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What entrepreneurs discover when creating opportunities? Insights from Skype and YouTube ventures

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Abstract Although the scholarly conversation about how entrepreneurial opportunities emerge has suggested that entrepreneurs both discover and create opportunity components, specific knowledge about what components are discovered is lacking. In this research, we use an exploratory case study to investigate the opportunity creation process. We found that entrepreneurs discover several opportunity-related components based on the prior experience and knowledge of other entrepreneurs. Drawing on the evidence from these exploratory cases, we identify three important types of components that entrepreneurs creatively recombine within an emerging opportunity: technology stack, business model, and product and service design architecture. These findings have important implications for our understanding of entrepreneurial bricolage and entrepreneurial recycling, and their connection to the process of opportunity creation.

Keywords Entrepreneurial opportunities · Opportunity development · Opportunity components

Introduction

The origins of entrepreneurial opportunity still seem to be a defining puzzle of entrepreneurship research (Shane and Venkataraman 2000; Ardichvili et al. 2003; Venkataraman et al. 2012; Suddaby et al. 2015). The existing scholarly conversation has been preoccupied with the question of whether entrepreneurial opportunities exist as objective gaps in the real world, which are ready to be discovered by entrepreneurs, or, alternatively, whether they are created by entrepreneurs through entrepreneurial action (Alvarez and Barney 2007). In this research, we align ourselves with the process

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view (Ardichvili et al. 2003; Sarasvathy 2004), which sees the emergence of entrepreneurial opportunities as being the result of both entrepreneurial discovery and creation. The emergence of entrepreneurial opportunity is an iterative process of shaping and development (Dimov 2007), since "most entrepreneurial opportunities in the world have to be made through the actions and interactions of stakeholders in the enterprise, using materials and concepts found in the world" (Venkataraman et al. 2012 p. 26).

The primary questions that have not yet been resolved within the context of the current debate are what components of opportunities are discovered by entrepreneurs and how entrepreneurs then use those components. In light of these questions, there are three primary aims of this study. First, we aim to identify the components of an entrepreneurial opportunity that are discovered. Second, we aim to provide evidence that will help us to better understand how entrepreneurs recombine the discovered components in the process of creating new opportunities. Finally, we explore the sources of the discovered components.

Discovery and creation of entrepreneurial opportunities

Shane and Venkataraman (2000 p. 218) defined entrepreneurial opportunity as "those situations in which new goods, services, raw materials and organizing methods can be introduced and sold at greater price than their cost of production." Their view depicts an entrepreneur with a passive-responsive role, since entrepreneurs "discover" opportunities and actively engage with those opportunities solely at the point of recognition. This discovery approach has long been the dominant view of opportunity in the entrepreneurship literature (Dutta and Crossan 2005; Read et al. 2009).

Several scholars, however, have initiated an intense debate about the core assumptions of the discovery approach, arguing that the agency of entrepreneurs actually instigates entrepreneurial opportunities (Dimov 2011; Dutta and Crossan 2005; Sarasvathy 2001a; Vaghely and Julien 2010). These authors have emphasized that entrepreneurs and their actions play a central role in the creation of opportunities. This assertion has led to the rise of the creation view – an alternative view of how entrepreneurial opportunities emerge, which acknowledges the active role of entrepreneurs in the process. What the entrepreneurs discover at a specific moment in time is a possibility (Sarasvathy 2004 p. 526) or simply a business idea (Dimov 2007 p. 416) that has yet to be developed into an opportunity. Possibilities and ideas can prove to be wrong, or can be greatly altered through the entrepreneurial process, since they are highly dependent on the worldviews and perceptions of the entrepreneur (Krueger 2000 p. 6). Dimov (2007 p. 416) emphasized the role of social context and action, claiming that "opportunities can be represented as a stream of continuously developed ideas, driven and shaped by one's social interaction, creative insight and action at each stage." As opposed to simply recognizing an opportunity, entrepreneurs identify, develop (Ardichvili et al. 2003), and, in the process, create new entrepreneurial opportunities (Vaghely and Julien 2010 p. 3; Sarason et al. 2006 p. 288; Aggestam 2014).

However, it is important to note that both the discovery and creation views emphasize the importance of socially embedded schemas (Suddaby et al. 2015) and the ability of entrepreneurs to identify them. With the discovery perspective, these schemas represent whole opportunities, while with the creation perspective, they represent

building blocks that can be recombined in exploring new opportunities. In this study, we build upon two assumptions. First, we assume that the components of entrepreneurial opportunities are discovered by entrepreneurs. Second, we assume that entrepreneurs use their ingenuity and creativity to actively recombine these components, which, in turn, contributes to the emergence of new opportunities (Ardichvili et al. 2003; Dimov 2011; Sarasvathy 2004; Venkataraman et al. 2012). These two assumptions point to three intriguing questions: (a) what are the discovered components of emerging opportunities and in what form do they exist?; (b) what is the source of these components?; and (c) how do entrepreneurs use these components to create new opportunities?

The first two questions have largely been unaddressed in the current literature, with the exception of Baron (2004) who suggested that what entrepreneurs find are "the dots" – changes in technology, demographics, markets, government policies, and other factors – and Davidsson (2012) who, at an abstract level, proposed that entrepreneurs discover opportunity conditions as objective, actor-independent circumstances that are then used to build opportunities.

The third question has received considerable attention from entrepreneurship scholars (Sarasvathy 2001a; Dimov 2011; Sarasvathy 2004). Among the most important entrepreneurial activities affecting opportunity creation are typical behaviors of entrepreneurs, such as effectuation (Sarasvathy 2001b), bootstrapping (Ebben and Johnson 2006), and entrepreneurial bricolage (Baker and Nelson 2005).

Effectuation is the inverse of causation. Causal reasoning (causation) begins with a given goal, and consists of principles, techniques, and criteria for generating and selecting between the possible means to achieve that goal. By contrast, effectual reasoning (effectuation) begins with a given set of means and tries to determine the possible effects that can be created through those means. Effectual reasoning is believed to be the dominant model for entrepreneurial decision making (Sarasvathy 2001b).

Bootstrapping and bricolage explain how entrepreneurs overcome the gap between available and required resources. Whereas bootstrapping focuses on financial resources, bricolage is a broader term associated with "making do with resources at hand" and "creating something from nothing" (Baker and Nelson 2005 p. 329). This concept is particularly interesting when studying the creation of entrepreneurial opportunities because it suggests that, in addressing opportunities, entrepreneurs should focus on using existing slack resources that are often available for free (Desa and Basu 2011). In so doing, entrepreneurs harness their foresight, creativity, and experiential knowledge to creatively recombine resources in order to introduce completely new resource sets (Baker and Nelson 2005; Raffi and Rüling 2010; Shane 2012). Therefore, it is important to know what components entrepreneurs discover in order to understand how they use bricolage to create opportunities. Entrepreneurs "make do with 'whatever is at hand,' that is to say with a set of tools and materials which is always finite" (Levi-Strauss 1967 p. 17). However, the entrepreneur's ability to discover opportunity components in the environment expands the resource base and thus broadens the set of tools and materials available. As such, this ability is at the heart of the opportunity emergence process.

In sum, although current scholarly discussion has converged on the view that entrepreneurial opportunities are both discovered and created (Suddaby et al. 2015; Venkataraman et al. 2012), little is known about what components of entrepreneurial

opportunities are discovered and how these components are recombined into new emerging opportunities. We use an exploratory case study approach to address these questions. Specifically, we analyze the founding teams of Skype and YouTube in terms of how they discovered and recreated components of entrepreneurial opportunities after the dot-com bubble burst in 2000. We identify empirically grounded types of components of entrepreneurial opportunities, discuss their sources, and illustrate how entrepreneurs recombine those components into new emerging opportunities. In doing so, we aim at expanding the entrepreneurship field's knowledge on how entrepreneurial opportunities emerge.

Methods

In this study, we use abductive reasoning (Chamberlain 2006). We use two exploratory case studies of ventures that managed to achieve rapid growth in a highly specific context following "the dot com bubble burst" in 2000. The two cases are exemplary cases of outstanding entrepreneurial success, which managed to rapidly disrupt existing markets. Skype Technologies was bought by EBay in 2005 for $2.6 billion, 2 years after its founding. Similarly, YouTube was bought by Google for $1.6 billion less than 2 years after its founding in 2006. Since their inception, both ventures have significantly disrupted their respective markets; Skype revolutionized the telephone market by offering free calls over the Internet, while YouTube provided a user-friendly and efficient way to share videos online, which significantly changed the ways in which video content is viewed and shared.

Two features characterized our research strategy. The first was related to the selection of the cases used in the research. One might question the relevance of studying outliers in attempting to gain a broader understanding of the dynamics of entrepreneurial processes. However, these two cases represent extreme cases (Flyvbjerg 2006). In order to further develop our understanding of the opportunity emergence process, it makes sense to study processes that have led to successful opportunities. Even though entrepreneurial success is difficult to define (Murphy et al. 1996), if one takes into account the growth rates and valuations at the point of exit of the studied ventures, it is possible to claim that they enjoyed a high degree of entrepreneurial success.

The second specificity of our approach pertained to the data collection strategy. The study of entrepreneurial opportunities is only possible retrospectively, given that an opportunity only exists when it is possible to exploit it for profit (Shane and Venkataraman 2000). Studying events retrospectively, however, introduces the issue of hindsight bias, which is the cognitive process by which individuals superimpose structure and simplicity on their recollections of the past (Roese and Olson 1996). Cassar and Craig (2009) suggested that entrepreneurs develop strong hindsight bias concerning their startup activities. Therefore, we sought data sources that were as close to the events as possible and that would be the least subject to the interpretation bias (Yin 2003) of prior researchers. We were able to avoid such bias by collecting the bulk of empirical data from publicly available video interviews with the founders of both companies. Given the instant business success of the two case companies, extensive media coverage and documentation has existed since their founding in the late 1990s.

The time frame for the data collected on Skype Technologies was between 2000 and 2003 and for YouTube between 2004 and 2007. These two time periods capture the opportunity emergence and early developmental phases of the studied ventures. The Skype data were primarily collected through video interviews with founders Niklas Zennström and Janus Friis, while the YouTube data were primarily collected from video interviews with Chad Hurley, Steve Chen, and Jawed Karim, the founders of YouTube. This amounted to 380 min of video covering direct interviews with the founders and speeches given at different events. The video data were transcribed, coded, and organized in a research database. Other important sources of data for our study were archival sources (websites, journal articles, etc.). We analyzed some 200 different texts, including written interviews, articles, and short news feeds related to the key events.[1]

We organized the collected data to present a chain of events leading to the identification and development of the entrepreneurial opportunities. Following the assumption that opportunities are both discovered and created (Venkataraman et al. 2012 p. 26), we first focused on identifying the components of the opportunities discovered by the two founding teams of entrepreneurs. We proceeded by analyzing how these components were recombined into the emergence of the opportunities associated with the Skype and YouTube ventures. We began by investigating the backgrounds of the entrepreneurial founding teams, their previous jobs, and entrepreneurial experience.

Open coding the collected data was done using Atlas.ti software. We relied mostly on direct quotes from the entrepreneurs in order to avoid interpretation bias. In the second round of coding, open codes were grouped into concepts that formed emergent categories. The main quotes from which the emergent categories were derived are shown in Table 1, with the open codes assigned to the relevant quotes. Examples of how we grouped the open codes into concepts are also given in Table 1.

In order to secure the internal validity of the research findings, we followed the steps suggested for qualitative research (Gibbert et al. 2008; Yin 2003): (a) creating a research framework based on the existing theoretical discussions regarding the opportunity creation process; (b) performing pattern matching for the emergent categories concepts by integrating the data from the two main cases and several supporting examples; and (c) conducting theoretical saturation and theoretical triangulation in order to test the emergent categories against existing bodies of literature.

Findings

What are the opportunity components that entrepreneurs discover in their contextual environments and recombine when developing a new opportunity? In analyzing the data from the two cases, our attention was drawn to the sources of opportunity components. The entrepreneurs systematically referred to opportunity components associated with their own prior ventures, as well as the ventures of other entrepreneurs in different industries. Based on these insights, we identified three different types of opportunity components.

[1] The protocols used for the collection are available from the authors upon request.

Table 1 Evidence for use of opportunity components with YouTube

Quote	Substantive code	Concepts
Jawed Karim "When I was reading this, it was pretty clear to me that BitTorrent would not be a part of the solution. At least not initially as BitTorrent works really well for large files, but does not work well for an on demand video service because: (1) There is no bandwidth guarantee. It could take 6 h or 6 days. You could never know. (2) It is also not good to find things. It is more of a transfer mechanism" (Karim 2006, 00:28:05)	BitTorrent was not a suitable technological solution to address the need to watch videos online	The entrepreneurs built on business templates connected to technology stack from previous ventures
Jawed Karim "And all the other pieces had already been proven. We have already seen that community sites were very feasible, that the scalability issue can probably be overcome; it could possibly be profitable" (Karim 2006, 00:30:30)	It had already been proven that scalability issues could be overcome	
Chad Hurley "And also the video codec we use is actually built into Flash and that is the video format that we chose which was launched only a year ago. Flash had 97 % penetration at the time" (YouTube 2007, 00:05:36)	YouTube used an existing solution with very high penetration	
Chad Hurley "Initially we thought it would be useful in the auction space, because we were coming from PayPal so we had features initially that were useful for that. We still have the embed feature, but we were kind of pushing that, so people would use it to describe what they are selling. It's much better than a photo but we did not see people moving in that direction" (Hurley et al. 2007, 00:06:40)	The entrepreneurs tried to use elements that had proven successful with PayPal	The entrepreneurs relied on previously developed templates to design their products/services
Chad Hurley "When developing YouTube we were just looking at basic concepts on what helped us grow at PayPal" (globalchange.com 2007, 00:04:26)		

Table 1 (continued)

Quote	Substantive code	Concepts
Jawed Karim "And all the other pieces had already been proven. We have already seen that community sites were very feasible, that the scalability issue can probably be overcome; it could possibly be profitable" (Karim 2006, 00:30:30)	Community sites had already been proven	
Chad Hurley "We are a very different service from Napster or KaZaA. The majority of the videos that we get are made by the users. They participate with their own content" (Hurley et al. 2007, 00:36:50)	The entrepreneurs designed their service to overcome the problems that had emerged with previous ventures	
Jawed Karim "When I read this [the article on BitTorrent] it really hit me… now to get the biggest audience, maybe online is the way to go, not television" (Karim 2006, 00:27:23)	BitTorrent pointed out that the largest audience could be reached online	
Chad Hurley "Jawed deserves the credit for the early idea. The original goal that we were working toward in the very beginning: a video version of hotornot.com"(Cloud 2006)	YouTube was designed to be a kind of Flickr or Hot or Not for video	
Jawed Karim "And so the question was what if there was a video site, where anyone could upload the clips and anyone could watch them. This is essentially nothing more than Flickr or HOT or NOT, except for video" (Karim 2006, 00:30:14)		
Jawed Karim "And all the other pieces had already been proven. We have already seen that community sites were very feasible, that the scalability issue can probably be overcome; it could possibly be profitable" (Karim 2006, 00:03:30)	Previous ventures had proven that similar websites could be profitable	The entrepreneurs relied on previously proven revenue model templates

We present our findings by first outlining evidence on what opportunity components were discovered by the YouTube and Skype entrepreneurs, and then discussing the

sources of those opportunity components. We continue by exploring how the entrepreneurs creatively recombined those components in developing their opportunities. Finally, we discuss the process of recombination through the lens of entrepreneurial bricolage (Baker and Nelson 2005).

What opportunity components do entrepreneurs discover?

It was the article "The BitTorrent Effect" (Thompson 2005) published in *Wired!* magazine in 2004 that triggered the opportunity that later materialized into the social networking site YouTube. The article described how the infamous appearance of Jon Stewart on CNN during the 2004 presidential elections had attracted an online audience three times larger than the one that had watched the original appearance on network television. Most of the online users had downloaded the clip through BitTorrent, demonstrating that there was great demand for an online video sharing service. "When I read this it really hit me… now to get the biggest audience, maybe online is the way to go, not television" – Jawed Karim (Karim 2006, 00:27:15).

Shortly after Karim's insight, a large tsunami threatened and took many lives in Southeast Asia. Because the tsunami was completely unexpected, there were no professional television crews present to cover its immediate effects. As a result, amateurs using their cell-phone cameras provided most of the video footage. They flooded the Internet with a large quantity of videos, but there was no adequate service with which to organize and view them.

We found out, when we launched the YouTube site, that a lot of people may upload videos that was not just a video from a week or month ago, but was actually uploading 25 videos from something like 2001 all the way to 2005. This was an unmet need not just from recently but all the way to the time first digital videos were taken and just lying on their computers and they had no place to upload and share these videos – Steve Chen (YouTube 2007, 00:03:17).

Having identified the latent need for users to be able to access a reliable and simple web-based service for uploading video files, the entrepreneurs systematically reviewed existing media and Internet service providers that were already addressing that need. They disagreed with the author of "The BitTorrent Effect," who suggested that BitTorrent would be the solution to the problem: "BitTorrent works really well for large files, but does not work well for an on demand video service because: (1) there is no bandwidth guarantee. It could take 6 h or 6 days. You could never know. (2) It is also not good to find things. It is more of a transfer mechanism" – Jawed Karim (Karim 2006, 00:28:12). The YouTube founders were also unable to find any other technologically viable alternative: "When we started this thing there was virtually nothing like it out there" – Steve Chen (CNN 2006, 00:50:00).

With a clear, persistent need lacking viable technological and business solutions, the entrepreneurs searched for solutions that had proven to be successful in similar fields. In the words of Jawed Karim, YouTube: "is essentially nothing more than Flickr or Hot or Not, except for video" (Karim 2006, 00:30:17). Hot or Not inspired the entrepreneurs "because it was the first time that someone had designed a website where anyone could upload content that everyone else could view" – Jawed Karim (Cloud 2006). Prior to the success of Hot or Not, it was unclear whether people were willing to share their personal content online and if that was even technologically viable. Flickr took the

photo-sharing experience to a higher level by enabling users to easily upload, share, and search photo albums. A brief comparison of the services revealed that YouTube was indeed very similar to Flickr in terms of its layout, design, features, (e.g., tagging), and free-based revenue model. However, technological barriers made it impossible to upload videos to Flickr.

The evidence above suggests that, when developing the YouTube opportunity, the entrepreneurs discovered (a) evidence of a latent market need and (b) existing opportunity components that could address that need.

Niklas Zennström and Janus Friis, the founders of Skype, sold their venture KaZaA in 2001. As they were living in different parts of Europe at the time, they predominantly communicated via the Internet. They quickly realized that "none of the services we tried worked" (Huldschiner 2008). Such services were made by technicians for technicians. "We soon realized that we could do a much better service ourselves with an entirely different technology solution" – Niklas Zennström (Huldschiner 2008). As these quotes suggest, the two entrepreneurs identified a market need associated with providing cheap voice calls through voice over Internet protocol (VoIP) technology, despite competitive attempts by other industry providers such as Vocaltec and Vonage. "We certainly didn't invent Internet telephony, but it wasn't very good and was too hard to use" – Niklas Zennström (Maney 2006). The entrepreneurs analyzed the experiences that other entrepreneurs had with VoIP technology and determined that the main problems with legacy solutions were "bad sound quality, difficult to set up, use and configure, and the need for expensive, centralized infrastructure" – Janus Friis (Charny 2003b). Looking to those previous VoIP ventures, the entrepreneurs identified the latent need for an easy-to-use service that could enable users to talk over the Internet.

The entrepreneurs tried to solve the problems associated with the leading VoIP technology at the time. In particular, they applied peer-to-peer technology that had been used previously in file sharing networks such as KaZaA and Napster. "P2P technology is really very well suited for Internet telephony, so it is a natural next phase." – Janus Friis (Charny 2003b). Peer-to-peer technology enabled a decentralized service design, significantly decreased the need for infrastructure, enabled high transfer speeds, and significantly improved the voice quality. When designing Skype, the founders carefully studied previous VoIP solutions. "Skype is addressing all the problems of legacy VoIP solutions: bad sound quality, difficult to set up and configure, and the need for expensive, centralized infrastructure. No one has seriously addressed these problems before, and this is why VoIP has never really taken off…" – Janus Friis (Charny 2003a). In developing the Skype opportunity, entrepreneurs adopted the freemium business models that had already proven to be viable in the VoIP industry, i.e., "… when you go and search on Google you don't pay for that. But sometimes you click on an advert and Google makes money on that" – Niklas Zennström (BBC 2005).

Similarly to the YouTube case, the Skype founders also discovered (a) evidence of a latent market need and (b) existing opportunity components that could address that need. Examining the observations from both exploratory cases together, we found that there were similarities in the pattern of existing opportunity components that the entrepreneurs discovered and then recombined when developing the emerging opportunity. The founding teams of both YouTube and Skype searched for, interpreted, assessed, used, and recombined the prior experiences of entrepreneurs in order to further develop their opportunities. The sequences of previously developed

technologies and concepts that led to the YouTube and Skype ventures provide practical examples of what scholarly literature refers to as "materials and concepts found in the world" (Venkataraman et al. 2012 p. 26) or "opportunity conditions" (Davidsson 2012 p. 1).

What types of opportunity components are discovered by entrepreneurs?

The analysis and synthesis of the data from the two exploratory cases revealed three distinct types of components of an entrepreneurial opportunity: technology stack, revenue model, and product/service architecture design (from the user's perspective). The substantive code column in Table 1 represents the initial code assigned during the coding process, while the theoretical codes represent groupings of similar substantive codes that form emergent categories.

The technology stack component of an entrepreneurial opportunity The introduction of a new technology involves many business risks. From the user's perspective, new technologies are typically more complicated and may require the learning of new skills. As a result, users may resist adopting the new technology. Furthermore, some solutions may be technologically viable, but do not appeal to user. Technological features must address the needs of and deliver value to the user in order for the new technology to be useful.

There were two key technological issues that the YouTube entrepreneurs had to tackle in order to create a desirable service that would address the market need identified: the size and the format of the video. First, since video-capturing devices stored digital videos in different formats, users had to have all of the right codecs installed on their computers in order to view the digital videos. This severely interfered with the user's experience, since the videos did not work if the user was unable to install the matching codecs. Understanding the user's "pain," the YouTube entrepreneurs wanted to find a technologically feasible way to simplify the user's interface. "We concentrated on the basics. Not making people think about which type of media player they were using. It was the first frustration we had" – Chad Hurley (globalchange.com 2007, 00:02:09). The entrepreneurs used a technological solution integrated into Flash, which had 97 % penetration at the time. This way almost every user could view videos directly in the web browser. "Upload any format… we would do the work. We would re-encode any video into Flash" – Chad Hurley (globalchange.com 2007, 00:02:32). In effect, the YouTube founders used existing technology solutions provided by Flash to overcome the codec problem and develop a user-friendly technological platform. Second, video size presented another technological challenge, in that digital videos are typically very large files. Thus, to enable video streaming, a substantial server infrastructure was required. However, the challenge was not only associated with the investment in hardware; the system's setup itself presented a huge technological challenge known as "scalability" in the industry. Several ventures (e.g., Google, PayPal, Amazon.com, Yahoo) had already faced scaling issues and developed experiential knowledge about how to serve millions of users simultaneously. Learning from the experiences of these ventures, the YouTube entrepreneurs were able to effectively deal with the scalability issues.

The practice of integrating technology stack related components of an opportunity in the development of an emerging opportunity is also exhibited in the Skype venture. The founders of Skype started KaZaA in 2001 to address the gap left by the shutdown of Napster (founded in 1999). Napster had enabled the use of peer-to-peer networks for Internet users to share audio files. The technology advanced by Napster was adopted and further enhanced by KaZaA (2001), BitTorrent (2001), and most notably Skype (2003) (see Table 2).

Peer-to-peer network designs were rare for companies offering Internet services. Questioning its primary purpose, the founders of Skype decided that the technology was well suited for voice over the Internet protocol (VoIP). "After Niklas Zennström and I did KaZaA, we looked at other areas where we could use our experience and where P2P technology could have a major disruptive impact." – Janus Friis (Charny 2003b). Our case study data suggests that the Skype entrepreneurs discovered how this technology had been used in the past and leveraged those solutions to solve the specific technological challenges associated with satisfying the particular market need. Based on the two cases, we found that the discovery and recombination of technology stack related opportunity components played a crucial role in making the YouTube and Skype entrepreneurial opportunities technologically feasible.

The product and service architecture design component of an entrepreneurial opportunity Because YouTube is an online service, its effectiveness largely depends on webpage design and functionality. Surprisingly, very little innovation went into the original outline of the YouTube webpage. "This is essentially nothing more than Flickr or HOT or NOT, except for video" (Karim 2006, 00:30:17). This statement best describes how the entrepreneurs approached the architecture of the emerging webpage. Indeed, they drew on several previously developed and tested architecture designs, and recombined them. The positioning of the elements, the colors used, the look of the logo, the simplicity of use, and the use of tagging for organizing videos all followed the templates already developed and tested by other companies. Product/service architecture does not only refer to functionalities, but also to the core value proposition of the service. YouTube followed the opportunity components, addressing the user's need to share content online. Without the opportunity components that had been developed by previous ventures, the creation of YouTube probably would not have been possible. "I

Table 2 Companies using peer-to-peer technology

	napster 1999	KaZaA 2001	BitTorrent 2001	skype 2003	joost 2007
Service	Napster	KaZaA	BitTorrent	Skype	Joost
Usage	File sharing	File sharing	File sharing	VoIP	Video streaming
Description	First large-scale web service using peer-to-peer technologies. Popularized peer-to-peer solutions	Largest and fastest growing peer-to-peer network. Less centralized than Napster	First completely decentralized peer-to-peer network that did not require server infrastructure	VoIP service using peer-to-peer to overcome the need for centralized infrastructure	Peer-to-peer television streaming service
Key contributions to the technology	Proved that it is possible to use the technology simultaneously for millions of users	Simplified peer-to-peer and used it for the exchange of all types of files	Enabled swarm downloads. Completely decentralized	Most notable peer-to-peer application outside of file sharing.	Failed and shut down in 2012

was incredibly impressed with HOT or NOT, because it was the first time that someone had designed a website where anyone could upload content that everyone else could view. That was a new concept because up until that point, it was always the people who owned the website who would provide the content" – Jawed Karim (Cloud 2006)

Table 3 shows an overview of service providers that enabled users to publish private content online at the time of YouTube's founding. The YouTube founders recombined the opportunity components developed by these providers and upgraded them to enable the sharing of videos online. The main upgrade was the addition of a browser-based video player that could enable a user-friendly experience for watching streaming video online.

In the case of Skype, the founders described the opportunity components they followed when designing the service: "People expect telephony to be simple. You pick up the handset; you get a dial tone; you call. That kind of simplicity is our benchmark…" (Charny 2003b). "If you can use a Web browser, you can use Skype" (Lasica 2004). It is also interesting to observe how the entrepreneurs integrated instant messaging technology into the service. "You can also instant message with others while you're talking to someone else, which makes the whole communication experience much richer and more efficient for businesses, too" – Niklas Zennström (Lasica 2004) (see Table 4).

Janus Friis described how the VoIP service benefited from the addition of instant messaging functionality:

Skype is a telephony software, but we feel that instant messaging is a good supplemental. If you're talking to someone, you can chat with someone else at the same time. When we designed Skype's user interface, we tried to combine the ease of use of cell phones. Everyone knows how to use them. With instant messaging, it also gives you the ability to see when your friends are online (Charny 2003b).

This quote illustrates how the entrepreneurs employed existing functionalities and recombined them into a revised solution. It is important to understand that when referring to "instant messaging," the entrepreneur was speaking about opportunity components developed by preceding ventures that had, through

Table 3 Development of user content creation online

	1999	2000	2001	2002	2005
Service	LiveJournal	Hot or Not	Wikipedia	Friendster	YouTube
Usage	Blogging	Online picture rating site	Online collaboration encyclopedia	Social network	Video sharing online
Description	Enabled any Internet user to create simple online content	Simple service that enabled online rating of pictures	Encyclopedia created and administered by Internet users	Online social network that enabled the social connections between users online	Enabled sharing and viewing of videos online
Key contributions	Proved that Internet users are willing to share personal content online	First service that enabled the sharing of pictures online	Proved that Internet users are able to collaborate to create content	Proved that users are willing to share personal information and connect socially online	First simple service that enabled the sharing of videos

Table 4 Development of instant messaging

	 1988	 1996	 1999	 2003	 2010
Service	Internet Relay Chat	ICQ	Microsoft MSN Messenger	Skype	Viber
Description	Instant chat service with a server-based infrastructure, real-time online discussion forums, and private chat capabilities	First easy to use instant chat	One of the most popular messenger services with 330 million users in 2005	Peer-to-peer instant messaging service	A cross platform VOIP and instant messaging platform
Key contributions	Among the first instant chat rooms	Popularized instant messaging	As the service was integrated into Microsoft Windows, it greatly contributed to the proliferation of instant messaging	Integrated VoIP and instant messaging with fast file exchange	Offered VoIP and instant messaging for smart phones

their own process of "trial and error," determined how an instant messaging chat service should function.

The revenue model component of an entrepreneurial opportunity In order to make money, YouTube drew on the business logics that had been well tested by preceding ventures.

I think that the advertisers are not really ready yet for something like YouTube, but I have always thought that as long as we are getting an average of people spending 15–20 min on the site there must be huge potential.... In a 24-h period if you take out 8 h for sleeping and 8 h for work, there is not so much time for entertainment. I just think that if YouTube and other video sites capture 20 min of that time, there has to be some kind of monetizable value to that – Steve Chen (Plesser 2007 00:01:44).

Media, such as magazines, television, and popular websites, mostly operate using revenue models based on advertising, as this enables them to offer their services free to the end users, thereby attracting a larger audience (Teece 2010). The search for a flexible and appropriate business model is imperative for any start-up (Trimi and Bebegal-Mirabent 2012). The advertising revenue model had been proven to be viable several times prior to YouTube. The key competitive advantage of websites providing user-created content, as compared to more traditional media, is that the content comes from the users themselves. Since there are no costs associated with content creation, the core service of such websites is free. Skype's founders followed a free-based business model (Anderson 2008) used by several companies (see Table 5). In this type of revenue model, the core service is provided for free to all users. Companies like Google and Yahoo have proven that it is possible to offer free services, while making money by selling advertising space or offering a premium service like those offered by Evernote and Dropbox (Gannes 2010). Skype was among the first companies to introduce a free-based business model into telecommunications. Niklas Zennström explained: "What we are doing is taking advantage of the broadband Internet to provide basically unlimited free calls to anyone at a higher voice quality than they can with the

Table 5 Companies following a free based revenue model

	hotmail 1996	Google 1997	skype 2003	LinkedIn 2003	Dropbox 2007
Service	Hotmail	Google	Skype	LinkedIn	Dropbox
Usage	Email	Search engine	VoIP	Social networks	Cloud service
Description	Enabled Internet users to open free email accounts with a web interface	Free-based search engine with a revenue stream based on advertising	VoIP service using peer-to-peer to overcome the need for centralized infrastructure	Professional social network that uses a freemium model	Cloud storage service with a freemium model
Key contributions	First important free web email service. One of the first services that used viral marketing	Popularized relevant ads based on the search queries from users	Most notable peer-to-peer application outside of file sharing	The largest professional social network	The most successful online service using a freemium model

phone lines" (Lasica 2004). Zennström went further to explain how they initially planned to gain revenue: "We want to make as little money as possible per user. We don't have any cost per user, but we want a lot of them" (The Meaning of Free Speech 2005).

What do entrepreneurs do with the opportunity components discovered?

In the previous section, we discussed what components of entrepreneurial opportunities entrepreneurs discover by learning from the experiences of other entrepreneurs. Based on the evidence from our exploratory cases, we found that entrepreneurs do not passively integrate previously proven components into their opportunities. Rather, they recombine and upgrade the components, modifying them to best fit the context of the emerging opportunity.

YouTube's founding team took the product architecture design that had been proven to be viable by other web 2.0 services, including a clean design with a bold logo and an emphasis on the simplicity of the service (O'Reilly 2005). Similarly, the YouTube entrepreneurs adopted the webpage and service design originally developed by Flickr. Furthermore, they used the tagging technology developed by deli.cio.us to organize the data, and the first version of the website also integrated a dating widget similar to the one used by Hot or Not. The service offered the option to embed its functionality into other webpages and email, a feature proven successful by PayPal. It also used the Flash video player to overcome the technological challenges associated with viewing video online. As these examples illustrate, the opportunity components that had been previously developed by other entrepreneurs were in fact crucial resources that these entrepreneurs were then able to recombine when developing their new opportunities. Jawed Karim, for example, observed that killer applications (an application that is so useful or desirable that it gives the value the value of the underlying technology) "build on top of each other. You get one killer app that establishes the base for the next killer app" (Karim 2006, 00:09:30).

The observations drawn from both exploratory cases suggest that the recombination and development of opportunity components represents an important form of entrepreneurial action in the early stages of the entrepreneurial process. The recombination of

components resembles entrepreneurial bricolage (Baker and Nelson 2005). It is, however, important to note that these components are just guidelines for entrepreneurial action and are open to subjective interpretation by the entrepreneurs. For example, imagine a scenario of two entrepreneurs who have identified a particular business component to use in their emerging ventures. It is quite unlikely that they will recombine this business component in the same fashion.

Sources of opportunity components

The idea that entrepreneurs find and use components that are grounded in the experiences of other entrepreneurs begs the question: what sources foster the emergence of opportunity components? Karim's suggestion that ventures "build on top of each other" (Karim 2006, 00:09:30) offers some initial avenues of inquiry. Indeed, if entrepreneurs use and recombine the business templates of prior entrepreneurs, such processes lead to expanded knowledge and experience in certain industries, and the origins of opportunity components can be recognized in the collective experience of all entrepreneurs in that domain. That collective experience continuously accumulates through a trial and error process. The iterative process of the emergence of collective entrepreneurial experience is congruent with effectuation, "taking a set of means as given and focus[ing] on selecting between possible effects that can be created with that set of means" (Sarasvathy 2001a p. 245). The existing components that are discovered by entrepreneurs represent the set of means that they try to recombine with whatever is at their disposal, with the goal of developing a new venture. Each new venture that uses a particular component adds to the collective experience and further evolves it.

The evolutionary process of how collective experiences that are sources of opportunity components of entrepreneurial opportunities are built in a particular industry can be illustrated through the example of the creation of the smartphone. One of the first devices to combine computing and telephony was the IBM Simon, introduced in 1994. The new device enabled users to program their telephone and featured a touch screen (Grush 2012). The concept was further developed and popularized by the introduction of the Nokia 9000 Communicator (Baguley 2013), which featured a full QWERTY keyboard and enabled users to send emails and browse the Internet. Several attempts to integrate the functionalities of PDAs with mobile phones were made in the first decade of the 2000s. The Symbian S60 by Nokia had the most notable impact on pushing the mobile phone further. The Symbian platform enabled users to install third party applications that enhanced the functionalities of their telephone. With that feature, the Symbian garnered the leading market share in the industry (Gilson 2012) and created a new market for phone applications. In 2007, Apple introduced the iPhone, which was the first telephone with a multi-touch screen that enabled the use of the phone without the need for an external keyboard. The phone was an instant hit, revolutionizing the smartphone industry. Together with the device came the new IOS operating system for mobile phones, which simplified the development and distribution of third party applications (Ritchie 2013). Several templates provided by Apple were used by its competitors. Smartphone producers all introduced multi-touch screen telephones, and Google also developed its own open source Android operating system. The evolution of the smartphone is another illustration of how

entrepreneurs learn quickly from the viable templates provided by preceding ventures, which they then further evolve in the process of developing new opportunities.

Similar patterns can be observed in the studied cases. Several sources of opportunity components enabled the emergence of YouTube, with the most notable being described by one of the founders: "This is essentially nothing more than Flickr or HOT or NOT, except for video. And all the other pieces had already been proven." – Jawed Karim (Karim 2006, 00:30:17). This example clearly shows how the entrepreneurs discovered, adopted, and upgraded previously proven "pieces" in order to create their opportunity. Accordingly, the Skype case offers an insight into the evolutionary development of technologies using VoIP services. Without the use and development of the technological knowledge applied to illegal file sharing, there would have been no technological background to enable the creation of Skype and to thereby revolutionize the telecommunications industry.

Discussion

In this research, we used abductive reasoning and an exploratory case study approach to enhance our understanding of what components entrepreneurs discover in the process of developing an opportunity. Specifically, we aimed at developing a taxonomy of opportunity-related components that entrepreneurs find in their contextual environment. We also illustrated how entrepreneurs recombine these components into a new emerging opportunity. Our findings expand the process view of entrepreneurial opportunities (Venkataraman et al. 2012) by proposing that the components developed and tested through preceding ventures represent an important source of discovered opportunity elements. The discovered components are then creatively recombined and integrated into a new emerging opportunity.

We identified three classes of opportunity components: technology stack, product/service design architecture, and revenue models. Our findings suggest that while exclusive information (knowledge, resources, etc.) is an important source of competitive advantage for entrepreneurs (e.g., Fiet 1996) the ability to identify, evolve, and recombine publicly available information is equally important for opportunities to emerge and be made into successful ventures. Furthermore, the process of entrepreneurial bricolage that we have identified through our case studies is evolutionary in the sense that it leads to the emergence of collective entrepreneurial experiences made up of a "stack" of opportunity components previously used by entrepreneurs. These aspects make an important contribution to the existing literature on entrepreneurial opportunities.

In sum, our findings from the qualitative data diverge from the propositions advanced by entrepreneurship scholars who see entrepreneurial action as being the result of a heroic entrepreneur who, through innovation, propels the economy forward with "gales of creative destruction" (Schumpeter 1950) or who has specific genetic factors that lead to success (Nicolaou and Shane 2009). Indeed, our findings provide practical evidence to suggest that opportunity "is the progress (idea + action) along a continuum ranging from an initial insight to a fully shaped idea about starting and operating a business" (Dimov 2007).

Prior research (Fuentes Fuentes et al. 2010) has emphasized that the previous experience of the entrepreneur is the key human capital of a firm. However, little has been said about the importance of collective experience. Our findings suggest that, through the evolution of opportunity components, the development of entrepreneurial opportunities is a collective action by many important actors. We push this perspective further by arguing that, in order to develop an opportunity into a successful venture, it is not enough to simply aggregate the action and knowledge dispersed among the many individuals associated with a specific opportunity. Rather, in developing new opportunities, entrepreneurs connect their own experiences to the experiences of other entrepreneurs that are embedded in previously developed components. Any new entrepreneurial action that weaves together the existing components of an opportunity into a new, emerging opportunity generates new insights through which entrepreneurs can understand how opportunity components perform within novel venture designs. Connecting these experiences creates a collective experience in the form of "common knowledge," which is more or less objectively accessible to all entrepreneurs (Ruef et al. 2003; Ucbasaran et al. 2009).

Implications

Our first theoretical contribution expands the literature on the process view of how entrepreneurial opportunities emerge. To our knowledge, this study is among the first to explain what entrepreneurs discover when creating opportunities. We have provided grounded evidence on how the materials and concepts (Venkataraman et al. 2012) or opportunity conditions (Davidsson 2012) materialize in emerging opportunities – through technology stack, product/service design, and revenue model. This deepens our understanding of the role played by discovery in the creation of opportunities. While we have identified three types of opportunity components connected to previous ventures that entrepreneurs systematically look for and use when creating their opportunities, we do not claim that these cover all types of discovered opportunity components. Nevertheless, their features point to several interesting questions associated with our understanding of the entrepreneurship process, especially in terms of entrepreneurial bricolage and entrepreneurial learning, as discussed below. Our study also proves the usefulness of the qualitative exploratory research strategies advocated by several entrepreneurship scholars (Bygrave 2006; Leitch et al. 2010; Hindle 2004). These scholars have argued that the use of exploratory grounded studies can increase the richness of the theory developed in the novel scientific field of entrepreneurship.

Our second theoretical contribution is to the entrepreneurial bricolage literature. Drawing on our qualitative findings, we show that the design of the new opportunity will most likely include a novel combination of discovered components developed by preceding ventures, which are then recombined to fit the specific context of the opportunity at hand. Information on the design and performance of these types of opportunity components can be often acquired by observation and through the media. Best practices from preceding ventures are thus widely accessible and can be claimed to exist objectively in a certain context. If we frame these components as a resource type, then the discovery of experiences from preceding ventures significantly expands the resource base available to entrepreneurs. In effect, the resources entrepreneurs have at hand (Baker and Nelson 2005) are much greater than if they were to rely solely on their

own subjective experience. Providing that an abundance of resources is available, the actions taken by entrepreneurs become more important than direct access to resources, emphasizing the importance of resource selection and interpretation within the context of entrepreneurial bricolage. Mason and Harrison (2006) proposed that, after exiting their previous ventures, entrepreneurs recycle their resources to create new ventures. Our findings suggest that entrepreneurs do not only recycle their own resources, but also reuse components previously developed by other entrepreneurs. Entrepreneurial bricolage has traditionally referred to how entrepreneurs in resource-poor environments manage to recombine existing resources to create new resources (Baker and Nelson 2005). The studied cases, however, show that even in environments where resources are not scarce, bricolage still plays an important role in the entrepreneurial process. In addition to being able to creatively recombine resources, the entrepreneur's success depends greatly on his or her ability to choose the right set of abundant resources. This further emphasizes the crucial role played by entrepreneurial choice and action in the opportunity emergence process.

Finally, our third contribution is to the literature on entrepreneurial learning. Dimov (2007) emphasized that opportunity development is a learning process and that entrepreneurs socially engage with others, thus making the individual's learning a social process. As proposed by Dutta and Crossan (2005), the social context becomes specifically important when interpreting, intuiting, and integrating the opportunity. The feedback that entrepreneurs receive from their social context is important mostly for refining and testing the opportunity at hand. The findings of our research push the idea of social context even further, suggesting that collective entrepreneurial experience represents an important source of opportunity components that are integrated when designing new opportunities. This represents a large database of tacit knowledge waiting to be discovered by forthcoming entrepreneurs. Each new opportunity that integrates an existing opportunity component from a specific opportunity thread represents an experiment in how a specific opportunity component performs in a slightly different context and combination of opportunity threads. This resembles a collective trial and error learning process (Nelson 2008). Under the conditions of bounded rationality, each new trial represents a modification of the opportunity component used in the past. Our findings suggest that in an entrepreneurial ecosystem, collective learning takes place continuously through a process of collective effectuation (Sarasvathy 2004), resulting in the continuous development of opportunity components. This process is akin to evolution, wherein successful iterations result in the championing of the opportunity components, while unsuccessful attempts result in extinction. Eventually, by using the logic of discovering and recombining existing opportunity components, entrepreneurs carve out temporal trajectories among ventures.

The findings from our research also have practical implications for entrepreneurs. Obviously, the emergence of a new entrepreneurial opportunity is crucial for the subsequent success of the venture. The results of our qualitative analysis emphasize the important role played by entrepreneurs in the process and the implicit control they can exert over the nature of opportunity itself. By recombining the types of opportunity components developed through preceding ventures, they actively contribute to the nature of the evolving opportunity. As entrepreneurs work under bounded rationality (Nelson 2008), previously tested opportunity components represent useful experiments

in how to design one's own opportunity. This approach decreases the number of trial and error attempts and, thus, substantially reduces the amount of time and resources needed for developing an opportunity. It is thus important for entrepreneurs to stay alert to leads in their contextual environment. The attitude entrepreneurs should adopt when creating new ventures is best summed up by Jawed Karim: "Just because 'experts' reject it, doesn't mean it's a bad idea. There are no experts. If they were experts, why didn't they develop this. If you are doing something new: 'You are the expert'" (Karim 2006, 00:37:58).

Limitations and avenues of future research

As with any research, there are several limitations to this study that we must acknowledge. The first limitation involves the methodology used in the study. The most common concerns associated with the use of a qualitative methodology are subjectivity, inductive reasoning, validity-related issues, and the statistical generalization of results (Hindle 2004; e.g., Arminio and Hultgren 2002; Neergaard and Ulhři 2006). Given the modest number of cases used, this research certainly has limitations concerning statistical generalization. As is the case in any qualitative research, the context played a central role in the cases we studied. Without sufficient understanding of the underlying events in the economy, society, and technological development, it would have been impossible to explain the emergence of the ventures. As such, the cases that we initially analyzed were selected as unique success stories in a specific and highly unfavorable context. One could argue that such an approach involves sampling on the basis of the dependent variable with no variance on the outcome, which could lead to sample selection bias and false inferences (Heckman 1979 p. 153). Because the main objective of this research was to explore the process of opportunity emergence, rather than to identify independent variables that lead to the success of the venture, the main value of (exploratory) observation studies lies in their capacity to provide insights through rich detail and to generate hypotheses for further testing (Břllingtoft and Ulhři 2005). Therefore, we suggest further studies on the interplay between the discovery and creation activities of entrepreneurs during the opportunity emergence process, using both quantitative and qualitative methodologies. Furthermore, in order to make the emergent categories more robust, additional cases from different environments, industry settings, and economic cycles could be used.

Another issue that we have not considered sufficiently is the question of how opportunity components discovered during the opportunity emergence process are recombined and integrated into a new opportunity. Future work could explore the specific techniques used by entrepreneurs during the process of searching for existing business opportunity components.

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