

From Saint Jerome's study to workplace seismographs: The role of spatial layouts in decision-making speed across different industries

Kerstin Sailer
The Bartlett School of Architecture, UCL
k.sailer@ucl.ac.uk
+44 20 3108 9031

Matt Thomas
University of Birmingham Business School
m.a.thomas.2@bham.ac.uk

ABSTRACT

Purpose: Strategy literature demonstrates the importance of fast strategic decision making to performance in dynamic industries. While some industries such as financial services operate based on decisions that take milliseconds, other industries such as academia are much slower paced and organise work within time periods of months or years. This paper investigates speed in relation to visibility arrangements in workplaces. It asks which potential for unplanned encounters arises out of spatial layouts and how those encounters in turn affect decision making speed.

Theory: Three main theory strands are brought together by this paper: firstly, the concept of industry clockspeed, which is used in management to understand the velocity of change in external business environments and how it relates to decision making speed in organisations. Secondly, space syntax theories as developed in architecture are employed to investigate visibility relationships in workplace layouts and the related affordances for encounter this creates. The concept of visibility acting as a 'seismograph' by creating awareness of what others are working on is elaborated on. Finally, theories of social networks and informal interactions are used to link management and space via a behavioural approach.

Design/methodology/approach: The conceptual ideas of the paper will be applied to a series of workplace layouts across different industries, including academia (slow paced), professional services such as law firms (medium paced) and the financial services industry (fast paced). Space syntax methods will be used to analyse the floor plans of the different organisations.

Findings: Findings suggest that floor plans generate encounter and awareness opportunities via the mechanism of visibility. Offices in high clockspeed industries were found to have significantly more integrated workplaces with higher levels of visibility. Nuances regarding required speed and the detailed role of layouts in mediating encounter opportunities are elaborated on. Spatial factors are found to be an additional and often overlooked resource when it comes to managing organisations. Spatial factors affecting strategic decision speed can be traded-off in favour of factors such as cost and privacy. Findings also show that the impact of spatial layout is particularly important in larger offices.

Originality/value: Speed of decision making is an increasing worry of companies observing how business environments become ever more fast-paced and volatile due to technological progress. Bringing this management angle together with a detailed architecturally informed analysis, arguing that floor plans provide specific opportunities for business operations is a novel approach.

Keywords

Speed, Decision Making, Industry Clockspeed, Open-plan, Cellular Office, Informal Encounters, Space Syntax.

1 INTRODUCTION

This paper explores the possibility that office layouts might have an impact on strategic decision making speed. Office environments vary a great deal from the isolation of cellular offices typified by St Jerome's Study (see figure 1) to the frenzied, seismographic like, interaction possible on open-plan commodity trading floors (Tsen, 2001).

The competitive environments within which organisations compete are not all equally dynamic. Strategy literature identifies three ways in which industries change: rate (the frequency of changes) (Duncan, 1972; Williams, 1994), turbulence (unpredictability of industry change) (Fombrun & Ginsberg, 1990; Jurkovich, 1974), and magnitude (the size of the change) (Brown & Eisenhardt, 1997; Tushman & Anderson, 1986). This paper focuses on the rate of industry change because of its impact on the speed at which strategic decisions need to be made (Bourgeois & Eisenhardt, 1988; Fine, 1998).

Figure 1 **St Jerome's Study**, engraving by Albrecht Dürer (1514). Note the wall mounted clock in the background.



Industry clockspeed is a concept developed by Fine (1998) that measures the rate of industry change driven by external factors such as the intensity of competitive rivalry and the rate of technological developments (Porter, 1985). Fine identified three elements of industry clockspeed: product (rate of new product introductions), process (rate at which new process technologies need to be introduced) and organisation (rate of change of strategic actions) (Fine, 1998). In combination, these three elements reflect the rate of industry-level changes based on the aggregate of all the strategic decisions and actions taken across an industry, for example fast clockspeed in semiconductors and fast moving consumer goods but slow in shipbuilding and diamond mining (Nadkarni & Narayanan, 2007).

Industry clockspeed is important because organisations in high clockspeed industries need to make fast strategic decisions, which according to Eisenhardt (1989) resulted in superior performance in high clockspeed industries. By contrast, Fredrickson (1984) demonstrates that slower strategic decisions, that are analytically exhaustive, improve performance in low clockspeed industries.

These findings showed that the speed of strategic decision making needed to match the rate of change in the industry and where organisations fail to do so their performance is adversely affected (Judge & Miller, 1991; Robert Baum & Wally, 2003). This means that all organisations should be concerned with strategic decision-making speed, and with clockspeeds in all industries getting faster (Dedehayir & Mäkinen, 2011; Mendelson & Pillai, 1999) the number of organisations that need to be concerned about making fast strategic decisions grows over time.

Despite the importance of fast decision making speeds it must be noted that not all fast decisions will be good decisions. Indeed, it has been shown that fast decisions result in poor performance when relevant information gathering is sacrificed (Kahneman, 1982). This is what makes Eisenhardt's findings about the characteristics of organisations that made successful fast strategic decisions so compelling. Eisenhardt found that faster decisions resulted in organisations that considered more alternatives simultaneously and where people with industry experience were involved in the decision making process (Eisenhardt, 1989). This suggests that fast strategic decision making is done best when useful information can be processed quickly, in other words in the most successful companies, decision making is both "*fast and comprehensive*" (Robert Baum & Wally, 2003, p. 1109).

These findings have generated interest in the internal characteristics of organisations that have the capability to make successful fast strategic decisions. However, these studies tend to focus on the formal strategy-making processes of senior managers. For example, Baum and Wally show that faster strategic decisions tend to occur in organisations where strategic management is centralised and in more formalised organisational structures (Robert Baum & Wally, 2003). The underlying assumption here is that all strategy making is deliberate and carried out by senior managers. However, it is increasingly recognised in strategy literature that informal and unintentionally strategic decision making is particularly important in fast clockspeed environments (Chia & Holt, 2006; Mintzberg & Waters, 1985; Vaara & Whittington, 2012). This is because strategic decision making relies on the availability of information that is spread across an organisation, and often the most useful information exists in the periphery of an organisation (Regnér, 2003). In fast clockspeed industries strategic decisions need to be made where relevant information becomes available because it takes time for that information to travel to the centre of an organisation and be recognised as relevant in formal strategic processes. As a result, organisations making fast strategic decisions are characterised by evidence of unintentionally strategic decisions getting made by people across an organisation

in their everyday intuitive actions (Chia & Holt, 2006) in response to everyday problems (Tsoukas, 2015).

For these reasons, strategy-as-practice scholars have focussed research efforts on the everyday interactions of people across an organisation in order to understand how strategies emerge unintentionally. Each interaction may appear inconsequential (Cooren, Bencherki, Chaput, & Vasquez, 2015) but they accumulate to form strategically important patterns of action over time and this accumulation happens faster as frequency of interaction increases.

However, not any interaction is necessarily beneficial to strategic decisions, but research shows that frequent interaction across broad social networks improves the quality of ideas and real novelty in organisations (Burt, 1992; Padgett & Powell, 2012).

Research in architecture has shown that visibility in workplaces has a significant impact on who interacts with whom and how often. More integrated spaces were found to encourage greater frequency of interaction than more segregated spaces (Grajewski, 1993; Toker & Gray, 2008). This suggests that workplace design is an important factor in understanding the potential for fast strategic decision-making in organisations and we hypothesise that organisations in fast clockspeed industries will require more integrated space than those in slow clockspeed industries. However, we acknowledge that organisational workspaces are rarely (if ever) designed with strategic decision speed as the main objective. Rather, a variety of other objectives are used in designing office space such as cost (Chan, Beckman, & Lawrence, 2007) expressions of power and identity (Dale & Burrell, 2008), efficient processes (Peponis et al., 2007), and privacy (Kim & De Dear, 2013). These objectives may conflict with that of decision speed and for this reason, we look both at a large sample, but also select three organisations to understand more in-depth what compromises to strategic decision speed might have been made in pursuit of some of these other objectives.

In this paper, we test our hypothesis by comparing the office integration scores for workplaces employed by organisations in fast, medium and slow clockspeed industries.

2 METHODOLOGY

In this study, we use a large sample of 72 workplaces, all of which have been analysed in existing literature (Sailer, 2010; Sailer, Penn, & Marmot, 2012; Sailer & Pomeroy, 2016; Sailer, Pomeroy, Raheem, Budgen, & Lonsdale, 2012; Thomas, 2019) according to the degree of spatial integration of their office layouts, based on space syntax methodology. We collated information on size of the offices (number of floors, net internal area) but also the average mean depth of each workplace based on its visibility graph (Turner, Doxa, O'Sullivan, & Penn, 2001), which shows what can be seen at eye-level from every vantage point across the office (see figure 3). Mean depth (MD) is a metric describing the average number of turns ('looking around the corner') required to visually access all areas of a workplace from anywhere. We brought this together with an assessment of clockspeed based on the industries of the organisations, classifying them as slow (public sector organisations, universities, manufacturing, scientific organisations), medium (advertising, consumer goods organisations, law firms, consultancies, real estate companies) or fast (media, financial services and technology companies). Table 1 gives an overview of the data set. The average office in our sample is 2164 m² large, is spread across 2.4 floors and has an average mean depth of 4.15, which means that from any point in those offices, an average of 4.15 turns are needed to see every area. Minimum mean depth in the sample is 1.46 for a real estate office, whereas the largest mean depth was found for a media company (MD=7.39). Differences in mean depth

can be seen across the industries, however, the biggest variation in mean depth is an effect of floor area and numbers of floors, both of which increase levels of segregation naturally.

Table 1 Overview of sample of 72 workplaces

Industry	# of offices	Clockspeed	Ave floor area [m ²]	Ave # of floors	Min MD	Ave MD	Max MD
Advertising	14	medium	2835	3.0	1.49	4.02	6.20
Consultancy	2	medium	2159	4.5	5.98	6.26	6.55
Consumer goods	2	medium	2307	1.5	2.15	4.24	6.32
Financial services	4	fast	1201	1.8	2.26	3.29	5.66
Law firm	2	medium	1753	4.5	4.60	5.11	5.62
Manufacturing	1	slow	2750	1.0	4.79		
Media	16	fast	2366	2.4	2.15	4.43	7.39
Public sector	21	slow	1099	1.9	1.74	3.75	7.36
Real estate	4	medium	571	1.3	1.46	2.88	4.54
Science / research	1	slow	6162	3.0	3.79		
Technology	1	fast	12600	3.0	3.97		
University	4	slow	3541	3.0	4.77	6.16	6.70
TOTAL	72	---	2164	2.4	---	4.15	---

In order to test the hypothesis that spatial integration of workplaces varies by clockspeed requirements of industries, we ran statistical models on the sample of 72 offices.

On the basis of this initial analysis three organisations were selected for a more detailed appraisal of the characteristics of the workplace in relation to speed of decision making and the strategic positioning of the organisation.

3 FINDINGS

3.1 Variances in workplace integration by clockspeed

We undertook a statistical analysis of variance (ANOVA) to test for differences in average mean depth values between the three different clockspeed categories. Results (see figure 2a) show that mean depth in itself does not vary by industry.

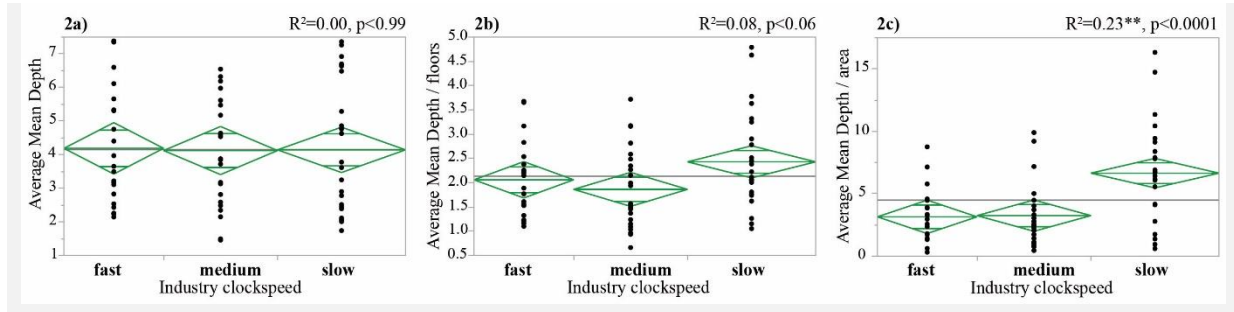
Mean depth, however, is rather size-dependent: a least squares regression model explains 63% of the variance in mean depth by the numbers of floors, and mean depth varies by office size, too, since a linear regression predicts 16% of variance in mean depth by office area. Hence, we tested normalising mean depth for the further analysis. Dividing mean depth by numbers of floors ($MD_{N-floor}$) and using this in the ANOVA (see figure 2b) results in a clearer differentiation of mean depth by clockspeed, yet the analysis remains insignificant. Finally, we normalised mean depth by area¹ (MD_{N-area}) and found that clockspeed now indeed varies (see figure 2c).

As expected, fast clockspeed organisations had a lower average mean depth given their area, hence tended to occupy more relatively integrated layouts, while slow clockspeed organisations

¹ In order to obtain easier to handle values, we divided MD by area/1000.

were accommodated in significantly more segregated layouts. Differences between medium and fast clockspeed were rather small.

Figure 2 ANOVA of mean depth by clockspeed. a) Mean depth; b) Mean depth normalised by number of floors; c) Mean depth normalised by area [in 1000m²].



It is interesting to see that average mean depth did not show variances, yet normalised average mean depth by area did.

Because of the size dependency of mean depth, almost all large offices showed high mean depth values, no matter which industry and therefore clockspeed they were associated with. Normalising by floor was also not successful since the measure $MD_{N-floor}$ was still largely floor dependent, yet less so than the not normalised mean depth (least squares fit of $MD_{N-floor}$ against number of floors resulted in $R^2=0.46^{**}$, $p<0.0001$). Normalising by area had an interesting effect: smaller offices now displayed a tendency towards larger normalised mean depth values. The top 15% of offices with the highest area-normalised mean depth were relatively small (mean area = 319 m²) but showed significant amounts of partitioning, evident in relatively large mean depth values given their size (average MD = 3.19, average MD_{N-area} = 10.74). Therefore, this metric of mean depth normalised by area seems to depict purposeful segregation in offices, achieved by deliberate partitioning. The floor plan of a media organisation (fast clockspeed) is shown in figure 3 below, highlighting how the workplace presents relative segregation (MD_{N-area} = 8.76) in a small area (= 245 m²) by partitioning but also to some degree by virtue of the character and shape of the floor plate.

Hence it can be summarised that the analysis confirms our hypothesis that organisations in fast² clockspeed industries tend to have more integrated offices than those in slow clockspeed industries.

This indicates that, on aggregate, organisations are adapting their office space to meet the strategic decision speeds demanded by their competitive environment. However, our data also shows that considerable variation exists within each clockspeed category suggesting that compromises to decision speed are also common. In the following sections we examine these possible compromises by exploring three of the organisations in our data set in more detail.

We selected three outliers for further investigation: 1) an organisation with segregated offices in a fast clockspeed industry; 2) an organisation with integrated offices in a slow clockspeed industry and 3) an organisation with segregated offices in a slow clockspeed industry. The first

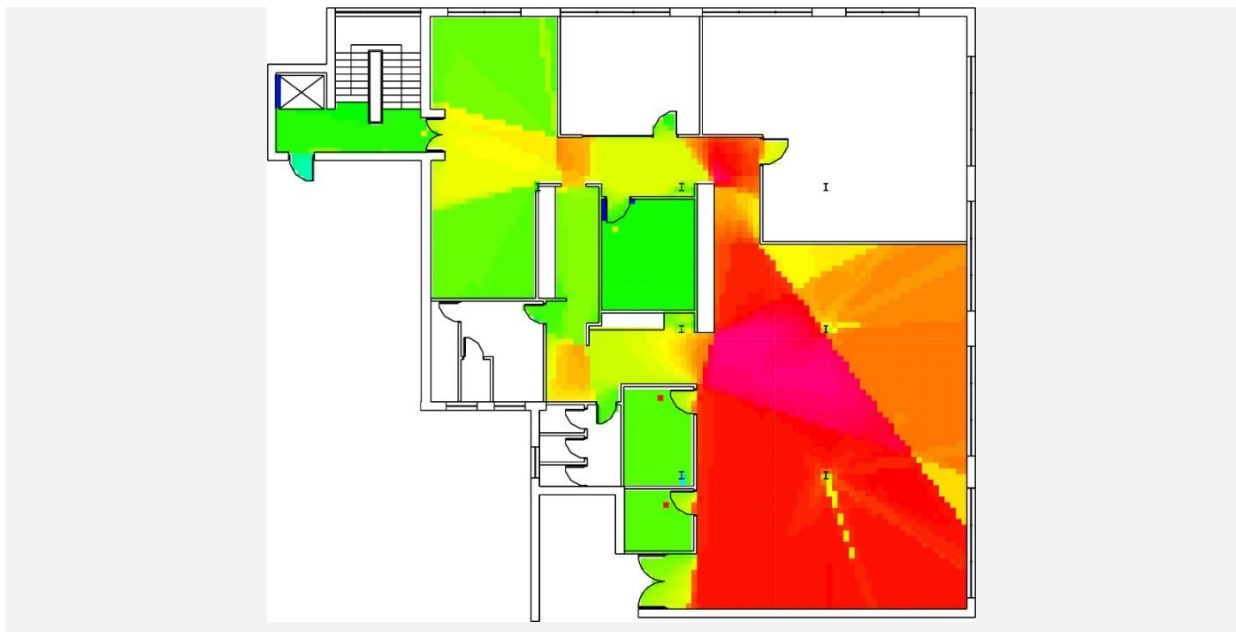
² Typically, the literature on clockspeed refers to fast and slow clockspeed only. As our results found no statistical difference between fast and medium clockspeed industries the remainder of the paper will refer to fast clockspeed only but our comments on fast clockspeed will also apply to the organisations we categorised as medium.

two examples present cases where office integration and clockspeed do not match our hypothesis.

3.2 In-depth case study 1: Fast clockspeed in a segregated office

Our first case is an outlier in the above analysis. This is a small media organisation operating in a fast clockspeed industry, yet it is accommodated in a relatively segregated workplace layout. It has the highest average mean depth normalised by area in the fast clockspeed category.

Figure 3 **Visibility graph of a media organisation showing mean depth.** Areas marked in warm colours (red, orange, yellow) are integrated (low mean depth), whereas those in cool colours (green, turquoise, blue) are segregated (high mean depth).

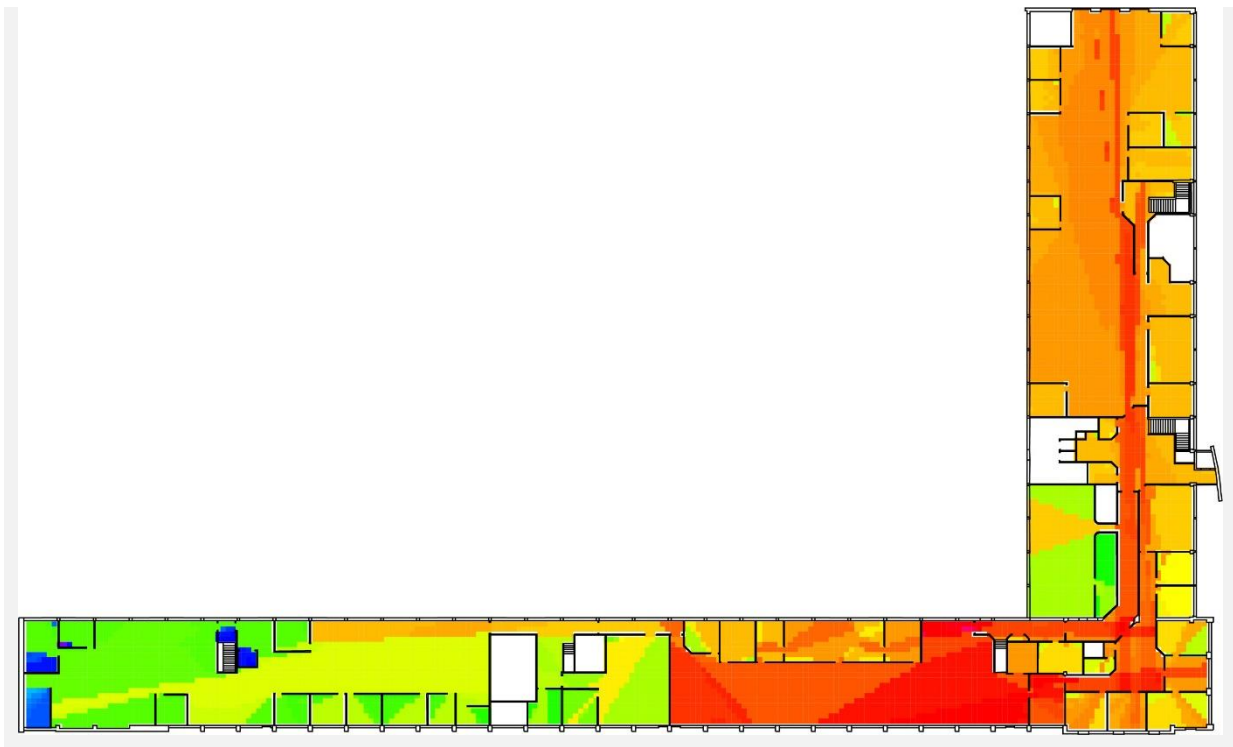


Potentially, the relative segregation of this office makes fast decision making less likely because it would constrain frequent interaction between those developing strategic options simultaneously and hence result in slow decisions. However, this media organisation is small, with just 20 employees, all of whom are located in a single open-plan office with high levels of intervisibility (shown in red in figure 3). The relative segregation evident in the analysis occurs because the rest of the floorplan is partitioned into meeting rooms, a kitchen and a reception area. The reality is that because the organisation is so small, everyone in attendance in the office is likely to interact with everyone else, especially as all desks are arranged open-plan.

3.3 In-depth case study 2: Slow clockspeed in an integrated office

We are now considering the exact opposite case: an organisation in a slow clockspeed industry situated in a well-integrated office. As before this goes against our hypothesis.

Figure 4 **Visibility graph of a manufacturing business showing mean depth.** The colour scheme is comparable to figure 3.



This manufacturing business had moved from predominantly cellular offices to an open-plan design. The floorplan was arranged in an ‘L’ shape and senior managers retained cellular offices that doubled as meeting rooms whilst the remainder of the office was open-plan where visibility was high although mean depth varied slightly depending on detailed location in the floorplan (see figure 4). The change in office layout was based on optimising space utilisation and had enabled the growing organisation to accommodate a larger number of people within the same office without the need for costly expansion of the premises. Although we do not have the data to demonstrate a performance consequence from this move, we are able to report on significant changes to working practices that resulted. The move away from cellular offices had removed a lot of potential meeting space that had not been replaced with alternatives. In the deliberate processes of comprehensive analytical decision making, many formal meetings were used to progress strategic options and to communicate the analysis. In the newer open-plan offices, existing bookable meeting space was always fully booked, and much frustration was evident that meeting space was not readily available. To replace these more formal meetings informal ‘gatherings’ around open-plan desk clusters started to become more frequent.

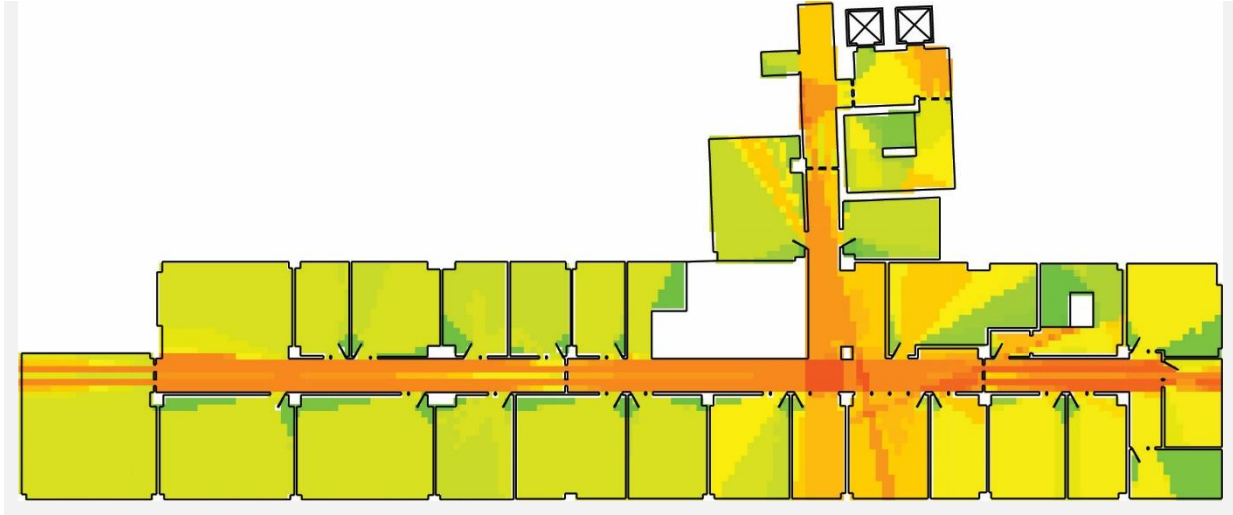
3.4 In-depth case study 3: Slow clockspeed in a segregated office

Our third example is of an academic institution, a slow clockspeed industry, that has segregated offices due to a cellular layout (see figure 5).

It is our experience that academics value the peace and quiet of a segregated cellular office space because it gives them the privacy for concentrated work. Our third example is segregated ($MD_{N\text{-area}} = 6.19$), precisely because the academics have cellular offices in the floorplan studied. This is an example of a good match between the clockspeed of the industry and the

impact of the floorplan on decision making speed. However, we have selected it as an example for further investigation because we think there may be hidden trade-offs.

Figure 5 **Visibility graph of one floor of a university building showing mean depth.** The colour scheme is comparable to figure 3.



All trade-offs as well as the match between clockspeed and workplace layout will be discussed together in the following.

4 DISCUSSION

Reflecting on the overall analysis and the three in-depth case studies, two separate points are worth making in this discussion. First, we consider the fit between industry demands on fast or slow decision making with workplace layouts.

Fast clockspeed industries are where fast decision making is most critical and we have argued that integrated offices aid that fast decision making. One of the key reasons for this is that Eisenhardt (1989) showed that successful organisations in fast clockspeed industries consider more (not less) strategic options simultaneously. This, in our view, makes it essential that there is widespread and frequent interaction between those developing alternative options.

Putting our media organisation into the context of Eisenhardt's analysis, its relative segregation is no constraint on fast decision making because of the size of the organisation. In fact, all three cases shown in figure 2c that fall above the mean in the column representing fast clockspeed industries are amongst the smallest in our sample.

In contrast to these small organisations, firms with larger numbers of employees that compete in fast clockspeed industries, such as the big tech giants, cannot expect widespread and frequent interaction with no help from the office layout. In our sample, we have no examples of large organisations in fast clockspeed industries with poorly integrated offices. We think it is possible that as organisations in fast clockspeed industries grow, they have to have more integrated spaces to survive.

A second reflection we want to offer is on potential trade-offs. Workplace design might suit an organisation in some of its processes and strategies but could be detrimental to other organisational goals. Our case studies two and three offer important insights here.

The manufacturing business is operating in a slow clockspeed industry, typically gaining a performance benefit from slower strategic decision making (Fredrickson, 1984). Since they compete in an environment where speed is less of an issue competitively, these organisations can make sure decisions are made after exhaustive and inclusive strategic analysis. This means that offices do not need to be well integrated, however that was the case here. Potentially this can put the (successful) slow, considered, strategic decision making at risk, replacing it with a more intuitive decision making that the literature suggests might undermine strong long-term performance; possibly an unplanned consequence of a decision about workspace that focussed on cost rather than decision making speed.

A similar trade-off might apply to our university example. The segregated structure of cellular offices supports a wide range of activities such as marking, writing research papers, private interaction with students etc. However, the segregation would not support the sort of broad and frequent interaction necessary for innovation and real novelty (Burt, 1992; Padgett & Powell, 2012). Mintzberg argues that universities do not need to innovate strategically (Mintzberg, 2007) because they compete in very stable environments. However, we would argue that innovation and real novelty is the essence of research and think that the environment found in this university may stifle this type of innovation. It is possible that this innovative work is not actually done within the workspaces provided by the university, but rather academics leave their university to attend conferences and co-author with academics from other universities.

This raises another important question about this study, the extent to which organisation work is done outside of the physical boundaries of the organisations' buildings.

4 CONCLUSION

This research has shown that organisations in fast clockspeed industries tend to have very integrated workspaces and organisations in slow clockspeed industries have more segregated workspaces. We have suggested that this is the case because of the impact of workspace on strategic decision-making speed.

Further research is needed to investigate in more depth how organisations balance decision-making speed and strategic development with other requirements on their workplace layout such as cost, privacy, innovative capabilities, etc. and how significant layouts are to decision making speed. Studying examples of successful and struggling organisations would be insightful. Focussing on one particular industry such as technology companies would also be a worthwhile endeavour.

We suspect few organisations factor in strategic decision-making speed into their decisions about workspace layout, but we would suggest that their long-term performance may depend on this.

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REFERENCES

- Bourgeois, L. J., & Eisenhardt, K. M. (1988). Strategic Decision Processes in High Velocity Environments: Four Cases in the Microcomputer Industry. *Management Science*, 34(7), 816-835. doi:10.1287/mnsc.34.7.816
- Brown, S. L., & Eisenhardt, K. M. (1997). The Art of Continuous Change: Linking Complexity Theory and Time-paced Evolution in Relentlessly Shifting Organizations. *Administrative Science Quarterly*, 42(1), 1-34.
- Burt, R. S. (1992). *Structural holes : the social structure of competition*. Cambridge, MA.: Harvard University Press.
- Chan, J. K., Beckman, S. L., & Lawrence, P. G. (2007). Workplace Design: A New Managerial Imperative. *California Management Review*, 49(2), 6-22. doi:10.2307/41166380
- Chia, R., & Holt, R. (2006). Strategy as Practical Coping: A Heideggerian Perspective. *Organization Studies*, 27(5), 635-655.
- Cooren, F., Bencherki, N., Chaput, M., & Vasquez, C. (2015). The communicative constitution of strategy-making: exploring fleeting moments of strategy. In D. Golsorkhi, L. Rouleau, D. Seidl, & E. Vaara (Eds.), *Cambridge Handbook of Strategy-As-Practice* (2nd ed., pp. 365-388). Cambridge, UK: Cambridge University Press.
- Dale, K., & Burrell, G. (2008). *The Spaces of Organisation and The Organisation of Space: Power, Identity & Materiality at Work*. Hampshire: Palgrave Macmillan.
- Dedehayir, O., & Mäkinen, S. J. (2011). Measuring industry clockspeed in the systemic industry context. *Technovation*, 31(12), 627-637. doi:10.1016/j.technovation.2011.07.008
- Duncan, R. B. (1972). Characteristics of Organizational Environments and Perceived Environmental Uncertainty. *Administrative Science Quarterly*, 17(3), 313-327. doi:10.2307/2392145
- Eisenhardt, K. M. (1989). Making fast strategic decision in high-velocity environments. *Academy of Management Journal*, 32(3), 543-576. doi:10.2307/256434
- Fine, C. H. (1998). *Clockspeed: Winning Industry Control in the Age of Temporary Advantage*. Cambridge, MA 02142: Basic Books.
- Fombrun, C. J., & Ginsberg, A. (1990). Shifting gears: enabling change in corporate aggressiveness. *Strategic Management Journal*, 11(4), 297.
- Fredrickson, J. W. (1984). The Comprehensiveness of Strategic Decision Processes: Extension, Observations, Future Directions. *The Academy of Management Journal*, 27(3), 445-466. doi:10.2307/256039
- Grajewski, T. (1993). The SAS Head Office: Spatial configuration and interaction patterns. *Nordisk Arkitekturforskning*.
- Judge, W. Q., & Miller, A. (1991). Antecedents and Outcomes of Decision Speed in Different Environmental Contexts. *The Academy of Management Journal*, 34(2), 449-463.
- Jurkovich, R. (1974). A Core Typology of Organizational Environments. *Administrative Science Quarterly*, 19(3), 380-394. doi:10.2307/2391979
- Kahneman, D. (1982). *Judgement under uncertainty : heuristics and biases*: Cambridge University Press.
- Kim, J., & De Dear, R. (2013). Workspace satisfaction: The privacy-communication trade-off in open-plan offices. *Journal of Environmental Psychology*, 36, 18.
- Mendelson, H., & Pillai, R. R. (1999). Industry Clockspeed: Measurement and Operational Implications. *Manufacturing & Service Operations Management*, 1(1), 1.
- Mintzberg, H. (2007). *Tracking Strategies: Toward a general theory*. Oxford, UK: Oxford University Press.
- Mintzberg, H., & Waters, J. A. (1985). Of Strategies, Deliberate and Emergent. *Strategic Management Journal*, 6(3), 257-272.

- Nadkarni, S., & Narayanan, V. K. (2007). Strategic schemas, strategic flexibility, and firm performance: the moderating role of industry clockspeed. *Strategic Management Journal*, 28(3), 243-270. doi:10.1002/smj.576
- Padgett, J. F., & Powell, W. W. (2012). *The emergence of organizations and markets*. Princeton / NJ: Princeton University Press.
- Peponis, J., Bafna, S., Bajaj, R., Bromberg, J., Congdon, C., Rashid, M., . . . Zimring, C. (2007). Designing space to support knowledge work. *Environment and Behavior*, 39(6), 815-840. doi:10.1177/0013916506297216
- Porter, M. E. (1985). *Competitive advantage : creating and sustaining superior performance*. New York : London: Free Press ; Collier Macmillan.
- Regnér, P. (2003). Strategy Creation in the Periphery: Inductive versus Deductive Strategy Making. *Journal of Management Studies*, 40(1), 57-82.
- Robert Baum, J., & Wally, S. (2003). Strategic decision speed and firm performance. *Strategic Management Journal*, 24(11), 1107-1129. doi:10.1002/smj.343
- Sailer, K. (2010). *The Space-Organisation Relationship: On the Shape of the Relationship between Spatial Configuration and Collective Organisaional Behaviours*. (PhD), Dresden.
- Sailer, K., Penn, A., & Marmot, A. (2012). Spatial Configuration, Organisational Change and Academic Networks. Paper presented at the Applied Social Network Analysis (ASNA) Conference, Zurich.
- Sailer, K., & Pomeroy, R. (2016). Organisation and network analytics: Exploring the role of the workplace. Paper presented at the 2nd European Social Networks Conference EUSN, Paris.
- Sailer, K., Pomeroy, R., Raheem, A., Budgen, A., & Lonsdale, N. (2012). The Generative Office Building. *Eighth International Space Syntax Symposium*.
- Thomas, M. (2019). *How space affects emergent strategy: A study of the role physical space plays in the generation of social interaction in organisations*. (PhD), Lancaster University, Lancaster, UK.
- Toker, U., & Gray, D. (2008). Innovation Spaces: Workspace planning and innovation in U.S. university research centres. *Research Policy*, 37, 309 - 329.
- Tsen, P.-R. (2001). Viewing the Market: The Architectural Design of Trading Rooms in the Interplay between Face-To-Face Communication and Face-To-Screen Communication. *The Journal of Space Syntax*, 2(1), 54-72.
- Tsoukas, H. (2015). Making strategy: meta-theoretical insights from Heideggerian phenomenology. In D. Golsorkhi, L. Rouleau, D. Seidl, & E. Vaara (Eds.), *Cambridge Handbook of Strategy as Practice* (2nd ed., pp. 58-77). Cambridge, UK: Cambridge University Press.
- Turner, A., Doxa, M., O'Sullivan, D., & Penn, A. (2001). From isovists to visibility graphs: a methodology for the analysis of architectural space. *Environment and Planning B: Planning and Design*, 28(1), 103-121.
- Tushman, M. L., & Anderson, P. (1986). Technological Discontinuities and Organizational Environments. *Administrative Science Quarterly*, 31(3), 439. doi:10.2307/2392832
- Vaara, E., & Whittington, R. (2012). Strategy-as-Practice: Taking Social Practices Seriously. *Academy of Management Annals*, 6(1), 285-336.
- Williams, J. (1994). Strategy and the search for rents: the evolution of diversity among firms. In R. Rumelt, D. Schendel, & D. Teece (Eds.), *Fundamental Issues in Strategy* (pp. 229-246). Boston, MA: Harvard Business School Press.