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# **Social capital, proximity and team performance improvement**

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## **Abstract**

*The purpose of this paper is twofold. The first part translates some theoretical concepts of social capital into business terms and explains its daily usage in international corporations. The second and main objective of the paper is a description of a method of recruiting new members to the team working on the Virtual Production Line (VPL) the concept introduced by Walukiewicz in 2006.*

*The core idea of the method is based on the assumption that the new hire should possess appropriate expertise knowledge (cognitive proximity) as well as the team adjustment ability (emotive proximity). In other words, teamwork capabilities of the team – either existing or new - are at least equally important as knowledge of individual members. Thus, the team development model is based on the combination of different forms of proximity in its optimized way.*

*The first stage of the method focuses on analysis of existing team members in terms of team role types (i.e. Belbin team roles, Myer-Briggs typology), existing professional skills (i.e. knowledge domain individual levels), interactions between individuals (i.e. communication channels, formal and informal team leaders), etc. This allows identification of key members and key competences of the team and possible gaps. The second stage of the method is focused on the analysis of potential candidates in order to select the best one.*

*Finally, by using different forms of proximity we are going to improve the performance and productivity of the team working on a particular VPL or solving a particular problem.*

## **Introduction**

This paper is a continuation of an article “Social capital and proximity in ICT companies” where general concepts of social capital, Virtual Production Line (VPL) and proximities are described (Grabowska, Wojnar 2009). Emotive proximity is one of the four forms of proximities introduced and developed by Walukiewicz since 2007 that can be used for analysis of social capital on particular VPL. It could be observed that some aspects of theoretical concepts mentioned above may be translated into daily language of international corporations and thus more easily adapted and applied into actions leading to general performance improvement of the company.

## **Social capital and teamwork**

There is no single definition of social capital. Depending on the author, research field (economy, sociology, management, etc.) or industry one can read different, often misleading or even wrong definitions (Walukiewicz 2007). Nevertheless there are few common themes or key words that are present in most of them (Grabowska, Wojnar 2009):

- cooperation
- expectations
- information channels
- network
- norms
- rules
- trust

These are the key words that informally define social capital.

On the other hand Katzenbach and Smith define a team as a small number of people with complementary skills and with commitment to common purpose and performance goals holding mutual accountability of their actions (Katzenbach, Smith 1992). It can be easily seen that similar definition could be made out of the above mentioned key words of social capital. There is a network of people that cooperate according to norms and rules, communicate with (or without) trust in order to fulfill their expectations. All above let us define here social capital at micro level of a single company. It is cooperation capability of team members in order to achieve a common goal by using previously defined working rules with mutual accountability for the final result. Teamwork became a key factor of successful company in global economy. It exists to solve all problems that single person is not able to solve (Jackson, Taylor 2008). Teamwork can also be seen as ability to continuous learning and core competences improvement for ensuring enough flexibility and reaction time to market signals in order to gain competitive advantage (Parry et al 1997). Additionally teamwork improves innovativeness of the company (Pirola-Merlo, Mann 2004). Chen and Lin noticed that cooperation capabilities and relationships between team members have a direct impact on team's performance. If team members are not able to cooperate and their professional relations are below the sufficient level such team will not be successful even though all individuals are very competent (Chen, Lin 2004).

Based on the above it can be stated that one of the ways to improve team performance is to first of all properly build such team.

## **Virtual Production Line and project**

According to Walukiewicz Virtual Production Line (VPL) which is a modern version of Classical Production Line invented by Henry Ford, is a division of a complex creative process into more or less precisely described tasks, combined with modern ICT. The division of labor into tasks as well as the number of tasks may be changed during the creative process by experts involved in the process. Such modification is called self-organization of virtual production line (Walukiewicz 2006). In other words there is a creative problem that group of experts are working on with usage of computers, networks, internet, etc. Each and every VPL has a finite time range from its start to end. This time range may vary depending on the complexity of the problem being solved but the fundamental rule is that each VPL has its finish.

In the business world all companies are conducting projects. Example of such project are building new software or hardware, organizing an event, building house or road, etc. Because almost every activity can be treated as a project, projects and project management became very popular worldwide being currently institutionalized with education paths and professional certificates. One of such organizations is American Project Management Institute, world's leading organization for the project management profession.\*

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\* [www.pmi.org](http://www.pmi.org)

According to “A Guide to the Project Management Body of Knowledge”, so called project management bible :

*“A project is a temporary endeavour undertaken to create a unique product, service, or result.”(PMI 2004)*

And here again similarities can be observed. Creative problem from VPL can be seen as unique product or service. Project as a temporary endeavour means that it has a definite beginning and definite and in the same way like VPL has limited time range. There are no doubts that in order to create such unique results a project team is needed.

Thus we can assume here that at the micro level of company Virtual Production Line can be represented by any project undertaken.

## **Proximity and diversity**

The term proximity literally means the state of being near in space or time. Different sciences offer different definitions, depending on their needs. In economic, geographic or mathematics literature we can read about space, neighbourhood or individual relations (Rallet, Torre 2005). Other sciences may use yet another wording or function here.

In today’s globalized economy many wonder whether a distance still play any important role. With significantly reduced costs of transportation and the off-shoring of labour it is becoming a more and more minor issue. Highly efficient ICT allows transferring information across distances as well as simulates face to face interactions by providing video and teleconferences. On the other hand, it is true that ICT cannot transfer all kinds of knowledge, e.g. uncodified type whereas face to face meetings allow tacit knowledge to be transferred.

In terms of social capital and for our research, we define proximity as relations between different actors cooperating on a particular Virtual Production Line within a given period of time (Walukiewicz 2007). In Walukiewicz’s “Four Forms of Capital and Proximity” (2007) we find four types of proximity that create a central concept for an analysis of social capital at a micro level –an ICT company in our example.

These proximities are:

- cognitive proximity
- emotive proximity
- spatial proximity
- organizational proximity

They are not new in terms of name or general meaning but in our research, in the field of social capital analysis, they have been somewhat re-defined and explicitly tailored, some basic measures and properties applied.

The basic properties of proximities are:

- they are orthogonal to or disjoint with each other
- symmetric or asymmetric
- direct or indirect
- dependent on Virtual Production Line

These properties can be represented by a figure below:

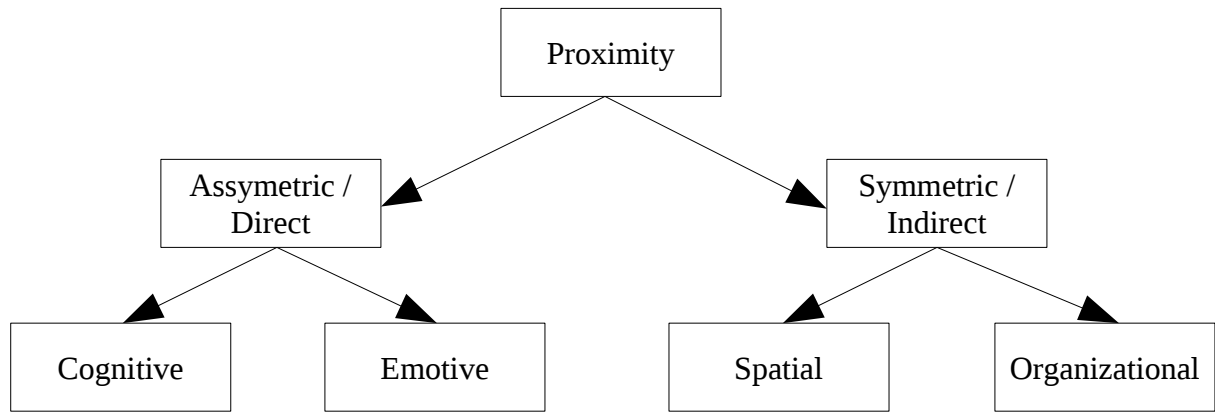


Fig. 1. Properties of proximity. Source: Walukiewicz (2008).

In general the concept of proximity helps us to answer the question of how similar or how different in terms of knowledge, norms, experience, etc. are two experts working on VPL and what is the impact of this on their cooperation.

In the business world most companies tend to emphasize the factor of diversity which can be understood as all differences – including visible and not visible differences – between co-workers. Chen and Lin state that good teams should be composed from the people having different interests, skills and norms (Chen, Lin 2004). Additionally according to Stolarski and Tilebein the bigger team diversity is the broader the knowledge become and thus broader perspective is gained which leads the team to higher efficiency (Stolarski, Tilebein 2009).

Heterogeneous teams tend to be more productive than homogeneous ones (European Commission 2003) and concept of proximity helps to measure or at least identify it.

Above examples show how theoretical concepts of social capital, virtual production line or proximity can be translated into daily language of global corporations.

Now we are going to show how theory can be applied into practice by presenting how one of the four forms of proximity can be used for building an efficient team.

### **Emotive Proximity**

Emotive proximity relates to personal relations and emotions such as trust, sympathy, common experience, etc. It creates a social environment for cooperation on a Virtual Production Line. This is direct proximity as it relates to emotions between two actors who shape and model this relation. Emotive proximity is asymmetric in that e.g. the fact that actor E trusts H does not mean that it is equally reciprocated by H.

Emotive proximity between two experts E and H working on particular VPL within time t, is defined by following utility function (Walukiewicz 2007):

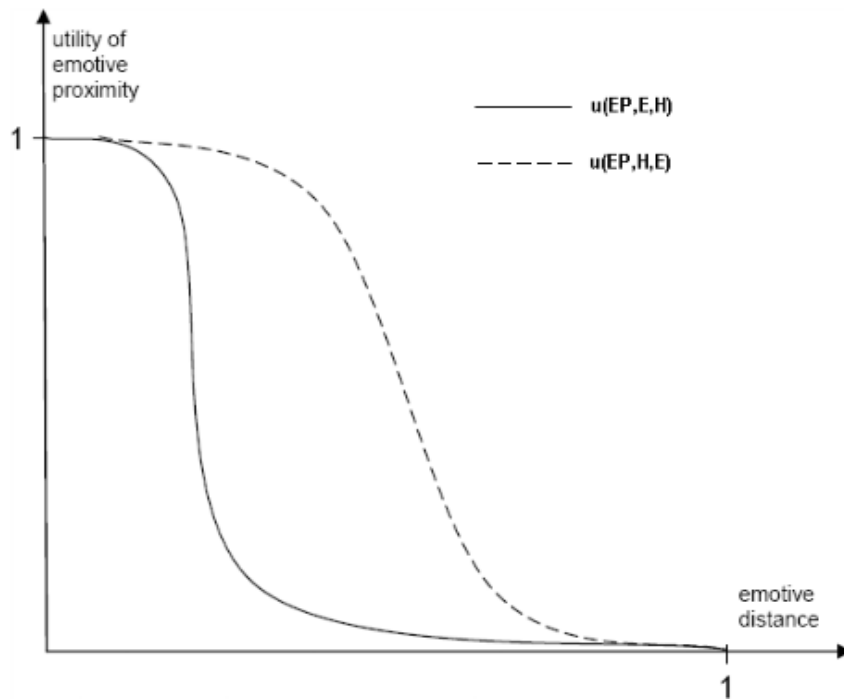


Fig. 2. Utility measure of emotive proximity. Source: Walukiewicz (2008).

In 2008 Walukiewicz introduced new utility measure of emotive proximity presented in Fig. 2 where  $d$  is an emotive distance (difference) between  $E$  and  $H$ . Without losing a general perspective we can assume that  $0 \leq d(E,H) \leq 1$

It can be proofed that EP has following properties:

- distance  $d(EP,E,H) \in \langle 0,1 \rangle$
- asymmetry  $u(EP,E,H,t) \neq u(EP,H,E,t)$
- marginal values  $d(EP,E,H)=1 \Rightarrow u(EP,E,H,t)=0$

$$d(EP,E,H)=0 \Rightarrow u(EP,E,H,t)=1$$

If emotive distance between actors  $E$  and  $H$  equals 1, then they are not able to cooperate emotively on a given Virtual Production Line (i.e. they personally hate each other and therefore are not able to work together). In a similar way, if emotive distance is equals 0, then at a given VPL both actors are emotively the same. With emotive proximity, the goal is to define and select an optimal group of actors working on a Virtual Production Line in terms of social connections and relations. This proximity can be supported by well-known Myers-Briggs Type Indicator (MBTI).

## Recruitment Problem

Building a successful team of experts who will creatively and willingly cooperate with each other is a big challenge. Admittedly, a company success depends on its employees, their experiences, codified and tacit knowledge, competences and - above all - mutual cooperation, sharing information, trust, sympathy, understanding, etc. Most companies recruit new employees using a rather simple process, analyzing usually only education, work experience, job, specific skills and knowledge, technical and business competency or language skills. Some companies use additionally assessment centers where candidates are put into a real job situation and their behaviour is analyzed. Such techniques can answer a question whether a candidate is a leader type or prefers to be led. Regardless of recruiting techniques and their sophistication, they are usually focused on the candidate's fitness in the

job description and knowledge, and very seldom on candidate's fitness into the team he or she will cooperate with. Having all the above in mind, we propose a new model of recruitment process using four forms of proximity as a tool for increasing social capital of a team. As an example we will use emotive proximity and MBTI.

## Myers-Briggs Type Indicator as new EP utility function

The concept of MBTI is based on Carl Jung's theory of psychological type. It assumes that every person has natural preference in perceiving the world and making decisions in they same way like with preference of using right hand over the left – or vice versa (Carlyn 1977). This preference is defined by four pairs of dichotomous attributes: **E**xtraversion/**I**ntroversion, **S**ensing/**i**Ntuition, **T**hinking/**F**eeling and **P**erceiving/**J**udging (Cakrt 2006). Combination of one attribute from each pair creates sixteen psychological types that a person can be described by.

Table 1. Psychological types (Cakrt 2006)

ISTJ	ISFJ	INFJ	INTJ
ISTP	ISFP	INFP	INTP
ESTP	ESFP	ENFP	ENTP
ESTJ	ESFJ	ENFJ	ENTJ

Each type shows the preference of the person in a way of perceiving a world and making decisions. For example a person characterized by type ISTJ is rather introvert that collects data by sensing, makes decision by logical analysis and prefers systematic and planned way of acting.

Optimal project team would consist members that are easy to work with, can get along together and will not create non-constructive conflict situations. In that stage of creating the high-performance project team we focus only on emotive proximity putting aside remaining three proximities. Each of the MBTI types will be decomposed in single attributes and those attributes will be valued from the perspective of cooperation. The pair introvert vs. extrovert is quite easy as extroverts are outer world oriented and teamwork stimulates them and such relation will be positive for cooperation. On the other hand it will be very difficult for two introverts to cooperate as they draw their energy from the focus on concepts and ideas and need quite time alone and thus such relation will be negative. Relation between introvert and extrovert will be neutral from the teamwork perspective. People characterized by attribute **i**Ntuition are able to create a vision from the scratch and set a future goal whereas **S**ensing team members will put this vision into realistic frame and make it happen (Cakrt 2006). Such relation is complementary and positive. Relations S-S and N-N are neutral as such people see the world in the same way and often such relation does not bring any creative impulse. The same rule applies to **T**hinking-**F**eeling relation. In case of **J**udging and **P**erceiving pairs the situation is different. J-J and P-P people share the same vision of the world and agree on the same values and norms. That why such relations will be positive. On the other and J-P people will not be able to understand each other and foresee what the other is going to do (Chen Lin 2004, Chen 2005). This relation will be negative from the cooperation perspective. Above relations have been summarized in below table by assigning “+” for positive relation, “n” for neutral and “-” for negative relation.

Table 2. Attribute relations

	<b>E</b>	<b>I</b>		<b>S</b>	<b>N</b>
<b>E</b>	+	n	<b>S</b>	n	+
<b>I</b>	n	-	<b>N</b>	+	n
	<b>T</b>	<b>F</b>		<b>J</b>	<b>P</b>
<b>T</b>	n	+	<b>J</b>	+	-
<b>F</b>	+	n	<b>P</b>	-	+

Now we are going to extrapolate single attribute relations to full types in order to get qualitative rating of relations between MBTI types. For this we are going to use 16x16 matrix and Saaty's fundamental scale for pairwise comparison.

Table 3. Fundamental scale. (Saaty 1990)

Intensity of importance	Definition	Explanation
1	Equal importance	Two elements contribute equally to the objective
3	Moderate importance	Experience and judgement slightly favor one element over another
5	Strong importance	Experience and judgement strongly favor one element over another
7	Very strong importance	One element is favored very strongly over another, its dominance is demonstrated in practice
9	Extreme importance	The evidence favoring one element over another is of the highest possible order of affirmation
2,4,6,8	Intermediate importance	Used in case of need of compromise
<b>Reciprocals</b>	If activity <i>i</i> has one of the above values in comparison to activity <i>j</i> , then activity <i>j</i> has reciprocal value when compared with <i>i</i>	

Based on the above scale following values were applied to relations:

- for negative relation – value 0 – in order to avoid negative numbers
- for neutral relation – value 1
- for positive relation – value 5

New table with attribute relations is shown below.

Table 4. Values of attribute realtions

	E	I		S	N
E	5	1	S	1	5
I	1	0	N	5	1
	T	F		J	P
T	1	5	J	5	0
F	5	1	P	0	5

Based on values from Table 4. MBTI types relations matrix is created.



Table 5. MBTI types relations matrix

	ESTJ	ISTJ	ESFJ	ISFJ	ESTP	ISTP	ESFP	ISFP	ENTJ	INTJ	ENTP	INTP	ENFJ	INFJ	ENFP	INFP
ESTJ	12															
ISTJ	8	7														
ESFJ	16	12	12													
ISFJ	12	11	8	7												
ESTP	7	3	11	7	12											
ISTP	3	2	7	6	8	7										
ESFP	11	7	7	3	16	12	12									
ISFP	7	6	3	2	12	11	8	7								
ENTJ	16	12	20	16	11	7	15	11	12							
INTJ	12	11	16	15	7	6	11	10	8	7						
ENTP	11	7	15	11	16	12	20	16	7	3	12					
INTP	7	6	11	10	12	11	16	15	3	2	8	7				
ENFJ	20	16	16	12	15	11	11	7	16	12	11	7	12			
INFJ	16	15	12	11	11	10	7	6	16	11	7	6	8	7		
ENFP	15	11	11	7	20	16	16	12	11	7	16	12	7	3	12	
INFP	11	10	7	6	16	15	12	11	7	6	12	11	3	2	12	7

Above matrix can be read in following way: the best combination of types for cooperation is a pair with the highest value in the matrix. In our case the highest value equals 20 for pairs (ENFJ, ESTJ), (ENTJ, ESFJ), etc. On the other hand the worst combination of types for cooperation are pairs with lowest value in the matrix. In our example these are (INFP, INFJ), (INTP, INTJ), etc.

In order to simplify further calculations above matrix is normalized by dividing it by maximum value and we get normalized matrix  $\Phi$

$$\Phi = (\phi_{ij}) \quad \forall i, j = 1 \dots 16$$

Table 6. Normalized matrix  $\Phi$

	ESTJ	ISTJ	ESFJ	ISFJ	ESTP	ISTP	ESFP	ISFP	ENTJ	INTJ	ENTP	INTP	ENFJ	INFJ	ENFP	INFP
ESTJ	0,60															
ISTJ	0,40	0,35														
ESFJ	0,80	0,60	0,60													
ISFJ	0,60	0,55	0,40	0,35												
ESTP	0,35	0,15	0,55	0,35	0,60											
ISTP	0,15	0,10	0,35	0,30	0,40	0,35										
ESFP	0,55	0,35	0,35	0,15	0,80	0,60	0,60									
ISFP	0,35	0,30	0,15	0,10	0,60	0,55	0,40	0,35								
ENTJ	0,80	0,60	1,00	0,80	0,55	0,35	0,75	0,55	0,60							
INTJ	0,60	0,55	0,80	0,75	0,35	0,30	0,55	0,50	0,40	0,35						
ENTP	0,55	0,35	0,75	0,55	0,80	0,60	1,00	0,80	0,35	0,15	0,60					
INTP	0,35	0,30	0,55	0,50	0,60	0,55	0,80	0,75	0,15	0,10	0,40	0,35				
ENFJ	1,00	0,80	0,80	0,60	0,75	0,55	0,55	0,35	0,80	0,60	0,55	0,35	0,60			
INFJ	0,80	0,75	0,60	0,55	0,55	0,50	0,35	0,30	0,80	0,55	0,35	0,30	0,40	0,35		
ENFP	0,75	0,55	0,55	0,35	1,00	0,80	0,80	0,60	0,55	0,35	0,80	0,60	0,35	0,15	0,60	
INFP	0,55	0,50	0,35	0,30	0,80	0,75	0,60	0,55	0,35	0,30	0,60	0,55	0,15	0,10	0,60	0,35

In this way we have created another estimation of Emotive Proximity utility function  $d$  which can be presented as

$$d(EP, E, H, t) = \Phi = (\phi_{ij})$$

It must be stated here that this form of utility function lacks the asymmetry assumption. However new estimation of it is being currently developed. New utility function of emotive proximity will be weighted by subjective criteria of professional experience's length factor in given company -  $\alpha$ -factor. Such experience although might not be related to the knowledge

domain that is being processed on particular VPL (knowledge domain is a subject of cognitive proximity) is very helpful in gathering the knowledge about company's working culture, rules, norms and values that simplifies cooperation. Period of twelve month seems to be sufficient to get to know organizational know how and it will be used as a base for weighting utility function. The equation is following:

$$\alpha = \begin{cases} 1 & \text{for } \xi \geq 12 \\ \frac{\xi}{12} & \text{for } \xi < 12 \end{cases}$$

where  $\alpha$  is weighting factor and  $\xi$  is a number of months in organization.

New estimation of utility function of emotive proximity will be presented and described in the next article.

## Conclusion

Emotive proximity is one of the four proximities created and developed by Walukiewicz as a part of research on social capital. It defines the potential team members' emotive ability to cooperate on Virtual Production Line. As a base for utility function of emotive proximity a popular Myers-Briggs type indicator and pairwise comparison's fundamental scale have been used. Creating a team consisting of well and carefully selected members increases the probability of better performance of such team.

## Further research

A problem of creating an optimized project team consists of four disjoint but dependent dimensions or proximities: emotive, cognitive, spatial and organizational. Remaining three proximities should be assessed and developed in similar way in order to build holistic model for optimized project team creation. Using these proximities in team building results in increasing social capital of such teams and their productivity. Applying such model throughout organization may help in increasing social capital of the company.

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