



# Competitive Intelligence Maturity Models: Systematic Review, Unified Model and Implementation Frameworks

Luis Madureira\*  
NOVA Information Management School, Portugal  
[lmadureira@novaims.unl.pt](mailto:lmadureira@novaims.unl.pt)

Aleš Popovič  
School of Economics and Business, University of Ljubljana, Ljubljana, Slovenia  
[ales.popovic@neoma-bs.fr](mailto:ales.popovic@neoma-bs.fr)

Mauro Castelli  
NOVA Information Management School, Portugal; School of Economics and Business,  
University of Ljubljana, Slovenia  
[mcastelli@novaims.unl.pt](mailto:mcastelli@novaims.unl.pt)

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**ABSTRACT** Competitive Intelligence (CI) is vital for sustaining the performance of organisations in an increasingly volatile, uncertain, complex, and ambiguous (VUCA) world. However, the impact of CI on performance is proportional to its maturity level. The article aims to review and integrate the existing literature on Competitive Intelligence Maturity Models (CIMMs) to provide a go-to framework for setting up, assessing, and developing CI. The CIMMs were sourced from scholarly databases, registers, the social web, and using backwards and forward searches. All the CIMMs respecting the characterisation criteria were included in the study. A scientific and empirically validated definition of CI guided the integration and synthesis of the fourteen selected CIMMs. The primary outcome is a proposed unified CIMM (UCIMM) covering all the CI dimensions and aspects in tandem with the respective implementation guidance frameworks. The proposed UCIMM and implementation frameworks effectuate the guidance needed to set up, assess, and develop the CI practice and theory and, ultimately, the performance of organisations.

**KEYWORDS:** Maturity Model; Maturity Levels; Framework; CI Function; CI System; Implementation Roadmap; CI Practice; Organizational Performance

## 1. INTRODUCTION

CI is “the process and forward-looking practices used in producing knowledge on the competitive environment to improve organisational performance” (Madureira et al., 2021a, 2021b). The maturity of the CI practice is positively correlated with being a learning organisation (Senge, 2006). A learning organisation addresses future decision-

making proactively, effectively, and efficiently. Within the contingency theory (Fiedler, 1964; Vroom & Yetton, 1973), organisations use decision-making to achieve a strategic fit with their competitive environment (Duncan & Weiss, 1979). The better the decision-making, the greater the fit and the organisational performance (Eisenhardt, 1989). Therefore, CI maturity is both an antecedent and a proxy for organisational performance.

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\* Corresponding author

In the current zeitgeist of a VUCA world with an exponentially increasing speed of change (Bennett & Lemoine, 2014), obtaining and maintaining the strategic fit to sustain top performance is the ultimate challenge. CI is thus vital to navigating highly challenging environments, remaining competitive (Harkleroad, 1998; Hedin, 2005; Vedder & Guynes, 2001), and ensuring the superior performance of organisations (Yap et al., 2018, 2013; Yap & Rashid, 2011). The problem arises in maintaining a CI maturity level that allows organisations to deal with change. Kahaner (1997) has long identified the critical change drivers as the increasing business pace, information overload, more aggressive and global competition, geopolitical changes, and rapid technological change. Nassim Taleb (2007) provided further insight into their volatility and unpredictability. Recent academic and business research corroborates and reinforces the severity of the impact on both organisations and the CI practice (Heppes & Du Toit, 2009; Calof et al., 2017; M-Brain et al., 2019; Klue & SCIP, 2021; ACI & Gilad, 2022; Crayon & SCIP, 2022). As a result, CI evolves up to the average maturity level (Hedin et al., 2014; Heppes & Du Toit, 2009; M-Brain et al., 2019). Organisations must be able to address these impacts in setting up, assessing, adapting, and developing the CI maturity level to obtain top performance. Therefore, the CIMM, consisting of several archetypal levels of achievement across the different dimensions and aspects, is a critical assessment and guidance tool supporting the CI practice evolutionary path.

Previous literature consists of tens of CIMMs. The development approaches for these models range from identifying best practices (APQC et al., 2004; Calof, 1998; J. P. Herring & Leavitt, 2011; Marceau & Sawka, 1999) to assessing cutting-edge CI functions (CIF), programs (CIP), or systems (CIS) (Heppes & Du Toit, 2009). Academic investigations (Calof, 1998; Oubrich et al., 2018), executive opinion (Marceau & Sawka, 1999), practitioners' self-assessments (Comai & Prescott, 2007), and CI experts' professional judgment vendor-sponsored studies (M-Brain et al., 2019) have been the formats of choice in evaluating the professional status and developmental progress of the CI practice. Benchmarking versus an independently established model (Hedin et al., 2014) and case studies are the most frequently used methods (J. P. Herring & Leavitt, 2011). However, CI dimensions and descriptors, as well as the maturity levels used, vary considerably. Most importantly, MMs are not exhaustive regarding the CI dimensions and aspects.

As a result, given the broad range of existing CIMMs, it is incredibly challenging to compare and identify the relevant model to use for improving practice or scientific research. Furthermore, no CIMM fully aligns with the conceptual definition of CI, its longitudinal evolution over time, or its full array of dimensions and aspects. These difficulties profoundly impact the scientific development of the CI practice, especially in smaller and less mature organisations. Thus, researching a unified scientific CIMM (UCIMM) is extremely important for effective practical guidance to address the conflicting interests of academics, executives, practitioners, and vendors.

This study aims to fill this gap by performing a systematic literature review – using an explicit, systematic method for identifying, analysing, integrating, and synthesising the findings of prior research – contributing to the conceptualisation of CIMM research. This conceptualisation will allow for integrating relevant descriptors across all dimensions and levels of maturity into a holistic go-to UCIMM. The expected empirical contributions from such a unified model are the significant improvement of decision-making quality and the consequent business performance, the implementation guidance for the effectuation of the CI practice or function, and the increased productivity of CI professionals. Furthermore, the grounding of this theory development exercise in sound theoretical and empirical evidence will highlight critical gaps and paths to exploit while dismissing outdated, irrelevant and duplicate research (Webster & Watson, 2002). Our systematic review based on scientific, commercial and grey literature is expected to deliver on this objective.

The following section details the systematic literature review procedure according to the PRISMA statement (Page, McKenzie, et al., 2021). Results will then be critically analysed and discussed, and a UCIMM will be proposed in the sections that follow. Finally, we conclude with implications and recommendations for application and further research avenues for this topic and the CI field.

## 2. LITERATURE REVIEW

To identify and characterise the relevant CIMMs published in the last three decades, we conducted the systematic review as outlined in table 1:

**Table 1.** Overview of the literature review based on PRISMA, Cooper and Webster & Watson Guidance (Cooper, 1988; Page, Moher, et al., 2021; Webster & Watson, 2002)

| Item              | Description  |
|-------------------|--|
| Scope             | Focus on CIMMs as research outcomes and practices or applications from all types of literature. However, only CIMMs that meet the MM characterisation are within scope (cf. Section 3.2).  |
| Goals             | Identify, synthesise, and integrate existing CIMMs into a unified holistic CIMM (UCIMM) to support the development of a common linguistic framework covering all CI dimensions per the 5Ps (Madureira et al., 2021a).  |
| Perspective       | Espousal of position in demonstrating the value of integrating existing CIMMs with the 5Ps of CI.  |
| Coverage          | Exhaustive as it intends to be “comprehensive in the presentation of works relevant to the topic” (CIMMs).   |
| Organisation      | Historical in combination with CIMMs content analysis (Cooper, 1988).  |
| Audience          | CI scholars, CI practitioners, CI vendors, business executives, policymakers   |
| Time frame        | CIMMs literature published after 1980.   |
| Conceptualisation | CI, MM, CIMM (cf. Section 2).  |
| Search strategy   | Combination and proximity of the search terms “maturity model” and “competitive intelligence” to ensure the exhaustiveness as mentioned above.   |
| Sources           | Database (DB), registers, CI journals (i.e., CIR and JISIB), and social web as we expect to find CIMMs from practitioner and commercial sources.   |
| Procedure         | Data was collected, analysed, synthesised and integrated by a single author to avoid reviewer bias for approximately one year between January and December 2022.<br>DB search: Google Scholar, ScienceDirect (Scopus), AB/Inform (Proquest), JSTOR, Emerald Publishing, EBSCO (Business Source Ultimate).<br>Specific CI Journals: Competitive Intelligence Review.<br>Registry search: SCIP.org (Strategic and Competitive Intelligence Professionals).<br>Social web search: use Google Search to identify leading practitioner and commercial literature [i.e., CI vendors (services and technology/software) CIMMs].<br>These sources cover journals, books, conference proceedings, and practitioner sources (Brocke et al., 2009).<br>Backwards and forward search: reviewing the citations found in articles from the first step; “to identify articles citing the key articles identified in the previous steps” (Webster & Watson, 2002).<br>All steps: examine at least titles, abstracts, and introductions in order to evaluate only relevant sources (Brocke et al., 2009). |
| Outcome           | The anticipated outcome is an identification of the main CIMMs, their dimensions, and their aspects. We followed the guidance of Cooper (1988) to “combine organisations, [...] by addressing works historically within a given conceptual framework.” The chosen framework is the 5Ps (dimensions and descriptors) from the CI unified view and modular definition (Madureira et al., 2021a). To the best of our knowledge, still “no classification system for CIMMs exists to date.” Therefore, for the content analysis of the MMs, we use a concept-centric approach based on so-called concept matrices (Webster & Watson, 2002).  |

## 2.1. Definition of Key Variables and Study Boundaries

### 2.1.1. Competitive Intelligence

Until recently, the definition of CI was not consensual and changed over time, as the previous five universal definitions demonstrate (Bartes, 2014; Breakspear, 2013; Brody, 2008; Marcial, 2018; Pellissier & Nenzhelele, 2013). However, Madureira et al. (2021a) developed a unified view and modular definition, the only empirically validated one (Madureira et al., 2021b). Furthermore, this definition provides the

5Ps – the core defining dimensions and respective descriptors – which may be used as a proxy for assessing the comprehensiveness of a CIMM. As such, we will use this working definition alongside its visual abstract as the guide for comparing and integrating the different CIMMs analysed in the literature review.

### 2.1.2. Maturity Models

Maturity is “the state, fact, or period of being mature” (Oxford English Dictionary, 2022a). As such, it implies the existence of an evolutionary process to achieve the desired end-state. A model is a simplified representation of reality used as an example to follow or imitate (Oxford English Dictionary, 2022b). A Maturity Model (MM) details the evolution levels (also known as stages or phases) of maturity across several structuring dimensions and their respective aspects. Levels have differentiating descriptors providing the purpose and

detailed characterisation of each level. Dimensions are areas of capability that structure the object of the model. Each dimension is subsequently structured into several aspects (also known as elements, activities, or measures) for each level (Bruin et al., 2005; Fraser et al., 2002). MMs serve as guide rails to the set-up and development path to achieve the targeted maturity level (Fraser et al., 2002). Lahrman & Marx (2010) characterised MMs as shown in Figure 1.

| Criteria            | Characteristics |                           |              |
|---------------------|-----------------|---------------------------|--------------|
| Dimensions          | One-dimensional | Multi-dimensional         | Hierarchical |
| Maturity principle  | Continuous      | Staged                    |              |
| Number of audiences | Single          | Multiple (configurations) |              |
| Assessment approach | Qualitative     | Quantitative              |              |

Figure 1. Fundamental characterisation of MMs (Lahrman & Marx, 2010, tbl. 1)

In this regard, we will base our study on a few considerations. First, De Bruin et al. (2005) guidance suggests that dimensions should be exhaustive and distinct. Second, MMs have single or multiple dimensions but can also be hierarchical. Hierarchical MMs are more complex and require a formal architecture of measures (Lahrman & Marx, 2010). Third, staged MM models require compliance with all the dimensions (Fraser et al.,

2002), the specified goals and critical practices to reach the aimed level. Fourth, although we acknowledge the different MM audiences, this paper aims to provide industry-agnostic maturity recommendations. Finally, the maturity level assessment can be qualitative using descriptions or quantitative using Likert-like scales (Fraser et al., 2002).

### 2.1.3. Competitive Intelligence Maturity Model

CI maturity relates to the process of thoroughly developing its practice across all dimensions for each level of the model. This maturity can be computed in levels (staged model) or configurations (continuous model). Considering the previous subsections, the CIMM guides both the effectuation, the maturity assessment, and the improvement of the CI practice. Thus, CI maturity indicates the level of development for each of the 5Ps (dimensions) and respective descriptors for a predefined audience, organisation, industry, or country.

Notable, CIMMs allow economic agents to assess, understand, and improve their performance. Finally, given that CI is multidisciplinary, the CIMM is a broader-scoped umbrella maturity model. As such, this study considers only CIMMs, not Business Intelligence, Market Intelligence, Data Management, Social Intelligence, or Capability Maturity Models (CMMs), as those would be specific and not representative of the overall CI concept.

## 3. The CIMMs STATE OF THE ART

### 3.1. Literature Search Results

The search focused on six scholarly databases (DB), one register (SCIP.org), one specific journal (Competitive Intelligence Review), the Social Web, and Citation

Searching (i.e., snowballing). We screened all the results except for Google Scholar and Google Search, where we stopped at the saturation point, i.e., no more showing of

relevant or duplicate CIMMs. We successfully retrieved all the 38 records sought and screened for relevant CIMMs matching the scope (cf. Table 1) and MM characterisation (cf. Figure 1). Snowballing – backward and forward search – allows us to identify five

additional records. Scholarly DBs and registers allowed us to elite eight reports while other methods identified six further. The outcome was fourteen reports included in this study (Figure 2).

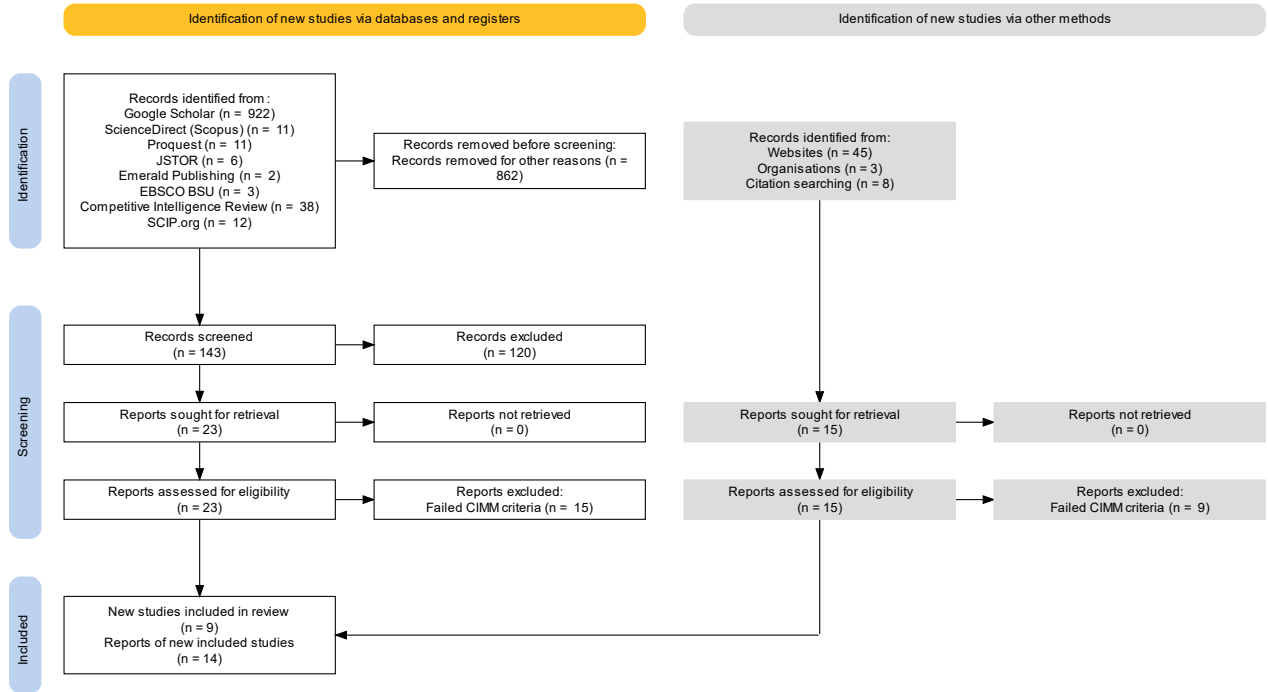


Figure 2. PRISMA 2020 flow diagram used for the systematic review (Page, Moher, et al., 2021)

### 3.2. Overview of the selected CIMMs

The overview goes beyond the criteria from Section 2-1 by adding supporting scientific or empirical evidence and the motive supporting the development of the CIMM (Table 2). We included a further detailed characterisation in Annex 2. A CIMM is developed every year and a half in the defined 1980-2022 timeframe denoting the longitudinal importance of the topic. The CIMMs

have 4,1 levels (computed for staged maturity principle) and 6,4 dimensions on average. They are primarily qualitative, based on case studies or surveys, and focused on assessing and improving the CI function or programmes. Only one CIMM (M-Brain et al., 2019) is motivated by increasing the performance of organisations, which is the ultimate purpose of CI (Madureira et al., 2021a, 2021b).

Table 2. Detailed characterisation of included CIMMs (developed by the authors)

| (Authors, Year) Citation | Name of the CIMM                             | Dimensions               | Maturity Principle            | Number Of Audiences                               | Assessment Approach | Study / Report                                 | Motivation                       |
|--------------------------|--|--------------------------|-------------------------------|---|---------------------|--|----------------------------------|
| (Calof, 1998)            | Competitive Intelligence Quotient (CIQ)      | Multi-dimensional: 4     | Continuous to Maturity (WCCI) | Multiple  | Qualitative         | Report   | Economic Policy                  |
| (Marceau & Sawka, 1999)  | World-Class CI Program in Telecoms (WCCIP-T) | Multi-dimensional: 5     | Continuous                    | Single (Telecom)                                  | Qualitative         | Study of Telecoms practices                    | CI Program development framework |
| (Prescott, 1999)         | Action-Oriented CI Program (AOCIP)           | Multi-dimensional: 5 + 5 | Staged: 4                     | Multiple: Proposal Management Professionals focus | Qualitative         | Report based on APQC 1997 Best Practices study | Improve CI effectiveness         |

|                                 |   |                           |                 |                                      |                            |                                    |  |
|---------------------------------|---|---------------------------|-----------------|--------------------------------------|----------------------------|------------------------------------|--|
| (West, 2001)                    | CI Stages of Development (CISoD)                    | Multi-dimensional: 4      | Staged: 3       | Multiple: European focus             | Qualitative                | Report                             | CI usage development   |
| (APQC et al., 2004)             | FIICH Model (FIICH)                                 | Multi-dimensional: 5 + 21 | Staged: 4       | Multiple                             | Qualitative                | Study of CI best practices         | Guide CI efforts leveraging empirical best practices                           |
| (J. P. Herring & Leavitt, 2011) | CI Maturity Matrix (CIMMx)                          | Multi-dimensional: 5      | Staged: 5       | Multiple                             | Qualitative                | Case Study                         | Implement and develop CI best practices  |
| (Comai & Prescott, 2007)        | World Class CI (WCCI)                               | Hierarchical: 9 + 48      | Continuous: 1-5 | Multiple                             | Mixed. Mostly Quantitative | Study                              | Identify the Dimensions, Level and Drivers for WCCI                            |
| (Singh et al., 2008)            | Roadmap for Enduring CI Success (RECIS)             | Multi-dimensional: 11     | Staged: 4       | Multiple. Additional focus on Pharma | Qualitative                | Study based on Worldwide CI Survey | Ensure CI success  |
| (Heppes & Du Toit, 2009)        | CI Function Maturity Level (CIFML)                  | Multi-dimensional: 8      | Staged: 3       | Single (Banking)                     | Qualitative                | Case Study                         | Establish the CIF maturity level within a South African retail bank            |
| (J. P. Herring & Leavitt, 2011) | World-Class CI Program Roadmap (WCCIPR)             | Multi-dimensional: 4      | Staged: 3       | Multiple                             | Qualitative                | Report                             | Show CIF evolution and promote Organisational Learning                         |
| (Hedin et al., 2014)            | World Class MI Roadmap (WCMIR)                      | Multi-dimensional: 6      | Staged: 5       | Multiple                             | Mixed. Mostly Quantitative | Report based on own global survey  | Guide the development of the CI function                                       |
| (Oubrich et al., 2018)          | Competitive Intelligence Maturity Model (CIMM-M)    | Multi-dimensional: 6      | Staged: 3       | Multiple. Focused on Morocco.        | Mixed. Mostly Quantitative | Report based on own local survey   | Identify the purpose and propose a CIMM to assess Morocco CI practices         |
| (M-Brain et al., 2019)          | M-Brain - World-Class Intelligence Framework (WCIF) | Multi-dimensional: 9      | Staged: 5       | Multiple                             | Mixed. Mostly Quantitative | Report based on own global survey  | Help organisations improve business performance                                |
| (Alvares et al., 2020)          | Organisational Intelligence Maturity Model (OIMM)   | Hierarchical: 2 + 17      | Staged: 6       | Multiple                             | Qualitative                | Report                             | Understand, implement, improve, benchmark or self-assess IM, KM, or CI models. |

### 3.3. CIMMs benchmark vis-à-vis the CI 5Ps and descriptors

We analysed and compared the content of the selected CIMMs vis-a-vis the dimensions (5Ps) and descriptors of the CI unified view and modular definition scientifically validated by Madureira et al. (2021a, 2021b). As such, the visual abstract of the paper (Madureira et al., 2021a) provided a standardised meta-model (Lahrman & Marx, 2010) for content analysis (conceptualisation, codebook creation, coding, refinement, and reliability check), guaranteeing the scientific rigour of the classification process (Neuendorf, 2019). Furthermore, the Webster & Watson (2002) conceptual-centric approach allows for the comparison between the CIMM's meta-model (dimensions and aspects) and the 5Ps (Purpose, Purview, Practices, Process, and Product) and underlying descriptors – Table 3. In its preparation, we paid particular attention to three potential issues.

First, synonymy – different names for the same dimension/aspect. Second, polysemy – same name but meaning different dimensions/aspects. Last, homonymy – similar names suggesting similar dimension/aspect but effectively meaning different dimensions/aspects. Additionally, we needed to make several assumptions:

- the tools and techniques can refer to the Process or the Product dimensions – e.g., Analysis of Competing Hypothesis (ACH) can either refer to the technique used in the process of analysis or the product of such analysis, the CI deliverable;
- that we correctly empathised with the meaning the author intended to convey from reading the original article;
- that some CIMM dimensions need to be split (hence appearing in two or more columns in table 3 below) for two reasons:

1) CIMMs included aspects that correspond

to different benchmarked dimensions (Madureira et al., 2021a) – e.g., the "strategic significance" dimension from Comai & Prescott (2007) has aspects of three of the 5Ps, Purpose (usage in strategy development), Purview (focus on

the strategic scope), and Practices (CI is included in the corporate strategy statement);

- 2) they refer to various dimensions or aspects in different maturity levels.

**Table 3.** Integration and benchmark of included CIMMs vis-à-vis the Unified View and Modular Definition of CI (Madureira et al., 2021a)

| (Authors, Year) Citation        | Name of the CIMM                             | CI Dimensions and (aspects)                                 |   |  |   |   | Model Maturity Levels   |
|---------------------------------|--|---|---|--|---|---|---|
|                                 |  | Purpose   | Purview                                     | Practices  | Process   | Product   |   |
| (Calof, 1998)                   | Competitive Intelligence Quotient (CIQ)      |   | Activities (scope)                          | Style Resources  | Activities (reporting, sources)   | Tools   | 1. Infancy<br>2. Maturity/World Class   |
| (Marceau & Sawka, 1999)         | World-Class CI Program in Telecoms (WCCIP-T) | Decision-support (opportunities)<br>Culture (early warning) |   | Process (interface, location)<br>Culture (info sharing)  | Process (key activities, interface)<br>Decision-support (options)<br>Technology (storage) | Decision-support (portfolio, tools techniques)<br>Technology (infrastructure) | World Class (continuous)  |
| (Prescott, 1999)                | Action-Oriented CI Program (AOCIP)           | Focus   |   | Location & structure (personnel) ethics  | Location & structure (network) Projects   | Products (TAR)  | 1. Gathering<br>2. Industry & competitor analysis<br>3. Strategic decision making<br>4. Core capability |
| (West, 2001)                    | CI Stages of Development (CISoD)             | Applications (anticipation)                                 |   | Organisation Applications (curiosity)  | Data Collection   | CI Systems  | 1. Aware<br>2. Sensitive<br>3. Intelligent  |
| (APQC et al., 2004)             | FIICH Model (FIICH)                          | Change (performance)<br>Focus (goals & objectives)          |   | Implement Institutionalise Change (behaviour)  | Hone Change (process)   |   | 1. Prestart-up<br>2. Start-up<br>3. Established<br>4. World Class                                       |
| (J. P. Herring & Leavitt, 2011) | CI Maturity Matrix (CIMMx)                   | Processes (aligned)   |   | Teams Tools (Training)<br>Processes (culture, ethics, legal)   | Processes (gathering, cyclic)<br>Techniques (KITS, Sources, Analytical)                   | Products Tools (Techniques, tools)  | 1. Ad-hoc<br>2. Emerging<br>3. Defined<br>4. Institutional<br>5. Optimised                              |
| (Comai & Prescott, 2007)        | World Class CI (WCCI)                        | Strategic significance<br>CI in SBU (vision)                | Project selection<br>Strategic significance | Human resources<br>Evolution<br>Governance<br>Culture<br>Process (protocol)<br>Resources (financial)                                     | Projects<br>Process (sub-processes)<br>CI in SBU (procedure, governance)                  | CI in SBU (portfolio)<br>Resources (system, software)                         | 1. Not started<br>2. Some progress<br>3. Still a lot to do<br>4. Nearly achieved<br>5. Fully achieved   |
| (Singh et al., 2008)            | Roadmap for Enduring CI Success (RECIS)      |   |   | People Analysis (capability)<br>Professionalism<br>Organisational structure<br>Roles & responsibilities<br>Awareness<br>Value perception | Processes<br>Research<br>Analysis (insight)   | Technology  | 1. Stick fetching<br>2. Pilot<br>3. Proficient<br>4. World Class  |

| (Authors, Year)<br>Citation      | Name of the CIMM  | CI Dimensions and (aspects)   |   |   |  |   | Model Maturity Levels   |
|----------------------------------|---|---|---|---|--|---|---|
|                                  |   | Purpose   | Purview   | Practices   | Process  | Product   |   |
| (Heppes & Du Toit, 2009)         | CI Function Maturity Level (CIFML)  | Relationship w/ management (strategy, early warning, opportunities)<br>Deliverables (strategy)                      |   | Relationship w/ management (C-suite)<br>Staffing<br>Skills & training   | Relationship w/ management (decision)<br>Capabilities<br>Analytical products<br>Sources of Information<br>Info requirements                                  | Deliverables  | 1. Early stage<br>2. Mid-level<br>3. World Class                                  |
| (J. P. Herring & Leavitt, 2011)  | World-Class CI Program Roadmap (WCCIPR)   | Policies (mission, alignment)<br>Uses (strategic planning, strategy, benchmark)<br>Methods (early warning, threats) |   | Professional development<br>Policies (governance, mission)<br>People<br>Users (training)<br>Methods (future studies)<br>Uses (long-range planning)                | Processes (CCI)<br>Procedures (KITs)<br>Methods (sub-processes)<br>Users (networks)<br>Sources   | Users & uses (products)<br>Methods (products, expert systems, software)<br>Processes (value added)    | 1. Developmental<br>2. Professionalisation<br>3. Optimisation                     |
| (Hedin et al., 2014)             | World Class MI Roadmap (WCMIR)  | Scope (purpose)   | Scope (macro, meso, user groups)  | Organisation<br>Culture   | Process<br>Tools (templates, techniques)   | Deliverables<br>Tools (CI system)   | 1. Firefighters<br>2. Beginners<br>3. Coordinator<br>4. Directors<br>5. Futurists |
| (Oubrich et al., 2018)           | Competitive Intelligence Maturity Model (CIMM-M)  | Impact  | Relationship w/ management (functions)  | Resources<br>Structure<br>Strategy & culture  | System<br>Analytical<br>Deliverables<br>Capabilities<br>CI Use<br>Relationship w/ management (actionable)  |   | 1. Early stage<br>2. Mid-level<br>3. World Class                                  |
| (M-Brain et al., 2019)           | M-Brain - World-Class Intelligence Framework (WCIF)   | Leadership<br>Scope (strategic objectives, opportunities, early warning)  | Scope (external environment)  | Organisation<br>Culture<br>Management<br>Scope (forward-looking)  | Process<br>Stakeholders<br>Digitalization  | Deliverables<br>Tools   | 1. Informal<br>2. Basic<br>3. Intermediate<br>4. Advanced<br>5. World Class       |
| (Alvares et al., 2020)           | Organisational Intelligence Maturity Model (OIMM)   |   |   | Org. learning (capability)<br>Org. capabilities<br>Org. memory (capability)<br>Spaces<br>Info. policy<br>Culture<br>Individual Vision<br>Env. scanning (practice) | Env. scanning (process)<br>Storage, search, recovery<br>Sharing & re-usage<br>Usability (use)<br>Org. memory (storage)<br>Security<br>Org learning (process) | Knowledge value<br>Knowledge and info processes<br>Intel. reports<br>Usability (system)<br>Technology | 1. Initial<br>2. Intermediate<br>3. Advanced                                      |
| <b>CIMMs w/ dimension</b>        | $\Sigma$  | 11  | 5   | 14  | 14   | 12  | <b>Average Levels: 3,9</b>  |
| <b>Dimension Alignment</b>       | %   | 78,6%   | 35,7%   | 100%  | 100%   | 85,7%   | <b>Total Benchmarked Aspects: 33</b>  |
| <b>Aspects average alignment</b> | %   | 30,0%   | 11,9%   | 42,9%   | 33,8%  | 31,3%   |   |
| (Madureira et al., 2021a)        | Competitive Intelligence Unified and Modular Definition (adapted from Visual Abstract for benchmarking) | Performance Decision (specific goals, competitive advantage, early warning)   | Competitive environment<br>External (macro, meso, micro)<br>Internal (org. functions) | Org. practices<br>Capabilities (individual, organisational, structure, policies, mindset, culture)<br>Orientation (time horizon)                                  | Activities<br>Procedure (processes, characteristics)   | Knowledge Nature (augmented, machine, human)<br>Outcome (knowledge management, characteristics)       |   |



## 4. DISCUSSION OF FINDINGS

The following sub-sections detail the findings from the integration and benchmarking exercise from the previous section. We start at the dimensional level and then go deeper into the aspects. Finally, we discuss the CIMMs, the implications of the findings, our recommendations for implementation and the limitations of the study.

### 4.1. Dimensions level

An evident gap in the results is that, as with any strategy (Rumelt, 2012, 2022), the underlying reason for the CI efforts should be the starting consideration. However, despite the need for CI practitioners to start with the end in mind, the CI Purpose dimension is the second least addressed in identified CIMMs.

A second finding is that only five CIMMs include the CI Purview dimension and aspects. The scope is critical for the CI practice as it defines the focus and conditions the effectiveness of the activities. It is impossible to develop intelligence for the entire CI scope. In an information-overloaded world, CI professionals must trade off the amount of Big Data (Laney, 2001) processed vis-à-vis the (lack of) computing power and the available headspace. The considerable stream of research on Key Intelligence Topics (KITs) is proof of the importance and guidance on this topic (J. Herring, 2008; J. P. Herring & Leavitt, 2011).

Surprisingly, all CIMMs address CI Practices despite being the least mentioned dimension in the 816 definitions used in developing the benchmarked definition (Madureira et al., 2021a). The importance of the CI Practices for the CIMM is evident since it materialises the concept. The Practices and Process dimensions form the core of the CI model, reinforcing each other in implementing CI effectively. The CI function location in the organisational structure (Calof, 1998; Comai & Prescott, 2007; J. P. Herring & Leavitt, 2011; Marceau & Sawka, 1999; Singh et al., 2008), the policies (namely the importance of respecting the legal and ethical aspects (J. P. Herring & Leavitt, 2011; Prescott, 1999), the capabilities of the organisation and the

individual (Alvares et al., 2020; Comai & Prescott, 2007; Oubrich et al., 2018), the mindsets (APQC et al., 2004; Calof, 1998; Comai & Prescott, 2007; West, 2001), and the culture of intelligence (Alvares et al., 2020; Hedin et al., 2014; M-Brain et al., 2019; Oubrich et al., 2018), are the most appointed key success factors in the CIMMs for the development and evolution of CI (Adamala & Cidrin, 2011; Nasri & Zarai, 2013; M-Brain et al., 2019; Marceau & Sawka, 1999).

There is no surprise, though, in the complete alignment between the CIMMs and the CI Process dimension, given that it provides the blueprint for the CI activities performed and overall output.

The lower level of alignment (85,7%) towards the CI Product dimension is somehow more problematic given the importance the quality of CI has on decision-making, which in turn profoundly impacts the performance of organisations.

### 4.2. Aspects level

An in-depth analysis of the aspects (and sub-aspects) evidence a high synonymy, polysemy, and homonymy. Navigating the meaning of the aspects across CIMMs is extremely difficult given its number, the diverse nomenclature used, and the longitudinal evolution of the CI construct (Prescott, 1999). It is almost impossible to benchmark the maturity level between CI functions, programs, organisations, industries or countries using different CIMMs. Therefore, there is a clear need for a unified reference model with standardised nomenclature of dimensions and aspects.

Another important finding is the different levels of the thoroughness of the CIMMs regarding the aspects. On average, for any given dimension, the CIMMs do not address half of the aspects of the unified view of CI. Again, this reinforces the need for a holistic go-to CIMM with a solid scientific base that executives and academics can rely upon in theory and praxis.

### 4.3. CIMMs

A significant finding is that only one CIMM covers the 5Ps. This insight highlights the relevance of this study, addressing the research gap for a go-to CIMM of reference

and delivering on the expected contributions. Moreover, by benchmarking the best of theoretical and empirical CIMM knowledge vis-a-vis a unified and scientifically validated definition of CI (Madureira et al., 2021a, 2021b), we bring a solid foundation and scientific rigour to the CI practice, the broad-spectrum CI audiences, and the related disciplines. The findings also contribute to establishing CI science, as an integrated scientifically developed UCIMM will make the practice more scientific, repeatable, and comparable between organisations and industries. On top, none of the literature from the included CIMMs refers to the order of implementation of the 5Ps. Nor are the criteria for dimension selection, exceptions for best practices, or findings from case studies and empirical surveys. The level of arbitrariness can be considerable and dependent on the scope – specific country, industry, or organisation under analysis.

Overall, the findings highlight the essential contributions of the study. Firstly, all the dimensions and aspects included in the CIMMs fit within the CI unified view and modular definition (Madureira et al., 2021a). Nevertheless, there are still descriptors of the CI definition not addressed by aspects in any of the maturity models studied. Consequently, integrating the missing aspects into a CIMM will guarantee that professionals do not oversee any critical aspect and a sound grounding in CI theory. Secondly, there is the need for a more manageable CIMM. Assessing more than five dimensions can be burdensome for practitioners in a more pragmatic business setting. Conveying the results to the top management is also made more difficult as the number of dimensions increases. This miscommunication with top management can endanger the allocation of further needed resources for CI, endangering its development. As such, the hierarchical structuring of all the aspects into five dimensions seems to be a valuable empirical and theoretical contribution. Therefore, given previous CIMM shortcomings, we propose a unified CIMM in the next section.

#### 4.4. Integration of CIMMs into a proposed UCIM

We used the Capability Maturity Model Integration (CMMI) developed by the Software Engineering Institute at Carnegie Mellon University to integrate the CIMMs (ISACA, 2022). This process and behavioural model, designed to improve the performance of organisations, share the exact purpose of CI (Madureira et al., 2021b), hence our preferred choice. The model aims to combine multiple business maturity models into one framework, thus additionally addressing the challenge identified in Section 4-3. A model is a tool for streamlining process improvement by developing measurable benchmarks and creating a structure for encouraging productive, efficient behaviour throughout the organisation, functions, and projects. Therefore, it leverages the established standards for vetting vendors and suppliers, identifying and resolving process issues, and minimising risk while building a corporate culture that supports the new integrated model. In addition, the maturity and capability levels of an organisation provide a way to characterise its capability and performance.

##### 4.4.1. Maturity Levels (ML)

MLs represent a staged path for the organisation to improve the performance and processes efforts based on predefined dimensions and aspects. Within each ML, the dimensions and aspects also provide a path to performance improvement. Each ML increments the previous by adding new functionality or increased rigour. The goal is to raise the maturity of the organisation to the highest ML. Once reached, organisations should focus on maintenance and regular improvements, a learning organisation.

The journey starts at ML0 – *Incomplete* – where CI work may or may not get completed. CI goals are not established, and the processes are partly formed or do not meet the needs of the organisation. In ML1 – *Initial* – CI processes are viewed as unpredictable and reactive. CI work gets completed, but it is often delayed or over budget. This is the worst level for an organisation facing an unpredictable environment that increases risk and inefficiency. In ML2 – *Managed* –

organisations achieve the project management level. Projects are planned, executed, measured, and assessed, but many issues remain unaddressed. In ML3 – *Defined* – organisations are more proactive than reactive. A set of organisational policies and standards guide projects, programs, and portfolios. Organisations know their shortcomings, how to overcome them and the objectives for improvement. In ML4 – *Measured* – the organisation starts to measure and control the business, working off quantitative data to determine predictable processes aligned with stakeholder needs. The organisation manages risk with insight-driven process deficiencies. Lastly, in ML5 – *Optimised* – the organisation processes are stable, flexible, and agile. The learning organisation status is achieved with continuous improvement and responding to changes or other opportunities in an innovative and agile way. ML4 and ML5 are considered high maturity and stakeholder and customer-centric.

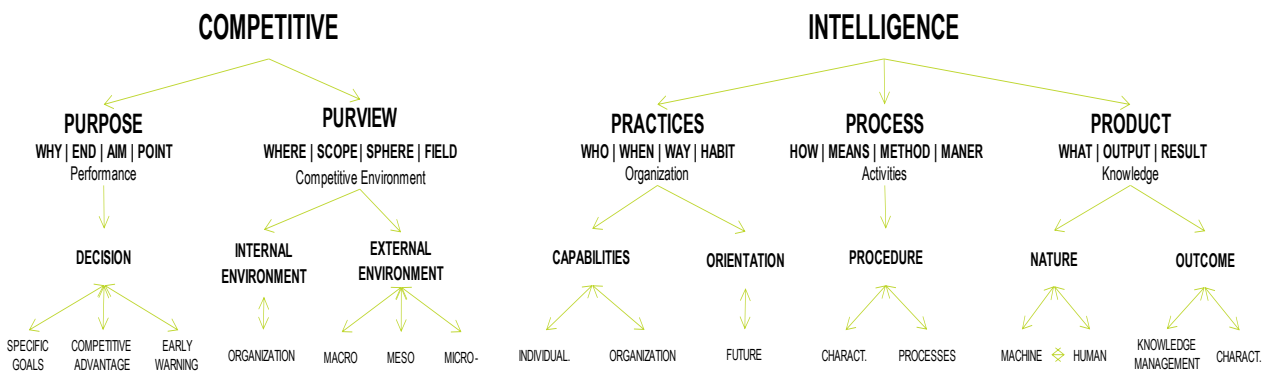
**4.4.2. Capability Levels (CL)**

CLs are used to evaluate the CI process improvement and performance of the organisation. They bring structure to the process and performance improvement. Each

CL builds on the last, in the same fashion as MLs, for appraising an organisation. The CLs range from CL0 – *Incomplete* – with inconsistent performance and incomplete approach to achieving the intent of CI. In CL1 – *Initial* - organisations address performance issues in specific activities, but there is not a complete CI practice in place. CL2 – *Managed* – there is a complete set of procedures that result in CI practice improvement. Finally, in CL3 – *Defined* – the focus is on achieving project and organisational performance objectives with clear organisational standards for managing CI projects.

**4.4.3. Dimensions and Aspects**

Based on the finding from Section 4-3 that some aspects are present but do not thoroughly cover all the relevant descriptors from Madureira et al. (Madureira et al., 2021a), we focused on adding the missing aspects to the UCIMM. Furthermore, given that the 5Ps and their descriptors are empirically proven, the outcome is a hierarchical catalogue (cf. Figure 3) of mutually exclusive CI maturity dimensions covering all aspects replicating the benchmarked visual abstract (Madureira et al., 2021a).



**Figure 3.** UCIMM hierarchical meta-model – dimensions, aspects, and sub-aspects (adapted by the authors)

**4.4.4. The proposed UCIMM**

The UCIMM proposed comprises five levels of maturity, three levels of capability, five dimensions, eight aspects, and sixteen sub-aspects. The UCIMM

is multi-dimensional, hierarchical, staged, primarily qualitative and built on the integration of previous studies.

**Table 4.** The UCIMM (prepared by the authors building on Madureira et al. unified view of CI (Madureira et al., 2021a)

| Name of the CIMM  | CI Dimensions and (aspects)   |   |  |   |  | Model Maturity Levels   |
|---|---|---|--|---|--|---|
|   | Purpose   | Purview   | Practices  | Process   | Product  |   |
| Unified Competitive Intelligence Maturity Model (UCIMM) | Performance Decision (specific goals, competitive advantage, early warning) | Competitive environment External (macro, meso, micro) Internal (org. functions) | Org. practices Capabilities (individual, organisational, structure, policies, mindset, culture) Orientation (time horizon) | Activities Procedure (processes, characteristics) | Knowledge Nature (augmented, machine, human) Outcome (knowledge management, characteristics) | <b>Proposed Maturity Levels</b><br>0. Incomplete<br>1. Initial<br>2. Managed<br>3. Defined<br>4. Measured<br>5. Optimised |

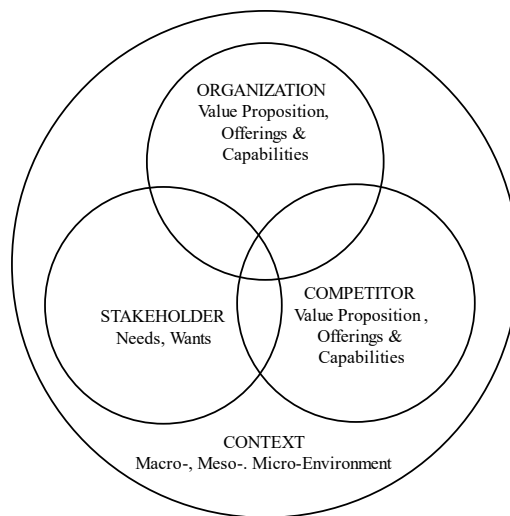
Following, we propose four integrated graphical visualisations (Figures 4-7) and their explanation to

**4.4.5. CI Purpose**

CI aims to create value by addressing its stakeholder needs in a unique and superior way vis-a-vis its competitors. As such, organisations must continuously make decisions to adapt to the evolving context and stakeholder needs and wants. Stakeholder centricity is pivotal to guaranteeing that the value created is superior to the value provided

guide and help CI professionals implement the UCIMM in practice.

by competitor organisations at any time. Optimised CI organisations support specific strategic, tactical, and operational decisions, help develop competitive advantages and provide early warning to decision-makers. Thus, the critical constructs are adaptation, agility, and anticipation.



**Figure 4.** CI Purpose (developed by the authors)

**4.4.6. CI Purview**

The scope of CI is the entire competitive environment (Figure 5). It encompasses the macro forces (macro-environment – outer arrows), the market forces (meso-environment – dashed triangle), the industry forces (microenvironment – industry (Porter, 2008)), and the internal environment (inside the organisation – players).

Therefore, given its wide dimension, aligning the scope addressed by the CI function with the purpose of the organisation is paramount. Most notably matching the scope to the maturity level of the CI competencies. An eventual mismatch affects the quality of CI, leading to sub-standard decisions and ultimately jeopardising the overall performance. Therefore, the CI practice must start small and increase the scope as its resources and competencies develop.

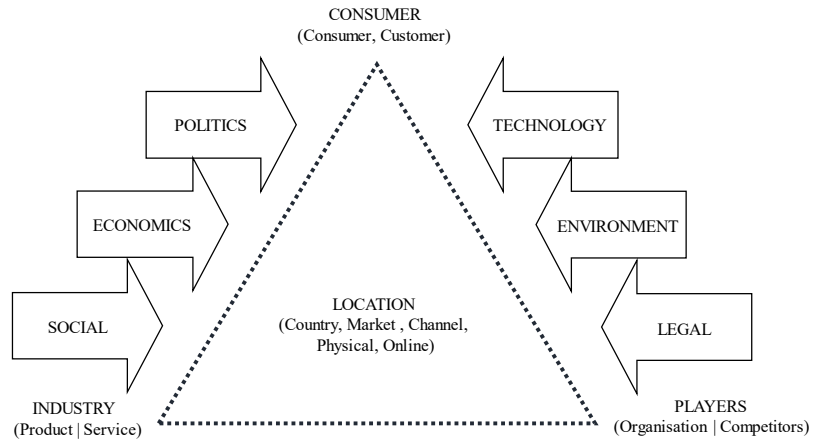


Figure 5. CI Purview (developed by the authors)

**4.4.7. CI Practices and Process**

The Core CI Model results from integrating the CI Practices and Process dimensions. Process-wise, learning organisations continuously adapt and improve their processes, tools, and techniques to support high-quality decision-making. The activities in the middle concentric circle (Figure 6) are guided by the CI procedure and executed with project management proficiency. The CI practice (and performed activities) depends on soft and hard factors: the place it occupies in the organisational structure, the policies that guide its execution, the mindsets, and

the intelligence culture. The time orientation also impacts CI activities. Understanding the past is not enough; understanding the present may not be possible without considering the past, and anticipating the future is impossible without previous time horizons. Organisations optimising CI are forward-looking, integrating the different time horizons synergically to create a new official future (Wilkinson & Kupers, 2013). In a nutshell, CI needs to be an established support activity within the value chain of the organisation.

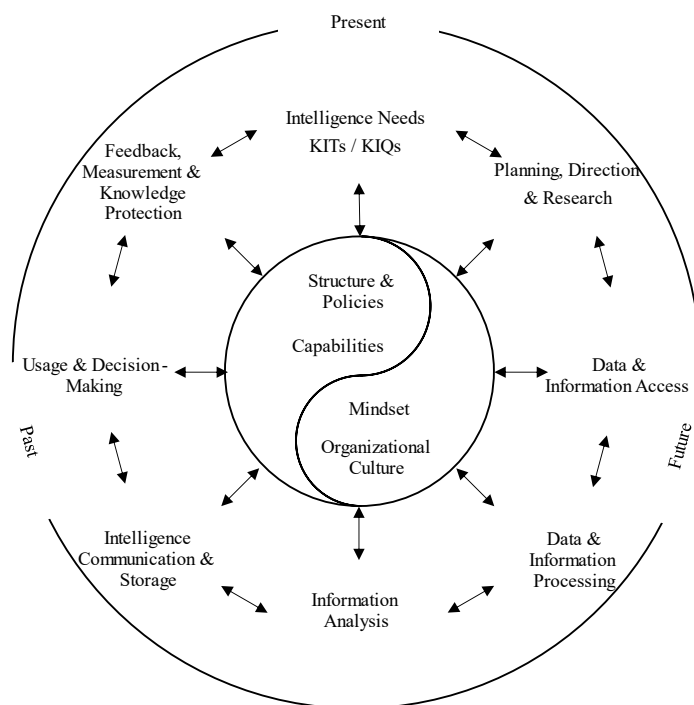


Figure 6. Core CI Model: Practices and Process (developed by the authors)

#### 4.4.8. CI Product

The output of CI outcome is a set of artefacts (deliverables, systems, or projects) produced for a given purpose, within a specific scope, through a systematic process, and a defined set of practices. Given the need for anticipation, organisations must act on quality intelligence – meaning the actionable insights will be verified true (converted into knowledge) or allow for creating an official future (Wilkinson & Kupers, 2013). Despite knowledge being the desired output, if an organisation waits for the insights to be verified true (e.g., a merger between two competitors), it will lose its opportunity to influence the competitive outcome. As such, CI has no value if the decision-makers receive factual truths. They need actionable

insights.

Moreover, the CI functions will derive learnings from using such intelligence and converting them into wisdom. The knowledge and wisdom of today are the data points of tomorrow, allowing CI practitioners to develop new higher-order intelligence. An increasingly important factor is the augmentation of artificial intelligence by CI professionals to guarantee reduced time to insight and overall timeliness of deliverables. Therefore, the CI function must not limit itself to data science or information management and should leverage knowledge management to become a learning organisation (Alvares et al., 2020).

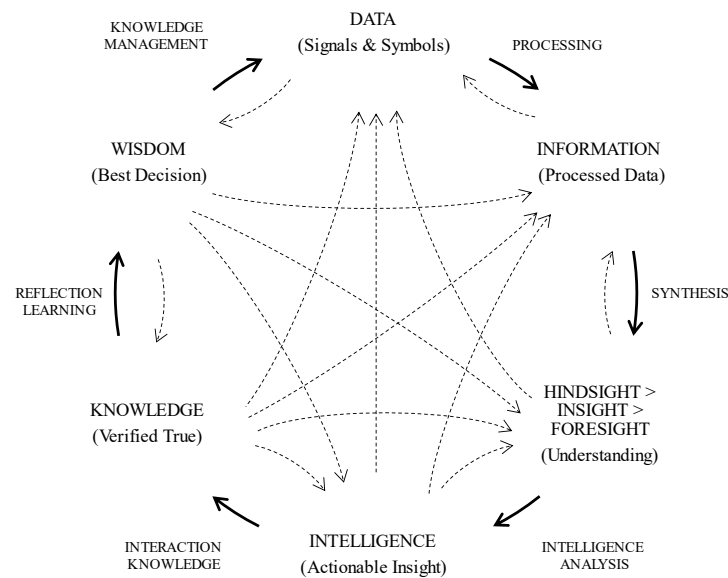


Figure 7. CI Product (developed by the authors)

#### 4.5. Limitations and future research

We purposely limited the study to CIMMs and excluded models focusing on CI subdomains, such as Business Intelligence MMs, Artificial Intelligence MMs, or Capability MMs. The specific models can thus be integrated for a more thorough and granular assessment, guidelines, and evolutionary path. Namely, AIMMs can be a fruitful and valuable research avenue, given the need for guidance in this newer field within CI. Another research path is the empirical validation of the proposed model, the UCIMM. To this end, developing a scientifically validated scale would be essential.

#### 5. CONCLUSION

The study successfully addressed the need to develop a UCIMM for effective practical guidance addressing the conflicting interests of academics, executives, practitioners, and vendors. This study adds to existing theory by synthesising the current CIMMs literature, serving as a future reference for all CI stakeholders. More prominently, it expands CI theory with the first ever integrated CIMM based on a scientific and empirically validated definition of CI. Furthermore, it contributes to practice by identifying gaps in existing CIMMs dimensions and aspects, providing a thorough and scientifically sound UCIMM. The model allows practitioners to pinpoint and address the areas they need to improve.

The accompanying frameworks support a better assessment, implementation, and development of the CI practice in organisations, navigating the adverse impacts of continuous change. Higher quality CI – timely, actionable, accurate, relevant (TAR) (Prescott, 1999) – should result in better decision-making and improved performance of

## 6. DECLARATIONS

### 6.1. Author Contributions

Conceptualisation, LM, AP, and MC; methodology, LM; formal analysis, LM; investigation, LM; resources, LM; data curation, LM; writing—original draft preparation, LM; writing—review and editing, LM, AP, and MC; visualisation, LM; supervision, AP, and MC; project administration, LM, AP, and MC; funding acquisition, AP and MC. All authors have read and agreed to the published version of the manuscript.

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## REFERENCES

- ACI, & Gilad, B. (2022). *2022 CIP™ Survey - A Changing Role Bodes Well* (p. 16) [Survey]. Academy of Competitive Intelligence.
- Adamala, S., & Cidrin, L. (2011). Key Success Factors in Business Intelligence. *Journal of Intelligence Studies in Business*, *1*(1), 107–127. <https://doi.org/10.37380/jisib.v1i1.19>
- Alvares, L. M. A. de R., Itaborahy, A. L. C., & Machado, R. P. M. (2020). Modelo de Maturidade em Inteligência Organizacional: uma visão integrada à gestão da informação, gestão do conhecimento e inteligência competitiva. *Informação & Sociedade: Estudos*, *30*(4), 1–21. <https://doi.org/10.22478/ufpb.1809-4783.2020v30n4.57352>
- APQC, Hasanali, F., Leavitt, P., & Lemons, D. (2004). *Competitive Intelligence: A Guide for Your Journey to Best-Practice Processes*. Amer Productivity Center.
- Bartes, F. (2014). Defining a Basis for the New Concept of Competitive Intelligence. *Acta Universitatis Agriculturae Et Silviculturae Mendelianae Brunensis*, *62*(6), 1233–1242.
- organisations. On becoming a reference model, the UCIMM will save time while guiding the effectuation of CI construct and practice, functions, systems and programmes in surpassing the average and reaching the world-class optimised level of maturity.
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- ### 6.3. Conflicts of Interest
- The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.
- <https://doi.org/10.11118/actaun201462061233>
- Bennett, N., & Lemoine, J. (2014). What a Difference a Word Makes: Understanding Threats to Performance in a VUCA World. *Business Horizons*, *57*, 311–317. <https://doi.org/10.1016/j.bushor.2014.01.001>
- Breakspear, A. (2013). A New Definition of Intelligence. *Intelligence and National Security*, *28*(5), 678–693. <https://doi.org/10.1080/02684527.2012.699285>
- Brocke, J., Simons, A., Niehaves, B., Niehaves, B., Reimer, K., Plattfaut, R., & Cleven, A. (2009). Reconstructing the Giant: On the Importance of Rigour in Documenting the Literature Search Process. *ECIS 2009 Proceedings*, *161*. <https://aisel.aisnet.org/ecis2009/161/>
- Brody, R. (2008). Issues in Defining Competitive Intelligence: An Exploration. *IEEE Engineering Management Review*, *36*(3), 3–16. IEEE. <https://doi.org/10.1109/emr.2008.4648884>
- Bruin, T. de, Freeze, R., Kulkarni, U., & Rosemann, M. (2005). Understanding the Main Phases of Developing a Maturity Assessment Model. *ACIS*

- 2005 *Proceedings*, 109.  
<https://aisel.aisnet.org/acis2005/109>
- Calof, J. (1998). Increasing your CIQ: the competitive intelligence edge. *Economic and Technology Development Journal of Canada*, Art 22/98, 103–108.
- Calof, J., Sewdass, N., & Arcos, R. (2017). Competitive Intelligence: A 10-year Global Development. *Competitive Intelligence Magazine*, 20(2), 21–26.
- Comai, A., & Prescott, J. E. (2007). *Workbook: World-Class Competitive Intelligence Function* (E. Ediciones, Ed.; 1st ed.). Emecom Ediciones.
- Cooper, H. M. (1988). Organising Knowledge Syntheses: A Taxonomy of Literature Reviews. *Knowledge in Society*, 1(1), 104–126.  
<https://doi.org/10.1007/BF03177550>
- Crayon, & SCIP. (2022). *2022 State of Competitive Intelligence* (State of Competitive Intelligence, p. 44) [Survey]. Crayon.
- Duncan, R. W., & Weiss, A. (1979). Organisational Learning: Implications for Organisational Design. *Research in Organisational Behaviour: An Annual Series of Analytical Essays and Critical Reviews*, 1, 75–123.
- Eisenhardt, K. M. (1989). Making Fast Strategic Decisions in High-Velocity Environments. *Academy of Management Journal*, 32(3), 543–576. <https://doi.org/10.5465/256434>
- Fiedler, Fred. E. (1964). A Contingency Model of Leadership Effectiveness. In *Advances in Experimental Social Psychology* (Vol. 1, pp. 149–190). Elsevier.  
[https://doi.org/10.1016/S0065-2601\(08\)60051-9](https://doi.org/10.1016/S0065-2601(08)60051-9)
- Fraser, P., Moultrie, J., & Gregory, M. (2002). The Use of Maturity Models/Grids as a Tool in Assessing Product Development Capability. *2002 IEEE International Engineering Management Conference, 18-20 August, 1*, 244–249 vol.1.  
<https://doi.org/10.1109/IEMC.2002.1038431>
- Harkleroad, D. (1998). Ostriches and Eagles II. *Competitive Intelligence Review*, 9(1), 13–19.  
[https://doi.org/10.1002/\(SICI\)1520-6386\(199801/03\)9:1<13::AID-CIR4>3.0.CO;2-S](https://doi.org/10.1002/(SICI)1520-6386(199801/03)9:1<13::AID-CIR4>3.0.CO;2-S)
- Hedin, H. (2005). *Competitive Intelligence in Large Companies – Global Study* (White Paper No. 4; Global Study, pp. 1–38). Global Intelligence Alliance.
- Hedin, H., Hirvensalo, I., & Vaarnas, M. (2014). *The Handbook of Market Intelligence: Understand, Compete and Grow in Global Markets* (2nd ed.). John Wiley & Sons Ltd.
- Heppes, D., & Du Toit, A. S. (2009). Level of Maturity of the Competitive Intelligence Function: Case Study of a Retail Bank in South Africa. *Aslib Journal of Information Management*, 61(1), 48–66.  
<https://doi.org/10.1108/00012530910932285>
- Herring, J. (2008). Defining Competitive Intelligence Needs: The Role of Key Intelligence Topics. In *Starting a Competitive Intelligence Function: A SCIP Best Practices Guide* (1st ed., Vol. 1, pp. 33–42). Competitive Intelligence Foundation.
- Herring, J. P., & Leavitt, J. A. (2011). The Roadmap to a World-Class Competitive Intelligence Program. *Competitive Intelligence Magazine*, 14(1), 9–28. SCIP.org.
- ISACA. (2022). *CMMI Levels of Capability and Performance*.  
<https://cmminstitute.com/learning/appraisals/levels>
- Kahaner, L. (1997). *Competitive Intelligence: How to Gather, Analyse, and Use Information to Move Your Business to the Top* (1st ed.). Simon & Schuster - Touchstone.
- Klue, & SCIP. (2021). *The 2021 Competitive Enablement Report - What do Stakeholders Really Think About Your Competitive Programs* (p. 41) [Survey]. Klue + SCIP.
- Lahrman, G., & Marx, F. (2010). Systematisation of Maturity Model Extensions. In R. Winter, J. L. Zhao, & S. Aier (Eds.), *DESRIST 2010* (Vol. 6105, pp. 522–525). Springer.  
[https://doi.org/10.1007/978-3-642-13335-0\\_36](https://doi.org/10.1007/978-3-642-13335-0_36)
- Laney, D. (2001). 3D Data Management: Controlling Data Volume, Velocity, and Variety. *META Group Research Note*, 6(70), 1–4.
- Madureira, L., Popovic, A., & Castelli, M. (2021a). Competitive intelligence: a unified view and modular definition. *Technological Forecasting and Social Change*, 173(December 121086), 1–17.  
<https://doi.org/10.1016/j.techfore.2021.121086>
- Madureira, L., Popovic, A., & Castelli, M. (2021b). Competitive intelligence empirical construct validation using expert in-depth interviews study. *2021 IEEE International Conference on Technology Management, Operations and Decisions*, 1–6.



- <https://doi.org/10.1109/ICTMOD52902.2021.9739422>
- Marceau, S., & Sawka, K. (1999). Developing a World-Class CI Program in Telecoms. *Competitive Intelligence Review*, 10(4), 30–40. [https://doi.org/10.1002/\(SICI\)1520-6386\(199934\)10:4<30::AID-CIR6>3.0.CO;2-H](https://doi.org/10.1002/(SICI)1520-6386(199934)10:4<30::AID-CIR6>3.0.CO;2-H)
- Marcial, E. C. (2018). Initial Proposal of a General Theory of Competitive Intelligence [Proposta Inicial De Uma Teoria Geral Da Inteligência Competitiva]. *Ciência Da Informação*, 45(3), 59–75. <http://dx.doi.org/10.22478/ufpb.1981-0695.2018v13n1.39268>
- M-Brain, Drieman, J., & Makinen, S. (2019). *Global Intelligence Survey 2019* (p. 32) [Survey & White Paper]. M-Brain.
- Nasri, W., & Zarai, M. (2013). Key Success Factors for Developing Competitive Intelligence in Organisation. *American Journal of Business and Management*, 2(3), 239–244. <https://doi.org/10.11634/216796061302397>
- Neuendorf, K. A. (2019). Content Analysis and Thematic Analysis. In P. Brough (Ed.), *Advanced Research Methods for Applied Psychology: Design, Analysis and Reporting* (1st ed., pp. 211–223). Routledge.
- Oubrich, M., Hakmaoui, A., Bierwolf, R., & Haddani, M. (2018). Development of a Competitive Intelligence Maturity Model: Insights from Moroccan Companies. *Journal of Intelligence Studies in Business*, 8(1), 25–36. <https://doi.org/10.37380/jisib.v8i1.303>
- Oxford English Dictionary. (2022a). Maturity. In *Oxford English Dictionary* (Oxford Languages and Google). Oxford University Press. <https://www.oed.com/>
- Oxford English Dictionary. (2022b). Model. In *Oxford English Dictionary* (Oxford Languages and Google). Oxford University Press.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews. *Systematic Reviews*, 10(1), 89. <https://doi.org/10.1186/s13643-021-01626-4>
- Page, M. J., Moher, D., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... McKenzie, J. E. (2021). PRISMA 2020 Explanation and Elaboration: Updated Guidance and Exemplars for Reporting Systematic Reviews. *BMJ*, 372(160), 1–36. <https://doi.org/10.1136/bmj.n160>
- Pellissier, R., & Nenzhelele, T. E. (2013). Towards a Universal Definition of Competitive Intelligence. *South African Journal of Information Management*, 15(2), 1–7. <https://doi.org/10.4102/sajim.v15i2.559>
- Porter, M. E. (2008). The Five Competitive Forces That Shape Strategy. *Harvard Business Review*, 86(1), 25–40.
- Prescott, J. E. (1999). The Evolution of Competitive Intelligence - Designing a Process for Action. *Proposal Management (Journal of the Association of Proposal Management Professionals)*, Spring, 37–52.
- Rumelt, R. P. (2012). *Good Strategy/Bad Strategy: The Difference and Why It Matters* (799615; 1st ed.). Crown Business.
- Rumelt, R. P. (2022, June 23). Build a Strategy that Addresses Your Gnarliest Challenges. *Harvard Business Review*. <https://hbr.org/2022/06/build-a-strategy-that-addresses-your-gnarliest-challenges>
- Senge, P. M. (2006). *The Fifth Discipline: The Art & Practice of The Learning Organisation* (Revised and Updated). Doubleday.
- Singh, A., Fuld, L., & Beurgschens, A. (2008). A Roadmap for Ensuring Success. In *Starting a Competitive Intelligence Function* (pp. 263–276). Competitive Intelligence Foundation; SCIP.org. [scip.org/cifoundation/](http://scip.org/cifoundation/)
- Taleb, N. N. (2007). *The Black Swan: The Impact of the Highly Improbable* (Vol. 2). Random House, Inc.
- Vedder, R. G., & Guynes, C. S. (2001). A Study of Competitive Intelligence Practices in Organisations. *Journal of Computer Information Systems*, 41(2), 36–39. <https://doi.org/10.1080/08874417.2002.11646989>
- Vroom, V. H., & Yetton, P. W. (1973). *Leadership and Decision-Making* (1st ed.). University of Pittsburgh Press.
- Webster, J., & Watson, R. T. (2002). Analysing the

Past to Prepare for the Future: Writing a Literature Review. *MIS Quarterly*, 26(2.3), xiii–xxiii.

<https://misq.umn.edu/misq/downloads/download/editorial/176/>

West, C. (2001). *Competitive Intelligence* (1st ed.). Springer.

Wilkinson, A., & Kupers, R. (2013). Living in the Futures - How Scenario Planning Changed Corporate Strategy. *Harvard Business Review*, May, 2–11.

Yap, C. S., Cheng, B. L., Mohamad Hussain, N., & Ahmad, R. (2018). Innovativeness, Market Intelligence Practices, and Firm Performance of Small- and Medium-Sized Tour Operators.

*Tourism & Hospitality Research*, 18(2), 143–151.

<https://doi.org/10.1177/1467358416636931>

Yap, C. S., & Rashid, M. Z. A. (2011). Competitive Intelligence Practices and Firm Performance. *Libri: International Journal of Libraries & Information Services*, 61(3), 175–189. <https://doi.org/10.1515/libr.2011.015>

Yap, C. S., Rashid, M. Z. A., & Sapuan, D. A. (2013). Strategic Uncertainty and Firm Performance: The Mediating Role of Competitive Intelligence Practices. *Journal of Information & Knowledge Management*, 12(04), 1350028-1–14.

<https://doi.org/10.1142/S0219649213500287>

## ANNEXES

### Annex 1: PRISMA Checklist

**Table 3.** PRISMA 2020 Checklist (Page, McKenzie, et al., 2021)

| Section and Topic       | Item # | Checklist item  | Location where item is reported |
|-------------------------|--------|---|---------------------------------|
| <b>Title</b>            |        |   |                                 |
| Title                   | 1      | Identify the report as a systematic review.   | Page 1, line 1                  |
| <b>Abstract</b>         |        |   |                                 |
| Abstract                | 2      | See the PRISMA 2020 for Abstracts checklist.  | Page 1, lines 4-15              |
| <b>Introduction</b>     |        |   |                                 |
| Rationale               | 3      | Describe the rationale for the review in the context of existing knowledge.   | Page 1-2, lines 45-13           |
| Objectives              | 4      | Provide an explicit statement of the objective(s) or question(s) the review addresses.  | Page 2, lines 14-23             |
| <b>Methods</b>          |        |   |                                 |
| Eligibility criteria    | 5      | Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.   | Page 2, line 32 - Table 1       |
| Information sources     | 6      | Specify all databases, registers, websites, organizations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.   | Page 2, line 32 - Table 1       |
| Search strategy         | 7      | Present the full search strategies for all databases, registers, and websites, including any filters and limits used.   | Page 2, line 32 - Table 1       |
| Selection process       | 8      | Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and, if applicable, details of automation tools used in the process.                     | Page 2, line 32 - Table 1       |
| Data collection process | 9      | Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and, if applicable, details of automation tools used in the process. | Page 2, line 32 - Table 1       |
| Data items              | 10a    | List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g., for all measures, time points, analyses), and if not, the methods used to decide which results to collect.                        | Page 5, line 6 - Table 2        |
|                         | 10b    | List and define all other variables for which data were sought (e.g., participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.   | Page 5, line 6 - Table 2        |

| Section and Topic             | Item # | Checklist item  | Location where item is reported           |
|-------------------------------|--------|---|---|
| Study risk of bias assessment | 11     | Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.                     | Page 2, line 32 - Table 1                 |
| Effect measures               | 12     | Specify for each outcome the effect measure(s) (e.g., risk ratio, mean difference) used in the synthesis or presentation of results.  | Page 6, line 27 - Table 3                 |
|                               | 13a    | Describe the processes used to decide which studies were eligible for each synthesis (e.g., tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).   | Pages 6, lines 2-26                       |
|                               | 13b    | Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.   | Page 6, lines 2-7                         |
| Synthesis methods             | 13c    | Describe any methods used to tabulate or visually display results of individual studies and syntheses.  | Page 6, lines 8-10                        |
|                               | 13d    | Describe any methods used to synthesise results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.                           | Page 6, lines 2-7                         |
|                               | 13e    | Describe any methods used to explore possible causes of heterogeneity among study results (e.g., subgroup analysis, meta-regression).   | Not applicable                            |
|                               | 13f    | Describe any sensitivity analyses conducted to assess robustness of the synthesised results.  | Not applicable                            |
| Reporting bias assessment     | 14     | Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).   | Not applicable                            |
| Certainty assessment          | 15     | Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.   | Page 6, lines 2-7                         |
| <b>Results</b>                |        |   |   |
| Study selection               | 16a    | Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.  | Page 4, lines 25-26 – Figure 2            |
|                               | 16b    | Cite studies that might appear to meet the inclusion criteria, but which were excluded and explain why they were excluded.  | Page 4, lines 25-26 – Figure 2            |
| Study characteristics         | 17     | Cite each included study and present its characteristics.   | Page 5, line 6 - Table 2                  |
| Risk of bias in studies       | 18     | Present assessments of risk of bias for each included study.  | Page 6, line 27 - Table 3                 |
| Results of individual studies | 19     | For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimates and its precision (e.g., confidence/credible interval), ideally using structured tables or plots.  | Page 6, line 27 - Table 3                 |
|                               | 20a    | For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.  | Page 6, lines 10-26                       |
| Results of syntheses          | 20b    | Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g., confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect. | Page 6, line 27 - Table 3                 |
|                               | 20c    | Present results of all investigations of possible causes of heterogeneity among study results.  | Not applicable                            |
|                               | 20d    | Present results of all sensitivity analyses conducted to assess the robustness of the synthesised results.  | Not applicable                            |
| Reporting biases              | 21     | Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.   | Not applicable                            |
| Certainty of evidence         | 22     | Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.   | Page 6, lines 10-26                       |
| <b>Discussion</b>             |        |   |   |
|                               | 23a    | Provide a general interpretation of the results in the context of other evidence.   | Pages 8, lines 3-6                        |
|                               | 3b     | Discuss any limitations of the evidence included in the review.   | Pages 8, lines 7-16                       |
| Discussion                    | 23c    | Discuss any limitations of the review processes used.   | Page 6, lines 10-26; Page 13, lines 13-19 |
|                               | 23d    | Discuss implications of the results for practice, policy, and future research.  | Pages 8-13, lines 8-10                    |
| <b>Other information</b>      |        |   |   |

| Section and Topic                               | Item # | Checklist item  | Location where item is reported |
|---|--------|---|---------------------------------|
| Registration and protocol                       | 24a    | Provide registration information for the review, including register name and registration number, or state that the review was not registered.  | Not registered                  |
|   | 24b    | Indicate where the review protocol can be accessed, or state that a protocol was not prepared.  | Not prepared                    |
|   | 24c    | Describe and explain any amendments to information provided at registration or in the protocol.   | Not Applicable                  |
| Support   | 25     | Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.   | Page 19, lines 9-14             |
| Competing interests                             | 26     | Declare any competing interests of review authors.  | Page 14, lines 15-19            |
| Availability of data, code, and other materials | 27     | Report which of the following are publicly available and where they can be found template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review. | Pages 14-17, lines 21-24        |

## Annex 2: CIMMs Further Detailed Characterisation

**Table 4.** Visualisation and Description of included CIMMs (developed by the authors)

| Citation                    | CIMM Name   | Visualisation   | Description  |            |           |       |                   |                    |            |           |                             |   |                 |                         |   |
|-----------------------------|---|---|--|------------|-----------|-------|-------------------|--------------------|------------|-----------|-----------------------------|---|-----------------|-------------------------|---|
| (Calof, 1998)               | Competitive Intelligence Quotient (CIQ)                               | <table border="1"> <thead> <tr> <th>Style</th> <th>Activities</th> <th>Resources</th> <th>Tools</th> </tr> </thead> <tbody> <tr> <td>All Inc. reactive</td> <td>Reading newspapers</td> <td>Literature</td> <td>Profiling</td> </tr> <tr> <td>Controlled tracking systems</td> <td>Fully integrated, field research competitors, customers and suppliers</td> <td>CI department =</td> <td>CI systems, base lining</td> </tr> </tbody> </table> | Style  | Activities | Resources | Tools | All Inc. reactive | Reading newspapers | Literature | Profiling | Controlled tracking systems | Fully integrated, field research competitors, customers and suppliers | CI department = | CI systems, base lining | <p>CI is about skills development, process, and structural and cultural change. The CIQ is the maturity level resulting from advancing style, activities, resources, and tools from infancy to maturity/World Class CI (WCCI). Building a competitive organisation requires its leaders' clear commitment and involvement, usually taking at least five years of committed effort from senior management to create a WCCI capability. A CI competencies list (from SCIP) is offered to support the development of the practice.</p> |
| Style                       | Activities  | Resources   | Tools  |            |           |       |                   |                    |            |           |                             |   |                 |                         |   |
| All Inc. reactive           | Reading newspapers  | Literature  | Profiling  |            |           |       |                   |                    |            |           |                             |   |                 |                         |   |
| Controlled tracking systems | Fully integrated, field research competitors, customers and suppliers | CI department =   | CI systems, base lining  |            |           |       |                   |                    |            |           |                             |   |                 |                         |   |
| (Marceau & Sawka, 1999)     | World-Class CI Program in Telecoms (WCCIP-T)                          |   | <p>The model presents five development planes as prerequisites and critical success factors to achieving a world-class CI: corporate culture (conducive to information sharing); straightforward interface (relationship and location of the CI within the organisation); relevance and extent of the CI portfolio of services; decision-making support (throughout the company); technical infrastructure (aggregation, organisation, and diffusion CI). The audience is the Telecom industry-leading global players, and critical stakeholders were the object of an interviews study for the development of the model.</p>  |            |           |       |                   |                    |            |           |                             |   |                 |                         |   |
| (Prescott, 1999)            | Action-Oriented CI Program (AOICIP)                                   |   | <p>This model is based on the analysis of the evolution of CI to identify its key dimensions and levels. The dimensions and aspects (ten) are based on identified main attributes and the Key Decision Areas from the Decision-Oriented Approach to Designing a CI Program. The latter is based on the 1997 study on CI best practices from APQC. The main objective is to improve the effectiveness of CI while presenting a business case for proposal management professionals. The model adds additional value by identifying key defining events and issues in the evolution of CI.</p>   |            |           |       |                   |                    |            |           |                             |   |                 |                         |   |
| (West, 2001)                | CI Stages of Development (CISoD)                                      |   | <p>The model assumes that organisations move through three stages of CI evolution across four dimensions: Data Collection, Applications, Organisation, and CI Systems. The model has three levels. First, Competitor Awareness - key competitors are known, some knowledge exists, the organisation rarely uses data for decision-making, and there is no CI Systems in place). Second, Competitor-sensitive - aware of competitive threats, relies exclusively on informal information flows, and there is still no structured intelligence program. Third, Competitor-intelligent - organisation anticipate competitive actions and events, dedicates serious resources, and has a specific location with the structure and systems to support the CI function. The model aims to understand the drivers and support the development of CI in Europe. The book offers further insight into the probability of using CI depending on the need for development capability and the ability to use it in practice.</p> |            |           |       |                   |                    |            |           |                             |   |                 |                         |   |

| Citation | CIMM Name | Visualisation | Description |
|----------|-----------|---------------|-------------|
|----------|-----------|---------------|-------------|

(APQC et al., 2004)

FIICH Model (FIICH)

| Prestart-up                          | Start-up                        | Established  | World-Class  |
|--------------------------------------|---------------------------------|--|--|
| Knowledgeable CI personnel           | Demonstration project           | Developed IT used as an innovation tool                  | Embedded CI culture                                |
| Determined role of IT                | Network design plan             | Project-based CI   | Dialogue-based CI                                  |
| Promotional plan                     | Awareness training              | Established product line                                 | Integration of strategic and tactical intelligence |
| Identifiable champion                | Developing IT platform          | Consistent application of CI analytical framework        | Direct role on key issues                          |
| Preliminary administrative structure | Ad hoc requests dominate        | Coordination of all CI activities throughout the company | Simulations and modeling of competitive dynamics   |
| Identifiable target of opportunity   | Kit process to prioritize focus | Formalized evaluation process                            |  |
|                                      | Informal feedback               | Network testing of local changes                         |  |
|                                      | CI code of ethics               | Knowledgeable and demanding CI users                     |  |

NOTE: Bold activities are essential to be in a particular stage of development; italicized activities represent transition points

The development of a CI program (CIP) proceeds through four stages: prestart-up, start-up, established, and world-class. Each stage of development has an identifiable set of critical activities or indicators that allows a company to know its level and transition activities to the next stage of the CI program development. The model is based on the premise that CIPs can be characterised by their stage of development and that identified external and internal factors may cause reversals to earlier stages — if not the failure of the CIP — must be examined. The model offers a methodology to evolve across dimensions into more advanced stages: Focus (clear set of goals and objectives); Implement (organisational culture); Institutionalise (incorporate CI practices); Change (modify processes, behaviours, and performance); Hone (dynamic, evolving, continuously improving activity). This empirical study provides a comprehensive understanding of what it takes to have a successful CI functional unit. Based on years of research of leading-edge organisations — supported by examples of best practices and tips from actual practitioners — it intends to guide readers in their own CI efforts. The study also aims to influence the academic community in researching the role of an intelligence function in decision-making theory.

(J. P. Herring & Leavitt, 2011)

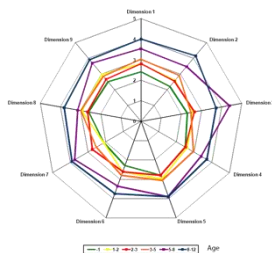
CI Maturity Matrix (CIMMx)

| Issues     | Ad-Hoc   | Emerging   | Defined  | Institutional  | Optimised  |
|------------|--|--|--|--|--|
| Issues     | Individuals perform CI occasionally and non-continuously | Identified people doing CI in business units and Services    | Full-time CI teams supported by annual budgets   | Senior leader as strategic CI change agent   | Strong support for enterprise-wide CI and senior leadership  |
| Tools      | Some customised commercial databases in the enterprise   | Control commercial database support                          | Standard set of CI general for entire for CI reference and standardised databases                  | Standard set of CI templates defined and used for CI reference and standardised databases                  | Advanced CI training techniques used, with basic commercial databases and standardised CI analytical tools |
| Techniques | Primary and secondary sources                            | ETIP/IFA, subject matter experts, SWOT, PEST, focus analysis | Analysis and report part of all CI products  | Advanced CI training techniques used, with basic commercial databases and standardised CI analytical tools | Advanced CI training techniques used, with basic commercial databases and standardised CI analytical tools |
| Processes  | One-off gathering  | CI Process Cycle defined and applied                         | Standardised CI process with business goals, methods for CI teams - CI tool process implementation | Standardised CI process with business goals, methods for CI teams - CI tool process implementation         | Standardised CI process with business goals, methods for CI teams - CI tool process implementation         |
| Products   | Non-existent   | Ad-hoc memos, reports, profiles, Personal profiles           | Non-existent   | Non-existent   | Forward-looking scenarios with insights and predictions  |

The matrix is based on a six-month study of the core of the entire value chain processes to optimise the CI of the enterprise. A later benchmark in best practices determined that it was ineffective to continue to be 'everything to all people.' Consequently, the group re-assessed its ion and audience and focused primarily on providing CI to support enterprise-wide strategic decisions and research new market potential. As a result, the author developed the CI Maturity Matrix in early 2006 to serve as a roadmap to achieve a CI process that provided more value to the enterprise. The matrix is five stages per five dimensions description of best practices to develop mature CI practices.

(Comai & Prescott, 2007)

World Class CI (WCCI)



The structure of the WCCI model identified nine dimensions subdivided into 48 aspects. The authors prepared a statement describing what the judges believe to be a world-class performance for each dimension and its accompanying aspects. The modes were defined so that their statements apply regardless of how the CI function is organised in the Strategic Business Unit (SBU). The authors defined "world-class" not as "the best that currently exists" but as "the ultimate best that might be achieved". The nine dimensions are: 1) Strategic Significance (recognised importance of CI defining the scope and level of CI activities); 2) CI in the Organisational Structure (clear operational vision between CI & the SBU); 3) CI Culture (organisational culture allows CI contribution to be maximised); 4) & 5) People and Physical resources (necessary for CI effective functioning); 6) CI Process (clearly defined and well established for gathering, validating, analysing, and storing CI); 7) CI project management (systems in place for selecting and prioritising CI projects); 8) Management Control (clear processes in place for top-level management control of CI operations); 9) Evolution Of The CI Unit (clearly defined evolutionary strategy for how the CI vision is to be achieved). The measurement scale to identify the development level is 1) We have not started this yet. 2) We have made some progress but still have a long way to go; 3) We have achieved a lot but still have a lot to do. 4) We have nearly achieved this but still have some work to do; 5) We have fully achieved this. The study aims to answer four research questions: What are the dimensions? What are the main dimensions? What are the milestones and relationships between them? What are the best ways to achieve WCCI?

| Citation | CIMM Name | Visualisation | Description |
|----------|-----------|---------------|-------------|
|----------|-----------|---------------|-------------|

(Singh et al., 2008)

Roadmap for Enduring CI Success (RECIS)

| Attributes                    | Stages  |  |  |  |
|-------------------------------|---|--|--|--|
|                               | Stick Fetching  | Pilot  | Proficient   | World Class  |
| 1. Roles and responsibilities | Clear roles with clarity, ownership, responsibility and focus | Strong role definition, roles in broad domain focus on resources                                   | Defined roles and responsibilities that are understood by the CI team    | Agreed across total organisation between the CI team and resource management team    |
| 2. Processes                  | Top-down, one-way chain of requests                           | Introduction to KPIs, targets, personal, team, learning curve for CI capabilities and competencies | KPIs aligned to a wider executive management audience                    | CI embedded in such a way that intelligence dialogue drives all major decisions      |
| 3. Secondary research         | High on the side source of intelligence                       | Expanding and trying additional external sources   | Top tier internal secondary sources                                      | Fully integrated use of internal and external sources and data sources               |
| 4. Primary research           | Nil   | Recognition the value of intelligence  | Use of readily human sources to create meaningful organised intelligence | Fully integrated use of internal and external human sources                          |
| 5. Analysis                   | Nil   | Occasional use of basic analytical tools   | Use of more analytical tools   | Selection and use of advanced analytical tools                                       |
| 6. People                     | No formal CI staff, volunteerism                              | Individuals nominated by sponsor   | Special CI practitioners working to agreed goal and ethical guidelines   | Established CI practitioners   |
| 7. Organisational awareness   | CI deliverables are the operational plan                      | CI activities are not recognised in the corporate hierarchy  | Placement of CI specialists across multiple parts of the organisation    | Specialists optimally placed across multiple parts of the organisation               |
| 8. CI services                | Limited to a handful of ad-hoc services that cannot be scaled | Increased awareness of the value of CI to the "top tier" of the organisation                       | Increased awareness by a significant proportion of the organisation      | CI embedded in all decisions, performance appraisal, training, projects and meetings |
| 9. Technology                 | Over-reliance on desktop human searching                      | Recognition that technology is not a substitute for the intelligence gathering on the ground       | Using appropriate technology and integration with existing practices     | Fully developed technology environment based on existing systems                     |
| 10. Value perception          | Limited or no recognition                                     | Direct by a recognition that CI is necessary   | Partial justification of the value of the CI capability                  | Complete clear decision across for wide, without artificial intelligence             |
| 11. CI professionalisation    | Nil   | Nil/limited  | Increased need for professional development                              | Management plan for CI team career progression                                       |

The RECIS results from the evolution of two reports and a study to ensure the success of CI activities in an organisation. The Self-Diagnostic Framework (SDF) (Singh & Beurgschens, 2006) provides value by describing the current stage of your program's development per attribute (dimension). The column with the most checks is where the organisation is in terms of CI development level (stage). This tool is a starting point to begin the analysis of the CI capabilities of an organisation by determining at which level it is and defining how it can be improved. The survey and white paper from Fuld & Singh (2007) explored the critical success factors of CI Programs (CIPs) across the globe. Using the exact eleven dimensions and "Four Intelligence Stages" from the SDF, it developed a more scientific and more profound assessment of the state of the CI discipline. A roadmap emerged from the two-year study where 141 worldwide companies examined and assessed their intelligence efforts (Fuld & Singh, 2007). Capability attributes are the key building blocks to developing a fully operational intelligence and competent CI function capability. The phases of development are the milestones for developing your function. The aim is to accelerate CI improvement as an individual, a team, or a function.

NOTE: This study was based on a self-assessment test submitted via a web survey. Fuld & Company did not interview or audit each respondent after submitting the survey.

(Heppes & Du Toit, 2009)

CI Function Maturity Level (CIFML)

|  | Developmental         | Professionalisation     | Optimisation                 |
|--|-----------------------|-------------------------|------------------------------|
| Substantiation and verification of CI function | Developed CI function | Established CI function | Optimised CI function        |
| Analysed products                              | Basic products        | Advanced products       | Highly advanced products     |
| Relationship with management                   | Basic relationship    | Advanced relationship   | Highly advanced relationship |
| Staffing of CI function                        | Basic staffing        | Advanced staffing       | Highly advanced staffing     |
| Source of information                          | Basic source          | Advanced source         | Highly advanced source       |
| Relationship with CI industry                  | Basic relationship    | Advanced relationship   | Highly advanced relationship |

Heppes identified the typical evolution of a world-class CI capability typically as spanning three significant stages; 1) Early-stage (providing facts and creating CI awareness | less than 1,5 years of operation); 2) Mid-level capability (identifying trends and implications from gathered data, within an emerging partnership with CI users | operational between 1,5 - 3 years); 3) World-class (CI regarded as a key component of company strategy | more than three operating years). These stages evolve across seven dimensions: 1) CI Function (CIF) deliverables and capabilities; 2) analytical products; 3) Relationship with management; 4) staffing of CI function; 5) CI skills; 6) sources of information. The overall aim is to establish the level of maturity of the CI function. This study focused on identifying the maturity level of CI for a South African retail bank.

The roadmap shows where the CI Program (CIP) is now, the vision of where the organisation wants it to be, and the steps needed to get there. The roadmap organises a CIP in three-time stages: 1) developmental (first 1-2 years), 2) professionalisation (3-5 years), and 3) optimisation (6+ years). The Developmental Stage is critical to building a world-class professional program (WCCIP) from the onset. All dimensions must be identified and put in place over the first two years to develop a strong foundation. The Professionalisation Stage requires formidable effort to enhance the collection and analysis methods while advancing intelligence policies and procedures requires experienced intelligence expertise. Once these essential functions and processes are established, the next set of tasks is to professionalise those operations and the individuals who produce and apply the intelligence. The Optimisation Stage is the final stage in becoming a WCCIP. The real challenge is to maintain the level of organisational performance for years afterwards. The SCIP-IRI study found that the average age of world-class programs was about eight years. The vertical axis contains the four functional dimensions that form the core of all CI programs: 1) users and uses; 2) people and their professional development; 3) sources and methods; 4) the policies, processes, and procedures that bring the program altogether and ensure it runs smoothly. Following is a descriptive discussion of the twelve boxes on the Herring-Leavitt World-Class CI Program Roadmap. The choice of a roadmap framework for the WCCI model shows the evolution of the world-class process over time and, most significantly, promotes organisational learning.

(J. P. Herring & Leavitt, 2011)

World-Class CI Program Roadmap (WCCIPR)

|   | Developmental                                   | Professionalisation                                | Optimisation  |
|---|---|--|---|
| Users and uses                            | Basic users and uses                            | Advanced users and uses                            | Highly advanced users and uses                            |
| People and their professional development | Basic people and their professional development | Advanced people and their professional development | Highly advanced people and their professional development |
| Sources and methods                       | Basic sources and methods                       | Advanced sources and methods                       | Highly advanced sources and methods                       |
| Policies, processes, and procedures       | Basic policies, processes, and procedures       | Advanced policies, processes, and procedures       | Highly advanced policies, processes, and procedures       |



| Citation | CIMM Name | Visualisation | Description |
|----------|-----------|---------------|-------------|
|----------|-----------|---------------|-------------|

(Hedin et al., 2014)

World Class MI Roadmap (WCMIR)

| Level KSF    | 1. Informal   | 2. Basic  | 3. Intermediate   | 4. Advanced  | 5. World Class  |
|--------------|---|---|---|--|---|
| Process      | Reaction set, no process, no structure, no discipline, no metrics, little or no metrics | Search system, little collection, no structure, no discipline, little or no metrics | Primary information collection, no structure, no discipline, little or no metrics | Complete market monitoring, advanced analysis, regular reports to top management | Integrated into the business process, advanced analysis, regular reports to top management, advanced metrics, early warning |
| Organization | No dedicated, uncoordinated activities  | One person, informal, uncoordinated activities                                      | Full time, dedicated, coordinated, no structure, no discipline, no metrics        | Specialized, dedicated, coordinated, no structure, no discipline, no metrics     | Integrated of internal and external, dedicated, coordinated, no structure, no discipline, no metrics                        |
| Scope        | No focus, Ad-hoc needs driven   | Limited with weak, no focus, Ad-hoc needs driven                                    | General, no focus, Ad-hoc needs driven  | Adapted, specific, no focus, Ad-hoc needs driven                                 | Focused, specific, no focus, Ad-hoc needs driven  |
| Culture      | No understanding value of information   | Seen as necessary, no understanding value of information                            | Higher awareness, no understanding value of information                           | Increased awareness, no understanding value of information                       | Comprehensive awareness, no understanding value of information  |
| Tools        | Tools shared, little or no use  | Corporate, shared, little or no use   | Specialized, shared, little or no use   | Highly specialized, shared, little or no use                                     | Intelligence, shared, little or no use  |
| Deliverables | Ad-hoc  | Fluctuating   | Structured, regular, little or no use   | Structured, regular, little or no use  | Advanced, comprehensive, little or no use   |

The World Class Market Intelligence Roadmap (WCMIR) incorporates intelligence development into an evolutionary process. The authors identified five levels of growth from the start to the world-class level and six key success factors (KSF) that move the program through those growth levels. The role of the CI manager is different for each of the five levels of the intelligence evolution roadmap. The same applies to all six Key Success Factors (KSF): the further the program advances through the various levels, the more sophisticated process it needs. Combining the six KSFs with the five stages creates a 30-box matrix. Each box describes a KSF relevant to each of the development steps. To grow the CI function, organisations need to implement the appropriate measures. Reviewing the development roadmap, one can identify the present status and what is necessary to move CI up a level. The roadmap can also help determine the CI function's future objectives. Over time, most CI functions should reach the intermediate level, where the basic intelligence processes are in place. However, several specific issues arise at that level and must be addressed before the organisation can move toward the advanced and world-class levels. The framework is based on research conducted during 2005- 2008 with 700 companies, and their input has been used to verify the roadmap concept. In addition, many companies have empirically tested the concept.

(Oubrich et al., 2018)

Competitive Intelligence Maturity Model (CIMM-M)

| CI dimension and sub-area                        | Early stage CI   | Mid-level CI capability   | World class CI capability  |
|--|--|---|--|
| CI Strategy and Culture                          | The organization is in the business environment in a reactive manner. CI practice is only about information collection. The aim is to cope with changes in the business environment. | The organization is in the business environment in a proactive manner. CI practice is about information collection and analysis. The aim is to cope with changes in the business environment. | The organization is in the business environment in a proactive manner. CI practice is about information collection, analysis, and dissemination. The aim is to drive the change in the business environment. |
| CI Relationship with Management and Organization | CI is not used for strategic or tactical decision-making. The aim of CI is to provide information to management.   | CI is used for strategic or tactical decision-making. The aim of CI is to provide information to management.  | CI is used for strategic or tactical decision-making. The aim of CI is to provide information to management.   |
| CI Resources                                     | CI resources are limited. The organization has a small number of people who have limited skills and experience. CI resources are not used effectively.                               | CI resources are increased. The organization has a larger number of people who have better skills and experience. CI resources are used more effectively.                                     | CI resources are optimized. The organization has a large number of people who have excellent skills and experience. CI resources are used very effectively.  |
| CI Deliverables and Capabilities                 | CI deliverables are limited. The organization has a small number of deliverables. CI capabilities are not used effectively.  | CI deliverables are increased. The organization has a larger number of deliverables. CI capabilities are used more effectively.   | CI deliverables are optimized. The organization has a large number of deliverables. CI capabilities are used very effectively.   |
| CI Impact  | CI impacts are limited. The organization has a small number of impacts. CI impacts are not used effectively.   | CI impacts are increased. The organization has a larger number of impacts. CI impacts are used more effectively.  | CI impacts are optimized. The organization has a large number of impacts. CI impacts are used very effectively.  |

The maturity model proposed is based on a comprehensive review of recent literature. The objectives of this study are threefold: 1) determine the significant purposes of a CIMM, 2) identify the CI dimensions and levels of maturity, and 3) evaluate Moroccan CI practices. The conceptual framework articulates the CI dimensions and three maturity levels. The six CI dimensions are CI Culture; CI deliverables; CI sourcing; CI cycle; CI investment in resources; CI users; and CI application). Implementing these dimensions determines the position across three levels: early, mid, and world-class. The model was tested through an empirical study conducted in the Moroccan context. The results show that most Moroccan companies are in the early stage of CI, using environment scanning in a not-so-intense competitive environment allowing for the absence of a CI structure. However, most of these Moroccan companies are not able to cope with changes in the business environment as CI systems and processes are implemented on an irregular basis.

(M-Brain et al., 2019)

M-Brain - World-Class Intelligence Framework (WCIF)

| Level        | 1. Informal   | 2. Basic  | 3. Intermediate   | 4. Advanced  | 5. World Class  |
|--------------|---|---|---|--|---|
| Process      | Reaction set, no process, no structure, no discipline, no metrics, little or no metrics | Search system, little collection, no structure, no discipline, little or no metrics | Primary information collection, no structure, no discipline, little or no metrics | Complete market monitoring, advanced analysis, regular reports to top management | Integrated into the business process, advanced analysis, regular reports to top management, advanced metrics, early warning |
| Organization | No dedicated, uncoordinated activities  | One person, informal, uncoordinated activities                                      | Full time, dedicated, coordinated, no structure, no discipline, no metrics        | Specialized, dedicated, coordinated, no structure, no discipline, no metrics     | Integrated of internal and external, dedicated, coordinated, no structure, no discipline, no metrics                        |
| Scope        | No focus, Ad-hoc needs driven   | Limited with weak, no focus, Ad-hoc needs driven                                    | General, no focus, Ad-hoc needs driven  | Adapted, specific, no focus, Ad-hoc needs driven                                 | Focused, specific, no focus, Ad-hoc needs driven  |
| Culture      | No understanding value of information   | Seen as necessary, no understanding value of information                            | Higher awareness, no understanding value of information                           | Increased awareness, no understanding value of information                       | Comprehensive awareness, no understanding value of information  |
| Tools        | Tools shared, little or no use  | Corporate, shared, little or no use   | Specialized, shared, little or no use   | Highly specialized, shared, little or no use                                     | Intelligence, shared, little or no use  |
| Deliverables | Ad-hoc  | Fluctuating   | Structured, regular, little or no use   | Structured, regular, little or no use  | Advanced, comprehensive, little or no use   |

M-Brain's Intelligence Framework (M-BIF) expands the Hedin et al. WCMIR to help organisations achieve three benefits: better and faster decisions, time and cost savings, and organisational learning and new ideas. This is achieved by a systematic strategic market and competitive intelligence operation. Results are measured against and plotted on the matrix of nine Key Success Factors of an intelligence organisation (KSF) against five increasing levels of CI professionalism. The M-BIF framework distinguishes five maturity levels from Level 1 - beginners or "firefighters" - to the most advanced Level 5, the "futurists" and World Class intelligence organisations. The supporting survey gives the international CI community a good picture of the global average and world-class intelligence functions. In addition, the results offer in-depth information about the size of intelligence teams, their place within the organisation, available budget, number of stakeholders and contributors to intelligence (for co-creation) and much more. In concrete terms, the survey results are used by many companies to benchmark, set aspirational goals and develop roadmaps with implementation plans.

(Alvares et al., 2020)

Organisational Intelligence Maturity Model (OIMM)

Figure 2: Matrix of dependence on information management (IM), knowledge management (KM), and CI to demonstrate that IM and KM are associated with the CI maturity level. The results from exploratory qualitative research based on a literature review show that IM is the foundation for KM, which, in its turn, supports and enables CI. This confirms that the maturity level as a series of one-dimensional linear stages is also applicable to the organisational intelligence expanded model. The result is a matrix of 2 categories and 17 dimensions across the three stages (IM, KM, and CI) and six

The Organisational Intelligence Maturity Model (OIMM) presents the condition of dependence between information management (IM), knowledge management (KM), and CI to demonstrate that IM and KM are associated with the CI maturity level. The results from exploratory qualitative research based on a literature review show that IM is the foundation for KM, which, in its turn, supports and enables CI. This confirms that the maturity level as a series of one-dimensional linear stages is also applicable to the organisational intelligence expanded model. The result is a matrix of 2 categories and 17 dimensions across the three stages (IM, KM, and CI) and six

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| Citation | CIMM Name | Visualisation | Description  |
|----------|-----------|---------------|--|
|          |           |               | levels (Non-Managed/Individual, Structuring/Group, Formative/Integration, Effective/Creation, Analytical/Network, and Proactive/Full). The study aims to explain business development relative to the progression from IM to KM and CI maturity levels to understand, implement, improve, benchmark or self-assess IM, KM, or CI models. |

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