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Give Me a Two-by-Two Matrix and I Will Create the Market:

Rankings, Graphic Visualisations and Sociomateriality

Neil Pollock & Luciana D'Adderio

University of Edinburgh, UK

Corresponding Author:

Neil Pollock (neil.pollock@ed.ac.uk)

Give Me a Two-by-Two Matrix and I Will Create the Market: Rankings, Graphic Visualisations and Sociomateriality

Abstract

Scholars have described how rankings can be consequential for the shaping of the economy. The prevailing argument is that they wield influence through encouraging 'mechanisms of reactivity' amongst market actors. We ask the question as to whether there are additional agential aspects found within rankings that extend 'social' accounts. We suggest that 'sociomateriality' is also a significant aspect of a ranking's influence. Through developing the notion of a 'ranking device', we examine how the "format and furniture" of a ranking can mediate and constitute a domain. Drawing on a detailed study of a prominent graphical performance measure from within the information technology (IT) arena, we provide evidence to show that IT markets can be as much a product of the affordances and constraints of ranking devices as any other (non-material) aspects of the ranking. The article integrates literature from Accounting research and Science and Technology Studies to contribute to our understanding of how material things and the economy mutually constitute one another. It also offers one of the first empirical accounts of the sociomaterial construction of a graphical ranking.

Keywords: rankings, sociomateriality, performance measures, information technology, inscriptions, graphs

Give Me a Two-by-Two Matrix and I Will Create the Market: Rankings, Graphic Visualisations and Sociomateriality

Introduction

Rankings represent an important mechanism shaping markets (Aldridge 1994, Shrum 1996, Schultz *et al.* 2001, Blank 2007), such that scholars have labelled them 'engines' within the economy (Espeland and Sauder 2007, Karpik 2010). To depict a ranking in this way is to imply that it is not a passive portrait of the world but "an active force transforming its environment" (MacKenzie 2006, 12). This is indicative of a growing consensus also from within Accounting research about how we should theorise the power of formal measures of performance and reputation (see Argyris 1954, Cooper & Hopper 1989, Lapsley & Mitchell 1996, Kornberger and Carter 2010). Despite highlighting a key area for empirical and theoretical inquiry, however, this popular conceptualisation carries unquestioned assumptions about the way we understand their constitutive role. In particular, the influence of a ranking is seen to reside predominately in how it encourages 'mechanisms of reactivity' amongst market actors (Espeland and Sauder 2007). What this suggests is that rankings are intrinsically 'social', at the same time raising the question as to whether there are further agential aspects that might extend this social mode of analysis. Are there additional agencies (other than how people respond to them) to be found in the makeup of rankings?

A useful prompt is found in tracing the idiom of the term engine itself. From 17th Century English science, for instance, we learn how instruments, artifacts and diagrams - combined with the 'ingenuity, craftiness and inventiveness' of gentlemen scientists - could function as generative engines in producing early scientific knowledge (Carroll-Burke 2001, 599). To capture the nature of this intervention, however, one also had to consider the tools and devices' hard, physical, material, engineering, and 'artificial' aspects (*ibid.* 600), which were key features of the artifacts involvement in everyday practices. Whilst the first view presents the intervention of engines as a social form of 'manipulation', the "products of ingenious minds, clever contrivances and artful designs" (*ibid.,* 599), the second places them squarely in the domain of practice, matter, method and constraint.

We see value in bringing both aspects together to capture how the abstract, generative capacity of a ranking can result from – and be shaped by - the interplay of a heterogeneous range of sociomaterial constraints and practices. To this purpose, and building on recent discussions of market devices (Callon *et al.* 2007), we develop the idea of a *ranking device*. This focus on objects is warranted because at a basic level a ranking cannot exist without some kind of device (*ibid.* 2007). The idea of the '100 top restaurants', '10 leading law schools', or '20 best cities to work and live', for instance, would be impossible without the device of 'the list' (Goody 1977). Analytically the notion of device is useful because it captures how a ranking is an 'artifice', an 'artifact', the product of a practice (OED). In can also be used to describe an object that contains certain constraints and affordances, while at the same time capturing the aspect of 'clever contrivance' and 'artful design' (rankings are clearly devised in the sense of something manufactured or contrived) (*ibid.*).

In this paper, we want to show that devices do more than simply facilitate the production and communication of a ranking. They actively participate in their shaping. The specific argument developed is that it is these sociomaterial aspects, together with how people respond to them, that can account for the influence of a ranking. We would go as far as to argue that, in certain case, the constitutive potential of a ranking can reside in its affordances and constraints as much as any other complementary aspect (like the 'calculation'). Our study draws on observations and interviews conducted over a period of several years on the construction and use of one of the most influential rankings from the information technology (IT) arena - a two-by-two matrix called the 'Magic Quadrant'.

To show this influence we draw on and integrate a number of schools of thought from Accounting research as well as Science and Technology Studies (STS). The first is Miller's 'governance of economic life' framework which studies the interactions between 'programmes' and 'technologies' as domains are made 'calculable' (Miller 2001, Miller and O'Leary 2007, Miller 2008). The second is the Accounting literature's focus on 'graphic inscriptions' (Robson 1992, Chua 1995, Bloomfield and Vurdubakis 1997, Ezzamel *et al.* 2004, Dambrin and Robson 2011, Qu and Cooper 2011). Whilst scholars have linked the issue of how a figuration might facilitate and mediate a financial decision (Miller and O'Leary 2007), they have not yet considered how calculations might be shaped by and result from the specific sociomaterial

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features of a graph. Finally, to demonstrate how a visualisation might offer affordances and constraints to those producing a ranking we draw on a range of studies from Science and Technology Studies on how material artifacts and economic markets mutually constitute one another (Callon *et al.* 2007, MacKenzie 2009, Vollmer *et al.* 2009) and the use of graphic inscriptions in Science (Latour 1986, Lynch 1985, 1988) and other domains (Espeland and Stevens 2008, Quattrone 2008).

Rankings are engines within the economy

Today there appear to be formal ranking measures to rate the quality and value of most things: art (Becker 1982), theatre (Shrum 1996), restaurants (Blank 2007), films, music (Karpik 2010), the performance of various public services such as hospitals, schools, Business Schools (Wedlin 2006), and universities (Strathern 2000, Free *et al.* 2009), the efficiency of the latest consumer products (Aldridge 1994), the reputation and competence of companies (Schultz *et al.* 2001, Author Study 2009). There are those listing the 'best places' to live and work (Kornberger and Carter 2010), the 'top holiday destinations' (Scott and Orlikowski 2009, Jeacle and Carter 2011, Scott and Orlikowski *in press*), and so on.

Despite their simple and often contested nature, there is growing evidence to suggest that rankings play an enhanced role in decision-making (Aldridge 1994, Wedlin 2006, Blank 2007, Karpik 2010). Speaking about one of the most well known rankings, the *Red Michelin restaurant guide*, for instance, Karpik (2010, 77) writes: "…this veritable paper engine [has] the rare ability to create the conditions of large-scale comparisons of incommensurable entities while thoroughly respecting their particularisms". In their discussion of the global league tables of cities Kornberger and Carter (2010, 333) similarly suggest that league tables are 'engines and not simply cameras' that create comparisons between hitherto unrelated places. The resulting competition between global cities, they argue, is not a natural fact but it has been brought into being through the circulation of rankings. League tables now, in their words, "form the battleground on which cities compete with each other" (*ibid.*, 236); for example, they have *actively* encouraged city administrations to change behaviours and to develop strategies that set them apart from other metropolis (*ibid.*)

Covering a plethora of devices as used in a variety of industries and contexts the above works address how rankings, as ordering systems, intervene in shaping the reality they attempt to monitor. One nuanced discussion of this kind – setting out in

detail the means by which rankings are generative - is Espeland and Sauder's (2007) report on university Law Schools. They suggest that: "…rankings are reactive because they change how people make sense of situations; rankings offer a generalized account for interpreting behavior and justifying decisions within law schools, and help organize the "stock of knowledge" that participants routinely use" (*ibid.,* 11).

Espeland and Sauder (2007) suggest that rankings do more than simply grade or describe: they also offer new interpretations of a situation. Actors then adapt their behaviour to conform with this altered understanding (in a formulation that has much in common with Hacking's [1983] notion of *representing* and *intervening*). To evidence how a ranking can intervene, they cite the words of a respondent. A university manager notes how "[r]ankings are always in the back of everybody's head. With every issue that comes up, we have to ask, 'How is this impacting our ranking?'" (*ibid.,* 11). Their thesis is that ultimately rankings can become *self-fulfilling*:

> One type of self-fulfilling prophecy created by rankings involves the precise distinctions rankings create. Although the raw scores used to construct [Law School] rankings are tightly bunched, *listing* schools by rank magnifies these statistically insignificant differences in ways that produce real consequences for schools, since their position affects the perceptions and actions of outside audiences (*ibid.,* 12, *our emphasis*).

This leads them to suggest that "[r]ankings are a powerful engine for producing and reproducing hierarchy since they encourage the meticulous tracking of small differences among schools, which can become larger differences over time" (*ibid.,* 20).Whilst changes in interpretations and perceptions are obviously important, however, this view seems to suggest that a ranking is an entirely 'social' phenomenon. Likewise to propose that a ranking primarily resides in the 'heads' of actors would tend to overlook additional inherently material agential features.

Espeland and Sauder (2007) hint at (but do not develop) the importance of material format in facilitating particular interpretations. To paraphrase their words, *the list* magnifies small differences that produce real consequences. Kornberger and Carter (2010, 330) write that the power of a ranking "rests in its capacity to shape people's cognitive maps and takes on material forms through translations into charts, models, graphs, documents, brainstorming techniques and other elements…". Building on Espeland and Sauder (2007) it could be inferred that a list does more than simply *magnify* a particular aspect of the ranking. Kornberger and Carter (2010) explicitly

flag the role of artifacts but foreground cognitive dimension, such that whilst devices figure in their analysis they are not necessarily seen as party to interactions.

Hacking (1992) provides a useful guide in his later formulation of the representation and intervention couplet where he acknowledges the centrality of 'instruments'. Representations should be studied alongside (not apart from) 'instruments', he argues, because it is these that produce particular kinds of intervention. In Hacking's view, it is representations *and* instruments that co-produce one another. Miller and O'Leary (2007, 707) apply these ideas through addressing the interactions between 'programmes' and 'technologies'. Programmes refer to "the imagining and conceptualising of an arena and its constituents, such that it might be made amenable to knowledge and calculation" (*ibid.,* 702). Technologies denote the "possibility of intervening through a range of devices, instruments, calculations and inscriptions" (*ibid.,* 702). The key aspect of their work is that processes of calculation can only be extended through the interaction *between* programmes and technologies. As Miller and O'Leary (2007) describe it is not simply a case of 'implementing' a set of ideas within a device. Rather, devices come to *mediate* and *shape* conceptualisations and vice versa.

We enthusiastically adopt this terminology both for the ways it focuses attention on how there is a 'calculation' involved in the production of a ranking (see Kornberger and Carter [2010] and Jeacle and Carter [2011] for this reading) but also because it flags the fact this calculation results from a process where 'social' and 'technical' elements are brought together. Scholars working within this framework, however, have only begun to specify the process by which we might study and theorise interactions between material objects and wider calculative conceptions. In this respect, we are given rather few clues as to the actual mechanisms of co-production or the ways in which technologies, devices or graphic inscriptions for that matter can mediate and shape ideas. We thus find a need to supplement our analytical toolbox with concepts more attuned to considering the affordances and constraints of (particularly graphic) devices.

Material agency: Affordance and constraint

Scholars have flagged the role of 'mediating instruments', 'market devices' and 'intellectual equipment' in facilitating processes of calculation within markets (Miller and O'Leary 2007, Callon *et al.* 2007, MacKenzie 2009). In contrast to those

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approaches foregrounding single actors in market decisions, it has been argued that actions and calculations are never performed by individuals alone. Rather, they are always propped up and aided by various kinds of material artifact. In this view, artifacts are seen to have 'agency', as they produce specific kinds of effects. In terms of who or what makes someone - or something - an agent, Latour argues that: ''*anything* that [can] modify a state of affairs by making a difference is an actor'' (2005:71, *emphasis in original*). Thus, Preda (2008) discussed how the 'price ticker' in the early years of the stock market was an agent in leading to different forms of decision making in the trading of stocks. Miller and O'Leary (2007), in their account of the history of integrated circuits, treat future based *graphs* or *technology roadmaps* in a similar way. Instruments were in their case central in channelling discussions concerning the funding and development of integrated circuits across different scientific and industrial domains.

Both examples suggest that material devices play key roles in *mediating* or *constituting* behaviour (Akrich and Latour 1992). Miller and O'Leary's concern was with how roadmaps worked to mediate between the interests and strategies of multiple organizations involved in the development of the new market of post-optical lithography (*ibid*., 720). In Preda's case, the price ticker produced a constant flow of prices that could be visualized in new ways. The ticker constituted the stockbrokers' practices in such a way that they found themselves having to adapt to the continuous flow of price data such that they switched from being 'observers of the market' to 'observers of the tape' (*ibid.*, 232).

Another way of describing this agency is to suggest that artifacts have *affordances* and *constraints*. Although the original idea of affordance stems from the work of Psychology (Gibson 1979), it has been subject to recent discussions within STS and the Sociology of Technology (Hutchby 2001, David and Pinch 2008). Gibson defined affordance as the "perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used" (*ibid.*, 9). Hutchby later softened this as those material aspects which frame but do not necessarily determine the actions of people (2001). In this latter relational view affordances exist in tandem only with how people take them up and the particular conditions of the local context. Writers like David and Pinch (2008) have recently built on this in their discussion of online book reviews where they describe how there

can be 'material' and 'social' affordances shaping reviews. Physical affordances mean that a reviewer can write as much as she wants (limited only by her patience and the capacity of the computer's hard disk) but social practices (such as publishing conventions) dictate that reviews are normally limited to a handful of pages. Scholars such as Orlikowski (2007) have noted that since these two things are inseparable it is necessary to theorize the 'social' and 'material' as elements that mutually constitute one another: "the social and the material are considered to be inextricably related — there is no social that is not also material, and no material that is not also social" (ibid., 1437). This reflects an intellectual project in the social analysis of technology never to simply 'black box' objects but to study their profoundly social and material elements. Since there is no clear boundaries between what is social and what is material scholars refer to these more precisely as 'sociomaterial'. Whilst adopting this particular terminology in the paper we will also at times refer to the 'social' and 'technical' as there are analytical benefits from treating separately these empirically entwined features.

Ranking Devices

We are now in a position to set out more clearly what we mean by a 'ranking device'.[1] Specifically, we propose that these are the "format and furniture" implicated in the materiality of a ranking. The analytical value of the term is that it foregrounds how a ranking (the 'calculation') can be shaped through its incorporation in particular sociomaterial objects. Those constructing a ranking are required to take into account the device's various affordances and constraints when they plot a dot on a graph. To lay the foundations for our empirical study we discuss some of the furniture commonly found within rankings. This is followed by a discussion of some of the sociomaterial affordances and constraints surrounding the production of graphs.

Format and furniture

Rankings are shot through with various kinds of devices in and through which they are embedded and become material. There are those that come in the form of lists or tables and then there are those that are more graphical in nature. One finds many

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1 Whilst our term builds on the idea of 'market device' - defined as "…the material and discursive assemblages that intervene in the construction of markets" (Callon *et al.* 2) – we attempt to operationalise this idea specifically for the way visual devices mutually constitute calculative practices. We do so by drawing on and making use of insights provided by more established ways of thinking (the 'programmes and technologies' framework, 'sociomateriality', 'affordance' and 'graphic inscription', and so on).

examples of ranked lists (our informal research on Google, for instance, suggests at least several hundreds). Stark (2011) argues that this format became popular in the 1950s and cites the 'jukebox' as a possible source. Since jukeboxes held 40 single records this apparently led to the development of 'top 40' record programmes on radio stations (see also Anand and Peterson 2000). Today the list has become the format of choice for many ranking organisations. One of its affordances appears to be that it is relatively unconstrained by the number of subjects evaluated. The 'top 10 MBA programmes' can (and often are) extended to include the 'top 50', 'top 100' degrees, for instance. Kwon and Easton (2010), in their discussion of the Financial Times' list of MBA programmes, suggest that the longer the list the more comprehensive or 'global' it may appear in certain peoples' eyes: "…individual consumers can find comfort in the perception that they can choose the 'best' among hundreds or thousands of alternatives, rather than the 'best' among several 'good enough' alternatives arising through the search process. The FT MBA 100 allows buyers to maximize their choice of a highly ranked school, given personal constraints such as budget, geographical preferences and entry requirements" (ibid., 133). We flag this feature because it is not a capacity found in all rankings (see empirical discussion below).

Rankings are also supported by specific furniture. In their discussion of consultancy reports, for instance, Qu and Cooper (2011, 358) highlight the role of the furniture of 'bullet points' and 'checklists' as providing a "topographical image of how various employee groups within an organization are relevant to achieving strategic objectives". In the case of rankings there are stars, lines, waves, tics, dots and so on. Kwon and Easton (2010, 132) argue that the use of such furniture constitutes a particularly novel feature or form of contribution. Whilst rankers have not been particularly innovative with regard to methodology, or how assessments are put together, they have been at the forefront in terms of developments in 'format and presentation'. Kwon and Easton (2010) describe how the *Michelin Red Guide*, for instance, was amongst the first of the major rankers to supplement complicated forms of quantitative data with 'qualitative descriptors'. It rated restaurant quality by producing the "now famous three-star scale to denote relative excellence" (*ibid.* 132). These descriptors are now very much part of the machinery for ranking restaurants around the world (see Karpik 2010).

However, we still know very little about why such furniture has become popular or what, if anything, it has meant for these particular settings. We would argue that they are important because, they render the calculation visible through some kind of large-scale ranking apparatus of which these descriptors form a part. They are thus an aspect of the calculative practices for turning 'qualities into quantities' (Miller 2001) (see Kornberger and Carter [2010] and Jeacle and Carter [2011] for a discussion of calculative practices involved in ranking). While therefore their importance has been acknowledged, their effects have not been demonstrated. This we suggest becomes more obvious when one considers the production of graphical rankings where rankers are forced to entertain and take account of quite specific affordances and constraints. To understand what these are we turn to a discussion of the construction of graphs.

Graphic visualisation: From looking *at* graphs to looking *in* graphs

Latour famously argued that 'he who visualises badly loses the encounter' (1986, 13). The 'scientific graph' was originally said to be one factor that gave science its influence over other forms of knowledge production. For Latour, the graph was an 'inscription device'; the key idea behind this concept was that of 'mobility' (the product of a laboratory could circulate widely without taking with it the apparatus that led to its production). Accounting research has focused on the inscriptions that construct performance measures more generally (see Robson 1992, Dambrin and Robson 2011), with particular attention being given to 'graphs'. Qu and Cooper (2011, 358), for instance, highlight how "graphical inscriptions are generally persuasive in communicating information. They solidify ambiguous concepts into concrete forms…". Whilst scholars have mobilised the notion of inscription to capture how material substances are translated into figurations that can travel, however, it would be fair to say that they have looked *at* the graph but not necessarily *in* the graph (see Qu and Cooper's [2011] call for research on the *production* of inscriptions).

Some partial exceptions include Miller and O'Leary (2007) and Quattrone (2008). In his discussion of the history of the book, for instance, Quattrone (2008, 109) suggests that it is because graphs are 'partial' and 'simplified' that they have an effect:

> Graphical representations…are always so partial and simplified that they essentially contain very little; they have little truth in them; for, if it ever existed, it has been lost in the process of diagrammatic representation which has sacrificed details and context for the sake of clarity. This is the only way in which they can effectively communicate and engage the user in a performative exercise.

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From sources further afield, Espeland and Stevens (2008, 423), in their review of the Communication Studies literature, argue that graphs are successful because they are produced according to 'aesthetic ideals' (*ibid*., 423, see also Bloomfield and Vurdubakis 1997). This includes how they should have clarity and be parsimonious: "…people who make pictures with numbers typically prize representations whose primary information is easily legible (clarity), and which contains only those elements necessary and sufficient for the communication of this primary information (parsimony)" (Espeland and Stevens 2008, 423; see also Tufte [2001] on whom Espeland and Stevens draw). This is because those who construct graphs as part of their professional activities want them to be "not only errorless but also compelling, elegant, and even beautiful" (Espeland and Stevens 2008, 422).

The contributions above suggest that graphs place 'limits' on designers. We supplement this with work from STS where Lynch (1988, 202) argues that graphs (in science) do more than constrain; they also *add* features and affordances not found in original understandings.

> The [graph] does not necessarily *simplify* the diverse representations, labels, indexes, etc., that it aggregates. It adds theoretical information which cannot be found in any single micrographic representation, and provides a document of phenomena which cannot be represented by photographic means (*emphasis in original*).

Even the simplest graphs, in Lynch's view, *add* rather than reduce information. They contribute:

> …visual features which clarify, complete, extend, and identify conformations latent in the incomplete state of the original specimen'. Instead of reducing what is visibly available in the original, a sequence of reproductions progressively modifies the object's visibility in the direction of generic pedagogy and abstract theorizing (*ibid.*, 229).

An example of those things added can be found in an earlier paper where Lynch discusses a common but little discussed graphic resource is the 'device of the dot' (1985, 43). Analysing a field manual describing the anatomy of a lizard he makes the following point:

> Note that each observation of a marked individual is rendered equivalent to all others through the use of the device of the 'dot'. The only material difference between one dot and another on the chart is its locale. Locales are reckoned in terms of the grid of stakes, and all other circumstantial features of observation 'drop out'.

Dots are 'additive' rather than 'reductive' (we get this terminology from Ingold's discussion of another type of notation, 'the line' [2007]). Lynch (1986) flags how graphs provide for commonplace resources of graphic representation. Understanding the interplay between graphic resources and the thing they purport to describe,

therefore, is important. Lynch (1988) suggests it is this way one can witness how the properties of graphs go onto merge with and come to incorporate the thing represented. He writes: "…one theme which applies to many, if not all, graphs is that of how the commonplace resources of graphic representation come to embody the substantive features of the specimen or relationship under analysis (Lynch 1988, 226). In turn: "…efforts are made to shape specimen materials so that their visible characteristics become congruent with graphic lines, spaces, and dimensions (*ibid.,* 227).

To summarise, we find it necessary to bring together a number of complementary disciplinary schools to discuss this complicated phenomena. Specialisation in this respect has traditionally posed a major barrier to analysis and understanding (Hopwood 2007). Linkages across different scholarly fields provide important new insights into how we understand, represent and theorize the tools and practices of performance measurement. In this respect, the 'programmes and technologies' framework (Miller and O'Leary 2007) tells us how areas are conceptualised in certain ways so that they can become 'calculable', often through interventions made possible through devices. The literature from STS directs attention to how devices do not simply support but can act within calculations. The idea of a 'ranking device' drills down further still to show how a ranking (and 'calculation') can be shaped by its incorporation in a specific format and furniture, and, in turn, with how these sociomaterial features can shape aspects of the market.

The kinds of markets we are interested in are those procurement markets related to the supply of advanced technologies like information systems and other kinds of software. We organise our empirical material around a discussion of three aspects of how specific furniture - 'the dot' – is moved around a graph. The first section focuses on how the ranking helps create a 'competitive space' in relation to the shaping of the visible market of players.[2] It discusses how new expertise, practices and routines are created and emerge as vendors attempt to improve their placing in the competitive space (what actors call 'moving the dot activities'). The second section investigates how the competitive space is shaped not only by 'people moving dots' but also by sociomaterial constraints. In particular, the affordances and limitations found within

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2 We define a 'competitive space' as the space of confrontation and struggle that is created between various economic players in a specific technological field, often through the use of various social and material strategies linked to a ranking.

the ranking device (here the focus is on how 'dots move people'). Specifically these are material affordances (for instance how players in a market can be brought together and compared in one space) and social constraints (not all players can be included on one graph). The final section discusses how these constraints encourage rankers to make interventions in the competitive space (how 'dots move markets').

Setting and method

The Magic Quadrant

The ranking discussed here is produced by the industry analyst firm Gartner Inc. (hereafter Gartner). Founded in 1979 by Gideon Gartner, the firm operates (almost exclusively) within the information technology domain.[3] Whilst Gartner is just one of a number of such research organisations within this area, it is widely recognised as the largest and most influential. Despite not having a monopoly over the production of IT analysis, commentators suggest it has something close (Hopkins 2007).[4] Gartner's strap line is that it "wants to be involved in every IT decision" (interview, Gartner Analyst A). The Magic Quadrant is by far the most well-known of Gartner's research tools. This attempts to compare and rank software vendors according to a number of predefined measures. It comes in the form of a box with an X and Y-axis (labelled as 'completeness of vision' and 'ability to execute') dimensioning a two-by-two matrix, with four segments into which one can see placed the names of several vendors (see figure one). Vendors are not randomly placed. Each segment is individually labelled (niche player, challenger, visionary and leader). The position of a vendor in a particular segment signifies something regarding its current and future performance as well as its behaviour within markets (Burton and Aston 2004). Those placed further to the right are seen to have more 'complete visions', whilst those placed towards the top an elevated ability 'to execute' on that vision.

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3 Gartner runs 'executive programs', has an established consultancy wing, organises regular themed conferences and symposiums on emerging technological topics, and produces research for the IT market. This latter activity forms the bulk of its enterprise, and it is where 80% of revenues are generated (Drobik 2010). Gartner has over 4,000 employees and offices in 80 countries around the world. It is reported to have over 60,000 clients from 10,000 different organisations (ibid.). For further information about Gartner's activities, see Author Study [2010].

4 This point about monopoly is important for what is described below. It is clear that rankers are stronger when there is only one dominant evaluator in an area. Kwon and Easton (2010, 124) note how an individual ranker "…can become powerful to the point where they are able to monopolize the information required for the efficient functioning of markets and thereby influence the behaviour of other market actors".

Figure one about here

Gartner are prolific in the production of Magic Quadrants: they author nearly 150 for different IT markets (Drobik 2010); this number changes all the time as Gartner continually creates new Magic Quadrants to reflect the development of new types of technology markets and occasionally 'retire' older ones to represent the fact certain markets have matured. Authorship of Magic Quadrants is not a one-off process. They are updated and released each year. This means how vendors are placed within the matrix will change over time. There may also be the introduction or exit of players onto the Magic Quadrant.

In the IT domain there are a number of visual rankings (examples include the 'Forrester Wave', the 'Gartner Hype Cycle', the 'Gartner Clock', the 'Ovum Decision Matrix', to name but a few). The Magic Quadrant is, by far, the most referenced of these (Violino and Levin 1997). One Gartner Analyst we interviewed describes how: "[a] good Magic Quadrant will get fifteen hundred downloads every month" whereas a "Hype Cycle will get around six or seven hundred" (interview, Gartner Analyst B). These are downloads from the Gartner website (accessible only by fee-paying clients). Magic Quadrants are also often posted on the Internet (meaning they are normally available to a much wider audience).

Decision makers apparently draw on these rankings to help facilitate choices when procuring IT equipment and software. It has become part of IT folklore that those looking to buy solutions invite only those in the top right quadrant to tender. This leads some to suggest that a high-ranking guarantees a vendor more attention than its rivals (Hind 2004) or that the ranking has the power to 'make or break' a vendor (Violino and Levin 1997). It is perhaps no surprise then that vendors seek to influence the shaping of the ranking. Some are even said to construct aspects of their business (marketing and product development strategies) in line with the ranking's underlying assumptions (Hopkins 2007).

Research on the Magic Quadrant

We have been studying the Magic Quadrant for several years now. Our attention was alerted to its significance whilst carrying out an ethnographic study of IT procurement in a large municipal council at the turn of the century (Author Study 2007) and then a

couple of years later during a study of how users bring influence to bear on ERP vendors (Author Study 2009). These initial dealings prompted us to plan and develop a research project that would enquire into the production of this ranking and the nature of the expertise surrounding it. The fact our project was funded filled us with both excitement and (it must be said) a certain amount of dread! There is a perception that it is difficult to gain access to Gartner (a point said to be true of rankers more generally [Kwon and Easton 2010], which perhaps explains the paucity of studies on the production of rankings). Nevertheless, we set out to conduct fieldwork in the hope that we would get lucky (and 'fortune' does seem to feature in a lot of research). In our initial attempts to gain access, we wrote to one particular analyst whom we had come across in previous fieldwork. He agreed straightaway to an interview, which meant we were able to visit Gartner's European headquarters in London and begin what turned out to be a highly productive period of fieldwork.

Data collection

Since this particular analyst worked in the area of 'Customer Relationship Management' (CRM) technologies and was able to provide specific details on how the CRM Magic Quadrants were constructed, we devoted most of our time to following events and people in this area. We attended two symposiums organised by the Gartner CRM team. Here we could observe the formal presentations made by analysts but also approach them informally afterwards. These occasions turned out to be a particular fertile ground for studying rankings. Since the meetings were run in a similar fashion to academic seminars it was easy to engage analysts in conversations or to simply hang around and listen whilst others quizzed them about their thinking behind the placing of vendors. Whilst we benefited from these spontaneous discussions, we were also able to conduct interviews with analysts. We carried out seven formal interviews with Gartner analysts: three of these were over the telephone, and four took place face to face.

We circulated an early research paper within Gartner, which not only served to validate our findings but also led to further episodes of fieldwork. One analyst, forwarded the article by a colleague and whom we had previously interacted with, contacted us to tell us that he thought that we had produced a 'critical but fair' analysis of Gartner's work. He also reflected on how we had missed some of the more 'internal' aspects by which Magic Quadrants were constructed. Later, in a hastily

arranged interview, he would tell us about these aspects. These form part of the material presented here.

Our study is further informed and contextualised by interviews and discussions we conducted with other actors involved in and around the ranking. This includes four categories of player: 1) we conducted two formal interviews with some of the vendors subject to Gartner's assessment; 2) we held informal discussions, especially during our attendance at Gartner conferences, with the IT managers and practitioners who consume this kind of knowledge; 3) we interviewed analysts from five rival firms to ascertain their view on Gartner's ranking process and its wider effects on the market; 4) we also interviewed and observed the activities of a new breed of professional that has emerged to offer advice to vendors on how to interact with ranking organisations like Gartner.

Within the larger IT vendors there are now commonly 'analyst relations' (AR) departments which contain experts whose role is to liaise with and represent the vendors to industry analysts, consultants and other commentators. These experts attempt to understand the details of how industry analyst firms work and what kinds of influence they can wield. They will be particularly keen to identify how the analyst organisation currently views their particular firm and what they might do to influence that opinion. Moreover, there are now hundreds of independent firms of 'AR consultants' operating in and around the IT marketplace. During our research, we were able to interview one of these consultants.

Overall we conducted fifteen formal interviews, carried out over 50 hours of observation at conferences, listened to and participated in more than 20 'webinars', and engaged in dozens of informal discussions. All the interviews were taped and fully or partially transcribed. During participation in Gartner conferences we took extensive notes. The collection of data at these venues was facilitated by the fact that Gartner video record all sessions and make these available to participants after the event (for a further fee!). This meant we could re-listen to presentations whilst back in our university offices.

Dot-ology[5]

How rankings shape the practices of those ranked (people moving dots)

Rankings wield significant influence over a field of activity (Sauder and Espeland 2006). However, those groups and organisations subject to these measures have not stood still. A market has been created that sells of information on the details of how major rankings are constructed, together with strategies for the improvement of placings. Below we report on our interactions with a number of Analyst Relations (AR) consultants who produce and trade in this kind of knowledge. We show how one effect of their work has been to establish the ranking as a space of confrontation and struggle between competing vendors (Kornberger and Carter 2010).

Moving the dot activities: A social affair

In these first set of quotes a consultant has prepared a presentation to AR professionals. Having previously worked as a Gartner analyst, this expert now offers advice to others on how to interact with ranking bodies. His presentation is organised around various 'moving the dot activities'. He is careful to tell the audience that if they are to be successful in shaping a ranking then they will be a significant amount of work to do:

> Now, these activities that we're going to talk about, although we're going to call them out and highlight them as specific 'Moving the Dot activities', they should be part of your overall AR Strategic and Tactical Plan….I'm going to remind you, tremendous effort is required to influence the Magic Quadrant. The data that we've gathered indicates that our clients spend anywhere from 60 to 200 hours on a single Magic Quadrant…understand that this is not an insignificant amount of work (presentation, AR consultant A).

In terms of the type of work necessary, firstly, this includes gathering insights about the makeup of the Magic Quadrant and, then secondly, feeding information back to the ranker about a vendor's products, strategy and specifically 'thought leadership'. Vendors are encouraged to do the latter through building personal relationships with individual rankers, often through engineering periods of 'social time' between them and particular analysts (conducting discussions 'over a meal' being one of the favoured methods) (presentation, AR consultant A). Thus, there appear to be rich and

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5 What could be more banal than a 'dot'? However, if we want to understand the constitutive nature of a visual ranking then we have no choice but to focus attention on this particular graphic furniture. Dots form the basis of every conversation and consideration with regard to the Magic Quadrant. Everything that happens typically occurs around the dot. Dot-ology, which is a development of an actors' category, attempts to capture how this mundane furniture can offer new possibilities, place limitations on actors, and encourage processes of co-production between graphs and settings.

direct interactions between rankers and those they rank (albeit mediated by these new kinds of intermediaries).

Another AR consultant interviewed described how he had engaged in a similar process when one of his own clients had received a negative placing:

> We used enquires with specific analysts in the channel to understand who they should be approaching to help go to market with specific vertical analysts at Gartner to understand the best approach to solve the business problems in that particular industry. And we focused on specific analysts to help us make sure our message and our persistent focus directly for that individual, that individual market (interview, AR consultant B).

The consultant goes onto describe how the key reason for these 'briefings', 'enquiries', 'touches', or 'deep dives' was to bridge the 'gap' in knowledge between the ranker and the vendor. To evidence this he gives an example of a successful set of interactions:

> [O]ne of our clients was getting involved in a Magic Quadrant and…we tried to understand what the analyst thought about our company, and we realised that there were several areas where there was a gap. So we made sure we filled those gaps…we did enquires to understand whether what we believed the message should have got across, whether the analyst got that across, and if it wasn't we tried to fill that gap. So when the Magic Quadrant finally came out we positioned, we knew the analyst had sufficient information, we knew where we had weak points and we addressed those, so it wasn't a shock. In fact, we were positioned in the top right hand corner. It was fantastic! (interview, AR consultant B).

Both consultants describe how the rationale for these briefings and meetings should be for the vendor to understand the 'evaluative criteria' the ranking organisation applies when assessing vendors/products. This is the specifics as to how individual rankers' conceive of the nature and characteristics of the various technologies covered by their particular Magic Quadrant:

> I need to understand the criteria and current opinion and the publishing schedule, and I need to see what I can do to influence that criteria and that opinion. Now we're going to use the analysts by doing inquiry to find out this information, like what is changing in the criteria…consulting with them, perhaps even use some of their information and criteria to influence the way in which my product roadmap is going to go (presentation, AR consultant A).

The suggestion given is that once a vendor understands the ranker's evaluative criteria that they should then use this information to influence their own product development strategies. In other words, they should develop products and strategies in a way that more closely resembles the ranker's description of the technology/market (this is reported to be a common strategy amongst many IT vendors [Hopkins 2007]). If not possible (or desirable) to realign product development around the ranking then another solution is to attempt to modify the criteria of the ranking:

> …we might even give consideration to trying to change the character of the Magic Quadrant [through] influencing the definition of exactly what this Magic Quadrant is. That's part of changing the criteria. If I can sort of say 'Look, this is not the same Magic Quadrant as it used to be, now it has a new set of objectives and a new set of criteria because the market has changed', that has an interesting possibility of radically changing the position of all the dots (presentation, AR consultant A).

What is being recommended is that vendors should attempt to move the ranker's conception of the technology assessed. In so doing, there will be obvious advantages for the vendor that is able to help set the criteria by which products in a particular market are judged. The AR consultant then closes this particular segment by giving some practical examples of what kinds of benefits might be gained from (re)setting criteria.

Bringing vendors into the same competitive space

The issue of competition – and shaping of the competitive landscape - is a key theme surrounding the Magic Quadrant. The AR consultant suggests that if a vendor has a product that is significantly different from those of competitors then it may be possible to suggest to Gartner that it need create a *new* Magic Quadrant. This they can do through feeding analysts their thoughts on how particular technologies and technology markets are developing. Alternatively, through similar kinds of interactions and briefings, there may also be the possibility of 'killing' a Magic Quadrant where a vendor is not doing so well:

> Alternatively, there's the chance of creating a completely new Magic Quadrant. Gartner does retire old ones and create new ones. Working with an analyst that doesn't have a Magic Quadrant, you might be able to create a new one. Working with the analyst that has two Magic Quadrants, you might be able to alter the characteristics. Working with an analyst that has lots of Magic Quadrants, you might be able to kill a Magic Quadrant (presentation, AR consultant A).

The suggestion is that a vendor may be able to create a Magic Quadrant for an area where it is the 'leader'. It may even be able to help retire a Magic Quadrant where its competitors are doing particularly *well* by comparison. The consultant suggests that whilst a firm may not always be able to move *its* dot up it should nonetheless give consideration as to how it might be able to move its competitor's dot *down*:

> An alternate objective is to move your competitor dot down, to the left…So that might be an interesting approach…if I had the ability to push my competitor down then by inference I've pushed myself up. I might look at an objective as increasing the distance between you and the competitors, or preventing a competitor from leapfrogging over you (presentation, AR consultant A).

What is being described here is how it is the ranking itself that mediates and constitutes competition. Even though a vendor may not necessarily have thought of

itself as directly competing with specific others, through placement on the Magic Quadrant, the competitive space has been mapped out. Vendors are seen (and increasingly treated) as direct rivals (Kornberger and Carter 2010). In the consultant's view, the Magic Quadrant clearly indicates a vendor's standing in relation to those immediately surrounding it. And whilst vendors could not previously rank their performance against others, they can now measure the dots on a graph (and the use of a ruler by executives to capture even slight movements appears to be common – see Author Study 2009). Interestingly, whilst vendors have been brought together in the same competitive space, the consultant is advocating that a vendor should not simply accept but potentially attempt to reconfigure this space. Vendors are given advice on how to shape the boundaries surrounding the competitive space; they are encouraged to develop tactics and strategies to push themselves up and to the right, which, by default, will push their competitors down and to the left.

To summarise, we see how dots have come to mediate a vendor's interaction not only with the ranking organisation but also with other vendors. Some have gone as far as to develop strategies and plan for modes of interaction with the rankers to help move places and shape spaces. Thus at a basic level dot-ology captures the practices and routines that develop as actors focus attention around the details of a ranking in order to influence, firstly, their own position in relation to competitors and, secondly, the boundaries of the competitive space. However, we want the notion to capture more than these 'social' strategies at play. It is not simply about how people contrive to move dots but how the competitive space is being (re)shaped in other ways too. In particular, we want to introduce the idea of sociomaterial agency, by which we mean that the field is influenced by the various affordances and constraints contained within the ranking. It is not simply people moving dots but also 'dots moving people'. To demonstrate this, we begin by discussing how dots are placed on the matrix in the first instance.

Individual rankers and the ranking organisation (dots moving people)
The production of the ranking is not static
The calculation of the Magic Quadrant has generated much discussion within IT practitioner circles. During fieldwork, we had the opportunity to interview a number of Gartner employees about how Magic Quadrants were developed: "The accusation we were always given", responded one to our question, "was that we threw darts at

the chart" (interview, Gartner analyst A). Here the analyst is responding to a widely held belief that the calculation of places lacks any form of process or systemization (see for instance Violino and Levin 1997). One issue that apparently vexed practitioners was the thought that placings were plotted by hand. Presumably this was problematic because it lent the ranking a discretionary quality (*ibid.*). Another was the fact the Gartner described the Magic Quadrant as resulting from predominately 'qualitative research' (Soejarto and Karamouzis 2005). One Gartner report describes how: "During the research process, we may ask for new information and briefings from vendors. We often gather information from vendor-provided references, from industry contacts, from unnamed clients, from public sources...and from other Gartner analysts (Burton and Aston 2004, 4). It was the idea that rankings could be influenced by 'unnamed clients' that caused much discussion (Violino and Levin 1997). Gartner would informally solicit the opinions from customers of those vendors being assessed. But this was seen as 'flawed' since it gave a paramount role to analysts who could choose which customers to listen to (and this raised the issue of 'bias' and 'partiality'; for more details see Author Study 2009).

In our interviews with Gartner analysts, however, they went to great efforts to dispel the idea that rankings were judgmental or approximate. They pointed to how the production of rankings, whilst they did rely on a range of sources including informal discussions with customers, was also circumscribed by standardised measures and technology: "The actual dot scoring, there is a standardised spreadsheet we have to use [and] standardised scoring mechanism" (interview, Gartner analyst A). Dots are plotted within a 'spreadsheet' and populated with numbers from a 'standardised scoring mechanism'. Scorings derive from a number of 'evaluation criteria' that have been divided along the two axis of the Magic Quadrant. These break down to reveal a number of further standard criteria (see table one).

Table one about here

Set criteria are then given a weighting ('high', 'standard', 'low', or 'no rating'). If 'no rating' is applied this means that this particular factor will not be counted in the calculation. However, whilst individual rankers had the flexibility to choose whether

to apply a criterion or not, it was reported that the bulk of analysts would use most of them:

> So for example, of the standard, I think it is eight criteria on the two dimensions, eight criteria on each [sic], you could theoretically get rid of four or five of them, and just weight it on three – so you could weight something zero if you want to – but most analysts are using most, if not all of those criteria, and weighting them to different degrees, on every single Magic Quadrant (interview, Gartner analyst A).

The primary reasons for these changes in calculating places was because of increasing pressure exerted by AR consultants and others who were probing ranking bodies – through 'briefings', 'enquiries', 'touches', etc., - to understand the detailed practice of ranking construction. Another reason was the fear of 'litigation'.[6] As a result the production of the Magic Quadrants are more regulated so as to create an 'audit trail' (see Free *et al*. 2009 for a discussion of the auditing of rankings):

> …individual analysts have to follow the same procedure, and we have to document that, and you have to have an audit trail of how it was created, and usually you have to have scoring sheets to demonstrate how you got to that point but on the actual spreadsheet that creates the quadrant there is a scoring, a whole scoring system which is standardised across the whole company (interview, Gartner analyst A).

Gartner had even gone as far as setting up a 'Methodology Team' to ensure that the standards for plotting the graph were maintained across the entire organisation. A former Director of the Methodology Team describes how this did bring a certain amount of systemisation in the work of individual analysts: "… there is some leeway in the methodology but [the Methodology] team is responsible for making sure that there methodology is sound and that it is followed, and that it is updated as technology changes and as we see things unfold in the marketplace" (interview, Gartner analyst C).

An analyst notes that this is a more regulated and standardised process than from just a couple of years ago. Apparently, individuals had more freedom in the past to plot graphs in different ways. He describes how the old way of calculating Magic Quadrants had both advantages and drawbacks:

> …they were more comprehensive in those days but they weren't consistent. So the way I would have my criteria would be nothing like my colleague sitting next to me. We weight in a very different way and the dots are arrived at very differently. And the vendors didn't like that. The vendors didn't like being top right in one and bottom left in another and not knowing why. Often that was because they were trying to negotiate about how they were treated (interview, Gartner analyst A).

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6 Gartner has been the subject of a number of high profile litigation cases. The most recent of which was the 2009-10 case presented by ZL Technologies Inc. who argued that because of a low ranking received on a Magic Quadrant they had been 'defamed'. The case, whilst gaining much publicity, was ultimately unsuccessful.

Magic Quadrants were more comprehensive because vendors could be scored according to criteria the individual ranker felt was important at the time or relevant to the specific circumstances. However, this meant the process of plotting the dots differed widely across the ranking organisation. This seemingly caused problems for Gartner's relationship with vendors who wanted greater clarity and uniformity around scoring mechanisms. One analyst notes that because the process of placing dots was now similar across Gartner that certain aspects of the ranking construction process had 'improved'. However, he was also of the view that that not all these changes in production were leading to improvements in the overall 'quality' of the Magic Quadrant:

> …the purpose of the Methodology Team, and the purpose of all these extra steps, and more rigorous procedures, is to improve quality. The question really is about what quality means? And I would argue that the definition of quality being used there is about consistency, repeatability and audit trail. It is that level of quality. In other words, we have a process, we're following it, no one is getting out of the process (interview, Gartner analyst A).

Improvements, in his view, were related to control over the process and the repeatability of the same evaluative measures. He then goes onto describes why he thought Magic Quadrant were better in previous years:

> So I would argue that the value of the Magic Quadrants' ten years was actually better, even though they were less accurate in some ways…there were bigger movements on Magic Quadrants from year to year. But the point being made was that analysts' were changing the weightings much more dramatically to reflect what the customers were telling them. Now we reflect the customers…less well, because we have to go through a lot more steps to reflect what the customers are asking. So it is an interesting trade-off really. Who is the value for? (interview, Gartner analyst A).

His point is that there used to be more 'movement' on the ranking at each new release. Since individual rankers had the freedom to set criteria and plot dots this reflected what these 'unnamed clients' were actually telling them about vendors. By contrast, today, even though an analyst might hear critical comments about a vendor, these may not be so easily reflected within the Magic Quadrant (they may fall outside of the publicly available criteria). The clear impression we gained from our interviewees was that in recounting these moves towards transparency and standardisation that they were also describing a *decrease* in their own discretion. In order to attempt to remove the idea of bias and partiality from the ranking, individual analysts were now increasingly circumscribed by a new material and organisational reality (increasingly explicit assessment criteria, a methodology team scrutinising their work, the need to provide explicit evidence for choices, a spreadsheet that plotted dots, etc.). We now turn to look in more detail at these constraints.

Actors are constrained in producing rankings

We want to show how dot-ology relies on an extensive organisational apparatus that patterns the activities of individual rankers in placing dots. Below we focus on two particular aspects: technology and bureaucracy.

Technology

The spreadsheet has become a central feature of the production of Magic Quadrants. Law (2001) argues that spreadsheets are among those technologies that help create powerful actors (through allowing them to manipulate data so as to see and project things that others cannot). However, at Gartner, the spreadsheet appeared not to be a malleable tool but one that placed limitations on individual rankers. For instance, when information had been input into the spreadsheet and the graph plotted it was then difficult, if not impossible, to move a vendor: "…you just can't put the dots where you want. The dots are all related to each other. So if you move one score up it impacts all the dots on the chart" (interview, Gartner analyst A). A vendor might be moved if the analyst thought the calculative apparatus had failed to position a dot in the way s/he considered 'fair'. Fair meant a placing that reflected the individual ranker's own knowledge as opposed to that which results from the 'organisational machinery'. However, moving a vendor once a graph had been generated would create further movement across the ranking. One small change could affect the position of *all* vendors and this would almost attract the attention of colleagues elsewhere in the organisation.

For this particular analyst, this was further evidence that dots were not arbitrarily placed but that individuals were constrained by the scoring mechanism and technology. The analyst then goes onto describes how one of the few changes they could actually do to the graph was to:

> …move the box around a bit. So, in other words, if all the dots are clustered in the centre you can reset the axes to get the box more spread out so they look more attractive. Otherwise, you would have a scale where all the dots are clustered around the centre or clustered around one spot. The idea there is just to make them spread out so you can actually read who compares to whom. So, there is a little bit of flexibility on the edges, but frankly, you can't really rig it anymore (interview, Gartner analyst A).

Analysts had the freedom to adjust the scale within the spreadsheet but not specific dots. If vendors were all clustered together, it was possible to adjust the box to create distance between them. That is, to enhance or develop a greater distinction between the entities ranked than was initially revealed in the spreadsheet. This was apparently

an attempt to make the rankings more 'attractive' (a point we develop in detail below).

Bureaucracy: The review process

There was reportedly increased scrutiny of the work of the rankers. The Methodology Team dictated that rankings should pass through various kinds of review. This includes, firstly, the discussions analysts would have amongst themselves. Most Magic Quadrants were produced by more than one individual, meaning that the ranking emerged from a consensus amongst a group of authors. There was also a 'peer review committee' where analysts from the same technology area would scrutinise the calculation. According to one analyst, it was now practically impossible to 'rig' Magic Quadrants because they were subject to so much scrutiny:

> If you have sat down and set the criteria out – I suppose mentally you could if you sat down – but there is a lot of heart felt discussion that goes on between usually a couple of the authors and, there is usually two authors, one author, sometimes two on each, and then there is a team of maybe three or four who are very closely involved (interview, Gartner analyst A).

Moreover, in recent years, a further check was also introduced where the placement of the larger vendors was also given a further round of review. It was inspected by what was called a 'lead analyst' within Gartner. This was someone who had overall responsibility for research produced on specific vendors:

> But now there is something else that happens as well. Say there is fifteen vendors on the Magic Quadrant, you might have lead analysts on some of the biggest vendors out there. So for the biggest vendors we tend to have a lead analyst on them to keep a consistent viewpoint of the whole vendor. So they might be in ten different areas of technology and one analyst will have an overview across the whole lot. So if there is any form of escalation or, you want to go to one person and say 'give me an overview of that whole vendor'. And they are a sixty billion dollar company or something, you've got somebody with a view across the whole company. Those people have to review where the dot is and what the wording of the text is (interview, Gartner analyst A).

One final part of the review process was that graphs were also sent out to vendors themselves prior to publication who, in turn, were free to comment. A consequence of this, according to an analyst with responsibilities for the Gartner Ombudsman office, was that this often led to 'thorny' interactions between Gartner and the vendors:

> … a thorny one would be a vendor is dissatisfied or believe that they haven't been treated objectively in a…Magic Quadrant…So a typical issue might be well I am too far down and to the left and I deserve for my dot to be higher and more to the right. So they'll come to us and say I haven't been treated fairly (interview, Gartner analyst C).

Interestingly, it was not only in the management of existing Magic Quadrants where various new kinds of bureaucratic measures could be found. They were also visible in other aspects of the ranking. In particular, this was in the creation of *new* Magic

Quadrants. Developing a new ranking turned out to be more difficult than in the past because a 'committee' had now been put in place to approve them:

> Before you could just do it. 10 years ago you could just create one if you wanted to. You just had to negotiate with the boss. But now you have to go to a committee. There is a senior research committee that has to approve all new proposals for Magic Quadrants. So you have to justify there is a market, it's big enough, it's growing at this rate, there's lot of market clients, here's the enquiry volume coming from the customers, 'OK then, you've got a Magic Quadrant' (interview, Gartner Analyst A).

Asked whether this particular analyst had been involved in or seen such a committee, he replied that he had observed from nearby the workings of a number. In particular, in recent months, he had seen a committee for a type of development called 'Social Software' (discussed in more detail below): "I didn't go through the committee but I saw the forms you have to fill in, and you have to go to a meeting, and you have to in effect propose it and negotiate why it has a right to exist" (interview, Gartner analyst A). Added to this, and this is where we get to the substance of our argument, there was a further reason as to why setting up a new Magic Quadrant had become difficult. It appeared that the affordances and constraints of the device itself was a mediating feature.

Affordances and constraints of the ranking

Creating a Magic Quadrant was reported by those we interviewed to be ineffective at certain key times in a technological lifecycle. It was said to be difficult to set a ranking up at the *outset* and then during the more *mature* stages of the career of a technology. There could be difficulties in the initial stages of the launch of a new technological field because there might simply be *too many* vendors. An analyst describes how:

> When there is a 100 [vendors], that's not very good for us…because then [the market] is not mature enough for us to actually say, so what we are doing is watching that very carefully, and going, I will give you an example, Social Media Monitoring devices. There is tonnes of them at the moment (interview, Gartner analyst A).

When asked to explain why the presence of too many vendors was problematic our respondent replies: "...graphically, you can't, […] we've done it, you can have a 100 dots on the chart but it is unreadable. It is just garbage. It is just a bunch of dots" (interview, Gartner analyst A). In other words, if all players producing (or claiming to produce a) new technology were to be included then this would mean graphs would be *too cluttered*. There would just be too many dots and vendor names on the device. This would presumably create confusion for those attempting to consume and make sense of the ranking (see figure two).

Figure two about here

Another analyst notes that, at the outset therefore, Magic Quadrants may not be very useful for those seeking insights into developing trends: "possibly if you have 200 vendors in the space that is probably not the right time to do a Magic Quadrant (interview, Gartner analyst B). The first analyst goes onto describe how, equally, too few vendors is also a problem: "And likewise when there is 3 dots on it, it is meaningless. What's the point of having a Magic Quadrant with 3 dots?" (interview, Gartner analyst A). Too few dots meant that little is being described in terms of how the market is developing (see figure three). The analyst gives a recent example:

> …we used to do things like operating systems… But when Microsoft started dominating operating systems on desktop or desktop applications it was pointless having 4 dots on a chart…But the ones that I have seen that have gone, have basically just dwindled to a point where through mergers and acquisitions they are down to less than 8 vendors, and the colleagues all turn around and go 'what was the point in that?'. The clients don't read them anymore, they are not so interesting. The only people who read them then are clients who want to justify what they are already doing – it is an insurance policy kind of thing. But their value is very, very low. The dots hardly move. And nobody is very interested (interview, Gartner analyst A).

Figure three about here

In contrast to the situation where there were too many or too few vendors, those analysts that we had interviewed had come to realise that there was an ideal number of dots that could be pictured at any one time:

> So, I would argue that Magic Quadrants are almost like, if you imagine a market always going theoretically going a 100 down to 10, to 5 vendors or something as it consolidates and the barriers to entry get put up by the incumbent. Gartner's Magic Quadrant is the beautiful picture when you have gone down to about 20, 25 to 15, or 10, and then once you go below that it ceases to be useful. And before that it is not particularly useful (interview, Gartner analyst A).

The ideal number is somewhere between 10 and 25 dots. This is what this individual ranker identifies as the 'beautiful picture'. Another analyst makes the same point: "Typically, we would cream off all the vendors by inclusion criteria, and we work that in a way so that there is 20, 25 dots" (interview, Gartner analyst B). It is seemingly a

beautiful picture because the graph is neither too crowded nor too empty. It is also a beautiful picture because it apparently keeps Gartner in the 'game' so to speak:

> So, while it is in that sort of state between about 25 down to maybe 10 vendors, there is a choice, there's a multiple different dimensions to it, and different ways of evaluating, how you write each vendor up. There is complexity in it, and therefore there is a game for us to play (interview, Gartner analyst A).

To summarise, dot-ology captures some of the interaction between the social and material aspects of producing a ranking. For instance, whilst (technically) it might have been possible to move individual placings on the spreadsheet, the analysts were constrained by the (social) review process where a moving dot would have to be explained and justified. Alongside this, the affordances of the Magic Quadrant meant that creating the figuration was difficult both at the outset and at the end of a technological evolution. At the outset, there were simply too many players and at the end, because the market has consolidated, there were too few. The individuals we interviewed appeared to agree that their experience had shown them that there were an optimal number of vendors that could be represented. In other words, the Magic Quadrant set limits on the kind of competitive space that could be created – and this was what one individual called the 'beautiful picture'. In terms of teasing out what the rankers were attempting to achieve we find Miller and O'Leary's (2007) 'programmes' and 'technologies' framework useful. Programmes refer to the conceptualisation and envisioning of a domain so that it might become open to calculation (the 'beautiful picture'), whereas technology refers to the various interventions that are made through a range of devices so as to bring about such ordering. We now turn to look as such interventions.

How the ranking encourages actors to intervene in the wider economy (dots moving markets)

Capturing the beautiful picture

The constraints dictated by the matrix appeared not only to have a spatial but also a time-related dimension. Although Gartner had identified the picture that furthered their interests and those of the market, this particular competitive space appeared temporally bound. At times, the number of players in an emerging field was changing so fast that Gartner could not *capture* the picture. Sometimes they were simply to slow to react to it, or, by the time they had reacted, the beautiful picture had long gone. To illustrate this point we include the comments of an analyst talking about the case of 'Web Analytics':

> Sometimes they move through so fast that…Gartner's Magic Quadrant never quite…hits it. And a good example of that would be Web Analytics where…it was 68 vendors about 4 years ago and now there is about 20 or so. But there is only 3 big ones who control a vast majority of the market, followed by Google which is free and then there's a couple of specialists. So really to have a Magic Quadrant with about 5 or 6 on, there is not much point anymore. So it went from 68 to 6 in about 3 years and so there was little window there where Gartner could have managed to get a snapshot of the market when there was 20 in, but then it was gone (interview, Gartner analyst A).

In this case there were initially too many vendors and then later too few for them to 'get a snapshot' of the market (Web Analytics just passed them by). The ranking organisation was unable to capture the beautiful picture. This was because the particular technology field was too fast moving for Gartner to mobilise its large organisational machinery in a timely fashion (these were the standardised processes, committees, review cycles described above). If this was the case for Web Analytics, it seems also to be true for a new kind of technology called 'Social Software':

> So a classic example is Social Software at the moment where there is a team of 7 or 8 analysts in Gartner now on that area…But Social has been around for - you know Facebook and all that stuff - has been around for quite a few years now…What happened was they went: 'Wait a minute people are making money in that area'….I don't mean Linked-in and that, they are not making money, but the stuff companies are buying to manage social networks or to deal with social networks. They are starting to invest and there is companies piling into that area and Gartner is going, at some point Gartner - I think it was 18 months ago - Gartner went 'Oh my god. We're late. Go. Boom!' (interview, Gartner analyst A).

Here the analyst finishes the conversation by noting how, in contrast to other smaller industry analysts and market commentators, Gartner were typically 'late' with their ranking:

> An analyst will take it upon themselves and say 'that's mine', and they will go leap after it. Then a couple will follow them and they will go after it. So we are, that's why I say that…we are not setting the pace. The only time we do set the pace is when we are quick followers I think is the best way I would describe it and we are useful in that we bless things (interview, Gartner analyst A).

Capturing the beautiful picture was also difficult because the grouping could simply no longer exist. That is, there was once a vibrant competitive space but now, because of mergers and takeovers, failures and collapses, and so on, there remained only a few competing players within a market. When this happened, the only solution apparently was to withdraw a Magic Quadrant:

> I haven't seen many [retired] recently because analysts don't like giving up turf but, it tends to be where you have got down to just a handful like 5 vendors in a market…So, there is no formal process that says we review them and anyone with less than 'x' dots gets shot. It is more that the analyst knows that and goes and finds a new market to go cover and research, if they are bright, which they usually are. So often you find an analyst has 2 Magic Quadrants: one old one that is dying; and then they got another one with a slightly different definition which has a newer and more buoyant market. And then eventually they stop doing that one, but there is no formal process as far as I understand it (interview, Gartner analyst A).

If a Magic Quadrant is 'old and dying', an analyst may then decide to 'retire' it. What all of this suggests is that the ranking organisation was not completely *passive* in searching for the beautiful picture. If the beautiful picture was not there then the Magic Quadrant prompted them to set about trying to *create* one.

Creating **the beautiful picture**

The affordances and constraints of the Magic Quadrant were such that it could encourage rankers to attempt to make interventions in/to markets. During our research, for instance, we noted how the ranking organisation appeared to have at least two strategies for creating beautiful pictures. The first of these is related to the standardised evaluation criteria described above. When there are too many vendors to be included in a Magic Quadrant, for instance, an individual ranker will continually set and reset these criteria in order to reduce the competitive space. One analyst describes this by talking through the example of Social Software:

> There is a lot of discussion [internally within Gartner] about…what stage do Magic Quadrants have in a lifecycle of a market? And they are not good at the start of a market; they are hopeless! When a market is in its first couple of years and there is, Social Software and I'm looking at Social CRM at the moment and we've identified 92 vendors in the last three days. Can't put 92 dots on a chart! So, it is pretty clear that we will set some high criteria to cut people out. And that is what the big debate will be about is how you set those criteria. But two years ago there was probably more than that. It all depends on how you define that market (interview, Gartner analyst A).

To paraphrase the words from above, these criteria are usually set around 'quantitative' aspects as well as more 'qualitative' elements. These will then be set and reset to 'cut people out'. The second strategy is to divide spaces up to get the required picture. An analyst describes how this is done: "[c]learly there is a kind of optimal number of dots on a chart which Gartner kind of ends up almost dividing markets up in order to get that number of dots on a chart, which is readable, which is about 15 to 25" (interview, Gartner analyst A). The analyst acknowledges not only that Gartner reduce the market down, but that they reduce it down to a particular size: "So in effect you'll find almost every analyst is setting the criteria, the bounds - not consciously really but we are doing it - to get 15 to 25 dots. Because if it drops to 5 dots, there's 5 vendors in this market, it's highly consolidated, so why would they ring us?" (interview, Gartner analyst A).

Let us unpack more carefully the implications of what is being described here. Gartner set the bounds of the competitive space so as to arrive at what it thinks is an optimal number of vendors. Because there are too many vendors in an area – and

since the emerging field cannot be captured in its entirety on a single Magic Quadrant – analysts will literally divide markets up. This means Gartner will attempt to create new competitive spaces and distinctions between technologies. The easiest way to do this appears to be through the introduction of alternative nomenclatures (Author Study 2011). During the period of our research, for instance, we observed how Gartner introduced three new terminologies within the category of 'Social Software'.

Social Software

Social Software is a relatively new area where there is currently a great deal of activity and interest as well as uncertainty. Gartner describe Social Software as the area where they are fielding most questions from clients and prospective purchasers. One key issue is that Social Software is something of an 'umbrella term' (also described as 'Social CRM' or 'Social Media'). The problem is that large numbers of vendors are rebranding their products as 'Social' in some way. We attended a Gartner conference in London, for instance, where an analyst makes this point to the audience:

> Social CRM is a huge topic. There has been tonnes of calls about it. I am tracking currently about 90 vendors who have some area of Social CRM. Some vendors are calling themselves that and they are *not*. Some people *are* that. Some people *don't know* that they have it when they have it. So there is a lot of movement going on as people try to make sense of just Social Media in the first place, and that is a hard nut to crack: 'What is Social Media?' (conference presentation, Gartner analyst D).

In the last couple of days alone, Gartner had identified nearly a *hundred* new players claiming to offer some kind of Social Software. There appears within the market a need for some form of clarity. Gartner's response therefore has been to break this technological field down into further sub-segments. They have defined Social Software as containing: 'Social CRM', 'Social Software in the Workplace', and 'Externally Facing Social Software' (EFSS). Another Gartner analyst presents the rationale for these splits during a presentation:

> …we initially had one Magic Quadrant for Social Software and it really covered quite a few different technologies. Increasingly…we have been looking to split that up because, as the market matures, we start to see some of the kind of submarkets or other kinds of segmentation….these Magic Quadrants that are being issued in 2010, we're building on the *Social Software in the Workplace* which is looking at how these kinds of ideas can be used behind the firewall…[t]he newest one that was released was EFSS or *Externally Facing Social Software*. What that is essentially doing is going beyond the firewall… Now we also see the public social media, and I will also be talking about in a moment the *Social CRM* Magic Quadrant, that is the third one which we are releasing (conference presentation, Gartner analyst E).

Out of one category, and because of the difficulty of representing all the possible vendors in the Social Software Magic Quadrant, they had crafted three new

(sub)spaces. Creating these new kinds of technological categories turned out not to be a straightforward process as we show in the final empirical section.

The pragmatics of making meaningful distinctions[7]

One way to bring a new competitive space to life seems to be to create Magic Quadrants for them. However, during a presentation, a Gartner analyst notes some of the difficulties surrounding the pragmatics of doing this – particularly in separating out the Social Software category and making clear distinctions between the vendors operating within in it. The three new categories are presented on a slide as circles that overlap with each other:

> Across these different segments you can see some examples of the kinds of vendors that we see. You can also see that these circles do kind of overlap. We do see that there are some vendors that are active in several different markets and that is reflected also when we start looking at the Magic Quadrant. There are vendors that are present on several of the Magic Quadrants and a couple who really are active on all three. Now…when we first started doing this analysis and we first started looking at the criteria we actually were…a little afraid that [we] would see a great deal of overlap (webinar, Gartner analyst F).

The analyst notes how there were vendors producing software that could be counted as belonging to all three categories. Their fear was that there would be a great deal of overlap. However, he goes on to say, there turned out to be fewer than anticipated: "…the overlap we had in the final publication is really quite small. There is only a couple really that appear on several different ones" (webinar, Gartner analyst F). The reason for this was how Gartner defined the evaluation criteria: "And parts of that is down to how we defined the criteria and what were the criteria and qualifications for being included in each Magic Quadrant" (webinar, Gartner analyst F). Setting and resetting the criteria meant that the rankings plotted exactly as they should do!

This *pragmatics of making meaningful distinctions* can be seen more specifically in the creation of the Social CRM Magic Quadrant. Here an analyst describes the difficulty Gartner have had in producing this particular ranking: "We're in the process of creating a Magic Quadrant for this. There isn't one yet… It is a very onerous task because so many of these vendors are very new and hard to define" (conference presentation, Gartner analyst G). Some months before the release of the Social CRM Magic Quadrant, an analyst speculated about how many vendors would be included. He shows the audience not the Magic Quadrant but a 'list' of some representative vendors:

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[7] We thank Robin Williams for suggesting this formulation.

> Again this is a representative list – we are checking out 80 or 90. I think we are probably going to come out to 25 to 30 based on the criteria. One thing that we are looking over is vend over five million and putting in things like 'Are we being asked about you?' So, there is a lot of things in here… (conference presentation, Gartner analyst G).

He makes clear the quantitative and qualitative evaluative criteria to be used. He also notes the use of 'the list', which he views as a stand in for the real ranking, which has yet to be devised. When, a few months later, the Magic Quadrant is published, the same analyst describes the final number:

> Gartner just got finished with a Social CRM Magic Quadrant. We started with about a 120 vendors that we looked at. Many vendors had some sort of social aspect included in their CRM – Social CRM aspects to it. We, finally, we were left with around '19' for various reasons that I will discuss (webinar, Gartner analyst G).

To summarise, evidence shows that when faced with a large number of vendors claiming to work in a new technological field, in order to create a competitive space, Gartner set the evaluation criteria to reduce the numbers of vendors included within each space; this is done by dividing up the field into new competitive groupings. If the beautiful picture that Gartner desire is not there then they set about trying to create it. Dot-ology therefore also captures the strategies deployed to influence the setting that the ranking describes. This pragmatic work is complex. The rankers struggle to differentiate between vendors within classifications; this is because they are imposing boundaries onto the market and this can provide for difficulties. Many vendors, for instance, could be included in more than one specific ranking. Deciding where a particular instance sits across a number of technology classifications therefore requires taking an explicit decision, which proves often to be an ambiguous process.

Discussion

According to Espeland and Sauder (2007, 36-7) the 'proliferation of public measures of performance' is one of the most 'important and challenging trends of our time' (see Jeacle and Carter [2011] who relate this point, through a discussion of rankings, to the core concerns of Accounting scholarship). The starting point for this paper was the suggestion that these measures wield forms of influence that have yet to be identified by existing forms of analysis. Whilst there are a growing number of studies that analyse the power of rankings, some from within Accounting research (Free *et al.* 2009, Kornberger and Carter 2010, Jeacle and Carter 2011, Scott and Orlikowski *in press*), others from outside this area (Shrum 1996, Wedlin 2006, Blank 2007, Espeland and Sauder 2007, Author Study 2009, Karpik 2010, Kwon and Easton 2010), very few have provided insights into their makeup and minutiae (but see

Schultz *et al.* [2001] who point to some aspects of their construction). One implication when a crucial market mechanism is black-boxed is that we only ever develop a *partial* understanding of its constitutive capacity. A tendency when faced with an incomplete vantage point is to raise the importance of those aspects of the phenomena that can be studied (Author Study 2009). Specifically, rankings are seen to influence domains through changing the way actors make *sense of* and *interpret* the world (Wedlin 2006, Espeland and Sauder 2007, Kornberger and Carter 2010).

We have worked up the idea of a 'ranking device' to capture how, alongside the way rankings cause people to adapt behaviour, that graphic *format* and *furniture* can also be significant. Taking the example of an influential performance measure from within the information technology sector, we have shown how, in ways that are both social *and* material, that this ranking has shaped the market for various technologies. Through describing how the ranking brought together and counterposed players in a 'competitive space', the paper considered three related aspects of the sociomaterial shaping of that space. Firstly, we focused on attempts by those technology vendors ranked by the assessment to affect the shape of the competitive terrain. Our evidence suggested that, because the ranking created the space by which various players could compete with each other (Kornberger and Carter 2010), vendors were advised to adapt and orient themselves to the nuances and measures of the ranking. These included employing strategies to help improve their position and weaken that of competitors. The players were therefore brought together into one space, and, importantly, with the help of new forms of expertise, this space appeared tractable.

Secondly, whilst our initial discussion emphasised the social strategies at play ('people moving dots'), we later introduced the theme of material agency. We demonstrated the sociomaterial constraints surrounding the shaping of the competitive space ('dots were moving people'). We saw this in relations between individuals and the ranking organisation and then between the ranking organisation and the market. Until recently within the ranking organisation, individual rankers could wield notable amounts of discretion in placing vendors. More recently however, because of moves towards transparency and standardization, there had been changes in ranking practices (the discretion of individual rankers had become entangled in and increasingly stifled by layers of technology and bureaucracy). Added to this, the graph *itself* (its affordances and constraints) also placed limitations on how the competitive space

could be captured and represented. The rankers could not capture and represent all the players in a market on one graph. This meant they were forced to adopt alternative strategies.

Thirdly, we showed in particular how the rankers, as a result, were required to intervene directly in the market to attempt to shape the competitive space to account for the limitations of the two-by-two matrix. This meant they did not use the graph to represent a competitive space conceived prior to its inclusion in the ranking. Rather, they conceived of new competitive spaces – better still, were *forced* to conceive of these spaces – through taking the capacities of the ranking into consideration. We could say that the ranking *prompted* such an intervention and that this was a prompt that individual rankers appeared willing to accept. Rankers would thus attempt to modify the competitive space to fit the ranking (rather than the other way around). It is specifically this aspect – a situation we conceive of as 'dots moving markets' – that identifies one of the main contributions of the paper.

New Visual and Temporal Dynamics

We propose that graphical performance measures (and figurations more generally) contribute a powerful instance of the process by which markets and material things mutually constitute one another (Miller and O'Leary 2007, Callon *et al.* 2007, Pinch and Swedberg 2008, MacKenzie 2009). We attempted to get at this through analyzing the interactions between 'programmes' and 'technologies'. These refer to the imaginings and conceptualisations of an arena and the various devices and inscriptions that mediate and shape these envisionings such that a domain may be acted upon and calculated (Miller and O'Leary 2007, Miller 2008). We studied the production of the ranking not as 'knowledge' but a 'practice'. This is to consider the idea of a ranking not in an abstract representational idiom (Espeland and Sauder 2007, Kornberger and Carter 2010), but one which captures the nuanced interplay involved between the conceptualisation of a market domain and its incorporation within various format and furniture. What our analysis sought to show was how these devices both shaped and were shaped by the market. In particular, the format and furniture helped create a new *visual* and *temporal* dynamic within the IT domain.

Visual dynamic

We say *visual* dynamic because the ranking organisation attempted to specify what a market should look like. They sought a conceptualisation that made the information technology domain amenable to calculation (Miller and O'Leary 2007, Miller 2008). This meant they strove to produce a ranking that would allow everyone to see and compare how one technology vendor was performing in relation to another, in the most straightforward manner, where there were neither *too many* nor *too few* players in the competitive space. They apparently found the optimal number that could be included and this represented the 'beautiful picture'.

What is the beautiful picture? The beautiful picture is part of what we might think of as an 'aesthetic economy' operating within the ranking organization. This is not to say that it is the picture of an ideal or perfect market (cf. Garcia-Parpet 2007). Rather, it is the result of a *negotiated, devised* and *contrived* intervention. The beautiful picture was a set of compromises *negotiated* between the imaginings and conceptualisations of the ranker and the sociomaterial possibilities of the ranking. Material affordances potentially allowed for the placing of many vendors on a graph but (conventional) constraints meant that the rankers could not overburden the picture (Quattrone *et al.* 2012). This would not only produce a figuration that would be difficult for clients to understand, it would give the impression of an overly complex market (and this would have adversely affected the aesthetic economy deemed crucial by the rankers). Thus, the ranking was also conventionally *devised* (Espeland and Stevens 2008): there were not only material aspects limiting the construction of the competitive space but also 'social' ones (David and Pinch 2008).

The ranking was also a *contrived* figuration for bringing about certain kinds of (potentially contradictory) results. It was necessary to reduce the level of 'confusion' for decision makers and practitioners (there could not be *too many* dots). However, there could never be *too few* players on a graph because then there would appear insufficient complexity in the market. It was still important to maintain adequate complication such that further consultancy advice was needed. If everything appeared straightforward, why would people continue to seek the ranker's expertise? The beautiful picture was one that kept this ranker in 'the game' so to speak (for a

discussion of the problems of creating and maintaining a market for expertise see Barrett and Gendron [2006]).[8]

Attempts to engineer the beautiful picture were consequential for the shaping of the market. It meant the ranking was not *neutral* with regard to what constituted a competitive space. It appeared ill suited to new, fast moving areas, for instance, where there were many new entrants in a technological area. Whilst individual rankers could spot vendors entering an emerging category, in practice, they could not capture or represent them within the ranking (the figuration lacked the affordances of a list in this respect). This issue resembles what Lynch (1985, 43), talking about scientific graphs, has called the 'problem of visibility'. Scientists determine what is 'natural' based on what their graphs are able to depict. Translated to our concerns, this means that the rankers decided what a market 'is' – the competitive space: which players make up the market, the boundaries of the field, etc. – partially based on what the ranking was able to capture and communicate. This clearly evidences how information technology markets today are a product of format and furniture as much as any other calculative aspect of this particular ranking.

What was also salient about our study was the finding that, if the beautiful picture could not be captured, then the ranking organisation would try to *create* it. Because the graph was seen to embody key features of the markets under analysis, efforts were made to intervene in competitive spaces, so that the characteristics of these spaces were congruent with the affordances of the ranking. From fieldwork, we saw how rankers performed this in one of two ways: through limiting the number of vendors operating in a particular competitive space or by creating entirely *new* spaces. They performed the former through setting 'inclusion criteria' and the latter by attempting to divide technological fields into new designated areas of activity (with their own unique nomenclature, definition, inclusion criteria, Magic Quadrant, etc.). The designation of a new technological field of activity, or 'competitive space' as we have called it here, is not trivial. It can draw boundaries around a set of artefacts and their suppliers and create a space in which sorting and ranking becomes possible. If taken up it can go on to provide crucial resources and constraints within which vendors and

8 We owe our thanks to one of the anonymous reviewers for encouraging us to develop this point.

management and technology consultants' articulate offerings. It can, in other words, become a fully-fledged market in its own right (Author Study 2009, 20011).[9]

One problem the ranking organisation now faces in competitive-spaces-constructed-according-to-the-affordances-of-a-ranking is the pragmatics of making meaningful distinctions. Since new boundaries were imposed onto the space, individual rankers struggled to differentiate between vendors in these new groupings. This was evidenced by the fact that certain vendors appeared in *all* three of the new Magic Quadrants. This outcome was thought less than ideal because it suggested a lack of *distinction* within the ranking. Similar issues were apparent when the ranker was forced to intervene because vendors clustered together. (This occurred because the market was converging or, over time, vendors were conforming to the evaluative criteria (Espeland and Sauder 2007), or, as in the case above, because there was no meaningful distinction to be made). Clustering was thought problematic because it suggested that all those on the graph had the same or similar qualities. This was problematic because there would be little value found in the ranking. Decision-makers required the vendors to be graded in a way that signalled a distinction. Without this, why would people contact the ranking organisation, to paraphrase one respondent? A further feature of this pragmatics therefore was the process whereby rankers were forced to devise distinctions by means of manipulating organisational machinery (i.e., resetting the axes of the spreadsheet to increase distance between dots).

Temporal dynamics

We say *temporal dynamics* because during fieldwork we were alerted to the fact that the affordances of the ranking were not static but evolving over time. Espeland and Sauder (2007, 36) discuss how rankings are a 'moving target': as people learn to 'game' them, their authors are forced to update evaluative criteria more or less on a continuous basis. Whilst this was also a factor in our case, we note how the ranking was similarly surrounded by a 'moving organisational apparatus' (Author Study 2009). The Magic Quadrant had begun its career as a relatively informal, subjective ranking but there had been later (quite vigorous) demands placed on the ranker to recreate it as a formal assessment subject to auditing (see Free *et al.* 2009 for a

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9 To give one example, Gartner coined and went onto shape the Enterprise Resource Planning (ERP) terminology, that subsequently went onto become one of the new paradigms of modern day information systems (see Chapman [2005] for a review of ERP in the accounting area).

discussion of these processes whereby rankings are audited). This meant individual rankers could no longer grade vendors exactly as they wished. It also limited their capacity to respond (rapidly) to innovation.

Today, the provision and administration of the ranking is circumscribed by new technology and bureaucracy. This has affected the ranker's ability to produce 'snapshots'. The ranking organisation cannot react in time to capture specific innovations. Some beautiful pictures disappear even before these experts can mobilise their committees, spreadsheets etc. The pictures are there for a moment and then they are gone, to paraphrase one respondent. This meant that certain technological innovations can completely pass the ranker by. Pockets of the market can remain unranked in what is typically a highly graded arena. We think the instances where ranking devices and organisational apparatus create situations of 'unrankability' deserve further attention. It is a situation where the market escapes dots.[11] This begs the questions: were the markets for these products adversely (or positively) affected. Were the vendors who remained outside the competitive space punished (or rewarded) in some way?

Our evidence also showed how the affordances of the ranking created cyclical pressures on the ranking organisation to intervene at certain key moments. The beautiful pictures they sought were time limited. They were not there at the outset of an innovation (there were *too many* dots to be represented), and nor were they there as the technology matured (either there were *too few* dots to allow anything meaningful to be said, or all the players had clustered in the same box). This prompted the ranking organisation to engineer interventions not arbitrarily but at certain key points in the lifespan of a technology. This included, for instance, the moment when a new technological field first appeared to emerge and then later as it matured.

What does a focus on Graphic format and furniture show?

Our paper has developed some of the analytical tools to consider the sociomaterial influence of a ranking. This begs the question whether a focus on format and furniture draw attention to aspects not visible under social approaches. Existing modes of analysis give particular emphasis to how rankings influence peoples' behaviour. The

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11 Thanks to one of the anonymous reviewers for suggesting this point.

'mechanisms of reactivity' concept (Espeland and Sauder 2007), for instance, explicitly captures this through showing how rankings evoke self-fulfilling prophecies that encourage people to adapt their behaviour towards the calculation. Extending this, we have emphasised how ranking devices can also play a role through offering specific affordances and constraints and encouraging others to modify the settings within which action takes place. For example, we have shown how the graphical ranking came to suggest a particular order for a market, prioritising one market view over another (a beautiful rather than a cluttered or sparse picture), which the rankers then set about creating. The corollary is that a ranking can influence a setting differently (perhaps more fundamentally?) than previously thought.

Whereas the point above is about the shape of the landscape within which actions take place, there is also a temporal issue. In this respect, our approach raises the question as to whether a sociomaterial influence, as opposed to simply a social one, is a more enduring form of influence. It could be argued that a ranking located "in the back of everybody's head", as Espeland and Sauder describe (*ibid.*, 11), may only have a fleeting influence whereas one residing in a specific format and furniture can endure indefinitely. As long as the ranker retains this particular format and furniture, the order described in the device above may continue to produce a particular shape to the market regardless of the actions of individual players at specific times.

What we are foregrounding is how processes of market making are inscribed in and flow from the sociomaterial negotiations surrounding a ranking. Clearly the episodes of market (re)construction described here are very different from those formal accounts beloved of economists, where supply and demand comes together to form a price (Callon and Muniesa 2005). The ranking organisation described in the paper has a long tradition of creating new markets through 'naming interventions' (see Author Study 2011). Many, though by no means not all, of these go onto become functioning and independent markets. We thus offer an example of how new markets are constituted by the seemingly mundane constraints of a graph. This also contrasts with those Accounting scholars who view market creation as the results of primarily 'social interactions'. Kornberger and Carter (2010, 330) write that "competition is something that is created out of interaction between market players". Our work, by contrast, has shown how devices are also party to these interactions (see also Miller and O'Leary [2007], Robson [1992] and Quattrone *et al.* [2012] who similarly highlight the link

between devices and processes of market making). Future inquiry would be to see whether the arguments set out in this paper hold true for other areas. Does format and furniture hold similar implications for other kinds of performance measures?

Implications for Accounting Research

Accountancy firms will potentially play an increasing role in the provision and administration of formal and impersonal reputational indices (Free *et al.* 2009). The last 30 years has seen the emergence of a powerful range of consultancy and professional services organizations that produce rankings of various kinds. Many of these assessments are also being integrated into the 'advisory' (i.e. consulting) elements of the large accounting firms. Whilst we know that the demand for rankings is expanding, we still understand little about the detailed processes by which consultancy firms produce, administer and create a market for these assessments. We have produced a detailed study of how one global consultancy and research organisation constructs a highly successful performance measurement product. Our study, in this respect, meets Qu and Cooper's (2001) recent call for more research examining the work of consultants – specifically how they acquire, commodify and apply their knowledge. Our aim, in this respect, was to assess the potential for an empirically grounded characterisation of the process by which such knowledge was produced and communicated. A popular conception of consultants is to see their assessments as based on the vagaries of individual discretion whereas our recently conducted and ongoing fieldwork suggests the origins of assessments result from more observable sociomaterial and distributed processes. Above, for instance, we have drawn attention to the large machineries of ranking that are in place.

Accounting firms have also been important shapers of the consultancy industry (Christensen and Skærbæk 2010). However, they have in the main unproblematically adopted many of the innovations generated from within this industry. Qu and Cooper (2011) highlight this specifically in relation to graphic inscriptions. Innovations in figurations will potentially have a number of implications for Accounting Research. In particular, whilst there has been a good understanding and theorisation of 20th Century accounting representational devices (see for instance Chua [1995] on 'accounting images', and Ezzamel *et al.* [2004] on factory performance indicators),

those of 21st Century accounting are still being formulated.[12] In this respect, Qu and Cooper (2011, 345) talk of new forms of inscriptions "materialized through different media with different qualities" and give the example of power point slides, flip chart pages, emails, strategy maps, graphics such as bullet points and checklists, and so on, to exemplify this. These new kinds of inscriptions – another of which is described here: the two-by-two matrix - may well require scholars to update characteristic analytical framings and/or to draw on insights from allied disciplinary approaches.

Our work, which sits at the interstices between a number of different disciplinary schools (see Vollmer *et al*. [2009] for a review of the evolving intellectual interdependencies between Accounting, STS and Economic Sociology), potentially provides insights into both how the graphic inscriptions of accounting (and the practices that surround them) might change. The capture of business by the two-by-two matrix (Lowy and Hood 2004), in particular, suggests that figurations are no longer a supplement but intrinsic and constitutive part of market settings. Whereas calculative practices have predominately been conceived of as 'numerical operations' (Miller 2001), Quattrone *et al.* (2012, 9) argue that there will need to be more attention devoted to the 'visual nature of numbers' (see also Justesen and Mouritsen 2008). We believe our paper meets elements of this call. Calculative practices turn 'qualities into quantities' (Miller 2001). In our case, this would be the translation of a subjective opinion about a vendor – rendered through a large-scale ranking apparatus - into a quantity, such as placing a dot on a graph. We suggest that the form of dot-ology described here represents a unique instance of these kinds of calculative practices. On the one hand, this is how a calculation can come to be shaped by mundane graphic resources (and vice versa), and, on the other, how there is an aesthetic element to the construction of visual numbers. In terms of the former, those producing visual numbers may come to determine what is 'calculable' based on what graphs are able to depict. It is not how corporate and market performance relate to dots (stars, lines, waves, tics, etc) for revealing and ordering that performance; it is rather how the format and furniture of graphs interact and merge with the calculations. Visual resources constitute calculative practices, such that any numbers that result bear the imprint of graphic sociomateriality.

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[12] Thanks to Chris Carter for suggesting this point.

This latter element is also important because, as Quattrone et al. (*ibid.,* 9) notes, little attention has been given to the 'imaginative power' of an inscription. This is their ability to envision what business and markets *could* and *should* look like. In this respect, we speculate that the two-by-two matrix is different from other formats, such as lists (Cardinaels 2008), because it creates particular way of representing and intervening in situations. As one of the premier modes of representing business activities – one only has to think of the 'cost benefit matrix', the 'product and market matrix', the 'BCG Product Portfolio Matrix', etc., - this creates a particular kind of aesthetic economy (Espeland and Stevens 2008). Through visualising the elements of a competitive situation, one alters the way in which that situation is thought about and acted upon or practised. Their allure is such that the situation appears amenable to intervention. They encourage various forms of co-production such that settings are modified to become congruent with graphic affordances and vice versa. Ultimately, the predominance of figurations across industries means that their sociomateriality should become a feature of academic study. We call for serious and detailed study of the format and furniture of the major business and accounting visualisations, for it is not simply engines but beautiful pictures that shape economic life.
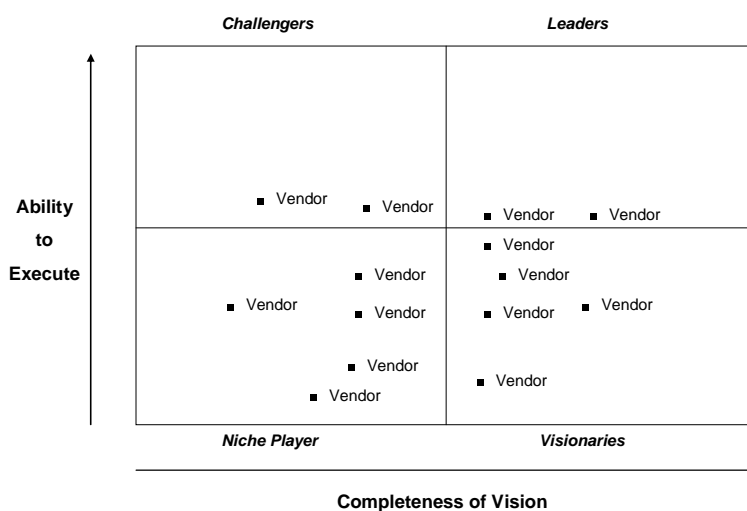
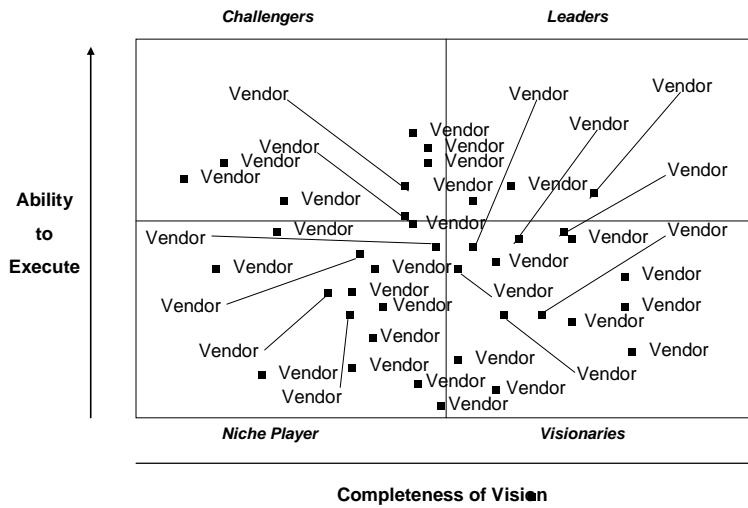Figure One

The Magic Quadrant

Figure Two

Too Cluttered

Figure Three

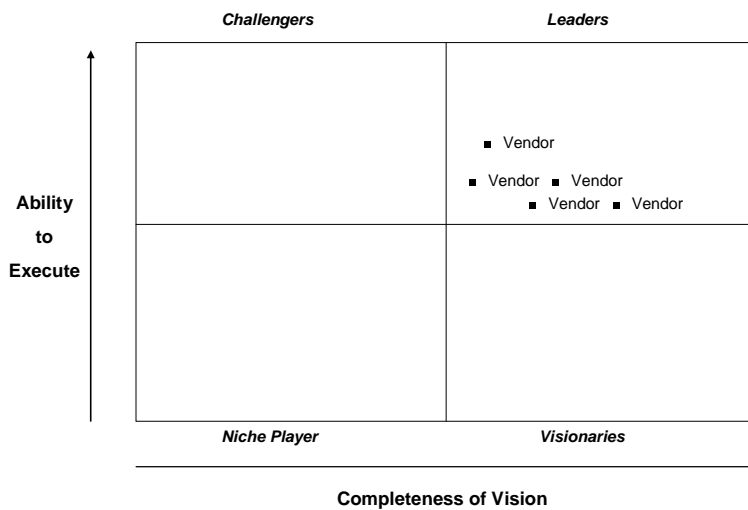# Too Empty

Table One: Evaluation Criteria for the magic quadrant

Completeness of Vision	Ability to Execute
Market understanding	Product or Service
Marketing strategy	Overall viability
Sales strategy	Sales Execution, Pricing
Product strategy	Market responsiveness
Business Model	Marketing execution
Industry strategy	Customer experience
Innovation	Operations
Geographic strategy	

Bibliography

Akrich, M. & Latour, B. (1992). A summary of a convenient vocabulary for the semiotics of human and nonhuman assemblies. In W. Bijker and J. Law (Eds.), *Shaping Technology/Building Society*. Cambridge, MA: MIT Press.

Aldridge, A. (1994). The construction of rational consumption in Which? Magazine: The more blobs the better?. *Sociology*, 28, 899–912.

Anand, N. & Peterson, R. (2000). When market information constitutes fields: Sensemaking of markets in the commercial music industry. *Organization Science*, 11(3), 270-284.

Argyris, C. (1954). *The impact of budgets on people*. New York: Controllership Foundation.

Barrett, M. & Gendron, Y. (2006). WebTrust and the 'commercialistic auditor': The unrealized vision of developing auditor trustworthiness in cyberspace. *Accounting, Auditing and Accountability Journal*, 19, 631-662.

Becker, H. S. (1982). *Art Worlds*. Berkeley, CA: University of California Press.

Blank, G. (2007). *Critics, ratings, and society: The sociology of reviews*. Lanham, MD: Rowman & Littlefield.

Blooomfield, B. & Vurdubakis, T. (1997). Visions of organization and organizations of vision: The representational practices of information systems development. *Accounting, Organizations and Society*, 22(7), 639-668.

Burton, B. & Aston, T. (2004). How Gartner evaluates vendors in a market, Document ID Number: G00123716.

Callon, M. & Muniesa, F. (2005). Economic markets as calculative collective devices. *Organisation Studies*, 26(8), 1229–50.

Callon, M., Millo, Y. & Muniesa, F. (Eds.). (2007) *Market devices*, Keele: Sociological Review Monographs.

Cardinaels, E. (2008). The interplay between cost accounting knowledge and presentation formats in cost-based decision making. *Accounting, Organizations and Society*, 33, 582-602.

Carroll-Burke, P. (2001). Tools, instruments and engines: Getting a handle on the specificity of engine science. *Social Studies of Science*, 31(4), 593-625.

Chapman, C. (2005). Not because they are new: Developing the contribution of enterprise resource planning systems to management control research. *Accounting, Organisations and Society*, 30(7-8), 685-689.

Christensen, M. & Skærbæk, P. (2010). Consultancy outputs and the purification of accounting technologies, *Accounting, Organizations and Society*, 35, 524–545.

Chua, W. F. (1995). Experts, networks and inscriptions in the fabrication of accounting images: A story of the representation of three public hospitals. *Accounting, Organisations and Society*, 20(2/3), 111-145.

Cooper, D., & Hopper, T. (Eds.). (1989). *Critical Accounts*. Basingstoke: Macmillan.

Dambrin, C. & Robson, K. (2011). Tracing performance in the pharmaceutical industry: Ambivalence, opacity and the performativity of flawed measures. *Accounting, Organizations and Society*, 36, 428-455.

David, S., & Pinch, T. (2008). Six degrees of reputation: The use and abuse of online review and recommendation. In T.Pinch & R.Swedberg (Eds.). *Living in a Material World: Economic Sociology Meets Science and Technology Studies*, MIT Press.

Drobik, A. (2010). Getting Gartner: How to understand what we are talking about. Presentation Given to the Customer Relationship Management Summit, London, 16th March.

Espeland W. & Stevens M. (1998). Commensuration as a social process. *Annual Review of Sociology*, 24, 313–43

Espeland W. & Sauder M. (2007). Rankings and reactivity: how public measures recreate social worlds. *American Journal of Sociology,* 113(1), 1–40.

Ezzamel, M. (2004). Accounting representation and the road to commercial salvation, *Accounting, Organizations and Society*, 29, 783-813.

Free, C., Salterio, S., & Shearer, T. (2009). The construction of auditability: MBA rankings and assurance in practice. *Accounting, Organisations and Society*, 34, 119–140.

Garcia-Parpet, M.F. (2007) 'The Social Construction of a Perfect Market: The Strawberry Auction at Fontaines-En-Sologne', D. MacKenzie, F. Muniesa & L. Sui (eds) *Do Economists Make Markets,* Princeton University Press.

Gibson, J.J. (1979). *The ecological approach to visual perception*. Erlbaum.

Goody, J. (1977). *The domestication of the savage mind*, Cambridge: Cambridge University Press.

Hacking, I. (1983). *Representing and intervening: Introductory topics in the philosophy of natural science.* Cambridge: Cambridge University Press.

Hacking, I. (1992). The self-vindication of the laboratory sciences. In A. Pickering (Ed.), *Science as practice and culture*. Chicago: University of Chicago Press.

Hind, P. (2004). Self-Fulfilling prophecies. *CIO,* 12 July, http://www.cio.au/pp.php?id=885195886andfp=4&fpid=1854618785, accessed 29 March 2006.

Hopkins, W. (2007). *Influencing the influencers: Best practice for building valuable relationships with technology industry analysts,* Austin, TX: Knowledge Capital Group.

Hopwood, A. (2007). Whither accounting research? *The Accounting Review*, 82(5), 1365-174.

Hutchby, I. (2001). Technologies, texts and affordances. *Sociology*, 35(2), 441-456.

Ingold, T. (2007). *Lines: A brief history*. Routledge, Abingdon, Oxon.

Jeacle, I. & Carter, C. (2011). In TripAdvisor we trust: Calculative regimes and abstract systems. *Accounting, Organisations and Society*, 36, 293-309.

Justesen, L. & Mouritsen, J. (2008). The triple visual: Translations between photographs, 3-D visualizations and calculations. *Accounting, Auditing & Accountability Journal,* 22(6), 973-990.

Karpik, L (2010). *Valuing the unique: The economics of singularities.* Princeton University Press.

Kornberger, M. & Carter, C. (2010). Manufacturing competition: how accounting practices shape strategy making in cities. *Accounting, Auditing & Accountability Journal*, 23(3), 325-349.

Kwon, W. & Easton, G. (2010). Conceptualizing the role of evaluation systems in markets: The case of dominant evaluators. *Marketing Theory*, 10(2), 123-143.

Lapsley, I., & Mitchell, F. (Eds.). (1996). *Accounting and Performance Measurement: Issues in the Private and Public Sectors*. London: Paul Chapman Publishing).

Latour, B. (1986). Visualization and cognition: Thinking with eyes and hands'. In H. Kucklick (Ed.). *Knowledge and society: Studies in the sociology of culture, past and present*. Greenwich, Connecticut., JAI Press.

Latour, B. (2005). Reassembling the social: An introduction to actor-network theory. Oxford: Oxford University Press

Law J. (2001). Economics as interference. In P. du Gay & M. Pryke (Eds). *Cultural economy: Cultural analysis and commercial life.* Sage, London.

Lowy, A. & Hood, P. (2004). The power of the 2x2 matrix: Using 2x2 thinking to solve business problems and make better decisions. San Francisco, Jossey-Bass.

Lynch, M. (1985). Discipline and the material form of images : an analysis of scientific visibility. *Social Studies of Science,* 15, 37- 66.

Lynch, M. (1988). The externalized retina: Selection and mathematization in the visual documentation of objects in the life sciences. *Human Studies,* 11, 201-234.

MacKenzie, D. (2006). *An engine, not a camera: How financial models shape markets,* Cambridge, MA: MIT Press.

MacKenzie, D. (2009). *Material markets: How economic agents are constructed,* Oxford: Oxford University Press.

Miller, P. (1998). The margins of accounting, *The European Accounting Review*, 7, 605-621.

Miller, P. (2001). Governing by numbers: Why calculative practices matter. *Social Research*, 68, 379–396.

Miller, P. & O'Leary, T. (2007). Mediating instruments and making markets: Capital budgeting, science and the economy. *Accounting, Organisations and Society, 32*, 701-734.

Orlikowski, W. J. (2007). Sociomaterial practices: Exploring technology at work. *Organization Studies*, 28(9), 1435–1448.

Pickering, A. (1992). *Science as practice and culture.* Chicago, IL: The University of Chicago Press.

Pinch, T. & Swedberg, R. (2008). (Eds.). *Living in a material world*, Cambridge, Mass: MIT Press.

Preda, A. (2008). Technology, agency, and financial price data. In T.Pinch & R.Swedberg (Eds). *Living in a Material World*. Cambridge, Mass: MIT Press.

Puyou, F., Quattrone, P., McLean, C., & Thrift. N. (2011). *Imagining organizations: Performative imagery in business and beyond*, London, Routledge.

Qu, S., & Cooper. D. (2011). The role of inscriptions in producing a balanced scorecard. *Accounting, Organizations and Society*, 36, 344-362.

Quattrone, P. (2009). Books to be practiced. Memory, the power of the visual and the success of accounting. *Accounting, Organisations and Society*, 34, 85–118.

Quattrone, P., Puyou, F., McLean, C. & Thrift, N. (2012). Imagining organizations: An introduction. In Puyou, F., Quattrone, P., McLean, C., & Thrift. N. (Eds). *Imagining organizations: Performative imagery in business and beyond*, London, Routledge.

Robson, K. (1992). Accounting numbers as 'inscriptions': Action at a distance and the development of accounting. *Accounting, Organizations and Society*, 17(7), 685-708.

Sauder, M., & Espeland, W. (2006). Strength in numbers? The advantages of multiple rankings. *Indiana Law Journal*, 81 205-217.

Schultz, M., Mouritsen, J. & Grabielsen, G. (2001). Sticky reputation: Analyzing a ranking system. *Corporate Reputation Review*, 22: 24–41.

Scott, S. & Orlikowski. W. (in press). Reconfiguring relations of accountability: Materialization of the social media in the travel sector. *Accounting, Organizations and Society*.

Shrum, Wesley M., (1996). *Fringe and fortune: The role of critics in high and popular art*. Princeton, N.J.: Princeton University Press.

Soejarto, A., & Karamouzis, F. (2005). Magic Quadrants for North American ERP service providers. Gartner Document, ID Number: G00127206.

Stark, D. (2011). What's valuable? In P.Aspers, J.Beckert (Eds.) The worth of goods: Valuation and pricing in the economy, Oxford: Oxford University Press.

Strathern, M. (2000). The tyranny of transparency. *British Educational Research Journal* 26(3), 309–21.

Tufte. E.R., (2001). *The visual display of quantitative information*. Cheshire, Conn., Graphics Press.

Violino, B. & Levin, R. (1997). Analyzing the analysts. *Information Week*, 17 November, http://informationweek.com/657/57iuana.htm, accessed 29 March 2006.

Vollmer, H., Mennicken, A., & Preda, A. (2009). Tracking the numbers: Across accounting and finance, organisations and markets. *Accounting, Organisations and Society*, 34, 619–634.

Wedlin, L. (2006). *Ranking business school: Forming fields, identities and boundaries in international management education*. Chichester: Edward Elgar.

Williams, R. Stewart, J. & Slack, R. (2005). *Experimenting with information and communication technologies: Social learning in technological innovation*. Chichester: Edward Elgar.