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John Knight

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Go with the Flow: Accelerated digital design in the age of Post-agility

John Knight*
Aalto University School of Arts, Design and Architecture
*Corresponding author e-mail: john.knight@aalto.fi

Abstract: This paper describes a progressive shift in agile. This change is characterised by greater team autonomy, hybridised practices and strong orientation to design thinking (Cross, 1982) and flow (Csikszentmihalyi, 1997). This conclusion is substantiated through research, a comprehensive literature review and theory building (Knight, 2013). The supporting data, elicited from a representative cohort (n=308) helps develop a theoretical model of agile. The model frames the shift in practice as an evolution toward ‘post-agility’ (Baskerville, et al 2011). In this future state, agile orthodoxy has been replaced by ‘co-design thinking’ through a new integrated ‘flow methodology’. There are many implications for the next phase of design. Firstly, agility must be core curricula in design education. Secondly, design methods that can work with a broader set of data to support autonomous teams are needed. Lastly, the speed of change necessitates stronger connections between practice, theory and the broader context of design knowledge.

Keywords: Agile Development, Digital Design, Design Thinking

2. Introduction

High-profile successes (e.g. the Apollo program) and failures (e.g. Mariner 1 crash) propelled early software development to incredible feats as well as catastrophic accidents (Campbell-Kelly and Asprey, 1996). In 1968, The first Software Engineering conference (Graham cited in Naur and Randell 1969, pp 10) sought to normalize this situation through applying scientific management (Doray, 1988) and ‘waterfall’ (Royce, 1970) engineering. Methodology helped make software development more manageable, but failed to increase productivity to profitability. A ‘silver bullet’ (Brooks, 1987) to commercial software losses was proposed by the ‘agile manifesto’ (Beck et al, 2001). Its approach went far beyond tinkering with processes, to the extent that Northover et al (2007) frames agility as the embodiment of Popper’s Conjectures and Refutations (1980).

The manifesto was a radical break with scientific management, ‘Fordism’ (Doray, ibid) and arguably the cognitive science paradigm of the age (Friesen and Feenberg, 2007) too. This revolutionary turn to ‘self-organising’ (Hoda et al, 2013) autonomous teams set individual agency against alienating hierarchical organisation. In practical terms this replaced top-down bureaucracy with fast,
collaborative, ‘leaness’, manifested through new methods such as ‘scrum’ (Schwaber, 2004) and ‘continuous integration’ (Huo, 2004).

Agility is an accumulation of influences. Its antecedents stretch back to the 1950s (Larman and Basili, 2003) and include Extreme Programming (XP) (Layman, 2004) and Lean Manufacturing (Womack et al, 1990) techniques such as ‘kaizen’ (Kato and Smalley, 2011). Commonalities in these diverse influences; pace, cooperation, value and waste reduction, continue to permeate the approach through to today (Ries, 2011).

Methodological influences can also be traced to Joint Application Development (Crawford, 1991) and Dynamic Software Development Method (cited by Hoda et al, 2013). These put client collaboration at a premium and more importantly embraced iteration. Replacing lengthy linearity with short cycles of activity, naturally resonates with ‘user-centric’ design-thinking approaches (e.g. Gould and Lewis, 1985 and Cross, ibid).

Lawson (2009, pp 49) notes how ‘designerly’ recursion moves through ‘frames’ (Stempfle and Badke-Schaub, 2002) to crack ‘wicked problems’ (Buchanan, 1992 and Rittel and Webber, 1973) where: “The problem is not understood until after the formulation of a solution” (Conkin, 2009).

The perceived affinity between agility and design predates the work of modern advocates such as Adikari et al (2013). Kent Beck and Alan Cooper (Nelson, 2002 cited by Sharp et al, 2006) as well as Bruce Archer (1999) expressed the synergetic potential of the two approaches with great foresight; right back to: ‘Agile Competitors and Virtual Organisations’ (Golman et al, cited by Archer, 1999) where the term first appeared in modern usage.

Agile’s full potential has been constrained by a lack of serious design research. This has allowed the topic to be dominated by a positivist scientific/engineering perspective. This means that despite the maturity of the practice, there is a profound lack of contextualization of the phenomenon or even case studies at the practical end of the spectrum. The situation is the more surprising, given that most of today’s designers work in an agile environment and that the approach is arguably as big a transformation in modes of production as the introduction of the factory method of manufacture.

2. Literature Review

Agile studies include Jurca et al (2014) and Senapathi and Srinivasan (2012) who evidence the value of the approach. Indicative works note efficiency gains (Kahkonen, 2004 and McInerney and Maurer, 2005) cost savings, error reduction and improved quality (Rodríguez et al, 2012). Similarly, Federoff and Courage (2009) note increased performance (61%) output (94%) and productivity (38%).

The agile advantage extends far beyond software (Goldberg, 2015) with impressive achievements in organisational change (Kuusinen, 2014) and transformation (Laanti et al, 2009). Similarly, Brhel (2015) finds improved collaboration, knowledge sharing and job satisfaction with agility. Points echoed by Brown et al (2011) Knight (2013) Sharp and Robinson (2004) and Feast (2012).

Early studies naturally focused on adoption (e.g. Boehm, 2002) and improving collaboration (e.g. Cockburn and Highsmith, 2001b). Later work is summarised in a comprehensive review by Dingsøyr et al (2012). Of the total (n= 452) publications only a fraction (8%) connect to theory, with most fixing on ‘technique’ (Salah et al, 2014). This threat of routine was anticipated in the manifesto literature thus, “techniques without a theoretical base are reduced to a series of steps executed by rote” (Highsmith 2000, pp 14).
A lack of theoretical foundations is noted by Wang et al. (2012) Nerur and Balijepally (2007) and Conboy and Fitzgerald (2004). Northover et al. (2007) – where agility is rightly framed as a ‘paradigm shift’ (Kuhn, 1962) is a rare example, as is Sharp and Robinson (2008) who connect sprint-based working with distributed cognition. Lack of theory is exacerbated by a focus on cognition that underplays the felt nature of practice. It is therefore understandable that related fields such as Flow Psychology (ibid, 1997) are largely absent from the literature, despite a clear affinity to the very specific character and pace of agile working.

In a similar review, Brhel et al. (2015) survey 83 publications covering agile design. They find that most (75%) focus on technique. Studies affiliated to design institutions are few: to which, Lievesley and Yee (2006) (noted by Brhel, ibid) just a few others can be added, Johannessen and Ellingsen (2012) Knight (2013) Archer (1999) and Cockton et al. (2016).

There are of course, areas of relevant research within the design corpus. For example, Hamdi et al. (2001) use agile tools for design effort estimation. Other relevant work includes, ‘co-design thinking’ (Badke-Schaub et al., 2014) digital materiality (Arnall, 2014) and craft (Eckert et al., 2010). Design Anthropology (Kjærsgaard, 2011) shares agile’s ‘Design-for-Design’ use of artefacts, despite its vastly different heritage.

### 3. Research Approach

Research was undertaken to explore agile from a design practice perspective. This was formalised through a framing study (S1) and expanded via quantitative studies (S2,3,4,5,6) (see Table 1). The focus was inductive theory building (Eisenhardt, 1989) and whilst not a phenomenological study (Groenewald, 2004) triangulating data and the primacy of accounts of practice were important.

#### Table 1. Summary of Research Studies

| No. | Title                  | Method        | Sample | Focus                                      |
|-----|------------------------|---------------|--------|--------------------------------------------|
| S1  | Initial Framing Study  | Interview     | 8      | Establishing research topics               |
| S2  | Waterfall vs. Agile 1  | Questionnaire | 12     | Measuring collaboration and satisfaction   |
| S3  | Hypothesis Testing     | Questionnaire | 135    | Validating topics and theory               |
| S4  | Hybrid Methods         | Online discussion | 26    | Exploring method adoption                  |
| S5  | Waterfall vs. Agile 2  | Questionnaire | 12     | Providing longitudinal data to S2          |
| S6  | Hybrid Practice        | Online poll   | 196    | Checking hypothesis                        |

The research has some methodological limitations, as well as weaknesses in data analysis due to the relatively long duration of the overall study. Despite these drawbacks, the combination of accounts of practice, primary research and theory building strengthen the overall contribution of the work in founding a design perspective on agility.

The first study (S1) surveyed designers who had adopted agile from waterfall. Interviews were conducted at a digital agency, with designer’s (n=4) and the wider project team (n=12). Content analysis identified themes (See Figures 1 and 2) from the outputs which were clustered into a set of constructs that build toward a theoretical model (Agile Practice Theory or APT).
After coding, hypotheses were developed and tested via an online survey (S2). The findings of this study indicated the positive impact of agile adoption. The outputs helped develop more targeted research questions to validate the constructs with a larger cohort (S3). This was undertaken with a self-selected (agile designers) sample (n= 135) and refined set of questions (see Knight, 2014).

In both cases (S3 and S5) a hybrid qualitative/quantitative discourse analysis approach was taken (See Figure 3). This involved using word and phrase counts to build sets of constructs, which were then tested and retested against the data, until a robust set were arrived at. A further study (S5) using the same questions was conducted in 2016 to check validity over time.

The results (S3 vs. S5) remained relatively stable over time. The most interesting finding, was a slight fall in levels of consensus (-5% mean) relating to design issues (questions relating to agile’s impact on quality and creativity). A further study was undertaken to explore hybrid practice. This involved an online discussion (S4) with designers (n=26) and S6 (an online poll) with a self-selected cohort (n = 196). Lastly, the author was actively involved as a practitioner in several agile projects during the time the research was carried out. This provided first-hand insights into practice and enabled continual reflections on the outcomes of the research and theory building.

4. Data Analysis – A Grounded Narrative Approach

The research synthesised various research outcomes elicited over several years. This was calibrated against a sample of the literature and coded. The literature sample (N=5) selection criteria consisted of studies that involved practitioner accounts of agile working over several years. This literature is denoted thus; (‘Author, 2014) in this paper.

The supporting literature validates the findings and gives them broad context. At the same time, the atomic level components (of the sampled literature) contributes to an overarching narrative (with the combined data set) that evidences the results in the lingua franca and shows how agile design ‘feels’ in practice. The story-based approach additionally helps explore current and future states.

The constructs identified in the research support theory building. APT builds on an Agile Design Theory (ADT) published during the first stages of research (Knight, 2014). ADT defined agile as an instance of Distributed Design that produces mutable outcomes (i.e. Minimum Viable Product (MVP)). APT defines agile as a Flow activity (Csikszentmihalyi, 1997) where collaborative, goal
directed activity (Mission) creates knowledge, capability and value (Agency) for clients’ and users’ anticipated needs (Vision) at pace (Velocity).

5. Findings - Agile Grounded Narrative

5.1 Agile Mission

‘Sprints’ (Schuh, 2004) break work up into small packages. These tasks are overseen by a ‘scrum master’ (Schwaber, 2004) whose goal is to ‘remove impediments’ (Dayton and Barnum, 2009) and report progress to a ‘product owner’ (Ericsson and Banfield, 2016). The former generally focuses on project delivery while the latter is more marketing oriented. While these jobs are commonplace today, the manifesto does not proscribe management roles in agile.

Projects start with a ‘sprint kick-off’ (Cho, 2009). Statements of work, mobilisation and facilitating ‘direct customer collaboration’ (Babb et al, 2014, Laanti et al, 2009, Adikari et al, 2013) are all prerequisites for ‘project initiation’. These ancillary activities have an indirect but important bearing on quality, cost and scope (Rasmussen, 1992 and Raento, 2004). Cost is a pressure point in agile as scope (and therefore cost) is emergent through the project (Eckfeldt et al, 2005) rather than being defined fully ‘up-front’.

Kuusinen (2014) correlates project failure to a lack of a ‘big picture’ as do Federoff and Courage (2009) and Kollman et al (2009). This is mitigated through ‘visioning’ (Sy, 2007, Fox, 2008, da Silva et al, 2013, Schwartz, 2014) or ‘sprint 0’ (Patton, 2008). These activities are usually followed by ‘Little Design Up Front’ (Chamberlain et al, 2006) where designers originate enough assets to start development.

Designers’ multifaceted role is challenging (da Silva et al, 2013) as they need to ‘feed’ developers assets, maintain vision, and conduct research. Often, their contribution is limited to low-value ‘production’. Cho (2009) remedies this ‘service orientation’ (Kuusinen, 2012) by explicit design strategy. Nevertheless, the pace of work and culture of delivery, generally limits designers’ power to influence.

Kahkonen (2004) describes how collaborative interactions such as ‘Show and Tells’ (Brown et al, 2011) help decision-making. Sharp and Robinson (2004) describe how ‘Boundary Objects’ (Star and Griesemer, 1989) e.g. models and sketches (Ferreira, 2012) enhance ‘ceremonies’ (Isomursu et al, 2012) by embodying team knowledge and project decisions. Such deep collaboration is also supported by growing number of digital tools (Law and Larusdottir, 2015).

Advances in planning aides (e.g. Kanban) progress self-organising far beyond that envisioned in the manifesto (S4). These tools enable teams to cooperate, track and self-manage the full gamut of tasks. Similarly, improvements in design software enable rapid prototyping and for teams to use common web-based toolsets. Design middleware is also making it easier for non-developers to build working software. These changes are contributing to blurring disciplinary boundaries.

Reusable code and UI libraries are an important development too. These standardised components, increase efficiency, but more importantly assure a consistent and familiar user experience (Nielsen et al, 2001). In practical terms, reusability means that agile design is often more fabrication than origination. This shift can threaten design authority. It is not uncommon today for business analysts to supplant designers entirely in projects, as work becomes less specialised.

Together, these changes are driving the hybridisation of practitioners (S6) into ‘generalising specialists’ (Ambler, 2004). This shift is accelerated by a predominately freelance workforce
(Christopherson and van Jaarsveld, 2005) where teams form, disperse and sustain themselves, through peer ties and interest groups. These developments are implicit to the broader democratisation of creative work (Feast, 2012) and in some ways the emergence of Open Design (van Abell, 2010).

5.2 Agile Agency

Agency connotes the self-directed, collaborative capacity to build skills, capability and closeness implicit to agile working. Agency is a recurring theme in the literature, evidenced by Babb et al (2013) Hazzan and Tomayko (2003) Serrador and Pinto (2015) Sharp and Robinson (2004) Baskerville et al (ibid) Raison and Schmidt (2013) Fitzgerald et al (2006) and Fox (2008). It also parallels activity theory (Vygotsky, 1978) reflexive practice (Schön, 1991) and ‘co-design thinking’. For example, Stempfle and Badke-Schaub (2014) describe teams collaborating through co-produced domain models (Kimbell, 2009).

Chow and Cao (2008) suggest agile project’s success is predicated on “doing it properly” rather than by rote or prescription. Similarly, Fitzgerald et al (2006) notes that even a subset of sprint-based methods deliver the agile advantage. This means that agile success depends on getting the mix of project, people, methods and contextual factors right. More research is needed to understand how these elements work together for best effect.

Agility is founded on direct personal interaction (Babb et al, 2014) and advanced through ceremonies rather than cascade-style management techniques. Teams are variously known as ‘pods’, ‘trios’ (Hodgson and Briand, 2013) or the ‘three amigos’ (Dinwiddie, 2014) and usually consist of a designer, developer and product owner. Achievement is highly correlated to individual’s capacity, ingenuity and propensity to collaborate (Brown et al, 2011) in contrast to atomized Fordist production.

On the negative side, this also means that ‘big’ personalities can critically effect success (Balijepally et al, 2006) and marginalise less extrovert team members. For example, a strong ‘voice of delivery’ can fixate attention on productivity at the expense of quality. Conversely, strong product leadership can focus on value rather than timelines, such are the inherent contradictions in current agile practice (S3 and S5).

Pods work in situ (Holzinger et al, 2005) or are ‘co-located’ (Sharp et al, 2009) to maximise communication. ‘The Wall’ helps teams ‘negotiate’ (Sharp and Robinson, 2004 and Ferreira, 2012) in ‘situatedness’ (Ikeya et al, 2012). This helps build an ‘agile culture’ (Livari and Livari, 2011) which is sustained through collaboration (Brown et al, 2011 and Ferreira, 2012) even when teams are geographically distributed (Larsson, 2007).

Teams ‘pivot’ (Blank, 2001) to respond to change during fortnightly sprints (Cho, 2009). Pivots can steer the MVP away from the agreed ‘vision’ and ‘story backlog’ (Liikkanen et al, 2014). Pivots are usually development-driven and often supported by a ‘spike’. These involve sub-teams tackling bottlenecks outside of sprint workflows. Broadening this activity around design, quality and innovation, is an obvious enhancement already implemented by some teams.

Broadening the reflexive qualities of agile is also a natural progression to the approach. This would involve going beyond technically determined ‘spikes’. For example, a ‘Learning Wall’ could help share insights into wider project issues, personal interests as well as productivity related topics such as training. This innovation would provide a much-needed counterbalance to the instrumental focus of current knowledge development as well as helping team cohesion.
Agile is working at pace (S2, S3 and S5). This is predicated on integrating project management tasks within delivery workflows. Work-packages are built from a continually refined backlog and go through ‘grooming’ to prioritise against ‘scope creep’. ‘Points poker’ supports ‘sprint planning’ sessions (Cho, 2009) that help teams self-direct their progress in ‘story points’ through ‘velocity’. Momentum is monitored. This is usually done through daily team ‘stand-ups’ and production ‘burndown charts’ (Senapathi and Srinivasan, 2012) managed by scrum-masters.

Getting pace right is tricky. Schwartz (2014) notes how individuals are often tasked with parallel working, sometimes on multiple projects. Hodgson and Briand (2013) find agile designers are ‘exploited’ while Babb et al (2014) report ‘iteration pressure’, where stressors negatively affect creative output (Byron et al, 2010).

More research is needed to understand this relationship. Anecdotally it seems working at speed, can foster creative co-design thinking, if managed well and within a supportive environment. At the same time, fast-paced design can hinder quality and cohesion. Achieving the right balance, requires, teams to collaboratively set, maintain and monitor the right pace for the work at hand.

Modulating pace would be a natural enhancement to current agile ways of working. This could involve running a parallel work-stream where practitioners are able to work on longer-term initiatives, reflect on practice and ready themselves for intensive working again. This kind of ‘Slow Lane’, would enable teams to make better use of down-time as well as contributing to innovation through personal projects utilising their deep product experience.

Understanding the nuances of time-boxed creative activities is a natural next step in this research. It is likely that this can be modulated through ‘Pace-cards’ that frame activities within the context of speed and focus. For example, pacesetting could drive rapid-ideation or at the other extreme slow-reflection.

4.8 Agile Quality

Dyba and Dingsøyr (2008) find ineffective decision-making and a ‘piecemeal’ mindset (Ferreira, 2012) affecting quality (also noted by Huo, 2004) in agile. Quality is also the main topic of concern for designers (S2, S3 and S5) in the research. Although a continual focus of attention for practitioners, it can easily be diverted by the demands of delivery schedules and prioritization calls.

Federoff and Courage  (2009) note a lack of user research (Nielsen, and Madsen, 2012) marginalization of designers (Salah et al, 2014) and dearth of design thinking (Kollman et al, 2009). On the other hand, Ferreira (2012) suggests design alleviates this situation by countering the ‘overwhelming’ development culture that often compromises quality (Isomursu et al, 2012).

Time pressure often means that ‘cut down’ methods (Dayton and Barnum, ibid, Isomursu et al, 2012, Ferreira et al, 2012 and da Silva et al, 2013) are used, reducing the strategic value of design (Buchanan, 2006) and taxing research activities (Nielsen and Madsen, 2012). At the same time, ‘user stories’ (the indivisible unit of agile requirements) can drive empathy and are easily understood by non-technical stakeholders (Sharp and Robinson, 2004). However, the quality of these narratives can be variable and often they merely transcribe ‘technical debt’ rather than inspiring value adding innovation.
6. Post-agile Theory and Practice

The research conducted in support of this paper, as well as that by Øvad and Larsen (2015) suggests that a blending of agile and design thinking is happening ‘on the ground’ as organisations concurrently adopt both approaches. However, this combination often creates team conflict (S3 and S5) rather than focus on innovation and value.

Common causes for discord are the accelerated pace of work, compromised quality due to delivery pressure and the general diminution of design. The current supporting role of design focuses on producing ‘assets’ rather than adding strategic value. Shifting the focus of sprint-based working slightly away from delivery and toward deeper client needs for innovation and value in use is likely to help remedy this situation.

Current lean/agile hybrids (e.g. Vivian, 2014) offer diminishing returns from synthesis. In these cases, investments in robust research, thoughtful design or indeed delivery pace, are somehow diluted through addition. Rather than changing the sequence, or duration of sprints to fit around waterfall bound design activities, as most combined methodologies do (e.g. Peres et al, 2014, Liikkanen et al, 2014, Hussain et al, 2009a and Ratcliffe and McNeill, 2011) a more radical solution is needed.

6.1 The Flow Methodology

True synthesis, where roles are shared and work is undertaken across disciplines leverages the full potential of self-empowered, hybrid teams to deliver real value at pace. A truly hybrid approach, aligns to the progressive values of the manifesto as well as critically relevant theories and research such as Flow Psychology (ibid, 1997) and design thinking where pace and recursion drive quality and value rather than just productivity. In practical terms, this would entail retaining sprints and increasing team autonomy further. To achieve this management overhead needs reducing and design capability across teams bolstered through four complimentary methods:

6.1 Develop Story-based Service Design

User stories (da Silva et al, 2013) are the atomic-level components of agility (Isomursu et al, 2012) and are similar to Holzinger’s scenarios’ (2005) used in Service Design. It is pragmatic to extend the range of ‘stories’, ‘cases’ and ‘epics’ beyond adoption through to the full service lifecycle. Such ‘Future Stories’, would enable all aspects of the experience, including the ethical implications of use, to be considered. More radically, this should also reach out beyond the ‘user’ to include the broader stakeholder community’s needs in order to embed co-design thinking. These broader story types, should also help teams to co-create a holistic vision for projects, beyond technical scope and delivery deadlines.

6.2 Broaden Sprint-based Working

Enable a broader definition of sprint scope. As well as production, this could involve running sprints with clients, to generate design thinking outputs such as sketches. These would help cost estimations and pre-production planning, making project work more efficient, costings more accurate for clients and ensuring strategic design input. Sprints could also focus on research, vision setting and quality assurance and utilise a cross-section of team members to assure buy-in and heighten knowledge sharing.
6.5 Facilitate Full Team Autonomy

The agile manifesto makes no mention of project management roles. The growing sophistication of planning tools, increasing reuse of assets and automated production suggests that self organisation is not just a philosophical possibility but is now a practical reality. Replace non-practitioner scrum master roles with a cross-disciplinary rota of team members. These rotating ‘light’ management roles could be sequenced into different sprints and even include clients to reduce conflict, maintain velocity and increase transparency and cost efficiency.

6.6 Deepen Evidence-based Decision-Making

Build on the unique capabilities of design research to triangulate common data sets used in agile. These typically include analytics, usage statistics and market research, but rarely cover personas, scenarios or indeed usability testing results. Remedy this with a dedicated role working across projects to tackle voice of the customer questions, provide data for decision-making and develop deeper product knowledge across projects.

6.6 Conclusion

Agile has been neglected by the design community. As the approach moves from early adoption to orthodoxy it is critical that this omission is addressed so that designers are given tools that help them thrive in agility. This can be achieved through education and training programmes that must show how design and agility work together to best effect. This synthesis has natural precursors in design thinking but successful synthesis is predicated on more studies, research and cases. Hopefully, this paper sets the first step on that journey in going with the flow.

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About the Author:

John Knight is a doctoral candidate at Aalto University School of Arts, Design and Architecture as well as a design strategist at Avanade. His research focuses on digital design and the emerging field of hybrid practice.

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