Collaborative e-Marketplaces Containing Clusters of SMEs: Drivers and Barriers in the Local Food Sector

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Abstract

This paper explores the current context of collaboration between small local food producers. The aim is to facilitate the design and maintenance of trustworthy collaborative e-marketplaces containing clusters of SMEs. An ethnographic approach was used and data was collected through observations, interviews and questionnaires. Our findings reveal both drivers to exploit and barriers to harness enabling trustworthy collaboration. Our current test bed is based on a research and design context that lacks mechanisms for governance. To take full advantage of the drivers and to tackle the barriers in a fruitful way, there is a need for a flexible infrastructure that allow for structured requirements, contractual agreements and validation of proposed collaboration services. To address this, we take advantage of recent developments in cloud computing, more specifically the integration of Platform as a Service (PaaS) in the support system.

1. Introduction

The importance of small and medium sized enterprises (SMEs) in national economies is widely recognised. SMEs often provide niche products, and the companies are usually built on a flat organisational structure with limited staff development. This allows for flexible and innovative organisation that quickly can respond to environmental changes [1, 2, 3]. However, due to the increasingly disruptive technology employed by e-businesses, governments and research studies stress the need for an e-business strategy if SMEs want to stay competitive or create a competitive advantage [4, 5, 6]. A particularly important application in the area of e-business is the e-marketplace.

E-marketplaces have made a significant impact on the business world by facilitating business activities such as reducing transaction costs and improving market efficiency. At the same time, e-marketplaces extend the competitive context, leaving non-participants vulnerable to competition [7]. Despite the obvious benefits of the digital business era and the dangers of neglecting it, it is difficult to find SMEs that are engaged in e-business activities in general and in e-marketplaces in particular [4, 5, 8, 9]. A considerable amount of research has focused on the adoption, development and impact of e-marketplaces [8, 10, 11]. Notably, it has been argued that an e-marketplace must offer advantages over traditional markets to thrive, and it has been suggested that integrating collaboration service offerings could be one way to achieve this effect [7, 8]. Collaboration service offerings may even be more important for e-marketplaces specifically designed for SMEs.

Inter-organisational relationships and collaboration among SMEs are essential for maintaining a sustainable competitive advantage through innovativeness [3, 12, 13, 14]. The continuous development of new products and processes is the key to survival, growth and profitability [3, 15]. Collaboration between SMEs has traditionally been devoted to the exchange and co-development of products; sharing services, resources and knowledge as well as co-marketing and joint development [8, 12, 16]. In this respect, collaborative e-marketplaces, that is, Internet-based electronic platforms that facilitate activities related to transactions and interactions between market participants, have emerged. These new resources constitute a promising opportunity for SMEs to collaborate and create new competitive advantage in the current digital business context [1, 2, 5, 17].
Research on collaborative e-marketplaces used by SMEs has mostly been focused on participation and adoption. Research has also focused on the role of the collaborative e-marketplace and its implications [9, 17, 18]. However, while the issue of collaboration in e-marketplaces is often addressed, the design and implementation of collaboration service offerings are not yet well understood [8]. Furthermore, research shows that SMEs in general, and small firms in particular, are often reluctant to join technology-based collaboration despite this being a critical factor that often improves innovativeness [3]. Our findings suggest a need for a combined top-down and bottom-up perspective on requirements engineering as well as the assessment and validation of pilots. This approach would support an evolutionary development of sustainable and cost-effective collaborative e-marketplaces based on the needs and requirements of a focused sector.

The local food sector has attracted increased public interest and enthusiasm. This sector is characterized by concepts such as ‘quality’ and ‘short food supply chains’. As a contrast to the conventional industrialized food sector, it mostly includes small businesses with limited marketing budgets [19, 20]. It has been argued that the success of small businesses positively affects regions socially as well as economically and adds value to the quality of life in communities [21]. The local food sector would most probably benefit from the visibility, enhanced business opportunities, interactivity and common marketing strategy provided by a collaborative e-marketplace. In addition to this, a collaborative e-marketplace may add value to a specific community by facilitating information about and the commerce of local food products. Combining these obvious benefits with public enthusiasm, a collaborative e-marketplace for local food producers may be assumed to be successful by definition. However, a previous study performed by us indicates that it is difficult to initiate collaborative activities with other business partners in real life. This situation constitutes a challenge for engaging local food producers also in a collaborative e-marketplace [22].

1.1. The case study

Our case study is part of an ongoing three-year research project (2008-2011) supported by the Swedish Agency for Innovation Systems (VINNOVA1). The overall aim of the project is to analyse, design, implement and evaluate models of e-marketplaces catering for locally produced food products. The project includes 26 partners in the southern part of Sweden: 23 local food companies, one wholesaler, one provisions consultant and one municipality that also acts as the customer part. All partners participate in the development process of the e-marketplace and are also available for interviews, group discussions and observations of their daily work.

Due to a growing public interest, municipalities, stores and restaurants have expressed the need to introduce a wider selection of locally produced food in their stock. However, the customers claim that they do not have an adequate overview of the local producers and the full range of food products that are offered. At the same time, individual producers lack capacity to deliver the amount of food that is required on their own. Collaboration between producers seems therefore to be necessary, partly so that they can present themselves as a united group and partly so that they can deliver a sufficient amount of products. The following phases of the case study have been conducted:

**Phase 1.** Identification of the main components and their dependencies as defined in our case study (see Figure 1);
**Phase 2.** Selection of producers and customers as the first stakeholders to be supported;
**Phase 3.** Design and implementation of a web-portal as the first pilot interface (Pilot I);
**Phase 4.** Collecting empirical data using Pilot I;
**Phase 5.** Analysing the data to identify barriers and drivers related to Pilot I (as reported in section 4 of this paper);
**Phase 6.** Assessment of Pilot I and Design of Pilot II (see section 5 of this paper).

![Figure 1. Main components of an e-marketplace.](image)

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1 VINNOVA home page: http://www.vinnova.se/en/
The research questions and findings that have been partly elaborated so far include:

- What are the crucial explicit and implicit issues supporting collaboration through e-marketplaces?
- How should an e-marketplace be designed and maintained to foster a trustworthy collaboration in a potentially competitive market?

Pilot I exploits the mechanisms of an open platform, and uses a bottom up approach to join relevant networks. However, our assessments indicate that most of the collaborative activities did not include the whole group. Instead the collaboration was conducted within smaller clusters with like-minded producers. This situation will most probably affect the use of, and engagement in, a collaborative e-marketplace in a way that was not anticipated in the beginning. The objective with an e-marketplace in this context should be to facilitate and support trustworthy collaboration within the existing networks and also to expand the co-operation beyond these clusters. This implies a need to exploit drivers and harness barriers in the current context towards trustworthy collaboration.

In this paper we identify the key drivers and barriers of Pilot I. The aim is to facilitate the design and maintenance of trustworthy collaboration e-marketplaces containing clusters of SMEs.

Our findings of drivers to be exploited and barriers to be handled are mainly related to the fact that the present e-marketplace has open access to networks that lack mechanisms for protection and security. Furthermore, issues of investments and ownership are unclear and considered risky for the stakeholders involved. To allow for more deep investigations and understandings of collaboration in e-marketplaces, we need a stable infrastructure that clearly define ownership and access rights. Finally, we outline additional research and development investigations concerning collaboration mechanisms hosted on cloud computing infrastructures (for Pilot II).

1.2. Overview of the paper

The remaining part of the paper begins with a description of our theoretical framework (Section 2) and continues with a description of the research setting and methods (Section 3). Then, we assess the current context of collaboration, including drivers and barriers (Section 4). This is followed by an analysis and discussion of issues that are important to consider also in the design of Pilot II of our study (Section 5). The paper concludes with a summary of our findings (Section 6).

2. Theoretical perspective

Supporting collaboration and cooperation with computer-based technologies has been a focus within the interdisciplinary research area of Computer Supported Cooperative Work (CSCW). The main endeavour with CSCW research is to understand the requirements of cooperative work better support it with computer-based technologies [23].

Within CSCW, cooperative work is not defined by formal organizational boundaries or structures, but by actual cooperative behaviour. This implies that cooperative work “emerges in response to the requirements and constraints of the transformation process and the social environment on one hand and the limitations of the technical and human resources available on the other” [24, p. 352].

CSCW research has highlighted several important aspects of the nature and requirements of cooperative work. In general, it has been shown that supporting collaboration is a complex issue that requires more than the improvement of information access and communication [25, 26]. Therefore, CSCW research highlights the importance of understanding the social nature and actual requirements of collaborative settings. In the current study, this is even more so the case since the development of a collaborative e-marketplace implies a need also for a bottom-up perspective based on the needs and requirements of the local food sector, as previously discussed. Furthermore, research in CSCW has shown that human actions are both situated and flexible according to the social and physical conditions that are in place [27]. As a response to this finding, collaborative settings are most often explored through ethnographic studies. [28].

3. Research setting and method

The findings presented in this paper are based on the collection of empirical data found during Pilot I (phase 4) of the case study.

The local food businesses included in this study are relatively small and they produce a small amount of products. The products vary from vegetables and milk to spices and herbs and in some cases the business includes a farm shop. The majority of the participants are family businesses and most of them do not have any employees except the owners.
The methodology for the collection of empirical data followed an iterative process that is often used in ethnographic studies. This implies that analysis is conducted through every stage of the research procedure and thus sharpens the focus of the data collection. The aim when analysing data was to identify and categorise common activities and/or issues which can explain how collaboration is accomplished in the examined context of local food producers. Therefore, the collected data was indexed according to which activity or issue it illustrated.

The methods used to collect data were observations, interviews, group discussions and questionnaires. In total, four days of observations of the producers’ daily work and collaborative activities were conducted. During these studies, field notes were taken and transcribed the day after the observations were conducted. As a follow up, some 15 interviews were conducted at the participating producers’ manufacturing environment. The aim of the interviews was to enable a more detailed understanding and validation of the situation of the producers’ work environment, the collaborative context and also to fully understand the objectives and aim with the observed activities and actions. The group discussions were conducted during project meetings and they focused on opportunities with collaboration between the participating producers through an electronic marketplace.

Finally, questionnaires were distributed and collected. These questionnaires investigated the producers’ view on the issues, objectives and aims of the current networks and the collaborative activities and also sounded the development of the collaborative e-marketplace. In short, the purpose of the ethnographical approach was to identify the needs and opportunities that may empower workflows in Pilot I.

4. Current context: Drivers and barriers of collaboration

Within the local food sector it is regarded necessary and important to collaborate, in particular in relation to business and marketing activities. Furthermore, since many producers manufacture and sell products on a small scale, there is an urgent need for co-transportation of products. However, while many producers consider collaboration as important for their business, they also state that they are not engaged in many collaborative activities. In addition to this, while many producers state that they do not collaborate, the observations show that some collaborative activities are in progress even so. In short, in spite of an articulated need of and belief in collaboration activities, certain barriers seem to be present.

In the following, we present the current context with a focus on drivers and barriers of collaboration and the producers’ future vision regarding interaction through collaborative e-marketplaces.

4.1. Networks and associations: a clash of identities

In the studied region, initiatives have been made by different organizations to bring together small local food producers in networks. These open networks are constructed and defined either by the products, such as the network of jam producers, or by the area/region to which the food producers belong. According to the questionnaires, the most important reasons for joining these open networks were:

- To broaden contacts;
- meet like-minded people;
- exchange experiences;
- joint marketing efforts;
- other benefits of joint efforts.

However, there is a slight difference between small and medium businesses. The smallest businesses join the networks to learn and make social contacts for the company and to make personal contacts for the owners of the business. In contrast, one of the larger producers stated that the reasons to join networks are “to sell, to inspire, to influence”, implying that the main objective is to affect the networks and find business opportunities. This diversity of interests have, in some cases, resulted in clustered active networks in which the participants are invited to different activities in order to exchange knowledge, information and experiences. In other cases, the networks have become more passive and are considered by the producers as merely paper products. In fact, the diversity of interests within these networks may be the reason that not all networks lead to deepened collaboration between producers. For example, while a small producer expressed during the interview that “we are what we are, and that is what we want to be”, a larger producer stated “In order to reach our business goal, we can’t collaborate with producers that has a slower pace”. While the diversity between producers is illustrated in these comments, it seems that most producers join these open networks in order to make others aware of their existence and find like-minded producers to make contacts with.
Making contacts with like-minded producers have, in several cases, resulted in new and more focused networks and a closer collaboration initiated by the producers themselves. For example, during our study we observed that a network of jam producers was initiated. The network recently established a homemade joint trademark called “authentic jam”. This trademark has established rules and specifications of how “real” or “authentic” jam should be produced. In particular, they have decided against the use of industrial pectin in the products, to use copper pots and make the jam on a small scale for a more natural and “authentic” jam production. Furthermore, the trademark sells jam products compiled by jam producers participating in the network. The producers are required to pass an examination to verify their knowledge about “authentic” jam production. After examination and selection, these producers make a jam that is sold exclusively through the trademark. In return, the jam producer is shown with picture and a notice about their regular business at the “authentic jam” product label.

The overall objective with the jam network is to increase the interest for jam production and to disseminate information about the importance of craftsman-like production and its impact on the product’s quality. This is a common marketing strategy that is equally important for the individual businesses that want to present their products as high quality products. However, by creating a focused network with like-minded producers, producers that have another definition of high-quality jam are excluded. A producer that currently is not included in the “authentic jam” trademark expressed that “the most important ingredient is to use first class berries”. Clearly, all strive for producing high-quality products, but have different views and definitions.

The above situation is only one example of contradicting views in the local food sector. In fact, several different definitions seem to be used. First, what qualifies as locally produced food varies, particularly for products that contain primary ingredients collected from foreign countries. Second, “quality” is defined differently and what may be considered as ‘real’ and “authentic” also depends on the producers’ subjective view. Third, what is an additive or what is not is defined differently and, what is more, there is a plethora of laws, rules and conventions about what is allowed to be added to a high-quality, locally produced authentic product. Fourth, Small-scale production is considered to be a craftsman-driven production, but there are divergent views on how small the production scale must be to be considered as small. For example, one producer stated that “it is handicraft, and therefore it is not possible to force it [the production] too far”. Finally, it is also important that the personal chemistry between the producers is working.

To conclude, the diverse definitions and contradicting interests between the food producers unveil a “clash of identities” within the local food sector in our case study.

4.2. Collaborative activities: enhancing business opportunities while avoiding clashes

The identified collaborative activities between producers are of two kinds: Collaboration concerning the producers’ core businesses and collaboration concerning add-on businesses, i.e. activities that are conducted with the purpose to enhance the core business. There seems to be more collaboration regarding the add-on business activities than regarding the core businesses.

The core business of local food producers is the production of food products. This includes purchasing, cultivating or breeding depending on the business’ primary product. This also includes the actual manufacturing process and the process by which the products reach the customer. Currently, collaborative activities are most often focused on the exchange of primary products between the producers, the purchase of packaging material when two or more producers jointly order packages for their products, and the joint transportation of products from two or more of the businesses to the customer. During the study, it was shown that collaborative activities are few regarding the core business although some producers have discussed future possibilities. Many producers stated that collaboration concerning the core business is possible only with selective producers, that is, those producers that have the same business goals, objectives and interests. Furthermore, it is important that the producers have a common view on the core concepts “authentic”, “real”, “genuine”, “locally produced” and “small scale”; i.e. concepts that also constitute and describe each company’s core business. In spite of these difficulties, it seems that the producers collaborate on their add-on businesses to a greater extent.

Add-on businesses are very common in the local food sector and they seem to be of great importance to the local food producers. For example, many producers have small farm shops in which they sell their own products but also other producers’ products. One producer said that “People really want to come to a farm shop and get the product from the direct source. In the meantime they buy other
products. The more products, the more attractive it is to go to the farm shop”. Many producers also arrange courses on their particular handicraft and organise events as an add-on business, such as theme days on a particular subject, food tasting, guided tours and markets. In some cases, collaborative activities were conducted on both the core business and the add-on business. For example, one producer stated that “Our sea buckthorn is used by a local bakery that bakes a bread of this, which we then sell at our farm shop”. In fact, many producers consider collaborative activities as essentially important in order to enhance business opportunities. Three main reasons have been identified:

- The opportunity to expand the network;
- the possibility to co-develop products and ideas;
- increased competitiveness that allow businesses to attract customers by offering a greater selection of products and/or services.

In summary: shared values and core definitions are the main pillars of the collaboration of working core businesses. However, through add-on business collaboration, the producers enhance the business opportunities while avoiding the clashes.

4.3. Collaborative e-marketplaces enabled by trusted interaction

Our case study shows ongoing discussions among stakeholders regarding the Internet as a new arena for marketing and business activities. At present, all producers have websites, some more advanced than others. At the same time, potential customers in the region, such as municipalities, the county council, restaurants and shops, have expressed a need for a digitally available collective and comprehensive overview of the producers in the region. A portal-like website has been discussed as one possibility to accommodate this need. In fact, during the interviews it was revealed that the producers also need a collective overview of the producers within the region. Several producers have also expressed the need for a digital platform for interaction and collaboration as well as a joint marketplace as an additional selling channel. To facilitate these needs, the development of a collaborative e-marketplace has therefore been discussed within the project as a possible solution. However, the producers and other market participants have different opinions, depending on their respective contexts, on what is useful to incorporate in the e-marketplace. Their opinion might depend on if they have certain certificates and/or belong to specific networks.

During the interviews, several issues regarding the increased interest in the local food sector was raised. In particular, the design of the marketplaces was discussed. An essential problem that has been put forward is the increasing amount of impostors that profit on the general interest for locally produced food products. In fact, many of the producers have witnessed people that do not even have businesses, but still sell products which they falsely market as more genuine and authentic than they really are. These ‘unreliable’ people have unfortunately made the producers suspicious of new and unfamiliar businesses. One producer stated that “It is dangerous to present oneself as something you are not. It is hard enough to be a small producer.” This situation has led to prejudices among producers based on rumours. Therefore, in order to enable trusted interaction, a common opinion is that the e-marketplace must have restrictions on which businesses that are allowed to join and that it must be possible to ensure that those restrictions are enforced.

5. Discussion: Collaborative e-marketplaces containing clusters of SMEs

From the assessments of phase 5 of the case study, we have identified the apparent paradox of drivers and barriers in networks designed for collaboration. On the one hand it is considered important to collaborate, but on the other hand most producers find it difficult to initiate collaborative activities. From findings in our study it is quite obvious that the main reason for the deficiency of collaborative activities is diverse and contradicting views on some key elements such as business goals, the definitions on the core concepts describing the products and the production, personal chemistry and divergent interests. The current situation has created clusters of SMEs, and between the clusters there is a clash of identities with divergent views and opinions.

Networks designed for collaboration, such as a collaborative e-marketplace, has to support the drivers in the current context. However, to harness identified barriers and to expand the co-operation beyond these clusters, there is a need to define suitable rules of engagement. We argue that our findings of drivers and barriers are not unique but quite common when setting up similar environments.

In the following, we discuss important aspects in the current context of collaboration for the design of Pilot II, which also need to be considered in the
design and maintenance of collaborative e-marketplaces that contain clusters of SMEs.

5.1. Clusters of individuals and organizations

One of the drivers for joining networks and associations is to learn from other producers and exchange experiences. The producers join the networks to find like-minded producers for closer collaboration on agreed activities. At the same time, while many producers consider collaboration as important for their business, they also state that they do not engage in many collaborative activities.

The current context reveals a collaborative behaviour that cannot entirely be explained and understood based on organizational requirements and business motivations. It seems that the producers currently collaborate with those considered as friends on a personal level rather than focusing on a professional relation concerning business activities. We argue that the separation of concerns between social networks and business networks is important in the development towards sustainable collaboration beyond clusters.

We suggest that a collaboration e-marketplace should support the drivers of current network activities as basic services, such as the exchange of information, experiences and knowledge.

In the studied context, it may be possible to soften some of the clashes by making the professional part visible and show actual facts about the products and producers. This may lead to new and more professional and productive relations for collaboration, connected to business activities instead of to individuals.

5.2. Common ground beyond clusters

In spite of articulated difficulties in initiating collaboration, our study showed that some collaborative activities actually occurred. In particular, collaboration regarding add-on businesses was common. However, only a few collaborative activities regarding the core business processes were identified. This implies that collaboration is possible despite the clashes and the tendency to cluster. Clearly, the producers have created a common ground based on more or less silent agreements of relevant add-on business activities. Common ground refers to “a process of communicating, testing, updating, tailoring, and repairing mutual understandings” [29, p.146]. The creation of a common ground is also crucial when it comes to contract-based collaboration, which is one of the main components of an e-marketplace [30].

We suggest that a collaborative e-marketplace must facilitate the requirements of support services, which may be drawn from current collaborative activities that are already established on a common ground. In this respect, the design process of collaborative e-marketplaces for clusters of SMEs needs to identify and facilitate agreements upon:

- The common ground of the participating SMEs beyond the clusters;
- useful support services.

Important to note is that the common ground also changes with the performance of collaborative activities [29]. Therefore, it is essential that a collaborative e-marketplace is dynamic and flexible for the development of new support services due to the evolving requirements for collaborative activities.

5.3. Trustworthiness and governance

In the present study, the producers are sceptical and dubious of a collaborative e-marketplace despite its beneficial factors for competitiveness. The main reason seems to be the risk of presenting themselves as allied with, for example, the impostors that have increased in the real-life marketplaces.

Trustworthiness is thus a key requirement of sustainable e-marketplaces. Trustworthiness is based on human assessments but could be enabled by engineering principles taking into account the concerns (barriers) held by the users [31, 32]. Restricting the e-marketplace by only allowing proper producers may increase the trustworthiness of the e-marketplace as a whole. For example, to become a qualified member of the e-marketplace might entail a screening process of participants as well as the signing of contractual agreements [33].

We argue that the maintenance of a collaborative e-marketplace needs to identify and facilitate agreement upon:

- trustworthy behaviour;
- rules of monitoring and enforcement.

However, our current test bed (Pilot I) is based on a research and design context without mechanisms for governance. Therefore, we claim that the following two important barriers also have to be addressed:

- Identification of owners;
- costs of ownership and participation.
To not resolve these barriers will make it difficult (even impossible) to trustworthily address the other requirements. For example, it has been argued that engaging in e-marketplaces may involve significant costs for participants due to the investment in hardware, software and employee training [10]. Reasonably, this also has implications for the owners of the collaborative e-marketplace, who in turn must charge the participants. In that case, it is of the utmost importance that the collaborative e-marketplace provides useful and valuable support services, which make participation worth the cost.

Our suggestion is that an external authority controls and guarantees that the included producers are serious businesses with valid certifications. An external authority might increase the trustworthiness by providing high information quality and information security [34]. Several external authorities may be engaged to harness different barriers towards trustworthy collaboration. For example, trusted trade associations may be useful as sponsors or facilitators of trustworthiness [4]. External control may also dissolve some of the rumours that circulate in the current context.

### 5.4. Future work

To sum up, the current context shows important aspects that must be agreed upon by the stakeholders that initiate a collaborative e-marketplace. To take full advantage of the drivers and to tackle the barriers in a fruitful way, there is a need for a flexible infrastructure that enable structured requirements, contractual agreements and validations of proposed collaboration services.

During Phase 6, which is the design and implementation of Pilot II, we will take advantage of recent developments in cloud computing [35] and set up an infrastructure for collaboration between SMEs using Platform as a Service (Paas), similar to Amazon’s Amazon Elastic Compute Cloud\(^2\) (Amazon EC2). The main components of the outsourced part of Figure 1 are given in Figure 2.

![Figure 2. The main components of outsourced EC2 components.](http://aws.amazon.com/ec2/)

The EC2 support is accessed via the ElasticIP. The primary EC2 components are: The Load Balancer, the Monitoring and Amazon S3\(^3\), the latter an online storage web service designed to make web-scale computing easier for developers. By applying this experimental environment we will enable the design, validation, implementation and user assessments of developed services in a cost efficient and sustainable framework. Through this, our aim is to gain validated experiences that allow us to identify the mechanisms that support development and govern collaboration services.

### 6. Conclusions

In this paper we have explored a current context of collaboration between small local food producers. The aim of the study was to identify the drivers and barriers to support design and maintenance of collaborative e-marketplaces for clusters of SMEs. From our findings and analysis we conclude that collaborative e-marketplaces that support drivers for collaboration and harnessing barriers should build on agreements on:

- the common ground of the participating SMEs beyond the clusters;
- useful basic services and support services;
- trustworthy behaviour;
- rules of monitoring and enforcement.

In addition to this, we claim that two important barriers remain to be harnessed. Those are the identification of owners and the costs of ownership and participation. Not resolving these barriers will make it difficult (even impossible) to address the other requirements in a useful way. We have also

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\(^2\) Amazon home page: http://aws.amazon.com/ec2/

\(^3\) http://aws.amazon.com/s3/
outlined Pilot II intended to structure further investigations.

7. Acknowledgements

This study is sponsored by the Swedish Agency for Innovation Systems. The authors would like to thank the 26 partners in this project for their time and effort. We also wish to extend our warmest gratitude to Bo Helgeson for reading, discussing and giving comments on this paper.

8. References
