

CHAPTER 8

From Numbers to Interventions and Back: How Do Accounting Facts and Management Concerns Interact?

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Abstract: This essay offers an account of how numbers are produced and consumed in organisations. It is noteworthy, that the 'world' has only a little relation to this process because the transformation of numbers through calculation produces the visibility and transparency that cannot be seen by any other means. Then the essay traces the process from numbers into more numbers and back to the world, where the process has transformed the world in a forward moving move but which remains a hope because it is only a decision which later has to be made a solution by the help of many other hands.

Keywords: quantification, calculation, circulating reference, 2-dimensional representations, accounting, strategy

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Introduction

It is a widely held belief that numbers do not lie. If they are audited competently, they reflect the truth of a matter: the number of cakes in a box, the weight of 100 apples, the fraction of students with a grade point average exceeding 7.0, and the worth of the equity (wealth) of firms in a given industry. Such numbers describe phenomena in the world and are matters of fact. They are precisely calculated, and they can be re-calculated or re-counted if in doubt (Mouck, 2004).

However, numbers are not only matters of fact; they quickly become matters of concern. They are concerns because the procedure of making them count acts on the documentation of the number more than on the circumstances that make them interesting and relevant. There is more to the number than the number itself, because when it is made into an argument to do something, then it is not a description anymore. It is a part of an argument and thus a force for change. Will the number of cakes in the box reveal a loss of cakes? Is the weight of apples enough for the production of apple pies? Is the fraction of students adequate to fill up the student places that require a certain grade point average? Is the worth of the equity a prediction of the price of the firm? Such questions go beyond the number and make it a concern. The concern arises, as the famous philosopher Bruno Latour (2008 p. 39) tells us, when the world is added to the fact:

A matter of concern is what happens to a matter of fact when you add to it its whole scenography, much like you would do by shifting your attention from the stage to the whole machinery of a theatre. [...] Instead of simply being there, matters of fact begin to look different, to render a different sound, they start to move in all directions, they overflow their boundaries, they include a complete set of new actors, they reveal the fragile envelopes in which they are housed. Instead of “being there whether you like it or not” they still have to be there, yes (this is one of the huge differences), they have to be liked, appreciated, tasted, experimented upon, mounted, prepared, put to the test.

The fact is too lonely; it needs company to be interesting.

This point, that facts need company to be interesting, is important for management studies generally and accounting research specifically. Accounting research is interested in the relationship between the world

and numbers. At the end of the day, the adage goes, numbers explain failures and successes. Daily, news media report on relationships between financial earnings and movements in the stock markets; they tell us that bonus contracts are tied to corporate profits; and they tell us that not adhering to the budget is a bad thing. They tell us that the numbers are good windows into the world of complex matters (Mattessich, 2003).

However, much research tells us that numbers are also deceptive (Benson, 2003). The facts are uninteresting when they are certain, Bruno Latour would say. When they are interesting, they move more and become entangled with matters of concern. When they are parts of a wider scenography of things their fate is more uncertain. They become contested and it is difficult to imagine how they will settle a controversy or disagreement.

Therefore, this chapter is concerned with the question of how numbers are developed and made into resources for intervention. This is highly relevant for management and accounting students because the number connects the two positions. How are numbers made into facts (accounting)? And how do they turn into concerns (management)? Let us take these questions in turn.

Accounting facts – creating references

Accounting calculates; when accounting calculates it produces a link between at least two categories (e.g. costs and revenues) that if followed far enough has a relation to slips of paper – to receipts. Therefore, an accounting calculation starts from a series of receipts that are the effects of certain actions: a revenue slip comes from a sales transaction; a payment slip requires a cash transfer. A cost requires a series of slips: a purchasing slip covering materials; a production slip suggesting how much material has been used; a salary payment slip covering labor spending; a time register documenting how much labor time goes into production. When these slips are collected on a grand scale, it is possible to calculate total revenues, total materials costs and materials in inventory, labor costs in production and indirect labor costs. Then the calculation goes on to develop a measurement of profit: sales minus materials costs minus direct labor costs

minus indirect labor costs. In addition, there is an asset in the form of the materials inventory. Then the calculation may proceed to calculate the profit/assets ratio to arrive at profitability.

Here profit and profitability are wholly effects of calculative practices, of procedures of calculation. Tracing the profit back shows that only in very small glimpses is there a clear world to which the calculation may correspond. The profit is in no particular place; it is dispersed into numerous, and typically detached, actions in sales, production and purchasing. Their connections are not clear until some form of calculation has been made. The world to which the fact of products and profitability could correspond is hard to find. It ends in very small activities compared to the force that a single profit number engenders. A profit number can be talked about in the boardroom, in the management offices, in the press, among investors, and in governments. The individual activities in production and sales cannot be communicated as efficiently. The number not only travels speedily, it is potentially a dramatic actor which can unsettle even the strongest people, such as managers, boards of firms, and investment firms, if it presents matters as unfulfilled concerns.

This process of creating references between numbers and the world arises from tools and techniques of noting and summarizing (Chua, 1995, Miller, 2001, Miller and Rose, 1990, Robson, 1992). They gradually transform a myriad of activities into a simple number – the number is the end of a long process of calculation that gradually loses the specificity of all the actions but also gains stability, mobility and combinability. That is, numbers lose many aspects of the world, but become stable because they are calculations that can be performed by a computer; they become mobile so that they can be sent to any office or table where they can be discussed; and they can be combined with other calculations to make an even more general statement (Latour, 1986, 1999). The number is the result of a process that transforms a three-dimensional world into to a two-dimensional inscription; this makes the world less confusing, as Latour (1986, p.15) notes:

If scientists were looking at nature, at economies, at stars, at organs, they would not *see* anything ... Scientists start seeing something once they stop looking at nature and look exclusively and obsessively at prints and flat inscriptions.

In debates about perception, what is always forgotten is this simple drift from watching confusing three-dimensional objects, to inspecting two-dimensional images which have been *made less confusing*.

When presented in a two-dimensional form, the world has an air of visibility as it has *eliminated* things that just confuse matters. The gradual production of the number is therefore a process of reducing the number of aspects of the world.

Latour (1999) describes this process as a circulating reference. The important point is that the production of numbers is a process, which only refers to its own internal consistency and claims only in a very limited sense that it has captured the world. The first step is to note the activities of selling, purchasing and using time for production purposes, which are really the only strong hooks on the world. After this, the rest of the calculation acts on the slips or receipts that these activities left behind by bookkeepers or clerks. Therefore, to arrive at labor costs, the total labor bill has to be divided into production labor and indirect labor. This is done by combining the register of employment with the register of labor costs. Then the materials usage is calculated by the opening materials inventory plus the purchases of the period from which the end inventory is subtracted. Then the decision is made as to whether the result will be a contribution accounting profit which simply subtracts direct labor and materials costs from sales; or whether it will be a simple full cost calculation or a more complex activity-based calculation which would subtract indirect costs from the contribution number in different ways. The observation is that the number here is dependent on a procedure of calculation more than on representational qualities. The world does not care because it is already lost at the start of the calculation. What is left is a calculation that is true, because its procedure has been followed (McKernan, 2007, Mouck, 2004, Porter, 1994, 1995).

This process develops a consecutive set of references each of which is transformed into a different one. For example, the individuality of each sales transaction will show how the sales person has to treat the individual customer differently, but the minute that this transaction is translated to an entry in the cash register what is left is the amount of money for the sale and the date of the sale. There is no account of the sales person's

strategy to persuade the customer, and there is no account of the particular customer's idiosyncratic behavior and preferences. Therefore, the individuality of the sales episode is lost, and a more general account of the sales process has been established. At the end of the day, even the individual transactions of the cash register may lose their separate identities and be accounted for as the day's sales, which again become the week's sales, etc. This process of arriving at a number for sales will reduce our insight into the episodes of sales transactions. The consecutive set of references here is not a misrepresentation of the sales transaction, but neither is it an expression of what selling is about. In a sense, the resulting number for sales is not true because it is not about the sales transactions, but neither is it false because it aggregates slips consisting of sales transactions. In this process, sales transactions lose specificity and gain generality.

The production of the costs number for the situation is more complicated. The activity consists of some people operating some machines and using materials to produce a product. To calculate this, an accountant faces a series of choices.

1. One possibility is to (a) count the materials at the beginning of the period under consideration, add purchases during this period and subtract the amount of materials at the end. This produces the materials usage, which is then multiplied by either (i) the price of the last item of materials, (ii) the price of the first item of materials, or (iii) the average materials price. At least three prices can be calculated. Then (b) direct time is tallied from timesheets reporting the attendance of employees, and the hourly wage for each employee (possibly including coverage for vacation, health and certain employment taxes) is then multiplied. Adding all employee costs, this produces a number for all direct costs. If then (c) materials and direct labor are subtracted from sales, the accountant will arrive at a *contribution profit*.
2. Another possibility is to say that in addition to the contribution profit, the calculation also has to take into account the amount of indirect costs. Then from the contribution profit a fraction of indirect labor, proportional to the use of the capacity of the various

products, is subtracted. Therefore, if the firm sells two products, indirect labor costs (the wages, etc. of the indirect labor working, e.g. in production planning, logistics, and information technology, and which support the capacity of the production system) have to be allocated to these products, e.g. by volume. Therefore, from contribution profit, the accountant subtracts indirect costs to arrive at *full cost profitability*.

3. A third possibility is that the accountant employs the principle of activity-based costing and suddenly the complexity of the production space is even higher as a separate cost is allocated to the three different drivers of indirect costs – production planning, logistics, and information technology – and the proportion of usage for the two product lines is used for all three. The accountant subtracts another set of indirect costs from the contribution profit and arrives at *activity-based profit*.

These three methods of calculation are all acceptable in practice, and any accounting textbook will explain at great length how these calculations work. For example, the calculations may look as follows:

Table 1 Three methods of calculation based on the same system of transactions/receipts/slips.

Method of calculation	Contribution profit.		Full cost profit.		Activity based profit.	
	Product 1	Product 2	Product 1	Product 2	Product 1	Product 2
Sales	3500	8000	3500	8000	3500	8000
Costs	700	4000	1740	8460	3630	6570
Profit	2800	4000	1760	-460	-130	1430

The table illustrates that these different calculations produce different profit numbers for the firm's two product lines. Are these numbers true? Can they lie? They are not truths simply because they are different manifestations of 'the same thing.' They are not matters of fact in the sense that they reflect something innate, independent of time and space. However, are they lies? No, they are not lies either, because each of them follows a meticulous and auditable procedure. They are all true, in the sense that they are the effects of a systematic accounting relentlessly adhering to the principles

that the calculations propose. Therefore, if a contribution accounting proposition is favoured, the accounting procedure honours its principles, and thus one acts similarly concerning the full costing and the activity-based costing propositions. With Latour (1999) this can be called relative truths, or relative objectivity. The addition of 'relative' suggests that the number is more than a matter of fact; it is more involved in matters of concern.

So, what may be the matters of concern that the calculation is involved in? This is another way of asking how companies choose calculations. The starting point here is that firms may be uncertain about which axes of value are interesting and relevant. The idea of ambidextrous organizations suggests that there are always dilemmas between the short and the long run, between exploitation and exploration (Nadler and Tushman, 1999, O'Reilly III and Tushman, 2008, Probst, Raisch and Tushman, 2011, Smith, Binns and Tushman, 2010). Likewise, the idea of heterarchy implies that there is always more than one value in a firm and they will often compete (Stark, 2009). Mouritsen et al. (2009) provide an illustration of how accounting calculations compete and this competition has, in their study, consequences for choices in relation to innovation, and subsequent consequences for firm capabilities and the inter-organizational division of labor. They suggest that accounting calculations compete to illustrate the different implications of choices relating to technology, organization and environment.

In one of their examples, they suggest that through the competition between a contribution calculation and a calculation of indirect costs two different versions of matters of concern emerged. The contribution argument favoured innovation based on advanced technology, which though experimentation would be able to increase revenues. This made outsourcing a difficult thing and, in a sense, development work was a black box because fixed costs were one undivided whole, but survived because of revenue increases. Alternative calculations of indirect costs focused on this black box and suggested that opening it (dividing it up somehow) would make it possible to be less experimental and more focused in making innovation choices, which again would make it possible and desirable to outsource a lot more of the production and innovation work. Generally Mouritsen et al. suggest that it is difficult for a manager to make a general

statement without the help of a calculation. If someone wishes to criticize an accounting calculation, it is not sufficient to express disagreement; it is necessary to develop another calculation that can show something else. Dissenters are small and insignificant persons when only shouting disagreement; dissenters are much stronger when they mobilize a different calculation.

Therefore, the calculation is more than a matter of fact; it is also a matter of concern relating to strategy and context. Yet, rather than suggesting that the calculations are effects of strategy and environment, it may be more rewarding to suggest that calculations help develop the strategies and environments that make up the controversies. They help to develop the propositions around which dissenters rally.

Numbers are therefore not reality. Instead, they *take the place of reality*. That is to say, the transaction of selling is quickly forgotten when it is counted in the cash register and becomes one among many entries, and later loaded onto the ledger where, combined with other sales transactions, it forms one single number for the day's sales. Its specificity is lost in the turbulence of the cash register, which records all the individual transactions, and the ledger, which summarizes these as an addition of transactions. Instead of the transactions, there is a sales figure per day. Likewise, the busy activities on the shop floor and in the planning offices are quickly lost in timesheets and wage calculations, and further in product cost calculations. Therefore, instead of busy people there is a cost calculation. Then, on top of this, the separated spaces of selling, producing and administrating are drawn together in the profit number, which relates sales to costs. Sales people, production workers and administrative clerks who are separated in time and space are now suddenly put together in the profit calculation. It draws together spaces that otherwise are distributed, and creates another space – a centre of calculation – which acts as one. The gradual development of the centre of calculation follows the sequence of calculative practices: from transactions, into slips and receipts, summaries of slips and receipts into revenues and costs, subtractions of summaries into profits, and division of profits and summaries of assets into profitability. Each operation loses the particularity of the transaction but gains generalization; each operation also reduces dimensions and ends in

a clear amplification (the final number such as the profits) that is said to stand for all things and connect every place (Chua, 1995, Mennicken and Miller, 2012, Miller, 1991, Robson, 1992, Vollmer, Mennicken and Preda, 2009).

Profit as a mechanism to assemble diverse places makes them one thing. It creates a unity out of separation. This is what calculation does. It creates entities that may not have existed before, and that may not exist as such without the calculation. Profits can be judged only by the principles of calculation – there is no ‘where’ where it would be possible to test it except through the competition from other calculations. Profit creates a new entity that draws things together, but there is no particular object that would correspond to it.

Management concerns – acting at a distance

The profit number thus constructed as a centre of calculation stands atop many dispersed spaces and has clear vision. Clarity of vision is rendered possible because the ambiguities and the multi-dimensionality of practices have been eliminated. It is, as Latour (1986) is cited for above, a less confusing world because it has been rendered two-dimensional, i.e. it can be seen on a piece of paper or on a computer screen. Management has a clearer view from the two-dimensional report than from looking out of its windows from the top of a skyscraper. This two-dimensional report asks management to do something. There may be differences between the profitability of product groups as shown in Table 1. Because of this discrepancy management is urged to do something to resolve it. Management is urged to attempt to intervene, and the report is an engine for this. The two-dimensional report makes it possible for management to ask other subordinate managers to do something, and make claims about the preferred profitability. The report allows management to act at a distance on the remote settings. The report is a resource that makes management strong; it can change matters that are located far away. Yet, it is also an obligation; the differences – the simple subtractions – between what is and what could be is a source of concern that will be difficult for the manager to overlook. Management has to do something.

This poses a problem because this visibility created by profit figures is not primarily a matter of fact; as suggested above the fact of the number is in its production process rather than in its correspondence with reality. Therefore, it becomes a matter of concern in the sense that the number is too smooth to help management all the way. Management instead has to face many of the traits that were removed to make the world less confusing. In a sense, management is charged to manage a three-dimensional world, while the number is two-dimensional. Management therefore has to prepare the journey back to the sales person, to the operations person, and to the clerk, all of whom exist in three-dimensional spaces (Frandsen, 2009, Preston, 2006).

How will management be able to travel back? This could be a problem as they then would have to become sales persons, machine operators or bookkeepers. They cannot assume such roles so there must be a trick. The trick is that they do not go quite all the way back to the three-dimensional space, but stay in a different type of two-dimensional space than the accounting calculation's two-dimensional space. The accounting calculation, as described above, works hierarchically from many small entities into a consolidated amplification, such as profit, which takes 'everything' into account so that all traces (receipts and slips) are accounted for. There is, however, a different type of two-dimensional space, which is lateral more than hierarchical. This is the space of planning devices such as budgets, strategic plans, project scopes, and other devices that help to imagine the future (Gireau, 2008, Puyou *et al.*, 2012). This space is lateral in the sense that it combines various types of calculations and representations to form new images of future states of the firm before they are yet realized. By such mechanisms, management postpones interaction with the sales persons, machine operators, and clerks, and works to develop new scenarios from the safe harbour of their offices. As Czarniawska and Mouritsen (2009) suggest, management prefers the world to be still when inspecting it from their offices.

Management substitutes the three-dimensional world with a new cascade of two-dimensional representations found in budgets, forecasts and plans. Even if much management literature points out that execution rather than planning is the key feature of management practice, most

managers will often wonder about budgets and plans, and hope, typically in vain, that they will reflect the future with a great deal of confidence and authority.

It is doubtlessly a good idea to think about the future, but since the future is certain by less than 100%, there is reason to be concerned with how propositions about the future are made. This is a process which involves not only having made the plan and the analytical structure within which it fits (Malmi and Brown, 2008, Ferreira and Otley, 2009) but also, and primarily, making the plan, the budget, or the strategy. The work of making these plans, budgets or strategies is a process of tinkering with planning documents (Gireau, 2008, Kaplan, 2011, Spee and Jarzabkowski, 2009). Here, the important question is how matters of concern are related to plans and budgets, and how they are attributed to effects such as performance.

The philosopher Ian Hacking (1986 pp. 130-149) provides a compelling fable about the emergence of visualization, or representation as he calls it. Fundamentally, he says, mankind represents (rather than thinks or talks); it is representation in a particular way, though, because it is concerned more with likeness than with correspondence – something looks like a thing rather than being a thing. Hacking speculates, for example, that thousands of years ago when cavemen pictured bison, mammoths etc. on cave walls they were concerned not only with describing these animals but also and more importantly with challenging each other to draw better. Each painter would paint by adding features and characteristics to paintings that were produced by other cavemen. They would articulate disagreement about the proper form and function of the painting. One painter might disagree with another about the characteristics of a mammoth, and paint it in a new way. These disagreements would not, Hacking suggests, be concerned with all attributes of the animal, but only those that would make the painting work in a particular way, and additions to paintings would continue to happen as long as there was still enough energy to disagree.

Disagreement would continue, Hacking conjectures, until painters stopped their attention to differences; not because they closed the distance between painting and the world but because they got tired of

fighting about difference. Even if there is a likeness between the painting and the animal, the point is not its correspondence to the world, but rather the concerns that stop other painters from adding to or subtracting from the painting. Paintings are proposed and re-proposed; each painting responds to other paintings and cultivates a new detail that changes the painting.

The struggle between painters is a struggle about the elements that compose the painting. This is parallel to struggles about the format of budgets and plans. What should the plan include? The budget probably, and then? A diagram that breaks down the market into segments? A comparison of the firm's capabilities with those of competitors? A consideration of the well-being of the workforce? A statement on customer demographics? An integrated business model, such as the balanced scorecard, the service profit chain, the performance pyramid, or an intellectual capital statement? A prediction of interest rates and currency fluctuations? In principle, there is no end to what a plan could contain. There are always possible new additions that could colour the message of the plan. These additions can be superimposed on planning documents, and by adding new elements, the message of the whole plan can change character. Some psychological research has shown, for example, that the presentation format – such as the difference between graphical and tabular information – of economic information has consequences for the performance of managers depending on their accounting skills. Thus, some managers perform better when using graphical representations, while others perform better using tabular information (Cardinaels, 2008). When firms use multiple types of information, when it is organized in a structure such as balanced scorecards, they are more involved in dialogues (Cardinaels and van Veen-Dirks, 2010). There is reason to believe that the composition of the planning device is of material importance.

The problem of composition can be illustrated in principle by the famous accounting researcher Robert Kaplan's and co-author consultant David Norton's work on balanced scorecards. For example, their book on strategy maps proposes a series of templates about all four perspectives of the scorecard (Norton and Kaplan, 2004). These offer the opportunity to engage a wide range of issues that planning could be concerned with.

The book develops a series of templates for the possible structure of each of the perspectives, and a series of examples from which it is possible to compose a particular balanced scorecard. In addition to the visualizations produced to link the perspectives, the book also offers guidelines for strategic thinking, including what it could (but not necessarily should) be about. This shows that the balanced scorecard is also understood as a series of checklists of the best practices possible for managers to choose. Therefore strategy making and implementation become processes of tinkering with checklists relating to what the particular foci of the particular company could be. The series of checklists and templates makes planning a question of the composition of the planning instrument. Or using Ian Hacking's idea, it is a matter of painting and repainting the landscape of planning tools.

More specifically Qu and Cooper (2011) illustrate empirically that tinkering with the structure of the balanced scorecard is conditioned more on politics and interests than on detached analysis. The eventual balanced scorecard is constituted by a range of media used to make the balanced scorecard a real entity, and the different methods to produce, capture, secure and refute claims about the objects of which the world consists. It may not be a surprise that complex planning devices such as balanced scorecards must be taken seriously only in the space for which they are designed. Otherwise the opponents become too strong and they will fail. Busco et al. (2009) suggest that decoupling local and global scorecards may be necessary because the elements that are tinkered with in different spaces are different. So, rather than insisting on integration and tight coupling, which would require compromising on the elements of planning, decoupling or loose coupling of the elements to be planned for may be constructive. Or in other words, there is a different composition of the elements across space and time even within a firm.

Likewise, in his study of the use of Renault's planning documents, Giraudeau (2008) shows that planning is not merely the programming of predefined strategies. More importantly it is a mechanism that positively opens eyes to things beyond the set strategy. Thanks to their visual and textual representation of contexts and strategies, these plans enhance strategic imagination more than they support the implementation of

strategies. His point is that many planning documents are constructed not for making a plan, but for creating interaction among managers who experiment with propositions. Not all plans have to be implemented. Plans are to be tinkered with, and it is not clear from the outset which plan will stick. It is, as Ian Hacking says, the task of composing the picture; analogously, it is the task of composing the planning document, while the question of which part of the firm and which calculative devices will gain power is open. The task is to find this out.

It is noteworthy that all these examples show that when managers take concerns into account and wish to make a statement that will influence the world (e.g. a budget, a plan, a strategic position) they still operate in the two-dimensional format. It is not about practices of selling, operating machines and organizing bookkeeping. It is about manoeuvring diagrams, models, calculations and surveys in relation to each other. It is the work of imagining what the world could be rather than what it is; it is about making the firm a virtual object that can be investigated through representations thereof (Puyou *et al.*, 2012). The firm is a proposition that can be made visible, but probably not in practice (Ewenstein and Whyte, 2007, Whyte *et al.*, 2008); it remains clearer in images than in practice, and this clarity is conditioned less on the world than on the instruments that make it visible. Even in situations when managers have to act on the world using the images that have been crafted and drafted through planning, they do not reach the world; they draw on images of it.

Where do the sales person, the machine operator, and the clerk have a role in this? They are not there except possibly as small rhetorical parts of the narrative of achievement and success that planning produces. Their precise tasks are treated not in their totality, but as functions and generalizations. This means that there is a limit to the realism of the planning activity. Like the first step of accounting facts the world is immediately lost. It is noteworthy that the road back towards practice is paved only part of the way (Frandsen, 2009, Preston, 2006). The plan is not a copy of the state of affairs of sales persons, operators and clerks. Therefore, as Professor Sten Jönsson has stated many times (e.g.1996), the last step from the plan to the operators has to be a leap of faith, hoping

that practical foremen and supervisors can make the big translation back to practice happen. When managers act on the world, they can make a huge impact through images, but they require help to go the final distance from paper to sales transaction, to spending time in the operation, and to concerns about making the financial database a solid one. When managers wish to act from a distance they influence the distant place mainly via mediators such as middle managers, foremen and supervisors.

Conclusion

Numbers are calculations; and plans are compositions of the elements to be taken into account. They are both visualizations but they are not alike. Calculative practices create numbers based on a procedure, which gradually reduces confusion by eliminating the traits of the transactions. This elimination happens because calculations are built not on the world per se but on receipts, slips and documents. These make calculations easy; they would be impossible to perform directly on the world. Numbers are the effects of calculations and are not true in the sense of corresponding to a world; they are not copies of the world. Yet, they may be true in the sense of following procedure. When calculations gradually become more and more singular, as in the measurement of profit, they form a centre of calculation gathering together many different spaces, which are removed from each other in reality. Calculations define a new vantage point from which other spaces can be acted upon.

Acting upon other spaces is not easy, however. Managers may not like to be practical. Instead, they play planning games in which they attempt to imagine a future world, which is different from the present one. This involves models, diagrams, calculations and other visualizations, the composition of which is an unknown or at least a variable. In principle, the two-dimensional world can accommodate any representation, but different types of representation do not tell the same story. Therefore, the struggle to create things during planning processes is important. This develops a virtual organization, which may or may not be distant from the practices it attempts to influence. Managers are still far away from the three-dimensional world, so they need the skills of foremen and

supervisors to make the last leap from paper to action; from two-dimensional representations to three-dimensional action.

Does this make management a trivial activity? On the contrary, management is a complex endeavour of imagination and persuasion. It shows that management is never a formula even if it requires lots of formulae (or calculations) to be made aware of their world. Unfortunately, for managers, it is not possible to provide them with one correct answer to questions of economic calculation. This is not a surprise to managers, however, and their task is to manoeuvre in such an ambiguous space. Even if numbers create clarity, they never erase uncertainty, ambiguity and complexity.

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