With the above in mind, the researchers collaborated with "Sustain-X" [2], a well-established sustainability and integrated reporting firm, to evaluate the appropriateness of a tool for gauging integrated thinking. Sustain-X has two decades of experience operating in

the broader sustainability space with a multi-disciplinary team of experts. The firm developed its tool over several years based on detailed case studies with individual firms. These involved extensive engagement between Sustain-X and different companies dealing with how profit-orientated entities modify their strategies, business models and operations to align with an integrated thinking philosophy and ensure high-quality reporting to stakeholders. Based on its experiences, Sustain-X derived a set of integrated thinking indicators grouped according to broader principles of themes which it uses for evaluating the advancement of integrated thinking at its clients and informing recommendations.

Details on the case studies run by Sustain-X are considered proprietary, but the consultancy has made its tool available to the researchers. The current paper highlights the schematic's principles and indicators and tests their reasonableness and completeness in a two-stage process. The identified integrated thinking principles and indicators are cross-referenced to the existing academic research on integrated thinking and evaluated in more detail using insights from detailed interviews conducted by the researchers with sustainability experts independent of Sustain-X. The researchers then apply the schematic to a sample of well-established South African companies using publicly available information to calculate the "levels" of integrated thinking. These are compared with other proxies for integrated thinking.

South African listed companies have been selected because of the country's status as an integrated reporting pioneer and earlier experience with different types of reporting dealing with sustainability-related issues [3]. The selected companies should have the resources, management control systems and accounting infrastructure to manage economic, environmental and social capitals following an integrated thinking philosophy.

The current paper's focus is neither theory development nor testing empirically possible determinants of integrated thinking. The researchers make a practical contribution by outlining the elements of an instrument which can guide the examination of a company's internalisation of integrated thinking. To the authors' knowledge, the study is among the first to outline formally the dimensions of integrated thinking and detail a tool which can be applied with relatively little effort to evaluate integrated thinking. For example, the tool can be used by investors, non-governmental organisations and other stakeholders uncertain about the meaning of integrated thinking and the indicators of its application. It can inform the topics for meetings with management and focal points for site visits. Standard-setters, policymakers and regulators interested in the extra-financial information being reported by companies may find the tool helpful for guiding their analysis of integrated reports and any engagement with companies. Even if the aim is not to "measure" integrated thinking, the tool can be used to highlight features of an integrated report which need to be examined more closely and inform questions put to governing bodies. The tool should also be useful for academics running ethnographies on integrated thinking and to compute an integrated thinking score when a more refined proxy measure of integrated thinking is required than those currently in use.

Importantly, the schematic can be used either when there is access to private information about an organisation's internal dynamics or when only publicly available information is available. There is, however, a trade-off between ease of application and the reliability of the resulting integrated thinking assessment. For example, if only information in an integrated report is used to assess integrated thinking, any inferences must be interpreted with caution. Integrated reporting (like other types of sustainability reporting) is not a statutory requirement subject to the same scrutiny by independent regulators as financial statements. Similarly, the controls and governance structures in place over integrated reports may not be as sophisticated as those designed to safeguard financial resources and reporting.

Accordingly, material disconnects between corporate reporting and behaviour because of impression management or error cannot be precluded.

The above does not, however, invalidate Sustain-X's schematic. The aim is not to quantify "integrated thinking" in a positivist sense, so a mathematically precise measure is not required. Any person using the schematic will need to apply judgement and be alert to facts and circumstances which confirm *and* refute the results of an integrated thinking analysis using the tool. In short, any instrument dealing with an inherently subjective subject matter will have weaknesses, but the authors submit that a tool designed specifically to evaluate integrated thinking is better than using broad proxy measures which were not expressly intended for that purpose or no measure at all.

The remainder of this paper is organised as follows. Section 2 provides an assessment of prior literature on integrated reporting and thinking, discusses the context of the study and presents the integrated thinking schematic. Section 3 details the methodology. The results and discussions follow in Section 4. Finally, Section 5 concludes, discusses implications and outlines areas for future integrated thinking research.

2. Literature review, context and an integrated thinking schematic

Before going into detail concerning the nature of integrated thinking, it is helpful to consider what is meant by integrated reporting. According to the Framework, an integrated report should provide:

> [. . .] concise communication about how an organization's strategy, governance, performance and prospects, in the context of its external environment, lead to the creation, preservation or erosion of value over the short, medium and long term (IIRC, 2021, p. 10).

Integrated reporting is a principles-driven process which explains how an organisation relies on and impacts multiple types of capitals at the strategic, risk-management and operational levels (IIRC, 2021). These include, in alphabetical order: financial, human, intellectual, manufactured, natural and social and relationship capitals (IIRC, 2021). Some have criticised the Framework for over-emphasising the importance of financial capital providers and economic imperatives (Flower, 2015; Thomson, 2015). Companies should generate financial returns but this must be done being mindful of the interdependencies among economic, environmental and social factors (Dumay *et al.*, 2016). As stated in the 2021 revisions to the Framework, "the cycle of integrated reporting and thinking, resulting in efficient and productive capital allocation, will act as a force for financial stability *and* sustainable development" (IIRC, 2021, p. 2, emphasis added).

To yield any benefits, integrated reporting must be genuine. It cannot be treated as a compliance-driven exercise or a tool for managing impressions (Haji and Anifowose, 2016). Reports should be prepared, mindful of the fundamental concepts, guiding principles and content elements outlined in the Framework to provide an accurate, complete and multi-capital account of value creation, preservation or erosion (IIRC, 2021). In this context, the prior research has focused extensively on differentiating between high-quality integrated reports and those reports which are superficial, compliance-based or driven primarily by impression management. Commonly used quality indicators are summarised in Table 1.

In addition to the broad measures developed by the academic research to gauge the quality of integrated and other types of sustainability or social and environmental reports, the Framework offers guidance. It defines fundamental concepts and minimum content elements which characterise high-quality integrated reports (IIRC, 2021 provides the relevant definitions).

Quality indicator	Explanation
Density and depth	Density is a measure of the amount of information a firm reports relative to its size and the extent to which the information is diluted. Depth is concerned with the impact of the underlying facts or circumstances on firm performance and how well this is explained
Accuracy or nature	Corporate reports contain a mix of information. While qualitative disclosures are helpful, quantitative ones are assumed to provide more useful information to users, especially if the disclosures are monetised
Balance	The information needs to be balanced between financial and extra-financial information and includes both positive and negative information
Orientation	Information should be specific rather than generic and repetitive while covering a broad range of material issues. Both historical performance and an organisation's prospects should be addressed
Assurance	External and internal sources of assurance are used to enhance the accuracy and completeness of the information included in an integrated report or equivalent

Source: Adapted from Michelon *et al.*, (2015), IRCSA, (2018), Malola and Maroun, (2019)

Table 1. Primary quality indicators of integrated reporting disclosures

Arguably, a high-quality integrated report is only possible if the organisation's managers and governing body have adopted a multi-capital perspective on value creation which characterises integrated thinking (Herath *et al.*, 2021). An alternate view is that integrated reports are prepared based on the current understanding of the business with the formalisation of the systems, processes and strategies based on an integrated thinking mindset following (Bridges and Yeoman, 2020). Also possible is that integrated thinking and reporting develop in tandem. As a result, to gauge the level of integrated thinking (rather than only the quality of integrated reporting), it is necessary to consider the prior research dealing with the former and how it can be understood without an over-reliance on the quality indicators discussed above.

2.1 Integrated thinking

Integrated thinking involves a multi-capital consideration of interconnected activities and outcomes to generate value for the organisation and its broader stakeholders (IIRC, 2021). Increases or decreases in value are evidenced by changes in the capitals on which an organisation is dependent and which are affected directly or indirectly by its operations (King and Atkins, 2016; IIRC, 2021). While providers of financial capital play a critical role, integrated thinking encourages a balanced prioritisation of constituents (Stacchezzini and Lai, 2020). It ensures that there is a holistic process to gauge risks, capitalise on opportunities and improve internal processes leading to financial stability, social and environmental responsibility and legitimacy in the eyes of material stakeholders (Beck *et al.*, 2015). Key features of integrated thinking include:

- responding to stakeholders' legitimate needs and interests;
- evaluating, managing and capitalising on risks and opportunities in the external environment;
- assessing the interdependencies among activities and capitals, together with the resulting trade-offs and outcomes; and
- a multi-timeframe analysis of activities, performance and outcomes (adapted from IIRC, 2021).

Integrated thinking bolsters an organisation's information systems, leading to better internal decision-making (McNally and Maroun, 2018). This promotes transparent governance and positive organisational change based on assessments of the capitals and value creation processes (Barth *et al.*, 2017; Velte and Stawinoga, 2017). The identification of risks and opportunities, strategic decision-making and operational efficiencies are improved by applying an integrated thinking ethos (Barth *et al.*, 2017; Velte and Stawinoga, 2017). Integrated thinking enhances internal and external communication by breaking down silos and promoting stakeholder engagement (Rinaldi, 2020; Dumay and Dai, 2017) contributing to a more robust business model (IRCSA, 2018) and legitimacy (Beck *et al.*, 2015). A combination of effective internal management covering the different capitals, proactive monitoring by governing bodies and transparent reporting to stakeholders ensures accountability for an organisation's financial and extra-financial performance (Rinaldi, 2020).

Despite its advantages, there are barriers to integrated thinking. A shareholder-centric logic continues to hinder the management of and reporting on other capitals (Dumay *et al.*, 2016; Oliver *et al.*, 2016). Organisations often battle to understand the connectivity among different capitals and their relevance to the business model (Dumay and Dai, 2017). Existing organisational structures and cultures may further hinder integrated thinking (Dumay and Dai, 2017). Organisations may follow a tick-box approach to integrated thinking to manage impressions. Some firms may have neither the ability nor the resources to implement integrated thinking principles and report on the resulting outcomes (Stubbs and Higgins, 2014). Assuring integrated thinking practices are also a challenge (Tweedie and Martinov-Bennie, 2015). As a result, there is no guarantee that an organisation claiming to have adopted an integrated thinking mindset is significantly altering its strategy, business processes and governance mechanisms and that the disclosures found in integrated reports align with actions taken to contribute meaningfully to sustainable development.

Consequently, the reporting quality indicators proposed by the academic research (Table 1) are not necessarily good measures of integrated thinking. For example, scores based on the number of disclosures and whether or not they are qualitative or quantitative may provide some indication of the extent to which an entity has invested in the accounting systems necessary for more intricate reporting (Alrazi *et al.*, 2015). Any inferences are, however, indirect: the scores do not capture the pluralistic value creation which characterises integrated thinking. The same is true if only the IIRC's guidance is used because the fundamental concepts and content elements are stated generally. The indicators of integrated thinking based on first-hand experiences with companies which are modifying their strategies, business models and internal processes to give effect to integrated thinking are more informative.

2.2 A schematic for evaluating integrated thinking

As explained in Section 1, Sustain-X's integrated thinking schematic has been developed based on case studies which the consultancy completed with multiple companies over an extended period. These engagements include detailed experiences with assisting organisations in transitioning to an integrated thinking logic. The company considers the exact steps taken to develop the schematic proprietary, but key features were disclosed to the researchers. The principles are included in Table 2.

Each principle is explained in more detail in Section 4.1. Broadly, Sustain-X focuses on how internal policies, management processes and accounting systems can be used to enable the collection and analysis of data dealing with economic, environmental and social factors affecting firm performance. How the resulting information is collected, communicated to

Principle	Explanation
Principle 1: Integrated awareness and understanding	The organisation demonstrates clear awareness and understanding of the connectivity and interdependence of matters material to its ability to create value over time
Principle 2: Integrated leadership commitment and capability	Leadership provides the mandate for integrated thinking and makes a deliberate and coordinated effort to connect and integrate matters material to organisational sustainability
Principle 3: Integrated structures	Organisational structures and systems are conducive to integrated decision-making and reporting
Principle 4: Integrated organisational performance management	Performance management of targets and KPIs is balanced and integrated to express the holistic and comprehensive performance of the organisation over the short-, medium- and long-term
Principle 5: Integrated External Communication	Communication to external stakeholders offers an accurate, holistic, balanced and integrated view of the organisation's performance and ability to create value over the short-, medium- and long-term

Note: Informed by the Sustain-X tool[2]

Table 2.
Integrated thinking schematic

different parts of a firm and actioned by senior executives is considered. The role played by governing bodies in overseeing and promoting a culture of integrated thinking, the importance of interacting with stakeholders when developing and implementing strategies and how performance is evaluated internally are factored into the integrated thinking assessment. This culminates in a review of the nature and extent of information which is included in integrated or other external reports to investors and other stakeholders.

3. Methodology

How integrated thinking is operationalised and evaluated has not been studied in depth (De Villiers *et al.*, 2020). This makes an exploratory research design capitalising on the benefits of qualitative and quantitative methods appropriate (O'Dwyer *et al.*, 2011). In the first stage, an extensive review of the prior research dealing directly with integrated thinking was conducted to identify features or indicators of integrated thinking and confirm the elements of the Sustain-X schematic. The literature review was complemented by informal interviews with experts including standard-setters, assurance providers and industry leaders on how integrated thinking is understood and implemented in practice. In the second stage, the tool was applied to a sample of South African listed firms and used to generate integrated thinking scores. These scores are evaluated by contrasting them with existing integrated thinking proxy measures.

3.1 Stage 1: literature review and interviews

A search was performed for peer-reviewed articles on integrated thinking published in the Scopus database from 2011 to 2021 [4] with "integrated thinking" in their title, keywords or abstracts. The approach is consistent with that followed in similar projects (Dumay *et al.*, 2016; Rinaldi *et al.*, 2018).

The resulting 98 sources were reviewed, focusing on the definitions of, challenges to and circumstances enabling integrated thinking. Relevant points were listed in a theme table which was updated as additional papers were reviewed. The theme table was then updated by merging duplicated points and aggregating those which dealt with similar themes. The

result was a list detailing features of integrated thinking developed independently of Sustain-X.

Semi-formal interviews were used to complement the integrated thinking themes. Interviews were conducted in 2019 and 2020 in South Africa with 16 experts. These include standard-setters; assurance providers specialising in environmental, social and governance (ESG) matters; and senior officials at some of South Africa's most prominent listed companies and professional accounting and consulting firms (other than Sustain-X). The experts have an average of 16 years of experience in their current roles (see Table 3).

The interviews ranged from 30 to 120 min. The aim was not to achieve consensus but to highlight how integrated thinking is understood and to ensure that no material concepts/principles were excluded from the theme table.

Participants were informed that the interviews were carried out for academic purposes only and of their right to withdraw at any time. The interviews dealt with how integrated thinking should be defined; the challenges to and enablers of integrated thinking; the relationship between integrated thinking and integrated reporting; and indicators of integrated thinking. To avoid respondents' views being influenced by the researchers, details from earlier studies and the Sustain-X schematic were not covered explicitly during the interviews.

The researchers worked systematically through Sustain-X's schematic cross-referencing each point either to the prior research or the findings from the detailed interviews. Possible modifications to the schematic were noted and discussed during follow-up sessions with the interviewees. The feedback was used to confirm the final set of points/indicators per the schematic. After this process was completed, the researchers met the Sustain-X team. The schematic was discussed in two meetings (each lasting approximately 2 h), and the integrated thinking indicators were finalised. The final schematic is presented in Section 4.1.

3.2 Stage 2: application of the integrated thinking schematic

The schematic can be applied using proprietary and publicly available information, but as a practical expedient, the researchers applied the schematic to a sample of companies using only the primary reports to stakeholders. This is an inherent limitation but allowed the researchers to collect data on integrated thinking from a larger number of companies as opposed to running case studies with only a few targeted companies. Using only publicly available information also demonstrates the ease with which the instrument can be applied by different stakeholders who may not have access to an organisation's internal processes and records.

As discussed in Section 1, South African companies are selected because the country has a well-developed reporting environment. In addition, integrated reporting by South African listed companies is *de facto* mandatory [5]. As a result, self-selection bias associated with voluntary reporting is reduced (Barth *et al.*, 2017; Zhou *et al.*, 2017).

Table 3. Summary of interviews

Category	No. of interviews	Average experience in years
Standard-setting/regulatory	3	25
Assurance provider	2	12.5
Business leader	7	15
Professional accounting and consulting	4	13
Total	*16*	*16*

Data are collected from the top 100 Johannesburg Stock Exchange (JSE)-listed companies by market capitalisation (as of 31 December 2018) which had also prepared integrated reports consistently from 2017 to 2019 [6]. This left a final sample of 97 entities. Using only the largest companies controls for the possibility that a lack of resources or technical expertise, limited following by analysts or inexperience preparing integrated reports confound results (Malola and Maroun, 2019).

Qualitative content analysis is used to collect data from the integrated reports. Content analysis is used because of its suitability for dealing with material which is not consistently formatted while highlighting trends and investigating both text and graphic disclosures (Krippendorff, 2013). Each entity's integrated report was read several times to gain a sense of its content and structure [7]. The reports were re-examined to identify quantitative and qualitative disclosures dealing with indicators outlined in the final integrated thinking schematic (see Section 4.1). Examples included: details on governance structures and leadership values, ESG performance indicators, explanations of strategies/integrated business models and materiality determination.

Scores were awarded to each disclosure grouped by indicator using a five-point scale developed by Sustain-X in consultation with the researchers:

(1) Level 1: No relevant disclosure or evidence of response relating to principle;

(2) Level 2: Boilerplate/superficial description of the response to principle without any substantiation of relevance and or application to value creation;

(3) Level 3: Basic explanation of response to principle, including a limited or incomplete outline of relevance, application to value creation and integration to related principles;

(4) Level 4: Good explanation of response to principle, including an informative but not comprehensive outline of relevance, application to value creation and integration to related principles; and

(5) Level 5: Comprehensive explanation of response to principle, including a comprehensive outline of relevance, application to value creation and integration to related principles.

Using a five-point scoring system incorporates subjectivity into the content analysis, but this is consistent with the interpretive/exploratory nature of the study. There is ample precedent for using ranked scoring for different types of ESG disclosures (Vitolla *et al.*, 2020; EY, 2020), and several validity and reliability checks have been introduced.

Firstly, scores were assigned by the lead researcher and evaluated by two research assistants working independently. Rather than testing for inter-coder reliability, all material differences were flagged and debated by the research team to arrive at a final score. The basis for conclusions was noted in each instance to ensure accuracy and consistency.

Secondly, the coding process was piloted with eleven listed companies before the entire sample was analysed. The pilot companies were analysed by three research teams independently. Un-tabulated inter-coder validity checks were computed and the lead researcher re-coded the pilot data as an additional safeguard.

Finally, both the integrated thinking schematic (as it appears in Section 2.2) and the coded results were tabled at informal workshops. The workshops included experienced academics and postgraduate students and were useful for confirming the reasonableness and completeness of the schematic and the appropriateness of the approach.

After the integrated thinking scores were finalised, they were compared to alternate proxies of integrated thinking. Each is discussed briefly below.

3.2.1 Alternate measure 1: report quality. Higher quality integrated reporting may be a good indicator of the effectiveness of an organisation's commitment to multi-capital value generation over the short- and long-term (Churet and Eccles, 2014). As explained by Barth *et al.* (2017, p. 48):

> [. . .] one of the benefits of integrated reporting touted by the IIRC is that its use can lead to integrated thinking and integrated decision-making - e.g. by breaking down silos and focusing on long-term, instead of short-term strategy - that results in better real decisions and enhanced firm value.

The content elements (IIRC, 2021) are included as a key part of the Ernst and Young (EY) "Excellence in Integrated Reporting Awards" which evaluate the quality of South African listed companies' integrated reports (EY, 2020). EY evaluates the quality of integrated reports according to the application of the guiding principles and content elements [8] of the Framework, as well as the fundamental concept of value creation across the six capitals (EY, 2020). EY does not publish companies' score sheets, but the ranking of integrated reports is publicly available (EY, 2020). Studies find that the EY scores provide a consistent and accurate measure of integrated report quality, are adjusted for possible impression management and are aligned to the Framework (Barth *et al.*, 2017; Zhou *et al.*, 2017). They are also accepted as an indicator of the application of integrated thinking (Venter *et al.*, 2017).

3.2.2 Alternate measure 2: the sophistication of the accounting and management systems. EY treats its scoring method as proprietary, and so the extent to which the EY and integrated thinking scores are based on the same indicators cannot be determined. Using measures of the sophistication of organisations' accounting and management systems (proactivity) obtained independently of reviews of their integrated reports overcomes this problem.

The first relies on the scores assigned by the CDP (formerly the Carbon Disclosure Project). These consider the quantity of CO_2 emissions and changes in total emissions. They provide "an indication of a company's *awareness* of climate change issues, *management methods* and *progress* towards action taken on climate change as reported in the response [to the CDP]" (CDP, 2017, emphasis added). The scores are useful because they deal with more than what content companies are including in environmental, sustainability or integrated reports. They deal with what Alrazi *et al.* (2015) describe as "proactivity" or the concurrent operation of accounting and management systems to monitor the environmental performance, inform changes to business processes and engage with external stakeholders. Importantly, the CDP focuses on how companies are tracking their performance, identifying challenges and taking steps to address remedial action along economic and environmental lines. In short, the CDP scores provide a good sense of the infrastructure on which companies can rely to manage *and* report on an important environmental issue and its economic implications in keeping with an integrated thinking philosophy.

A second proxy measure is based on whether or not a company is included in the FTSE/JSE Responsible Investment Index Series (RIIS). Unlike the CDP which is concerned mainly with greenhouse gas emissions, the responsible investment index series (RISS) is multi-faceted, considering different ESG performance indicators including, for example, biodiversity impact, health and safety protocols, measures to combat corruption and the quality of the organisation's corporate governance systems (FTSERussell, 2015). The RISS is not only the result of what companies are reporting but also on how economic, environmental and social factors are integrated and managed collectively to generate sustainable returns for investors and other stakeholders. The researchers concluded that the

inclusion on the index is a good indicator of an integrated thinking philosophy taking shape in organisations.

The third measure relies on well-established databases. Researchers have used different parts of the Thomson Reuters ASSET4 to provide proxies for integrated thinking. For example, Serafeim (2015), Venter *et al.* (2017), Busco *et al.* (2019) and Malafronte and Pereira (2021) use the "corporate governance: vision and strategy" (CGVS) scores in ASSET4 as a measure of integrated thinking and reporting. The CGVS scores provide a reasonable proxy for integrated thinking because they deal with the internal management and monitoring of economic, environmental and social imperatives at an integrated level, in addition to what companies report in their annual, sustainability or integrated reports (Venter *et al.*, 2017; Busco *et al.*, 2019).

The Thomson Reuters/Refinitiv ESG scores are an "enhancement and replacement to the existing ASSET4 ratings" and a "robust indicator of companies" ESG performance' (Thomson Reuters, 2017). The environmental pillar includes three categories, namely, resource use, emissions and innovations. The social pillar has four categories (workforce, human rights, community and product responsibility) with three categories under the governance pillar (management, shareholder and CSR strategy) [9]. The scores distinguish between entities which deal with ESG-related matters at a superficial level and those which integrated ESG factors into their strategies, operations and actions (Refinitive, 2021). As a result, the authors conclude that the revised ESG scores are an additional proxy for integrated thinking as was the case with the original ASSET4 scores.

3.2.3 Variable definitions. The associations between the four alternate scores (considered individually) for each company under review and the integrated thinking measures determined using the Sustain-X schematic are tested using non-parametric Spearman Rho correlations and other association tests. Variable definitions are provided in Table 4.

4. Results and discussion

4.1 Stage 1

In the interest of brevity and to protect Sustain-X's proprietary interests, a detailed mapping of the prior research and interview finding to the principles in Table 2 is not presented. How each of the principles aligns with key themes from analysing earlier studies and engaging with reporting experts is, however, outlined.

4.1.1 Principle 1 (P1): integrated awareness and understanding. The material internal and external factors impacting the business (Alrazi *et al.*, 2015) need to be understood to develop an appropriate response to the risks and opportunities (Velte and Stawinoga, 2017). Understanding how different stakeholders are considered as part of this response illustrates an "integrated awareness" or management's understanding of the business model and how it impacts different capitals and stakeholders, particularly for long-term value creation (IRCSA, 2018):

> Most important is the business case for integrated reporting. When [management] has a clear understanding of how [environmental, social and governance] fits in with the business model or the core of the what the [company] does, that means that integrated thinking has started to take place (R7).

4.1.2 Principle 2 (P2): integrated leadership commitment and capability. Management must take responsibility for the company's direction (IOD, 2016). The governing body needs to drive the integrated thinking ethos at different levels of the business (IRCSA, 2018). P2 indicators assist in assessing the organisation's board structure, the commitment to sustainability and the adoption of codes of best practice. They align with a proactive

Code	Measures	Scoring
Primary measure of integrated thinking		
THINK	A measure of the level of integrated thinking determined using the Sustain-X schematic	The score ranges from Level 1 to Level 5 and are aggregated to a percentage ranging from 0% to 100%. A higher score implies higher levels of integrated thinking
Alternate measure of integrated thinking used for calibration testing		
IRQ	Integrated report quality measures per the EY "Excellence in Integrated Reporting Awards"	The scale from lowest to highest quality is: "Progress to be made" 0, "Average" [1], "Good" [2], "Excellent" [3] and "The Top 10" [4]. These are converted to an ordinal score where a higher value indicates better quality reporting
CDP	Scores provided by the then Carbon Disclosure Project	Performance is rated from A to D where A represents the highest level of performance and is converted to an ordinal environmental performance score
RIIS	Whether or not a company is included in the FTSE/JSE Responsible Investment Index Series	A score of 1 is assigned when a company is included on the index and 0 when it is not
ESG	Composite ESG scores by Thomson Reuters/Refinitiv	The scores range from D (poor level of ESG performance/transparency) to A (high level of ESG performance/transparency). These are converted to ordinal measures where a higher value implies better ESG performance

Table 4.
Variable definitions

approach to the "governance of integrated thinking" (R11) explained by one respondent as follows:

> I don't think it's possible to have real value generation if you don't have good leadership. That's not only about the guys who come up with ideas but also about balancing power and perspective. Do you have the diversity of views to make sure that you look at all of the angles including your environmental impact? Can you take risks pertaining to human capital and turn these into opportunities? Can we see how strategy actually incorporates "non-financial issues" because people know that this is a misnomer – that ESG are not "soft issues?" (R12)

Practical challenges to implementing integrated thinking have been identified (Malafronte and Pereira, 2021). Examples provided by interviewees included:

- a limited understanding of how financial and extra-financial factors interconnect;
- prioritising compliance with reporting guidelines, rather than explaining the actual processes and systems in place to enable value creation; and
- under-investment in the accounting systems, management controls and governance structures required to incorporate economic, environmental and social factors in strategic decision-making, risk mitigation and operating practices.

Addressing these challenges is an essential role of the governing body (R3; R9; R15) which requires a genuine commitment to sustainability at the "top leadership level in addition to implementing codes of best practice 'at the coal face'" (R1). Sustainability must be a "strategic priority" (R1) which is embedded in "the leadership philosophy" (R3) as well as in the organisation's formal policies and codes of ethics (R8; R9). Input from investors and other key stakeholders is essential for developing a business ethos guided by integrated thinking, especially in cases where the "social licence to operate is a key point and we

operate in an environment where diversity and equality are paramount" (R10) (Baboukardos *et al.*, 2021; Herath *et al.*, 2021).

4.1.3 Principle 3 (P3): integrated structures. An organisation needs to have appropriate structures in place to enable integrated decision-making and reporting (P3). These structures need to be supported by good corporate governance, high levels of accountability, continuous stakeholder engagement and the implementation of robust systems, technologies and processes (R2; R4; R9; R12; R13; R15). The organisation should be proactive in terms of stakeholder engagement, improving the efficiency of operations and monitoring progress with suitable control systems (Alrazi *et al.*, 2015).

Both academics and interviewees stressed the role of integrated thinking in changing corporate behaviour and as a type of cultural control (Dumay and Dai, 2017). An appropriate accounting and management infrastructure is paramount for enabling integrated thinking, ensuring that it "translates into action" and "realising its benefits fully" (R13). These are, broadly, the:

> [. . .] accounts, database and records which you need to collect material information on the performance indicators, to track the performance and to take remedial action where required (R14).

The accounting element is completed by a robust system of internal controls which ensure the integrity of data collection and processing (R2; R4; R5; R6; R9) including the use of formal assurance services (R10; R11; R16) to ensure the reliability of information used internally and reported to stakeholders (Prinsloo and Maroun, 2021) and to "drive accountability for performance according to the triple context [10]" (R1). Respondents were unanimous that the accounting and management systems must be sufficient to address stakeholders' valid expectations and information requirements. The accounting and management systems must allow governing bodies to assume ultimate responsibility for the organisation's strategic direction, integrated assessment of risk and long-term value creation. This will require the use of the latest technologies, including advances in data science and artificial intelligence to collect and analyse the broad range of information necessary for describing a firm's performance holistically (R16; R1; R7).

4.1.4 Principle 4 (P4): integrated organisational performance management. Key performance indicators (KPIs) and related disclosures highlight when milestones are achieved (Oliver *et al.*, 2016), how financial and extra-financial factors are managed and how the organisation understands the value creation process (De Villiers *et al.*, 2020). Both positive and negative outcomes should be addressed (IIRC, 2021) to ensure that areas for improvement are identified, best practices are replicated and the organisation is held accountable according to a broad conceptualisation of performance (Malafronte and Pereira, 2021).

"Performance" is not framed in only financial terms but "incorporates material social and environmental issues which are relevant for the business model and material for understanding value profiles and risks" (R10). Consistent with the early management and environmental accounting literature (Gray, 1990), integrated thinking is characterised by evaluating progress against targets and taking corrective action where required (R1). The result is an integrated report which provides an "evidence-led assessment" of how well an organisation has managed its economic, environmental and social imperatives (R3; R16). Compliance with codes of best practice is important (MSCI, 2022), but there must be an awareness of the economic, environmental and social factors which are relevant for investors and other stakeholders (R2); "demonstrable evidence of steps taken to implement integrated thinking" (R6); "key performance indicators for ESG" to allow for accountability

(R7) and 'substantive examples of how operations are changed in response to post-implementation reviews (R13).

4.1.5 Principle 5 (P5): integrated external communication. All respondents agreed that organisations do not always follow a linear approach which starts with accounting and management systems informed by an integrated thinking logic and ends with high-quality reporting. In practice, an iterative process is followed where the underlying accounting and management structures and the corporate reports develop in tandem. A high-quality report is, however, improbable if the necessary accounting, management and decision-making activities are insufficiently refined and mature. Conversely, if a high-quality integrated or sustainability report is observed, it is reasonable to conclude that an integrated thinking philosophy is taking hold at the respective organisation (R4; R6: R10; R12).

The integrated thinking "indicators" identified by Sustain-X and cross-referenced to the prior academic research and interview findings are outlined following the principles in Table 5. Examples of the types of disclosures which, according to the sustainability experts, provide insights into the integrated thinking principles are also provided.

4.2 Stage 2: calibration with association tests

After cross-referencing the integrated thinking principles and indicators to the prior research and interview findings, the researchers applied the tool using the information from a sample of companies' integrated reports.

The integrated thinking scores were calculated for each company and then compared to alternate proxies for integrated thinking. The average scores are reported per level (ranging from 0 to 4) of the alternate measures (refer to Figure 1). In each case, there is an upward trend in the median and mean Sustain-X scores. An improvement in integrated report quality (IRQ), CDP, RISS and ESG is associated with higher levels of integrated thinking gauged according to the Sustain-X schematic. Separate chi-squared tests show that the associations are statistically significant at the 1% level (approximately X^2; $p < 0.01$) with this finding supported by likelihood ratio tests (ranked by quartiles).

Un-tabulated Cramer's V ranges between 0.240 and 0.369, pointing to a medium effect size ($p < 0.01$). This is confirmed using a non-parametric Spearman correlation analysis per Table 6. Correlations among each of the five principles in the Sustain-X schematic (P1–P5) and the total integrated thinking score (THINK) are reported.

There is a moderately strong correlation between the EY scores and the total integrated thinking scores (r = 0.366, $p < 0.01$). Each principle also reports a moderate and direct correlation with the EY rankings. Likewise, ESG (r = 0.324, $p < 0.01$) and CDP (r = 0.283, $p < 0.01$) are positively correlated with the total integrated thinking measure ($p < 0.01$). Inclusion on the RISS has a positive association with the integrated thinking scores (r = 0.173, $p < 0.01$), but the correlation is weaker than those reported for the other measures. To confirm these findings, differences in the Sustain-X integrated thinking scores are evaluated among companies grouped by level of IRQ, RISS, CDP and ESG using either a Kruskal–Wallis H-test or a Mann–Whitney U-test (Table 7).

Table 7 confirms that the differences in the integrated thinking scores (THINK) per level of the alternate scores (IRQ, RISS, CDP and ESG) are significant. Based on the sign and statistical significance of the standardised Jonckheere–Terpstra (JT) test statistics, as these alternate scores increase so do the integrated thinking scores. These results hold when considering each of the principles making up the total integrated thinking scores, barring only two exceptions (P3 and P4 for changes in CDP scores). Three sensitivity tests are performed to support these findings.

Principle	Indicator	Disclosure examples – good practice	Disclosure examples – bad practice
Principle 1: Integrated awareness and understanding The organisation demonstrates clear awareness and understanding of the connectivity and interdependence of matters material to its ability to create value over time	1.1. Awareness and understanding of external factors impacting the organisation's operating context 1.2. Awareness and response to the legitimate needs and interests of stakeholders 1.3. Awareness and understanding of risks and opportunities 1.4. Awareness and understanding of material themes 1.5 Articulation of business rationale for sustainability and integrated thinking as a driver of long-term value creation	• Multi-capital assessment and capital "trade-offs" are disclosed • Strategy is linked holistically to the mission and vision of the entity • Financial and non-financial data are linked • Company-specific case studies are included and explicated • Likelihood, magnitude and time-frames for risks are disclosed • Detailed materiality determination process is explained • Details of stakeholder engagement channels and key concerns are disclosed	• Only high-level or generic risk assessments are provided • Risk assessment lacks likelihood and magnitude assessment • Focus on financial capital and metrics • Generic, boilerplate disclosures for capitals, risks, strategies and governance processes • Limited application of sustainability frameworks • Poor identification of material matters
Principle 2: Integrated leadership commitment and capability Leadership provides the mandate for integrated thinking and makes a deliberate and coordinated effort to connect and integrate matters material to organisational sustainability	2.1. Leadership ambition and commitment to an integrated approach to sustainability 2.2 Diversity of leadership experience 2.3. Strategic positioning of sustainability 2.4. Values and ethics 2.5. Conscious and relevant adoption of codes and standards	• The company is committed to applying good sustainability practices (for example, the GRI principles, AccountAbility AA1000 standards or working towards the Sustainable Development Goals) • Detailed disclosure on board composition, diversity, qualifications, experience, contribution, activities, outcomes and direction • The sub-committees' functions and progress are clearly defined and explicated	• Generic, boilerplate disclosures • Poor format of reports lacking insight and analysis • Vague board composition disclosures • High staff turnover rates are evident • There is a limited application of other codes/sustainability frameworks

(*continued*)

Table 5.
Final integrated thinking schematic

Table 5.

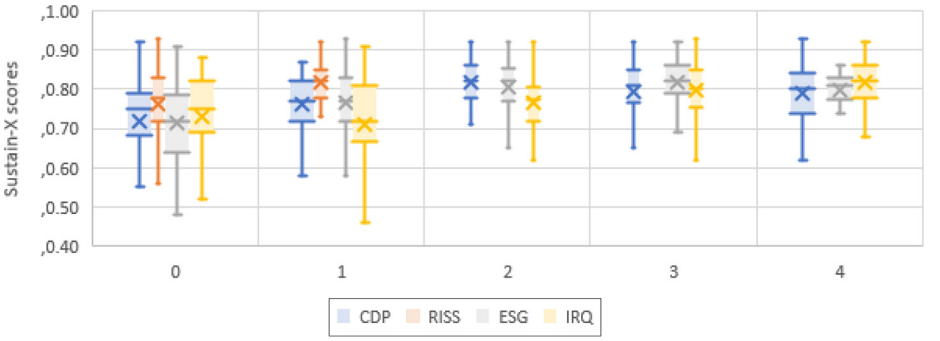
Principle	Indicator	Disclosure examples – good practice	Disclosure examples – bad practice
		• There are staff development programmes and entity-wide communication and feedback channels • Sustainability is emphasised through the mission and vision statement and codes of good practice	
Principle 3: Integrated structures Organisational structures and systems are conducive to integrated decision-making and reporting	3.1 Integrated governance 3.2 Integrated accountability for sustainability 3.3. Integrated business model 3.4 Integrated and devolved stakeholder engagement processes 3.5 Integrated systems, technologies and processes	• Linked to P1 in terms of the multi-capital assessment, strategy evolution and link of financial and non-financial data • The stakeholders are clearly linked to the capital outcomes and value creation goals • A detailed stakeholder matrix analysis is included • The board is accountable for targets and reporting on positive and negative outcomes • There is a clear analysis/adoption of technological innovations	• Generic, boilerplate disclosures • There are limited capital disclosures and a lack of connectivity of information across the report • Lack of application of the IIRC Framework/sustainability frameworks • Greenwashing is evident by including detailed ESG metrics without explicitly assessing the impact of these metrics or evaluating/measuring the progress • Limited stakeholder engagement with a focus on providers of financial capital

(*continued*)

Table 5.

Principle	Indicator	Disclosure examples – good practice	Disclosure examples – bad practice
Principle 4: Integrated organisational performance management Performance management of targets and KPIs is balanced and integrated to express the holistic and comprehensive performance of the organisation over the short-, medium- and long-term	4.1. Non-financial metrics 4.2. Targets and contextualised performance metrics 4.3. Response to performance 4.4. Integrated assurance	• Detailed KPIs are based on financial and non-financial metrics • There is clear accountability for targets and reporting on positive and negative outcomes • Transparent and balanced disclosures are included • There is external/internal assurance over the KPI metrics	• Greenwashing by including detailed ESG metrics without explicitly assessing the impact thereof • Limited stakeholder engagement with a focus on providers of financial capital • No assurance is provided over the non-financial metrics in the report
Principle 5: Integrated External Communication Communication to external stakeholders offers an accurate, holistic, balanced and integrated view of the organisation's performance and ability to create value over the short-, medium- and long-term.	5.1 Integrated marketing and communication 5.2 Integrated external reporting	• Hyperlinks are used for connectivity, and there are references to additional reports, for example, financial or sustainability reports • Summary of ESG impacts from other, detailed reports are included to provide a holistic overview • Technology integration is evident	• Long disclosures are included, which also includes matters that are not material • There are limited disclosures on long-term impacts/risks/ opportunities • Communication channels are underdeveloped

Note: Informed by the Sustain-X tool[2]



	Average integrated thinking scores per level of alternate measures					Associations between integrated thinking scores and alternate measures	
Metric	0	1	2	3	4	X^2	Likelihood Ratio
Average per level CDP	.72	.77	.82	.80	.80	45.752**	48.915**
Average per level RISS	.76	.83				10.906**	8.910**
Average per level ESG	.71	.77	.81	.82	.81	39.010**	39.179**
Average per level IRQ	.73	.71	.77	.80	.82	50.331**	59.250**
** significant at 1% level and * 5% level							

Figure 1.
Integrated thinking scores

Note: **Significant at 1% level and *5% level

Measure of integrated thinking	IRQ	CDP	RISS	ESG	P1	P2	P3	P4	P5	THINK
IRQ	1.000	0.518**	0.134*	0.488**	0.404**	0.298**	0.237**	0.301**	0.158**	0.366**
CDP	0.413**	1.000	0.112	0.392**	0.296**	0.295**	0.160**	0.209**	0.223**	0.283**
RISS	0.120*	0.101	1.000	0.123	0.151**	0.124*	0.129*	0.115	0.152**	0.173**
ESG	0.399**	0.325**	0.112	1.000	0.294**	0.330**	0.218**	0.237**	0.117	0.324**
P1	0.313**	0.235**	0.130*	0.229**	1.000	0.649**	0.629**	0.632**	0.315**	0.892**
P2	0.230**	0.242**	0.108*	0.266**	0.521**	1.000	0.479**	0.485**	0.343**	0.784**
P3	0.187**	0.125**	0.112*	0.175**	0.503**	0.375**	1.000	0.592**	0.330**	0.793**
P4	0.234**	0.166**	0.100	0.186**	0.510**	0.384**	0.476**	1.000	0.321**	0.791**
P5	0.133**	0.190**	0.142**	0.098	0.262**	0.286**	0.275**	0.269**	1.000	0.448**
THINK	0.274**	0.216**	0.144**	0.246**	0.758**	0.639**	0.649**	0.649**	0.364**	1.000

Table 6.
Univariate correlations

Notes: **Significance at the 1% level; * significance at the 5% level. Spearman correlations above the diagonal except RISS, which is a point biserial correlation; Kenall's tau-b below the diagonal for all variables

Firstly, the preparation of a separate sustainability/CSR or governance report may be evidence of improved ESG performance and, in turn, integrated thinking. This is predicated on the position that only companies with superior ESG performance will be inclined to provide complementary disclosures to stakeholders (De Villiers and van Staden, 2011).

Secondly, integrated thinking should be an integral part of an organisation's governance framework. The governance structure must support responsible value creation over the

Variables		P1	P2	P3	P4	P5	Total
Primary variables				Test-statistics			
IRQ	H-stat	50.125**	35.785**	21.317**	28.253**	16.798**	44.169**
	JT-stat	6.459**	5.723**	4.461**	4.725**	3.294**	6.496**
CDP	H-stat	15.918*	15.681*	7.192†	10.218†	11.549*	17.651**
	JT-stat	5.158**	5.255**	2.708†	3.585*	3.822*	4.888**
ESG	H-stat	25.872**	28.398**	14.307**	18.101**	16.399**	30.208**
	JT-stat	4.375**	5.018**	3.314**	3.512**	1.719**	4.853**
RISS	U-stat	2390*	2580*	2549*	2647*	2444**	2233*
Sensitivity tests							
Separate SR prepared	U-stat	7370**	7356**	6836**	7415**	2722**	6368**
Other reports	U-stat	6189**	6067**	7161**	6134**	1984**	5529**
Separate ESG committee	U-stat	2606**	2169**	2216**	2657*	2575**	2478**
MSCI	H-stat	3947†	3639*	4541†	3844*	4004**	3737*
	JT-stat	0.281†	0.454*	−0.826†	0.141*	0.328*	0.309**

Notes: **Significant at the 1% level (two-tailed); *Significant at the 5% level (two-tailed) †No significance. Companies are grouped according to ranking per IRQ, RISS, CDP and ESG scores

Table 7. Sensitivity analysis [11]

short-, medium- and long-term by enabling strategy development, risk management and refinement of business models which take the different capitals and the legitimate expectations of stakeholders into consideration. It follows that companies with a separate CSR or ESG committee may be more committed to, or efficient at, integrating financial and extra-financial information in their strategies, risk management and operations.

Thirdly, in addition to the ESG scores provided by Refinitiv, the researchers collected data from Morgan Stanley Capital International (MSCI) ESG Research. The MSCI ESG ratings "measure a company's resilience to long-term industry material environmental, social and governance (ESG) risks" (MSCI, 2022). Companies are scored from high exposure to ESG risks and failure [CCC (laggard MSCI rating rated)] to those leading in the management of significant ESG factors and capitalising on emerging ESG-related opportunities [AAA (leader MSCI rating rated)]. Managing the combined effect of economic, environmental and social factors on an organisation's strategy and risk management operations per the MSCI aligns well with the integrated thinking philosophy described by the IIRC (2021). Like the association between the Refinitiv ESG and integrated thinking scores reported in Figure 1, the latter should also be strongly associated with the MSCI ESG scores.

In line with expectations, the sensitivity section of Table 7 shows that integrated thinking scores per principle and in total are greater for companies which prepare separate sustainability reports, publish other complementary reports and have separate ESG/CSR committees than for companies which do not do so. Companies with a better MSCI rating also have higher integrated thinking scores determined according to the Sustain-X schematic. These findings are not only the result of additional information being reported to stakeholders, which leads to a higher integrated thinking score. When companies are grouped according to the length of their sustainability and complementary reports, qualitatively similar results are generated. The results are also robust to weighting the integrated thinking scores by the volume of information disclosed by each entity (these tests are un-tabulated).

While testing integrated thinking determinants is beyond the scope of the current paper, the Sustain-X scores were verified by evaluating if they predict the most common alternate measures of integrated thinking employed by the prior research, namely, IRQ and ESG (Venter *et al.*, 2017; Busco *et al.*, 2019; Malafronte and Pereira, 2021). For this purpose, the factors

usually associated with improved integrated report quality are introduced as control variables. These include firm size, financial performance (return on assets), leverage and industry type [grouped by industry impact: mining/industrial (3); financial (2); other industries (1)]. To address the possibility that integrated thinking measures are affected by the amount of information disclosed to stakeholders, a measure of the total number of pages in the primary report to stakeholders relative to the average number of pages for the companies under review is included in the sensitivity test (DENSITY). A control is also introduced for the presence of a dedicated committee dealing with economic, environmental and social factors (ESG committee) and a company's commitment to the application of codes of good governance as indicated by statements of compliance with King-IV (GOVERNANCE). The presence or absence of a separate sustainability report (or equivalent) is introduced to control for firms which have better extra-financial performance (De Villiers and van Staden, 2011). Refer to Table 8.

The measures determined using the Sustain-X schematic (THINKING) report statistically significant coefficients in the models predicting IRQ ($\beta = 0.304$, $p < 1\%$), the ESG score ($\beta = 0.209$, $p < 1\%$) and the MSCI measure of integrated thinking ($\beta = 0.186$, $p < 1\%$). The relative magnitude of the standardised coefficients confirms that THINKING is second only to industry type in terms of its contribution to the variation in each of the integrated thinking proxies in Models 1–3.

5. Conclusion

This paper lays out a schematic which can be used to gauge integrated thinking by organisations. The tool evaluates integrated thinking according to five principles which include

Independent and control variables	Dependent variables Model 1: IRQ	Model 2: ESG	Model 3: MSCI
DENSITY	0.072	0.012	0.056
ESG COMMITTEE	0.062	0.036	0.027
SEPARATE REPORTS	0.046	0.111	0.013
GOVERNANCE	0.119*	0.216**	0.014
INDUSTRY	0.233**	0.394**	0.442**
SIZE	−0.083	0.013	0.040
ROA	0.092	0.131*	0.121*
LEVERAGE	0.129*	0.182*	0.099
THINK	0.304**	0.209**	0.186**
Adjusted R^2	0.219	0.396	0.277
Robust to fixed year effects	Yes	Yes	Yes
Robust to fixed firm effects	Yes	Yes	Yes

Notes: Standardised coefficients reported. ** Significant at the 1% level; * Significant at the 5% level. VIF scores are less than 3 for each independent and control variable. Collinearity diagnostics show that predictors are not clustered on a single dimension. This suggests that multicollinearity is not having a material effect on the models' predictive power. An un-tabulated scatter plot showed that residual errors were approximately normally distributed and gave no indication of material heteroscedasticity. Results were re-run using robust standard errors and bootstrapped using 1,000 iterations and a bias-corrected and accelerated method. An un-tabulated analysis of variance is used to test the null hypothesis that the independent and control variables do not contribute to the predicted outcome. A heteroskedastic regression model with the same dependent, independent and control variables corroborated the results. Finally, standardised measures were used to confirm that the findings are robust to the effect of variables being measured on different scales

Table 8.
Sensitivity analysis [12]

integrated awareness and understanding; integrated leadership commitment and capability; integrated structures; integrated organisational performance management; and integrated external communication. Each is supported by a set of indicators which can be assessed by evaluating information obtained from corporate reports, companies' Web pages, direct engagement with organisations and other sources. The principles and indicators have been tested using cross-references to prior integrated thinking research, findings from detailed interviews conducted by the researchers with a group of experts and comparisons with alternate proxy measures for integrated thinking employed by earlier studies.

Outlining a tool to evaluate the levels of integrated thinking makes an important technical and practical contribution. Much of the current work focuses on the quality, determinants and value-relevance of different types of sustainability reporting rather than on the underlying sustainability logic which ought to inform the preparation of these reports. There has been some effort to examine integrated thinking at a conceptual or theoretical level but relatively little on how integrated thinking is operationalised. Even rarer are papers dealing with how integrated thinking can be defined, observed and gauged in practice. The Sustain-X schematic addresses these limitations by framing integrated thinking according to five principles which refine existing explanations of the concept per the Framework, aggregate the findings per the prior research and provide a more current reference for understanding the dimensions of integrated thinking. The principles are supported by associated indicators which contextualise integrated thinking and make it easier for stakeholders to appreciate the operation of integrated thinking among organisations.

An organisation needs to consider the risks and opportunities resulting from sustainable development issues and the integration and achievement of sustainable development goals into the business model (Adams *et al.*, 2020). The board's governance structures and management approach should also provide oversight over the integration of sustainability performance and targets into the business processes to maximise long-term value creation (Adams *et al.*, 2020). The Sustain-X tool, supported by an integrated thinking logic, can be used to address these sustainable development issues by actively considering core elements of the management of the organisation's resources, relationships with stakeholders and a multi-capital approach to economic, social and environmental decisions to promote long-term sustainable development.

Importantly, the tool is not limited to South Africa, where integrated thinking and reporting are referred to explicitly in codes of best practice; it can be easily adapted for any setting. What is required is a broader approach to business management incorporating economic, environmental and social factors irrespective of whether this is mandated by statute and regardless of the title of the report issued to constituents. The schematic can be used by academics to guide detailed case studies or by investors and other stakeholders engaging directly with companies on sustainability-related matters. The current paper demonstrates how the tool can also be used by parties who do not have access to organisations' inner workings and must rely on only publicly available information. While this has been done using integrated reports, any integrated thinking analysis can be expanded to include supplementary reports, corporate webpages and third-party commentary in the public domain in addition to what is found in integrated reports. The tool can also be complemented by information from assurance reports, social media and regulatory findings (where available). As is the case with any analysis of a firm's performance, judgement and scepticism are required. Information which confirms and refutes the assertion that an integrated thinking logic is being applied should be considered.

Finally, alternate measures for integrated thinking exist, but these deal with integrated thinking only indirectly and, in many cases, can be accessed at considerable cost. Existing databases are also limited to the most prominent organisations and jurisdictions, a challenge

which is especially relevant for those interested in studying sustainability-related matters in developing economies. In contrast, the Sustain-X schematic has been developed using detailed experiences with the implementation of an integrated thinking ethos in practical settings, can be easily modified to deal with different types of organisations and, most importantly, can be used free of charge.

The researchers acknowledge that, while the schematic has been verified using well-known integrated thinking proxies, there is room for improvement. Not all the companies being scored were co-opted in the research and a detailed case study to examine how integrated thinking can be defined and operationalised was not conducted. It would be useful to examine how companies are managing economic, environmental and social factors over time to test further the completeness of the schematic. Using the schematic in other settings (such as the public sector/non-governmental organisations) and for profit-orientated entities in other jurisdictions can provide further insights into the levels and development of integrated thinking. This is especially the case if the tool is used in countries which, unlike South Africa, have not expressly adopted integrated reporting for listed companies. Positivist-inspired studies dealing with the determinants of integrated thinking, its value relevance and other consequences will also prove useful for understanding how companies move from focusing on one-dimensional assessments of financial performance to the pluralistic approach to business needed for achieving long-term sustainability.

Notes

1. The terms "organisation", "business", "company" and "entity" are used interchangeably.
2. Details have been withheld in terms of the memorandum of understanding between the researchers and the consulting firm. The researchers are entitled to share the tool, as it appears in Table 2 and Table 5, in published work per the signed agreement.
3. Different types of reports deal with extra-financial information. Examples include integrated reports, sustainability reports and corporate social responsibility reports. A review of the differences and similarities among the reporting types is beyond the scope of this paper, which refers collectively to "sustainability reports" or "integrated reports". These are multi-capital focused and deal with how organisations generate value for themselves and their stakeholders.
4. The Scopus database is used because of the quality of the filtering criteria it uses (Dumay *et al.*, 2016). The data were obtained from 2011, as this is when the Framework discussion paper was released and therein coined the term "integrated thinking".
5. JSE-listed entities are mandated to comply with King IV's principles which cover, *inter alia,* integrated reporting and thinking. King IV operates according to a "apply and explain" model but does not have the direct force of law (IOD, 2016).
6. There were few reporting or regulatory developments which took place in this period which would impact the nature of integrated thinking and associated disclosures. King-IV was adopted during the period under review (IOD, 2016); however, the impact of this would be to strengthen regulations and governance practices.
7. The research examines the primary integrated reports issued to stakeholders. Separate sustainability reports, ESG checklists, interim results, investor presentations and companies' webpages are not included in the analysis. This is because an integrated report should communicate the underlying enterprise value and financial information.
8. Guiding principles: strategic focus of the reports and future orientation, connectivity of information, stakeholder relationships, materiality, conciseness, reliability and completeness and consistency and comparability. Content elements: organisational overview and external environment, governance,

business model, risks and opportunities, strategy and resource allocation, performance, outlook, basis of preparation and presentation (IIRC, 2021).

9. Thomson Reuters announced its acquisition of ASSET4 on 30 November 2009. On 1 October 2018, Thomson Reuters sold a controlling interest in the Financial and Risk Unit to Blackstone Group LP with the new business called Refinitiv. The London Stock Exchange Group purchased Refinitiv in early 2021. The Thomson Reuters category scores and their definitions can be accessed using as follows: (Thomson Reuters, 2017).
10. The respondent is referring to the combined economic, environmental and social performance of a firm. The term "triple context" is used in South African codes on corporate governance.
11. The results are corroborated using a Kolmogorov–Smirnov Z, which has greater power than a Mann–Whitney test when dealing with smaller group sizes.
12. The results are for an ordinary least squares regression using THINK as a percentage ranging from 0% to 100%. An ordered logistic regression is used to corroborate the findings with categorical THINK scores. As the results are qualitatively similar, the latter is not included in Table 8.

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Corresponding author
Dusan Ecim can be contacted at: dusan.ecim@wits.ac.za