

Personalization of Knowledge, Personal Knowledge Ecology, and Digital Nomadism

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Abstract

We examine the concept of personal knowledge management using data drawn from our studies of digital nomads. We make two contributions: an empirical and conceptual development of knowledge management as it relates to independent workers and an advancement of social informatics that builds on Gibson's ecological perspective. Digital nomads provide an empirical basis to better understand how knowledge management is shifting from organization-centric, with its concomitant emphasis on organizational information systems to worker-centric, which relies on personal knowledge ecologies. We advance this concept as a combination of personal knowledge management activities and the digital technologies that support them. Our data make clear that individuals are the locus of personal knowledge ecologies, but these ecologies are embedded in a larger community of collaborators, clients, and peers who are often extensively mediated by digital technologies. This embedding and mediation are at the core of the sociotechnical arrangements that define the personal knowledge ecologies that we document.

Introduction

Personal knowledge management (PKM) involves situated, individual-level work activities through which workers develop ideas and meaning and make sense of work environments and interactions with other actors. These activities typically yield a set of adaptive, personalized sociotechnical systems that an individual worker uses to insure his or her productivity; these systems are known as knowledge ecologies (Chatti, 2012). Here, we focus on the PKM activities and ensuring knowledge ecologies of a specific set of workers: independent and mobile knowledge workers --what others and we call digital nomads (Dal Fiore, Mokhtarian, Salomon, & Singer, 2014; Nash, Jarrahi, Sutherland, & Phillips, 2018; Reichenberger, 2018). This framing allows us to move beyond conceptualizations of knowledge management (KM) that emphasize organization-centric approaches and the use of organizational information systems and more fully embrace a perspective on KM that examines the intertwining of ICT (information and communication technologies) affordances and sociotechnical practice (e.g., Alavi & Leidner, 2001; Hew & Hara, 2007; Orlikowski, 2002).

While organizations are still an important loci for KM, work-related activities are increasingly personalized and take place more than ever in extra-organizational arrangements (Winter, Berente, Howison, & Butler, 2014). This shift has occurred for at least two reasons. First, flexible work arrangements such as teleworking and flexible work schedules have grown rapidly in the last decade (Spinuzzi, 2015). In many instances, knowledge workers entering the workforce now prefer the flexibility of nomadic and/or remote working (Vanderkam, 2014). Second, because independent, project-centric work arrangements are on the rise (Barley, Bechky, & Milliken, 2017), knowledge workers now have weaker connections with organizations. The rise of online freelancing platforms such as Upwork, for example, mediates digital gig work that is not only increasingly location-independent but also independent of organizational culture, standards, or mission (Manyika et al., 2016). This personalization of work goes hand in hand with the rise of personal and consumer technologies being used by independent workers, both inside and outside of organizational boundaries.

To examine KM in the context of the rise of independent, decontextualized forms of knowledge work, we draw from an empirical study of digital nomads. Digital nomadism is a moniker used to represent a community of remote workers that mix travel and work, and as such, can be understood as constant world travelers (Nash et al., 2018; Reichenberger, 2018). Due to their extreme mobility and organizational independence, even across different kinds of professions, digital nomads face common types of work uncertainty, such as unpredictability of projects and lack of a physical workplace. More importantly for the work reported here, in order to support this lifestyle nomadic workers live on their expertise and knowledge, making PKM a core activity and skill. As such, the question this paper seeks to answer is: *what are the core PKM activities that enable digital nomads to leverage digital technologies in order to construct a functioning knowledge ecology?*

This research makes two contributions. First, it conceptually develops key constructs of KM relative to the emerging sociotechnical dynamics of independent workers. This treatment advances the field beyond the traditional context of the organization and the assumed use of organizational information systems alone. It also marks the importance of independent, contractual work and the increased reliance on personal technologies for professional activities as a salient subject for KM research.

The second contribution advances social informatics research using an ecological perspective, which builds from Gibson's (1979) seminal work as well as the 30+ year stream of scholarship that followed (Bødker & Klokose, 2012; Davison et al., 2013; e.g., Jung, Stolterman, Ryan, Thompson, & Siegel, 2008). Much of the early work in social informatics analyzed the complex and paradoxical roles played by ICTs in organizational and institutional contexts, examining computerization in work (Fichman & Rosenbaum, 2014) and the mediational roles of ICTs in various knowledge-based work settings (e.g., Hara & Kling, 2006). More recently, social informatics scholarship has focused on studies of knowledge and technology (Fichman, Sanfilippo, & Rosenbaum, 2015). We bring together these trajectories, focusing attention to KM and work – a path that continues the tradition of critical analyses of technology and information uses that define social informatics scholarship (Kling, 2007).

Relevant literature

Three bodies of literature bear directly on our study: KM (particularly PKM), digital nomads and nomadic work, and the relevant work that draws on and extends the ecological perspective on technologies.

Personal knowledge management

As noted, much of the contemporary KM scholarship has focused on organizational approaches and the enterprise-level information systems that undergird them (Davenport, 2016; Pauleen & Gorman, 2016). This approach is consistent with what Winter et al. (2014) outline as studying “organizational containers.” As such, little is known about individual approaches to KM and how individual workers creatively deal with the knowledge problems of their work (Cranefield & Prusak, 2016). As Pauleen and Gorman (2016) argue, PKM differs significantly from commonly held notions of organization-level KM, because PKM concerns the ways in which knowledge workers maintain their currency and individual competitive advantage over time.

To date, KM scholars have not focused on the growing personalization of KM and the rapid rise in uses of a range of personal (or at least non- or extra-organizational) technologies for managing personal knowledge (e.g., Clemente & Pollara, 2005). Most of the nascent literature on PKM is framed on defining activities. For example, Davenport (2016) presents these as individualized activities that enable workers to support their creation, distribution, or application of knowledge. Similarly, Razmerita et al. (2014) suggest the primary function of PKM

activities is to facilitate the creation, organization, and sharing of personal knowledge. Pauleen and Gorman (2016) suggest management, learning, communication, interpersonal skills and use(s) of technologies as the primary PKM activities.

The research on Personal Information Management (PIM) also provides a useful perspective on the strategies workers use to improve productivity and navigate contemporary information spaces, such as the processes of storing, organizing, and retrieving (Barreau, 1995; Kwasnik, 1989). More recently, Jones (Jones, 2007) shows that any one person's information is fragmented across multiple "information islands". PIM and PKM are closely overlapping topics (Świgoń, 2013), and Jones (2016) situates PKM as a subset of PIM based on the idea that knowledge cannot be directly managed, rather, it can only be managed through information.

Research on PIM has a strong focus on the strategies of using information collections and what Jones (2007) calls information items and information forms (e.g., Diekema & Olsen, 2014; Whittaker & Sidner, 1996). This attention to the ontological structures of information means that even though there is an area of overlap with PKM, PIM scholars focus on tangibles and ignore core topics in KM and PKM such as tacit knowledge, as these are hard to formalize in words or numbers (Nonaka, Toyama, & Konno, n.d.; Razmerita, Kirchner, & Sudzina, 2009). Strategies for finding, organizing, and retrieving information certainly bear on the issue of digital nomadic work, especially in managing and sharing information through cloud storage and managing information overload. However, our interest in this study is in how digital nomads develop tacit or non-propositional information or what Buckland (1991) calls "information as knowledge" rather than dealings with tangible information artifacts or what Buckland (1991) refers to as information as "things".

Digital nomads

Though the definition of "digital nomad" varies, most definitions agree that a digital nomad is someone who has escaped the traditional office work environment by engaging in digital work and by drawing on digital technologies (Erickson, 2017). Digital nomads are unified most strongly by their motivation for living nomadically, which is, in almost every case, a desire for travel and a sense of adventure, to live and work from anywhere in the world, and to be independent of the traditional 9-to-5 workday and its designed-in lack of flexibility (Gusseklou & Jacobs, 2016). This means that digital nomads blur and balance their professional lives with personal and recreational time in order to accomplish a somewhat delicate state of 'workation' (Springer, 2017). That is, the commonality across digital nomads is their approach to work: nomadism is what they share, even as they pursue writing, or programming, or training as their profession.

Digital nomads share some of the work practices of remote workers (such as those described by Halverson (2004)); but may differ from the traditional remote workers in that they are positioned at a unique crossroads of global adventure travel and nomadic work (Nash et al.,

2018). Digital nomads have a passion for constant mobility and location-independence. Unlike, traditional nomadic or remote workers, the pursuit of flexibility are inextricably tied to the desire for exotic world travel. Digital nomads are continuously visiting new places to pursue hobbies such as surfing or skiing, and/or to experience foreign countries and cultures (Reichenberger, 2018). Digital nomads' desire to change geographic locations – and, thus, their workspaces – set them apart from more traditional nomadic workers, who may be required by their employer or type of work to be mobile.

The ecological perspective

The conceptual underpinning of this work builds from Gibson's ecological perspective (Gibson, 1979). The premise of this perspective is that material objects in the world possess varying affordances depending on the user and the situation in which the user finds him or herself. Affordances are unique ways that social actors come to perceive and use an object or technology, so affordances of a digital technology can be understood as particular ways through which it helps argument and enable objectives and social practices (e.g., maintaining social relationship with Facebook friends).

Like scholars in HCI, CSCW and other related intellectual communities, social informatics scholars have drawn on the ecological perspective to help theorize on networks of digital artifacts, information behavior in context, and interactions with various communication and social technologies (Bødker & Klokmoose, 2012; Davison et al., 2013; Jung et al., 2008; Nelson, Jarrahi, & Thomson, 2017).

We conceptualize digital nomad's PKM activities and associated digital technologies as comprising a knowledge ecology. These knowledge ecologies include multiple devices (e.g., mobile phones, tablets, laptops), each with specific interactivities and different forms of breakdown (Jung et al., 2008). These devices (and other artifacts such as portable storage devices, Wi-Fi hotspots, and printer hubs) may take on well-articulated roles within the ecology, and there may be friction or competition between them to maintain those roles or positions (Bødker & Klokmoose, 2012). Nomadic workers introduce additional complexity to the ecology: they are mobile, seek to carry out tasks across multiple spaces; they often work collaboratively – working with others who have different subjectivities and often their own digital ecologies that need to mesh together so as to support interaction (Nelson et al., 2017).

The ecological perspective has been used as a vehicle to broaden examinations of singular technologies or technology-mediated activities (Bødker & Klokmoose, 2012; Davison et al., 2013; Jung et al., 2008), and, in doing so, to provide for more holistic considerations of the technology's context – its embeddedness in a larger ecology of social relations, physical arrangements, cognitive engagements, and technological elements. The ecological perspective focuses analytic attention to the connections among the disparate elements of a knowledge ecology, providing a means to see that alignment is more than simply mirroring or

synchronizing the affordances (Bardram, Jeuris, & Houben, 2015), because users may wish to perform the same activities on multiple devices or may divide parts of a larger workflow amongst different devices depending on how they perceive individual device affordances.

Central to the current articulations of the ecological perspective is a focus on activity, which forefronts the constellation of practices, which are used to span the multiple technologies within an ecology (Bardram et al., 2015; Bødker & Klokmoose, 2012). Seen this way, PKM activities, and the uses of various technologies to support and enable these activities, are bound up together. A knowledge ecology emerges from the interactions among knowledge-oriented activities of the worker, their uses of and affordances of multiple digital technologies that support those activities. Finally, even though knowledge ecologies are individualized, they can have implications for interactions among social actors and serve as resources for collaborative practices.

Methods

To address the goal of this study, we utilized a methodology that allowed us to explore both the structure of digital nomads' digital ecologies as well as their patterns of assemblage and use. The empirical base of this paper draws on two data sources: three online, English-language digital nomad forums and 23 interviews with digital nomads. The sampling procedure for both the forums and the interviewees was purposive and aimed at acquiring theoretical saturation (Corbin, Strauss, & Others, 2008). The investigation of the online forums allowed us to gain a comprehensive view of the issues relevant to the larger digital nomad community; capturing data from three different forums helped us to avoid narrow reliance on any one forum's sub-community. Each forum was selected because it had a large population of users who identified as digital nomads or expressed experiences as digital nomads. We also chose the set of forums we did based on the inclusion of active discussion related to the use of technology in dealing with situations of nomadic work.

The forum *Nomad List*¹ was developed by a prominent digital nomad and has become a hub of digital nomad activity that includes both active discussion and an array of tools digital nomads can use to find destinations. Within this larger site, we focused on the forum section, *nomadforum.io*, where users introduce themselves, ask questions, and discuss different aspects of nomadic work. We also chose to look at two popular loci for digital nomad conversation: a Facebook group dedicated to digital nomad issues called *Digital Nomads Around the World* and the Reddit forum (*/r/digitalnomad*). We sampled discussion in each of these forums between 2014 to early 2017, a period that corresponds with a rapid rise in traffic on all of these sites. In sum, we collected 866 comments on the *nomadforum.io* site, 917 comments from the Facebook group, and 1,088 comments from the Reddit forum.

¹ <https://nomadlist.com/forum>

We scanned the discussion data from each forum, starting from the most recent posts and proceeding through older posts, to identify all posts that contained discussion content related to working nomadically. Posts, which solely concerned travel or were focused on discussion of a particular profession without mention of nomadic work issues were not included in the subsample. As the coding process proceeded, new posts were iteratively identified for inclusion until no new themes appeared and a degree of theoretical saturation had been accomplished.

We also conducted 23 interviews with digital nomads. Based on observation of the forum data, we determined a number of factors that defined a digital nomad: (1) an interest in world travel, (2) constant mobility in terms of workspace and location, and (3) working while travelling. We solicited the participation of potential interviewees that satisfied these criteria via online profiles on LinkedIn or in the forums we were following. All participants had some attachment to the term 'digital nomad' that warranted contacting them, such as actively posting about digital nomadism, running bloggings about digital nomadism, attending digital nomad workshops or events², or identifying themselves on social media as digital nomads.

After verifying that that they did in fact live and work nomadically or had multiple years of recent experience doing so (e.g., visiting multiple countries every year while working remotely), we contacted 72 digital nomads and 23 agreed to be interviewed. While the participants represent diverse professions (See Table 1), they share a centrality of nomadic work practices in common (e.g., Czarniawska, 2014). Our interview protocol was designed to be semistructured; it had four sections. One section contained questions about the participant's profession and their relationship with organizations. A second section included questions about the technologies these nomads used to manage their work and documents. A third section focused attention to specific practices and issues associated with being a digital nomad. The fourth section included a set of questions derived from our review of the forums, focusing on such matters as staying up to date with one's profession, looking for new knowledge, job searching, work locations, and general reflections on work practice. Interviews lasted between 50 and 70 minutes each, and were conducted by the first author either via web conference or by phone. The conversational path through each interview varied based on the participant's responses and the topics that emerged. All interviews were audio recorded and then transcribed by a professional transcriptionist service.

² E.g. Nomad Summit, or Digital Nomad Festival (DNX)

Participant	Gender	Position	Profession	Nationality
P1	M	Freelancer	Web designer/developer	United States
P2	F	Freelancer	User experience designer	Latvia
P3	F	Freelancer	Marketing consultant and social media strategist	United States
P4	M	Freelancer	Online marketing and development	United States
P5	M	Freelancer	Business writer	United States
P6	F	Freelancer	Media producer	United States
P7	F	Freelancer	Personal coach	United States
P8	F	Freelancer	Organization and process consultant	United States
P9	F	Freelancer	Web developer	United States
P10	F	Freelancer	Web editor	United States
P11	F	Freelancer	Technical writer	United States
P12	F	Freelancer	Blogger	Canada
P13	M	Entrepreneur	Developer	France
P14	M	Freelancer	Journalist	United States
P15	F	Entrepreneur	Ecommerce consultant	United States
P16	M	Entrepreneur	Lawyer	United States
P17	M	Freelancer	Journalist	United States
P18	M	Freelancer	Web developer	United States
P19	F	Freelancer	Online marketing	Slovakia
P20	F	Organization	Product manager	Canada
P21	M	Organization	Entrepreneurship consultant	Germany
P22	M	Freelancer	SEO marketer	India
P23	F	Freelancer	Entrepreneurship researcher	United States

Table 1: Participants information

Forum posts and interviews were analyzed using a process of open, then axial, coding on Dedoose, a collaborative coding application. In open coding the forum content, we focused on digital nomads' discussions of how their nomadic situation impacted their ability to manage personal knowledge, maintain important discourses with professional contacts, and reflect at a high level on their work. We adopted the same foci in analyzing the interview data. Themes, which appeared across all of our data, led to the development of a set of first-order codes

primarily surrounding behaviors and strategies. Per coding norms, we articulated these codes as the participants described them (Van Maanen, 1979, p. 4).

Through axial coding, we aggregated and categorized our first-order codes into second-order themes and finally aggregate dimensions. Based on Gioia et al's framework (2012), Figure 1 demonstrates the connection among first-order concepts, second-order themes, and aggregate dimensions. Because we used the material from the forums to structure the interview protocol, and then used the interview data to guide us through rereading the forum posts, we were able to triangulate across the two forms of data. In this way, the interviews allowed us to uncover new phenomena and revise interpretations of the forum data.

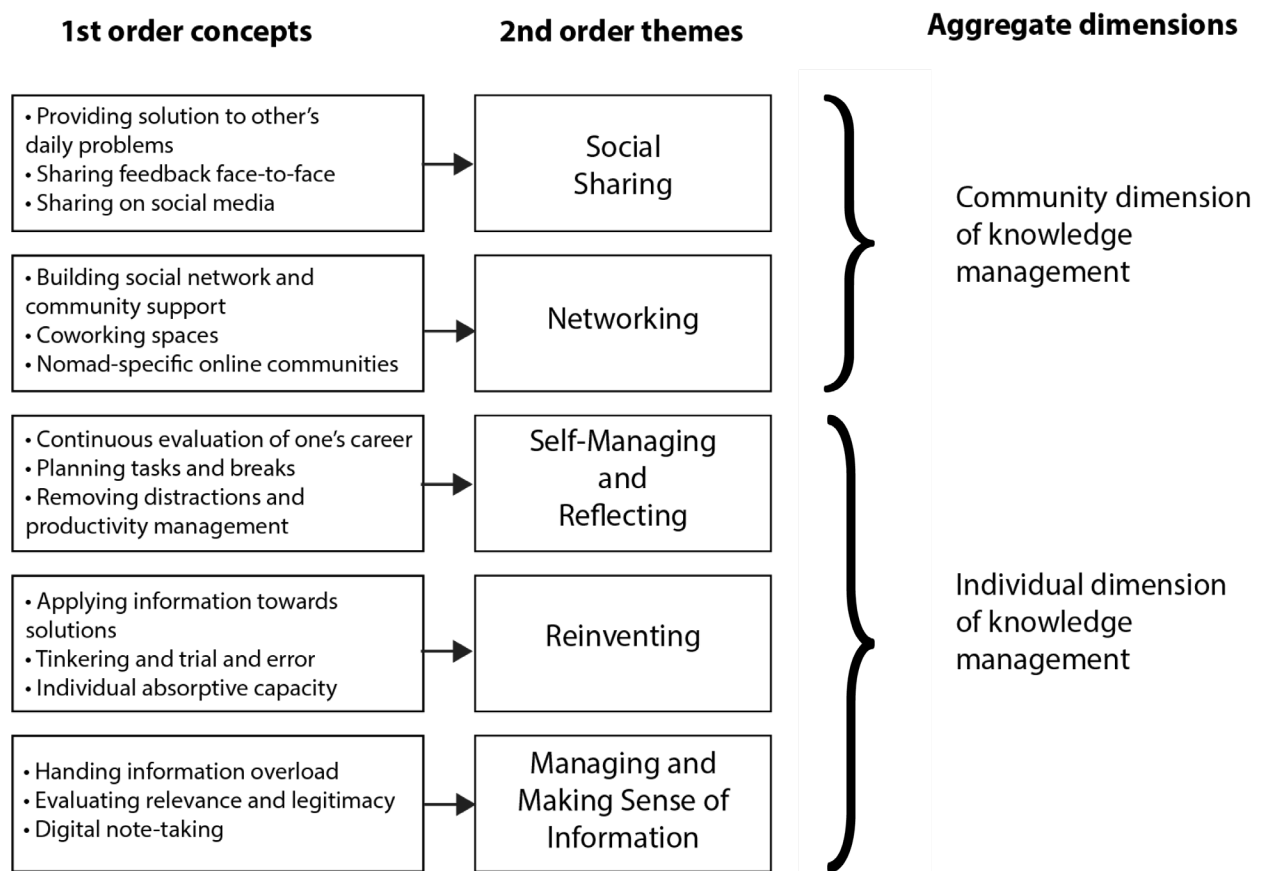


Figure 1: Data structure adopted from Gioia et al. (2012)

Findings

Motivated by our research question, we identified five PKM activities that digital nomads engage in to construct functioning knowledge ecologies. These activities enable digital nomads to create, distribute, and apply knowledge using digital technologies outside of a traditional, organizational KM context.

Social sharing

Digital nomads report that they frequently consult one another regarding problems and solutions. This sharing and interaction allows participants to benefit from the experiences of other digital nomads (and other workers) and to develop responses to the difficulties they encounter in their day-to-day nomadic life. Digital nomads are clear about the benefits of connecting to other workers, particularly as they have few other means for peer interaction; they typically operate as independent workers without a stable organizational office environment where they can readily communicate with partners, colleagues, and/or clients. Participant 20 noted that she highly values *“the opportunity to visit meetups and connect with people in person.”* Participant 19 shares the same outlook, stating that *“the interaction with people”* allows her to *“hear feedback on projects”* and that she similarly *“likes to help”* those she interacts with.

For digital nomads, most of this type of social sharing occurs online or in transitory places like co-working spaces. Popular social media frequented by digital nomads include Twitter, Facebook, Instagram, online publishing technologies like Medium, and collaboration tools (e.g., Skype, Slack chat, text messaging, and Google Hangouts). These tools allow for knowledge exchange across time zones and on opposite sides of the globe. Older direct communication channels like email or instant messaging are also used to maintain *“strong connections with friends and family that may be remote”* (participant 23). Participant 18 describes social media usage as a way to *“talk to the people you’re interested in and kind of see what’s up to date.”* Similarly, Participant 15 stated: *“LinkedIn [and social media like it]”* serve as something to utilize for the times when *“friends have questions”* and her expertise would be valuable.

Coworking spaces are also viewed by digital nomads as places where they can socialize and share knowledge with other similar non-organizationally bound workers. In the experience of P19, *“coworking space(s) are mainly for community...people that I can talk to... [and] can exchange ideas with.”* Similarly, P13 described going to coworking spaces for events in order to make contacts, and P14 stated that he was more interested in going to coworking spaces now because he was starting a company and would need to hire people. In short, part of the PKM strategy of digital nomads is to seek out agile mechanisms (i.e., digital and thus universally accessible from any location or local but with a targeted population) for knowledge exchange. Even though they are highly independent and, thus, consequently disconnected and dislocated, they remedy this situation by proactive social sharing.

The activity of social sharing is enabled by a variety of technologies that promote communication and direct knowledge sharing. Social media platforms (both general and nomad-specific) and direct communication tools (e.g., Skype, Slack chat, text messaging, and Google Hangouts) allow for knowledge exchange across time zones and on opposite sides of the globe.

Networking

Social sharing allows the collective negotiation of meaning. Doing so requires a social infrastructure. In other words, social sharing requires the presence of other knowledgeable agents who can collaborate to build on one another's knowledge. While social sharing is directed at seeking solutions to specific knowledge problems, networking is the activity of intentionally fostering connections to other independent workers whose knowledge can bolster a digital nomad's own. The two PKM activities are intertwined; however, social sharing is instrumentally focused on "know-how" or "know-what," whereas networking primarily results in "know-who." To address this issue, digital nomads rely heavily on digital-nomad specific forms of networking, such as social media groups and co-working spaces. Participant 9 describes meeting people through discussions on "*common problems*" via social media groups. These online communities are "*...active because...people have questions for each other.*" Digital nomads are actively seeking out social media activity to meet others with similar lifestyles, outlooks, and problems.

Similarly, Participant 9 discusses the affordance of co-working spaces for network building. As she describes it: "*if I need...to meet somebody or...want to...change the pace [of work] I go to co-working spaces.*" Digital nomads searched online to identify these physical spaces; participant 13 even built an application, which allows digital nomads to give "*co-working space recommendations.*" Oftentimes, dedicated in-person meet ups focused around specific topics or work-fields grow out of this digital connection. Participant 22, for example, hosted numerous meetups, including a "*WordPress meetup group*" that organized events in which WordPress site managers could interact and hear "guest speakers," allowing both the problem-holder and assistant to "learn something new" about the technology they utilize in their work. As a result, even though digital nomads are considered extreme location-independent workers, they still see themselves attached to certain spaces, particularly those with social affordances.

Similarly, popular social media platforms, such as Facebook and Twitter, serve as common communication channels and provided opportunity for digital nomads to nurture their network. These are complemented with a number of digital nomad-specific applications that are designed to foster ties among digital nomads. For example, Nomadlist.io, provides an active forum section (which mostly serves social sharing) which allows digital nomads to post their travel itinerary and shows other users who will be in the same places at the same time. It also provides a dedicated page for organizing digital nomad meetups in various cities, because, as the page's banner indicates, "sitting in front of a laptop on the other side of the world can get pretty lonely."³

³ <https://nomadlist.com/meetups>

Nomadbase, a more recent messaging application, was described in an announcement post in a digital nomad Facebook group as designed to enable digital nomads to “[meet] like-minded people...in every new location.” There are digital nomad-specific or traveler-specific dating sites and applications, such as dateanomad.net and misstravel.com, which help connect digital nomads with one another. These applications support a grassroots effort amongst digital nomads to build connections within the community, forge professional connections, and find travel partners. The result is entangled personal and professional networks.

This community support extends to integrating new digital nomads into the lifestyle. Participant 17 runs a business that assists prospective digital nomads to transition to the lifestyle. Their outreach and networking is primarily focused through digital nomad channels on social media, advertising primarily through Facebook and Instagram. Similarly, digital nomads on the forums often give advice about the ‘runway,’ the time it takes for a digital nomad to establish themselves professionally and find consistent remote work before they run out of savings. A reddit user even created a spreadsheet that “takes your income, passive income, tax rate, fixed expenses, and savings and figures out how much runway you'd have in 500 popular digital nomad cities.” Through these tools, and by interacting with the larger community, the digital nomad not only establishes connections within their profession, but also joins a supportive network for working remotely.

Self-managing and reflecting

Digital nomads, by definition, are self-directed. Because their KM is less dependent on organizational sources and influences, they must be highly invested in self-reflection to maintain their work style and career. This means that they constantly rely on their awareness to take stock of their knowledge and assess how to best translate or reinvent it to suit their ever-changing environment and status.

Self-managing and reflecting are aspects of digital nomad’s self-evaluation of their career growth and learning, and constitute more tacit aspects of their knowledge ecology. Doing this requires digital nomads to reflect on what they know and assess what knowledge is necessary to move forward. The goal of self-reflecting is therefore not to solve a specific problem or answer a specific work-related question. Instead, it is focused on improving a digital nomad’s self and developing a philosophy for life and work. This is performed through a combination of focused meditation and what Kolb and Collins (2011) call intentional, “regenerative disconnection” (fostering self-reflection and individual absorptive capacity by disconnecting from information streams and social interactions): digital nomads perform not only high-level strategy but may also remove themselves from a work environment or information streams in order to meditate on their status and goals. This enables to engage with deeper thinking, sorting out priorities, career strategies, and life options.

To accomplish regenerative disconnection, participants underscore their need for intentional breaks. For example, participant 6 stresses the importance of “taking a breather” and “planning breaks” throughout the workday, stating that *“the more breaks she takes, the more creative and productive she is.”* Participant 9 likewise stresses, “work life balance” and expressed interest in *“digital sabbaticals where... [she] just [goes] offline...for a week...weekend”* or even a day. Participant 22 takes this a step further, describing a portion of time in which he spent one month completely off the internet camping in the mountains. His explanation for this withdrawal was that *“being disconnected is good for productivity.”*

Self-reflecting is often supported by journals, notebooks, or other forms of note-taking or diagramming tools that assist in processing information. For example, Participant 17 *“always carries a little notebook to write down small thoughts”* until they can be copied to a digital medium.

Removing distractions is also integral to self-managing and reflecting. Some participants turn off push notifications manually, intentionally keeping certain times free of information. Others use blocking technologies such as Cold Turkey to get rid of digital distraction. For example, participant 22 relies on such notification blockers because notifications cause *“too many distractions”*, and even though a message may be of some importance, *“[he doesn’t] need to know right away”*. Other personal productivity tools aid by creating a more comfortable environment for concentrated thought. For example, several digital nomads on the digital nomad forum described their usage of white noise applications such as Noizio to help them overcome distractions from working in places with substantial ambient noise.

Reinventing

Most digital nomads pursue project-based work and are oriented towards problem solving. Many problems digital nomads face, much like other knowledge workers, are complex enough that they rarely involve “cut-and-dried answers.” (Halverson, 2004, p. 1). As such, reinventing solutions constitutes a high portion of their daily work activities. Reinventing, in this context, is the act of transforming ideas, experience, and general knowledge into a solution that directly addresses the project at hand; it relies on trial and error rather than a linear progression.

Reinventing enables digital nomads to put into use knowledge that has been acquired through the activities of social sharing (know-how and know-what) and networking (know-who). It is, in effect, the third part of a sequence of acquiring and making sense of the information and knowledge digital nomads are perpetually gathering in the wild. That said, because knowledge must be reinvented to be usable, it is not always possible to discern success ahead of time. This means that risk is an unavoidable element in the activity of reinventing. Nevertheless, via reinventing, digital nomads showcase their knowledge as problem solving, the core intention of this activity. In this way, digital nomads pursue “... individualized approaches

and individual autonomy over implementation... ”, which Davenport (2016, p. 169) sees as a “... relatively unexplored approach ... to ... KM.”

The digital technologies that support reinventing are limited in comparison to other PKM activities, typically falling into the category of thinking tools: tools that facilitate thinking and tinkering such as notebooks, scrap paper drawings, or any form of digital tool that allows the worker to capture serendipitous thoughts, keep track of them, and analyze them. Participant 5 views the use of a notebook as “a creative process” because “*visually doing something by hand with pen and paper*” helps him “*change his perspectives.*” On a similar note, participant 15 favors “*the paper notebook because...[she]*” can process material “*far better than if I’m...on the phone or computer.*” Participant 17 describes, “sketching” as a way “*to build...conceptual skills*” that assist in problem-solving. Participant 13 explains that “*a lot of his initial ideas*” originate via notebook and pen rather than through any digital methods. Audio-recording and processing devices also assist in capturing spontaneous thoughts. Participant 16 describes the use of a dictation app on his phone to jot down quick ideas when he was unable to access writing tools, particularly on the move.

Managing and making sense of information

As is hopefully evident already, digital nomads must both maintain their knowledge base, constantly absorb, and adapt to new knowledge. This requires a digital nomad to seek and store (in their head or on some material or digital platform) relevant new information while being mindful of information overload. Doing so puts a primacy on properly seeking and sourcing valuable information. For example, participant 18 discussed sourcing first-hand travel advice from sites like wikivoyage and prioritizing sources like NomadList because its paywall limits postings, ensuring that this information there is likely to be from experienced digital nomads.

Furthermore, information seeking and sense-making in this context require intentional pacing and filtering. Avoiding information overload becomes a complex task of curating, scheduling, and manipulating information in order to absorb it most effectively. For example, Participant 18 describes the “noisy” element of “newsfeeds” and discussed his intentions to ignore what is unnecessary. Participants 13, 14, 17, 19 and 21 all describe pacing their information intake by scheduling certain tasks for specific environments, such as trains or airplanes, when they cannot work on other things, and have the time or attention to absorb them. Clearly, information can be acquired at a rapid pace, but the process of transforming it into actionable knowledge – ready for digital nomads’ daily practices of reinventing – requires arbitration by the worker.

This negotiation of information intake is partly facilitated by cloud storage and information management tools. For some digital nomads, cloud technologies and storage applications such as Google Drive, Dropbox, Pocket are integral means of processing information at a pace that prevents information burnout. Participant 13 keeps a rich cache of

information on Pocket, “*thousands and thousands of articles*” collected through “*years of reading online work.*” Likewise, participant 3 describes coming across “*great articles*” while working, but explains that “*if I start reading it then I go down a rabbit hole and I don’t get anything done so I can just click it immediately to Pocket and saves it and syncs it and then later if I’m on a bus and without WiFi or 3G, a tablet or whatever then I have all of it right there to read.*” Applications like Pocket support digital nomads’ constant mobility by allowing them to determine where and when they consume information.

Other digital nomads prefer to support their information curation practices using digital note-taking tools. For example, participant 26 uses Evernote “*for light word processing*” and jotting down “*ideas and notes.*” Technologies such as muting tools and work-assistance tools also allow participants to block out distractions. In essence, these technologies are being used to create a cognitive “*space*” in which digital nomads can focus.

Discussion

Drawing these findings together, we can see two key insights that bear further conceptual development. The first is the realization that our notion of PKM provides a strategic vantage point for viewing and explaining more personal and community-oriented knowledge activities and resources increasingly leveraged in digital work. The second corresponds to our nascent understanding of the interrelationship between digital nomads’ PKM activities and the knowledge ecologies that support them. We address each insight in turn. .

Digital Nomad’s PKM Activities

Like any knowledge worker, digital nomads require an understanding of information management and a high degree of information literacy (Pauleen & Gorman, 2016). This also means that they must continually add to their store of knowledge to be effective and keep relevant with their work. Because this necessity puts them at risk of being overwhelmed, digital nomads must work hard to prevent or mitigate the negative effects of information overload to be successful, even if they possesses a high level of information literacy. One key way that they do this is by engaging in social sharing activities.

Social sharing relies on digital nomad’s socializing and networking activities, which contribute to developing and extending a social infrastructure or community for other socially oriented KM practices. By “*getting out of the office*” and opening up communication channels via social media, digital nomads are able to broaden both their scope of knowledge and information as well as their social networks (Cranfield & Prusak, 2016, p. 108). These activities end up being simultaneously a means of learning about and contributing relevant information across their social networks (Pauleen & Gorman, 2016) as well as curating salient information. By In social sharing activities, a digital nomad’s personal and professional information seeking converges.

In sharp contrast to most organizational KM efforts designed to support workers with static resources, a digital nomad's KM is embodied and personalized, relying on information curation practices that are mediated by interpersonal interaction rather than inert knowledge resources (Snowden, Pauleen, & Jansen Van Vuuren, 2016). Nomadic networking, as such, relies on building and managing relationships; it is these relationships that enable digital nomads to benefit from the knowledge of others (Halverson, 2004; Jarrahi & Sawyer, 2013). More broadly, this social sharing reflects what we know from prior KM literature that established "... social knowledge...is...about mutually directed relationships with meaning developing out of interactions with others" (Davenport, 2016, p. 118).

Likewise, digital nomads' reinventing activities require them to go beyond what they know to find a suitable response to a problem. In such situations, they often seek inputs from their broader network to bootstrap their understanding of the problem. Applying this collective intelligence, however, occurs in a highly situated context--one that becomes a test of a worker's personal capacity to integrate absorbed knowledge; ultimately, it is up to the digital nomad alone to develop a specific response to the problem at hand. We can see reinventing, therefore, as "not merely about tweaking the ideas of others. It requires the skillful selection, analysis, and assimilation of the right external knowledge... [matched] to the right local needs at the right time" (Cranefield & Prusak, 2016, p. 100). To reinvent requires a digital nomad to "continually appraise" the ideas they are exposed to, both in terms of usefulness and in respect to context (Cranefield & Prusak, 2016).

Digital nomads' PKM practices of self-managing and reflecting are similar to what Pauleen and Gorman (2016) have termed "management" in the context of PKM, and can be understood as a form of personal evaluation that enables knowledge workers to decide on and seek "new and relevant information, knowledge experiences, and learnings." These practices are the basis of "[determining] and [structuring] a PKM strategy that meets one's personal situation" through an "understanding of self, including...strengths and weaknesses" (Pauleen & Gorman, 2016, p. 7). In other words, self-managing and reflecting are strategic activities. Critical reflection helps digital nomads to challenge, invalidate or confirm their theories of work and the world (Chatti, 2012).

In sum, our findings connect to much of what we already know about knowledge workers. Indeed, we see a tight coupling with workers who engage in flexible work arrangements (e.g., such as remote working or traditional nomadic working). The PKM practices of these workers overlap with those outlined here to different degrees. Our premise is that none of these activities is unique to the work context of digital nomads, but digital nomads provide a useful foray into how knowledge management may be pursued when the worker is less administratively and spatially attached to the organization.

Personal Knowledge Ecologies

Our findings also point to the interrelationship of PKM activities and digital technology, which together comprise digital nomads' knowledge ecologies. These knowledge ecologies 'belong to' the individual worker (in that these workers are responsible for keeping the ecology together) and are utilized by individual workers as a mechanism to support their PKM activities. Personal knowledge ecologies demonstrate minimal dependence on organizational knowledge infrastructures and the need for increased personalization of knowledge and IT to support modern (and future) work practices.

We began by setting digital nomads' PKM activities in the context of project-based and gig work, a context that reflects a weakened relationship between organization and worker (Manyika et al., 2016; Spinuzzi, 2015). What workers have long known, regardless of organizational context, is to rely on community knowledge resources. Our data show that this is an activity still very much in practice by digital nomads. How they accomplish this, however, is new. They use digital technologies with social and communicative affordances (e.g., online forums, social media, and communication tools) to perform PKM activities such as networking and social sharing; these are familiar social and community-oriented functions for knowledge workers. What is distinct in the case of digital nomads, is that these practices have moved from secondary sources of knowledge seeking to primary sources for sharing and building expertise.

This community dimension of digital nomad's knowledge ecologies is depicted in Figure 2. Even though personal knowledge ecologies are enacted in a self-interested fashion, they overlap with the knowledge ecologies of others to create a set of sociotechnical community resources for all digital nomads. For example, a record of online conversations around work visa and tax situations in different countries is available on the Nomadlist forum. Similarly, by integrating inputs from nomads, *coworking.coffee* provides information on the top workplaces with decent coffee.

The community dimension of digital nomads' knowledge ecologies serves as a means to facilitate the translation of personal knowledge (individual level) into a shared or collective intelligence that can benefit the community of digital nomads as a whole. Despite differences in professional goals, digital nomads tend to face similar forms of work and personal challenge as they travel globally. One of the primary strategies for handling these challenges is to form and take advantage of a community of practice around digital nomadism (Sutherland & Jarrahi, 2017). In these situations, people may invest in their own learning and contribute to the community's knowledge resources, motivated by a norm of reciprocity and the desire for recognition from peers (Huysman & Wulf, 2006). Social media offer the most visible affordances for bringing about this dynamic form of collective intelligence. As Razmerita et al. (2014, p. 89) suggest, "Social media makes the management of knowledge possible as a way to augment collective intelligence by connecting and summing the individual intelligences in a harmonious manner."

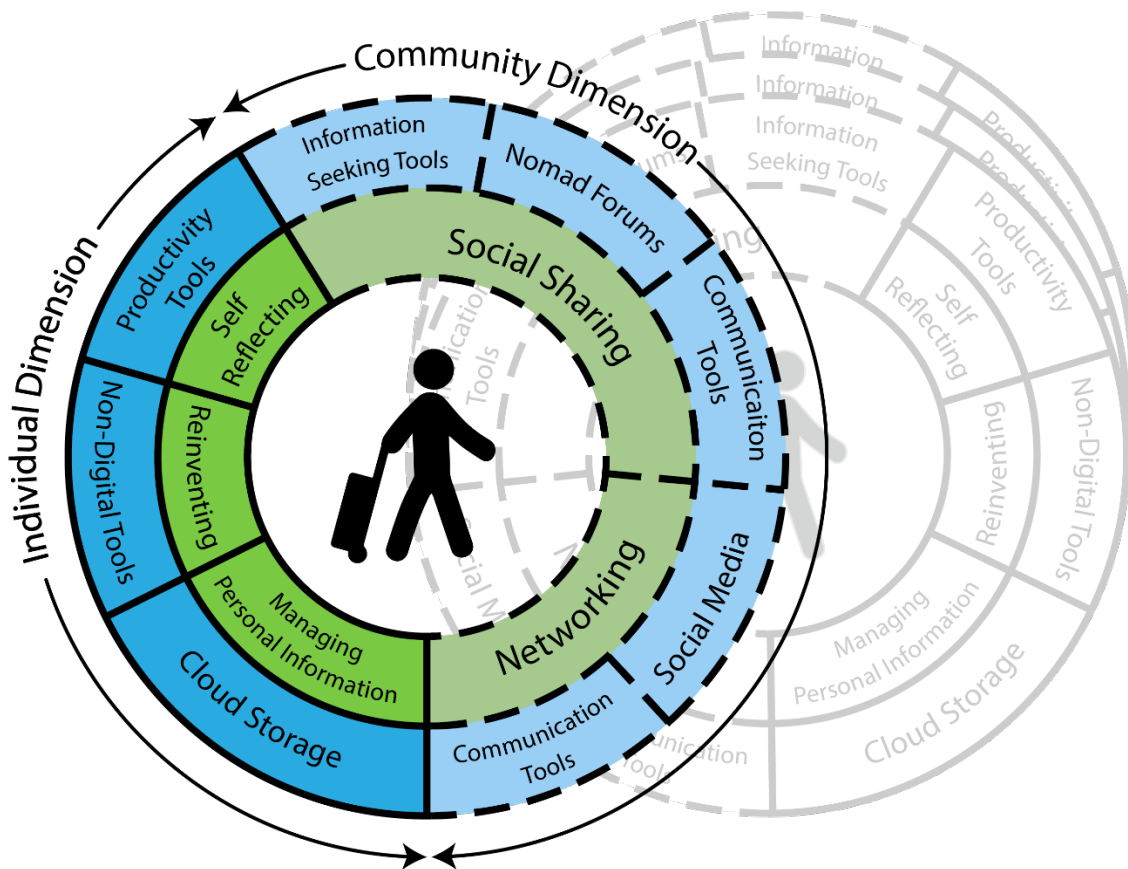


Figure 2: Knowledge ecologies embodying both individual and community dimensions.

Furthermore, the overlap of knowledge ecologies among digital nomads allows individuals to not only contribute to a community resources, but to easily access key knowledge which they can internalize and reflect upon. . A direct outcome of this process is to ignite, if initially latently, the cycle of reinventing--absorbing acquired knowledge, applying it in new situations, and creating solutions to emerging knowledge problems. These activities require continuous reflection on one's work and career, as well as a balance between professional and personal life. This often takes place through regenerative disconnection from information overload and distractions, including those caused by digital technologies. The PKM activity of self-reflecting helps digital nomads to constantly decide about their future career and directions, as well as develop, and maintain individual competitive edge over many other independent gig workers.

Advancing Social Informatics

Beyond our two empirical insights, this research also contributes to social informatics in two ways. First, we carry forward an empirical tradition that has been the hallmark of SI research in the past with our documentation of the ways that the personalization of both

knowledge and uses of ICTs permeate the knowledge-intensive work contexts of digital nomads. Our second, conceptual contribution advances social informatics by introducing the concept of knowledge ecologies: sociotechnical assemblages of PKM practices and the mutual interdependence of these with an assemblage of digital devices and related technologies. This conceptualization builds from the work of Gibson's ecological perspective, with specific attention to the ways in which this perspective encompasses the intertwined relationships among the digital nomads, their knowledge needs and goals, the digital (and material technologies) that are either embedded in or drawn in to the activities. These two contributions are modest in the sense that they reflect what social informatics scholars have been seeking (Kling, 2007; e.g., Steve Sawyer & Hartswood, 2014). More to the point, these contributions also provide additional empirical material and conceptual clarity regarding the complex sociotechnical arrangements that bring humans and digital technologies together.

Conclusions

We have advanced the concept of PKM and digital ecologies. In doing this we have used data about digital nomads, who serve as a living laboratory for exploring how KM will evolve as the relationships between workers and organizations grow weaker and more transactional even as the relationship between both organizations and knowledge, and workers and knowledge, grow more critical to future success. In the new landscape of work, individual knowledge workers have to engage in "lifelong personal learning" and will "need to take action on their own to enhance their potential for success" (Hagel, Schwartz, & Bersin, 2017). Both PKM and knowledge ecologies embody taking action and pursuing lifelong personal learning.

We have shown that the digital nomad's efforts at PKM, and the knowledge ecologies they assemble in support of this, demonstrate two sociotechnical dynamics that are likely to epitomize the future of knowledge work and KM. First, the primacy of organizations and organizational resources are likely to fade into the background as knowledge workers increasingly operate as free agents (Barley et al., 2017) and as a significant proportion of knowledge work is executed through alternative or non-standard work arrangements (e.g., online freelancing and contract-based work) (Hagel et al., 2017). Digital nomads represent this new form of work as both location and organizationally independent workers. Our findings indicate that these workers have to navigate the work environment by themselves in the absence of hierarchical direction and resources. KM in this context is largely personal and depends on individual or community resources that a digital nomad can bring to bear. Consequently, the ecology of KM tools and practices is situated in a combined personal-professional sphere. Another important aspect of digital nomads work concerns nomadism and remote working, which is expected to be a defining element of future work settings (Leclercq-Vandelannoitte & Isaac, 2016). While constant travel and mobility enables digital nomads to come into contact with new ideas, it also poses certain challenges. Therefore, some of the PKM

activities of digital nomads are directed at understanding places and acquiring knowledge about how to survive in unpredictable work environments.

Second, the PKM activities of digital nomads underscore the central roles of consumer technologies. Different than organizational KM (which are often specifically designed using bespoke software and organizationally-centric processes), personal knowledge ecologies emerge from the actor-centered uses of personal tools (e.g., productivity applications), personal services (e.g., personal cloud services), and community-based online resources (e.g., the Nomadlist forum).

Commercial digital technologies play key roles in supporting PKM (Jung et al., 2008). Their importance made clear, our data make clear that purchasing or using consumer technologies does not itself create a knowledge ecology. As a bricoleur of different technologies (Halverson, 2004), digital nomads often go to great lengths to configure these commodity technologies and bring them together in the form of cohesive knowledge ecologies. Information is often fragmented across different digital platforms, and it becomes the project of the digital nomad to bring the various devices into useful alignment. Seen this way, knowledge ecologies are not given, they emerge out of this kind of ‘articulation work’ or ‘coordination work,’ (Bardram et al., 2015) - what Sawyer et al. (2018) have called “infrastructural competence.” Going forward, it may be this infrastructural competence or technological acuity defines one of the most critical literacies that digital nomads have to possess and nurture as digital workers, and -- more broadly -- knowledge work itself ((See Halverson, 2004, for example)).

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