Influence of the Adoption and Use of Social Media Tools on Absorptive Capacity in New Product Development

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Abstract

In this article, we discuss how the adoption and use of social media tools influence new product development (NPD). Our aim is specifically to consider how an organization's absorptive capacity is influenced by using social media tools. Based on a two-phase data collection process comparing the situation before and after adoption of social media tools in three organizations, we conclude that the amount of accessible knowledge and the number of ideas increases as an organization's ability to find and access various sources of intra-organizational expertise increases, thus, increasing knowledge acquisition and assimilation. Consequently, we infer that organizational absorptive capacity rises and is linked to improvement in new product development.

Keywords: new product development, absorptive capacity, social media

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Introduction

The use of social media has permeated communication among the general public in the last decade, as the masses have adopted these tools for their online social interaction. The use of these tools in the corporate context is following suit, and in recent years the use of social media tools has increased significantly (Haefliger, Monteiro, Foray, & von Krogh, 2011; McKinsey, 2012; Saldanha & Krishnan, 2012). For engineering management, one of the uses of these tools is to improve the process of new product development (NPD). Specifically, the empirical study described in the present article considers a case study of three companies that have adopted social media tools and have strong incentives to use these tools in their product development, among other functions and processes. Due to the lack of saturated convergent theoretical frameworks in the existing management literature, we adopted an exploratory empirical approach to investigate the implementation and intra-organizational use of social media tools in NPD.

We measured companies' potential absorptive capacity before and after their large-scale adoption of social media tools. Additionally, we explored the differences between active and conservative (non-active) users of social media tools in relation to potential absorptive capacity. Our empirical data were collected in two phases. In the initial phase, the absorptive capacity related to new product development was evaluated with an online survey. In order to draw conclusions about the influences of the social media tools on NPD, after the tools were adopted, we repeated the empirical investigation with a post-implementation survey. We were able to draw conclusions about their influences on new product development practices by comparing the survey results from these two disparate points in time.

The contribution of the present article is the introduction of a conceptual model synthesized from the literature (Flatten, Engelen, Zahra, & Brettel, 2011; Hoopes & Postrel, 1999; Murovec & Prodan, 2009; Tsai, 2001) that describes our overall understanding of the effects of implementing online collaboration tools within the NPD process. We, therefore, in light of the exploratory nature of our research, identify key findings that pave the way for future research as propositions regarding social media tool implementation and use as they relate to absorptive capacity and NPD. We also present the managerial implications of our findings.

Theoretical background

Absorptive capacity (ACAP) theory has become well known since Cohen and Levinthal's contribution in 1990 that resulted in a wide-spread discussion in the literature (Cohen & Levinthal, 1990). Absorptive capacity includes organizational knowledge acquisition, assimilation, transformation, and exploitation. Zahra and George (2002) divided ACAP into two differing parts, namely potential and realized absorptive capacity. Absorptive capacity can also be described by concentrating on different entities within an organization. Typically, it has been discussed at the organization and unit levels, but recently it has been examined at the individual level as well (Hotho, Becker-Ritterspach, & Saka-Helmhout, 2012; Jansen, Bosch, & Volberda, 2005). Potential absorptive capacity (PACAP) is referred to as the potential amount of absorptive capacity of a "unit" (the word "unit" is used to indicate a group of interest, and it can also be an individual). The amount of ACAP depends on the amount of existing, prior, knowledge, interfaces between parties, and social relations in a particular unit (Hotho et al., 2012). The amount of absorptive capacity used is referred to as realized absorptive capacity (RECAP). According to the results of Jansen et al (2005), RECAP is strengthened by connectedness and socialization. In addition, it is argued that complementary knowledge can be absorbed from consortiums if a company's absorptive capacity is high (Sakakibara, 2003).

New product development management seems to require additional effort to gain access to internal and external networks where new knowledge can be acquired (Flatten et al., 2011; Tsai, 2001; Yli-Renko, Autio, & Sapienza, 2001). Intra-organizational communication and collaboration are good proxies for knowledge acquisition and assimilation (Flatten et al., 2011). Additionally, crucial knowledge can also be acquired inter-organizationally (Yli-Renko et al., 2001). Furthermore, and according to Tsai (2001), cross-functional communication is the main element that increases organizational capability to innovate, but the absorptive unit should have high enough ACAP to use the knowledge that is available. A unit with high ACAP is considered highly innovative (Tsai, 2001) as a company's capability to acquire and apply different ideas and knowledge plays an important role in the development process (Anderson & Tushman, 1990). The design cycles of a company also seem to be positively affected by its high ACAP (Moorman & Slotegraaf, 1999). Therefore, the social networks and their functioning inside a company and across functional units seem to play a major role in NPD.

The connection between ACAP and the use of social media tools has been argued by Peltola (2014). He used communication, NPD environmental variables, and the use of social media tools as variables to address acquisition and assimilation of knowledge. He found a positive relationship between the use of social media tools and PACAP. Intra-organizational and enterprise use of social media has also been discussed by various scholars investigating various perspectives on social media, such as benefits of their use (Alberghini et al., 2014; Denyer et al., 2011), strategy related to social media use (Haefliger et al., 2011), the practical level of social media implementation and use (Alberghini et al., 2014; McAfee, 2006), and issues relating to adoption of social media (Saldanha & Krishnan, 2012). There are also a few existing studies that have concentrated mainly on the boundaries between an organization and its environment (Jussila, Kärkkäinen, & Leino, 2011; Kietzmann, Hermkens, McCarthy, & Silvestre, 2011; Mangold & Faulds, 2009; Seraj, 2012). However, findings in the extant

literature are not convergent when considering benefits of social media: the impact of social media can be positive (Bondar & Peltola, 2013), negative (Denyer et al., 2011), or negligible (Meroño-Cerdán, 2008). The reason for conflicting results may be, for example, that organizations and their contextual factors differ from one another, or the interaction process between organizational members are heterogeneous among organizations, or the process of adopting new technological innovations differs between organizations. Furthermore, the existence of collaborative technology does not necessarily result in benefits, as these benefits are based on individual use, not on the availability of such technologies in the organization (Migdadi, Zaid, & Hujran, 2012). Additionally, it has been argued that the nature of social networks among employees play a central role in organizations' capabilities to implement social media tools (Talukder & Quazi, 2011).

Communal working practices have been studied, for example, by von Krogh & von Hippel (2006). They concentrated on open source projects and found positive results based on communal working practices (von Krogh & von Hippel, 2006). Additionally, Leonardi (2007) argued that communal tools can be applied to better use organizational knowledge and therefore to improve work efficacy among employees (Leonardi, 2007).

Consequently, the possibilities of online collaboration and increased communication with social media inside an organization have not been well-studied to date, even though there has been a recent global trend to enhance internal communication between, and inside, organizations by implementing social media tools. In the present article, we discuss the adoption of social media tools in new product development and its influence on organizational practices in new product development. Our aim is specifically to consider how the absorptive capacity of an organization is influenced by its adoption of social media tools.

Methodology and data

Our data collection methods were based on online surveys of three large enterprises that have operations in several countries worldwide. Our approach does not fully follow a typical case study methodology (Eisenhardt, 1989), as empirical data were not used to formulate hypotheses. Instead, our approach was to find insights and enable learning based on cases (Flyvbjerg, 2006). Cases were selected purposefully from different industries to have information-rich view in the intended focus of the study (following e.g. Patton, 2002). This diverse case selection (Gerring, 2007, 98) procedure was deemed necessary as the study is exploratory in nature focusing on studying the possible effects of implementing social media tools in organizations. Following our focus of the study the selected cases also had to have several internal functions and should actively pursue new knowledge and ideas, in contrast to merely operating a business and not having a NPD function.

The online survey was designed to collect data from people at different levels and with different functions in the organizations. The empirical evidence found in this study is based on a subgroup of a larger survey that addresses other aspects, in addition to PACAP. The whole questionnaire contained three primary sections and a total of 61 questions. The questions that specifically related to PACAP are outlined in Appendix A. These Likert-type questions were rated on a scale of 1 to 7, where 1=strongly disagree and 7=strongly agree. We synthesized our survey questions from existing literature (see references in Exhibit 2) so as to strengthen our theoretical premises and increase the validity of our measures so that they would measure what is intended. In order to further increase the validity of our measures, we also pre-tested the questionnaire. The survey was first pre-tested with experienced researchers (N=4) and the questionnaire was refined based on the comments received. Further, the questionnaire was pre-tested with a pilot survey that had respondents from representatives of NPD process in case organizations. The results of the pilot survey revealed no major needs for refinements but some

case-specific, industry terminology needed to be updated in each case. The final survey questionnaire was refined and finalized based on the results of pre-tests. Further, by outlining the references for our measures in existing literature, we also wanted to increase the reliability of our study and facilitate improved replication logic for future studies.

The data were gathered from each organization pre- and post-implementation of social media between 2012, and the second quarter of 2013 (see Exhibit 1). The respective two datasets from each organization were compared to each other to analyze whether there had been changes in the organization's potential absorptive capacity due to social media tool adoption.

[Insert Exhibit 1 about here]

As presented in Exhibit 1, the three cases followed somewhat different paths towards implementation of social media tools. All of the cases selected a different main social media tool and implementation route. In Case 1, the decision to implement social media tools was made by senior managers, but the actual roll-out and usage followed a bottom-up type of implementation. This meant that senior managers made the decision to implement the tools, but the use of the tools was not significantly supported or enforced by management; rather, the tools were made available for the organization. In Case 2, the implementation route was not clearly bottom-up or top-down, as the commitment of senior managers varied. The tools were made available and some commitment in using the tools was shown by management, but large scale systematic support by management was not provided for the implementation. In Case 3, senior managers were actively committed to the implementation of the social media tools. They were involved in using the new tools, brought content to discussions and also refined internal processes to support implementation.

Results and discussion

An invitation to participate in the online survey was sent to 596 people from NPD-related functions at different levels of organizations. We received 252 responses: 131 from the initial data collection and 121 from the second data collection. The response rates for the three companies for the first data collection were: 46.8% for Case 1, 51.6% for Case 2, and 44.8% for Case 3. For the second data collection, the response rates for the three companies were: 38.8% for Case 1, 36.4% for Case 2, and 38.0% for Case 3. The surveys were independently administered and the risk of information leakage between respondents (which could have generated bias) was considered negligible. Non-response bias seems not to raise a major concern, as, according to the Mann-Whitney *U* test, there was no bias between the actual respondents and all invited respondents ($p < 0.05$). Therefore, the responses were used to describe the whole sample population.

We split the collected data into subsections. In order to study whether adoption of social media application influences the potential ACAP of NPD, we studied the survey results from before and after adoption of social media tools. We also investigated whether the adoption by the organization changes the use of social media tools, and whether the adoption or use had an influence on screening ideas in NPD. We divided the survey results into active and conservative groups of users in order to investigate whether the use of social media tools influences PACAP of NPD (last question in Exhibit 2). The active users group contained organizational members who used social media tools at least daily. The Mann-Whitney *U* test was used to investigate whether the distributions of responses were different between subsections at the significance level of $p < 0.05$, as our research was exploratory in nature and was intended to identify findings that would be used further to build propositions for future studies.

The summary of our findings is presented in Exhibit 2. Exhibit 2 presents the results from our two samples, underlining the differences between pre- and post-adoption responses and differences between groups of active and conservative users of social media tools.

[Insert Exhibit 2 about here]

The impact of implementing social media tools was addressed in terms of amount and quality of knowledge. The groups of answers before and after the (pre- and post-) implementation of social media tools differed statistically with respect to discussing ideas internally across organizational levels (question 8 in Exhibit 2, $p < 0.05$) and use of these tools (question 15 in Exhibit 2, $p < 0.05$). Therefore, these results together imply that the implementation with increased use of social media tools decreases organizational hierarchies and borders between hierarchical levels. This is supporting the earlier finding that merely implementing social media tools in general does not change working practices (Migdadi et al. 2012) but there has to be a change in a way of working and using these tools need to be part of it. As the use of social media tools had increased and there were changes in organizational practices after implementation it indeed made sense for us to continue investigating specifically whether the level of social media tool use influenced potential ACAP.

The impact of using the social media tools was addressed similarly in terms of amount and quality of knowledge. We find that active users find it more appealing to submit ideas via social media tools (question 4 in Exhibit 2, $p < 0.01$). This implies that the possibility to acquire different ideas internally in organizations is heightened, due to the increased awareness and transparency, and therefore, social media tools facilitate an environment in which knowledge may be acquired more easily.

Further, we find that tool use reflects the frequency of commenting on ideas (question 7 in Exhibit 2, $p < 0.01$). From an organizational perspective, this implies better use of the potential absorptive capacity (Flatten et al., 2011; Zahra & George, 2002). Active use of the social media tools also seems to increase discussions about ideas across organizational levels (question 8 in Exhibit 2, $p < 0.01$). The relationship between decreased organizational borders and the use of the social media tools was also found by Bondar & Peltola (2013). These results imply that active use of social media tools increases the quality of acquired knowledge.

Additionally, our results show that developing ideas further is enhanced by increased use of social media tools. In particular, our results indicate that the active users of social media tools develop more ideas with different colleagues from different organizational functions (question 9 in Exhibit 2, $p < 0.05$) and across different organizational levels internally (question 10 in Exhibit 2, $p < 0.01$). These results highlight the increase in amount of assimilated knowledge inside organizations in terms of intra-organizational collaboration in developing ideas further.

Lastly, we find that active users view idea screening as more rigorous and systematic; the active users rate the selection process and screening ideas among themselves as higher than do conservative users of social media tools (question 14 in Exhibit 2, $p < 0.01$). In sum, the statistically significant differences between the active and the conservative users imply that increased transparency will become an asset for the organization as ideas are more thoroughly and transparently dealt with in the organization.

[Insert Exhibit 3 about here]

Exhibit 3 presents key findings of our study. In all case organizations, the use of social media tools increased significantly, namely, in Case 1 social media tools were used ~5 times more, in

Case 2 ~8 times more and in Case 3 ~20 times more after implementing and adopting social media tools. As outlined in describing Exhibit 1, the implementation routes were differing and we may infer that the actual use of social media might be increased more when a top-down implementation route with clear senior management commitment is used. As the information acquisition is a process driven by individuals (Cohen & Levinthal, 1990; Lane, Koka, & Pathak, 2006) senior management commitment drives the individuals' use of tools after the implementation at all organizational levels and communication across organizational levels is increased due to implementation as suggested in our survey results. Further, this positively may feed the use of social media tools and thus, it is possible that this creates a positive feedback loop increasing individuals' information acquisition. With this enhanced communication process internally, the information that individuals have gained becomes transparently available across the whole organization (Tsai, 2001).

The study did not focus on certain sub-processes of NPD, but on communication and collaboration in general as part of the NPD process. NPD processes among case organizations were similar as they all followed a typical stage-gate process. Yet, the typical NPD projects had variations in length, size, and type. According to our results, the active usage of the social media tools is related to various benefits in NPD. According to our results, organizational members like to share their ideas more actively and they see other internal functions as more beneficial, if they are accustomed to, and also actively use, social media tools. As organizational members share more of their own ideas via these tools, they become more aware of the ideas of others. Congruently, social media tools are mainly used to enhance communication and collaboration within the organization and due to the utilization of the increased online collaboration, potential internal knowledge was enhanced. Moreover, subsequently, this increase in use further facilitates better screening of ideas in the early phases of NPD, when knowledge acquisition

and assimilation are vitally important. These results further indicate that the capacity to absorb knowledge may increase for individuals who use social media tools.

Our results imply that the quality of acquired knowledge also increased. This is based on the indication that an increased amount of acquired information seems to help organize and identify acquired knowledge and this assimilated knowledge is used in screening ideas. Discussing acquired ideas further intra-organizationally enables contributions from various parties, reflecting improvements in the quality of knowledge and ideas (Dahl, Lawrence, & Pierce, 2011). As the amount of intra-organizational discussion and collaboration increases, the amount of intra-organizational assimilation follows. If knowledge acquisition seems to happen widely across organizations due to the use of social media tools, according to the present study, the assimilation of acquired knowledge seems to happen more within organizations, involving various organizational levels. In addition, users of social media tools seem to strengthen the development of ideas further by taking advantage of other intra-organizational assimilated knowledge (supported by Tsai, 2001). The assimilation process was altered by social media tool use, and those who used social media tools seemed to have an increased amount of assimilated knowledge. Evaluation of assimilated knowledge may benefit from information transparency due to use of social media tools.

Managerial implications

In terms of implications for engineering managers, we may conclude that when social media tools are implemented the efforts to increase wide-spread use of these tools should be at the forefront to gain the organizational benefits of their existence. All organizational levels should include users of social media tools, and management practices should support social media tool use, not just in the implementation phase but also in using these tools in day-to-day practices.

It is not sufficient for management to merely make the decision to implement social media tools, but rather, there has to be a top management support and engagement in using these tools so that work practices are updated to maximize the organizational benefits of the implementation. The main focus should not be on the implemented tools as such, but on the altered working practices. This necessarily requires time and patience but as our results show, the improvements may be realized within relatively short time periods, such as six to eight months, as was seen in our cases.

Further, our study shows that there may be wide-spread benefits in using social media tools as part of NPD practices; knowledge might be distributed and further developed across the organization more, ideas may be screened in a more rigorous manner, and multi-functional approaches may become more integrated in daily routines. However, the role of senior managers is crucial in increasing the use of social media tools after these tools have been implemented and gaining the benefits of these tools. Senior managers should have a leadership role, and through visible commitment, they can foster the active use of social media tools among organizational members. Senior managers are important examples of reference users for the rest of an organization and this may lead to changes in practices and way of working.

Conclusions

In the present article, we presented empirical data from a multiple case study of three companies that indicated an increase in potential absorptive capacity, based on the adoption and use of social media tools. We discussed absorptive capacity from a potential ACAP perspective and in terms of acquired and assimilated knowledge, and we deepened our analyses by evaluating the mere adoption of social media tools and the level of use of these tools in selecting ideas as

a part of NPD. We showed the influence of implementing and using social media tools on the amount and quality of intra-organizational communication.

With respect to theoretical implications, our study confirms the positive link between PACAP and communication. From a theoretical perspective, our study strengthens the connection between social media tools and PACAP. We conclude, in general, that social media tools may increase potential absorptive capacity, but only if there is an increased use of these tools. The existence of such tools and their organizational adoption do not seem to have a direct impact on potential absorptive capacity, and it requires active users in all layers of an organization to promote the use of these tools.

The limitations of the present exploratory study are naturally numerous and include the limited sample size and the rather wide-scope of investigation and therefore the findings pave the way for additional studies across industries to allow for better generalizability. Our case study design is a first step in identifying trends and questions that then could lead to more broadly-based experiments that could generalize our results. However, it is one of the first articles in its area in the empirical literature, and its findings can guide future hypothesis building and testing. Consequently, the article outlines multiple fruitful avenues for future research, including the questions of the critical mass of users in an organization in order to increase ACAP and of how exactly to improve the dimensions of NPD, such as timeliness, cost-effectiveness, and producing more or better new ideas.

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Appendix: Exhibits

Exhibit 1. Survey Data Collection for Each Case.

		Online Surveys						
		Q4/11	Q1/12	Q2/12	Q3/12	Q4/12	Q1/13	Q2/13
Case 1	Sharepoint & Social Sites*		Pre:			Post:		
	Bottom-up**		Mar-	Apr		Nov-Dec		
Case 2	Confluence*			Pre:			Post:	
	Mixed**			Apr-May			Feb-Mar	
Case 3	blueKiwi*				Pre:			Post:
	Top-down**				Sept-Oct			Apr-May

* Main social media tool used

** Implementation route

Pre: survey before the implementation

Post: survey after the implementation

Exhibit 2. Survey Items, Results, and Sources for the Items.

Survey Item	pre mean	pre s.d.	post mean	post s.d.	p-value	act mean	act s.d.	con mean	con s.d.	p-value	Reference for Survey Item
Amount of acquired knowledge											
1. I receive too few ideas from various external organizations	4.38	1.46	4.32	1.23		4.36	1.47	4.32	1.39		(Birgit, 2009; Flatten et al., 2011; Kim & Wilemon, 2002; Murovec & Prodan, 2009)
2. I receive too few ideas from various organization levels	4.54	1.37	4.42	1.33		4.37	1.55	4.52	1.28		(Birgit, 2009; Flatten et al., 2011; Kim & Wilemon, 2002; Murovec & Prodan, 2009; Tsai, 2001)
3. I receive too few ideas from other internal functions	4.42	1.39	4.39	1.36		4.55	1.49	4.25	1.35		(Birgit, 2009; Flatten et al., 2011; Kim & Wilemon, 2002; Murovec & Prodan, 2009; Tsai, 2001)
4. Submitting ideas into the social media tool is appealing	4.25	1.57	4.55	1.56		4.73	1.5	3.96	1.48	0.00	(Birgit, 2009; Kim & Wilemon, 2002; Tsai, 2001)
Quality of acquired knowledge											
5. I frequently discuss ideas with external parties	4.01	1.55	4.48	1.36		4.3	1.41	4.00	1.52		(Adams, Bessant, & Phelps, 2006; Flatten et al., 2011; Murovec & Prodan, 2009)
6. I frequently discuss ideas internally between with different functions	4.61	1.42	4.58	1.40		4.58	1.43	4.44	1.40		(Adams et al., 2006; Flatten et al., 2011; Murovec & Prodan, 2009; Tsai, 2001)
7. I frequently comment on ideas in the social media tool	3.10	1.60	3.48	1.74		4.10	1.66	2.58	1.30	0.00	(Hoopes & Postrel, 1999; Kim & Wilemon, 2002; Murovec & Prodan, 2009; Tsai, 2001)
8. I frequently discuss ideas internally with various organization levels	4.71	1.50	5.13	1.38	0.04	5.25	1.29	4.51	1.52	0.00	(Adams et al., 2006; Flatten et al., 2011; Murovec & Prodan, 2009; Tsai, 2001)
Amount of assimilated knowledge											
9. I frequently develop ideas with various internal functions	4.49	1.48	4.66	1.30		4.82	1.31	4.31	1.48	0.01	(de Brentani & Reid, 2012; Flatten et al., 2011; Murovec & Prodan, 2009; Tsai, 2001; Van & Moenart, 1998)
10. I frequently develop ideas with various organization levels	4.42	1.41	4.70	1.33		4.84	1.21	4.27	1.45	0.00	(de Brentani & Reid, 2012; Flatten et al., 2011; Murovec & Prodan, 2009; Tsai, 2001)
Quality of assimilated knowledge	5.02	1.26	5.09	1.21		5.22	1.21	4.93	1.25		
11. In my opinion. most developed ideas are targeted to current customer needs											(Adams et al., 2006; Flatten et al., 2011)
12. In my opinion. most developed ideas are targeted to needs of potential customer	4.53	1.33	4.50	1.27		4.49	1.29	4.48	1.40		(Adams et al., 2006; Cooper, Edgett, & Kleinschmidt, 2004; Flatten et al., 2011)
13. Most of the product ideas I receive are valuable to me	4.61	1.10	4.57	1.20		4.52	1.26	4.62	1.14		(Adams et al., 2006; Tsai, 2001)
14. Ideas are screened against each other before ideas are selected	4.39	1.12	4.58	1.09		4.67	1.02	4.33	1.05	0.00	(Cooper & Kleinschmidt, 2007; Murovec & Prodan, 2009)
15. How often do you use social media tools at the moment*	2.92	1.14	3.58	1.26	0.02	4.31	0.47	2.27	0.86		(Denyer et al., 2011; Migdadi et al., 2012)

Pre-post is comparison between before and after adoption of social media tools in the organization.

Act-con is comparison between active and conservative users.

* Rated on a 7-point scale from "Several times daily" to "Never"

Independent samples Mann-Whitney U-test. asymptotic significances (only sig. p-values shown)

Exhibit 3. Key Findings

Finding 1	*The more social media tools are used as part of organizational NPD practices, the more knowledge is shared.* Q: Submitting ideas into the social media tool is appealing
Finding 2	*The more social media tools are used as part of organizational NPD practices, the more ideas are refined.* Q: I frequently comment on ideas in the social media tool.
Finding 3	*The more social media tools are used as part of organizational NPD practices, the less there are organizational hierarchical barriers to develop ideas.* Q: I frequently discuss ideas internally with various organization levels. Q: I frequently develop ideas with various organization levels.
Finding 4	*The more social media tools are used as part of organizational NPD practices, the more there is development of ideas across organizational functions.* Q: I frequently develop ideas with various internal functions.
Finding 5	*The more social media tools are used as part of organizational NPD practices, the more rigorous idea screening becomes.* Q: Ideas are screened against each other before ideas are selected.