Connection Dynamics in Learning Networks: Games, Agents and Social Network Visualization

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Abstract: This paper addresses the challenge of enhancing social interaction through value-adding connections among the online members of Learning Networks. We report on our exploration of three types of connection dynamics: (1) features enabling network member to visualize and browse through relationship networks, (2) intelligent agents and (3) game dynamics aimed at stimulating the identification and establishment of value-adding connections between people and other people, groups, knowledge assets or relevant community dynamics. We describe here how such dynamics could be embedded in Lifelong Competence Development Networks.

Keywords: intelligent social agents, connection games, lifelong competence development and management system, learning networks, knowledge management in virtual communities.

1 Introduction

Designing sustainable competence development networks and systems for distributed communities of users is a challenging task. One of the main trends today is to extend the traditional knowledge management functionalities embedded in such systems with new features which take into consideration the social nature of knowledge exchange networks and communities (Cheak et al, 2006; Brown and Duguid, 2000; Cross et al, 2001; Wenger et al, 2002). The ultimate objective of such advanced features is to support the social exchanges that occur between community members; in particular, the ability to generate and sustain ‘connections’ between users, and to stimulate them to actively participate in sharing and building on each other’s knowledge and experience (McAfee, 2006; O’Reilly, 2005). Our objective is to first present a relevant application context – the individual user’s lifecycle in a Competence Development Learning Network - to then discuss the focus of our research, i.e. the approaches and technologies that we are designing and validating to:

- facilitate social networking (i.e., users-to-users and users-to-community connections (Wasserman and Faust, 1994; Watts, 2003; Cross and Parker, 2004)),
- help users identify relevant learning opportunities and make informed decisions (i.e., users-to-competences connections), and
foster active contributions to the collective knowledge space (i.e., competences-to-competences connections).

We report on our exploration of three types of connection dynamics:

1. features enabling network member to visualize and browse through relationship networks,
2. intelligent, social “Connection Agents”, and
3. “Connection Games” dynamics aimed at engaging groups of network members (online) in game-like the identification and establishment of value-adding connections between members and other members, groups, knowledge assets or relevant community dynamics.

2 Competence Development Lifecycle

The application context considered in this paper is linked with the Integrated Project TenCompetence (Koper and Specht, 2006), where the focus is on interactive online systems supporting Learning Networks and providing individuals interested in extending their competences with an overview of competence development opportunities (or CDOs). In such a system, users are able to access information related to a variety of CDOs, including not only traditional courses, workshops, and reference material, but also ‘live’ resources, such as communities of practice developed around a given competence, or experts and peer groups. Such systems can be considered as interactive knowledge repositories which inform and guide competence development decisions in organizations, educational institutions, and individuals. The main challenge in this type of systems is to (i) provide sustainable value to users, and at the same time (ii) stimulate users to contribute their knowledge, insights and experiences on a continuous basis. In order to address (i) and (ii), we hypothesize that users seeking competence development support go through several phases (cf. figure 1) corresponding to Rogers’ change and adoption stages (Rogers, 2003).

Figure 1 Competence Development Lifecycle within a CD Network (User perspective)

At first, users might act very much as ‘free-riders’ and passive ‘lurkers’. In this first phase, the main objective is to help users become increasingly aware of and familiar with what is going on in the network by encouraging them to explore the system to see how it could effectively support them in identifying relevant competence development
experiences and opportunities. In a second phase, users might develop increased interest in the system and the users’ community and become gradually more actively engaged and motivated to spend their time with the system. It is in this critical phase that users can move beyond passively “watching” the content of the system and the behaviour of other users. They will start realizing the value of expressing their own insights related to specific CDOs, or the value of extending their user profiles with more information about themselves and their competence development expectations and objectives. Once their interest is high enough, users are expected to enter the third phase, and start becoming actively involved by contributing their own experiences, engaging in exchanges and gradually establishing relationships with other users. If they see that these exchanges are valuable and recognize the system and the network as a significant support for their competence development process, this phase will lead to a final “adoption” phase in which users will develop the necessary motivation and competence to become active members of the network, engaging in a mutually productive and sustainable knowledge exchange with the system and the users’ community.

The ultimate goal of the features described in this paper is to help users move efficiently through the phases of the lifecycle, providing them the motivation, the competence and the confidence necessary to gradually become well-connected, aware, involved, engaged users, who can extract value from their system usage (through their connection to other users, to relevant knowledge informing their decisions, and to competence development opportunities) and at the same time contribute to the community by pro-actively sharing their experience and the expertise they have developed over time.

3 Connecting Users

To support users throughout the lifecycle, we have identified four distinct domains in which users’ ‘connectedness’ can be gradually enhanced in a significant way (that is, via the establishment of new connections or the strengthening of existing ones). These four distinct domains determine a structured context for injecting different dynamics (network visualizations and browsing, intelligent agents and game dynamics) in the system.

Figure 2  Four Domains for “connection”-enhancing Embedded Dynamics

As illustrated in Figure 2, the four domains include: (i) Helping users to better “connect” to themselves (in which case value can be created by letting users reflect on their own competence development experiences and objectives, as well as on their personal
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profiles), (ii) Helping users to better “connect” to the user community (identification of relevant users and groups, notification of and involvement in community roles and events), (iii) Helping users to better “connect” to CDOs documented in the system (recommendation of relevant CDOs and CDO categories) and (iv) Helping users to better “connect” to the system itself (to enhance the users’ competence to generate, extract value from, and contribute to the system).

In concrete terms, agents can stimulate users on a regular basis to review their own personal profiles and competence development objectives (Angehrn, 1993; Roda et al, 2003) in the light of recent experiences, contributing to (i). Agents can also make sure that users explicitly describe their relationship networks, and are stimulated to extend them through exchanges with appropriate peers, contributing to (ii). Game-like dynamics, beyond supporting individual and collaborative learning (Wideman et al, 2007; Manzoni and Angehrn, 1997) can also contribute significantly to (ii), providing an opportunity for users to meet and know each other in informal contexts. Furthermore, agents can reduce the search costs for relevant CDOs and proactively invite users to explore them, contributing to (iii). Finally, agents or game dynamics can help users learn to use the specific features of the Competence Development system more efficiently, contributing to (iv) e.g. by ‘connecting’ novice and expert users so that they can share best practices in using the system in an effective way.

Ultimately, these embedded dynamics are all focused towards promoting and stimulating action, via dynamically-generated suggestions, maintaining existing relationships (connections) and promoting a high level of willingness to exchange within a community. Such actions aim specifically at helping users discover and connect to network resources (other users, or different types of knowledge assets (Boisot, 1998) which will support their own social and competence development, learn about and from other users through game-like dynamics developed to encourage them to share their competences and work together towards a common objective, identify and engage in suitable CDOs (formal learning) or more informal knowledge exchanges with relevant peers and experts, and finally increase their motivation to share their own experience and insights which will contribute to an increase in the overall value of the system both for themselves and the user community.

4 Network Navigation Functionalities

Network visualisation refers to a set of techniques commonly used to provide graphical and (in most cases) interactive ways to tackle the complexity of a networked structure, that is, a collection of nodes (representing ‘objects’, or ‘actors’) and edges (representing ‘relationships’ or ‘linkages’ between these objects).

Visualisations techniques provide users with graphical cues that represent both the qualitative and quantitative information associated to each element of the network, and sets of operations to display and manipulate it. This information can include for instance the completeness of a network (‘can every node be connected to another by at least one path?’) or its density (‘which nodes are the most interconnected to others and are therefore more likely to be seen as hubs?’).

Figure 3 shows which nodes are the most central in a network of Web sites, an additional, meta, information that gives an indication of the authority of a Web site and that can influence newcomers to start their discovery of this field with one of these central Web sites.
Networks can be used to represent individuals, teams, or organizations and their communication patterns (Wasserman, 1994), individuals and their attributes (Heer and Boyd, 2005), knowledge assets (as nodes) and the topics they share (as ‘qualified’ edges), as in many current Web 2.0 platforms, and, even more interestingly, combination of some or all of the above, as in the recent Knosos platform (Coenen et al., 2006). We will following such a hybrid approach in our competence development context, as our networks are composed of knowledge assets (CDOs, learners, competences, tags...), learners, and typical relationships such as ‘addresses’ (between a competence node and a CDO node), ‘describes’ (between a tag and a CDO), ‘has undertaken’ (between a learner and a CDO), or ‘is my friend’ (between two learners). We are indeed hypothesizing that facilities to visualize and browse through a graphical representation of a network of people and CDOs are better suited than the flat, linear, representations that one can find in previous environments. We also hypothesize that the facilities they offer will enable users to single out potentially valuable connections, rekindle existing ones, and ultimately create value out of the ‘ocean of possible connections.’

Figure 3  Network navigation in Touchgraph (Touchgraph, 2007)

4.1 Navigation and manipulation
Our goal here is to identify which features, among the ones commonly developed in navigation modules, are particularly suited to a competence development context, and which ones need to be added to helps learners make sense of the social network, the CDOs and the connections holding between them.

Finding the most central nodes (the most commonly referred to by learners) in the network can be the first of these features. The centrality of a node can be seen as a measure of the quality of a CDO, which can therefore help newcomers focus on these highly-sanctioned items. This feature can be coupled with a possibility to specify a node
as a central node, thus providing a starting point in a quest for a relevant CDO that can be displayed again at any time.

Filtering features can also help reducing the complexity of a network which may intimidate newcomers. Both qualitative and quantitative filters can be applied, in order to display only the nodes matching a given criterion, the relationships matching a given criterion, or a combination of them. Learners can thus decide to display only the CDOs containing a particular word in their description. They can also apply filters on the relationship, to find out all the CDOs addressing a given competence. Later, they will be able to display, for instance, CDOs that address one particular competence and that have been undertaken by someone in the immediate network of the learner. Singling out relevant CDOs is of course only one of the ways to create value out of the networked representation. Learners can also make use of these features to extend their network and to get in touch with their peers, by identifying who is looking for the same competences in their network, or who, in the networks of each member of their networks, knows about a given competence.

Time can also be considered to visualise the evolution of the network over a long period. New, fresh, nodes and connections can be revealed, as well as the ones which are slowly becoming deprecated. This can again give a feeling of what is fresh in the network and what is still being used nowadays, as opposed to competence development opportunities which may have been used extensively two years ago but that have not seen much use recently.

### 4.2 Representation

As we have seen, the key contribution of network visualisation techniques is their ability to visualise and support interaction with complex and interrelated data. Different sources of qualitative and quantitative information can be included in a graph, such as the type of a node, the number of its connections, and the type of these connections. Various graphical representations can be used to convey these dimensions, including variations on the size of the node, a colour scheme, or a shape.

In a competence development context, CDOs that are consistently rated above average by their users could be displayed in green, while the ones which do not seem to encounter success could be displayed in red. Similarly, green arrows could be used to point to CDOs teaching competences that are required to undertake the current CDO in proper conditions, while blue arrows could connect CDOs teaching related competences.

### 4.3 Challenges

One of the major challenges associated to network representations is their ability (or lack of, thereof) to cope with high number of items (or nodes). While displaying a few dozens on nodes on a rather large display is both feasible (that is, nodes can have a distinct location on a display and be far enough from each other to be differentiable) and cognitively understandable by humans, trouble arises when one needs to display hundreds of nodes. In such situations, new graphical paradigms must be developed to move away from the complexity and subtlety of the network (Freeman, 2000). Kartoo for instance investigates how ‘zones’ (rectangular areas of a given colour and surface) can be used when there are too many nodes to display (Kartoo, 2007). These zones cluster the space of nodes into areas satisfying certain conditions. Mechanisms to zoom in these areas and to reveal the full complexity of the network can be devised to move from a macro-level to a micro-level and vice-versa (Tufte, 1990).
5 Connection Agents and Game-like Dynamics

In order to bring life to the system and stimulate users to gradually move though the different phases of the lifecycle model, we are developing connection agents which provide embedded dynamics. Agents can be perceived by users as virtual characters inhabiting the network and responsible for enhancing the users’ experience, for instance by regularly suggesting new or relevant CDOs, by pointing to interesting trends and events, or by initiating connections between users who have followed similar CDOs and happen to have related objectives. Agents aim to bring value to the users by helping them establishing “connections” in the four domains identified in Figure 2.

A concrete example of an agent we are currently investigating is the so-called “Personal Development Agent”, who acts as a personal coach (Roda et al, 2003; Cross and Parker, 2004). The goal of this agent is to help users better understand themselves and their needs by helping them formalise their objectives as well as their current and desired competences. It will suggest existing competences related to the ones users have indicated, and will provide them with initial tentative connections to both relevant users who have a similar user profile and to relevant CDOs that they may want to explore to address their desired competences. Other agents include “CDO Connection Agents”, responsible for maintaining a consistent network of relationships between the CDOs included in the system, and “Concierge Agents” responsible for updating users about relevant events, particularly when they log in after a while and need to be “re-connected” with the community.

5.1 Online Connection Games

Game dynamics can be defined as experiences that help participants gain awareness of a complex situation by letting them experiment with various solutions to a problem, and by showing them the consequences of their choices. They provide a situated context for learning and encourage participants to try and experiment, while ensuring that they learn something out of it via feedback on their decisions (Rogers, 2003). Teams seem to provide a very good setting for games, as they regroup different users with different experiences and approaches to a given problem. They are especially interesting because they trigger debate and discussion as to how to best solve the current situation, thus making everybody even more engaged in the game scenario.

Games and agents work together. Agents play two roles: (i) selecting the best candidates for a game and (ii) stimulating individual users to engage in the game. An example of one game dynamics that we are currently exploring and designing is the “Connection-finder Competence Development Game” which focuses on challenging users/players to find the “best” person to interact with to extend one’s competences in a given area. The purpose of this particular game is to help a user find someone that is not in her network yet and that is similar enough to her to guarantee a productive exchange, while being dissimilar enough to make sure that they will both learn from each other. Following ‘blind date’ dynamics, the game asks each user a set of multiple-choice questions and uses the answers to filter the network and reduce the space of possible connections. When a ‘match’ is found, the user profiles of both parties are revealed and a connection is proposed.

In the context of our research we are currently designing and validating a number of “Connection” Games to be deployed in online communities and Learning Networks. We currently distinguish three different types of “Connection Games”: Profile-related Connection Games, Collaboration and Knowledge Connection Games, and Organizational Connection Games.
Profiles are central for each community of users engaged in exchanging formal and informal knowledge related to competence development. It is for instance there that individuals can map explicitly their experiences as well as their ambitions, providing a basis for matching as well as information and inspiration for other users. **Profile-related Connection Games** is a first type of Connection Games which use profiles as a basis for stimulating the creation of new connections or the reinforcement of existing ones in all 4 domains discussed in previous sections. In particular, such Connection Games can help individuals to better understand how to gradually improve their own profiles, as well as to re-assess critically and redefine their competence development objectives and plans. At the same time, by getting exposed to profile of other users, individuals can identify relevant users to connect with for knowledge exchange, as well as CDOs mentioned by others when describing their competence development trajectories. Finally, exploring profiles of other users can help individuals to learn how the system can help them improving their own profile, making them more attractive to other users and hence increasing the probability of value-adding connections.

**MutAnT** (Mutual Anonymous Tagging Game) is a concrete example of a Connection Game. The game is played by a (selected) large group of users (synchronously or asynchronously) and the profiles used in the game are actually the anonymized profiles of the players themselves. When starting the MutAnT Game, the players are introduced to a realistic scenario and competence development-related challenge. This scenario is represented by the simulated department of an organization featuring a team of employees in a given professional area (from which the players will have been selected based on their experience or competence development ambitions/objectives). What the players do not know is that the profiles of the employees of the simulated department correspond to those of the actual players. In this context, players (operating in small distributed teams) are challenged by the mission of selecting the three most “promising/interesting” profiles to be promoted to create a new department after the existing one will have been dissolved (the typical problem of “who to keep” in an acquisition and restructuring situation). In the first phase of the game players are asked to select individually the 3 employees to “save”, indicating (1) the reasons for their choice and (2) suggestions on how each one of the selected employees should be supported through a competence development plan. In the second phase of the game the results from the individual selections are aggregated. At this point all the players will be able to access the information produced by other players (particularly the one related to the individuals they selected, as well as to the profile of the employee “representing” them). Winners in the game can be then determined as the players whose profiles has been selected in the aggregated assessment, as well as the players whose individual selection matches most the aggregated group selection. Beyond achieving the same “connection” objectives as other Profile-related Connection Game we are designing, the MutAnT Game provides a direct feedback related to the users profiles, and the opportunity to critically review them (the information provided there, as well as the competence development objectives included) on the basis of the information gathered by peers to whom users have been “connected” through the game and are therefore available for further personalized feedback.

Developing the fundamental competences of collaborating effectively is key to the development and sustainability of the community of users of learning networks such as the one targeted in the TEN Competence project. **Collaboration and Knowledge Connection Games** addressing the development of these competences can hence contribute not only in generating value-adding connections among players but also to
increase the overall competence of the network members to engage in value-creating knowledge sharing exchanges.

Understanding that competence development has not only an individual but also an organizational dimension is also key to help people reflecting and fine-tuning their competence development objectives as well as to better understand how competence need to be continuously renewed within companies and how the process of diffusing new competences often meets the resistance of people (and ourselves too). **Organizational Connection Games** addressing the development of these competences are therefore a third type of Connection Games we are exploring to generate value-adding connections among players but also to increase the overall competence of the network members to understand the organizational dimension of competence development and the associated diffusion (and resistance) dynamics.

An overview of Connection Games currently under development is provided in Table 1 in the Appendix.

6 **Inside two Usage Scenarios**

This section describes two user scenarios illustrating some of the concepts and approaches we have developed in this article.

6.1 **Connecting People to and via CDOs**

In our first scenario we show the interaction of a user interested in locating Competence Development Opportunities (CDOs) related to a given subject, “Ajax”. A first approach consists in using the network visualization features to display all the CDOs which address “Ajax” and then use the selective display and network filtering options mentioned in section 4 to narrow down the search to CDOs fitting the specific preferences of the user (e.g. books and online courses addressing “Ajax”). The same network visualization options could then be used to display not only relevant CDOs, but also other users who are knowledgeable about them. In this way, using network visualizations, the user could easily identify people she knows who are in some way related to relevant CDOs (as they have read and commented a related book or attended an online course on the subject).

A second approach requires the user to indicate explicitly to the system that she is interested in developing her “Ajax” competences (by adding this information to her personal profile). Automatically, the agents embedded in the system will be activated and generate suggestions for relevant CDOs (as described in section 5), pointing also to discussion forums in which users exchange their opinions about “Ajax”, as well as to a list of relevant users to be contacted. In this case, agents would significantly reduce search costs for the user and also help her answering the question “Who do I know who knows about the subject I am currently interested in?” In case none of the people she knows are directly knowledgeable about “Ajax”-related CDOs, the user could use the network visualization features to display relationship networks and identify the “shortest path” to a relevant expert (“Who do I know, who knows somebody, who knows somebody … who is knowledgeable about “Ajax”).

6.2 **Connecting People to People**

In our second scenario we take the viewpoint of a user who wants to explore alternative careers. Many individuals who visit the TENCompetence website in order to reflect on their current competences, to learn which functions or jobs are within their reach, or to
explore the possibility of learning new skills or working in a new field will be doing so in the context of managing their own career development.

We may need to explore alternative careers at many different stages of our lives. When we are young and need to choose our first career, when we have experienced a career crisis beyond our control like losing our job due to down-sizing or de-localization, when we want to re-enter the work-force after raising children, or simply because we start to question, at any age, if we are really doing what we want with our life.

However, it is difficult to choose the right career unless we first understand ourselves, and it is difficult to give up a career in which we have invested years of our lives unless we have a good idea of the alternatives. Recent research on career transition (Ibarra, 2003), highlights the need for individuals to be more aware of the basic assumptions they use to evaluate career possibilities. Figure 4 shows three levels of career decision criteria adapted from (Ibarra, 2003). It helps to think of these as parts of an iceberg. The tip of the iceberg is our job - Level 1. This is what is visible to the outside world. Just above and below the surface are the competences, motives and work-related values that hold constant from job to job - Level 2. Schein (1993) refers to these as “career anchors”; for example, the need for autonomy, security, entrepreneurial creativity, pure challenge or lifestyle. Career anchors are what we would be unwilling to give up if forced to make a choice. Deep below the surface in Level 3 we find our basic assumptions about how the world works. These are usually rooted in our infancy, early family life, and cultural and social context; for example, our preconceived notions of acceptable male and female roles. Although we may not be aware of these basic assumptions, they also determine how we manage our careers. For the purposes of identifying relevant career possibilities, we propose to first help users identify their basic and work-related values through an online personality test (level 3) and career anchor survey (level 2), and then to connect them to other users with similar values.

Figure 4  Three Levels of Career Decision Criteria

Another aspect of Ibarra’s research has found that in the context of re-inventing ourselves, the people who know us best are the ones most likely to hinder rather than help
us. In addition, it is nearly impossible to change careers without altering our professional and social circles. This means that we need to shift connections, i.e. look for new peer groups, guiding figures and communities of practice. We need to find people who can help us see and grow into our new selves, find new role models and people we can relate to, and find new communities that offer inclusion, a safe base and replace the community that is being lost. The use of information and communications technology (ICT), and in particular, intelligent agents and games, can help people shift connections.

User Description
Caroline, a 46 year old professional woman, recently lost her job when her company decided to merge two business units. She knows it is not going to be easy to find another position in her field. She lives in France, a country with a very high unemployment rate. Fast approaching 50 and with two school aged children, she doubts that she will ever be able to find work in the youthful world of marketing again. Her self esteem has also taken a severe blow - was she chosen to go because she was bad at marketing? Or was it the office politics? Maybe she should also try finding a new job in another field – but what? What else could she do? What are her competencies? What jobs correspond to these competencies? And which of these alternatives would she actually like?

Unfortunately, there aren’t many people with whom she can discuss her dilemma. She has to be careful, if word gets out that she was fired, she may never work again. No one wants to hire a failure, and that’s what she feels like these days. In fact, she thinks it’s probably best to avoid people when she feels like this – she is tired of the sympathy offered by her close friends, and she doesn’t want to make use of her business contacts until she has a positive attitude, and a good story.

The kids are at school, the rest of the world is busy, and she has time on her hands. She makes a cup of coffee, turns on her computer and googles “lifelong competence development”.

First visit – Building Awareness
One of the websites she comes across is the TENCompetence website – where she is greeted by a “Personal Development Agent” that we’ll call Wendy. Wendy asks Caroline if it is her first visit to the site. On learning that it is, Wendy gives Caroline a very quick overview of the site. She then asks Caroline to click on the option below which interests her most.

A. Keep up-to-date with developments in field of expertise.
B. Reflect on current competences in order to know which functions or jobs are within reach.
C. Improve proficiency level in a specific competence
D. Explore the possibility of learning new skills or working in a new field

Caroline chooses option B. Wendy explains to Caroline that in the “reflection” phase she will create her “Professional Identity Profile”. This profile will initially be made up of four parts.

- A personality test which measures basic but implicit assumptions about what is desirable and possible in our lives and in the world.
- A “career anchor” survey to determine the competencies, preferences and work-related values that we would be unwilling to give up.
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- A “life experience” survey to provide details about the jobs (and other related activities) we have already tried, and what we liked and disliked about each of them.
- Other basic information such as education, age, sex, nationality, and language(s).

By completing her profile, Caroline will not only learn more about herself, she will also be able to learn what jobs people similar to her (i.e. with her basic and work-related values) have or have not found satisfying and why. This should give her some good ideas about alternative careers.

Caroline can then contact the people behind the jobs (and comments) that sound interesting to her in order to learn more about their experiences. She can also use further narrow down the career list, using network visualization and navigation tools, to show only the careers, for example, of “all women in France, between 45 to 55, who share her values”. Since they share the same values, live in the same country, and are at the same point in their lives, it is very likely that these women can provide some useful advice. Caroline may even find a good role model in this group. Of course, Caroline is not limited to contacting people with her values – this is just to help narrow down initial job ideas. In addition, if Caroline desires to discuss her test results face-to-face with a real person, she can also use the TENCompetence site to find a career counselor.

Wendy asks Caroline if she would like to start creating her Professional Identity Profile. She tells her that her true identity will never be revealed to anyone without her permission. Wendy helps Caroline log-in to the system in order to create her private space.

**Moving from Awareness to Interest**

Every time Caroline visits the TENCompetence site she is greeted by Wendy. Wendy encourages Caroline to complete each part of her Professional Identity Profile. As Wendy learns more about Caroline she will be able to help her connect to different information resources and people.

**Moving from Interest to Trying/Engaging**

Caroline has now completed her profile, learned a lot about herself, and has some good ideas about alternative careers that she would like to explore. She also feels less depressed and socially isolated. Wendy told her about a “Fired and over Forty” forum. Via this forum she has made a couple of new friends in her situation and they keep each other up-to-date on their progress and mutually encourage each other. It is nice being in contact with others in her situation.

Wendy also told her about a young person who wanted to work in marketing who was looking for someone to give him a mock interview. Caroline has experience in this area, likes to help others, and does have some extra time, so she agreed to do this. Plus she might like to have some mock interviews herself later! She interviewed the young man via Skype’s video-conferencing facility, and gave him some feedback that she hopes will help him improve his story. Wendy has added him to Caroline’s “helped” list.

Wendy has also prompted Caroline to add a list of possible careers that she is interested in exploring to her Professional Identity Profile. When Wendy found out that Caroline was interested in jobs in public relations, she directed Caroline to CDOs that could help her learn more about this area. In addition to pursuing this idea with her real-life contacts, Caroline is also using the filtering options on the site to find people who have recently worked in this area, for example “Anyone over 40 who has worked in..."
public relations in the last two years”. For now, she is curious to see what type of background they have, what type of public relations they do, what books they recommend, and what groups they belong to... maybe later she’ll even contact one of them and ask for advice. For the moment she just adds links to interesting profiles to her “potential contacts” list. On another occasion Wendy will ask Caroline if she would like her to contact some of these people on her behalf.

Moving from Trying/Engaging to becoming Actively Involved and Connected
One day when Caroline logs into the site, Wendy asks her if she would like to participate in the “Convince Me” game. In the anonymous version of the game, people who want to work in a field try out their stories – a short explanation that links what you have been doing with what you want to become – on people who work or have recently worked in that field. Each judge reads the story and votes yes or no. They are also asked to give a few reasons for their decision. In the non-anonymous video version, people make a video of themselves selling their story. In the video version participants not only receive feedback about their story, but also about how they have presented themselves. People “win” when they have a story that convinces all the judges.

As a contestant, Caroline decides to try out her “marketing to public relations” story in order to receive feedback about how it can be improved. For the moment, she does not want to appear in video herself; however, she decides to judge some video version contestants who want to work in marketing. Later Caroline decides to contact one of the contestants to see how they are getting on.

7 Conclusions
In this article we have motivated and presented a number if dynamics we believe are necessary to gradually “connect” users - to themselves, to the user community, to relevant knowledge assets in the system, and to the system itself - as well as increase their motivation and capability to act as active members of a learning network. We also described and discussed a number of specific connection-enhancing features and dynamics we are currently exploring:

(1) Network visualization and navigation tools provide means to browse and filter the network, making the most use not only of one’s network, but also of the networks of each member of one’s network.
(2) Stimulus agents responsible for triggering (suggesting or stimulating the creation of) value-adding connection dynamics
(3) between users and/or knowledge assets and competence development opportunities. Finally, game dynamics contribute to the development of rich exchanges within and across community members via learning-by-doing experiences. We are currently developing prototypes in the context of the TenCompetence project to validate these components and assess their suitability to extend current competence development systems and learning networks.

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References


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## Appendix: Table 1 Connection Games

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| "ProfilAMat": Profiles Annotation and Matching Game | In this game, played in parallel by pairs of anonymous users over the Internet, users get exposed to different Profiles from other users (including their own ones) and have to provide annotations/remarks about the profiles until they match, in a similar way as in the ESP, Verboxity and similar successful internet-based matching games (von Ahn and Dabbish, 2004, von Ahn et al. 2006). | - browse through and reflect about relevant profiles  
- gather annotations related to profiles and provide feedback to existing profiles  
- provide opportunity to identify relevant community members |
| "MutAnT": Mutual Anonymous Tagging Game | This game is played by a group of users, whose personal Profiles are anonymized and then associated to virtual characters populating the department of an organizations which has to be downsized (only 3 can be retained). Players have now to first individually and then jointly decide which 3 to retain, explaining their choices and trying to guess which 3 will be retained by the group of players. | - connect to other users with relevant profiles  
- connect to how other “assess” and comment the own profile anonymously  
- connect the own competence development plans with the ones others would advice |
| "L2C/CDC": Learning to Collaborate (in Competence Development Contexts) Game | In this online game groups of players are engaged into an entertaining and realistic role-playing scenario in which they need to take individual, small team and large group decisions collaboratively. The performance in the game depends on their capability to reach consensus and share/combine their knowledge online using different comm. technologies, as in the collaboration-related simulations developed in the L2C Project (Angehrn, 2006a) | - connect to relevant users in a realistic organizational decision making context  
- connect to CDOs related to the fundamental competence of “collaboration”  
- connect with one own’s competence (and lack of competence) to collaborate and reach consensus with others in small teams as well as groups/communities |
| "CoRe": Competence Renewal Diffusion and Resistance Game | In this game, players operating in small teams are challenged to spread a new set of competences in a simulated organizations populated by virtual characters displaying different forms of resistance to renew and acquire new relevant competences, in a similar way as in EIS, EduChallenge (Angehrn et al. 2005) and similar successful SmallWorld Simulation games (Angehrn, 2006b). | - connect players to people (and to their own) resistance to competence renewal  
- connect to the reality of diffusing new competences in organizational contexts  
- connect to relevant profiles and CDOs related to the professional area simulated in the game |