Knowledge Dissemination from the European Institute of Innovation and Technology

Centre for Economics & Policy
Working Paper 2008/2

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June 2008

Centre for Economics and Policy

Working Paper Series

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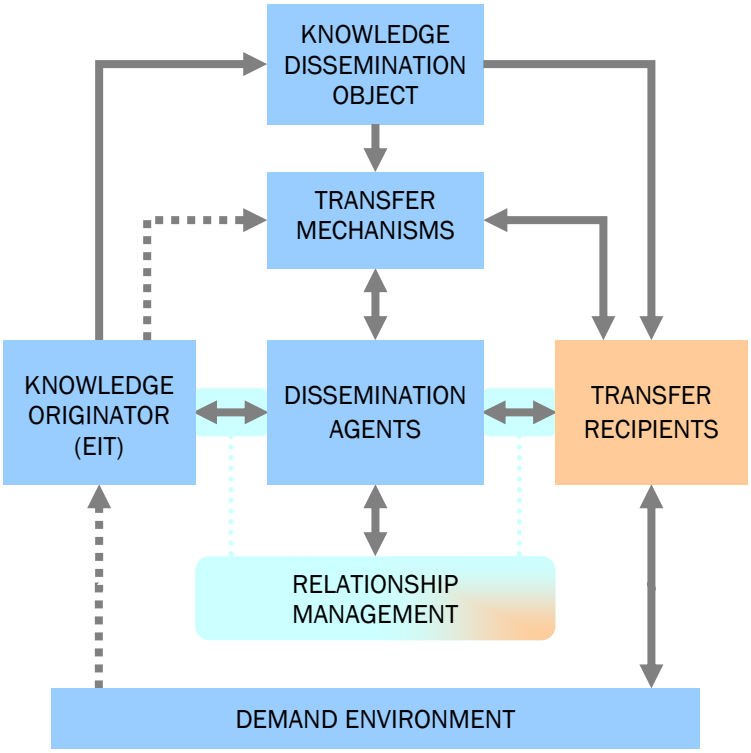
Summary

This paper explores the issues related to the dissemination of knowledge originating from the EIT and outlines the elements of potential structures the EIT may deploy to disseminate its knowledge outcomes.

The European Institute of Innovation and Technology (EIT) will require effective structures for disseminating knowledge throughout the knowledge triangle of higher education, research and innovation. In particular, a clear interface to business is needed to support industry-based innovation exploiting the EIT's knowledge outcomes.

Since no proposals for structuring dissemination activities have been put forward, we have developed an initial framework which outlines the elements affecting the knowledge dissemination process and the relationships between them; by making explicit the issues to consider, the framework below provides a potential guide for structuring knowledge dissemination activities.



As seen in the framework, potential knowledge dissemination schemes will need to consider aspects such as the EIT itself as an excellence-driven knowledge originator, the demand environment for knowledge, the choice of dissemination agents who carry out knowledge dissemination, and their own choices of the mechanisms they use to disseminate knowledge in its various forms.

Evaluating effectiveness will be a key component of any dissemination schemes. Choosing criteria aligned to the EIT objectives of promoting innovation for growth, developing human capacity and improving the exploitation of outcomes can drive forward knowledge dissemination efforts, while reaching for easy-to-find but less appropriate indicators threatens to misguide them.

Knowledge dissemination schemes will need to be tailored to each context of application and to each class of intended recipients. For example, SMEs (which could form a major focus of knowledge dissemination) have specific needs which must be found and addressed by such schemes.

Specifying the recipient target groups and investigating their needs will be essential towards building robust knowledge dissemination structures for the EIT. Developing appropriate indicators for knowledge dissemination effectiveness which are tractable for evaluation yet aligned with the EIT's objectives will also be useful. Validating the framework in an actual *knowledge triangle* setting, such as that provided by the four "Pilot projects for cooperation between European Institutes of Technology", will be an especially suitable next step.

List of Acronyms

CIP	Competitiveness and Innovation Framework Programme
EIT	European Institute of Innovation and Technology
FP7	7th Framework Programme for Research
JTI	Joint Technology Initiative
KD	Knowledge dissemination
KIC	Knowledge and Innovation Community
R&D	Research & Development
SME	Small- and Medium-sized Enterprise

Acknowledgements

This report would not have been possible without the contributions of the many individuals in the European Institutions and the studied organisations who gave their time generously to the February-May 2007 research project. The author would like to thank Finbarr Livesey, Eoin O'Sullivan and Tim Minshall at the Institute for Manufacturing for their critical feedback and insightful discussion. Input from Céline Domecq at the European Parliament, and Maria Velioti at the University of Peloponnese is also gratefully acknowledged. Any errors are obviously the responsibility of the author.

1 Introduction

The European Institute of Innovation and Technology (EIT) will require effective structures for knowledge dissemination[1] (KD) throughout the *knowledge triangle* of higher education, research and innovation. In particular, a clear interface to business is needed to support industry-based innovation exploiting the EIT's results. However, no systematic framework for such dissemination activities has been put forward. *How can the EIT disseminate its knowledge outcomes?*

As a first step, this paper presents the results of a short research project focused on how the EIT could disseminate knowledge to the business community, and especially Small- and Medium-sized Enterprises (SMEs)[2]. As the knowledge-based SME community accounts for a fifth of all economic activity in the EU[3], fostering its links with the EIT is desired in order to promote the Lisbon strategy goals of innovation and long-term economic growth[4]. The project investigated institutions combining research, education and industry interaction (the "supply side" of knowledge dissemination), while focusing on their interface with business illuminated the role of SMEs as a "demand-side" community in the KD process.

A key outcome was a framework outlining the elements affecting the knowledge dissemination process and the relationships between them. The framework provides a potential guide for formulating KD structures and measuring their effectiveness by making explicit the issues to consider, particularly in the context of the EIT.

For readers unfamiliar with the EIT's structure, a brief description[5]: the EIT's activities will be carried out by a number of Knowledge and Innovation Communities (KICs) – partnerships of higher education institutions, research organisations and companies. KICs

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[1] *Knowledge dissemination* is defined as "*managing the way knowledge is shared within an organization to encourage innovation or action on the part of the knowledge receiver*", viewing the entire system of the EIT and its knowledge triangle stakeholders as the said organisation: Yang, J. (2005). "Knowledge integration and innovation: Securing new product advantage in high technology industry" *The Journal of High Technology Management Research* **16**(1): 121.

[2] Conducted at the Centre for Economics and Policy between February and May 2007, the project studied the knowledge dissemination process from organisations combining research and education activities with industry links: Georgopoulos, G. (2007). *Investigating options for structuring the interface with industry for the proposed European Institute of Technology*. Industrial Systems, Manufacture and Management Thesis. Institute for Manufacturing, University of Cambridge.

[3] The knowledge-based economy is defined as the aggregate of knowledge-intensive services and medium-high-technology and high-technology manufacturing. Sources: Eurostat (*Science, technology and innovation in Europe* 2006. Industry, Trade and Services database 2005). OECD (*Science, Technology and Industry Scoreboard* 2005).

[4] EUROCHAMBRES (2006). *Updated position on European Institute of Technology*. Association of European Chambers of Commerce and Industry.

[5] More detailed information can be found on the official EIT website: http://ec.europa.eu/eit/

will be selected, evaluated and coordinated through contractual agreements by a Governing Board, which will also set the EIT's strategic priorities.

This paper is structured as follows:

- Section 2 presents a possible **framework** for structuring knowledge dissemination from the EIT, illustrating the factors which affect the knowledge dissemination process
- Section 3 considers the opportunities and threats with regards to **evaluating the effectiveness** of the EIT's knowledge dissemination efforts
- Section 4 highlights the **need for specification** in knowledge dissemination structures
- Section 5 deals with **SME-specific issues**
- Section 6 discusses the **conclusions** of this paper and outlines areas for further work.

It should be noted that the findings presented in this paper are not based on large-scale data analysis but on in-depth study of knowledge dissemination from a limited number of organisations. The selection of these organisations was deliberately biased to focus on the combination of research, higher education and industry-facing activities, within the practical constraints imposed by the time-frame of the study. Consequently, this paper should in no way be interpreted as presenting an exhaustive framework of the options available to the EIT for disseminating its knowledge outcomes. Rather, this paper aims to provide a starting point for more comprehensive research, which can then inform the structure of the EIT's knowledge dissemination schemes.

2 An EIT Knowledge Dissemination Framework

This section introduces a possible framework for structuring knowledge dissemination from the EIT. The framework is presented in the diagram overleaf (Figure 1); it consists of six main elements, illustrating the factors which affect the knowledge dissemination process:

- *Knowledge Dissemination Object*: what is being disseminated – the forms which knowledge takes (e.g. Intellectual Property or human expertise)
- *Transfer Mechanisms*: how knowledge is disseminated, closely linked to the forms of knowledge (e.g. licensing or spin-offs)
- *Knowledge Originator*: the organisation from which the knowledge originates (for example the EIT)
- *Dissemination Agents*: the organisations (e.g. the EIT itself or other intermediaries) which transfer knowledge from the originator to the recipients, making use of *Relationship Management* strategies to connect organisations across the dissemination chain
- *Demand Environment*: the external factors which can affect demand for the disseminated knowledge (e.g. other Community initiatives)
- *Transfer Recipients*: the organisations which receive the disseminated knowledge (e.g. SMEs).

The framework elements contain possible examples of what these factors might correspond to in actual knowledge dissemination structures (in grey). These will be explained in more detail in the following sections.

Throughout this section, the more general discussion of the framework is supplemented by examples arising when considering the particular case of knowledge dissemination to SMEs. As these examples also serve to outline a number of more general opportunities and threats for the EIT's knowledge dissemination structures, the following sections offer some thoughts on how these can be tackled.

A word of caution: this framework is intended to be contextualised for each individual setting, in order to produce appropriately tailored KD schemes; it was not designed for blanket application. By outlining a number of options, the framework invites the implementer to consider their relative merits, and to evaluate how appropriate (i.e. supportive of the EIT's strategy) each combination of options would be for application to each individual setting.

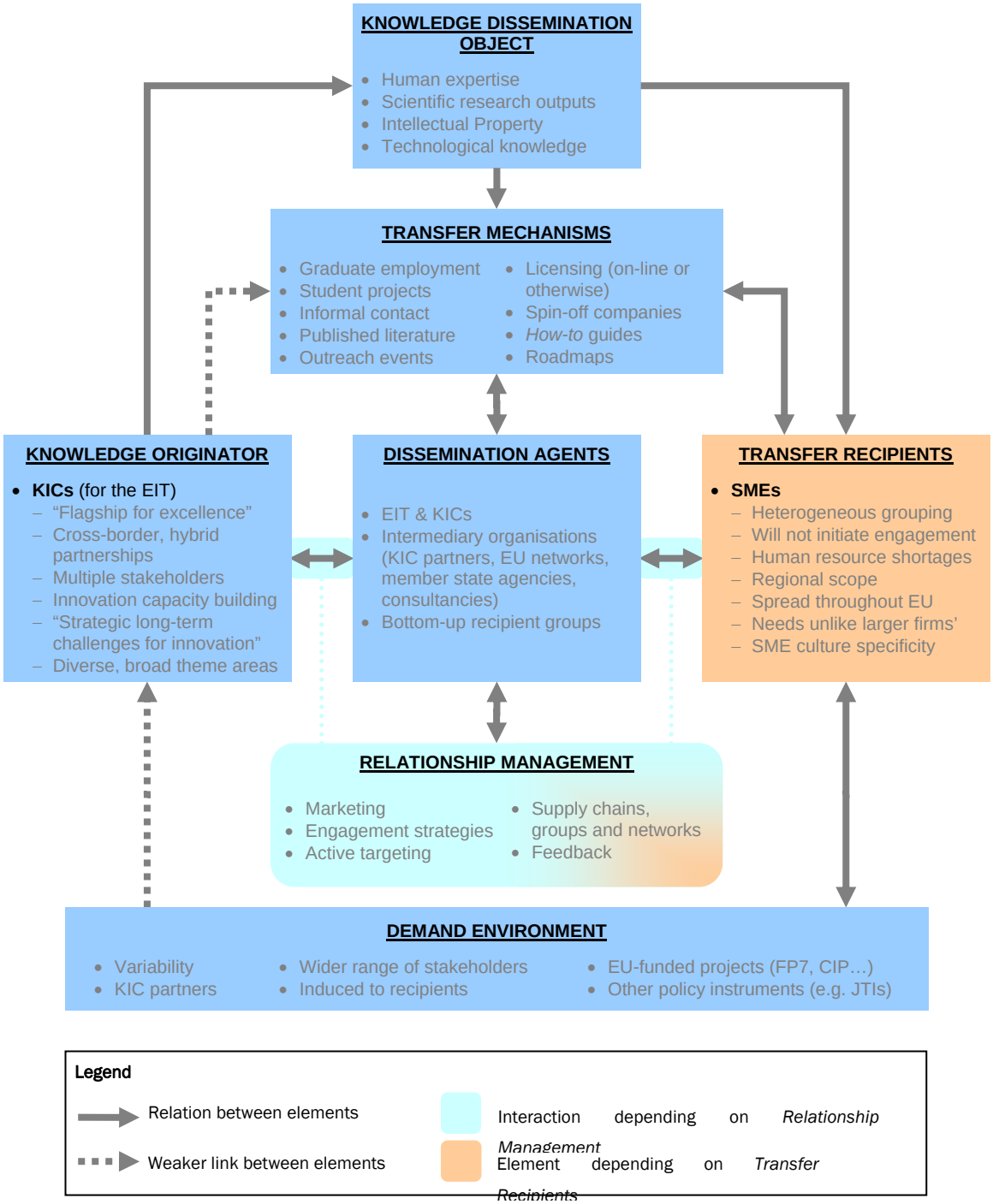

Figure 1 – Framework for the EIT's knowledge dissemination process[6]

[6] Building on and adapted from research in Bozeman, B. (2000). "Technology transfer and public policy: a review of research and theory." *Research Policy* **29**(4-5): 627.

2.1 Knowledge originator: Branding with excellence

The vision of the EIT as a flagship for excellence bodes well for knowledge dissemination activities. A strong brand image – built on excellence and appropriately developed and exploited – could be the EIT's greatest asset in aiding such activities. A transcending theme that emerged from the research was that association of the *knowledge originator* with a brand of "excellence" facilitates KD.

The benefits of a positively recognised brand are threefold: it lends prestige and credibility to the disseminating organisation, which make the targeted recipients more willing to engage; it allows it to attract high-calibre staff, who can ensure the quality of the activities; and it attracts a high standard of students, who can transfer knowledge effectively through student projects[7].

The first of these benefits is especially important for KD to the private sector: companies, and especially SMEs, are motivated to associate with "excellent" institutions in order to build their own reputation and signal their competencies[8].

2.2 Demand environment: Making knowledge desired

Knowledge dissemination cannot take place without recipients, and recipients exist in a wider environment of demand for knowledge. As such, the *demand environment* forms the base and can determine the success of knowledge dissemination schemes. The level and nature of demand for EIT knowledge products will vary depending on the actions of several agents.

The KIC partners are the agents closest to the EIT whose actions are likely to affect demand, as they will shape the KIC programme and knowledge areas. Through this involvement, KIC partners will likely make knowledge outputs in these areas more valuable in general, thus creating demand incentives.

Other Community programmes can also enhance the demand environment, offering opportunities for complementarity and synergy with the EIT's KD activities. Programmes promoting research, development and innovation activities in specific areas create a favourable demand environment for knowledge outcomes which contribute to these activities. For instance, demand would likely be created for EIT knowledge outputs which are relevant for work in the areas targeted by the 7th Framework Programme (FP7) Joint

[7] Wicksteed, B. (2007). *Institute for Manufacturing, Cambridge University 1991 - 2007*. The Gatsby Charitable Foundation.

[8] Fontana, R., A. Geuna, et al. (2006). "Factors affecting university-industry R&D projects: The importance of searching, screening and signalling." *Research Policy* **35**(2): 309.

Technology Initiatives (JTIs); in turn, exploiting these outcomes would advance the JTIs' objectives. Similarly, the Competitiveness and Innovation Framework Programme (CIP) is likely to create demand for EIT knowledge if its focus areas of eco-innovation, ICT and energy are advanced by the outcomes of particular KICs (which is probable, considering the first KICs are likely to focus on "*climate change, renewable energies and the next generation of information and communication technologies*"[9].

Beyond the EIT's immediate focus, a wider range of stakeholders can influence the demand environment. Regions can create localised demand for certain outcomes by pursuing cluster policies which focus on related areas. Industry-wide trends, in terms of e.g. emerging markets, can similarly increase the demand for knowledge which can confer competitive advantage to the companies using it. And finally, the demand patterns of public procurement and final consumers are shaped by broader societal trends, thus indirectly influencing demand for knowledge outputs[10]. For example, the growing awareness of environmental and climate change issues led to the rapid growth of the "clean-tech" industry, which creates a mass of demand for "green" and low-carbon technologies. Among other trends, population ageing will create a demand for e.g. assisted living solutions, which can in turn increase demand for the knowledge enabling such solutions to be produced.

Finally, the EIT itself can proactively shape the demand environment for its knowledge outcomes. For example, the EIT can induce demand for its outputs in SMEs who could be potential licensees for EIT-produced IP; one possible dissemination mechanism involves expert staff working with SMEs to identify how their needs could be met through a KIC's work (see section 2.4). R&D-intensive SMEs, such as those participating in the recently-launched Eurostars programme, would be prime candidates for such an initiative. Another approach is to indirectly stimulate demand through marketing-oriented plans[11].

2.3 Dissemination agents: KD – by whom?

The knowledge dissemination process can be carried out by a variety of agents: directly by the KICs, through intermediate organisations acting as secondary dissemination agents or through bottom-up recipient groups. Each type of agent has different strengths and weaknesses, such as trade-offs between scale of operations and adaptability to the EIT KD needs. By managing these trade-offs, a KD structure can be created to combine the

[9] EIT website: http://ec.europa.eu/eit/ (accessed 27/3/2008)

[10] Marshall, K. P. (2005). "An Overview of Potential Government Impacts on Technology Transfer and Commercialization." *Journal of Nonprofit and Public Sector Marketing* **13**(1-2): 3.

[11] For examples and elements of such marketing plans, see Piper, W. S. and K. P. Marshall (2000) "Stimulating Government Technology Commercialization: A Marketing Perspective for Technology Transfer." *Journal of Nonprofit and Public Sector Marketing* **8**(3): 51.

strengths of each approach – providing a structure with high flexibility and wide reach while using a minimum of resources.

An obvious option is for the KICs to contact the potential recipients directly, essentially creating an EIT KD network. In this case, the adaptability-scale trade-off will likely favour adaptability: scale will be necessarily limited by the KIC's own resources. On the other hand, the EIT can design such KD schemes *ab initio*, ensuring their suitability to KD needs and the flexibility to adapt to changes in the future. Research indicates a number of important factors for successful networks[12]: KD is mediated *via* personal relationships within the network (e.g. in-person meetings), requiring early development of the associated "human infrastructure"; networks flourish through relative autonomy and loose central control; and greater identification of the participants with the network enhances the network's benefits for the participants.

Another option is to disseminate knowledge to intermediary organisations, who will then act as secondary dissemination agents. A number of possible intermediaries have been identified:

- *Member State agencies*: State or local government bodies already exist to provide knowledge, particularly in support of industry (e.g. the Manufacturing Advisory Service in the UK).
- *EU networks*: Several EU instruments (such as the Competitiveness and Innovation Framework Programme) have established networks which disseminate knowledge to various recipients, for example the recent Enterprise Europe Network (which has a particular, although not exclusive, focus on companies and especially SMEs).
- *KIC partners*: Universities and research institutions often have already established dissemination activities. Similarly, companies (especially the large industry leaders likely to partner in a KIC[13]) have established relationships with potential recipients. For instance, SMEs often act as suppliers of products, technologies and R&D to such large, multi-product, multi-technology multinationals[14].
- *Consultancies*: Operating in a KIC's area of interest, consultancies can disseminate KIC-originating knowledge to their customers. This can happen in a way similar to

[12] Research on the UK Knowledge Transfer Networks conducted by Prof Ed Bond, Foster College of Business Administration, Bradley University. See for example Bond, E. U., III, M. B. Houston, and Y. Tang (2007). *Establishing a High-Technology Knowledge Transfer Network: The Practical and Symbolic Roles of Identification*. Unpublished manuscript. Bradley University. Peoria, IL.

[13] EUROCHAMBRES (2006). *Op. cit*.

[14] Coombs, R. and L. Georghiou (2002). Research and Development: A New "Industrial Ecology". *Science* **296**(5567): 471.

how e.g. the IMP³rove tool (part of the Europe INNOVA initiative) is offered to innovation management consultancies.

By making use of these intermediaries' resources, KD can be effected at a much larger scale than directly, therefore multiplying the impact of the EIT's own KD schemes. The trade-off for this approach is reduced flexibility, due to dependence on the existing dissemination schemes employed by the intermediary organisations. Synergies are possible, as the KIC offers the knowledge product, while the intermediary provides the dissemination process; in a mutually beneficial arrangement, the KIC benefits from a wider KD reach, while the intermediary enriches its own portfolio.

Finally, a particular form of secondary dissemination agent can be formed bottom-up by interested recipient parties – similar in a way to trade associations, for example. Being less formalised than the ones discussed previously, such receptive channels for KD can have considerable flexibility, thanks to their autonomy and bottom-up origins. With the appropriate cultivation of interest and provision of support (e.g. managerial resources) by the EIT, such bottom-up groups can reduce the KD workload of the EIT by taking over contact with individual recipients. In addition, such groups are naturally interactive and sources of valuable feedback on the KD process, contributing to its continuous improvement.

2.4 Knowledge dissemination objects & transfer mechanisms

Each different form of knowledge outcome is suitable for dissemination through different mechanisms; Table 1 (p.14) presents suitable mechanisms for various examples of knowledge dissemination objects, and details about their use. In order to give concrete examples, the case where SMEs are the recipients is explored in detail; however, many of the mechanisms can also apply to other types of recipients.

Mechanisms can require varying amounts of effort from the dissemination agents, and have differing degrees of specification to the transfer recipients; this is schematically represented in Figure 2 (overleaf), which is based on case study evidence. Specification is also inversely correlated to reach – mechanisms which are more tailored to the recipients are necessarily limited in reach to a smaller audience, and vice versa. It should be noted that the placement of mechanisms along the specificity and effort axes is approximate and indicative, with their exact placement depending on how they are implemented.

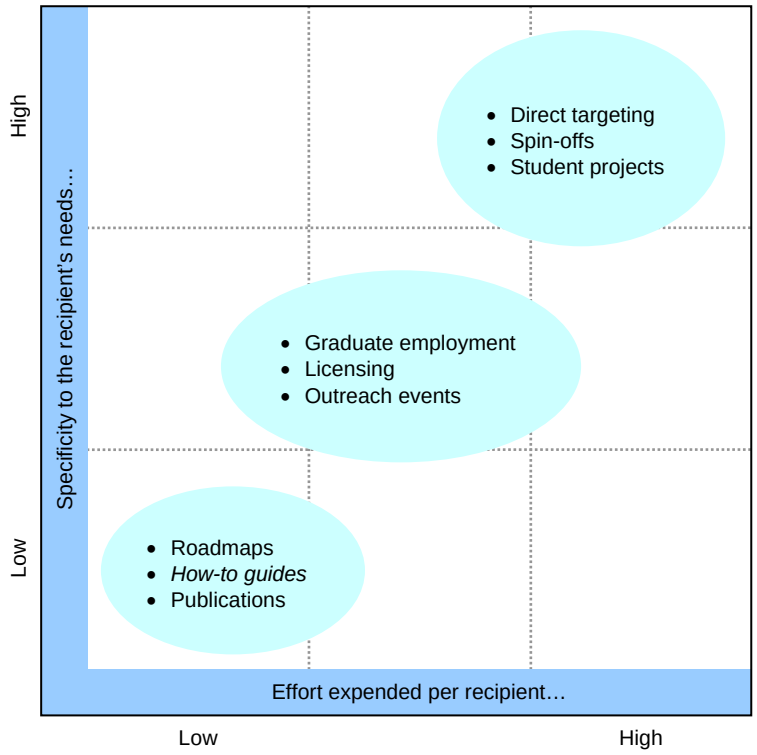

Figure 2 – Effort/Specificity classification of transfer mechanisms

Form of knowledge and examples[15]		Suitable transfer mechanisms	Details
Human expertise	Graduates	Student projects	• Market-led, focusing on host company's issues; attractive to SMEs because they offer additional resource • Enabled by KIC education mission, and also contribute to education mission • Require effective knowledge transfer between research and education[16]
		Graduate employment	• Student projects can be a precursor to employment after graduation • Specific facilitating schemes also possible: e.g. company-led "club" helping its members recruit EIT graduates[17]
Scientific research outputs	Publications	Published literature	• Produced almost automatically, but SMEs must look for it – or be directed to it
		Outreach events (e.g. conferences)	• Multiple regional-focus events inviting local SMEs (e.g. "road-show" model) • Several tightly specified topics within KIC's broader area of interest • Present outputs in conferences with SME attendance • Smaller-scale, interactive events to promote exchange of ideas • Dedicated support for organising
Intellectual Property (IP)	Designs, inventions, patents…	On-line licensing scheme[18] (SME "pull")	• Ready commercialisation: cheap, quick and easy • SMEs must be made aware of technologies and how they can benefit
		Direct targeting of SME licensees (EIT "push")	• Experts working with SMEs to identify their technological needs which can be fulfilled through the KIC's work[19] • Resource-intensive, high engagement and potential benefit
		Spin-off companies	• Encapsulate knowledge and potential for developing into innovative SMEs
Technological knowledge	Future trends	Thematic roadmaps (e.g. industry-level)	• Disseminate future trends and directions for technological development • On-line availability to wide audience, can guide entire industries
	Codified expertise	*How-to* guides on specific topics of interest	• Ready-to-use material, guiding SMEs on the application of specific know-how • Minimal burden on user, disseminate fairly limited information to wide recipient base

Table 1 – Knowledge dissemination objects and suitable transfer mechanisms

[15] Based on and adapted from Tindemans, P. and L. Soete (2007). *Assessment of the feasibility and possible impact of the establishment of a European Institute of Technology*. IP/A/ITRE/ST/2006-11. European Parliament.

[16] Ford, D. W. (2007). *The development of a new university-industry knowledge transfer model.* Manufacturing Leaders Programme Thesis. Institute for Manufacturing, University of Cambridge.

[17] For an existing example and detailed guidelines, see Allott, S. (2006). *"From Science to Growth": What exactly is the mechanism by which scientific research turns into economic growth?*. 2006 City Lecture, 6 March 2006. Hughes Hall, University of Cambridge.

[18] See for example the University of Glasgow's online licensing system ("Innovative Licences & Technologies") at http://www.innovativelicences.com

[19] See for example the InnovationXchange schemes; an implementation in Europe is the IXC-UK piloted by the University of Birmingham. IXC-UK (2007). *Paper for the HEIF 3 meeting 15th March 2007*. IXC-UK website: http://www.ixc-uk.com.

3 Evaluating effectiveness: Four opportunities & a threat

As with other aspects of the EIT's operations, the effectiveness of knowledge dissemination activities is expected to be monitored in order to ensure their contribution to fulfilling the EIT's objectives in an optimal way. In addition, the effectiveness of KD from the EIT is likely to be understood and measured in multiple dimensions. With input from an effectiveness evaluation model[20], five such dimensions, or criteria, were identified by analysing the EIT's probable characteristics from the legislative documents:

- *Economic Development*: evaluates KD-induced economic growth in the targeted regions (i.e. the EU)
- *Human Capital*: considers human capacity building and development towards performing the activities supported by KD (e.g. research, education, innovation)
- *Opportunity Cost*: examines
  (a) whether the resources deployed for KD could have been better put to alternative uses and
  (b) the potential impact of KD on any other activities of the dissemination agent
- *Participation/Interaction/Feedback*: presents a recipients' view of KD effectiveness, reflecting their own expectations, satisfaction, perceived benefit and value of knowledge gained
- *"Out-the-Door"*: regards the existence and scale of knowledge dissemination activities as an indicator of effectiveness, regardless of outcome.

Each of these has individual merits and problems, and one (*Out-the-Door*) presents a risk. As a result, an evaluation structure will likely consider several or even all of the above in order to be effective, using complementarities between the criteria to exploit their respective merits, mitigate more problematic aspects and manage associated risks. Table 2 (overleaf) outlines how the effectiveness criteria originate in the EIT's probable characteristics and comments on their merits, problems and risks.

[20] See Bozeman, B. (2000). *Op. cit.*

EIT characteristics	Effectiveness criteria	Comments
Primary objective to develop innovation capacity, in order to boost competitiveness	Economic Development	• *Merit*: Greatest alignment with objective, most appropriate for EIT strategy • *Problem*: More likely to occur in the longer term • *Problem*: Difficult to evaluate
Operational objectives include "*attracting and retaining high level staff and students*"[21]	Human Capital	• *Merit*: Aligned to operational objective, appropriate for EIT function • *Problem*: Difficult to quantify inputs & outputs, i.e. people's knowledge levels – although emerging research on Human Capital networks could help[22]
KD will be only one of EIT's many activities	Opportunity Cost	• *Merit*: Aligned to operational objectives, holistic view of EIT activities • *Problem*: Difficult to evaluate because of "counterfactual" focus (i.e. on what could have happened rather than what happened)
KD aim is to improve exploitation of knowledge by the recipient community	Participation-Interaction-Feedback	• *Merit*: Tractable for evaluation • *Merit*: Represents the "customer's voice" • *Problem*: More research required to develop indicators
Heavily quantitative nature of proposed indicators[21]	Out-the-Door	• *Problem*: Increasingly, using metrics for evaluation has been observed to provoke a shift to this criterion • *Risk*: Not aligned to EIT objectives; activity-, not outcome-oriented

Table 2 – Effectiveness criteria, based on probable EIT characteristics

[21] SEC(2006) 1313, section 9.2

[22] For example Bozeman, B., G. Dietz and M. Gaughan (2001). "Scientific and technical human capital: an alternative model for research evaluation." *International Journal of Technology Management* **22**(7/8): 716.

4 Need for specification

Previous work indicates that the great variability in the modes of innovation which exists between disciplines, sectors and companies calls for contextualised approaches to knowledge transfer[23]. In addition, the innovation environment is turbulent rather than static, thus introducing variability in the time dimension as well; in turn, this calls for flexible and reconfigurable infrastructures to support knowledge transfer[24]. These have a number of implications for the EIT:

- Considering the long-term focus of the EIT and the relatively long duration of KICs, is it unlikely that a KD scheme established at the launch of a KIC will be suitable several years later. Schemes should be regularly reviewed to ensure they remain appropriately aligned to evolving objectives.
- Each KIC will be different and will require its own design for KD schemes: for instance, KICs are likely to differ in their aims, resources, organisation and partners (which will bring their own strengths and weaknesses); produce knowledge in a different mix of forms; have access to different and dissemination agents (influencing what the "possible" and "best" KD options might be); face a variable demand for their knowledge products, depending on external factors; and target different recipient groups.
- Even within the same KIC, tailoring will be needed at every element of the KD framework, as explained previously. For example, the variety of knowledge outcome forms will require using different transfer mechanisms; each established dissemination agent will require their own scheme; demand may vary at a more granular level (hence the need for flexible and reconfigurable infrastructures); and KD will likely be targeting be a number of recipient sub-groups. The following section will explore these specificity-related issues in more depth, focussing on the case of SMEs as recipients.

[23] When it comes to knowledge transfer policy, "*one size does not fit all*": Allott, S. (2006). *Op. cit*. p.8

[24] Azzone, G. and P. Maccarrone (1997). "The emerging role of lean infrastructures in technology transfer: The case of the Innovation Plaza project." *Technovation* **17**(7): 391.

5 SME-specific issues

This sections deals with issues arising specifically when considering knowledge dissemination to SMEs. As noted in section 2.3, the recently-launched Enterprise Europe network is an existing instrument with promising features for use as an EIT knowledge dissemination tool, and appears especially suitable for SMEs.

All the following points concern SMEs, as they depend closely on the recipients' characteristics. However, they point to the fact that relationship management and target definition are fundamental in the KD process to any recipient, and further research is needed to discover corresponding points for other kinds of recipients.

5.1 Relationship management for dissemination

Engagement between the dissemination agent and the transfer recipients is a prerequisite for knowledge dissemination; however, knowing which SMEs to engage is not easy because of their sheer number, and engaging SMEs is difficult because they do not initiate contact themselves. Raising the target SME groups' level of awareness of KD activities through publicity in appropriate outlets (e.g. trade journals, local media) can lessen these difficulties.

The research made evident a number of engagement strategies, based on exploiting existing connections to draw SMEs into KD activities; several of these echo attributes of the dissemination agent structures outlined in section 2.3.

- For instance, connections will exist throughout the supply chain of KIC partner companies, through which SMEs can be engaged; this form of engagement is particularly suitable if the KIC partner also acts as a dissemination agent.
- Throughout the EU, organisations focussing on regional development have their own SME networks, which can be harnessed for EIT/KIC KD activities. The plurality and diversity of these organisations offers opportunities to compare and discover best practices.
- Targeting existing SME groups (possibly regional or affinity-based, e.g. trade associations) can substantially lower transaction costs, as the group forms one target instead of its several constituents.
- SMEs can be engaged through informal links between prospective and existing KD participants, in e.g. open networking events.
- Finally, specific SMEs could be actively approached through direct contact by the dissemination agent.

After engagement, collecting and using feedback can enhance future relationship management[25]. The provision of a unique, highly visible "one-stop shop" for collecting feedback facilitates this process.

5.2 Transfer recipients: Defining the targets

"Targets" refers to both the goals of the knowledge dissemination process, and the intended recipients; the two are closely linked. Defining what should be achieved through KD depends on what the recipients' needs are, and discovering the recipients' needs requires specifying the target recipient group. The importance of defining the targets should not be underestimated: the lack of success of at least one SME support initiative in the past has been attributed to an insufficient definition of SME innovation needs[26].

This matter is complicated further by the heterogeneity of the knowledge-based SME community: using the single term "SME" (which is purely an operational and financial size classification) should not imply that the diverse companies in this grouping are similar or have identical needs. Indeed, these will almost certainly differ by geographical location or industry sector, echoing the point that "one size does not fit all". However, affinity groups with similar needs will exist within this community; once found and researched, these could form the basis for the specification of SME "target groups" by a KIC, whose needs can be then investigated.

At present, since the nature of KICs is not itself specified, it is not possible to specify further details on possible SME target groups or their needs. Still, some generic potential questions to eventually probe the needs of SMEs can be tentatively presented: What knowledge topics would be of benefit, and in what forms? What would their preferred means of contact be, in terms of transfer mechanisms, dissemination agents and relationship management? What level of resources would they commit to exploiting KD? What facilitation could help? How far (geographically) would they be prepared to go to acquire knowledge? What value do they expect to gain from KD interactions?

With regards to value expectations, some speculation can be made on the basis of past research[27]. SMEs will likely consider the potential to develop their people's knowledge and in-house expertise (a human capital argument). In the case of specific technologies that can be incorporated into products, the impact of KD on the SMEs' position in the market

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[25] Hadjimanolis, A. (2006). "A case study of SME-university research collaboration in the context of a small peripheral country (Cyprus)." *International Journal of Innovation Management* **10**(1): 65.

[26] Bessant, J. (1999). "The rise and fall of 'Supernet': a case study of technology transfer policy for smaller firms." *Research Policy* **28**: 601.

[27] Bozeman, B. (2000). *Op. cit*.

may be considered. As previously noted in section 2.1, recipients may gain a "political" advantage – such as improved reputation – by associating with the EIT's KD activities. And finally, if SMEs cannot participate in KD due to constraints in people's time, this can be construed as a manifestation of opportunity cost which outweighs potential value that could be gained through KD.

5.3 SME constraints – Keep it light on the people

While people are needed to absorb knowledge within a knowledge dissemination recipient organisation, human resources are scarce in SMEs. This scarcity usually constrains participation in KD to a regional level and can even limit the SMEs' ability to benefit from KD. To tackle these limitations, KD schemes must limit the burden placed on SME human resources and offer value proportionate to the time they require. Putting it in market terms, person-hours in SMEs are in short supply, and have a correspondingly high "price" in terms of knowledge-value. Gauging this "price" can allow the EIT/KIC to offer a KD value proposition that is clearly articulated against SME needs and resources, thus creating more effective KD schemes.

6 Conclusions

Disseminating the EIT's knowledge outcomes is a complex process affected by several factors, as outlined by the framework underpinning this paper. The EIT itself as an excellence-driven knowledge originator, the external demand environment for knowledge (which can be influenced, to a certain extent), the choice of dissemination agents to carry out KD, and their own choices of the mechanisms they use to disseminate knowledge in its various forms – all these are elements which will need to be considered in the creation of any KD scheme.

Equally important is the way in which the effectiveness of the KD process will be measured. While an appropriate choice of criteria will offer the opportunity to use them for driving the EIT's KD forward, inappropriately reaching for easy-to-find but less meaningful indicators entails the threat of misguiding knowledge dissemination efforts. As we have seen, further work is required to develop appropriate indicators for KD effectiveness, which will be tractable for evaluation yet aligned with the EIT's objectives.

A key theme is the need for specification: KD schemes tailored for one context will have limited effectiveness in another. Whether across time, different KICs, or even within the same one, the variable interplay between elements in the KD process calls for a bespoke scheme in each individual setting.

In developing KD schemes, tailoring to the intended knowledge recipient is of paramount importance. Discussing SMEs as an example, we showed that in-depth research of the recipients' needs (with regards to KD) is an essential first step, which will require a precise definition of the various recipient target groups.

This work has provided an initial framework for knowledge dissemination, making explicit the issues that affect the process; it is hoped that it will also stimulate further work to support the EIT's interfaces with its stakeholders. Beyond the areas for further research outlined above, an especially useful next stage would be validating the framework in an actual *knowledge triangle* setting. In particular, the four "Pilot projects for cooperation between European Institutes of Technology" (BRIDGE, GAST, ComplexEIT, Success) [28] could benefit from this work to build robust dissemination structures into their integrated partnerships.

[28] Selected following the call for proposals EAC/26/2007

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