	<p>OPAALS PROJECT</p> <p>Contract n° IST-034824</p>
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WP11: Bridging Digital Ecosystems Research to Regional Development and Innovation in the Knowledge Economy

D11.14 – DE adoption typologies and lessons learned

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Short Description:

This deliverable is the main output of task 11.9 - DEs local deployment: Experience exchange, comparative analysis, and policy modelling. The deliverable gathers information on eleven experiences of DE adoption/deployment analyses and compares them highlighting points of contact and differences. The target of this deliverable is twofold: the research community on one hand and practitioners and policy-makers on the other hand. In fact, this deliverable attempts to "translate" the experiences had so far in DE adoption into a language accessible to policy-makers' and put forth a series of recommendations for regions interested in the DE approach.

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Partners contributed: The deliverable takes advantage of interviews with project partners (CAM, ITTK and NUIM) and other researchers outside OPAALS consortium.

Made available to: public

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Dependences:

Achievements*	This deliverable addresses the need (of research community, policymakers and practitioners working at local level) to have an easy to follow document that can summarise different experiences of DE adoption and compare them. In order to do this, the deliverable developed two questionnaires and a set of related variables that are re-usable by other projects and that make comparable experiences so far dispersed in many documents, often not published. In other words, this deliverable tries to make explicit knowledge that so far has been extensively tacit. In this way, it contributes to the sustainability of the DE research community.
Work Packages	<p><i>What exactly were the contributions to other WP and what effect they have had on the work in these other WPs.</i></p> <p>This deliverable mainly summarises the work done in separate tasks of WP 11. We think it is important to mention that this deliverable can have an important impact of other EU projects in which it has been and is going to be further disseminate. The EU projects we are referring to are: DEN4DEK and DE-LAN. The presence of T6 Ecosystem in both projects will assure an effective knowledge transfer of this deliverable to the two main regional communities actually working on DE adoption at local level.</p> <p><i>What exactly are the future contributions to other work packages</i></p> <p>This deliverable is useful for dissemination and sustainability related workpackages by providing them with an extensive overview of different DE adoption experiences. By providing important information to regional practitioners interested in DE adoption, it can be useful in term of sustainability strategies: if more regions adopt the DE approach, this would possible mean more possibilities for the research community to carry on the work done in OPAALS.</p>
Partners	Create-NET and T6 Ecosystems
Domains	Social science
Targets	Research community, policy makers and practitioners working in regions and territories interested in DE adoption
Publications*	<p><i>Where the reported work was published.</i></p> <p>Part of this deliverable has been published in "Digital-Ecosystems". The book presents a selection of the articles presented at the third International Conference of OPAALS project held in Aracujú, Sergipe, Brazil, in March 22-23, 2010. The book, published by Springer, 2010, is part of the <i>Series: Lecture Notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering, Vol. 67</i>,. The title of the article published is "Digital Ecosystem adoption: a preliminary comparative analysis".</p>
PhD Students*	None
Outstanding features*	<p><i>Specify the outstanding features of the work being done (incremental change in the state of art, improving significantly the state of art, or going beyond) and if anyone outside the OPAALS Consortium has taken notice of this work</i></p> <p><i>This deliverable take advantage of the work done in DBE and OPAAL (year two) about De adoption model and apply it to different case of</i></p>

	<i>DE adoption at local level. It is the first document that take in consideration experience done outside the DBE-OPAALS projects and the first to develop a model for comparison. The work has been shortly presented to the DE-LAN consortium, will be soon become part of the knowledge repository for the Den4DEk project and will be at the centre of the next training event of the DE-LAN project.</i>
Disciplinary domains of authors*	Social Science

The information marked with an asterisk () is provided in order to address Recommendation n. 4 from the Year 2 review report*



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1. Introduction

1.1 The background to this deliverable

At the end of the second phase of OPAALS it became evident that it was necessary to provide a research-based document to summarize the experiences of DE adoption carried out so far through different EU and local projects in different territories. This was a necessity of OPAALS research community as well as a clear need for those regions interested in implementing the DE approach. Moreover the necessity to map the state of the art of so many different experiences and understand point of strength and weaknesses was also clear. This deliverable, in answering to the above-mentioned needs, drew on previous research activities. In mapping the background to this deliverable we can separate its theoretical background from its case study dimension.

The theoretical background of this deliverable is based on the work done on DE adoption model in DBE project first and then in OPAALS. A preliminary point of reference was the model of DE adoption described in the DBE book (Passani, 2007) that was built on the experiences of Aragon, West Midlands and Tampere during the DBE project. Starting from that model, in OPAALS' phase two a new, integrative model of DE adoption was created (Botto and Szabo, 2008); this second model over-reached the limits of the first one by opening to a more participative approach to local innovation through DE adoption. This second model was then synthesised and merged with the DBE model in a final deliverable of OPAALS's phase two (Dini et al, 2009). This deliverable builds on the model presented in D12.10 (part three) and applies it to concrete cases of DE adoption.

With reference to the case studies, this deliverable could count on many sources of information on single cases, however - in analysing the available materials - it quickly became evident that the difference in structure, approach, targets and theoretical approaches would make comparative analysis very difficult and uncertain. For this reason the authors chose to develop an a- hoc questionnaire and a dedicated comparative model in order to proceed in the research. By using this approach the authors are very conscious that using a common grid of comparison, the reader can loose the richness of each single case and that each case would deserve a lengthier analysis. In order to overcome this issue we provide as much references as possible thus allowing the reader to autonomously learn more about each case. Aside from this, we think that this approach was the more effective for reaching the objectives that are presented in the following paragraph.

1.2 Objectives of the deliverable

This deliverable is the main output of task 11.9 - DEs local deployment: Experience exchange, comparative analysis and policy modelling. The aim of the deliverable is to analyse different experiences of DE adoption/deployment, compare them and generate a typology of possible adoption strategies. The targets of this deliverable are twofold: the research community on one hand and practitioners and policy-makers on the other side. In fact, this deliverable attempts to “translate” the experiences had so far in DE adoption into a language accessible to policy-makers’ and put forth a series of recommendations for regions interested in the DE approach. The deliverable is a continuation of the work done in Phase II in Task 11.5 and took in consideration the research outputs of WP12 and WP6.

More specifically, the deliverables objective can be reassumed as follows:

- to recapitulate the theoretical work done so far on DE adoption model;
- to build a model and a data gathering instrument/process for mapping and comparing DE adoption experiences;
- to collect in a single document information and knowledge that was so far dispersed in many different document (almost not yet published) and to translate tacit knowledge in explicit knowledge;
- to describe in a easy-to-follow language eleven experiences of DE adoption;
- to present point of strength and open issues of the current stage of DE research and adoption;
- to draft recommendations for local practitioners, policy makers and future regional catalysts as emerged by the research carried on so far.

1.3 Structure of the deliverable

The structure of this deliverable recalls and mimics the research process that produced it and its articulated in 4 chapters and three annex. In the second chapter - that follow this first, introductory chapter - the work that led to the actual DE adoption model is described; then we introduce the rationale for a comparative analysis. The last paragraph of the second chapter is dedicated to the description of the methodology we developed and used in order to gather and analyse information about different experiences of DE adoption.

Chapter three opens with the analysis of the data gathered thanks to the first questionnaire; in the first part of the chapter, in fact, aggregated data are reported and analysed. The second part of the chapter described the eleven experiences of DE adoption in a more qualitative way; each case has a separate session that is mainly based on the second questionnaire and qualitative interviews. The third part of the chapter, then, compare the eleven cases by using 5 variables emerged as more sensitive during the interviews. The five variables are: the territorial dimension of DE adoption, the stage of DE adoption, the introduction of DE approach in local/national policies, the funding scheme, the technological/infrastructure element of DE adoption.

The fourth chapter recaps the analysis, traces the conclusions of the work

done and put the attention on some open questions and issues that will need to be taken in consideration in future research and in the field activities related to DE adoption.

The first two annex (annex A and B) are the two questionnaire used during the research that lead to this deliverable, the third annex presents few and synthetic recommendations for those territories and their actors that wish to start the process of DE adoption.

2. Theoretical background and methodology

2.1. DE territorial adoption

We consider the DE adoption (Nachira et al, 2007), or deployment at local level, as a socio-technical process (Bijker, Hoghes and Pinch, 1987; Bijker and Law, 1992). This translates to a process for technological environment development and knowledge creation and sharing in different local contexts, and maximises potential in terms of economic development, social capital improvement, ICT diffusion and the democratisation of knowledge diffusion. In socio-technical systems, society and technology construct and reconstruct each other in a complex process.

Moreover, to understand DEs, we used the metaphor of the socio-technical infrastructures (Star and Griesemer, 1989; Star and Ruhleder, 1996): DEs are artefacts emerging from practice, directly connected to human activities and material structures that should be jointly analysed with the technological and social frameworks (see: Botto and Passani, 2007). Consequently, DE adoption is a long-term investment that implies also a process of network-building, participation and the activation of multiple collaborations as well as the involvement of diversified stakeholders (universities, intermediate actors, SMEs, police makers and knowledge hubs) (see: Passani, 2007).

The understandings of DE territorial adoption have been evolving since the first definition given during the DBE project. We will therefore present the models stemming from the DBE project and then their evolution during the OPAALS project. Then, we will argue for the need for a comparative adoption analysis. In the next chapter, then, we will present 11 cases of DE adoption or promotion and the results of the comparative analysis.

2.1.1. The DBE Model

At the end of DBE project (Passani, 2007) the process of local adoption of DEs was defined as influenced by different variables, and as a process that needs to be adapted to local needs, user behaviours, and specific historical/economic junctures (see Figure 1). Although the DE adoption process, as DE technology, needs to be planned with the aim of being adaptable to specific local needs, we synthesised the process into the following steps:

1. DE concept dissemination and awareness building.
2. Socio-economic regional analysis: Regional/territorial Maturity Grade

- and/or DEII.
3. Regional Catalyst definition and engagement.
 4. Industry/sector/community definition.
 5. User definition (Cluster and SMEs identification and selection, or research community identification, etc).
 6. Development of a shared road-map for the development of the first habitat.
 7. Training.
 8. Service development and ecosystem population.
 9. Pilot action evaluation (with DEII) and planning of systemic deployment of DEs.
 10. Steps from 3 to 8 can be replicated for different habitats adapting the activities to the specific needs of each industry/sector/community.

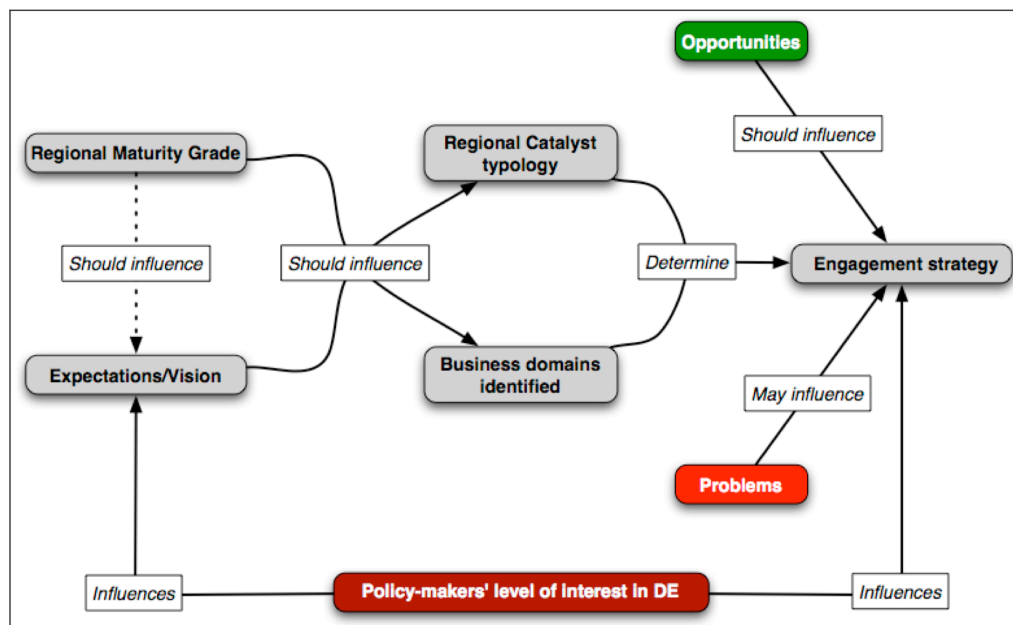


Figure 1: DBE model of local implementation process for DEs (2009).

This first model, that has the positive characteristic of being easily understood by local stakeholders, is based on a useful, but problematic simplification: it is mainly based on a linear process.

2.1.2. The OPAALS Model

An addition, the DBE model was proposed (Botto and Szabo, 2008 and 2009). In this complementary model, the concrete actions to be taken at local level are analysed in depth and a participatory methodology is suggested. Thus, in this second approach the top-down nature of the first model is mitigated, and

the local community (future users) gain a bigger role in the DE definition process. The top-down element of DE adoption, however, cannot be eliminated; due to the fact that DE deployment at local level is undoubtedly a political action that needs to involve policy-makers and needs to be connected to the institutional process of innovation policy development (this is particularly true at the present stage of digital ecosystem technology development). Botto and Szabo (2008 and 2009) brought the following points to the attention of research community for consideration:

- I. Start from concrete local needs
- II. Work with people at various levels: In addition to the policy makers, innovation should involve both the management and the lower levels of business organisations and communities
- III. Work on what makes sense for participants, not just on the digital ecosystem idea: instead of 'implementing' a digital ecosystem (or a digital community ecosystem) as the core objective, focus on developing meaningful innovations for the community and use the digital ecosystem idea as a tool
- IV. Avoid using the term "digital ecosystem" or "ecosystem": the result of this innovation should be something meaningful for local communities also in its label. It is improbable – but not impossible – that they will adopt their own vocabulary.

In this model (Figure 2), therefore, the top-down approach meets the bottom-up processes that always exist at local level, and the Regional Catalyst becomes the principal actor responsible for the area in the middle, in which the institutional level needs to meet the necessities and aspirations of the community level.

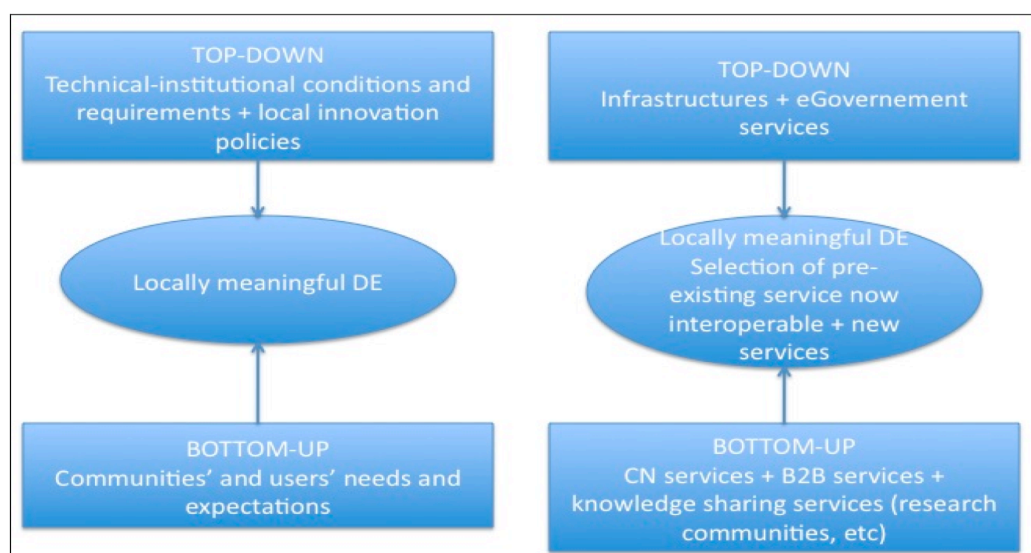


Figure 2: A second model of DE adoption, Passani (2009) abstraction and further development from Botto and Szabo (2008).

The role of Regional Catalyst¹, in this model, is that of translating the digital ecosystem research into the 'local language' and of facilitating the process of bottom-up introduction of DE. It is consistent with the hermeneutic approach of the OPAALS projects and can be seen as an application of the participatory design and action research ideas to a complex local innovation process (Greenbaum and Kyng, 1991; Reason and Bradbury, 2006).

The combination of the two DE adoption models is in line with Foucault's discursive approach by taking in consideration the definition that local actors give to a DE. In addition, it also acknowledges issues of power and democratic processes by introducing participatory decision-making processes.

In this new approach, to DE adoption, partially already tested in Trento and in Lazio regions, we can see a better balance between the top-down and the bottom-up approaches and the role of the Regional catalyst has evolved significantly. In this model, the knowledge generated by the OPAALS project (and other projects in the DBE cluster) reaches out beyond the local level because of the emphasis on the complexity of the language layer of innovation. Local DE adoption can be seen as a process in which knowledge is provided by the research community to local stakeholders that then can use it for creating new knowledge, according to their concrete needs.

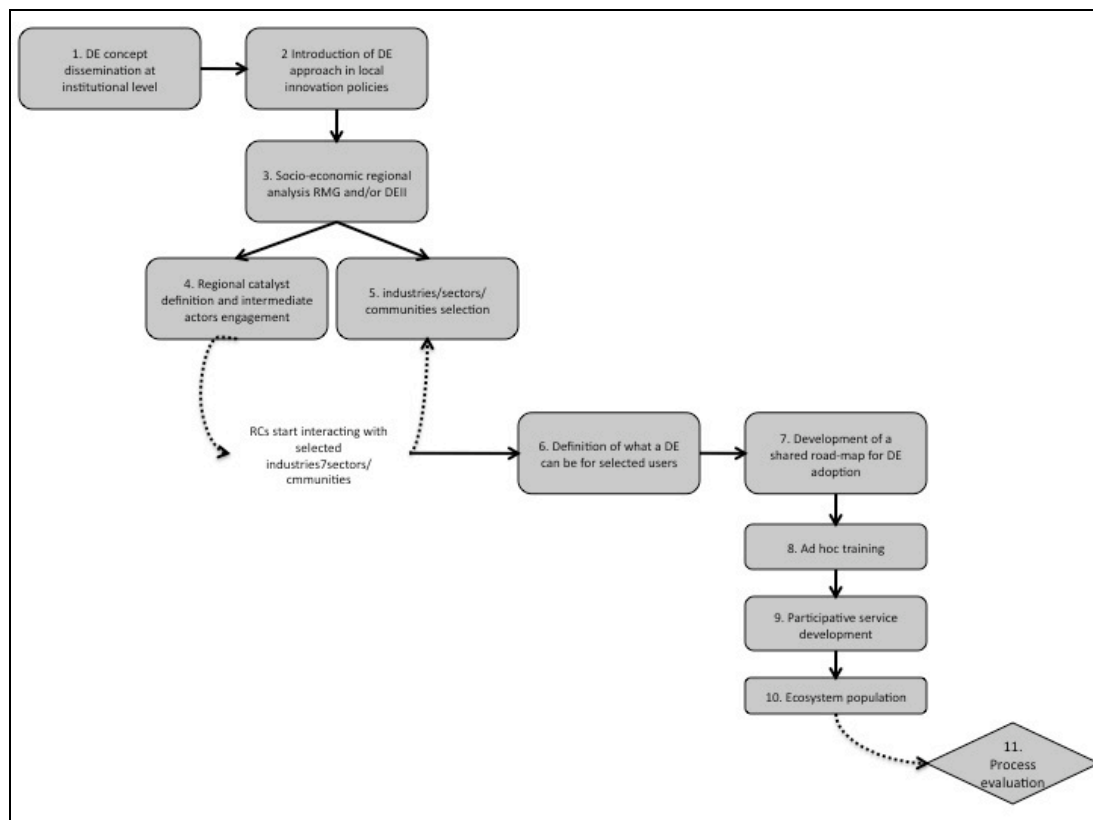


Figure 3: The OPAALS model of DE adoption (2010).

¹ It is important to note that the role of Regional Catalyst can be played in a collaborative way by more than one local actor. For example a local development agency can act as RC in the first steps of the process positively engaging the institutional level. Then a research centre or an innovative software enterprise can take action as Regional Catalyst when dealing with participatory service design. This issue has been already covered during the DBE project, see D31.6 (Passani, 2007).

Power asymmetries (between the institutional and the user layer on one hand and between knowledge providers and users on the other) are also acknowledged and mitigated thanks to participatory decision-making process (participatory development of a DE adoption roadmap) and participatory service development. The discourse layer is also taken into account enabling and facilitating users to develop their own definition of what a digital ecosystem can be for them.

Figure 3 shows a global summary of the participatory process of DE adoption.

2.1.3. The need for a comparative analysis

This deliverable is not the first report regarding the DE adoption cases in the DBE cluster projects. In the literature, a description of five regional cases is presented: Aragón (Spain), West Midlands (UK), India, Ireland and Brazil (see: Nachira et al, 2007). Since the presentations of adoption cases are performed by the catalyst persons, they have the value of the first information coming from the field of real-life adoption of technologies and services.

Therefore the presentations are relevant because of their self-narration of adoption phases, problems encountered, expected impacts and first lessons learned. In addition to this, the DBE project produced several deliverables about territorial experiences from the point of view of the regional catalysts (Censis 2006 and Passani 2007a – those deliverables consider the DE implementation in Aragon, East and West Midlands in the UK and the Tampere regions) and from that of the SMEs engaged (Darking and Whitley 2005). The Peardrop project produced a dissemination analysis of the Aragón (Spain) and Wales (UK) cases designed especially for policy-makers.

Conversely, previous descriptions lacked (1) a common analysis framework, and (2) a critical, ex-post evaluation approach that could evidence what is working or not and why. A serious and clear analysis of successes and failures is commonly considered a warranty of far-sighted research. For this reason we started working on a comparative DE adoption analysis.

2.2. The research process

The research process is organised into two steps. First, preliminary data gathering and analysis was conducted - at the end of 2009 - in order to understand the core elements of the case studied and to prepare the second step. Second, another round of data gathering was conducted – at the beginning of 2010 - in order to deepen the analysis on some specific issues.

For the preliminary analysis, a questionnaire was created (see Annex A) with 50 questions and the following structure:

1. Grounding data
2. Information on DEs
3. Projects involved
4. Strategy and methodology
5. Initial situation
6. Sectors involved
7. Actors involved
8. First DE idea and changes
9. Actual situation
10. Communities involved
11. Governance
12. Expected impact of the DE
13. Infrastructures involved
14. Services involved
15. Knowledge involved

Table 1: The regions analysed, the contacted persons and the related regional cases

Case N.:	Institution/Company	Contact-person	Regional Case
1	T6 Ecosystems srl - Italy	Antonella Passani	Lazio
2	CREATE-NET - Italy	Francesco Botto	Trentino
3	CREATE-NET - Italy	Luigi Telesca	"ONE" Service
4	University of Modena and Reggio Emilia - Italy	Flavio Bonfanti	Emilia Romagna
5	Instituto Tecnológico Aragón (ITA) - Spain	Javier Val Alonso	Aragón
6	Inst. of Technology Kanpur (IITK) - India	Jayanta Chatterjee	India
7	Cambridge University - England	Jo Stanley	Cambridge
8	National University Ireland Maynooth - Ireland	Chris Van Egeraat	Dublin Great Area
9	CM International Ireland	Patrick Sullivan and Rosemary O'Connor	Wales - UK
10	CM International Ireland	Patrick Sullivan and Rosemary O'Connor	East Midlands
11	London School of Economics (LSE) - England	Lorena Rivera Leon	Argentina

This first level of analysis enabled the gathering of the preliminary output that will be discussed in Section 3.1. and the creation of an in-depth semi-structured interview (See Annex B). This second level of analysis focused the investigation on the following points:

1. Activities for the development of the DE.
2. DE as part of the local innovation policies.
3. Detailed list of stakeholders and data.
4. Detailed list of technologies involved.
5. Detailed list of services - DE and not - involved.
6. Governance of the process of DE creation.
7. Governance of the future DE.
8. Resources enabling the process.
9. Difficulties and lessons learned.
10. Risks and further actions to reduce them.

The selection of the regional cases followed the intention to investigate the OPAALS regional cases community and some other experiences related to DE cluster projects (Eulaks, SEAMLESS, Pearldrop and ONE) and local experiences carried out by OPAALS colleagues (DBE Lazio project). It was also decided to consider the ONE project experience as an "European regional case". The ONE project, in fact, provided a web-based service for high level negotiations between networks of partners, therefore it provides a novel DE service that is searching for a community more than a regional case. The decision to consider this experience is due to the need to compare DEs development processes with different starting assumptions and architectures. Some of the interviewees are working or have been working in more than one EU DE related projects. The table below (Table 2) shows the project represented.

Table 2: Link between regional experiences and EU projects.

Regional experience and EU projects	
<i>Project</i>	<i>Respondents that participated to the project</i>
DBE	● ●
OPAALS	● ● ● ● ● ● ●
EFFORT	●
DEN4DEK	● ● ●
PEARLDROP	● ●
ONE	●
SEAMLESS	●
EULAKS	●

3. Analysis

In this chapter we will describe the 11 experiences introduced above. We will first of all, analyse them in an aggregated manner, this first analysis is based on the first round questionnaire we submitted to our colleagues. In the second part of the chapter, we describe each case separately. In the very last paragraph, then, we will briefly introduce the ongoing experiences of two European networks (DEN4DEK and DE-LAN) of regions interested in the introduction of DEs at local level.

3.1 Overview

As we said, DE is intended as an instrument for local sustainable development. In order to see how this statement has been interpreted at local level, we asked what the pre-existing situation was that the interviewees intended to change with the introduction of DE. We can interpret the outputs of this question as an answer to a core question: "why to introduce DEs?". Table 3 presents the data gathered.

Table 3 - Reasons for adoption DE

Why to introduce DE	Score
Fostering SMEs network	● ● ● ● ● ●
Provide to SMEs and clusters new and more interoperable ICT solutions	● ● ● ● ● ●
Foster collaboration and information flow within Public Administration (PA) and between PA and enterprises	● ● ●
Support and further develop local innovation strategies	● ●

The aim to provide locally new and more interoperable ICT solutions and the aim to foster SMEs networking (score 6) motivated the catalysts more than the aim to foster collaboration with and within the PA (score 3) and develop local innovation strategies (score 2).

SMEs are at the centre of most DE adoption actions, either in or related to the industrial sector we can see that researchers and practioners are working in many fields, and are adapting DE to various different industrial fabrics (Table 4). From the data emerge that the touristic and the biotech/biomedical sectors are considered suitable for DE adoption more then other industrial sectors.

Table 4 - Sectors of DE adoption

Sector in which DE adoption has been or is going to be introduced	
<i>Sector</i>	<i>Score</i>
Tourism	● ● ●
ICT-based regional innovation system for the public sector	●
Longitudinal to different productive sectors	●
Textile	●
Logistic	●
Agriculture	●
Biotech/biomedical	● ● ●
Environmental tech	●
Metal mechanical	●

(The total number of sector is different from 11 – the total number of cases examined – because some project focuses its activities in more than a sector at the same time).

The technologies that have been chosen to support the DE are various (Table 5). As we know, the DBE project did not provide fully functional working applications. Currently four regional cases are considering this option. However, as we will see in the analysis of in-depth interviews, other territories are waiting to see the results of the OPAALS project and are open to the adoption of its platform if it proves to be robust and reliable enough. Four cases are explicitly moving through the adoption of Open Source Software (OSS) and five cases are considering a Peer-to-Peer (P2P) architecture. Considering that the DBE project cluster was built upon the P2P and OSS columns, this is a very informative data. Most of the cases (eight) are considering specific software applications to implement the DE, and four are using (or planning to use) social network devices.

Table 5 - Technologies for DE adoption

Technologies							
<i>Case</i>	<i>WEB portal</i>	<i>Social Network</i>	<i>Specific services apps</i>	<i>DBE or OPAALS tools</i>	<i>P2P</i>	<i>OSS</i>	<i>Mob</i>
1	●	●		●		●	
2	●	●	●				
3			●		●		
4			●		●		
5	●	●	●	●	●	●	
6	●		●		●		●
7			●			●	
8		●			●	●	
9			●	●			
10			●				
11				●			

In regions there is a huge variety of services that currently are or will be available in the DE (Table 6): social networking – four cases choice -, business to consumer, back-office management, Open Negotiation Management (ONE), transportation optimisation, tourism, knowledge management and labour exchange. The ONE platform provides a service that is composed of: social networking, sales and negotiation management, contract definition, accounting and consulting. The project has been led by CREATE-NET, therefore the two cases related to this research centre (2 and 3) are actually considering this service for DE adoptions. The state of the art of services adoption is described in the last column and shows that only in the Indian case are the services currently under adoption:

Table 6 - Services planned or working in DEs

Services									
<i>Case</i>	<i>Soc Net</i>	<i>B2C</i>	<i>Back-off manag.</i>	<i>ONE</i>	<i>Transport optim.</i>	<i>Tourism</i>	<i>Know. manag.</i>	<i>Labour exch.</i>	<i>State of the art*</i>
1	●	●	●						--
2	●			●					-
3	●			●					-o-
4			●		●				+
5						●			-
6							●		++
7									(?)
8	●						●	●	(?)
9									--
10									--
11	Not jet defined								

*The service is a prototype, but the adoption is an idea (-o-): 1 case; The services will be defined (--): 3 cases; The services are being defined (-): 2 cases; The services are under construction (+): 1 case; Under adoption (++): 1 case

Finally we investigated the governance of the DEs (Table 7). The Governance system is not defined yet in four cases (Lazio, Aragon, Argentina and Wales). Most of the cases are considering the creation, or involvement of a foundation, company or board to govern the system. Regarding the service management, the distributed self-management suggested by the DBE cluster project is actually under consideration in only three cases (Aragon, East Midland, Cambridge and Peterborough). A more centralised solution is in operation or will be implemented in the other cases, in Lazio and Emilia-Romagna the centralisation is seen as a feasible solution in the first phase of DE introduction and a gradual de-centralisation is planned in a second stage.

As we can see from the below described data, regional experiences of DE adoption are very different from many points of view such as: reasons behinds DE adoption, industrial sectors involved and so on. Another important difference deserves to be mentioned in this concluding section.

Table 7 - DEs' governance models and service management

Case	Governance	
	<i>Governance system</i>	<i>Service manager</i>
1	Not yet defined.	Not yet defined.
2	Main rules: Local Government; Monitored: Board (Local Gov, Res Centres, Catalyst).	Catalyst will manage centralised services. Board will supervise.
3	Open ecosystem and public infrastructure. A foundation will coordinate the developers.	Initially a start-up.
4	Based on equal rights and policies. Promoted by trusted intermediaries.	Intermediaries.
5	Not yet defined.	Easily managed by the business owner.
6	Partially moderated and self-governed.	IITK manages the platform.
7	(no answer)	(no answer)
8	Not yet defined.	The industrial promotion agency or the university.
9	Community Interest Company will provide a legal structure.	Project partnership.
10	Collaboration agreement initially, later more formal structure.	Project partnership.
11	Not yet defined.	

We described the OPAALS model of DE adoption in Paragraph 2.1. It is composed of 11 steps; as obvious regional experience we considered in this article are at different steps of DE adoption. We have one case in stage two: "Introduction of DE approach in local innovation policies"; two cases in stage 3 "Socio-economic regional analysis", one case in stage 5 "Industries/sectors/communities definition", one case in stage 6 "Definition of what a DE can be for selected users", one more case between this stage and the following "Development of a shared road-map for DE adoption". Only two cases are in the last phases, one on "Participatory service development" and another in "Ecosystem population". As is evident, we are speaking - in most cases - about ongoing processes that are open to modification and are still susceptible to various risks.

We will examine in the next paragraphs some of these risks, by analysing more specifically the main difficulties that the DE adoption process may imply. We are also really interested in describing the problems, issues, possible conflicts that occurred during the process amongst the engaged actors.

Moreover, if in this paragraph we focused our attention on similarities among cases; in the next step we will prioritise the differences between them. We will go deeper in each case with the results of help of face-to-face, semi-structured interviews and we proceed with a more biographical approach in

order to achieve a better understanding of the actors, roles and responsibilities of different players at local level.

3.2. Cases description

The eleven case studies that we analysed are described in the following sub-sections. What follows is a brief introduction to each experience with a short description:

1. **Lazio experience.** This case study takes place in the region of Lazio, in the south central Italy. T6 Ecosystem promoted the DE approach in the region since 2003 and led the activities in the last three years starting from 2007 to 2010. The activities performed so far have been financed by the regional government thanks to FESR funds. It involved the regional government, SMEs in the tourism sector and SMEs in the software sector to match the requirements of the SMEs in tourism sector with the expertise of the SMEs in software sector. The development of the proposed services would strengthen the growth of the tourism sector in the north of the region connecting it with agro-food and logistic sectors on one side and with the local and regional PA (Public Administration) on the other side.

2. **Trentino experience.** The case study is carried out in the Trentino region in Northern part of Italy. Create-Net promoted this activity with the help of the local government and other organisations in the last four years starting from 2006 to 2010. This project aimed at providing a framework for new policy enabling the provision of ICT services in the region.

3. **"ONE" service.** This case study was carried out in the Trentino region of Italy. The main objective of the ONE project (an EU funded project) is to enrich Digital Business Ecosystems with an open, decentralised negotiation environment and enabling tools that will allow organisations to create contract agreements for supplying complex, integrated services as a virtual organisation/coalition. Without the support of proper tools, SMEs cannot easily find trustworthy partners to provide services or be found themselves. Access to reputation information is not readily available and negotiations are time consuming. To solve these problems, a negotiation environment must be affordable, open, not centrally controlled, support the sharing of knowledge via flexible security and trust policies and be able to learn and evolve with the changing market conditions. ONE provided such a solution via an open-source approach ensuring transparency and sustainability. By using the ONE environment all business players (SMEs, corporations and others) will benefit from reduction of time to market and transaction costs.

4. **Emilia Romagna experience.** In Emilia Romagna region, in the North-East of Italy, the introduction of DE approach started in 2005 taking the steps from the EU funded project SEAMLESS. The University of Modena and Reggio Emilia lead the activities since then. In fact, after the SEAMLESS project (belonging to the DE cluster of projects) other initiatives and projects (KASSETTS and i-best) have been promoted in the region. The first activities and technological solutions developed and used at regional level got as target the logistic and textile sector.

5. **Aragón experience.** The case study is taking place in the region of Aragón, in the North of Spain, where the Instituto Tecnológico de Aragón (ITA) promoted this action from the beginning of the DBE project to the end of the OPAALS project. It involved the local Software SMEs and Tourism SMEs sectors, in order to develop the tourism sector and help the SW sector in the development of new services also for the global market.

6. **India experience.** This is a specific case of Knowledge Ecosystem in the Agriculture Sector initiated by the Ministry of Agriculture, India. The primary objective is to create a platform for knowledge exchange. The initiative lead by the Indian Institute of Technology Kanpur, India started in April 2006.

7. **Cambridge experience.** University of Cambridge catalysed the introduction of DE in the greater Cambridge and Petersborough areas, as part of the OPAALS project activities starting in 2006. With reference to industrial sectors, in the Cambridge area the activities focus on high-technology sector, specifically on biotech, meditech and ICT related enterprises; in Peterborough, the attention was more focused on the Environmental sector. This sector definition refers to the first part of Cambridge activities, then some constrains emerged especially for the environmental sector that was not mature enough for the DE adoption. The research in the area focus, then, on the possibility to introduce DE in the public sector (especially in schools) and a detailed analysis of public procurement have been conducted for evaluating the feasibility of such adoption strategy (see D11.12).

8. **Dublin Great Area experience.** The greater Dublin area biotech DE was initially promoted by the National University (NUI) of Maynooth and will be catalysed by Enterprise Ireland, a semi-state agency for the development of industries. The project started in June 2007 with the aim of structuring and coordinating the local biotech sector, and it is currently waiting for resources for the technology deployment.

9. **Wales experience.** In Wales, DE was promoted by the Welsh government with the support of CM international Ireland. The region entered

a contact with the DE approach via the PEARDROP project and started introducing the DE in the tourism sector. In Anglesey and surrounding areas, the project of DE deployment goes under the name of Menai Intelligent Tourism Network (MITN).

10. **East Midlands experience.** In East Midlands (UK), the DE has been promoted by CM international in the biomedical sector. More specifically, the project was intended to pilot DE as a regional policy tool able to connect biomedical companies, clinicians and the research department of local universities.

11. **Argentina experience.** At the beginning of 2009, as part of a EC funded project, LSE started the feasibility study for the development of DEs in Argentina. No sector has been clearly identified.

In the long description of the cases we provide a DE adoption story for every experience by describing the following categories:

1. Region/territory.
2. Main actor – DE promoter.
3. Sector.
4. Initial situation and expected impacts.
5. Activities.
6. Stage of adoption.
7. Local innovation policies.
8. Strategy used.
9. Stakeholders and offline communities.
10. Technology.
11. Services.
12. Governance.
13. Resources.
14. Difficulties in the past / future risks.

3.2.1 The Lazio region experience (Italy)

The DE experience in Lazio (Italy) has been promoted by T6 Ecosystems Srl in order to sustain the local tourism sector. Networking activities and contact with the regional government started during the DBE project (2003-2006) and lead to the introduction of the DE approach in the regional innovation policies. The local innovation policy, now, includes a specific terms for the DBE implementation in the region in the name of 'I-Lazio 2010' (2007-2013) with a focus on the growth of SMEs in the region.

The concrete project activities started in 2006 in parallel to the last stage of

the DBE project with a feasibility study performed by CENSIS regarding the implementation of DBEs in Lazio region. This feasibility study helped in contacting the available research centres and innovators in the region. It also helped to come up with an outline for the process of DBE adoption in the region, funds availability, model of governance and methodology for cluster identification.

In 2008, a pilot action started in the region with a focus on analysing the territory and selecting the industrial sector (and a sample of 15 SMEs) to work on the DBE. The territorial analysis was carried out by T6 using the Territorial Maturity Grade methodology (implemented in DBE and ameliorated during the pilot action) that showed the points of strength and weakness of the innovation capability of the territory. In parallel, the Lazio region became a partner of the DEN4DEK project, an European network of regions interested in the implementation of DE.

The pilot action selected the tourism industry as the first sector for the implementation of DE, a preliminary analysis on technological and information needs was carried out with a group of SMEs and the development scenario was defined. In fact, the process of user expectation analysis is currently being carried out. Funds are awaited to proceed further to define the DE for this case, they were allocated but the regional elections of 2010 slowed down the concrete opening of the call for proposals.

The DBE/OPAALS strategy and technology are thought to be used in the Lazio pilot action. The idea was to foster SMEs competitiveness through ICT by supporting networking and collaboration. There are differences in the initial strategy and the one adopted in Lazio pilot action. Due to the territorial limitations that came up with the tender process, the selection of stakeholders, industrial sectors and final users were influenced by the regional policy. With the regional policy the entities from under-developed provinces have been more privileged than the others in the selection, consequently the DE pilot action have been carried out in the Province of Viterbo and Rieti (in the north of the region). The role of the regional authority has changed from influencer to an indirect manager. The project was taken care of by Lait, the Regional agency of innovation. Due to the shortage of resources the pilot action had to resort to limited deployment rather than a full deployment. Finally the development of technology or tools was not ready by the time SMEs asked for services. The process had to be slowed down and readjusted with a new time-line.

There was no specific community as an umbrella organisation for the SMEs in the tourism sector. The communications are very informal. The process of tourism cluster formation with the corresponding SMEs was ongoing at the time of the project. The main stakeholders selected for the pilot action were: Province of Viterbo, Province of Rieti, Regional agency of innovation (Lait Spa), the Chamber of Commerce of Viterbo and Rieti, industrial associations, SMEs, University of Viterbo, Technology Park of Viterbo, and a local consultancy firm. T6 conducted the process and carried out the research

activities on behalf of Lait Spa which can be viewed as the Regional Catalyst Lait Spa.

In terms of technologies, Lazio region plans to use the OPAALS tools. Open Source Software and Social Networks will be used during the course of the project. In terms of services the following services emerged as necessary: a B2B and B2C portal, automatic aggregation of Information for SMEs, services that improve the communication between SMEs and local and regional government. The use-cases ONE (n. 3) and Aragón (n. 5) are going to be taken in consideration for a possible implementation as services.

T6 is managing the process. The plan is to ultimately hand over the project to the local actors. The pilot action was funded the regional government thanks to a co-funding from EU FESR funds.

The prime difficulties include: unavailability of technology, pressures from public administration that altered/reduced the time frames and difficulty in working with the environment with low levels of ICT awareness and entrepreneurial skills. The change at regional government level blocked the next stage of the project which was the concrete DE deployment. The risk now is that if EU stops funding and there will be a problem to find funds from other sources.

For further information please see Passani, A. and Giorgetti, M. (2009).

3.2.2 The Trentino region experience (Italy)

The DE experience in the Province of Trento (Trentino) in Italy is promoted by CREATE-NET in order to improve the local ICT innovation for the PA sector. The ICT services in the region are completely governed by Informatica Trentina. Since there is no clear competition in the provision of services, the policies had to be altered to re-organise the structure of service provision in the region.

In 2006, during the DBE project, the DBE idea was presented in Trentino to the possible local stakeholders, politicians, economists, researchers and other people of interest. As the outcome of this discussion/presentation, the local government agreed to support the sustainable development of DBE in Trentino.

In June 2006, the OPAALS project started. From 2006 to the end of 2008, several trials were made to understand how introduce DBE in Trentino. As part of these trials CREATE-NET worked with the Province (local govt.) and Informatica Trentina (an public entity that provides ICT services in the region especially for public administration) to understand how to work with local communities to create a possible DBE in the region.

By the end of 2008, the idea to start a local DBE became concrete and Informatica Trentina, Create-Net, Dept. of Economics, and Engineering Faculty of University of Trento joined hands to define a framework to change

the local system of innovation for the ICT in public administration at policy level, called as TASLAB. This provides with new vision, business model and policies for Informatica Trentina. The main goal of TasLab is to define the 'as is' of the innovation system, define the stakeholders interest, and try to suggest new organisation and technology for the future.

With the official start of the project from January of 2009, a study of the state of the art innovation system was carried out and the project provided the suggestions for new services and technologies in the province. Two enterprises are providing the portal and the social network for this project.

The current stage of adoption is at the identification of requirements, services, procedures, scenarios and the technologies to bootstrap the new innovation system in Trentino. TasLab would provide some suggestions to create new local innovation policies.

In terms of strategies, at the beginning CREATE-NET adopted the formal DBE dissemination model: push policy makers, define a sector and start catalysing the process was defined as the ideal strategy for a DE project. But when it comes to local adoption, there will be differences in each case. The process started by gathering concrete local needs, and working with people at many levels (MPs, managers, workers, development organisations and citizens). Focusing the work towards what makes sense for the participants and presenting DE as a tool rather than a concept to be implemented. It is learned from experience with people that the terms DE or ecosystems are not commonly used with all the people to refer a concept.

Stakeholders are: Province (Local Government), software enterprises, local public administration (innovation users), research centres, Informatica Trentina and innovation managers. Project partners are Informatica Trentina, CREATE-NET, Dept. of Economics and Dept. of Computer Science, University of Trento.

Centralised system architecture is being used. The ONE architecture is suggested for use at different levels. A social network and portal is developed. DE specific tools are not used currently and will be discussed in the future. The services will be incorporated in the social network. These services include communication, information and self-presentation services for people. Open Stack is suggested for future developments.

The process is started by CREATE-NET and Informatica Trentina will manage the system in future, probably under the control of a heterogeneous commission. The project is funded by the EC via FSE budget.

The main difficulties are: (1) obtain concrete involvement of Local Government, and (2) the centralised framework as decided upon by Informatica Trentina for the new innovation system.

For further information please see Botto, F. (2010).

3.2.3 The “ONE” service experience in Europe

CREATE-NET is a research centre in Trento, Italy, that promoted the development of a Business Process negotiation service for any sector. The project is especially geared towards SMEs, providing them with a trusted, secure and cost-free technological environment through which they can create the tactical and strategic alliances to pursue business opportunities and growth. To be competitive in Digital Ecosystems, SMEs will need to develop alliances and collaborate to provide joint service offerings and also address large tenders. Current negotiation platforms, such as Business-to-Business electronic marketplaces and Internet trading platforms are centrally managed, not fully trusted by SMEs and/or too expensive and hence not widely used by European SMEs today. The ONE environment will also provide wider ecosystem benefits in terms of an increase in the number of participants; better negotiation performance and collaboration while creating new business opportunities.

In Early 2004, the process started by contacting Francesco Nachira then Project Officer in EU for DEs. The DBE project started in the same period and was the first IP with Trentino Case.

In 2005, a meeting was held in Turin to discuss the plan for ONE and OPAALS to address the issues and coordinate the proposals to the May-Sep Call of 2005.

In 2006, a workshop was conducted with an attendance of 40 people from the Local Government, the Ministry for Innovation and other participating entities to understand the goals of the project. An informal agreement was signed for promoting this project from PAT in the region. The project ONE was expected to overcome the technical drawbacks of DBE project and provide a negotiation environment.

The project was completed. The team is trying to set up a joint company to exploit the research results of the ONE project and engineer the production version of the developed platform. The plan is to offer professional services and a free platform for setting up DE (OPEN-FREEMIUM). The Trentino local government is committed to provide the required support. The project received seed funding from Trentino Govt. which helped to bootstrap the project.

A concrete approach towards technology adoption starting with immediately identifying a possible economic segment and companies that could take up the technology developed during and after the project lifetime. The idea was to start from a concrete problem of a specific community that could be merged with the local and regional DE adoption plan.

European Service Communities is the major pre-existing community. The stakeholders in the project are nearly 15 entities from three countries namely Italy, Spain and France. There is direct involvement from three associations of

companies from each of these nations, two research centres (CN and WIT), one SME, one large company, one investment agency from Trentino region, and one business angel. There is also indirect involvement from Italian public procurement initiative CONSIP, one standardisation group and one SME.

The platform is developed as P2P web service with a distributed knowledge base which has features like distributed storage and a service registry. The platform has major components such as a learning engine and negotiation engine. The platform is developed in Java and also provides an Eclipse IDE plug-in for developers. It uses web 2.0 technologies to provide a social network based support.

The platform is designed to offer wide range of services including advertising, accounting and payment system, analytics, templates for negotiation, legal mediation, certification, financial and technical certification, mobility and integration with third party tools.

The project is successfully completed. After the completion, an association is formed with the partners. It mainly consists of commercial entities and non-profitable entities. This association will further look after the formation of the start-up and future survivability of the project. The project is financed by the European Commission, local government and co-financed by the partnering institutions.

The difficulties faced during the project are: understanding users, dealing with users, improving the visibility of the project, and conducting training programmes. Risks exist at the marketing of the project outcome as a product and competition in the market.

For further information please see <http://one-project.eu>

3.2.4 The Emilia Romagna experience (Italy)

The DE approach has been introduced in Emilia Romagna by the University of Modena and Reggio Emilia, Faculty of Engineering – department of Engineering of information. This first introduction was related to and EU funded project (6FP – IST) called SEAMLESS (Small Enterprises Accessing the Electronic Market of the Enlarged Europe by a Smart Service Infrastructure). In that project – belonging to the DE cluster – the university of Modena and Reggio Emilia was the project co-ordinator. After the SEAMLESS project - that ended in 2009 – the university started an INTERREG funded project called KASSETTS (co-ordinated by ITL – Foundation for logistic of the Emilia Romagna Region) that continued the work done during the previous project. In addition to this, the region and the university are also engaged in the eBest project, financed under the Research for SMEs EU programme that plans to provide SEAMLESS-like services to SMEs of the service sectors such as fashion, ICT, house renovation (other related projects proposal are in negotiation t the time of writing). Interestingly, based of the SEAMSLESS

technology, the University developed a service for electronic invoice management that have been adopted by San Paolo IMI, one of the larger back operating in Italy.

The focus of both projects was on the development of services for supporting the collaboration among small and micro companies of the textile and logistics sectors. The DE introduction has been seen as an instrument for overpass the lack of ICT usage of local SMEs, mainly due to their small investment capability. In this framework, Open Source appeared to be an important instrument.

The innovation strategy adopted was that of the DBE project, SEAMLESS project, was intended to be complementary to the DBE project in the sense that the DBE should have developed the technological infrastructure on top of which the SEAMLESS services would have run. Unfortunately, this integration did not happen during the life-time of the two projects. The integration at theoretical level is visible and a validation of the technological interoperability would be of great interest. The concept of Digital Ecosystem is now used at regional level, but is a sort of buzzword that is liked and used, but we cannot be sure about what they mean when they use this buzzword. What is important is that the regional Government provided huge funds for SMEs innovation, stimulating enterprises to work with universities and research centres with the aim of innovate. So what is visible is that on the practical level there are important policies, but this seems to be detached by the theoretical level that seems to be vague in terms of concrete projects.

At regional level the activities performed are several, in addition to the service development, in fact, the university engaged various actors such as entrepreneurial associations, research centres and logistic brokers as intermediary to provide innovative ICT services to the companies they collaborate with. Therefore intermediate actors played a crucial role in engaging the final users. Intermediate actors - that now believe in DE related services – work with SMEs on a face-to-face level supporting them to innovate their production system by integrating their businesses and then, the intermediate actors presented the ICT services as a solution supporting their pre-existing integration. Their centrality is confirmed both at governance and technological level, in fact, the governance model is based on the equal rights policies applied and promoted by those intermediate actors that can count on the trust of the final users. Similarly, most services are storage on intermediate actors' servers in order to the decentralised in a second moment. Medium sized enterprises tend to prefer to have the applications on their machines or on a dedicated section of the intermediaries' servers. So the university provides different level of P2P solutions. In fact, the P2P approach represents the final scenario of the DE adoption at regional level.

Among the services developed we can mention: partner profiling and offer presentation, offers search, transport planning and internal resource scheduling (for the logistics sector), exchange of business documents and information with language translation (for all sectors), and search optimisation of transport services, automatic reactive planning and execution

(under construction, for the logistic sector)

The business document exchange service is actually used by some tens of companies as well as the logistics optimisation service.

The business model in the medium to long term is to have a very small annual fee for the services offered, counting of a critical mass of users. Currently, the services are provided to SMEs as free and open source services.

The main difficulty encountered is the complexity of getting the SMEs to understand the value added by the services, in most cases the need for innovation and ICT is not perceived as such. This leads to the problem of a critical mass of users that is needed in order to support the SMEs decision to innovate. Here, the role of Public Administration and intermediate actors is crucial; i.e. if legislation forces the use of virtualised process such as electronic invoices for public administration, this will lead the SMEs to a radical change in terms of innovation.

For further information please see: <http://www.seamless-ip.org/> ; <http://www.kassetts.eu/> and <http://www.ebest.eu>

3.2.5 The Aragón region experience (Spain)

The DE experience in Aragón, Spain, has been promoted by the Instituto Tecnológico de Aragón (ITA), a public agency for local ICT development. Tourism has been identified as the sector in which to develop a DE.

In this sector, the initial situation is that of a very fragmented productive fabric, more than 90% of the enterprises have less than 10 employees and they show a low capability to collaborate. Beside this, also the level of ICT usage was limited and there was a lack of information flow and request by SMEs to improve communication and collaboration with the regional and local PA. ITA expected to solve the fragmentation and lack of ICT in the local tourism sector by applying the processes and technologies developed during the DBE project, and adjusting the process during the OPAALS project. More specifically, ITA expected that Software SMEs may take advantage of this technology and sell their services in other regions which would also like to deploy a DE in their region.

In 2003 TechIdeas (partner of DBE project) was searching for a Regional Catalyst in Aragón and contacted the Regional Government. ITA, that is part of the regional government, was identified.

In 2005 ITA organised the local Strategy Meeting. Barrabes, a consultancy SME, carried a study of sectors and consequently the tourist sector was chosen by Barrabes and ITA.

Later the Plan for Deployment was formalised by ITA. It included the definition of the 3 different profiles to be engaged: policy makers and

consultancy; user SMEs; Software SMEs. A local agency for the information systems development was contacted first (part of the University), and an explanation of the project idea was given. This department explained the project to the local Software SMEs, later the Software SMEs, as providers, involved the users and gathered the requirements.

In the same year the Technology Training was performed by ITA for the Software SMEs. No documentation was provided by TechIdeas, which was in charge of the DBE platform, and this technology never provided what was expected.

In the meantime ITA created the Work Plan with architectures, interfaces, features, testing and so on. It was the output of the cooperative work with 3 different groups: Software SMEs, tourism broker agencies, and hotels and bed & breakfasts.

Between the 2005 and 2006, ITA integrated applications and DEs scenarios. Some original DBE project interfaces have been developed, but given the low quality of the DBE technology it was decided not to work on it so as to avoid breakdowns. The system has been in use only for three weeks for a pilot project.

Currently (Spring 2010) ITA is trying to provide a stable platform for the regional case, and in the meantime it is working with local Open Source Software SMEs and make relationships a reality.

ITA selected the industries and performed a pilot project. Currently (Spring 2010) ITA is waiting for new funds in order to proceed to a user definition of what form a DE could take in the future. This process has already been started with an analysis of user expectations.

The local Government created a three years strategy for the ICT development in the Aragón Region. ITA integrated the DE as one of the points of its regional strategy. ITA did not adopt a specific innovation development strategy other than common sense.

The project in Aragón was based on two pre-existing off-line local communities: CESLA and TECNARA. In terms of stakeholders the local project involved in addition to ITA (Regional Catalyst): two persons from the local IT Ministry, four leaders Software SMEs in the region ("prescriptors"), 40 Software SMEs, and 100 user SMEs from the tourism sector.

The project adopted from the beginning the technology that was developed during the DBE project. There was an initial lack of documentation, therefore ITA provided it and tried to reduce the problems caused by the early level of the technology. They did not work on the Web Portal and on a Social Network.

The P2P architecture was never implemented, but in Spring 2010 ITA was waiting for the last release of the OPAALS technology. The project adopted Open Source Software standards, but is also open to proprietary Software.

DEs services tested in the pilot project are tourism sector services such as on-line booking and video-conferencing. ITA managed the process of DE

creation. A local public agency will manage the DE in the future, pending funding.

The local project was possible because of funding from both the DBE and the OPAALS projects, and the Regional Government support. The local authorities will decide if further initiatives should be supported or not in the future. SMEs are also waiting for a return on their investments.

The project faced two main difficulties: lack of documentation of the DBE Software, and the need for more stable technology features.

For further information please see Veja-Murgula, J., Navamuel, J.J., Lacueva, F.J. and Val, J. (2010)

3.2.6 The Indian experience

The India CE case study is promoted by the Indian Institute of Technology, Kanpur (IITK) and the Government of India for the agriculture sector. Initially the project started as a Pilot project with 5 field stations within the 70km radius of the IITK. The expected impact of the outcome of the project is higher and at the national level.

The Indian Ministry of Agriculture initiated this project in early 2007 and requested the universities in the country to provide a platform for knowledge exchange in the agriculture sector. It should work as an extension system to the existing nodal and field centre system. IITK responded to the request from the Govt. and started field level studies in 2007 to understand the requirements of the farmers. The process took nearly one year until 2008. From 2008, actual development activities have taken place to provide the planned services based on the requirements analysis carried out earlier.

The stages are running in parallel which includes 'Definition of what DE can be for its users', 'Development of a shared roadmap for DE development', and 'participatory service development'. After the initial development the project is adapted as a pilot project in the region with a minimal setup.

In 2008, the Ministry of Agriculture, Govt. of India, having read the field studies from the Agriculture universities, made a two year (2008-2010) plan for ICT in Agriculture. All the activities of the Knowledge Exchange platform are funded under this plan.

The project received initial inspiration from the ICT led networking and communication. At a later point in time, the project used more specifically one of the aspects of ICT and shifted to understand the role of social media in community creation.

The government of India is the primary stakeholder. The agriculture community of India which consists of organisations such as Agricultural Universities, Technological Institutions, Resource Providers, Research Institutions, and Policy making Government bodies.

Web development tools like DRUPAL are used for development in an open source web environment. The architecture follows a centralised approach for the pilot project.

This project provides services like Agropedia - a wikipedia for Agriculture - for educated farmers and an Interactive Voice Response System (IVRS) of uneducated farmers to provide information about crops, seeds and weather.

IITK with the help of ministry of agriculture managed the process of DE creation. The Agricultural community will look after the future of the DE with the help of Government funding. The project was possible because of funding from the Government of India.

The project faced difficulties in communication aspects in terms of people from different educational and expertise backgrounds working together with the community of farmers. Literacy rate of the farmers is one problem in the region. The technological services should be at the level of farmers understanding.

For further information please Chatterjee, J. Pattanaik, D. and Dini, P., 2009

3.2.7 The Cambridge experience (England)

University of Cambridge catalysed the introduction of DE in two areas: the greater Cambridge area and the Petersborough area. Both the efforts are part of the OPAALS project activities and were started in 2006. With reference to industrial sectors, in the Cambridge area the activities focus on high-technology sector, specifically on biotech, meditech and ICT related enterprises; in Peterborough, the attention was - at the beginning of OPAALS phase three - more focused on the Environmental sector. During the research activities it emerged that environmental sector was insufficiently established there to study as a sector. For this reason and the specific situation of Petersborough area – in which SMEs are highly dependent from public funds – the work have been focused on studying the procedure and the philosophy of Public Private Partnerships as a means to deliver local goods and services. The possibility to introduce the DE through PPP has been investigated and the difficulties for SMEs in accessing this kind of funds emerged as an important drawback. The activities are still running at the time of writing and will continue after the end of the OPAALS project.

The strategy of DE deployment is constantly changing to suit very rapidly changing economic and business profile of regional development.

The initial situation was characterised by ignorance in the firms and public bodies as regards scope and potentialities of digital support, views to adoption, and low knowledge of ICT benefits in general. Aside from this, public bodies are outsourcing ICT provision and services; this reduces the efficiency of the services themselves, increases the costs and exclude SMEs. Twenty councils at UK level signed a memorandum for OSS strategy and

services, but still the general situation shows a lack of knowledge of OSS benefits for SMEs and Public bodies. The strategy is, consequently, to promote DEs by promoting the OSS approach and the concept of communities of practise. At the beginning these awareness rising activities targeted single SMEs, but this didn't produce results so the decision was to engage the political level and local intermediaries first.

Actually two public bodies and two businesses networks have been contacted together with approximately 20 SMEs. Aside from the above mentioned awareness raising initiatives, University of Cambridge also organised meetings with key players and disseminated the DE approach through conferences and journal papers. It was intended but not possible to organise a demonstration of OPAALS infrastructures and services. Beside the contact with local public actors, particularly the City Council, the University of Cambridge also carried out lobbying activities in order to have the support of those local actors that may have influence on the City Council.

Looking at the OPAALS model of DE introduction, the Cambridge case is now running the first three steps in parallel.

The main problems encountered can be summarised as follow: on one hand the pre-existing situation called for knowledge transfer and intense awareness raising activities, on the other hand the OPAALS technology was not ready to be presented to potential stakeholders and this made it more difficult to show them the potential benefits of the DE approach.

For Further information, please see Stanley, 2010 – D11.12

3.2.8 The Greater Dublin Area experience (Ireland)

The Greater Dublin Area (Ireland) experience was promoted by the National University Ireland (NUI) of Maynooth. The biotechnologies sector was identified as suitable for a DE adoption.

The initial situation was a normal off-line networking of the local Biotech sector. The expected impacts were: (1) more intensive information sharing and unintentional information flow, and (2) enhancement the competitiveness of the regional SMEs as well as increased connectivity of the academics.

The local project started at the beginning of the 2nd phase of the OPAALS project (June 2007) and actually is also part of the DEN4DEK project with the aim to plan a DE in the biotech sector. Between 2007 and the end of 2009, NUI organised five local meetings.

The first meeting in the middle of 2007 was a "roadshow" with the OPAALS PM and representatives of the EC explaining the idea to some local actors: universities, Enterprise Ireland (EI, the Industrial Government agency), and the regional authorities. At the beginning of 2008 the second meeting was held to re-contact the local actors (EI, regional authorities) and enter the DEN4DEK project community.

During the third meeting at the beginning of 2009 the Regional Authority concretised a plan for the local DE. In June 2009, a fourth meeting was held by NUI Maynooth to plan a local workshop. In September 2009, the first local workshop involved 15 people from: NUI Maynooth, Biotech enterprises, venture capitalists, the Biotech department of EI, two regional authorities, and a consulting agency. During the workshop : the DE idea, the network and the innovation flows of the biotech sector, the DE experience in the East Midlands, and the technical aspects of DEs were presented. This allowed a discussion about a possible DE on biotech in Ireland.

Later NUI Maynooth organised some follow-up meetings to refine the ideas and maintain the contacts between participants.

Currently (Spring 2010) the project is in the development phase of a shared road-map.

In Ireland the Regional Authority has no power and the national Government is facing economic problems, therefore no budget is provided by the public. Nevertheless, biotech is one of the two sectors that the government agencies consider as relevant.

The innovation strategy that NUI Maynooth adopted initially was to promote business ecosystems on the basis of advanced IT, and it did not change during the project.

Many stakeholders participated in the feasibility project. Enterprise Ireland (EI) is a semi-state agency that provides information on enterprises and in the future will be the DE catalyst and training agency. An Intel laboratory is willing to provide training and disseminate technology. There is a cluster composed by 100 Software SMEs that will develop applications. The user is a biotech cluster composed by 80 SMEs. 5 Universities are involved in the project to facilitate innovation. The Regional Authority is involved and will help the project if needed. There are venture capitalists interested in the project.

NUI Maynooth is planning to use the tools developed through the OPAALS project, such as Guigoh, the OKS and Sirona.

The local stakeholders defined four services for the DE:

- 1 – a forum for regional actors to consult each other on a reciprocal basis about the location of actors and sources of knowledge;
- 2 - regionally based science forum for biotech scientists and technicians. Here biotech scientists in companies and universities can ask for advice about, and interactively discuss scientific and technical problems;
- 3 – a biotech sector dedicated electronic labour exchange, matching skilled people to jobs;
- 4 - a directory tool, providing information about and promoting regional actors and promoting Ireland as a biotech region.

NUI Maynooth started the project as a promoter and involved Enterprise Ireland to be the regional catalyst and manage the DE in the future.

NUI Maynooth used the OPAALS founding for the socio-economic research that investigated stakeholders and their intentions in the biotech market. Enterprise Ireland will provide funding for technology deployment by looking at European funding for regions and venture capitalists.

The project is facing three main difficulties: funding, the critical mass creation, and a reliable and user-friendly technology architecture and applications.

The two main risks the project will have in the future are funding for technology implementation and the sustainability of the DE from a commercial point of view.

For Further information, please see Van Ageraat 2010

3.2.9 The Wales experience (UK)

The Welsh regional government start working on the concept of DE in 2006 thanks to the Peardrop (Promoting Digital Ecosystems) project, a project co-financed by the EU under the six frame work programme for IST. During the Peardrop project various dissemination activities took place, and in that context the Anglesey stakeholders asked the Welsh government to start working on the DE deployment and so the local experience described below can be seen as a case study of Peardrop but also as a Welsh government funded project thanks to structural funds (as object one area).

The Welsh government got the support of CM international that carried out the field research and networking activities. The activities of DE deployment have been concentrated on the tourism sector on Anglesey island and surrounding areas. The project of DE deployment took the name of Menai Intelligent Tourism Network (MITN).

The initial situation called for an intervention aiming at supporting regional clustering and networking among SMEs. The area is undergoing a drastic economic restructuring (and decline) due to the closure of the Wylfa Nuclear Power Station and the possible knock-on effect on Anglesey Aluminium factory. This change will have a tremendous impact on the employment market and is intended to change the working identity of the island.

The tourism sector could have an important and positive role in the forthcoming period of change; the island - in fact – host in the busiest port of UK - but the sector is characterised by limited collaboration between enterprises and segregated services and offers. DE was and is intended to be used in order to reinforce the sector by supporting the networking among the enterprises and the development of high-value added services. Moreover, the tourism cluster on the island is intended to be linked with the software sector of North Wales. This will increase the competence of the software sector and will promote it across Wales and EU.

The strategy used for DE introduction was that of the DBE project and

concluded the stage of development of a shared road-map for DE deployment. Unfortunately the end of Peardrop project and the lack of local funds slowed down the process of concrete DE development. But at the time of writing new local funds are available and the DE-LAN project - which aims to carry out a pilot of DE deployment – is now operating, possibly insisting on the same territory. Among the activities already performed we can report an intense activity of networking and cluster creation and the realisation of a feasibility study and DE deployment plan.

At the beginning the local stakeholders saw the DE concept as something innovative and futuristic and capable of supporting the restructuring of island's economy. After this preliminary phase, CM International organised workshops with the local innovation agency and other local stakeholders. The DE was presented as the next generation internet. The tourism sector was selected together with the local stakeholders during the workshops by analysing points of strength and weakness of different economic sectors. The Regional catalyst is the innovating agency Menter Mon.

In term of governance the network of actors aggregated by the Menai Intelligent Tourism Network project will be regulated by a memorandum of collaboration that will facilitate stockholders collaboration in the first phase of the DE deployment. In a second stage – when the DE will become more self-sustainable – the idea is to have a Community Interest Company (CIC) to provide a more formal legal structure.

From a technological point of view, the DE of tourism sector is intended to use the DBE tool (or its further development by OPAALS) in term of infrastructure and then look for add-on services on the market. The local ICT supply base would be engaged in this way. The role of P2P and OSS is not yet defined, also the process of infrastructure and service maintenance and management have not been defined at the time of writing. But it has been decided that the services would be commissioned and owned by the project partnership.

The idea of reproducing the process carried on so far at national level has been explored and a national level-project has now be funded. In this context the local project described above will become a sub-project of the national one. The concept of DE is mentioned in the national (Welsh) innovation programme both in the ICT and the tourism sector, and this has been done during the Peardrop project; this offers a hook at political level for working more at local level.

Main problems encountered dealing with the difficulties to attract funds for the next stages of DE introduction (now the project is undergoing the evaluation process for securing national funds) and the complexities of working with different local innovation agencies and many different intermediate actors that often have different political agendas and act in a non-coordinated way, even with a certain level of internal competition. Aside from this, other difficulties meet were the fragmentation of the tourism sector and the economic crises that the island is undergoing. An additional challenge that the island is facing is retaining the young population that actually moves

away to London or other cities, in this context the DE can represent the emergence of a local ICT sector run by young who are interested in starting a business in this context.

3.2.10 The East Midlands experience (England)

This case has been carried on by CM International and shares many similarities in term of the process followed with the Welsh case (based on the Peardrop methodological toolkit). In East Midlands the sector chosen is the biomedical one, the local project of DE deployment was intended to pilot the DE as a regional policy tool with the biomedical sector with a view to potentially extending this to other sector. The project was started by the Nottingham City Council that was at the time, involved in a European clustering initiative called CLOE.

During the writing of an INTERREG proposal the local government came across the concept of DE. Even if then the project did not have the EU funds, the City Council decided to start working on the concept. Consequently, the feasibility study was financed with local funds. They were looking to further develop their policies through the creation of innovative and unique solutions for regional cluster policy development CM International carried out a feasibility study at regional level and selected the biomedical sector as the most promising for DE deployment. The project started as a process of networking among enterprises in the biotech sector and then it developed into a tool for supporting collaboration between biomedical companies, clinicians and the research departments of Universities. The deployment plan developed a design process for supporting clinical trials and the development of new products for surgery processes. A big achievement was the actual engagement of clinicians.

On the one hand, Nottingham has a big university hospital and a high number of clinicians. They do research and often they need new instruments for the surgery process and when they identify a need they do not know which enterpris is able to provide new instruments. On the other hand, the SMEs operating in the sector of the clinical trial do not have contact with the clinicians. So the DE can support these two processes. CN International used a mind-map based methodology (self-developed) in order to choose the sector and the objectives of the DE deployment.

In the future is intended that the project will be led by Medilink as the regional catalyst (together with the Nottingham City Council who started the process), as Medilink provide innovation support services to the sector in the region. The project will initial operate as an unincorporated association through the means of a collaboration agreement. At a later stage there will be a need for a more formal structure such as a limited liability company operating under a Memorandum and Articles of Association. Given the sensitive nature of the sector in question the use of non-disclosure

agreements and confidentiality clauses will be in place from the outset.

The DE deployment finalised the stage of DE development of a shared road-map.

From a technological point of view, this case is similar to the Welsh one so the infrastructure to be used is that of the DBE and OPAALS project and the service to be develop on top of the infrastructure will be sought on the market, and at local level by engaging the local ICT sector.

One of the problems encountered is the identification of funds for the actual deployment of DE.

3.2.11 The Argentina experience

The Argentina experience was promoted by the London School of Economics (LSE) in the context of the EU funded project Eulaks, in order to develop a DE for an industry sector that is not yet defined. The metal-mechanical industry sector is the most interested.

The Eulaks project started at the beginning of 2009 and ended in July 2010. It is a research network between Europe and Latin America dealing on DEs and the knowledge society. One work-package, led by LSE, was interested in creating a feasibility study on DEs in Argentina - specifically in the province of Buenos Aires - with the collaboration of the University and the Department of Industry.

In December 2009, the possible interest of the metal-mechanical industry sector was discovered. The cluster of the metal mechanical industry in the province of Buenos Aires was not well linked at the different levels of the value chain or with other relevant stakeholders in the region. The promoters though those linkages and collaboration could be increased efficiently by deploying a DE.

This case study was fundamentally a study at the research level. The focus was more on introducing the concept at theoretical level to the Latin American research community than to actually deploy the DE. The research objective was to develop a "manual" for DE deployment adapted to the Latin American reality. Consequently, the networking activity with local stakeholders was not too intense. No real institutions have been involved apart from some study visits we had together with our university partner with local authorities, SW SMEs, academic stakeholders and business SMEs. At the end of the project no decisions and particular initiatives were organised, and LSE is creating a manual for a future development of DEs in Argentina. The promoters finished the feasibility study with no particular expression of interest from the territory.

There are no particular innovation policies in Argentina to facilitate the

adoption of DEs. For the future, the DE is intended to be introduced first, through key stakeholders in the regional and then with a small number of software SMEs supported by the local government. If we consider the OPAALS model of DE adoption, we can position this case at the third step: socio-economic regional analysis. The second step, however, was not achieved but it was not the aim of the protagonist, to see the second step as a consequence of the successful achievement of a concrete action at local level and not as a pre-requisite.

Two official partners of the work-package were interested in DEs: LSE and a University in Buenos Aires. The University involved a public institution for competitiveness between enterprises. The University of Montevideo (Uruguay) has been also contacted.

A presentation of the Guigoh social networking tool (by Saulo Barreto) was organised. But the local researchers did not feel the benefits of the Open Source Software strategy and it was too early to concretely appreciate the P2P strategy.

Even if the technological aspect were not at the centre of any formal decision, the local actors are expected to own the technology and the networking process.

In terms of services, there has been a generic interest in knowledge management systems, in order to allow information sharing for business practices along the value chain. The promoter of the feasibility study is LSE. The possible future regional catalyst is not defined yet.

The team faced two difficulties: to find appropriate local people to work with (good network), and stay more close to them (geographical distance). The main lesson learned is that in Latin America tacit knowledge is very important and unstructured cooperation is more common than in the EU. A second lesson is that OSS can be considered only if it means something concretely to local stakeholders, because discussions on “democracy” are not considered as relevant. Regarding the future, the risk is that the work done for the feasibility study and the involvement of stakeholders will remain on the paper.

For further information please see Rivera-Leòn, Kataishi and Dini, 2010 and <http://www.eulaks.eu/document/665.html>

3.2.12 DEN4DEK and DE-LAN projects: goals and expectations of two European networks of regions interested in DE deployment

In this paragraph, we will briefly introduce two EU networks that aggregate European regions interested in the DE introduction at local level. Those two networks are engaged in two EU funded project: DEN4DEK and DE-LAN. We introduce these two projects – even if not directly engaged in the research we made so far – because they represent possible new cases of DE adoption at local level. None of the two projects have as a final objective the introduction

of DE but they both are concentrating on learning more about the DE approach and understanding the possibility of local deployment. More specifically, the regions engaged in DEN4DEK have as their main goal the development of a DE deployment plan and are currently finalising this work by selecting industrial fields of introduction and main local stakeholders. They are also promoting the concept at political level both in their region and in other territories in order to include the DE approach in the local innovation strategies. The DE-LAN project, started in 2010, with the aim of promoting the reciprocal learning among regions interested in the DE and Living Lab (also present in the DEN4DEK project) approaches. The final aim of the project is to pilot a DE introduction in each region. There follows a list of the regions engaged in the two projects. In both projects there are partners that participated to DE cluster projects such as DBE, OPAALS, SEAMSLESS and PEARDROP projects.

DEN4DEK: Techideas (coordinator), Lazio region (Italy), Aragon (Spain), Extremadura (Spain), Valencia (Spain), Basque country (Spain), Umbria (Italy), Galicia (Spain), Madeira (Portugal), East-Slovak region (Slovak), State Vorarlberg (Austria), Southern Great Plain region (Hungary), Helsinki region (Finland). In the network there are both direct representatives of regional governments and other organisations (such as innovation agencies and SMEs as T6 Ecosystems) that act as regional catalyst in their territories.

DE-LAN: Wales UK (coordinator) as lead partner, Castilla la Mancha (Spain), Vysocina, (Czech Republic), Piemonte (Italy), Lazio (Italy), Extremadura (Spain), Koroška (Slovenia) and Kaunas (Lithuania). Projects partners represent both regional government and other kind of organisations active at local level such as innovation agencies, universities, municipalities' associations and so forth. Eris@ (European Regional Information Society Association) is also a DE-LAN partner with the important role of disseminating project's activities and outputs.

For further information please see <http://www.den4dek.org/blog/> and <http://www.de-lan.eu>

3.3. Comparative analysis

In the following paragraphs we propose a comparison of the eleven cases so far described. In order to do this we will use a small number of variables that will support us in grouping the cases and describe the differences among them in a clear way. Of course we are aware of the simplification – the grouping - that this operation implies; we consider the classification proposed as a map useful in analytical terms aside from the fact that the analysed cases have many more points of contact and differences than those considered here.

3.3.1 DE and territorial adoption

The eleven experiences of DE development and/or regional adoption are very heterogeneous. In order to compare the presented cases we should first understand that some of them can not be comparable in terms of proper “DE and regional adoption”. We will clarify this in two steps.

First, the case of the ONE service (case 3) is not regarding a regional adoption. It is relevant because of the fact that the service has been developed through a project that is part of the DE cluster projects, and also because of the different strategy of DE development that it follows. The ONE project started with the analysis of a European and regional negotiation market of sub-contracts in the cooperatives services field. Nevertheless, even if there are some plans to introduce the ONE service in the Trentino region, the project did not stem from an organic regional needs analysis and local development strategy. Afterwards, the ONE service experience is relevant because it lays testimony to a different DE development model compared to the DBE/OPAALS ones: the opportunity to develop DE as web services detached from a specific local community.

Second, in the group of the remaining proper “regional adoption” cases, the Indian experience (case 6) does not really regard DEs as the DBE and OPAALS project defined it. This case is more accurately a knowledge ecosystems study on the basis of an interesting national project of ICT-facilitated development in the agricultural field. From this analysis emerge that it never considered or planned to deploy DBE or similar technologies in order to sustain an open and P2P-based ecosystem. Nevertheless, the Indian experience is relevant because it created the opportunity for reflecting on knowledge ecosystems in a concrete and already planned activity during the OPAALS project and succeeded in engaging a large and active community of users.

Table 8: DE experiences between DE technologies and regional adoption.

	DE technology	Not DE technology
Regional adoption	All the other 9 cases	India (case 6)
Not Regional adoption model	ONE (case 3)	/

3.3.2 Stages of DE adoption

The 9 regional cases without the ONE and India ones are – at least in the first plans – considering DBE/OPAALS technologies with a high degree of regional adoption. The first question is what stage of the regional development those cases are at.

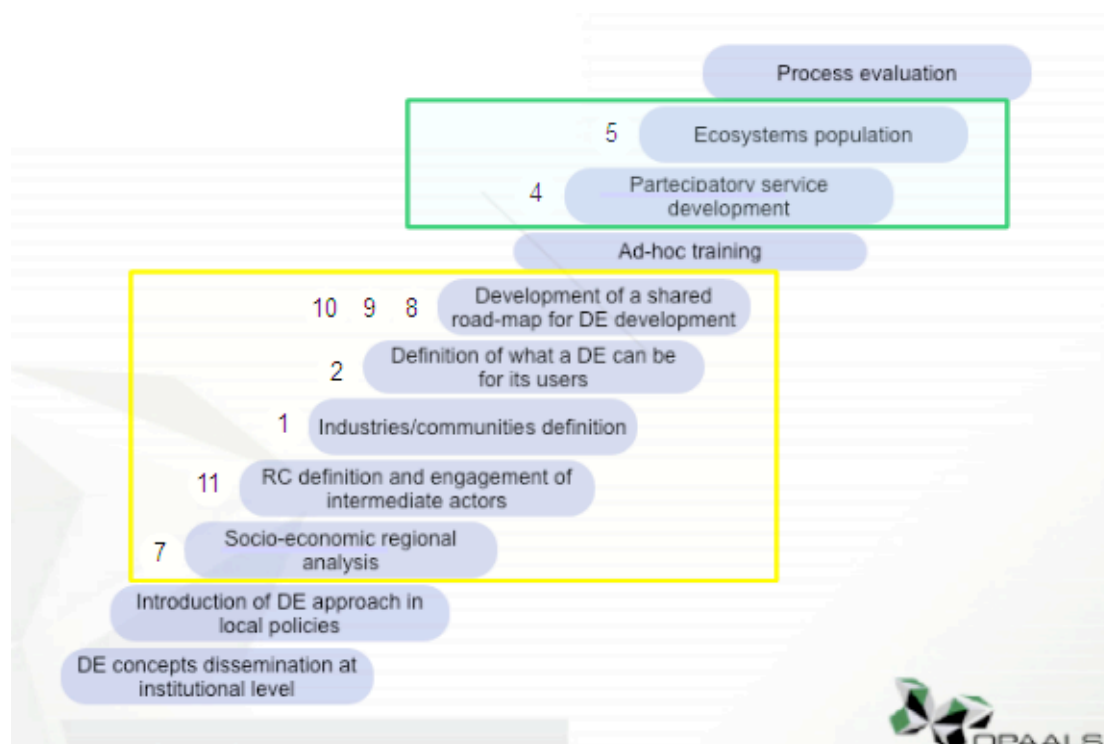


Figure 4: Stage of DE adoption for the 9 regional cases.

As represented in Figure 4 there are two groups of cases: with the green frame the Aragon (case 5) and Emilia Romagna (case 4) experience are the only ones that reach the stage of services development. The other cases (yellow frame) are between the “socio-economic regional analysis” and the “development of a shared roadmap for DE development”, therefore 7 cases out of 9 are still in an underdeveloped condition.

3.3.3 DE in public policies

The DBE dissemination model suggested engaging in negotiation with the local policy and decision-makers at the beginning of a territorial adoption process. What happened to the experiences reported in this study? Did the facilitators and regional catalysts try to introduce the DE idea into the local public policies?

Three cases tried and managed to formally introduce the DE approach in the local policies: Lazio, Aragon and Wales. In three cases the local facilitators did not try to formally introduce the DE in local policies or simply in publicly facilitated projects plans: India (case not focused on the DE approach), Cambridge and Greater Dublin Area. In the last two cases the local facilitators decided to avoid working for a formal involvement of the regional authority

because of its low relevance in the region and/or the trial for a more liberal and market oriented innovation.

Table 9: Level of local policies involvement in the DE regional cases.

Level of local policies involvement	Cases
Introduced in local policies	1 5 9
General public authority agreement as part of a project plan	2 3 4 10 11
No local policies or agreements	6 7 8

Finally 5 cases out of 11 did not manage to introduce the DE in the regional policies, but gained a general public authority agreement as part of a project plan for evaluating DEs in the territorial innovation. In three Italian cases (Trentino, ONE and Emilia Romagna) it is reported that the term DE is more concretely used as a buzzword by the public authority. Nevertheless, in the 6 cases the introduction of "DE" in one (or more) project plan(s) created the chance to work on the DE territorial adoption. In the case 4 (Emilia Romagna) the regional catalyst is currently (Spring 2010) working on a DE approach for local policies.

3.3.4 Technology infrastructure: the lack of bootstrapping tools

The OPAALS project comes after the DBE project, which had the mission to provide a first level of technological infrastructure (DBE technologies) for the first adoption cases and further research. What are the positions of the regional experiences on this point? What happened during the territorial adoptions?

As we explained before, two cases were centred on different technologies and did not consider the DBE ones from the beginning: ONE (case 3) opted for a totally different technology framework and developed a web service; in India (case 6) the project used different specific technologies. The other 9 cases started with the idea to apply the DBE technologies at least at the beginning of their adoption processes.

Depending on the maturity of the regional activities, all those cases are affected by a lack of concrete and affordable technologies. The more excellent experiences 4 and 5 (Emilia Romagna and Aragon) started working when the DBE project was running, therefore they had the chance and the time to involve stakeholders and conduct concrete activities, but the services and communities they developed can not work on the top of the provisioned (DBE) technology (in Aragon SMEs got the chance to develop and use the services on top of the DBE infrastructure and to test the OPAALS

infrastructure too, but both attempts have been mainly at research not at business level).

The 7 less developed cases that adopted a DBE technology approach (see yellow frame in Figure 4) are variously affected by a lack of affordable technology in the phase of territorial negotiation and planning. When the first political/high-level reflection has been positively conducted, it is difficult to convince operational people on the validity of DEs in absence of a concrete adoption regional case and of affordable and testable technologies. In many cases the DE facilitators started suggesting OPAALS technologies (OKS, Guigoh, Sironta, ...) DE web services (ONE) or developed their own services (Emilia Romagna case) to reduce this lack.

Finally, we can say that the lack of affordable bootstrap technologies is the most important problem for regions. It involves a double difficulty: it is a problem *per se* and it is a problem because it amplifies other difficulties in a regional development setting. For instance, it reduces the trust of local stakeholders, especially the more operational ones that avoid using DE as a buzzword, and it makes the problem of funding and economic sustainability explode.

3.3.5 Funding: between past and future

In terms of funding, all the regional cases have been co-financed by the EC through direct or indirect funds with the exception of the India case (case 6). In all the cases, with an exception of the Cambridge (case 7) and Argentina (case 11) the Local or National Government provided a quote of financing:

1. EC co-fund (FESR and FAS) + Local Government
2. EC co-fund (OPAALS and FSE) + Local Government.
3. EC co-fund (ONE) + Local Government + partnering institutions.
4. EC co-fund (SEAMLESS and INTERREG).
5. EC co-fund (DBE, OPAALS) + Local Government.
6. Government.
7. EC co-fund (OPAALS).
8. EC co-fund (OPAALS) analysis + Local Development Agency will finance the technology deployment (EC and venture capitalists).
9. EC co-fund (Peardrop and structural funds) + Government
10. EC co-fund (Peardrop) + Government / funding for next phase.
11. EC co-fund (Eulaks).

Only three cases, (Lazio - 1, Wales – 9 and East Midlands – 10) explicitly express concern regarding funding to continue the project. In fact the low level of regional activities implies that the continuation of the DE developments will hardly be self-sustainable. With an affordable

bootstrapping technology and a well organised local project all the cases should avoid the need of further European direct funds to reach their objectives. If, mainly because of the low level of the DE technology, most of the cases could not even try to really engage the local stakeholders in DE related activities, probably the same cases are not mentioning the need for future EC financing support. They probably did not reach this point of reflection, but it is the opinion of the writers that at the current stage of both DE technologies development and DE local actions, every regional experience will need Public support. Of course the public support can take different shapes: structural funds were still available, ERDF (European Regional Development Fund) and/or national funds will be needed even once the technology will be ready. In fact, feasibility study, networking, training, services development and other support activities need to be done and economically supported in any case.

4. Conclusions: DE deployment model and open questions

In this final section, we start with a brief summary of the analysis process. In the next few paragraphs, we provide a summary of the results and conclude with open questions from this first comparative study on DEs experiences in regions. Another output of this deliverable - The recommendations to policy-makers - is explained in Annex C.

The study started with the discussion of the DEs territorial adoption models that emerged during the DBE and OPAALS projects. The first and simpler DBE model is based on a linear process of territorial innovation composed of regional analysis, stakeholders and sectors to implement the DBE technologies, the definition of the relevant services and, finally, circles of pilot actions, evaluations and improvements. During the OPAALS project the previous model was improved to leverage on participatory methodologies and socio-technical facilitation sensibilities. Therefore the bottom-up component of the adoption was underlined and the suggested role of the Regional Catalyst (RC) became the “translator” of DE research into the ‘local language’ through an in-situ sense-making process.

Subsequently we consider that, though there are some RC ‘self-narrations’ of regional cases present in literature, the time is appropriate for a comparative analysis of several regional DE-inspired development experiences. This analysis is carried out to reflect on the cases with a common theoretical and methodological framework and with a focus critically on evaluating what is working, not working and why.

The analysis was planned in two steps: a first preliminary questionnaire was sent by email (see Annex A), and then a more focussed semi-structured telephone interview (see Annex B) was intended to deepen the knowledge on some specific issues. We considered 11 adoption cases: Lazio (IT), Trentino (IT), “ONE” service, Emilia Romagna (IT), Aragon (SP), India, Cambridge (UK), Greater Area Dublin (IE), Wales, East Midlands (UK), and Argentina. Most of the cases belong to the DBE and OPAALS regional community adoption; in addition, we considered some experiences linked to others DBE cluster projects (Eulaks, SEAMLESS, Pearldrop and ONE) and Den4Dek project.

The preliminary analysis was conducted according to some first level considerations. Most of the adoption cases adhere to the aim of providing new and more interoperable ICT solutions and aimed at fostering SME networking locally. Many sectors are considered suitable for the DE adoptions, but the tourism and biotechnology/biomedical sectors are the most rated. The technologies considered locally to support the DE are numerous and it

emerged as an item to consider in the second level of the analysis. Also various services are planned in the DE regional cases, but the maturity level of the experiences indicates that most of the planned services are hypothetical.

In terms of governance, investigation has been carried out both on the governance system of the DE experiences, and the planned/operating service management. The first is not yet defined as in the four experiences and most of the cases; participants are considering the creation, or involvement of a foundation, company or board to govern the system. Secondly, the self-organised services management suggested by the DBE project is being considered only by three cases and the other cases are working for more centralised solutions.

The in-depth analysis conducted in five levels of considerations:

1. *DE and territorial adoption.* The experiences are heterogeneous in terms of planned technology and regional attitude. The case of the "ONE" service consists in a web-based service not already linked to a region, and the "India" experience is not properly considering the DE infrastructure. Only nine cases worked for the application of DE technologies in regional contexts and are therefore comparable in this analysis.
2. *Stages of DE adoption.* Only two cases (Aragon and Emilia Romagna) reached the stage of the service development. The other seven cases are still at the first stages of adoption, between the RC definition and the development of a shared roadmap.
3. *DE in public policies.* In three cases (Lazio, Aragon and Wales) the facilitator tried and managed to formally introduce the DE approach in the local policies. In the other three cases (India, Cambridge and Greater Dublin Area) there were no trials to modify the local policies for a DE adoption. The remaining five cases reached a general public authority agreement as part of a project plan.
4. *Lack of bootstrapping technologies.* All the cases are affected by the lack of concrete and affordable DE technologies to sustain the first levels of regional development. It has been underlined as the main problem for regional activities because: (a) it is impossible to work on the adoption of technologies, (2) it amplifies other difficulties - like the trust relationships and funding for a sustainable future - in a regional development setting. The two excellent cases (Aragon and Emilia Romagna) started their activities during the DBE project and had the chance and the time to involve stakeholders and develop specific services that were tested and used by SMEs. In the case of Emilia Romagna an analysis has been carried out as to whether the services developed can run on top of the actual DE infrastructure. Due to this lack of technology, the other cases encountered difficulties in the involvement of operational people; therefore facilitators started suggesting the test of services such as Giugoh and Sirona while

waiting for the actual DE infrastructure.

5. *Funding.* Almost all cases have been co-financed by the EC (1 exception) and the Local or National Government provided a quote of financing (2 exceptions). Due to the lack of affordable bootstrapping technologies and the general low level of DE development, currently all of the cases are also affected by a low capacity for self sustainability. Therefore all of the cases are still in need of further public financial support in order to reach an adequate maturity level.

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Annex A: The preliminary analysis questionnaire



Dear colleague,

We would like to thank you in advance for the attention and the time you are dedicating to this questionnaire. By fulfilling it you will support our research that is part of OPAALS project and which aim is to map Digital Ecosystems (DE) experiences at territorial level. The final aim of our research activity is to develop a synthetic model of DE adoption and to provide policy-makers and experts with a DE's adoption How-To Guide. In order to reach this objective, the expertise you developed about DE will be of great support, thanks for sharing it with us!

This questionnaire will take you half an hour; please feel free to attach to it any document you think may help us in better understand your experience. If you need any support or clarification please do not hesitate to contact Dr. Francesco Botto and/or Dr. Antonella Passani at the following addresses:

francesco.botto@create-net.org

a.passani@t-6.it

A. ROLE AND PLANNING

Grounding data:

1. Name and Surname
.....
.....
2. Institution/company
.....
3. Did your organization participate in any of the Digital Ecosystems related projects? If yes, in which one/ones?
.....
.....
4. Have you been personally involved in any of the DE cluster's project? If yes, what was your role in the project? (add a line if you participated in more than a project and please specify project title)
.....
.....
.....
5. In which region are your DE-related activities focused?
.....

6. How can you describe the relationship between the institution you work for and the Public administration of the region in which your DE related activities are concentrated?

My institution is part of the regional authority	<input type="checkbox"/>
My institution is controlled by the regional authority	<input type="checkbox"/>
My institution is independent from the regional authority but has a long and stable subcontracting activity	<input type="checkbox"/>
My institution is independent from the regional authority but we have several projects financed by the region	<input type="checkbox"/>
We collaborate with the regional authority only for the DE related activities	<input type="checkbox"/>
We have no relationship with the regional authority	<input type="checkbox"/>
Other, please specify	<input type="checkbox"/>

Information on DEs:

7. When and how did you have the first knowledge on DEs?

.....

Projects:

8. What DE-related EU and regional projects are you working on?

.....

Strategy and methodology:

9. Which innovation strategy inspired you at the beginning of the projects?

.....

10. Is there any difference between the strategy inspired you at the beginning and the methodology you adopted/are adopting?

.....

B. PROJECT START AND ACTUAL SITUATION

Initial situation:

11. Please describe the initial situation which you intended to modify through the application of the DE approach

.....

Sectors:

12. On which sector(s) is the

innovation focused?

.....

Actors:

13. What kind of socio-economic actors are involved? How many for each category?

Typology of socio-economic actors	Number of actors involved

14. What is the specific role of the actors?

.....

First DE idea and changes:

15. How the DE was intended to be introduced?

.....

16. Did you modify the first strategy of DEs introduction and, if yes, how?

.....

Actual situation:

17. At what stage of DE adoption are you in? (Please refer to the DE adoption schema below and add comments as necessary)



.....

C. THE DE. IN THE CASE-STUDY

Communities:

18. Which pre-existing off-line communities the project is based on?

.....

19. How do (or should) the communities interact on-line?

.....

Governance:

20. What is the governance system of the ecosystem?

.....

Expected impact:

21. What are the expected impacts on the socio-economic development of the region and when are they expected to happen?

.....

.....
.....
Infrastructures:

22. What technologies will support the DE?
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.....
.....
.....

23. What is the role of P2P and why?
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24. What is the role of OSS and why?
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.....

25. What is the role of the local actors for the creation, personalization and management of infrastructures?
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.....

Services:

26. What services are planned to be developed or made available in the DE?
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.....

.....
27. Who manages the services and how?
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.....

28. What is the state of the art of services adoption?
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29. What is the Business Model of the services?
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.....
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.....
.....

Knowledge:

30. What impact are you expecting in terms of knowledge sharing?
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.....
.....
.....
.....

Thanks you!

Annex B: The semi-structured interview

OPAALS D11.14 - 2nd phase data gathering: semi-structured Interview

In an open discussion on the regional case study, try to satisfy the following points:

- 1) Activities** for the development of the DE (when, who, what, how...) in past/present/future.
- 2) DE as part of the **local innovation policies**:** if, how, allocated budget.
- 3) Detailed list of **stakeholders**** divided in public-influencers-catalysts (less detailed about research centers and enterprises), with:
 - a) Name
 - b) Affiliation (public,...)
 - c) Role
 - d) When entered
 - e) Activities past/present/future
 - f) Level of involvement
 - g) Risks related
- 4) Detailed list of **technologies**** involved with (i) description (distributed/centralized,...), (ii) motivation (iii) state of the art (planned, defined, implemented,...), (iiii) risks and related difficulties. Suggest in case:
 - a) web portal,
 - b) social network,
 - c) DBE/OPAALS tools,
 - d) Specific services apps,
 - e) P2P
 - f) OSS
 - g) Other...
- 5) Detailed list of **services**.** Services and DE services (distributed): description and state of the art (planned, defined, implemented, ...).
- 6) (**Governance 1**)** Who is managing the process of DE creation and how (settings, rules, roles, ...).
- 7) (**Governance 2**)** Who will manage the DE and how.
- 8) How is the process being **financed** and how it will?**
- 9) Past and ongoing **difficulties** and lessons learned.**
- 10) Future **risks** and further actions to reduce them.**
- 11) "During the different phases of DE implementation did you use any socio-economic **methodological tool** such as interview, balance scorecard, focus group etc etc?"**

Annex C: Recommendations to RCs and policymakers

In this short Annex we develop a series of recommendations for policy-makers and practitioners interested in the local deployment of Digital Ecosystems. In this deliverable we described the DE adoption process and the experience carried out and still ongoing in many European territories. The reader may consider the deliverable as the first access point to DE adoption practises, but he will need to look at other documents in order to develop a sufficient level of understanding about what a DE is from a theoretical, technological and socio-economic point of view. A first important access to this kind of knowledge can be found on the OPAALS-OKS portal: <http://www.opaals-oks.eu>. We recommend to start from the information toolkit available at the following address: <http://www.opaals-oks.eu/about-opaals/downloadable-toolkit.html> especially the "Engagement & interest groups" section and the Power Point presentations in the digital Ecosystems & OPAALS section.

What is the purpose of these recommendations?

At the current time, the DE infrastructure has been tested and some services are already available, the research on DE achieved important results and there is a vital community of researchers and regions working *on* and *with* the DE concept. Even so you will not find an object called "DE" ready to be instantiated at local level. DE is a socio-technical process that needs to be translated in the local reality and that still needs a substantial effort in terms of technological development and social capital fortification. What follows is a list of considerations that the writers think should help you in starting and conducting the DE deployment in a successful way. These recommendations have been developed considering the lessons learned from the last years of research and activity at local level.

1. DE is a socio-technical process for local sustainable development. In this sense it is important to consider it as a circular, iterated process that needs monitoring, evaluation and reflexive methodologies capable of rethinking and fine-tuning the process accordingly to emerging needs of local stakeholders.
2. DEs need to be translated in the local language/interests of your territory. You can use the "label" DE in the political arena and you will find many support documents. However when working with local SMEs, intermediate actors or software development teams, you will need to go behind the label and use a language that makes more sense for your users. This translation exercise is one of the main duties of a Regional Catalyst. It is also necessary to make explicit the links and the complementarities between the DE introduction and other local activities of innovation. This will allow you to propose to your

audience/beneficiaries a more coherent map of local development.

3. Use existing technologies in line with the research outputs of the DE research community. If you are starting your DE adoption activities when the DE infrastructure is not yet finished and stable, you can start the process by using existing technologies. This needs to be done, however, in line with the research outputs in order to be ready to take advantage of the DE infrastructures and services once ready. It is important to plan the DE deployment keeping in mind the necessity to have a distributed, decentralised and open environment and making explicit use of the Open Source Software (F/OSS) approach and software. You can find references about OPAALS infrastructure in the following document "Consensus Detailed Architecture of the OPAALS DE" available in the SMEs & Software Developers section of the OKS (<http://www.opaals-oks.eu/about-opaals/downloadable-toolkit.html>). References about DE software are reported here: <http://www.opaals-oks.eu/about-opaals/downloadable-toolkit.html> in the "OPAALS Software 'How-To's' section"
4. The Regional Catalyst is neither a person nor an institution, it is a role, a function. Please consider the possibility to build up a multi-disciplinary team that takes the responsibility of this role in a collaborative way. Particularly, it emerged that the DE deployment is more effective and straight forward in those territories in which political, networking and technological competences are co-present in the team. A technical team seems to be particularly important in this phase in which the DE infrastructure is still in a development phase, with good technological competences in your team you will be able to understand the research outputs promptly.
5. Consider Free and Open Source Software (F/OSS) not only as a special approach to technology but also as a market and opportunity for the region. DE should not be separated by a process of F/OSS diffusion at local level. Moreover, the literature and the business model developed by the OSS community can be of great inspiration and help in making you DE self-sustainable.
6. Consider the possibility to carry out a feasibility study before starting the DE deployment. The DE research community developed and tested several methodologies that you can use for your feasibility study and DE deployment plan.
7. Consider the possibility to test the DE in one industrial sector first (or even with a small group of SMEs) and then to spread it to other sectors. In a similar way, also the number and the complexity of DE services can be added step by step, but a core of services needs to be in place at the stage of ecosystem population in order to support the bootstrapping phase (an empty DE is not going to be attractive). You can find some use cases at the following address, these can help you in imagining your DE: <http://www.opaals-oks.eu/about-opaals/downloadable-toolkit.html> "use cases section"

8. Nurture the pre-existing social capital: a successful DE is one that is capable of engaging the highest number of users possible. In order to do this you need to engage, first, local intermediaries and pre-existing clusters and communities. DEs will improve the social capital of your territory, but need to start from pre-existing business, social and knowledge networks and hubs. Recognising such pre-existing networks is part of the DE deployment plan development and also in this case you can find interesting methodologies already tested by the DE research community.