

CIPD

Championing better
work and working lives

Research report

May 2017

Human capital

analytics

and reporting:

exploring theory

and evidence



The CIPD is the professional body for HR and people development. The not-for-profit organisation champions better work and working lives and has been setting the benchmark for excellence in people and organisation development for more than 100 years. It has more than 140,000 members across the world, provides thought leadership through independent research on the world of work, and offers professional training and accreditation for those working in HR and learning and development.

Human capital analytics and reporting: exploring theory and evidence

Research report

Contents

Foreword	2
Executive summary	3
Introduction	5
1 The people value question: how can we determine the value of the human capital?	8
2 Measuring and reporting on people and HR: the HR analytics discipline	19
Discussion and recommendations	31
References	33

Acknowledgements

This report was written by Edward Houghton, Research Adviser at the CIPD. I would like to thank the teams who authored the two technical reports which informed and contributed to this work: Dr Martin McCracken, Professor Ronan Mclvor, Dr Raymond Treacy and Mr Tony Wall at Ulster University Business School, Professor Andy Charlwood and Professor Mark Stuart at Leeds University Business School, and Dr Clive Trusson at Loughborough University School of Business and Economics.

Foreword

Across many of the professions involved in delivering sustainable organisational success, the Holy Grail has been understanding the relationship between the people engaged in the enterprise and the value they bring and deliver.

This is a complex question. On a production line, Taylorism once offered the answer through the careful breaking-down of processes and the precise human input required to maintain a set level of productivity. This is increasingly augmented by technology (automation, scheduling applications, algorithms, and so on) and continues to dominate some sectors. Where human discretion and judgement is required, the Taylorist approach begins to unravel as more complex cognitive functions, the engagement of the workforce and the power dynamics of the organisation affect outcomes. These important concepts can result in fatal outcomes, such as the 1986 NASA Challenger shuttle disaster, when engineer Allan McDonald's recommendation not to launch due to safety concerns over the 'O' rings was over-ruled, resulting in the deaths of the entire crew.

This report aims to bring together the available evidence and literature on human capital theory, human capital measurement and reporting.

The purpose of the report is to provide a sound basis for anyone who wishes to understand the evolution and construct of human capital, as this will influence any subsequent attempt at devising the data and the measures required for any measure and analytical framework to illuminate the value that people bring and deliver to their organisations.

The journey starts with clarity on the value that the organisation and its activities provide. That value proposition then forms the basis for determining what value is created and where people add value to capital. Implicit in this is the quality and ideology behind the management of people. Clearly a Taylorist, instrumentalist perspective would differ in its value metrics from a more humanist perspective, where job roles and organisational design are centred on the people and their particular skills and talents in relation to the organisation's value proposition.

Unapologetically, the detailed work in deconstructing and problematising 'human capital' and highlighting the considerations around the measurement, analysis and reporting of the value people bring is to bring to the fore the opportunities presented by a humanist approach. This is one where the focus is to design

person-shaped jobs, encouraging organisations to develop the professional capability to design ways of working that develop the potential of everyone involved in value-creation to deliver value in the form of safety, quality, innovation, collegiality, and so on. That, however, requires a people governance approach that recognises the value people bring in a more nuanced way. This requires considerably greater skill when conceptualising human capital and its measurement.

This report is informative and reflective and demands the same of the reader. I hope that this report, by cutting through to what is materially important, will both challenge and inform your thinking and as such your approach to human capital. While the discourse of human capital is contested and the idea of people as capital is problematic, the report seeks to bring together what is known about the subject and invites you to co-create the practices and tools required for the future of people management, where we can be justly proud that the professions involved are delivering good work and meaningful working lives to their diverse workforces.

Dr Wilson Wong

Head of Insight and Futures
CIPD

Executive summary

People, or more specifically their knowledge, skills and abilities, are often touted as being an organisation's 'most important asset'. This human capital is something which, in modern knowledge-based organisations, is fundamental to delivering value through the business model. However, how leaders and the organisations they manage develop and utilise this often intangible construct is an issue that plagues modern business, particularly in the UK, an economy which suffers low levels of productivity and a shortage of critical skills (CIPD 2017a). HR analytics and human capital analytics are designed with these challenges in mind. Both look more closely at how people are able to contribute to delivering against organisation objectives.

Appreciating the family of people-related capitals of human, intellectual and social capital is an important way by which organisations and the people that work for them are able to realise as well as provide value through the work that they do. How these capitals interact is an important question that the HR, finance and management profession all face. Misunderstanding the influencing power of each capital, how they flex and contribute is dangerous in the face of the changing business context, in which poorly aligned systems and structures that are unable to leverage the power of resources, such as human capital, may in fact damage or destroy value-creation potential. Measuring the

interactions of the capitals, and how they align across operating and business models, is a critical way of understanding where human capital value-creation or value-destruction activity plays out in the organisation.

Human capital metrics emerged from accountancy and economics as ways by which organisations can assess the financial value of the human resource, but over time concepts of well-being, engagement and culture have entered the work and performance discourse. As such, more recent examples of human capital data and analytics which have been captured in published academic case studies have considered the extent to which measures of individual aspects, such as diversity and capability, deliver overall organisation performance. Connecting human capital data to measures of innovation, connectivity and knowledge development is an emerging area of literature that has the potential to demonstrate the impact of human capital on various aspects of organisation and individual performance.

While the analysis of people data with analytics systems and processes has been a topic of theoretical debate for over 30 years, the last decade has seen the topic gain considerable attention from the people profession. In practice terms, analytics capability, technology and the potential to deliver predictive insights have been mainstays of the ongoing discourse on the

topic, with considerable attention paid to these areas by vendors, technologists and thought-leaders alike. The profession, however, has only recently started to utilise new technologies to use people data more strategically – and as the case studies our research has highlighted show, this new practice is often confined to large, resource-rich organisations. These approaches, often termed 'best practice', remain very much out of reach for many HR professionals, although the findings from such studies often prompt important debates concerning the nature and value of human capital data.

When we consider peer-reviewed published articles, the evidence for analytics impacts appears to be of fairly low quality, often framed as a question of driving performance, as opposed to other possible outcomes. Of the small number of systematic reviews or rapid evidence assessments of this topic, there does appear to be a lack of robust evidence for the value of such practice. That is not to say that data reported in grey literature has no value; indeed, these publications are often useful indicators of emerging trends and broad perspective on practice, but more critical examinations of the impacts of analytics and big data are required. In particular, further research must interrogate analytics methods and the evidence of the impact of people analytics on key organisation and individual outcomes, the latter of which appears to be missing in current published texts.

From the synthesis of the technical assessments by colleagues at Ulster University, Leeds University and Loughborough University, and our own CIPD research, we draw out a number of important recommendations that we believe should act to further both academic and practice thinking on the topic of human capital analytics:

- **Articulating the importance of human capital, social capital and intellectual capital in future practice:** these concepts have been around for some time, but modern people professionals have not adequately adopted a language which conveys their meaning. This is particularly true of human capital, which for many professionals is a divisive and inhumane term. The people profession should look to adopt a language that conveys a positive notion of human capital, describing the importance of knowledge, skills and capabilities to personal growth, investment in skills from both organisations and individuals, and the importance of human connectivity in social capital terms.
- **Investing in high-quality benchmarking studies of human capital analytics practice:** analytics practice, both from the academic and the practice domain, suffers as it has very low methodological quality. Common method issues such as convenience result in outcomes which may not adequately convey the reality of practice, and as such standards are

not adequately measured. An outcomes-focused benchmark of practice, which draws on parallels between different approaches and technologies, and highlights the value generated, could be one way by which practice can be enhanced through greater-quality insights.

- **Improving empirical evidence:** the empirical evidence of the outcomes of HR analytics, both at the organisation level and individual level, remains fairly scant. Many academic publications adopt cross-sectional studies which offer insights at a snapshot moment on practice, without exploring if practice is resulting in specific outcomes. More critical research exploring a broad scope of outcomes, such as performance, productivity, well-being and engagement, should be sought. Where possible, deep investigations of practice through randomised control trials of practice, which include comparator groups, should be developed and reported in peer-reviewed academic journals.
- **Building human capital analytics into the future people profession's body of knowledge:** CIPD evidence shows that capability appears to be low, with only large, resource-rich organisations investing in developing analytics and reporting capability. It is important, however, that analytics becomes a capability for future professionals who are able to appreciate different forms of evidence

as they make decisions on people and business issues. Without adequate training and development, analytics will not be adopted to explore broad organisation issues that require measurement, which include topics such as individual performance, resource management and productivity. The future people profession should look to enhance capability by locating people data and analytics as key aspects of the future professional standard. Building the capability to explore different forms of evidence will only enhance the ability of people professionals to deliver value and drive impact for all stakeholders.

Introduction

The value question

For modern business, the question isn't what role do people play in value-creation – we know that people are fundamental to business success. However, we have less appreciation of exactly how valuable people are in the complex value-creation process which exists in modern businesses. In essence, people are material, but just how material are they? And most importantly, what is the evidence (Houghton and Spence 2016)?

Appreciating the value questions has always been a part of the HR profession, directly through conversations on cost, or indirectly through investments such as those on learning and development, or organisational transformation. Locating value and maximising value-creation through intangible assets, such as people and their knowledge, challenges the very core of both management and accounting disciplines. Through many lenses, different academic perspectives have viewed the value question. In HR management (HRM), the action to tackle this question has been a driving force for considerable innovation in our understanding and appreciation of both good people management and good professional practice.

This research report investigates the question of people and their relationship to organisational value, and illustrates some of the theoretical and practical indicators available today. Its purpose is to draw together expertise from across the academic and practice

thought-leadership space, and to explore the case for further exploration through deep, meaningful research. Through this work, we hope to highlight the opportunities and challenges facing scholars and practice specialists today, and provide a route ahead for management experts across all professions on the topic of human capital analytics.

What is human capital? How does HRM consider value?

To appreciate if and how people relate to value within the organisation's context, it is important to define the nature of value that the workforce adds. This has, over time, come to be described as human capital, originating from work by Schultz in 1961, as the 'knowledge, skills and abilities of the people employed in an organisation'. Locating the know-how of individuals as the valuable commodity that individuals trade with their employment, the idea of human capital was born.

Since the mid-twentieth century, the human capital concept has evolved to include concepts such as health and well-being (Becker 1993), and then later to also incorporate value-adding concepts such as innovation, change and creativity (Bontis et al 1999). An alternative and more encompassing view widens an appreciation of human capital further from knowledge and instead towards one which sees the entirety of individuals as human capital, locating value instead directly as an aspect arising from performance

'...people are material, but just how material are they?'

‘Looking at the relationships between different descriptions of value in organisations is an important way to understand how practice can harness and generate its significance and importance.’

and some measure of potential (Thomas et al 2013). Even broader still, one definition considers the potential to invest in and grow human capital through learning, and the task-relevance of aspects of human capital which determines its value (Dess and Picken 1999). As we will see later in this report, the construct of human capital can be defined as both broad and narrow, and depending on your theoretical slant, can be viewed at different unit levels (for example individual, organisation or economic/society). This diversity in perspectives is important as it alters the way in which we consider organisational value. Looking at the relationships between different descriptions of value in organisations is an important way to understand how practice can harness and generate its significance and importance.

Outcomes-driven human capital

Highlighting investment and performance does two things for the construct. It demonstrates that investment in it may lead it to grow (it is dynamic and changing), and that it is an aspect of the organisation that connects to activity (it influences). Broadening the terminology does arguably make it harder to locate that which does generate value, meaning isolation of the value-generation mechanism becomes far more difficult.

In outcomes terms, human capital literature tends to demonstrate value outcomes as those which are performance-related, whether at unit or group level. As we will see, this aspect of HRM research is where considerable scholarship energy has been focused, determining the linkages of people, their knowledge and overall measures of performance. Less coverage has been expanded to consider

the additional outcomes which may arise from leveraging human capital, some of which modern organisations and workforces will be particularly interested in.

It is this aspect of human capital in which we believe there is emerging interest: the connection of human capital, and the analytics processes that come to measure and report on it, to broader concepts of value and values – not just that of finance or performance, but those relating to ethical aspects of organisations and modern work.

Research focus

In this research report we bring together some of the most recent debates exploring human capital, value and measurement, and consider how academia conceptualises the knowledge, skills and abilities of the workforce. We also shed some light on the quality and relevance of the measures currently conceptualised in HRM to determine human capital value and significance. We achieve this by asking two important research questions:

- 1 How is human capital management and measurement theory conceptualised?
- 2 What are the current measures being implemented for the measurement and reporting of human capital?

Research approach

To conduct this research, the CIPD commissioned two expert teams to review published academic literature and assess scientific theory and empirical evidence on human capital theory, and human capital measurement and reporting. The methodology that was applied in both cases was a literature review, an abridged systematic assessment which offers greater breadth of analysis than a rapid evidence

assessment (REA), a methodology which in the recent past has gained favour among scholars and expert practitioners alike.

The research method adopted in each of the reports allowed for a considered and thorough assessment of published academic research, which included theoretical positioning papers, experimental works, and meta-analyses of relevant theory. For the practice-focused human capital measures report, we also considered high-quality grey literature, as this forms a major part of the published work which describes practice. The limitations of this particular aspect of the study are explored later in the report.

Purpose

The purpose of this positioning paper is to consider the two technical in-depth studies and explore the practical implications of theoretical insights, by providing clear insights and actions to the practitioner audience. To do this we offer a step-wise exploration of the technical documents in the following stages:

- The first stage is to consider **human capital theory** in more detail, by exploring its understanding at the firm level and at the individual level. Here we consider its relationship to other forms of value in the organisation. To do this we detail emergent concepts, discuss and interpret theoretical positions, and appreciate the opportunities and limitations of current concepts.

- The second stage considers the theory and practice of **analytics**, considering concepts of measurement and reporting by understanding the nuances of measurements, metrics and key performance indicators. Here we consider the role of evidence-based management in developing practice, critique current theory and practice in the measurement and reporting of people data, and highlight important developments such as standards and human capital metrics.
- Finally we conclude with a **summary** of our discussion. We explore the potential areas for conceptual exploration, and investigate the pros and cons for a number of avenues of scholarship which we believe may provide insightful debate.

This report is informed by two important technical reports that explore in considerable detail the points above, and which in their publication act as a foundation for important new research in the space. These reports are:

- *Human Capital Theory: Assessing the evidence for the value and importance of people to organisational success* (McCracken et al 2017)
- *Human Capital Metrics and Analytics: Assessing the evidence of the value and impact of people data* (Charlwood et al 2017).

Find out more by reading the reports at **cipd.co.uk**

1 The people value question: how can we determine the value of the human capital?

In this section we consider how academic literature considers the value of people and knowledge in organisations, by looking at the concepts of human capital, social capital and intellectual capital. We map their relationships with one another, and highlight important theoretical perspectives of the role of human resources in delivering value to organisations. We conclude by drawing on the links between people and performance, and highlight some of the major gaps and criticisms that define contemporary thought in this space.

Defining human capital: origins in economics and the development of skills

While the concept of human capital has been appearing within management and economic literature for well over 200 years, human capital theory gained

prominence in the twentieth century from the work of Schultz (1961), when he recognised the importance of knowledge, skills and abilities to national economic growth. As an economic theory, human capital challenged the notion of physical capital as the paramount factor of economic success, instead arguing for a human value component related to organisational financial performance (Becker 1975, Schultz 1961, Mincer 1974). As the theory gained traction and adoption in economics and management, it then assumed new form within HR management (HRM), where concepts of learning capacity and investment in learning development became prominent, and recognised the analogy with product and service development in produce service chains (Lucas 1990). Over time multiple perspectives have come to view human capital

as an important concept for understanding the value and contribution of the workforce, ranging from those considering the individual perspective to the economic view of productivity and performance.

Given the number of perspectives on the construct, there are multiple interpretations and definitions that bear consideration, and that the OECD categorises as arising from three useful perspectives, which may be summarised as: individual qualities, education and accumulation, and productivity and production orientation.

As Table 1 illustrates, there are nuances between key definitions of the human capital construct; but common in many is the importance of knowledge and skills, and as such human capital within practice

Table 1: Definitions of human capital and perspectives (adapted from OECD 2009)

Perspective	Definition	Author
Individual qualities	Knowledge and skills embedded in an individual	Beach 2009, Schultz 1961
	Knowledge, competency, attitude and behaviour embedded in an individual	Rastogi 2002
	Knowledge, skills, education and abilities	Garavan et al 2001, Youndt 2004
Education and accumulation	Knowledge and skills developed through compulsory and vocational education	De la Fuente and Ciccone 2002, as cited in Alan et al 2008
Productivity/production orientation	Fundamental source of economic productivity	Romer 1990
	An investment that people make in themselves to increase their productivity	Rosen 1999
	An amalgam of factors such as education, experience, training, intelligence, energy, work habits, trustworthiness and initiative that affect the value of a worker's marginal product	Frank and Bernanke 2007
	The stock of skills and knowledge embodied in the ability to perform labour so as to produce economic value	Sheffrin 2003
	The knowledge, skills, competencies and attributes in individuals that facilitate the creation of personal, social and economic well-being	Rodriguez and Loomis 2007

has come to be recognised as the knowledge, skills and experience of the workforce. Therefore, human capital is recognised as a synonym for embedded knowledge in individuals (OECD 2009).

The view that employees may in fact benefit from investment in skills through training more than their incumbent organisation was one such important view which challenged the purpose and outcomes of workforce training (Becker 1964). The implications of this are understood when considering employee turnover of trained workers, and the productivity reductions that arise from employees marketing their skills elsewhere.

The importance of human capital to learning and development is apparent when considering the choices HR and L&D professionals make when investing in skills and capabilities. An important concept is that of generic/general skills, and bespoke technical skills – general/generic skills are less lucrative for

the firm, and thus receive reduced investment in competitive markets. Instead, employees must invest in specialised skills which improve productivity, and provide greater opportunity to enable them to access higher wages, and improved organisational and working conditions (Acemoglu and Pischke 1999).

It is clear then that the initial interest in human capital from a skills development perspective has theoretical weight, but as we will see, human capital is now recognised as a crucial concept in understanding aspects of performance, productivity and engagement – and sits at the heart of numerous perspectives on strategy and management.

Mapping human capital as part of HRM theory

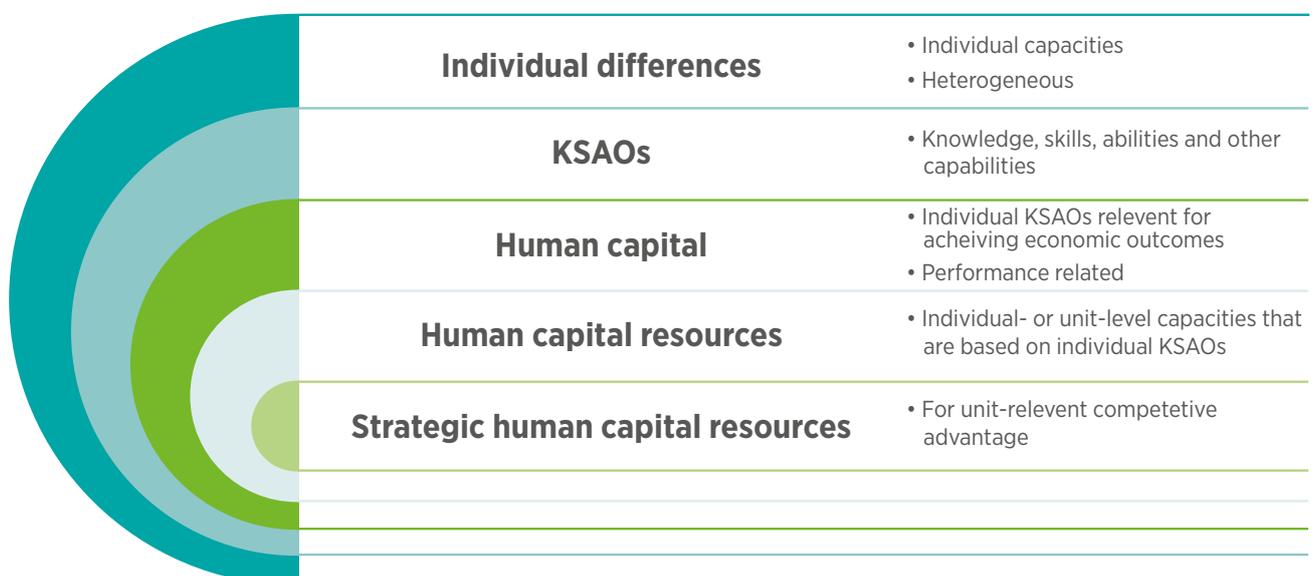
Human capital can be considered to be multi-level in nature, existing at the individual level in the form of knowledge, skills, abilities and other capabilities (KSAOs), and at the collective and organisational level as capacities formed from

the combination of these KSAOs (Ployhart et al 2014). This is illustrated in Figure 1, which maps the multiple levels of human capital.

At the individual level, human capital has been conceptualised as the knowledge, skills, abilities and other capabilities (KSAOs) of individuals, and as such scholarship has described important antecedents in the form of motivation and well-being, as well as aspects of education and qualification which have been shown to directly interact with the value of individual human capital. As a construct, these KSAOs are considered to be fairly stable in design and consist of differences between individuals, which, given that they're psychological, in origin are heterogeneous across people. Human capital is the valuable aspect of these KSAOs which assists the organisation in achieving economic outcomes.

Beyond performance, with a particular view to adaptability and flexibility to change, human capital has been noted to be an important

Figure 1: Human capital at multiple levels (adapted from Ployhart et al 2014)



‘Value is resultant from the contribution and combination of the six organisation capitals.’

aspect of organisational strategy and operations. This is particularly true for operating in circumstances (Schultz 1961, Nelson and Phelps 1966). This is useful to consider in organisations which are adapting radically to technological change, or are adapting to operate in economically and politically complex and changeable circumstances.

Human capital’s relationship to other capitals

A number of initiatives exist to promote better understanding of the organisational capitals and their relationships with one another. The Integrated Reporting (or <IR>) approach demonstrates the relationships of the capitals within organisation business models. Value is resultant from the contribution and combination of the six organisation capitals: financial, manufactured, intellectual, human, social and relationship, and natural (International Integrated Reporting Council 2013). Central to the successful generation of value are those which are human-related, namely human, social and relationship, and intellectual capital (Houghton and Spence 2016).

Social and relationship capital: uncovering the intrinsic value of relationships

As we have seen at the individual level, the human capital construct has over time become a stable construct now commonly used to describe individual knowledge, skills and capabilities which employees contribute through the relationship with the work they do. There are, however, tensions in the term that relate to the value that arises through relationships within the firm – tensions which sit at the very heart of the modern organisation.

Management literature considers the importance of relationships in developing and evolving human capital as important aspects of

social capital. Arising from studies of intangible assets and in particular intellectual capital (Edvinsson and Malone 1997, Nahapiet and Ghoshal 1998, Grigoriou and Rothaermel 2014); the concept of social capital is, according to Bourdieu (1986), *‘the relational networks in actual and potential capital based on individual or social units’*. This has further been expanded by the OECD and is considered to be the networks together with shared norms (which are unquestioned social rules), values and understandings (which have value often only apparent when they’re broken) that facilitate co-operation within or among groups (OECD 2007).

Academic literature highlights that the value of social capital arises from the connection of individuals to develop new knowledge, often from existing expressed/codified knowledge, or even unexpressed tacit understanding (Pennings et al 1998, Liu 2014). When considered at the organisational level, social capital connects clearly to the ability of the organisation’s members to engage in collective action (Nahapiet and Ghoshal 1998); this is an important aspect of social capital in that it operates across different levels. Social capital is more easily measured at the organisation or collective level, where relationships and networks may be more easily appreciated. Measurement itself poses useful insights; for example, some scholars recognise social capital as a proxy indicator for human capital, and consider social network analysis in particular as a useful tool to measure and report on knowledge within the organisation network (Hollenbeck and Jamieson 2015). This is useful, as we will see later on that at an individual psychological-level measurement of human capital poses a number of methodological challenges.

Why is social capital useful for the people profession?

Social capital has for some time been considered to be an emerging concept, but has in the recent past gained traction with the emergence of empirical insights into its nature and value. Given the highly social nature of work, and what we know of the complexity of knowledge-based workplaces, social capital must receive greater investigation, particularly given that by combining social capital with human capital, the firm is able to generate more knowledge. This, as a result, often leads to increasing the value of the firm.

At a theoretical level, human and social capital can seem in places contradictory, particularly regarding the individual nature of value enhancement through training and development of general human capital skills. Those skills which are transferable are believed to lead to greater employee turnover, as training enhances value of

individual human capital to the wider labour market (Becker 1964). However, social exchange theory suggests that employees who experience general human capital investment may view development of general skills as an investment in their skills and as such will remain with the firm (Koster et al 2011). Literature views this as being dependent in large part on the adopted organisation strategy, and the objectives of human capital investment by the firm.

Mapping the layers of firm value: locating complementary and antagonising people constructs

It's helpful to remain aware of the complementary constructs of intellectual capital and structural capital when considering the value of human and social capital. These important concepts are considered to varying degrees to complement or overlap with human capital and social capital, and, as we illustrate

below, there is no clear consensus on the framework for understanding value in organisations.

There are obvious tensions when considering the overlap between the definitions highlighted in Table 2, particularly with respect to knowledge as a part of intellectual capital, and knowledge as referenced in innovation capital. There is no unifying concept that ties descriptions of value together. A good example of the difference between constructs is apparent when considering links to organisational outcomes and innovation. Human and social capital have been shown empirically to influence 'game-changing' innovation, while organisational capital alone has been shown to impact incremental innovation design (Subramaniam and Youndt 2005). The differences in influencing power mean that there may be situations where the capitals do not flex and contribute, but instead limit or even damage value-adding potential.

Table 2: Definitions of intellectual and structural capital

Perspective	Definition	Author(s)
Intellectual capital	<i>'the possession of knowledge, applied experience, organisational technology, customer relationships and professional skills that provides organisations with a competitive edge in the market'</i>	Edvinsson and Malone 1997
	<i>'intellectual material that has been formalised, captured and leveraged to produce higher value assets'</i>	Klein and Prusak 1994
	<i>'claims to future benefits, which have neither a physical nor financial form'</i>	Lev 2001
	<i>'the holistic or meta-level capability of an enterprise used to coordinate, orchestrate and deploy its knowledge resource'</i>	Rastogi 2003
Structural capital	<i>'the supportive infrastructure, processes, and databases of the organisation that enable human and social capital to function'</i>	Ordonez de Pablos et al 2013
	Organisational capital: the organisation's philosophy and systems for leveraging organisation capabilities	Armstrong et al 2010
	Process capital: the techniques, procedures, programs that implement and enhance the delivery of goods and services	Edvinsson and Malone 1997
	Innovation capital: the intellectual property and certain other intangible assets; and can include protected commercial rights such as patents, copyrights and trademarks	Chen and Lin 2004

Important points for practice

- A broad definition of **human capital** is that it is the knowledge, skills and abilities of the workforce. There are a number of perspectives of human capital, from the **economic, finance and human resource management** disciplines.
- Human capital can be considered to exist and be measured at both the **individual level** (for example formal qualifications) and at the **collective level** (for example measures of performance using technical skills).
- **Social capital** considers the **value of relationships** in networks (for example within and between teams of individuals, value of collective action) and is important to consider in highly networked and social work environments. It includes the **shared norms** and **values** that facilitate team or group co-operation.

Individual-level human capital management theory

At the individual level, human capital may be considered to be a psychological construct. As we have seen, skills development through education is a primary measure of human capital potential on an economic level, but at the individual level there are concepts which are important to consider if we are to understand the individual aspect of human capital within organisations.

Human capital growth: training and skills development

Improvements in human capital are believed to come from many sources within the firm; however, the most direct and perhaps more easily measured are changes that occur through training and development. Skills development may be either an investment by an individual in their skills and education, or an investment by an organisation in an individual – both generate value, but often the purposes and key stakeholder of that value can be very different. For example, organisations tend

to invest in human capital through training in areas that are directly related to future value-creation potential (for example, training new employees to be able to use a firm-wide IT system), while individuals may invest in capabilities that enable progression in current and future roles, which may not be directly relevant to their current circumstances, and may even be outside of the organisation. As Becker illustrated in his work exploring skill development, organisations are more likely to share the cost if the training provides firm-specific knowledge, skills and abilities – and acts to retain the individual in the organisation (Becker 1964).

Becker's theory of human capital development only considers cognitive skills development (for example problem-solving, analytical or language skills), and excludes non-cognitive skills, such as those related to beliefs or experiences (Becker 1964). This has proved to be an area of criticism on Becker's original work, as contemporary scholars consider work experience as important, particularly during the

recruitment and selection process (Oliviera and Da Costa 2014). A second, perhaps crucial, aspect is the difference between specific and general skills, which Acemoglu and Pischke in their 1999 work argue is not clear and requires further clarity, which was provided by Estevez-Abe et al in their 2001 paper. Ideas connecting beliefs to outcomes of success for the organisation, including those related to concepts of hope and resilience, are yet to find their way into the discourse of human capital, which continues to be dominated by cognitive skills.

Human capital micro-foundations: the building blocks of knowledge, skills and abilities

Micro-foundations of human capital are unique fragments of human capital, which, when considered as the whole, are able to point to value-creating capabilities and processes at all unit levels, but are specifically useful to describing individual-level human capital. To consider these ideas in greater detail, we must look to the particular aspects of human capital management which interact with human capital at the individual level (see Table 3).

The employee perspective: understanding appropriation hazard

Employees who are aware of their human capital and the value of their expertise and knowledge to the firm may become aware of the value and risks associated with their unique knowledge. According to the concepts explored above, firm-specific skills when used with explicit and tacit knowledge are valuable to organisations, and have an impact on organisational performance. Because of this, employees with such characteristics are difficult and costly to replace. As such, these employees demand a higher

Table 3: individual concepts and key theories

Theory	Key concepts	Reference
Intellectual capital	Training and development has a positive relationship with individual and organisational performance.	Individual performance: Schmidt 2007, Jones et al 2012, Bapna et al 2013 Organisation performance: Hatch and Dyer 2004, Vidal-Salazar et al 2012, Georgiadis and Pitelis 2016
	General skills training improves likelihood for employee turnover as opposed to firm-specific training.	Becker 1964, Benson et al 2004
	Firm-specific training has less impact on employee performance than general skills training.	Bapna et al 2013
	Employee training generates KSAOs of individual employee knowledge and commitment, ^a absorptive capacity ^b and problem-solving skills. ^c	a Vidal-Salazar et al 2012 b Cohen and Levinthal 1990 c Hatch and Dyer 2004
Opportunities for learning	Workplace learning is experiential; a large part of learning comes from non-specific unplanned learning opportunities.	Eraut et al 1998
	Self-directed learning suits autonomous and ambiguous roles and has been shown to lead to improved employee and firm performance.	Powell 1995, Boyer et al 2014
	Mentoring improves KSAO development for protégé and organisation, particularly with regards to role-modelling for minorities and marginalised communities.	Gedro 2006, Klinge 2015
	Mentoring acts as promoter of continuous on-the-job learning and operates effectively as a complement to formal training.	Armstrong 2014
	Online learning is less effective than traditional learning programmes for building soft skills such as team-building capability.	Armstrong 2014
Career management	Career objectives should be aligned to individual goals to reduce potential for employee turnover and to improve employee engagement.	Byrne 2015
	Matching newly developed skills (for example from training investment) to new jobs is important to reduce voluntary turnover in employees who have experienced investment in KSAOs.	Benson et al 2004
Non-cognitive skills	Non-cognitive skills, such as character, personality traits, goals, motivations and preferences, are becoming more valuable aspects of individual human capital.	Kautz et al 2014
	Psychological capital in the form of hope, resilience, optimism and efficacy have been linked to job satisfaction and overall organisation competitive advantage. ^a Positive psychological capital has been related to employee well-being. ^b	a Badran and Youssef-Morgan 2015 b Avey et al 2010b
Employee engagement	Perceived organisational support predicts job and organisation engagement for individuals. Job characteristics predict job engagement and procedural justice predicts organisational engagement.	Saks 2006
	Organisational citizenship behaviours improve organisational-level outcomes, including productivity, customer satisfaction and cost reduction.	Podsakoff et al 2009
Creativity and innovation	Creativity has been positively linked to engagement: engaged employees are more likely to generate new ideas for the workplace.	Eldor and Harpaz 2016
	Employee attitudes have been linked to promoting and hampering innovation at the enterprise level.	Antons and Pillar 2015
Talent management	Human capital strategies tend to favour internal recruitment over external recruitment because of the extent of investment undertaken on the known individual resource.	Thomas et al 2013
	Screening for human capital requirements (educational and organisational) improves learning and development outcomes.	Hatch and Dyer 2004
	Silo thinking across organisations is pervasive and continues to hamper the abilities of line managers to consider impact and processes across the firm, instead focusing on their own domain.	Stahl et al 2012

wage premium, and associate their mobility with a financial penalty (Mahoney and Kor 2015, Ployhart 2015). Given this context, there are tensions that exist between individuals and their organisation, specifically:

- **Limitations to movement:** individuals may have less desire to develop their firm-specific skills as they perceive these to be of less value to future opportunities, and as such limits their mobility.
- **Mistrust of intentions and future risks:** an organisation may offer firm-specific training that could generate value for the organisation, in return for payment from the returns that are generated by the investment – however, once the employee has generated the firm-specific knowledge through development, the firm may not deliver the payment promised at the outset. In this case the firm captures the full value of the investment, and the employee does not gain that which they were promised. For this reason, safeguards or protections are important.

To protect against these issues, where employees do not benefit from the personal investment they make into developing skills, Mahoney and Kor (2015) argue for safeguards in the form of governance and recognition of individual intellectual property rights of value generated through training on the part of the individual. Governance mechanisms and rewards have been shown to mitigate such risks developing (Wang et al 2012).

What are the criticisms of human capital theory?

One major concept in opposition to human capital theory is that of signalling theory. Signalling

theory describes the abilities of individuals as unobservable and intangible, giving rise to an inherent information asymmetry between employees and organisations. Education in the form of qualifications and codified skills exist to communicate across this information gap to demonstrate the potential value of employees to their employers in the form of a signal to the organisation (Spence 1973). As part of this theory, the link between education and productivity is disputed, as signals are instead used to convey unobservable characteristics of KSAOs (Weiss 1995). This alternative has found some traction and has in part been explored through empirical evidence within the education system (Hämäläinen and Uusitalo 2008).

The people-related capitals are theoretically still very much in development, in part because of the changing nature of organisations and work, and also as a result of the greater potential for scholars and organisations to undertake insightful empirical work. Appreciating human

capital, and its relationship to the other aspects of organisation value, however, is fundamental to the future of the people profession, which, at its heart, is concerned with building the capabilities of individuals and workplaces to maximise the value that organisations, people and society generate from work. The human nature of the construct means that, to make informed management decisions, a clearly articulated and operating measurement framework is crucial – otherwise the opportunity to leverage the somewhat fleet-footed concept of people value may be lost.

At the firm level, human capital has been viewed from the perspective of a strategic concept connected directly to developing and realising the competitive advantage of the firm. Within knowledge-based organisations, it is argued that human capital is a fundamental driver of competitive advantage, which, when activated, is able to deliver value to the organisation's key stakeholder groups.

Important points for practice

- Both **cognitive** and **non-cognitive** skills should be considered as valuable and potentially valuable to organisations, and should be considered throughout all stages of the employee lifecycle.
- **Newly trained skills** should be recognised in the roles of individuals who have received training investment, as this has been shown to **reduce turnover intentions**.
- Training and development should look to invest in both **firm-specific** and **generic** human capital skills, as both are important at driving individual and organisational performance. **Generic** human capital has been shown to benefit performance in certain circumstances/contexts.
- Appropriation of hazard illustrates that HR and people professionals should make clear to employees the purpose and value of the training and development they will receive. Employees should be **engaged in selecting training programmes** to provide autonomy on their own human capital development, and ensure trust and engagement with their work.

Firm-level human capital management theory

As we have seen, human capital is multi-level in nature (Ployhart et al 2014). Research has predominantly focused on exploring the outcomes and impacts that arise from human capital management at the organisation level, specifically looking to describe aspects of performance in relation to changes in human capital.

There are four perspectives of human capital which describe its relationship to ideas of organisation impact and performance: the resource-based view (RBV), the knowledge-based view (KBV), the capability view (CV) and dynamic capabilities (DC)

The resource-based view (RBV)

The resource-based view links the resources of organisations to the organisational-level sustainable competitive advantage (Penrose 1959), whereby a competitive advantage is a condition in which a company is in a favourable business position. Later work explored different components of competitive advantage and found that it is influenced by combinations

of different resources, capabilities and competencies which interact and generate advantage (Barney 1991). This view describes a number of qualities which increase the value of these components to organisations:

- 1 The component must be **valuable** to enable exploitation of opportunities or reduce threats of risks to firm value.
- 2 The component must be **rare**, which means it is not easily accessible by current or future competition.
- 3 The component must be **imperfectly imitable**, which means it is non-substitutable, complex (for example knowledge-based), has an indirect or intangible link to competitive advantage, and is obtainable to the organisation because of unique historical conditions.

Resources which meet these conditions are also by their nature unique, and because of their qualities are less likely to be mobile. It is for this reason that the ideas articulated in the RBV can be considered to build on the ideas expressed in Becker's work regarding firm-specific skills, that

is, skills which are tied to locations, often socially based, and are causally ambiguous (Barney 1991, Ployhart et al 2014, Wright et al 2014).

A number of useful ideas have been explored in academic thinking that may inform the development of improved practice. The major concepts to consider are illustrated in Table 4.

The knowledge-based view (KBV)

Emerging from criticism of the RBV, the knowledge-based view (KBV) of human capital locates knowledge as the central resource of organisations which is used to generate value; it states that the RBV considers knowledge as generic, whereas in the KBV knowledge is of significant value (Alavi and Leidner 2001). Within the KBV, sustainable competitive advantage arises from the ways in which the organisation leverages knowledge in both explicit (that which can be codified, articulated, accessed and communicated easily) and tacit (that which is hard to codify, difficult to communicate and share/verbalise) forms. Building knowledge routines that embed tacit knowledge in explicit processes

Table 4: RBV concept summary

RBV concept	Key concepts
Human capital resources and competitive advantage	Talent pipelines from a single source result in homogenous human skills, restricting competitive advantage (Brymer et al 2014). Managing multiple strategic human resources (for example talent management, geographic diversification) requires trade-offs and affects profitability (Kor and Leblebici 2005).
Human capital losses	Employee turnover rates reduce organisational performance metrics; but the severity of decrease reduces when investments in HC development (for example training, pay and benefits) are high - illustrating the importance of building firm-specific human capital (Shaw et al 2013). Little or no investment in HRM creates conditions which are not affected significantly by employee turnover, as firm-specific human capital is not being developed. Performance rates are unlikely to change in low HRM investment conditions (Shaw et al 2005). The greater the degree of firm-specific human capital and complex human capital resources, the greater chance for firm survival. The greater the losses of firm-specific human capital (for example employee turnover), the greater the chance of firm failure (Pennings et al 1998).

‘The knowledge-based view considers a broad set of capitals, and is therefore more relevant for understanding knowledge-based systems.’

is one way by which organisation resources can be focused on the pursuit of competitive advantage (Grant 1996a). For example, it is inefficient for an owner-manager to describe their vision and goals of their business to all individual employees; instead, such concepts can be described by the leadership and embedded into training programmes, employee voice systems and selection processes, for example. This requires consideration, however, as it is costly in resource terms to codify and express tacit knowledge (Podgorski 2010).

The KBV argues that the RBV does not go far enough to define the complex components that constitute value from knowledge (Kogut and Zander 1992, Grant 1996b, Spender 1996). As the component capitals of firm value are a mix of tangible and intangible, the KBV states that a more nuanced perspective is required that recognises the physical and human capital resources. Within the RBV these are viewed as the same (Grant 2002, Edvinsson and Malone 1997), but the KBV argues that the RBV is internally focused, and doesn't take account of the acquisition of knowledge through external stakeholders; additionally, the RBV is not dynamic enough to represent changing aspects of knowledge (Gavious and Rabinowitz 2003). The KBV attempts to address this by considering a broader set of capitals and, as such, appears more relevant for understanding knowledge-based systems.

The capability view (CV)

The capability view details the relationship between the strategic resources of an organisation (physical, human and organisational) and explores how they can be used to generate firm-specific competencies. For example, an organisation may have

invested heavily in a technological infrastructure to facilitate knowledge-based working, but if it does not invest in employee on-the-job training to use the technology, the firm-specific competencies needed to perform will not be developed. This is an example of co-specialisation – the use of human resources with other organisational assets (in this case information technology) to generate value (Mahoney and Kor 2015).

To generate capabilities, firm-specific human capital should have three important characteristics (Mahoney and Kor 2015):

- 1 Experiential knowledge:** knowledge of the different unique resources, co-specialised capabilities and routines and how they have operated historically: for example, an HR director who knows how people managers interact with information technology and management systems.
- 2 Collective shared knowledge:** knowledge of employee strengths and weaknesses, and the characteristics of the specific organisational culture.
- 3 Stakeholder knowledge:** explicit and tacit knowledge of the stakeholders of the firm.

Building these capabilities will foster the conditions that enable performance of human capital to be achieved, particularly important in organisations which have access to and must leverage a complex array of different asset types. Co-specialisation in particular is an important concept for understanding how strategic capabilities are developed and utilised in organisations, particularly as organisations pursue their corporate outcomes and goals (Porter 1985).

Dynamic capability theory (DC)

As organisations operate in often complex and changing contexts, a number of academics have suggested that a theory of developing capacity for altering and using resources on an ongoing basis should be developed (Schreyögg and Sydow 2010). The idea of dynamic capabilities was suggested to explore how adaptation/flexibility and competitive advantage related, and is suggested as a build on the RBV to a perspective on organisations that is more relevant to modern organisations.

DCs are argued to be unique and different from traditional capabilities that result from current operations and describe the ability of the organisation to create, extend or modify its current resource base (Helfat et al 2007). This describes the ability of the organisation to reconfigure the resources it currently has in such a way that it is able to respond to external pressures, particularly those which may create the need for significant alterations to generate value from resources (Teece et al 1997). Resource restructuring and reallocation may be classified as a strategic response in which flexibility and adaptability are paramount, and which requires

change as the risk of potential economic or socio-political shocks becomes more apparent (Kim and Ployhart 2014). A recent example of dynamic capabilities may be the response of the UK's financial services sector to the results of the EU referendum, where roles that serve EU interests may need to be positioned elsewhere.

Linking human capital to organisation performance: high-performance work practices

Connecting human capital to performance has been an extensively researched area of HRM and human capital management for some time. High-performance work practices (HPWPs) in particular are fairly established as a way by which organisational performance is driven in part by the KSAOs of the workforce. Within the strategic HRM literature, HPWPs are considered to consist of various interwoven complex practices within the HR discipline that, when used in combination, have been linked to performance (Huselid 1995, Delery 1998, MacDuffie 1995). In particular, they consist of practices such as learning and development (Huselid 1995), incentive compensation, training and development, selectivity and flexible working arrangements (Huselid 1995, Pfeffer 1998). In utilising these practices,

‘High-performance work practices connect human capital to performance.’

Table 5: Key summaries of dynamic capability concepts

Concept	Key points	Relevance to HR
Multi-level development	DC can develop at the individual, organisational and network level (Hess and Rothaermel 2007) with the majority of developments enabling adaption and flexibility (McCracken et al 2017).	Includes HR practice elements such as job rotation and management experience (Kor and Mahoney 2015) and transformational leadership (Pandza and Thorpe 2009) and corporate leadership (McCracken et al 2017).
Flexibility versus efficiency	Choice between flexibility and efficiency often required compromise in the short term. For example, job redeployment may be value-destroying if operationalised too frequently, as individuals are discouraged from building their own firm-specific human capital (Wang et al 2016).	HR needs to weigh up the pros and cons of over-investing in restructure and redevelopment in quick succession. Immediate efficiency and performance downturn may be likely (Protogerou et al 2012).

strategic HRM literature considers that the KSAOs of individuals increase, and they're empowered to utilise their human capital for the benefit of the organisation. These practices also increase the motivation of individuals, in effect ensuring that they continue to share their KSAOs with the organisation with which they work. Literature considers the effects of such practices at the individual level, stating that employees experience improved job satisfaction, lower employee turnover, and higher productivity. And at the organisation level, HPWPs which operate across social structures of the firm have been shown to improve flexibility and drive efficiency throughout the organisation's system (Evans and Davis 2005). The relationship with performance, however, has been shown to not always be positive; multiple practices have also been shown to be value-negative. An example given on this point in particular is training that develops a skill that, because of the recruitment and selection process, employees already have. In this case the cost of training to build the skill is wasted (Becker and Huselid 1998). The combination of practices may also result in negative performance – this is often cited in literature exploring management of teams, and the adverse effects of individual compensation on team performance (Delery 1998).

Overall, the concept of HPWPs is linked directly to human capital because of the link to organisation performance and the way in which individual aspects of human capital are expressed in organisation performance outcomes.

Performance is believed to be enhanced through the utilisation of HPWPs in two ways: first, they develop the KSAOs of individuals by motivating and offering opportunity to develop (Delery and Shaw 2001); and second, they improve internal structures by fostering co-operation and engaging the value of the social network of the firm (Evans and Davis 2005). It is this second aspect of linking human capital to performance which illustrates the importance of social capital.

Important points for practice

- **The resource-based view** considers human capital to have value and to contribute to competitive advantage when it is **valuable, rare** and **imperfectly imitable**. Enhancing these characteristics through HR practice has been shown to positively influence competitive advantage outcomes.
- **The knowledge-based view** builds on the **resource-based view** and considers knowledge to be the most strategically important firm resource, as it is **socially complex** and **hard to imitate**.
- The **capability view** and **dynamic capabilities** consider how the combinations of different firm resources and capabilities may result in increased organisation performance. **Dynamic capabilities** is a useful view for understanding the importance of **firm flexibility and adaptability** for weathering significant contextual shifts, for example economic pressures or social change.
- Human capital resources are linked to firm **competitive advantage** and influence the chance of advantage being achieved. Articulating competitive advantage through the resources that people contribute to work is an important way by which practitioners can illustrate the importance of good-quality HRM.
- Investments in **firm-specific human capital** through training regarding culture, values, behaviours and skills specific for roles within the organisation's systems are crucial because these **firm-specific capabilities** are predictors of performance and organisation sustainability.
- Training **firm-specific human capital** qualities can increase employee retention, but in some circumstances may not result in an increase in performance.

2 Measuring and reporting on people and HR: the HR analytics discipline

In this section we consider how human capital is measured and reported within organisations. We first begin by considering the practice of HR analytics, its definitions and current practice as understood in CIPD research. We then explore the discipline of evidence-based management and its perspective on data as a source of information and insights, by considering the barriers to better practice. We conclude by describing human analytics and reporting.

Defining HR analytics

In their most recent work, Marler and Boudreau (2017) describe the evolution of the terminology of HR analytics and describe how over time the language of HR analytics has gained traction in academic

publications. Emerging from academic literature in 2003–04, the terminology was more readily adopted towards 2010, when there was a considerable growth in academic publications that reference the term. Over this time the term has taken on a number of shapes, which are summarised in Table 6.

As Marler and Boudreau (2017) demonstrate, there are a number of commonalities between those papers which do define HR analytics: many gave no definition, or an assumed definition is stated. For those which were included in the study and did provide a description, we can make the following observations:

- Company-level analysis appears to dominate the definitions, with

the overall majority of papers describing analytics as a means to understanding aspects of performance, mainly at group level. Few considered the individual level of analytics at the point of definition.

- Reference to HR analytics being a process to illustrate evidence is light; only one definition includes reference to providing evidence.
- Definitions consider measurement of the workforce, and the types of tools and technologies that may be involved in HR analytics are included; HR analytics is a technology-driven component.
- Some papers consider HR analytics as a suite of practices and/or processes which combine to be considered as analytics; analytics is therefore not a single activity but the combination of

Table 6: Common definitions of HR analytics from literature (adapted from Marler and Boudreau 2017)

Definition	Key theory and level of analysis	Source and typology of author
Process using statistical techniques linking HR practices to organisational performance	Strategic HRM perspective; based on resource based view (RBV) Company-level analysis	Lawler et al 2004 – academic
A number of analytics processes for analysing HR data	No theoretical description Company-level analysis	Harris et al 2011 – consultant/practice
An evidence-based approach for making better decisions on the people side of business and consists of an array of tools and technologies, ranging from simple reporting of HR metrics all the way up to predictive modelling	Strategic HRM perspective; adopted to predict individual and organisation performance Individual, group and company-level analysis	Bassi 2011 – consultant/practice
Demonstrates the direct impact of people data on important business outcomes	No theoretical description; implies HR scorecard approach Individual and group levels within a company	Mondare et al 2011 – consultant/practice
A way to measure and monitor individual performance	Agency theory Company-level analysis	Aral et al 2012 – academic
A group of 18 practices which are used by organisations to measure the workforce	No theoretical description Company-level analysis	Falletta 2014 – academic and consultant/practice

a number which require specific consideration, management and investment.

From assessing the definitions of HR analytics, the authors of the literature review then provide their own understanding of HR analytics, considering the above perspective and synthesising ideas into one view or perspective, which is located within the school of HRM innovation (Marler and Boudreau 2017).

‘A HR practice enabled by information technology that uses descriptive, visual and statistical analyses of data related to HR processes, human capital, organizational performance, and external economic benchmarks to establish business impact and enable data-driven decision-making’

(Marler and Boudreau 2017).

This definition, which brings together the broad perspectives on HR analytics, is designed to ensure it considers the process and technology aspects of analytics, as well as the view that analytics is for the purposes of understanding organisational performance. The combination of external benchmarking data to illustrate progress against competitors and

peers also speaks to what we know about evidence-based management and the four sources of evidence (Barends et al 2014).

This definition also illustrates that the HR analytics domain is dominated by the perspective that organisation performance is the priority. This is even true of engagement metrics which are often positioned as a technology designed to uncover the employee connection to work. The overriding perspective of management scholarship is that HR analytics has value as it enables organisations to understand how to generate improved performance through its human capital. Appreciating the people perspective on organisations and the more ethical implications of work on people and organisation stakeholders – such as the degree to which individuals connect with and gain value from their work – appears to be missing from scholarship’s perspective on human capital. Indeed, these definitions of human capital do not reference individual employee-level value as an outcome of analytics. This is a potential gap that warrants further investigation.

HR analytics and data as evidence: the view of evidence-based management and evidence-based practice
Seeing data as a form of evidence is a useful way of considering its value

to an individual, particularly during a decision-making process. Evidence-based management considers data and insights arising from HR analytics to be one form of information that can inform evidence-based practice, a concept that stems from the view that good decisions arise from the combination of critical thinking and the best available evidence.

The full definition of evidence-based practice is as follows:

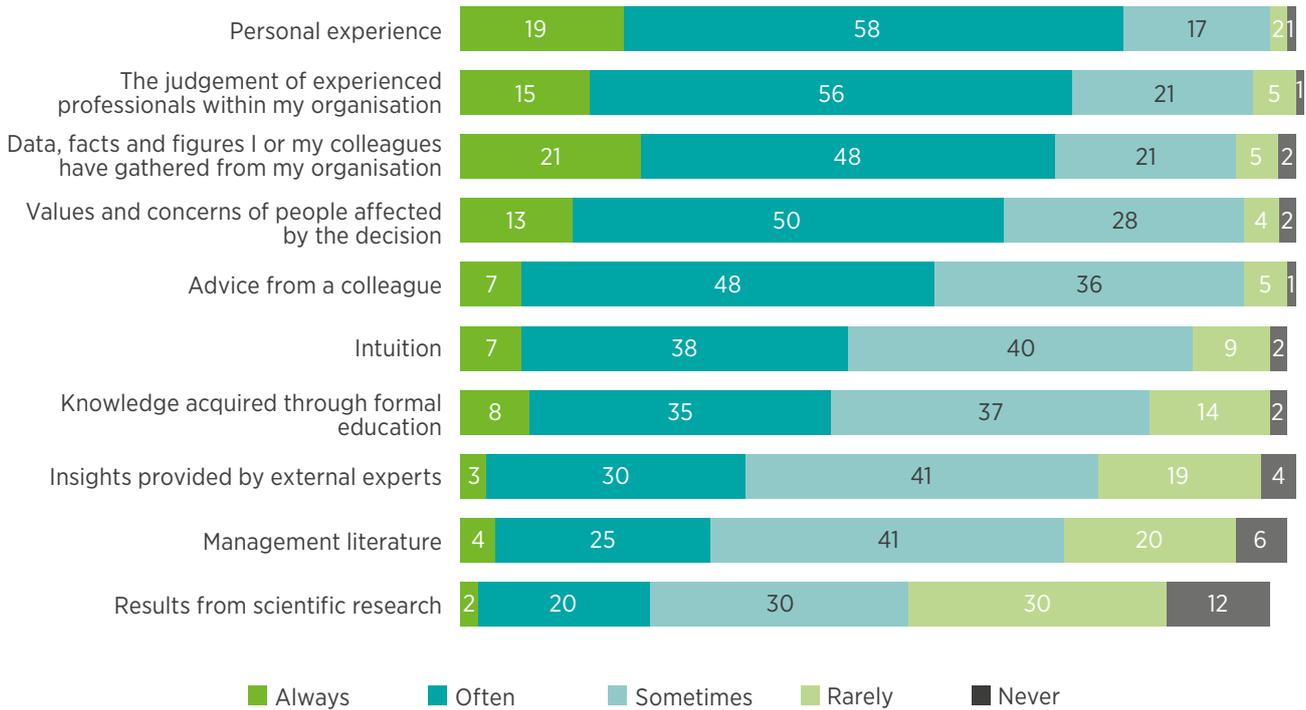
Barends et al (2014) say evidence-based practice is about making decisions through the conscientious, explicit and judicious use of the best available evidence from multiple sources by:

- 1 **asking** – translating a practical issue or problem into an answerable question
- 2 **acquiring** – systematically searching for and retrieving evidence
- 3 **appraising** – critically judging the trustworthiness and relevance of the evidence
- 4 **aggregating** – weighing and pulling together the evidence
- 5 **applying** – incorporating the evidence into a decision-making process
- 6 **assessing** – evaluating the outcome of the decision taken so as to increase the likelihood of a favourable outcome.

Figure 2: Four forms of evidence in evidence-based practice (adapted from Barends et al 2014)



Figure 3: How frequently do you use these types of evidence to inform business decisions? (%)



Base: 629 (Percentages don't equal 100 because some respondents selected 'don't know'.)

The concept of best available evidence highlights that different forms of information may be considered to be evidence. By considering evidence in its different forms, there is a clear link to HR analytics practice and the use of data in organisations, as illustrated in Figure 2.

As can be seen, the process of analytics is predominantly associated with the organisation's internal data, whereby analytics is used to process and understand information from the business. However, external data from stakeholders may also be considered a source of information and evidence with which people analytics processes are often linked.

In the CIPD *HR Outlook* winter 2016–17, we asked HR professionals the frequency with which they use different sources of evidence to make decisions. Figure 3 illustrates the responses from 629 employees.

It appears that HR professionals use a range of evidence to inform their decision-making, with most emphasis being placed on personal judgement, while HR analytics data and insights are also referenced as regular sources of information. The findings suggest that more can be done to improve the extent to which HR professionals draw on analytics insights when making decisions.

Connecting HR analytics and 'big data': what's the (big) difference?

Much of the recent discourse as to the power and potential of HR analytics has been dominated by another term: big data. While there is no accepted definition of the term, a number of scholars and practitioners have considered big data to consist of a broad set of interlinking technological and cultural concepts. A selection of big data definitions are illustrated in Table 7 on page 22

'...more can be done to improve the extent to which HR professionals draw on analytics insights when making decisions.'

Table 7: Big data definitions

Definition	Authors
Big data is the interplay of three themes of:	Boyd and Crawford 2012
1 technology: the rise in computational power to gather, analyse and compare large amounts of data	
2 analysis (processing) which draws on large data sets to locate patterns	
3 mythology: a belief that large data sets, when combined and processed, can enable a greater knowledge potential to be realised, and which may be able to be used to offer, among other things, truth, objectivity and accuracy.	
Big data refers to large data sets, the tools and procedures used to manipulate and analyse them, and the computational approach to research and thought.	Burkholder 1992, cited in Boyd and Crawford 2012
Data whose size forces us to look beyond the tried and true methods that are prevalent at that time.	Jacobs 2009

Academic and practice literature has highlighted a number of risks that may arise from big data and its use within organisations to explore workforce-related concepts, namely:

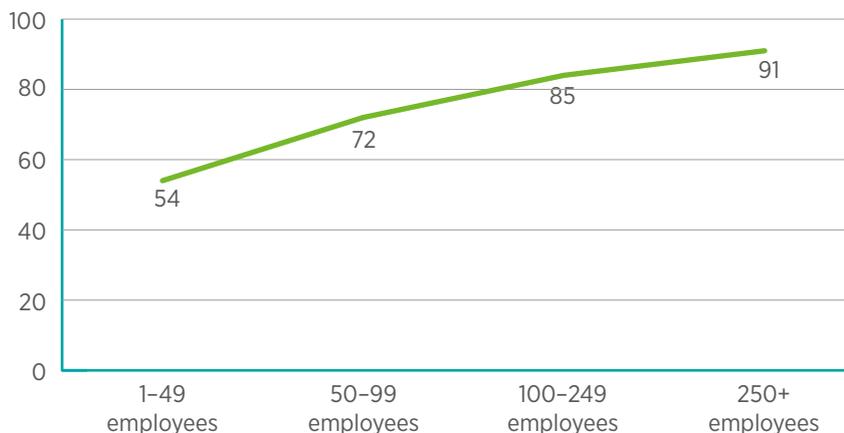
- Risk of apophenia: the tendency to see patterns within random sets of data (Boyd and Crawford 2012); closely linked to confirmation bias, which impacts on the quality of insights and decisions made.
- Risks associated with uncertain or unclear data sources: big data makes use of numerous data sets of varying quality, which themselves may have a number of errors that could influence the quality of insights (Boyd and Crawford 2012).
- Big data is not whole data: having significant amounts of information does not mean that the full information is supplied. This links to the quality of data, which will influence the outcomes achieved through analysis (Boyd and Crawford 2012).
- Assumption that big data is better: the value of ‘small data’ should also be recognised. This raises the debate as to the value of individual-level experiential qualitative data, in the form of case studies, that explores

perspectives and experiences of people, not an aggregate-level assessment (Boyd and Crawford 2012).

- There is little knowledge of the ethical implications associated with the growth of big data; questions such as the use of aggregate data of individuals, measurement of behaviours and the importance of recognising the context of data are all issues that have yet to receive particular attention in academic debate (Boyd and Crawford 2012).

A significant risk that has been highlighted within more recent academic literature is the growth in terminology that has been used to describe the analytics domain. As a result of this, the relationship between HR analytics and big data has remained unclear – with the grey literature considering analytics as a precursor to more evolved data science within the big data domain (McAfee et al 2012), and aspects of the academic community viewing the two as complementary and, in some cases, synonyms for the same data processes (Charlwood et al 2017). This appears to have only added to confusion felt by the HR profession as it tries to navigate the emerging concept of data-driven HR.

Figure 4: Percentage of organisations that use HR analytics to any extent, by size (%) (adapted from CIPD 2017b)



Use and impact of HR analytics

The extent to which the HR profession uses data appears to differ according to size of organisation. As demonstrated by the CIPD *HR Outlook* survey, HR analytics is adopted more frequently in larger organisations, while smaller businesses have less capability (see Figure 4).

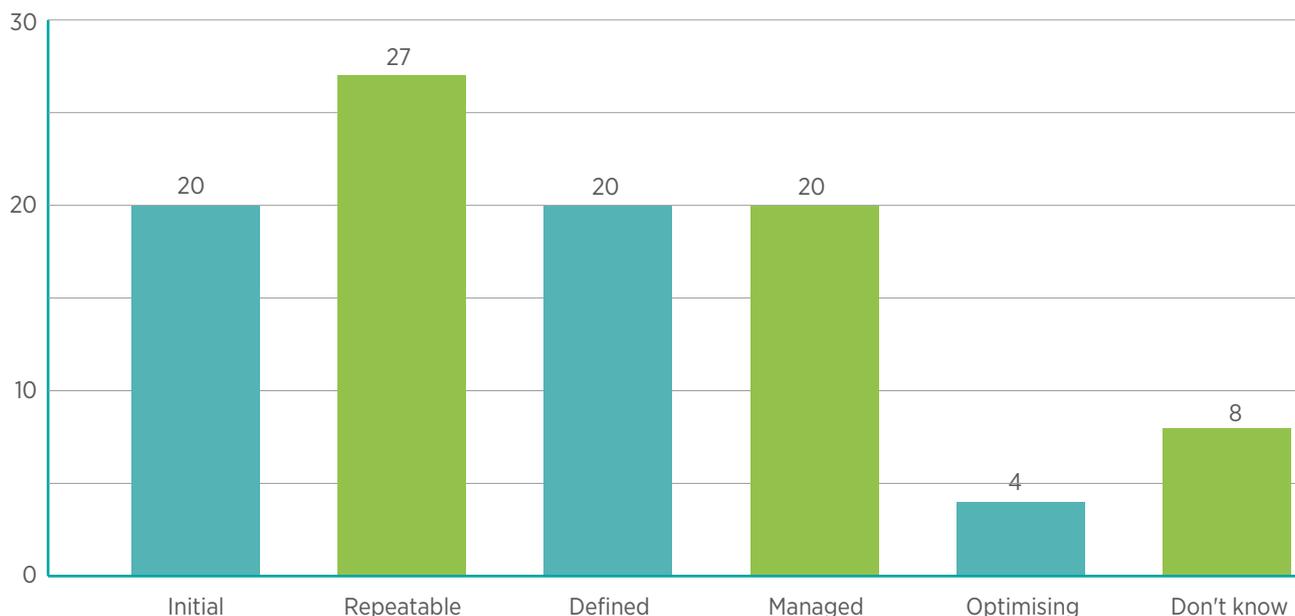
The same report (CIPD 2017b) considered the extent to which HR analytics is operating at differing degrees of maturity, whereby the stages of maturity are outlined as follows:

- **Initial:** HR teams answer one-off queries as and when they happen, or to ‘fix’ something with HR data, but no process is documented. The terms analytics or data probably aren’t used, and there are no specific data or analytics capabilities embedded in HR teams.
- **Repeatable:** HR teams have a process in place to run analytics, and document queries so they can be repeated. No specific analyst role exists; it is something that is done by members of the HR team.

- **Defined:** HR analytics is a role and/or activity in the HR team, and the process of developing and running analytics is well documented and standardised. There aren’t standardised metrics across the business, but HR is able to use its own data to answer queries and run analytics.
- **Managed:** HR analytics team has developed standard measures and metrics which have been agreed internally. A management and governance role is in place to ensure that analytics is business-focused and robust.
- **Optimising:** analytics is increasingly predictive, and is being used to inform both HR and business strategy, including the optimisation of business and people/HR processes. HR data is used to drive business performance.

As Figure 5 on page 24 illustrates, the level of analytical maturity in the profession remains skewed towards the emergent and developing phases of initial and repeatable analytics. Few responding professionals recognised the optimising statement as that which most reflected analytics in their organisation (4%).

Figure 5: Maturity of analytics in the HR function (% of those who use analytics) (adapted from CIPD 2017b)



The technical report *Human Capital Metrics and Analytics: Assessing the evidence of the value and impact of people data* (Charlwood et al 2017) provides an overview of published case studies in the academic body of knowledge.

Important points for practice

- **HR analytics** consists of a number of processes, enabled by technology, that use descriptive, visual and statistical methods to interpret people data and HR processes. These analytical processes are related to key ideas such as human capital, HR systems and processes, organisational performance, and also consider external benchmarking data (Marler and Boudreau 2017).
- Data and insights arising from **HR analytics** may be considered a source of evidence that is used in making more effective decisions. There are four recognised sources of evidence, of which the organisation's internal data is one. The others are **practitioner's personal experience, stakeholders' values and concerns**, and **scientific empirical studies**. HR professionals should look to use HR analytics alongside other forms of evidence.
- HR analytics maturity remains relatively low, with few organisations reporting that they are **optimising HR analytics** and producing **predictive insights** for their business.
- Just over 50% of small organisations (1–49 employees) report that they have a form of analytics process. Analytics is more prevalent in large organisations.

Defining human capital analytics: the value perspective

Human capital measurement and analytics differs from HR analytics in one important way. Human capital analytics is specifically designed to address questions relating to the nature and value of the knowledge, skills and abilities of the workforce. In this regard, human capital analytics attempts to measure both the quantity and quality of people and their business impact.

Academic perspectives on human capital measurement

Analysis of the literature has illustrated that there are five key perspectives that consider human capital measurement (Charlwood et al 2017) (see Table 8).

More contemporary theory of human capital measurement is concerned with linking individual employee performance indicators to those of overall team-level or

organisation-level performance and success. This approach considers the outcomes of HR activity to be the indicator of value, and as such utilises the interpretation of current and trend data through human capital analytics to assist in forecasting future changes across performance metrics (Coco et al 2011, Thomas et al 2013).

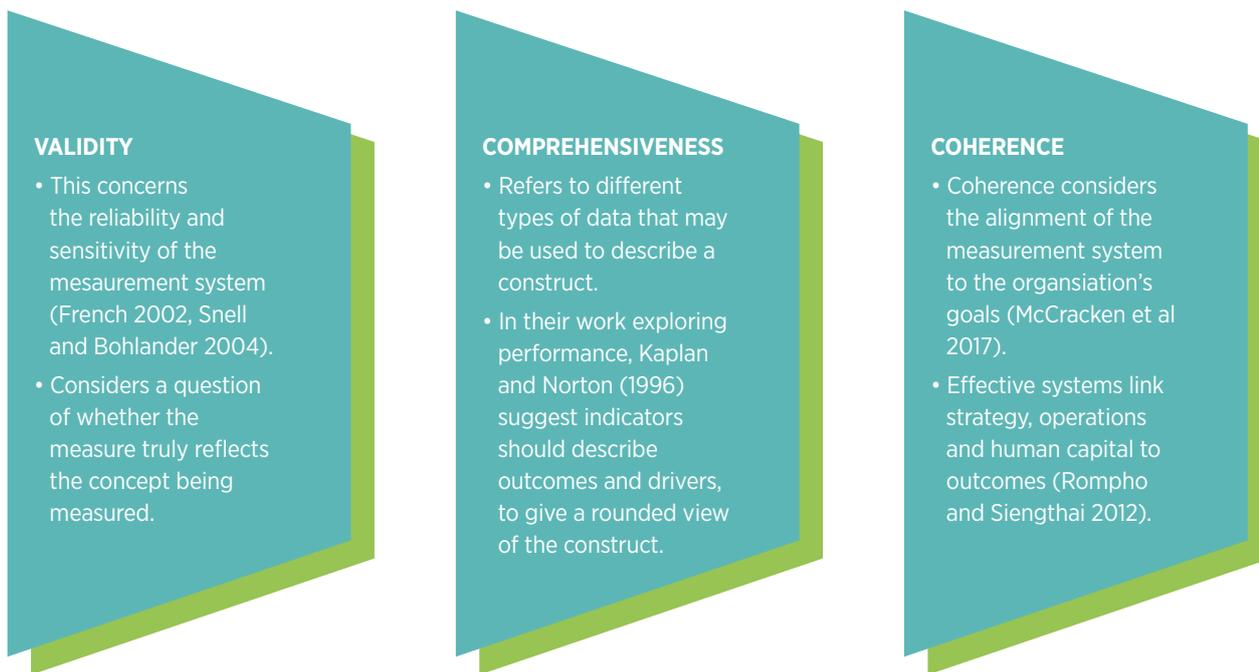
Getting quality right

Central to the value that data and analytics provides is a question of data quality. As organisations use human capital data and information to monitor and control, they also must consider the quality of data which is being used to inform decisions. As human capital data can and should be used to inform human capital development, such as learning and knowledge development (Thomas et al 2013), it's crucial that the information being used is of high quality. Various conceptual frameworks exist which describe a set of qualities believed

Table 8: Five perspectives on human capital measurement (adapted from Charlwood et al 2017)

Perspective	Key points
Cost approach	Based on the cost-of-production method (Engel 1883) that estimated value of human capital using the cost to parents of child-rearing. However, found to be inefficient at calculating individual human capital value as it only summarises historical costs (Dagum and Slottje 2000) and does not account for quality of output and the value of capital being driven by demand, not cost of production alone (Le et al 2003).
Market-value approach	An approach that tries to evaluate organisational human capital value by drawing on an organisation's market value (the value according to the stock market), its book value (the value according to balance sheet: the difference between total assets and total liabilities) and the number of employees (Scholz 2007). This approach, however, does not account for the internal processes and antecedents of human capital (McCracken et al 2017).
Accounting approach	Accounting measures for human capital attempt to measure the costs of five key processes: recruitment, acquisition, formal training and formal familiarisation, informal training and informal familiarisation, and experience and development. This approach suggests that instead of placing costs on the income statement, human capital should be located on the balance sheet (Hermanson 1964, Chen and Lin 2004). This, however, requires standardised measurement and requires complex adjustments to be made regarding the balance sheet (Scholz 2007).
Value-added approach	This approach attempts to link the value that employees contribute to their human capital. Used predominantly to understand productivity, particularly in sales environments, the approach uses relatively short-term outcomes-based measures to describe value generated by human capital. The value-added approach, however, can be skewed by changes in the market (Scholz 2007).
Human resource indicator approach	Developing key performance indicators for aspects of HR is another approach to understanding the role of human capital and its contribution in value terms through measurement and reporting. A number of key performance indicators have been developed (Becker et al 2001), but there remains a lack of standardisation between the measures which have been defined (Houghton and Spence 2016).

Figure 6: Measurement qualities for human capital analytics (adapted from Rompho and Siengthai 2012)



to foster high-quality measurement of human capital, and may deliver useful analytics to HR and beyond. One such system which offers a set of qualities that should be adhered to is that developed by Rompho and Siengthai (2012). Their work considered a system which has three key attributes: measures which are valid, comprehensive and coherent. These characteristics are described in further detail in Figure 6

Reporting human capital data – the importance of external reporting

An emerging area of interest within HR literature is the extent to which organisations report on their human capital structure and content. Given that knowledge-based organisations in particular have a large majority of their value tied up in intangible assets, such as human capital, the quantity and quality of this information is of considerable importance and value to firm stakeholders. When and how organisations express this information and to what effect is the subject of new debate regarding people data.

Evidence in the form of data is one way by which information is conveyed to important stakeholders, particularly investors, but increasingly other communities, such as employees and regulators. Describing the organisation's performance through a mix of financial and non-financial indicators, which include those relating human capital information, is believed to be one area that will undergo considerable growth (Houghton and Spence 2016, Chen and Lin 2004, Thomas et al 2013).

Why is human capital reporting important?

The topic of human capital reporting and its importance has been an ongoing debate for over 20 years, with a number of key publications and political developments marking the cause's progression. Marked by a desire to put weight to the age-old business adage of 'people are our most important asset', a number of important groups have lobbied for evidence to be better reported in financial statements (Roslender

Human capital reporting is the production of analytics, data and narrative information which describes the quality and quantity of human capital present within an enterprise. Human capital reporting includes quantitative, often objective, data which describes the people of the organisation, for example demographics, as well as objective and subjective measures of performance, culture and engagement, which are often described within the narrative disclosure of the organisation (McCracken et al 2016) .

Further information about human capital reporting can be found in the CIPD report *Reporting Human Capital Value: Illustrating your company's true value* (McCracken et al 2016).

and Stevenson 2006). Human capital reporting is important because at its heart it is concerned with illustrating the risks and opportunities facing organisations with regards to their workforce (Houghton and Spence 2016).

The publication of the Kingsmill Review in 2001, which concluded that not enough human capital information is reported, sparked debates throughout government and businesses alike about human capital (PLSA 2015). The Accounting

for People initiative, announced by the UK Government in 2003, was a concerted effort to champion better human capital reporting, but was ultimately undone by the power and influence of the accounting profession, which resisted its call for more effective reporting of employee aspects (Roslender and Stevenson 2006). This culminated in the short-lived Operating and Financial Review (OFR), which was both passed and repealed in 2005, marred by shifting political sands, and was followed by the enhanced Business

Review in 2006 (Accountancy 2006, Rowbottom and Schroeder 2014). These developments were followed by a number of business-led and profession-led initiatives, including the CIPD and UKCES partnership Valuing your Talent, which has continued to campaign for more transparent reporting of human capital (Houghton and Spence 2016).

Published academic evidence has demonstrated that human capital information influences investment decisions, and also plays a role in

Table 9: Developments in human capital reporting

Initiative/programme	Description
Integrated Reporting – the International Integrated Reporting Council (IIRC)	The IIRC provides a principles-based approach to reporting against six capitals (financial, manufactured, human, intellectual, natural and social) through an integrated report. Integrated reports are designed to provide information and financial and non-financial measures, and offer insights as to the nature and relationship between the resources present in an organisation’s business model (IIRC 2013).
The Global Reporting Initiative (GRI)	The GRI’s purpose is to define ways by which organisations can become more sustainable through more effective reporting of their value. The GRI framework represents a way by which organisations can approach reporting on critical sustainability issues, including climate change, human rights and the supply chain. The GRI defines a set of standards against which organisations can operate (GRI 2016).
UK strategic report	The strategic report has been a requirement of the annual report for listed companies since 1 October 2013. The strategic report is designed to enable key stakeholders to assess the extent to which an organisation’s directors have performed against section 172 of the Companies Act: their duty to promote the success of the company (FRC 2014). The strategic report should include information about the organisation’s employees, should it be decided that this information is useful for determining the development or performance of the organisation. Investors have welcomed these reports, but voluntary disclosure of employee information appears to be restricted mainly to diversity information (PLSA 2015).
EU Directive on the disclosure of non-financial and diversity information 2014/95/EU	The EU non-financial disclosures directive requires large companies (500+ employees) listed in EU markets, or operating in the banking and insurance sectors, to disclose environmental and social information in the management report, first due for publication in 2018. Disclosures should include information on their policies, main risks and outcomes relating to at least social and employee aspects, and respect for human rights (European Commission 2017). While the directive is designed to drive reporting on, amongst others, issues around working conditions, respect and rights, gender equality, and health and safety, there is little belief in the investment community that voluntary disclosures will effect real change (PLSA 2015).
Valuing your Talent	In 2013 the CIPD – funded by the UK Commission for Employment and Skills and in partnership with the Chartered Management Institute, Investors in People and Chartered Institute of Management Accountants – conducted research with Lancaster University to develop a framework for human capital measurement and reporting. The Valuing your Talent Framework is designed in line with business model thinking to describe stages of value-creation, and the potential human capital measures that can inform management and stakeholders’ decision-making (Hesketh 2014). Original research was then followed up with CIPD and CIMA case study investigations to appreciate practical barriers to human capital measurement and reporting (Houghton and Spence 2016).
International Organisation for Standardisation (ISO) & British Standards Institution (BSI)	The ISO technical committee (ISO TC260) involves 26 full-member countries and 24 observing countries working on international standards for people management and development. The <i>ISO 30414: Human capital reporting for internal and external stakeholders</i> workgroup aims to provide organisations with a clear approach to reporting human capital information, which will include reference to optimal operating and reporting systems and guidance regarding transparent human capital disclosures.

attracting talent and new knowledge to the organisation (Gamerschlag and Moellor 2011, Houghton and Spence 2016). Interest in improving the content of reports to include human capital information continues, in particular the extent to which data is transparently reported – an issue found to be prevalent in FTSE 100 reporting (McCracken et al 2016). Key developments in the reporting space are illustrated in Table 9.

Issues of quality

Research has shown that the quality of report continues to be low, while quantity does appear to be on the rise: overall, annual report sizes are on the increase, as is space dedicated to describing human capital, but the quality of disclosures is low (McCracken et al 2016, PLSA 2015). Misrepresentation of data is one particular area of issue, whereby organisations fail to provide a true reflection of their people or human capital strategy (Houghton and Spence 2016). In organisations driven by knowledge, this may be costly.

Human capital reporting has the potential to influence the way that external stakeholders such as investors make decisions. In the UK, the quality of reporting on human capital information remains broadly low, with insights into human capital risks and opportunity being omitted from many annual reports. An analysis of the media coverage of organisations demonstrated that while human capital issues are present in organisations, there was sometimes little or no insight as to the issue itself in the narrative disclosure. As such, human capital reports have to reach a quality benchmark whereby they are offering real value (McCracken et al 2016).

The CIPD continues to make the case for more transparent and effective disclosure of human capital information, working with

its members to promote more effective reporting of human capital. In particular this includes engaging with the Financial Reporting Council as it looks to respond to the Department for Business, Energy and Industrial Strategy Select Committee's recommendations for improved human capital reporting; and the implications of these recommendations on the emerging redesign of the Corporate Governance Code, and the Stewardship Code (House of Commons 2017).

Important points for practice

- **Human capital reporting** is the disclosure of data and information about the quality and quantity of human capital in an organisation to its multiple stakeholders.
- **Human capital reporting** consists of the reporting of data in numerical form and a **narrative disclosure** that describes key qualities and information about specific people-related concepts. **Narrative reports** are increasingly being used by investors to understand ideas such as **corporate culture**.
- The quantity of information organisations disclose about their human capital is **increasing**, but the quality of information remains **low**. Organisations should look to be more transparent with data that describes **risks and opportunities** that relate to their workforce.

Academic critique

In their assessment of the HR analytics literature, Marler and Boudreau (2017) illustrate that there is more to be done to collect robust evidence that describes the practical applications of current HR analytics practice: in particular,

if and how HR analytics produces outcomes for organisations, and the nature of these outcomes. From their assessment of the literature, they found 6 of 14 articles assessed used an approximation of the LAMP model first coined by Boudreau and Ramstad in 2007. LAMP is an acronym comprising four components (logic, analytics, measures and processes) which determine whether a measurement system is able to uncover evidence-based relationships between data points, and also whether the system is able to enhance decision-making off the back of said process. They also point to the HR scorecard, a model that is referenced as a way to link HRM processes to business outcomes (Becker et al 2001).

The same literature review highlighted that many publications did not clearly articulate an explicit theoretical framework through which analysis was undertaken – this was believed to be in part because non-quantitative empirical studies tend to dominate the HR analytics domain. Where theoretical perspectives were clear, or were articulated, the RBV was often articulated as illustrating the link between data describing people and human capital, and the links to value-creation capabilities and additional organisation resources. The only other perspective that Marler and Boudreau describe is that of agency theory, which was used by Aral et al (2012) to explore firm-level productivity using HCM software, performance compensation and HR analytics. This work showed that all three used in combination lead to improved firm-level productivity (Aral et al 2012, Marler and Boudreau 2017).

The academic assessment of the literature that forms the two technical documents which accompany this report illustrate a number of criticisms of HR analytics

and human capital measurement and reporting that should be considered as the profession invests in analytical capability. These are illustrated as follows.

Lack of clearly defined definitions for HR analytics, human capital analytics and related analytics concepts

As both Charlwood et al (2017) and Marler and Boudreau (2017) illustrate, there is a lack of definition which is preventing insights into analytics from developing. Given that the discipline has been emerging for over ten years, it is surprising that no agreed definition has yet to emerge, although this appears to be what Marler and Boudreau argue for in their synthesis. This is further compounded by a clear overemphasis of qualitative evidence describing HR analytics theory and its impacts, as opposed to empirical quantitative evidence that is reported in peer-reviewed academic journals. This is particularly important as the profession looks to move towards being more evidence-based, where studies of important HRM concepts must be clearly described so they may be repeated and critically examined by academics and professionals alike (Marler and Boudreau 2017, Charlwood et al 2017).

Poor quality evidence: case studies

Much of our understanding of analytics practice comes from case studies of practitioners, often following best-practice techniques to build metrics and analytics systems. While case study methods have been used for some time to describe specific issues that organisations face, there has been some backlash as to the relevance of such methods for exploring highly context-specific situations in organisations, such as those related to HR analytics activity. Frequent issues highlighted include:

- **Sample of opportunity:** organisations or participants tend to be recruited via networks 'warm' to the idea of participating in research, which biases the sample. There are also issues of comparability with specific methods such as those used to generate case study descriptions.
- **Positive bias:** case studies describe the 'best practice' view of a particular issue or situation, as opposed to objectively assessing theory and qualities of the practice.
- **Lack of empirical evidence and reproducible experiments:** analysis and reporting of methodology, outputs and evidence-based assessment is limited, and as such the quality of the data which is produced does not describe recognised or experimental theories in action.
- **Lack of critical commentary:** case studies tend to lack critical assessment of the concept; within analytics this includes describing specific processes, measures and indicators, reports and outputs.

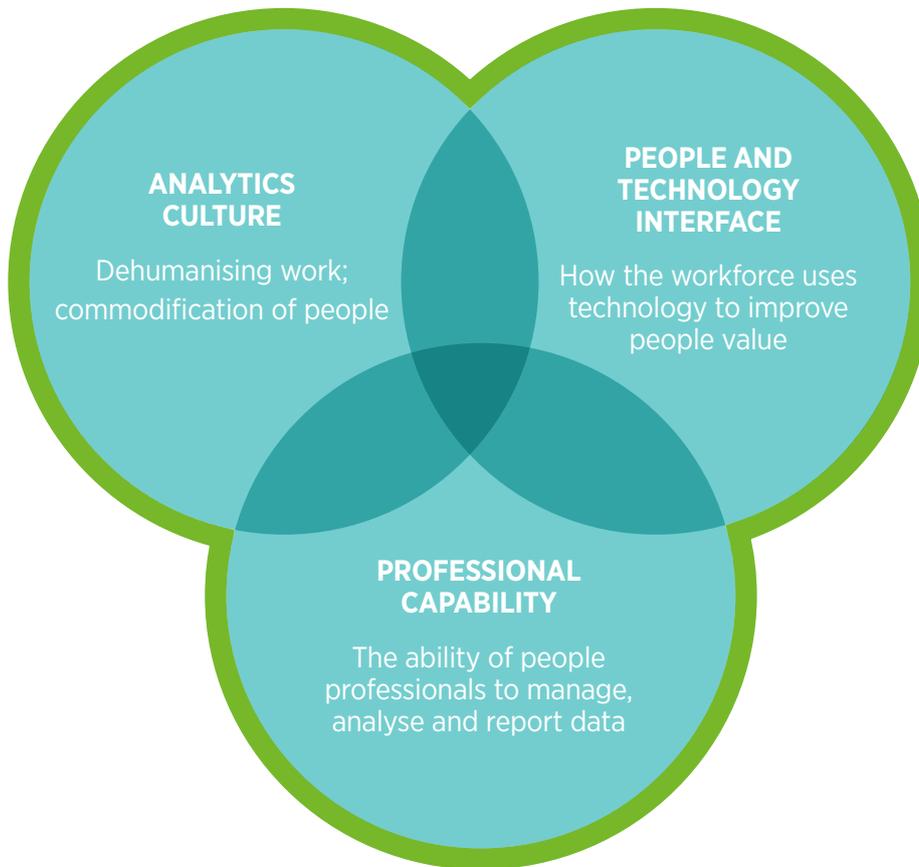
A full assessment of academically published human capital metrics and analytics case studies and cross-sectional studies can be found in the accompanying report: *Human Capital Metrics and Analytics: Assessing the evidence of the value and impact of people data* (Charlwood et al 2017).

Poor quality evidence: surveys/cross-sectional studies

Trend assessments by global analytics firms look to understand how organisations and practitioners are approaching human capital analytics and reporting. Studies tend to consider specific topics of interest (talent management, for example) as well as the specific human capital metrics that are found in practice.

'It is surprising that no agreed definition of analytics has yet to emerge.'

Figure 7: Theoretical barriers to better utilisation of people data and analytics



While these studies can often provide an interesting overview of trends in the analytics domain, a number of issues may be highlighted that should be considered when interpreting outputs. These include:

- **Population and sample size:** some surveys may not be transparent as to the quality and quantity of the sample, any sampling issues that may skew output data, and whether the sample selected offers a credible representation of the population being studied (Charlwood et al 2017).
- **Hidden agenda:** some well-known studies within leading practice are often from vendors or those with systems or services to sell. The objectivity of the authors, and their critical understanding of the data outputs,

may therefore be questioned (Charlwood et al 2017).

- **Study design:** the majority of big-picture studies are cross-sectional in nature and do not attempt to track changes over time on specific areas of human capital analytics and reporting. This means that true ‘trend data’ that describes whether or not practice is changing is hard to come by (Charlwood et al 2017).

Professional barriers to people measurement and reporting

Given the previous assessments, we believe there is much interest in adopting standardised approaches to both the measurement and reporting of human capital information. There are, however, professional boundaries that have

been highlighted which the HR profession, both in the US and the UK, has to overcome if people measures are to be standardised. The profession faces three key challenges that must be tackled, as shown in Figure 7.

Discussion and recommendations

In this report we have looked to appreciate the nature of people value in organisations – specifically human and social capital – and to develop with this an understanding of the way by which people professionals can measure and report on this information to their organisations and stakeholders. Exploring the areas of human capital theory, human capital measurement and reporting and HR analytics theory and practice, we note that in combination a theory of human capital analytics may be able to change the way people professionals and their stakeholders view the value of the workforce.

As HR and human capital analytics have evolved over time, there has been considerable growth in interest on the topic across areas of practice. The concept of using data to inform how organisations manage their workforce is one which has existed throughout the history of the profession, but the evolution of information technology, and the explosion in the speed, accessibility and quantity of data, has meant that the people profession sits on huge amounts of information that may or may not offer considerable value within and outside the function. Of particular importance in this debate is how HR professionals view people data alongside their own understanding of HRM theory and human capital theory: how does analytics sit alongside other aspects of their profession, and does it influence the way in which decisions are made?

For human capital analytics to deliver value, there are clear ways that academic theory and practice

need to evolve: in particular, the gulf between what is theoretically possible and practically useful should be fully understood. And while there is a tendency for scholarship to view only the theoretical end of analytics practice as valuable, much more evidence-based scholarship of high quality is needed to inform the development of better practice. Academic inquiry has, to date, not offered a critical enough lens to the practice of human capital analytics within the academic literature; a more robust and critical debate about analytics is required.

Evidence-based management offers one useful description of the importance of people data to more effective practice. Locating the measurement and reporting of data internal and external to organisations as two of the four quadrants, the theoretical framework neatly illustrates why evidence of this type is of considerable importance to improving practice within the people profession. Overlooking evidence or overemphasising the value of evidence in one quadrant to the detriment of other types of evidence is something that future people professionals must have an awareness of. This includes having the capability to understand the different types and characteristics of evidence, and assess these in a rounded and methodical way. Applying judgement alone, without understanding the analytics dimension, will not develop the profession in a way that delivers value for all.

If the people profession is to fully realise the value of human capital analytics, it must overcome its

fear of data and clearly consider how the practice of human capital analytics and reporting fits into the future capability of the profession. While technology and the availability of data have improved the viability of analytics practice, there has been little movement in the capability of people professionals to manage, measure and report on human capital data in a meaningful way. Instead, such capability is often provided by vendors or those in service to the organisation. While different models of implementing analytics exist, the people professional must have as a central competence an appreciation of people data, and the critical questions required to make sense of it.

Key recommendations

We make a number of recommendations as to how the people profession may adopt human capital analytics more readily, and which may promote more valuable outcomes from analytics practice.

Articulating the importance of human capital, social capital and intellectual capital in future practice

For some time the concepts of human, social and intellectual capital have existed within the academic sphere, but have not adequately transferred into the lexicon of modern people professionals. As a result, the language of the people-related capitals can appear disengaging to those in HR and management, who view the valuation of the workforce as dehumanising. The language of human capital should look to evolve with statements which illustrate the

individual perspective of human capital more clearly, demonstrating value to the employee as well as the outcomes that human capital investment can have at an organisational or economic level. The profession should look to build a positive language of mutual value-creation through the people-related capitals, and work with practitioners to educate and inform business colleagues as to the importance of investments in HRM and people management.

Investing in high-quality benchmarking studies of human capital analytics practice

Analytics practice, both from the academic and the practice domain, suffers as it has low methodological quality. Common method issues such as convenience sampling currently muddy the quality of analysis and as such the insights from academics are not to the high levels of quality that the profession demands. Benchmarks of aspects of tools that are being used across the profession is one category that would drive investment in technologies and capabilities that can offer improvements in capability at both the individual and the organisational level. This may also inform the development of standards across the profession for investing in and building HR analytics and human capital analytics capability.

Emphasising the comparison of human capital analytics outcomes is one way through which practice

in this area can improve. For the profession to move towards using people data to understand human capital risks and opportunities, there should be investment in education around human capital data and its value when used in benchmarking systems. Such practice should be promoted within and between organisations.

Improving empirical evidence

There is a gap between the practice of human capital measurement and reporting, and high-quality empirical evidence of the different types of outcomes for individuals, organisations and the business stakeholders. The assessment of literature has picked up on a number of research questions that are avenues of important investigation if the practice is to evolve beyond its current state. These are:

- 1 How and why are different forms of human capital measurement and reporting adopted by organisations, and how do they benefit or hinder the stakeholders of organisations, in particular employees?
- 2 What are the institutional and cultural barriers within organisations that prevent the development of high-quality human capital analytics and reporting?
- 3 What are the ethical implications of human capital analytics and reporting? In particular, how are ethical employee/workforce concerns considered in analytics activity?

Building human capital analytics into the future people profession's body of knowledge

As the profession looks to become more evidence-based, and the capability for undertaking analytics becomes more commonplace across the profession, it is important that analytics becomes a fundamental capability for the future people professional. Without the skills and capabilities to undertake human capital analytics, progress towards more evidence-based practice will be slow. Human capital analytics must be recognised for its value in understanding the links between HRM, firm performance and individual outcomes of well-being and engagement, where there is emerging evidence that should be further explored.

Future people professionals will need to have the competency and desire to explore different sources of information to inform their decisions, and to help evidence decisions for key stakeholders. Human capital analytics, as part of the drive for evidence-based practice, should be incorporated into the evolving HR professional standards.

References

- ACCOUNTANCY. (2006) OFR: a missed opportunity. *Accountancy*. March.
- ACEMOGLU, D. and AUTOR, D. (2009) *Lectures in labour economics*. Boston: MIT.
- ACEMOGLU, D. and PISCHKE, J.S. (1999) Beyond Becker: training in imperfect labour markets. *Economic Journal*. Vol 109, No 453. pp112–42.
- ALAN, K.M.A., ALTMAN, Y. and ROUSSEL, J. (2008) Employee training needs and perceived value of training in the Pearl River Delta of China: a human capital development approach. *Journal of European Industrial Training*. Vol 32, No 1. pp19–31.
- ALAVI, M. and LEIDNER, D.E. (2001) Review: knowledge management and knowledge management systems: conceptual foundations and research issues. *MIS Quarterly*. Vol 25, No 1.
- ANTONS, D. and PILLAR, F.T. (2015) Opening the black box of ‘not invented here’: attitudes, decision biases, and behavioural consequences. *Academy of Management Perspectives*. Vol 29, No 3. pp193–217.
- ARAL, S., BRYNJOLFSSON, E. and WU, L. (2012) Three-way complementarities: performance pay, human resource analytics, and information technology. *Management Science*. Vol 58. pp913–31.
- ARMSTRONG, M. (2014) *Armstrong’s handbook of performance management: an evidence-based guide to delivering high performance*. 5th edition. London: Kogan Page.
- ARMSTRONG, C., FLOOD, P.C., GUTHRIE, J.P., WENCHAUN, L., MACURTAIN, S. and MKAMWA, T. (2010) The impact of diversity and equality management on firm performance: beyond high performance work systems. *Human Resource Management*. Vol 46, No 6. pp977–98.
- AVEY, J.B., LUTHANS, F., SMITH, R.M. and PALMER, N.F. (2010a) Impact of positive psychological capital on employee well-being over time. *Journal of Occupational Health Psychology*. Vol 15, No 1. pp17–28.
- AVEY, J.B., LUTHANS, F. and YOUSSEF, C.M. (2010b) The additive value of positive psychological capital in predicting work attitudes and behaviors. *Journal of Management*. Vol 36, No 2. pp430–52.
- BADRAN, M.A. and YOUSSEF-MORGAN, C.M. (2015) Psychological capital and job satisfaction in Egypt. *Journal of Managerial Psychology*. Vol 30, No 3. pp354–70.
- BAPNA, R., LANGER, N., MEHRA, A., GOPAL, R. and GUPTA, A. (2013) Human capital investments and employee performance: an analysis of IT services industry. *Management Science*. Vol 59, No 3. pp641–58.
- BARNEY, J.B. (1991) Firm resources and sustained competitive advantage. *Journal of Management*. Vol 17, No 1. pp99–120.
- BARNEY, J. and FELIN, T. (2013) What are microfoundations? *Academy of Management Perspectives*. Vol 27, No 2. pp120–37.
- BARENDT, E., ROUSSEAU, D. and BRINER, R. (2014) *Evidence-based management: the basic principles*. Amsterdam: Center for Evidence Based Management. Available at: <https://www.cebma.org/wpcontent/uploads/Evidence-BasedPractice-The-Basic-Principles-vsDec-2015.pdf> [Accessed 12 April 2017].
- BASSI, L. (2011) Raging debates in HR analytics. *People and Strategy*. Vol 34. pp14–18.
- BEACH, M.J. (2009) A critique of human capital formation in the U.S. and the economic returns to sub-baccalaureate credentials. *Educational Studies: A Journal of the American Educational Studies*. Vol 45, No 1. pp24–38.
- BECKER, G.S. (1964) *Human capital: a theoretical and empirical analysis, with special reference to education*. New York: Columbia University Press.
- BECKER, G.S. (1975) *Human capital: a theoretical and empirical analysis, with special reference to education*. 2nd edition. Cambridge, MA: NBER.

- BECKER, G.S. (1993) *Human capital: a theoretical and empirical analysis with special reference to education*. Chicago: University of Chicago Press.
- BECKER, B.E. and HUSELID, M.A. (1998) High performance work systems and firm performance: a synthesis of research and managerial implications. In: FERRIS, G.R. (ed.) *Research in personnel and human resources management* (Vol 16, pp53–101). Stamford, CT: JAI Press.
- BECKER, B.E., HUSELID, M.A. and ULRICH, D. (2001) *The HR scorecard: linking people, strategy, and performance*. Boston, MA: Harvard Business School Press.
- BENSON, G.S., FINEGOLD, D. and MOHRMAN, S.A. (2004) You paid for the skills, now keep them: tuition reimbursement and voluntary turnover. *Academy of Management Journal*. Vol 47, No 3. pp315–31.
- BONTIS, N., DRAGONETTI, N.C., JACOBSEN, K. and ROOS, G. (1999) The knowledge toolbox: a review of tools available to measure and manage intangible resources. *European Management Journal*. Vol 17, No 4. pp391–402.
- BOURDIEU, P. (1986) The forms of capital. In: RICHARDSON, J.G. (ed.) *Handbook of theory and research for the sociology of education*. New York: Greenwood.
- BOUDREAU, J. and RAMSTAD, P.M. (2007) *Beyond HR: the new science of human capital*. Boston, MA: Harvard Business School Press.
- BOYD, D. and CRAWFORD, K. (2012) Critical questions for big data: provocations for a cultural, technological, and scholarly phenomenon. *Information, Communication, and Society*. Vol 15, No 5. pp662–79.
- BOYER, S.L., EDMONDSON, D.R., ARTIS, A.B. and FLEMING, D. (2014) Self-directed learning: a tool for lifelong learning. *Journal of Marketing Education*. Vol 36, No 1. pp20–32.
- BRYMER, R.A., MOLLOY, J.C. and GILBERT, B.A. (2014) Human capital pipelines: competitive implications of repeated interorganisational hiring. *Journal of Management*. Vol 40, No 2. pp483–508.
- BURKHOLDER, L. (ed.) (1992) *Philosophy and the computer*. Boulder, CO: Westview Press.
- BYRNE, Z.S. (2015) *Understanding employee engagement: theory, research, and practice*. New York: Routledge.
- CHARLWOOD, A., STUART, M. and TRUSSON, C. (2017) *Human capital metrics and analytics: assessing the evidence of the value and impact of people data*. London: Chartered Institute of Personnel and Development.
- CHARTERED INSTITUTE OF PERSONNEL AND DEVELOPMENT. (2013) *Talent analytics and big data – the challenge for HR [online]*. London: CIPD. Available at: <https://www.cipd.co.uk/knowledge/strategy/analytics/hr-challenge-report> [Accessed 27 April 2017].
- CHARTERED INSTITUTE OF PERSONNEL AND DEVELOPMENT. (2017a) *Making the UK's skills system world class [online]*. London: CIPD. Available at: <https://www.cipd.co.uk/knowledge/work/skills/uk-skills-system-report> [Accessed 27 April 2017].
- CHARTERED INSTITUTE OF PERSONNEL AND DEVELOPMENT. (2017b) *HR outlook winter 2016–17 [online]*. London: CIPD. Available at: https://www.cipd.co.uk/Images/hr-outlook_2017_tcm18-17697.pdf [Accessed 27 April 2017].
- CHEN, H.M. and LIN, K.J. (2004) The role of human capital cost in accounting. *Journal of Intellectual Capital*. Vol 5, No 1. pp116–30.
- COCO, C.T., JAMISON, F. and BLACK, H. (2011) Connecting people investments and business outcomes at Lowe's: using value linkage analytics to link employee engagement to business performance. *People and Strategy*. Vol 34. pp28–33.
- COHEN, W.M. and LEVINTHAL, D.A. (1990) Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*. Vol 35, No 1. pp128–52.
- DAGUM, C. and SLOTTJE, D.J. (2000) A new method to estimate the level and distribution of household human capital with application. *Structural Change and Economic Dynamics*. Vol 11, No 2. pp67–94.
- DE LA FUENTE, A. and CICCONE, A. (2002) *Le capital humain dans une économie mondiale sur la connaissance*. Brussels: Rapport pour la Commission Européenne.
- DELERY, J.E. (1998) Issues of fit in strategic human resource management: implications for research. *Human Resource Management Review*. Vol 8. pp289–309.
- DELERY, J.E. and SHAW, J.D. (2001) The strategic management of people in work organizations: review, synthesis and extension. In: FERRIS, G.R. (ed.) *Research in personnel and human resources management* (Vol 20, pp165–97). Stamford, CT: JAI Press.
- DESS, G.D. and PICKEN, J.C. (1999) *Beyond productivity: how leading companies achieve superior performance by leveraging their human capital*. New York: American Management Association.

- EDVINSSON, L. (1997) Developing intellectual capital at Skandia. *Long Range Planning*. Vol 30, No 3. pp366–73.
- EDVINSSON, L. and MALONE, M. (1997) *Intellectual capital: realising your company's true value by finding its hidden roots*. New York: Harper Business.
- ELDOR, L. and HARPAZ, I. (2016) A process model of employee engagement: the learning climate and its role with extra-role performance behaviours. *Journal of Organisational Behaviour*. Vol 37, No 2. pp213–35.
- ENGEL, E. (1883) *Der werth des menschen*. Berlin: Verlag von Leonhard Simion.
- ERAUT, M., ALDERTON, J., COLE, G. and SENKER, P. (1998) *Development of knowledge and skills in employment*. London: Economic and Social Research Council.
- ESTEVEZ-ABE, M., IVERSEN, T. and SOSKICE, D. (2001) Social protection and the formation of skills: a reinterpretation of the welfare state. In: HALL, P.A. and SOSKICE, D. (eds) *Varieties of capitalism: the institutional foundations of comparative advantage* (pp145–83). Oxford: Oxford University Press.
- EUROPEAN COMMISSION. (2017) *Non-financial reporting*. Available at: http://ec.europa.eu/finance/company-reporting/non-financial-reporting/index_en.htm#legal-framework [Accessed 13 April 2017].
- EVANS, W.R. and DAVIS, W.D. (2005) High-performance work systems and organizational performance: the mediating role of internal social structure. *Journal of Management*. Vol 31. pp758–75.
- FALLETTA, S. (2014) In search of HR intelligence: evidence-based HR analytics practices in high-performing companies. *People and Strategy*. Vol 36. pp28–37.
- FINANCIAL REPORTING COUNCIL. (2014) *Guidance on the strategic report*. Available at: <https://www.frc.org.uk/Our-Work/Publications/Accounting-and-Reporting-Policy/Guidance-on-the-Strategic-Report.pdf> [Accessed 13 April 2017].
- FRANK, R.H. and BERNANKE, B.S. (2007) *Principles of microeconomics*. 3rd ed. New York: McGraw-Hill/Irwin.
- FRENCH, W. (2002) *Human Resource Management*, 6th ed. Boston: Houghton Mifflin.
- GAMERSCHLAG, R. (2013) Value relevance of human capital information. *Journal of Intellectual Capital*. Vol 14, No 2. pp325–45.
- GAMERSCHLAG, R. and MOELLOR, K. (2011) The positive effects of human capital reporting. *Corporate Reputation Review*. Vol 14, No 2. pp145–55.
- GARAVAN, T.N., et al (2001) Human capital accumulation: the role of human resource development. *Journal of European Industrial Training*. Vol 25, No 2. pp48–68.
- GAVIOUS, A. and RABINOWITZ, G. (2003) Optimal knowledge outsourcing model. *Omega*. Vol 31, No 6. pp451–7.
- GEDRO, J. (2006) Lesbians: identifying, facing, and navigating the double bind of sexual orientation and gender in organizational settings. *New Directions for Adult and Continuing Education*. Vol 112. pp41–50.
- GEORGIADIS, A. and PITELIS, C.N. (2016) The impact of employees' and managers' training on the performance of small- and medium-sized enterprises: evidence from a randomized natural experiment in the UK service sector. *British Journal of Industrial Relations*. Vol 54. pp409–21.
- GLOBAL REPORTING INITIATIVE. (2016) *Introducing the GRI standards – presentation*. Available at: <https://www.globalreporting.org/standards/resource-download-center/#user-details> [Accessed 12 April 2017].
- GRANT, R.M. (1996a) Toward a knowledge-based theory of the firm. *Strategic Management Journal*. Vol 17, No S2. pp109–22.
- GRANT, R.M. (1996b) Prospering in dynamically competitive environments: organizational capability as knowledge integration. *Organization Science*. Vol 7, No 4. pp375–87.
- GRANT, R.M. (2002) The knowledge-based view of the firm. In: BONTIS, N. and WEI CHOO, C. (eds) *Strategic management of intellectual capital and organizational knowledge*. New York: Oxford University Press.
- GRIGORIOU, K. and ROTHÄRMEL, F.T. (2014) Structural microfoundations of innovation: the role of relational stars. *Journal of Management*. Vol 40, No 2. pp586–615.
- HESKETH, A. (2014) *Managing the value of your talent: a new framework for human capital measurement [online]*. London: Chartered Institute of Personnel and Development. Available at: https://www.cipd.co.uk/Images/managing-the-value-of-your-talent-a-new-framework-for-human-capital-measurement_2014_tcm18-9266.pdf [Accessed 27 April 2017].
- HÄMÄLÄINEN, U. and UUSITALO, R. (2008) Signalling or human capital: evidence from the Finnish polytechnic school reform. *Scandinavian Journal of Economics*. Vol 110, No 4. pp755–75.

- HARRIS, J.G., CRAIG, E. and LIGHT, D.A. (2011) Talent and analytics: new approaches, higher ROI. *Journal of Business Strategy*. Vol 32. pp4–13.
- HATCH, N.W. and DYER, J.H. (2004) Human capital and learning as a source of sustainable competitive advantage. *Strategic Management Journal*. Vol 25. pp1155–78.
- HEL FAT, C.E. and MARTIN, J.A. (2015) Dynamic managerial capabilities: review and assessment of managerial impact on strategic change. *Journal of Management*. Vol 41, No 5. pp1281–1312.
- HEL FAT, C.E., FINKELSTEIN, S., MITCHELL, W., PETERAF, M., SINGH, H., TEECE, D.J. and WINTER, S.G. (2007) *Dynamic capabilities: understanding strategic change in organizations*. Oxford: Blackwell.
- HERMANSON, R.H. (1963) *A method for recording all assets and the resulting accounting and economic implications*. PhD dissertation. Michigan State University.
- HESS, A.M. and ROTH AERMEL, F.T. (2011) When are assets complementary? Star scientists, strategic alliances, and innovation in the pharmaceutical industry. *Strategic Management Journal*. Vol 32, No 8. pp895–909.
- HOLLENBECK, J.R. and JAMIESON, B.B. (2015) Human capital, social capital, and social network analysis: implications for strategic human resource management. *Academy of Management Perspectives*. Vol 29, No 3. pp370–85.
- HOUGHTON, E.A. and SPENCE, P. (2016) *People measurement and reporting: from theory to practice [online]*. London: Chartered Institute of Personnel and Development. Available at: www.valuingyourtalent.com [Accessed 28 March 2017].
- HOUSE OF COMMONS. (2017) *House of Commons Department for Business, Energy and Industrial Strategy Committee – Corporate Governance – Third Report of Session 2016–2017*. Available at: <https://www.publications.parliament.uk/pa/cm201617/cmselect/cmbeis/702/702.pdf> [Accessed 13 April 2017].
- HUSELID, M. (1995) The impact of HRM practices on turnover, productivity, and corporate financial performance. *Academy of Management Journal*. Vol 38, No 3. pp635–72.
- INTERNATIONAL INTEGRATED REPORTING COUNCIL. (2013) *The international framework*. Available at: <http://integratedreporting.org/wp-content/uploads/2015/03/13-12-08-THEINTERNATIONALIRFRAMEWORK-2-1.pdf> [Accessed 19 March 2016].
- JACOBS, A. (2009) The pathologies of big data. *Communications ACM – a Blind Person’s Interaction with Technology*. Vol 52, No 8. pp36–44.
- JOHNSON, D. (1985) *Computer ethics*. Englewood Cliffs, NJ: Prentice-Hall.
- JONES, D.C., KALMI, P. and KAUHANEN, A. (2012) The effects of general and firm-specific training on wages and performance: evidence from banking. *Oxford Economic Papers*. Vol 64. pp151–75.
- KAPLAN, R.S. and NORTON, D.P. (1996) Linking the balanced scorecard to strategy. *California Management Review*, Vol. 39, No. 1, pp53–79.
- KAUTZ, T., HECKMAN, J.J., DIRIS, R., TER WEEL, B. and BORGHANS, L. (2014) *Fostering and measuring skills: improving cognitive and non-cognitive skills to promote lifetime success*. (No. w20749). National Bureau of Economic Research.
- KIM, Y. and PLOYHART, R.E. (2014) The effects of staffing and training on firm productivity and profit growth before, during, and after the great recession. *Journal of Applied Psychology*. Vol 99, No 3. pp361–89.
- KLEIN, D.A. and PRUSAK, L. (1994) *Characterizing intellectual capital*. Cambridge, MA: Centre for Business Innovation.
- KLINGE, C.M. (2015) A conceptual framework for mentoring in a learning organization. *Adult Learning*. Vol 26, No 4. pp160–66.
- KOGUT, B. and ZANDER, U. (1992) Knowledge of the firm, combinative capabilities and the replication of technology. *Organization Science*. Vol 3, No 3. pp383–97.
- KOR, Y.Y. and LEBLEBICI, H. (2005) How do interdependencies among human-capital deployment, development, and diversification strategies affect firms’ financial performance? *Strategic Management Journal*. Vol 26, No 10. pp967–85.
- KOSTER, F., DE GRIP, A. and FOURAGE, D. (2011) Does perceived support in employee development affect personnel turnover? *International Journal of Human Resource Management*. Vol 22, No 11. pp2403–18.
- LAWLER III, E.E., LEVENSON, A. and BOUDREAU, J.W. (2004) HR metrics and analytics: use and impact. *Human Resource Planning*. Vol 27. pp27–35.
- LE, T., GIBSON, J. and OXLEY, L. (2003) cost and income based measure of human capital. *Journal of Economic Surveys*. Vol 17, No 3. pp1–37.
- LEV, B. (2001) *Intangibles: management, measurement, and reporting*. New York: Brookings Institution Press.

- LIU, K. (2014) Effects of inventors' human capital and intellectual capital on the value of patents. *Journal of Management*. Vol 40, No 2. pp616–36.
- LUCAS, R. (1990) Why doesn't capital flow from rich to poor countries? *American Economic Review*. Vol 80, No 1. pp92–6.
- MAHONEY, J.T. and KOR, Y.Y. (2015) Advancing the human capital on value by joining capabilities and governance perspectives. *Academy of Management Perspectives*. Vol 29, No 3. pp296–308.
- MACDUFFIE, J.P. (1995) Human resource bundles and manufacturing performance: organizational logic and flexible production systems in the world auto industry. *Industrial and Labor Relations Review*. Vol 48. pp197–221.
- MARLER, J.H. and BOUDREAU, J.W. (2017) An evidence-based review of HR analytics. *International Journal of Human Resource Management*. Vol 28, No 1. pp3–26.
- MCAFFEE, A., BRYNJOLFSSON, E., DAVENPORT, T.H., PATIL, D.J. and BARTON, D. (2012) Big data: the management revolution. *Harvard Business Review*. Vol 90, No 10. pp61–7.
- MCCRACKEN, M., MCIVOR, R. and WALL, T. (2016) *Reporting human capital: illustrating your company's true value [online]*. London: Chartered Institute of Personnel and Development. Available at: <https://www.cipd.co.uk/knowledge/strategy/analytics/illustrating-companys-true-value> [Accessed 27 April 2017].
- MCCRACKEN, M., MCIVOR, R., WALL, T. and TREACY, R. (2017) *Human capital theory: assessing the evidence for the value and importance of people to organisational success*. London: Chartered Institute of Personnel and Development.
- MINCER, J. (1974) *Schooling, experience, and earnings*. New York: Columbia University Press.
- MONDARE, S., DOUTHITT, S. and CARSON, M. (2011) Maximizing the impact and effectiveness of HR analytics to drive business outcomes. *People and Strategy*. Vol 34. pp20–27.
- MOOR, J.H. (1985) What is computer ethics? *Metaphilosophy*. Vol 16, No 4. pp266–75.
- NAHAPIET, J. and GHOSHAL, S. (1998) Social capital, intellectual capital, and the organisational advantage. *Academy of Management Review*. Vol 23, No 2. pp616–36.
- NELSON, R.R. and PHELPS, E.S. (1966) Investment in humans, technological diffusion, and economic growth. *American Economic Review*. Vol 56, No 1/2. pp69–75.
- OECD. (2007) *OECD insights: human capital*. Available at: <https://www.oecd.org/insights/37966934.pdf> [Accessed 11 April 2017].
- OECD. (2009) *Human capital and its measurement*. The 3rd OECD World Forum on 'Statistics, Knowledge and Policy' Charting Progress, Building Visions, Improving Life. Available at: <http://www.oecd.org/site/progresskorea/44109779.pdf> [Accessed 11 April 2017].
- OLIVEIRA, T.C. and DA COSTA, J.F. (2014) Gaining or losing? Projective identification, professional identities and new public management. In: MACHADO, C. and DAVIM, J.P. (eds) *Work organization and human resource management*. Switzerland: Springer Publishing.
- ORDONEZ DE PABLOS, P., TENNYSON, R. and ZHAO, J. (2013) *Intellectual capital strategy management for knowledge-based organizations*. Pennsylvania: IGI Global Publishing.
- PANDZA, K. and THORPE, R. (2009) Creative search and strategic sense-making: missing dimensions in the concept of dynamic capabilities. *British Journal of Management*. Vol 20. ppS118–S131.
- PENNINGS, J.M., LEE, K. and VAN WITTELOOSTUIJN, A. (1998) Human capital, social capital, and firm dissolution. *Academy of Management Journal*. Vol 41, No 4. pp425–40.
- PENROSE, E. (1959) *The theory and growth of the firm*. 3rd ed. New York: Oxford University Press.
- PFEFFER, J. (1998) Seven practices of successful organizations. *California Management Review*. Vol 40. pp96–124.
- PLOYHART, R.E. (2006) Staffing in the 21st century: new challenges and strategic opportunities. *Journal of Management*. Vol 32, No 6. pp868–97.
- PLOYHART, R.E. (2015) Strategic organisational behaviour (STROBE): the missing voice in the strategic human capital conversation. *Academy of Management Perspectives*. Vol 29, No 3. pp342–56.
- PLOYHART, R.E. and MOLITERNO, T.P. (2011) Emergence of the human capital resource: a multilevel model. *Academy of Management Review*. Vol 36, No 1. pp127–50.
- PLOYHART, R.E., NYBERG, A. J., REILLY, G. and MALTARICH, M.A. (2014) Human capital is dead; long live human capital resources! *Journal of Management*. Vol 40, No 2. pp371–98.

- PLSA [PENSIONS AND LIFETIME SAVINGS ASSOCIATION]. (2015) *Where is the workforce in corporate reporting?* Available at: <http://www.plsa.co.uk/PolicyandResearch/DocumentLibrary/-/media/Policy/Documents/0439-Where-is-the-workforce-in-corporate-reporting-An-NAPF-discussion-paper.pdf> [Accessed 12 April 2017].
- PODGORSKI, D. (2010) The use of tacit knowledge in occupational safety and health management systems. *International Journal of Occupational Safety and Ergonomics*. Vol 16. No 3. Pp283-310
- PODSAKOFF, N.P., WHITING, S.W., PODSAKOFF, P.M. and BLUME, B.D. (2009) Individual- and organizational-level consequences of organizational citizenship behaviors: a meta-analysis. *Journal of Applied Psychology*. Vol 94, No 1. pp122-41.
- PORTER, M.E. (1985) *Competitive advantage: creating and sustaining superior performance*. New York: The Free Press.
- POWELL, T.C. (1995) Total quality management as competitive advantage: a review and empirical study. *Strategic Management Journal*. Vol 16, No 1. pp15-37.
- PROTOGEROU, A., CALOGHIROU, Y. and LIOUKAS, S. (2012) Dynamic capabilities and their indirect impact on firm performance. *Industrial and Corporate Change*. Vol 21. pp615-47.
- RASTOGI, P.N. (2002) Knowledge management and intellectual capital as a paradigm of value creation. *Human Systems Management*. Vol 21, No 4. pp229-40.
- RASTOGI, P.N. (2003) Rethinking the process of value creation and sustained enterprise growth. *Journal of Intellectual Capital*. Vol 4, No 1. pp227-48.
- RODRIGUEZ, P.J. and LOOMIS, R.S. (2007) A new view of institutions, human capital, and market standardization. *Education, Knowledge and Economy*. Vol 1, No 1. pp93-105.
- ROMER, P.M. (1990) Endogenous technological change. *Journal of Political Economy*. Vol 98, No 5. pp71-102.
- ROMPHO, B. and SIENGTHAI, S. (2012) Integrated performance measurement system for firm's human capital building. *Journal of Intellectual Capital*. Vol 13, No 4. pp482-514.
- ROSEN, H.S. (1999) *Public finance*. New York: McGraw-Hill
- ROSLENDER, R. and STEVENSON, J. (2006) *Accounting for people: a real step forward or more a case of wishing and hoping?* Herriot-Watt University. Available at: <https://www.hw.ac.uk/schools/social-sciences/documents/dp2006-af02.pdf> [Accessed 13 April 2016].
- ROWBOTTOM, N. and SCHROEDER, M.A.S. (2014) The rise and fall of the UK operating and financial review. *Accounting, Auditing and Accountability Journal*. Vol 27, No 4. pp655-85.
- SAKS, A.M. (2006) Antecedents and consequences of employee engagement. *Journal of Managerial Psychology*. Vol 21, No 7. pp600-19.
- SCHMIDT, S.W. (2007) The relationship between satisfaction with workplace training and overall job satisfaction. *Human Resource Development Quarterly*. Vol 18. pp481-98.
- SCHOLZ, C., STEIN, V. and MULLER, S. (2007) *Monetary human capital measurement: empirical evidence from the German DAX 30 companies*. Academy of Management 2007 Conference. Philadelphia, PA, USA.
- SCHREYÖGG, G. and SYDOW, J. (eds) (2010) *The hidden dynamics of path dependence*. London: Palgrave-Macmillan.
- SCHULTZ, T.W. (1961) Investment in human capital. *American Economic Review*. Vol 51. pp1-17.
- SHAW, J.D., GUPTA, N. and DELERY, J.E. (2005) Alternative conceptualizations of the relationship between voluntary turnover and organizational performance. *Academy of Management Journal*. Vol 48, No 1. pp50-68.
- SHAW, J.D., PARK, T.Y. and KIM, E. (2013) A resource-based perspective on human capital losses, HRM investments, and organizational performance. *Strategic Management Journal*. Vol 34, No 5. pp572-98.
- SHEFFRIN, M.S. (2003) *Economics: principles in action*. New Jersey: Pearson Prentice-Hall.
- SNELL, S. and BOHLANDER, G. (2004) *Human Resource Management, International Student Edition*. New York: Thompson.
- SPENCE, M. (1973) Job market signalling. *Quarterly Journal of Economics*. Vol 87, No 3. pp355-74.
- SPENDER, J. (1996) Making knowledge the basis of a dynamic theory of the firm. *Strategic Management Journal*. Vol 17. p45.
- STAHL, G., BJÖRKMAN, I., FARNDAL, E., MORRIS, S.S., PAAUWE, J., STILES, P., TREVOR, J. and WRIGHT, P. (2012) Six principles of effective global talent management. *Sloan Management Review*. Vol 53, No 2. pp25-42.

- SUBRAMANIAM, M. and YOUNDT, M.A. (2005) The influence of intellectual capital on the types of innovative capabilities. *Academy of Management Journal*. Vol 48, No 3. pp450–63.
- TEECE, D.J., PISANO, G. and SHUEN, A. (1997) Dynamic capabilities and strategic management. *Strategic Management Journal*. Vol 18, No 7. pp509–33.
- THOMAS, H., SMITH, R.R. and DIEZ, F. (2013) *Human capital and global business strategy*. New York: Cambridge University Press.
- TSENG, J.F., WANG H.K. and YEN, Y.F. (2014) Organisational innovability: exploring the impact of human and social capital in the banking industry. *Total Quality Management*. Vol 25, No 10. pp1088–1104.
- VIDAL-SALAZAR, M., HURTARDO-TORRES, N. and MATHIS-RECHE, F. (2012) Training as a generator of employee capabilities. *International Journal of Human Resource Management*. Vol 23, No 13. pp2680–97.
- WANG, C.Y.P., JAW, B.S. and TSAI, C.H.C. (2012) Building dynamic strategic capabilities: a human capital perspective. *International Journal of Human Resource Management*. Vol 23, No 6. pp1129–57.
- WANG, H., CHOI, J., GUOQUANG, W. and QI DONG, J. (2016) Slack resources and the rent-generating potential of firm-specific knowledge. *Journal of Management*. Vol 42, No 2. pp500–23.
- WEISS, A. (1995) Human capital vs. signalling explanations of wages. *Journal of Economic Perspectives*. Vol 9, No 4. pp133–54.
- WRIGHT, P.M., COFF, R. and MOLITERNO, T.P. (2014) Strategic human capital: crossing the great divide. *Journal of Management*. Vol 40, No 2. pp353–70.
- YOUNDT, M.A. (2004) Intellectual capital profiles: an examination of investments and returns. *Journal of Management Studies*. Vol 41, No 2. pp335–61.
- ZWITTER, A. (2014) Big data ethics. *Big Data and Society*. Vol 1, No 2.



CIPD

Chartered Institute of Personnel and Development
151 The Broadway London SW19 1JQ United Kingdom
T +44 (0)20 8612 6200 **F** +44 (0)20 8612 6201
E cipd@cipd.co.uk **W** cipd.co.uk

Incorporated by Royal Charter
Registered as a charity in England and Wales (1079797) and Scotland (SC045154)
Issued: May 2017 Reference: 7501 © CIPD 2017



9 781843 984702