

# ACTIVE

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### Analysis of Incentives in Knowledge Management and Web 2.0 Applications

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#### *Abstract*

The analysis was carried out in two separate parts, from the user perspective, focussing on individual motivation and decision making in relevant situations, and from the organizational perspective. It was decided to abstain from an attempt to integrate the two sections of the report, which represent different approaches to the defined goals, because this would make it much more difficult to read.

Section 1: Analysis of incentives in Knowledge Management and Web 2.0 applications (user perspective)

Section 2: Applied organizational incentive systems

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## Executive summary

This is a summary of the result of the analysis of incentive issues in knowledge management and web 2.0 applications from the perspective of the individual user. The goal is to understand which principles apply to incentives which can stimulate the use of ACTIVE applications. The core issue is how to enhance cooperation and trust in web-based applications as preconditions for effective use of the ACTIVE case study prototypes and similar applications.

There is a large body of relevant theory and experimental evidence in scientific subjects ranging from microeconomics, human decision making, organizational behavior, motivation theory, social psychology and others. The most relevant scientific background is provided by scientific studies in microeconomics and labor economics, and human decision making.

The main motivation in a working environment is to earn an income by own efforts, the essence of work relationships. Not only immediate monetary rewards are of importance, but also long-term career prospects and non-material rewards. The essential question for Knowledge Management (KM) systems is how these can be implemented in the form of incentives for KM systems in corporate environments, to generate benefit for the enterprise as a whole as much as for the individual user.

We summarize a body of existing results from relevant working environments, and consider the relevance of web 2.0 applications. Some aspects of the cooperation in the Wikipedia organization and the use of reputation systems can be adapted to options for company-internal knowledge management systems.

Cooperative behavior is generally not easily rewarded with material rewards. An obstacle is that the definition of fair and effective incentives require the availability of transparent measures of performance. There are examples for incentives used in KM systems which did lead to unwanted effects. The observed effects can be explained in terms of rational decisions of the users, which did not serve the interests of the organizations.

The organizational context (enterprise strategy, organizational structure, and processes) determine many aspects of the human resource management principles (and thus available incentives), cooperation, and knowledge management principles (which may be based on codified or personalized knowledge). In order to define effective incentive systems, these organizational issues must be analyzed and taken as constraints.

We conclude that incentive schemes must be defined specific to the context of an organization, independent of the IT solution used. It is important to take the entire work and remuneration situation into account, and anticipate the effect of modified incentives on the entire range of the behavior of employees. A number of factors, such as career situation, experience, personality, and others are likely to affect individual cooperative behavior, and may not be easily affected by incentives.

In the subsequent activity in WP7.3 incentive schemes will be defined for the specific ACTIVE case study applications and tested in simulations of the case study applications.

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# 1 Background

## 1.1 Knowledge management: Productivity and collaborative behavior

The ACTIVE technology is developed to increase the productivity of knowledge workers, to support seamless collaboration and problem solving, including informal collaboration. An essential success factor for knowledge management systems such as the ACTIVE case study applications is the participation of a large proportion of the members of an organization, typically a business unit. The activities expected from users include tagging, depositing documents, reviewing and updating, and also active use of the knowledge base during the course of business. An organization can set rules for its members which prescribe such activities, but especially with professionals who are used to (and in fact expected to) work autonomously, these are hardly enforceable. Therefore it is most important to make it attractive to contribute to and use a corporate knowledge management system. The main objectives are firstly to improve individual performance, and secondly to advance the indirect collaboration by exchanging knowledge assets. On the super-ordinate organizational level the corporate organizational structure and processes should be improved, become faster, more efficient, and of higher quality.

While there have been success stories for knowledge sharing and knowledge management systems which were successfully established and used within organizations, there are also many reports of the disappointing absence of evidence of improved collaboration and insufficient use of technically competent applications for collaboration and knowledge sharing.

Acceptance of socio-technical systems which require collaboration depends on the repeated and continuous decisions of the participating individuals to contribute high-quality information to the collective effort. We discuss here which incentives elicit such behavior, and how these can be implemented and optimized to maintain collaboration. A necessary condition for effective knowledge management – as for other collaborative social systems – is a sufficiently high rate of participation.

Understanding the effective incentives, and the ability to influence these, is thus a decisive advantage for the implementation of information systems which rely on a high rate of acceptance and trustful cooperation among the members of a defined group.

## 1.2 Motivation and Incentives

Incentives are anticipated consequences of behavior which direct behavior. Incentives can be positive or negative, and they direct behavior towards the most attractive alternative, given the current motivational state. (E.g. in a state of hunger, food is an incentive which directs behavior towards food, but if thirst is stronger, then a different behavior will be chosen). Incentives are a variable in decision making.

There are two different uses of the term incentives: In the general scientific sense incentives are the expected outcomes of any behavior which direct the course and intensity of the behavior. This is part of general theories of behavior (human and also animal behavior). There is an extensive literature relevant to this generic theoretical problem, and a very wide range of different methodological approaches, including philosophy and ethics, sociology and social psychology, decision theories and research, both normative and empirical, behavioral ecology, experimental psychology, and others. It is important to differentiate between systematic observations of behavior, and verbal accounts of underlying cognitive processes. Verbal reports are also a kind of behavior, but the underlying processes cannot be observed objectively. Introspection does not produce reliable information. Scientific evidence therefore refers to behavior and evidence generated according to the scientific empirical method.

In a much narrower sense, specific to business contexts, incentives are understood to be rewards which can stimulate extra performance and strengthen certain desirable aspects of economic behavior. In organizations incentives are typically rewards outside the salary system which are awarded for extra performance. Other types of incentives in consumer behavior are specific rewards to consumers, for example air-miles, stamps, Panini pictures and other, which are designed such as to increase the expected value of goods to the consumer more than the effective cost to the trader. In a scientific sense, all possible outcomes must be taken

into account to explain how behavior is shaped, including negative ones. Punishment is usually not considered in the context of business incentives.

An interesting aspect of incentives in a business context is that a small cost to provide incentives can generate a return of much higher value. Examples are air-miles, where small benefits at low cost to the provider increase the loyalty of customers, sometimes generating decisions against the interest of the individual customer or his employer. The opportunity to win a family trip to the Seychelles, even if with a small probability only, may lead to significant extra performance of a large group of employees with a significant business value to the employer. Incentives of this type are especially important in a HRM context where no objective measure to reward performance is available. Thus, the interesting aspect of this type of incentives is due to the fact that the value is not realistically calculated by the persons whose behavior is to be influenced by the incentive. It is generally expected that the benefit of the reward is highly overestimated by the individual, i.e. the incentive effect of rewards is expected to be higher than the direct monetary value. It should be noted that lotteries exploit similar distortions in economic judgements.

### 1.3 Approaches to the study of incentives

The scientific study of motivation and incentives is a topic of Behavioral Sciences, primarily Psychology and Economy. The main problems in the study of motivation are the fact that the motivational space is of high dimensionality, there are many interdependent motivational factors – hunger, thirst, sex, power, social attention, status, and others. The relevant functions, for example those which map motivational dimensions onto each other, are nonlinear. The system is dynamic in the sense that parameters vary as a function of time, e.g. hunger, thirst, need for rest, vary during each day, other values vary over seasons or the lifespan. A simplified understanding of motivation of economic behavior (work) is that the only motive for work is to achieve income through effort and avoid risk, but modern labor economics has identified other important factors, such as motivation to perform interesting work, contributing to fair labor conditions, social recognition, and personal learning. In the following we refer to a large body of background research in the fields mentioned above, but can refer in detail to a small number of studies only. Introductory overviews describe the relevant fields, and should be consulted, Breyer (2005), Furnham (2005), Robbins (2001), Roth (1989).

The impact of incentives occurs by decision making. Authors such as Simon (1959), or Kahneman and Tversky (1979) have shown that human decision making deviates systematically from “rational” behavior in the economic sense, i.e. the concept of utility maximization. While scientific empirical approaches and mathematical models of the dynamics of motivation and behavior are available (see e.g. McFarland (1974) for a description of theories and experimental methods), in practice these have been mainly applied to motivation where the physiological basis is understood, and to variables which are easy to measure. In the study of human decision making in economics very similar theories are upheld, but studies are conducted on the assumption that all motivational dimensions can be mapped on one linear “utility” scale, represented by a currency. Human decision making can only be studied when simplifying assumptions are made to reduce the complexity of the multidimensional, nonlinear, and dynamic decision space.

In the attempt to understand how human decisions deviate from economic rationality, cooperation and altruism have been studied extensively (Fehr & Falk, 2002). There is evidence for the fact that altruism has a genetic basis, but there are also results which show that apparent altruism (helping others at a cost to oneself) can be successful self-serving behavior: Helping members of the own group makes this group more successful, and is therefore an advantage to each individual member, even if the payback may be uncertain and indirect. A major problem is the occurrence and prevention of free-riding in communities.

A number of conceptual, unformalized theories of behavior focus on factors such as self-realization, power over others, self-esteem etc. These refer to commonly observed behavior, such as the fact that many people seem to strive for meaningful work, derive satisfaction from completing tasks, and strive for influence and power, even if they do not obtain immediate rewards for this behavior. Although they have high assumed (face) validity, the descriptive power and the empirical evidence for these theories are rather limited, which invites ideological judgements.

As part of management and business economy, organizational theory specific to business organizations has been developed, based on Social Psychology, Organizational Behavior, Group Dynamics and a number of related disciplines. The aim is to understand the dynamics of human behavior in (business) organizations,

and to present guidelines and principles for analyzing and managing organizations. Incentive Theory as part of Human Resource Management aims to explain the causes for diverging behavior of individuals in organizations, and how to influence their behavior. The main thrust of organization theory is the long-term competitiveness of organizations.

Microeconomics and labor market economics explain individual behavior in work situations with economic principles, the core assumption of which is rationality of human choice. A main feature of this view is that outcomes of behavior are mapped onto a single dimension of utility, commonly expressed in monetary terms, although it is increasingly recognized that the assumption of rational human decision making in the normative sense does not suffice to describe observed behavior. Many of the findings which we will refer to below have been made in this field.

Business ethics is a scientific field which addresses the issues of cooperation, trust and fairness in business environments in a normative sense, and as preconditions of successful long term development of business organizations and the economy as a whole.

## **1.4 Contractual framework of organizations**

Organizations are defined by the coalitions which their members have formed explicitly and implicitly, using their freedom to form associations, but implying binding contractual obligations as a consequence. The legal context of business activities is highly regulated, the obligations of employees (and in verso, the obligations of firms towards their employees and business partners) imply far-reaching constraints on the ownership, use, and confidentiality of information. In general, the use of all information used and generated by an employee is subject to general legal constraints and the rules of the employer, who by default is the owner of all information. Confidentiality is explicitly regulated in most organizations, and frequently excludes use of insecure information sources. Even if not explicitly regulated, the ownership of information and the right to regulate access rests with the employer.

In labor relationships the typical situation in Europe and North America is that the obligations of employees are defined by their explicit contract of work. These usually define average or minimal performance requirements, and do not allow sanctions due to performance differences between individuals, extreme deviations excepted. Detailed and continuous performance measurement of individual employee behavior generally requires agreements between employer and employee, and is admissible to a limited degree only. The applicable legal conditions and industry-specific agreements appear to vary significantly, and would have to be the subject of a separate analysis. The performance expected from professionals in knowledge intensive jobs typically cannot be defined in contractual terms which make the contract enforceable by law, except grave misconduct or extreme performance deficits. Consequently other means to motivate employees are important to manage, especially when the employees are relatively autonomous and carry out specialized and qualified professional tasks.

Cooperative behavior, either conscious, rational behavior or altruistic behavior, is of key importance to KM systems of the type which ACTIVE develops in the case studies. It is important to remember that social behavior is not necessarily altruistic, or corresponding to social norms. There are also motivations to achieve a position and power in a group, to gain power over others, or to obtain unfair advantages. On the positive side, there is motivation to live in a positive, trustful and safe social context, or to earn praise from others. Opportunities for collaboration and communication can also be used to pursue goals which are generally or in the particular context not considered acceptable or desirable.

## **1.5 What can be achieved with incentives?**

In this report we consider incentives related to software applications and to tasks of the users of these applications. The incentives which interest us are expected to strengthen certain aspects of user behavior in collaborative work systems: Contributing to knowledge repositories in organizations by submitting knowledge assets and by contributing to the development of metadata by tagging and by maintaining semantic metadata. This includes the willingness to share information liberally with other individuals in the organization.

In such an application environment incentives should be specific to the user tasks, their goals, the context of use, the population of users, and the application software. It usually does not make sense to define incentives

for using an element of technology, such as semantic technology. Compare two applications, either including or not including semantic technology: If both enable the same performance (the difference in technology may not be visible for the user), then the same incentives should be effective for both, and should motivate behavior which leads to improved quality and performance of work.

The concept of incentives, somewhat simplified, is to add to the apparent value of carrying out selected behaviors which are desirable from a super-ordinate point of view, for example the operator of a company-wide knowledge management system.

Incentives must represent a value for the persons whose behavior is to be influenced. New technology does not introduce new values, but of course rewards may assume a different form.

It is certainly not possible to shape any arbitrary form of behavior with incentives (promises of reward and punishment), but a very wide range of behavior can be maintained, given that two conditions can be met:

- The behavior which is to be strengthened with rewards can be measured with confidence and precision
- Control can be exerted over the context and environment within which the individual acts.

Furthermore, not all combinations of a desired behavior and a reward are equally effective. In general, those rewards are most effective, which are logically related to the behavior to be rewarded. A strong incentive for using a KM system is an obvious and directly visible benefit for the user, e.g. finishing a job in 15 minutes rather than the expected 2 hours. The prospect of slightly improved chances for a bonus in one years' time is a much weaker incentive. Rewards can also be dysfunctional: Rewarding, for example, helping other people, with money often weakens rather than strengthens the tendency to help (Fehr & Falk, 2002).

## 2 Objectives: Making ACTIVE applications more attractive

There are not many organizations which can rely on their ability to control the behavior of their individual members to a large degree by direct instruction (such as the military), consequently methods of persuasion are needed to generate the behavior which is desirable for achieving the general objectives defined by the strategic goals. The use of systems such as ACTIVE requires that individuals find it attractive to make use of them. Our goal is to understand which incentives can be provided to stimulate the use of the ACTIVE case-study applications, and the use of the functionality provided. This functionality supports collaboration, partly in an indirect manner by the contribution of process and business knowledge to a large audience in an organization. The incentives must apply to the technical functionality – which the users must find useful and attractive to use for improving their own performance. In addition, the specific, indirect cooperation within a large, partly anonymous community must rely on the active participation of the members of the community. The use of ACTIVE implies that a codification strategy for KM is pursued, demanding cooperative behavior towards anonymous members of the community by the submission of high-quality and timely information to the knowledge base.

### 2.1 Problem situation

Part of the new functionality added by ACTIVE semantic technology supports the user either automatically (process learning and context-related information delivery), while the functionality which supports collaboration depends on cooperative behavior from the majority of users. Only a sufficiently large number of users generate the critical mass which is needed for the system to operate successfully, and to provide a long-term momentum to grow. Software systems and other formal and informal processes support collaboration, social networking, and communication within organizations. Users are not limited to use one particular application, but software applications as well as traditional means to cooperate compete, and the combination of services which offers the highest overall benefit is in the best position to win the support of a large user community.

We focus on business applications, business information and work processes, and professionals collaborating in a business context. In this context the decision to adopt and implement a system is made by management, but the users decide whether they use the applications for their tasks, and how they will contribute to the system. The services offered to users in this domain are in a state of fast transition, there is currently no stable state in the supply of social web services for users to adapt to. New services are appearing on the market in quick succession, and it is quite open how these will evolve. New services can be expected to supplant existing ones.

The context is a given organization, and given operating procedures. In this situation formal and informal structures and processes exist, which largely prescribe on the one hand what individuals are expected to do, and what the consequences are for complying with the rules. In addition, the formal regulations as much as the informal structures and processes, and external pressures (such as competition) determine what kind of incentives can be used to control individual behavior.

The context of knowledge management processes is given by

- Business strategy
- The organizational structure and the roles of individuals in the organization
- Current work processes and procedures
- Actual behavior, in compliance with or deviating from official procedures
- Applicable incentives

The objective is to structure the applicable incentives in such a way that in the community which shares knowledge a desirable form of cooperation evolves, using the knowledge management facilities in the best possible way to create benefit for the owner (which is the organization).

The business strategy and its systematic application in strategy and processes may limit the applicability of document-based KM systems, for example if there are reasons to prefer a people-centered knowledge management strategy, or confidentiality requirements.

On the level of individual user behavior the following activities should be strengthened by appropriate incentive mechanisms:

- The submission of knowledge assets for sharing
- Tagging: Providing high quality metadata
- Helping colleagues who request specific information
- Advertising own competencies to the community
- Releasing data about the own work processes, overcoming privacy concerns
- Providing feedback for the learning process to identify work procedures (process learning)
- Providing quality feedback about assets in the knowledge base
- Making best use of the available KM system to optimize business processes

## 2.2 How can incentives become effective?

Which incentives are effective to direct and stimulate specific behavior? This is a most generic question. In general a person has a variety of needs at any moment in time, and corresponding motivation to reduce these deficits. Motivation is a state in a multi-dimensional space (no simple and reasonably complete solution to define the dimensions of this state space is known). Any event which reduces these deficits can reinforce (increase the frequency of) the behavior followed by this event. Not all combinations between desired forms of behavior and rewards are equally effective, and the specific schemes of rewards (which reward, how often, how much, when etc) vary widely in effectiveness. Any behavior may reduce the deficit in one or several dimensions, but increase the deficit in other dimensions. Working overtime, for example, provides means for increased consumption, but at the same time reduces the time to enjoy the opportunities provided.

Labor economics has developed theories and models which can predict the effectiveness of monetary incentives quite well, but applications depend on the ability to measure performance rigidly and precisely.

Collaborative behavior in large communities involves uncertainty and random elements, because most of the potential partners are not known in person, and it is hard to predict the value which specific information will have for the entire population, or if and when cooperation will be rewarded. In small teams collaboration is determined by personal relationships between the individual team members.

Why do people cooperate, and maintain and contribute to communities?

The main question is if motivation for cooperative behavior is driven by self-interest or altruism. Both can effectively generate and maintain successful cooperative behavior in communities, depending on the specific circumstances and on the understanding of the community by the individual members.

1. Self-interest (rational economic behavior) motivating cooperative behavior: The members of a community expect to obtain net benefit as a consequence of cooperation, then they invest in own effort. There are two possible causes for this:
  - 1.1 Collaboration produces net benefit (“win-win” situation). This is a realistic option, given the right conditions, for example specialization and division of labor, which are an essential condition for effective professional knowledge work. This assumption is generally made when the expected benefit of cooperative knowledge management is described.
  - 1.2 Insurance. Collaboration among peers is usually based on the assumption that all contribute equally. This is an unrealistic assumption because there are always individual differences in performance, and free-riding occurs in all collaboration environments. Why is cooperation still attractive, even to those members of the community who believe that they invest more than others? Even if over certain periods some individuals may contribute less to the total group performance, all hands may be needed in emergencies, and contributions may in fact fluctuate. It can be in the

interest of all members of a community to tolerate a certain amount of uncooperative behavior, assuming that the uncooperative members of the community may be available later, when the urgent need for their contribution arises.

2. Altruism. Altruistic behavior means that costs occur for the person who exhibits altruistic behavior, but the benefit is created for other individuals. Often a tacit assumption is made that this effort may be paid back at a later time, directly or indirectly. However, altruistic behavior may have an economically rational justification under certain conditions: Altruistic behavior increases total group performance when the benefit to the recipients of altruistic acts is higher than the cost incurred to the donor. If this is the case, cooperation is in the self-interest of all community members. (For the individual it is desirable to be a member of a highly cooperative community, but not contribute himself, optimally to be the only member of the community who is riding for free.)

There are also some behaviors which appear to be economically without value, but which still have to be regarded as motivated by self-interest (and thus rational behavior), such as learning, play, and entertainment. These behaviors generate no material rewards, and they are clearly not carried out for the benefit of others, but it is not transparent what benefit the acting individual obtains. (The fact that individuals invest regularly into such behavior is sufficient evidence that it is motivated.) In many instances the reward is not obvious in monetary or other material terms, and can be indirect and effective over long-term periods. Personal benefits can be, for example, to obtain knowledge and gain practice (learning), entertainment and play, building up a reputation, developing self-esteem, and investment into becoming a member of a community which offers opportunities in the future to exploit the added value of cooperation.

A condition of cooperation is trust, which means the extent to which other members of the community are expected to cooperate in a fair and equal manner. Trust relies on previous experience and on fundamental factors shaped by culture, socialization and factors specific to the individual. Trust is inspired or hindered by previous experience with a person. Reputation is an indirect form of previous experience with a person. The value of reputation depends again on the trust assigned to the organization or process which produces the data on which reputation is based (restaurant recommendation by Guide Michelin versus advertising.)

The most important incentives in a work context are remuneration and reputation. There may be short-term and long-term effects in both dimensions. Short term effects would be created by a bonus payment, long-term effects by advancement on the employment (and salary) scale, and appointments which define reputation on a long-term scale.

While in principle both positive and negative consequences are applicable for generating a desired form of behavior, explicit negative incentives (threat of punishment) are confined to legal infringements in a business context under normal operating conditions. Implicit punishment, such as unfavorable reports, are normally restricted to severe incidents. Withdrawal of privileges may be interpreted as punishment, depending on the expectations and aspirations of the individual.

## **2.3 Other factors which determine how cooperative behavior can be motivated**

### **2.3.1 Personality factors and group membership**

Individuals differ significantly in their tendency to cooperate, and in their tendency to trust others. Personality is defined as stable patterns of behaviors which are exhibited in different situations. It is disputed to which extent these factors can change, or can be influenced. While there is a genetic component, there is also a strong influence of education and socialization, leading to a stable pattern of behavior in adult life.

Persons with specific personality traits and patterns of social behavior are not distributed randomly, but are clustered in organizations due to a process of selection: Employees are selected, among other criteria, according to their social behavior and their personal characteristics, cooperation is one of these properties. Employees also apply for employment in organizations which suit their expectations and their own style of social behavior. For these reasons individuals will tend to cluster in organizations or groups with compatible cooperative behavior. Individuals with a high apparent reputation for either cooperative style or other competencies tend to be co-opted into successful groups and organizations (who gain in competitiveness by attracting individuals who strengthen their performance).

In addition to selection, the dynamics of an organization are subject to training and collective experience, which create “organizational culture”, a stable and persistent pattern of behavior in an organization.

An interesting phenomenon is the “esprit de corps” response. When persons are assigned randomly to a group (members unknown to them previously) in experiments, they will invest heavily into making this group successful and competitive. This is rational behavior as long as investing into your own group creates benefit for all group members.

### **2.3.2 Cultural differences**

Cultural differences have been found between nations and between organizations concerning the parameters of cooperation, and the level of trust towards unknown persons.

In business organizations the structure (size of groups, hierarchy, lines of command and processes of collaboration, HR principles) depend on the requirements of the tasks executed in the organizations. These will also impact the knowledge management strategy in organizations (Hansen, Nohria and Tiernay 1999).

### **2.3.3 Gender differences**

There are well known gender differences which hold through many different life situations. Women on average are in most cases more cooperative than men. It must be noted that these are observations which are not controlled for differences in working conditions and life situations between men and women in general.

### **2.3.4 Lifespan development**

Certain forms of co-operative behavior are observed more frequently with either younger or older persons, such as students and retired persons. This may be due to a performance-oriented life situation which extends throughout a career. Different situations may persist during education, and again during retirement.

### **2.3.5 Anonymity**

Cooperation and trust develop among persons who are known personally or are recommended by trustworthy persons. (Knowledge about co-operation partners may enhance or reduce co-operation.) The phenomenon of free-riding is more frequent in an anonymous context.

## **2.4 Applicable types of incentives in a business context**

### **2.4.1 Monetary incentives**

In an economic context incentives might be directly translated into the currency in which either goods or services are priced, or in which the salary is paid. This can either be implemented in a system where there is a strict piece-rate regime of payment, or in a system where a fixed salary is paid plus bonuses. Under a strict piece-rate regime this would mean that a programmer, for example, is paid for lines of code submitted, for documentation effort, or for submitting knowledge assets and providing metadata, each at a specific tariff. The problem with such a scheme is that it can only be implemented when performance can be precisely quantified, and when a quality management system can be implemented to assure that a desired quality level can be maintained (cheating may be easily possible, e.g. by exploding the number of lines of code unnecessarily, or generating meaningless metadata). The problems of pay-for-performance incentives are discussed by Ghosh (2004).

### **2.4.2 Non- monetary rewards**

Non-monetary rewards range from equivalents to payment (family trip to the Seychelles, bottle of champagne, or book voucher) to reputation-enhancing rewards (diploma, recognition in the weekly KM bulletin). Substitutes for payment may offer the advantage of the lottery, where the value of the prize is perceived as much higher than the market value of the prize. Other non-monetary rewards can be related to career development, and recognition of performance with an impact on career opportunities.

There are good reasons to separate non-monetary, material rewards and the payment system. Firstly, rewards appear insignificant when seen in perspective to the total payroll, and secondly unwanted impact on the main working motivation should be avoided.

### **2.4.3 Reputation systems**

Systematic, public recognition of good performance without immediate material reward is called a reputation system. Reputation systems exist in many formal or informal formats. The most informal is social reputation in the classical sense, covering a long time-span, personal relationships, and a wide range of criteria. In formally defined organizations a system of ranks, responsibilities, awards, authority and other factors determines the reputation in a formalized manner. The reputation systems implemented by assessments of business transactions in ebay, amazon, and other shops and services are in comparison quite simple. There are many types of reputation systems between these extremes. The main characteristic is that the benefits of building up a reputation are obtained over a long term. Reputation indicates that the person with a high reputation can be trusted, and consequently enjoys significant advantages in a collaborative context. The benefits are partly of a material nature which can be estimated as a monetary value of reputation (such as easier transactions, higher prices, preferred partner status.)

Reputation is a multi-dimensional property and can be quite differentiated (as in society in general). Typical factors are trustworthiness, dependability, competence, responsiveness.

In a competitive environment reputation is linked to business success, income, and career advancement. The mechanisms include career advancement, co-optation (being elected as a member of attractive communities), and socialization. In many social systems, the main effect of reputation is co-optation, and valued highly. The scientific community operates a reputation system which is the basis for allocating resources and for managing career development. Gammelaard (2007) concludes from a large survey that employees prefer incentives in the form of reputation gain and opportunities for personal development to monetary (pay-for-performance) incentives.

### **2.4.4 Positive and negative incentives**

Incentives can be positive (rewards), or negative (punishments). Direct negative incentives (punishment) are neither permitted in most work situations, except for severe transgression of rules, nor are they popular. The reason is that the de-motivating effect is un-proportionally high – there is an asymmetric rate effect. A particular problem in labor contracts is implicit punishment in the form of withdrawal of a previous or expected reward (Baker et al. 1994). As an illustration, consider an employee who has been “knowledge contributor of the year” for five successive years, and expects to win the award in the subsequent year. If this fails, it is likely to be perceived as a punishment, which most individuals would find very frustrating, and which has a de-motivating effect.

### **2.4.5 Incentives applicable in KM systems, specifically the ACTIVE case studies**

There are no incentives for co-operation and trustful behavior which are specific to knowledge management systems, or specific to internet applications or IT systems. Incentives are provided by the environment of the individual who should be influenced by the incentives which are investigated. This context is the economic, legal, and social context of the individual.

Individual persons can be rewarded with a fairly well understood set of rewards. In a work and business context these are mainly related to income and related material benefits. Recognition, social status, the absence of risk, stable and dependable prospects for future development are related to these material rewards. These are also those rewards which are easiest to define and to provide in a business context. Other desired states can act as incentives, but these are harder to define, and difficult to provide in a systematic way: These are fun, satisfaction, positive work environment, friendship – but also power or control over others.

We do not propose to look for entirely new ways to reward organizational behavior (co-operation) and to stimulate trust, but we are looking for incentive schemes, i.e. a set of appropriate parameters to configure a combination of the effective rewards, which are fairly well known.

Solutions must be specific to organizations and their culture, the target populations of users, and specific contexts of work. They are not specific to a technology, or a combination of technology components.

Experimentation can help to identify appropriate incentive schemes for a given context of work and application system. In order to effectively control behavior with appropriate incentives,

- It must be possible to measure the desired behavior reliably.
- Rewards must be controllable by the organization.
- The complexity of the context must be controllable (the multi-dimensionality, non-linearity and dynamics of motivation), otherwise individuals may adapt their behavior in unforeseen and possibly undesirable directions.

## 2.5 Motivation and incentives in web 2.0 applications

Web 2.0 refers to applications which include publishing of information, information sharing, collaboration, and social networking on the web. Most use of the WWW is information retrieval and transactions. The term web 2.0 designates activities with active participation and collaboration with other individuals, often previously unknown. The interesting aspect of web 2.0 applications is that many develop in an unplanned and unexpected manner, outside traditional business processes. Some applications, notably open source software projects and Wikipedia, are large and lasting collaborative undertakings which produce complex information entities in a non-commercial environment. We examine some of these applications to identify the motivation and incentives which make people invest significant effort into these activities.

### 2.5.1 Types of relevant web 2.0 applications

We discuss a number of web 2.0 applications with properties which we consider to be relevant for ACTIVE:

- Knowledge media creation, notably Wikipedia and similar applications
- Social networks
- Broadcasting of personal information (such as Twitter)
- Commercial activities with information contributions from users or customers, most importantly reputation systems, such as those at ebay, amazon, or consumer fora
- Microjobs (sometimes called “clickwork”, web-based organizations which distribute many small tasks to paid or voluntary contributors)

The questions we ask are:

- Why do people contribute to these web 2.0 applications?
- Which conditions affect their participation?
- What are the effective incentives?

#### **Knowledge media creation: Wikipedia, Wiktionary**

Wikipedia has highly successfully built up a large and recognized knowledge base. What motivates individuals to contribute to Wikipedia? Kusznetsov (2006) found in a survey that the most frequently given reason for contributing is to learn an interesting new technique, followed by altruistic motives. Stegbauer (2009) concludes from extensive observations and studies of the Wikipedia organization that in addition to the motivation to create interesting content, reputation and the opportunity to obtain a defined role in the Wikipedia organization appears to be a main incentive for participation in the Wikipedia effort. This is supported by the evolution of the Wikipedia organization into a complex, fairly rigid social organization. While obtaining a position with reputation, authority and power in the Wikipedia organization acts as an incentive for active participation at considerable cost, it is not yet clear what will maintain long-term engagement.

Why is Wikipedia a successful undertaking, but other, similar ones such as Wiktionary are not? A likely explanation is that the inherent satisfaction derived from providing dictionary information is considerably lower than when writing essays. Other reasons may be that the desire to influence public opinion and the power motive may be served much less. Wiktionary is more similar to clickwork than to a creative activity such as Wikipedia, providing less inherent satisfaction from a creative task. Tagging (producing metadata) is

not considered an attractive task. To make tagging more attractive, Siorpaes and Hepp (2008) test a solution proposed by von Ahn, where the incentive is a computer game, and tagging is carried out as a side-effect.

It is worth considering that scientific communities are structured in a form similar to Wikipedia: Scientists do not obtain direct payment for most publications, but contribute actively, even beyond the end of their career. In the scientific community reputation and the position in an organization act like a separate currency.

Open source software generation is not considered here, opinion surveys have been undertaken which stress the altruistic motivation of contributors. We would point out that the educative and social aspects of these activities represent self-interested behavior.

### **Social networks**

Social networks such as facebook, myspace, or studivz combine several functions. Firstly they are means to advertise own competence and own personality. Secondly they are used as a communication medium to influence views and opinions within a community. In this sense they model and replicate social communication in groups with other means of communication. Significant differences are that many recipients can be reached simultaneously, and a record of previous communications remains.

The expected benefit seems obvious, networks are used as a way to influence public opinion and to share information in a group. The effect can be to maintain coherence within a group and to establish power relationships. It is increasingly being recognized that a feature unforeseen by many users is the fact that information once published in a social network remains publicly available for a very long time.

Many large companies and public administrations have banned use of social networks during working time, some have even blocked access to certain sites. Enterprise-specific solutions for microblogs such as JIVE or YAMMER add means to assure confidentiality, but as yet little is known about actual use and benefits in business organizations. At this moment social networks are not considered as relevant functionality for knowledge management systems such as ACTIVE, although they may turn out to assume a role as reputation system. The very profound effect which the information about individuals in social networks may have on reputation should be noted.

### **Broadcasting information: Blogs, Twitter**

Blogs and services like Twitter can be used to broadcast information fast and cheaply for any purpose. The motivation to use these services is the same as for any other channel for information distribution – to make one's own opinion known and to influence other persons. They could serve as an alternative way to publish relevant information which is not sufficiently codified to enter into a KM system.

The main danger is the quality and arbitrary selection of information content generated spontaneously.

If quality assurance is required, the fast and spontaneous form of communication may be lost which may be a main incentive for many people to use these services. However, to spread information contained in KM systems over additional channels may be a useful added functionality.

### **Reputation systems in commercial services: Ebay, amazon, consumer reviews of products and services**

Ebay, amazon, market platforms, price-comparison services and many other similar services include reputation systems. These allow customers to rate the quality of products, services, or trading partners. The reputation ratings obtained at ebay have been shown to have an immediate business impact: Traders with a lower reputation achieve significantly lower prices for the same products or services. This fact provides a strong incentive for manipulation.

Why do people provide ratings in the first place anyway? Broadcasting quality feedback is a form of altruistic behavior, because the person who provides the information obtains no direct benefit from investing the effort to provide a rating, possibly even at the cost of becoming the object of retaliation.

The effectiveness of reputation systems depends on the absence of manipulation and unfair influences on the reputation ratings. An effective reputation system is of significant value to its users, and the co-operation rate (number of users prepared to invest by providing ratings) can be expected to depend on a low cost for providing feedback (quick and easy), and on the value of the information generated by the system.

### **Micro-jobs and clickwork**

Collaboration via the Internet can reduce the logistic overhead enormously. This has led to suggestions to set up markets where individuals offer to perform small jobs, either for a small payment, or as a voluntary contribution. There are both commercial and non-commercial organizations which use this principle, such as <http://www.humangrid.de/>

which offers text-related services, mainly editing, translating, and searching, based on distributing many small jobs in a special marketplace.

<http://clickworkers.arc.nasa.gov/>

Mars Clickworkers is a project at NASA Ames where interested laypersons carry out classifications of Craters on Mars from photos.

<http://interneteyes.co.uk/>

proposes to people to watch public cameras via the web, and offers a substantial reward for those who alert the police to the largest number of criminal incidents.

The micro-job principle can be applied to different systems: Unpaid, use of money or a specific currency, and for markets limited to a single organization vs. an open market which can be used by members of any organization.

It would appear an obvious option to allocate certain KM activities, such as tagging, to a marketplace of this type. For company-internal KM systems the problem is that in a payment based system the main resource used would be the working time which however the company owns and has already paid a salary for.

The principle was tested in an unpublished case in a company-internal KM system, where a formalized and automatic reward mechanism was installed. The rewards were vouchers which were convertible into goods in the company store. The desired behaviors were the contribution of tags and documents to the knowledge base. This experiment was terminated after a short time due to observed misuse. It was suspected that some employees were spending an undesirable large part of their working time to earn vouchers. This illustrates the problem of insufficient control over the complex behavior of employees. All consequences of changing the incentive system must be taken into account. It may be noted that suggestions have been made to install market mechanisms in KM (Siemens sharepoint, 2003), but results are not known.

We can conceive of situations where it may make sense to employ the micro-job principle in KM systems, but do not see this as a concrete option for the ACTIVE case study applications. The reason is that professional work is based on responsibility, and a scheme of small-scale piece-work is hard to integrate into such a working context.

A special form of a micro-job market involves the introduction of a special-purpose currency (e.g. knowledge-points), which can be exchanged for knowledge related services in a closed economy. Such a solution differs from a money-based system by the limited convertibility of the income earned, which may have the advantage that it takes place outside the administrative constraints of a money based economy.

## 2.6 Organizational rules and cooperation among employees

The rules in organizations define the incentives for individuals in relation to the organization. By exchanging information, knowledge workers produce benefit for the organization by helping other individuals - KM is a form of indirect cooperation between employees. In addition to competition for status or better opportunities to exploit information, there is also an influence of individual co-operation on KM performance. The perception of fairness in the co-operation between a pair of individuals, or the perception of other individuals' fairness towards a group, determines the tendency of the observer to co-operate. Thus, if an individual or group has a reputation of being uncooperative, there is a strong tendency not to co-operate with this group, or to co-operate on the basis of explicit and direct exchange only (barter, rather than co-operation). The situation is further complicated if individuals are expected to co-operate who are in competition in other respect, for example for promotion, or for profitable projects. While a limited amount of uncooperative behavior and free-riding is tolerable, organizational rules and incentives must compensate for the effect of uncooperative behavior, which means that they must promise significant rewards.

## 2.7 Differentiation of roles and levels of authority

In an organization there are individuals with different roles and responsibilities, different knowledge and experience, and different levels of authority. The tasks in active knowledge sharing, building up knowledge resources, and the provision of metadata may be structured by different levels of responsibility. Because authority is developed on the basis of merit and competence in most organizations, this is not different in principle from open reputation systems (where every participant can voluntarily contribute and assess knowledge assets, metadata and reviews in an egalitarian manner). Formalized authority can support considerably more efficient processes, and is of course controllable in a hierarchically structured organization. Roles in a KM system can be defined in correspondence with or in addition to existing function definitions, such as:

- Authority – individuals who have assigned tasks for a given domain, and who decide on the acceptance of knowledge elements into the general use, and potentially also on differentiated access to knowledge asset by different members of the organization.
- Active contributors - who contribute actively by submitting knowledge, metadata, and reviews of information items.
- Passive contributors – who just open their information space for others to search, but do not invest actively by providing information of any kind.
- Users of knowledge assets.

Incentives would be provided to make it attractive to be recognized and promoted within these functions. In this way the access of qualified persons to key roles in the KM system would be managed.

## 2.8 The organizational context for incentive systems

There are a number of aspects describing the application context of the case study applications which determine the applicability of incentive schemes in the case study organizations. The logic of analyzing organizational context corresponds to the hierarchical principles of management: The company strategy determines organizational structure, roles and responsibilities, and business processes. Support functions, such as KM systems, must follow these constraints. Otherwise it is likely that the system will not be accepted, or will even create significant problems by disturbing the regular operation of the enterprise.

Organizational structure and existing processes: Different types of organizations use different policies for managing knowledge and cooperation. These are dependent on the type of information used, customers, industry sector, size and organizational aspects. An important differentiation is the extent to which knowledge is codified. The organizational context determines which behavior is expected from individuals. Organizational analysis has identified clusters of applications and contexts with common properties, and elaborated the experience with KM in these clusters. Certain factors can be analyzed in an analytical manner, and results interpreted in terms of organizational requirements.

HRM principles: The applicable incentives are determined by the human resource management principles and the organizational arrangements which exist in the case study partner organizations. We expect that these issues will be clarified in the studies of organizational aspects of incentives which are proceeding in parallel.

- What are the target behaviors which organizations want to develop in their workforce? (HRM strategy) Which types of behavior are considered of value to the business, and are promoted within the company? What are the most urgent issues?
- What types of incentives are in use today? How are they administered? Are they part of the remuneration system, or are they separate? How are the incentives-related aspects relevant for knowledge management, sharing of information within the organization, and for co-operation aspects defined and implemented in the company.
- What are the objectives of the incentive systems?
- How is this strategy extended to KM?
- What are the targets in process improvement?

- What do the ACTIVE CS partners see as their next level of improvements?

Krönig (2001) states that both monetary and non-monetary incentives are used to stimulate knowledge sharing in a sample of 21 companies, but unfortunately presents no detail on the effectiveness of incentives.

Governance of internal information: Is the information which individuals generate in the course of their work partly private or fully accessible within the organization, at least in principle? How is access to information on the computer network regulated within the company, and how is it technically possible? Does information have to be released actively into the community, or is the information commonly accessible? What kind of regime determines the release of information? Are there separate communities?

## 2.9 Some conclusions for the use of incentives in ACTIVE

- Working to generate knowledge assets: Wikipedia seems to work because it offers appropriate rewards, mainly social position, power to exert over others, and opportunity for creative self-expression. In this respect it resembles the incentives which operate in the scientific community, rather than the execution of demanding routine tasks typical for professional work.
- Reputation systems are a mechanism to regulate the value generated by co-operative behavior: The person with a high reputation for fair and co-operative behavior obtains benefits from the system, such as obtaining a higher price for services or goods, better jobs or promotion, faster acceptance, and possibly authority over other persons. Reputation systems are a means to manage the quality of information markets, but require effective management.
- Professional use of information is governed by different principles than private use. Professional use requires active management to prevent information leaks and undesirable side effects. Anonymity is handled very differently in organizations than by private individuals.
- Motivation and incentives are personal constants. Priorities and the value of incentives differ between individuals. There are risks that personal motives dominate company objectives. There may be strong tendencies to pursue personal interests in an apparently unregulated environment of information exchange, especially when a certain amount of anonymity exists, which in large organizations may be unavoidable. The essential degree of hierarchical control may on the other hand hinder spontaneous contribution of information.
- Enterprises can only use incentives in a way which is compatible with their strategy, organizational structures and processes.

### 3 Setting up incentives for ACTIVated applications

The conclusions reached will be transformed into recommendations for the ACTIVE case study applications, specific to the user organization and the application, and depend on core strategic goals of the case study organizations, such as the targets in process improvement, and goals for the next level of improvement which the CS organizations aim to attain. Recommendations will be defined as alternative options, and tested.

The recommendations to the case studies will be specific incentive schemes (a combination of measures) for each application and organization. The expected benefit will be described in a testable manner.

The following options and constraints are considered:

- We do not envisage using singular or even new incentives. Rather, the balance in the various incentives which are effective must be optimized in such a way that the right balance of behavior is obtained.
- There are system-immanent incentives which have priority: Improving performance of the individual employee, reducing stress, uncertainty, and risk to achieve better performance. A direct personal benefit should result in a benefit to the business at the same time.
- Incentive schemes are built upon existing organizations and cannot be contradictory or conflicting with those. The incentives used must be compatible with the current organizational practices.
- The incentives must target specific, observable behavior crucial for KM.
- The incentive schemes must be well balanced and assure that no dysfunctional behavior is created. This is due to the multi-dimensional nature of motivation. By changing incentives for one behavior, there will be a repercussion on others, which will be weakened.

#### Material Rewards

Material rewards are essential in a working and business context. However, wage and bonuses are not sufficient and not effective in rewarding co-operative behavior. Material rewards can also be indirect and apply to consequences such as promotion, upgrading, recognition and expert status.

#### Non-material rewards

Improving working conditions can be an effective incentive. This may include working time, flexibility, authority for certain decisions concerning the own work environment. Non-material rewards of this kind are not entirely separable from material rewards in a commercial environment, due to the fact that the *raison d'être* of the entire organization is to generate a good income, both for the organization and for the individual members.

Rewards for altruistic behavior are hard to define, and in fact, defining rewards for altruistic behavior would change the nature of the behavior – it would not be altruistic any more. If rewards are expected, by definition it is no longer altruistic behavior. Even further, behavior outside the business logic can be hardly tolerated by a commercial organization.

There is a domain of person-to-person relationships which may be important for the good co-operation and a positive social climate in an organization, but which is outside systematic management approaches. The main option to influence this factor is selection and placement.

It is likely that non-material rewards will be preferred, but these must be perceived as obvious advantages for the employee, most important the recognition of expertise, of constructive social behavior, and potential for personal development, career advancement or improvement of personal working conditions.

Negative incentives are to be avoided due to their de-motivating effect.

There must be an effective and transparent monitoring system which cannot be easily cheated, or where there are obvious controls for cheating. Adequate and timely feedback must be given.

The entire regime of incentives in the work situation must be reasonably transparent, taking the confidentiality of person-related information into account.

### **3.1 Testing the effectiveness of incentive schemes for ACTIVated applications**

Controlled and meaningful testing of incentive schemes is hardly possible in an experimental setup such as the ACTIVE prototypes. To test options for incentive systems, simplified simulations will be set up. These will be modeled according to existing KM systems, and will allow the systematic modification and test of incentives. The subjects will go through a number of trials in succession, and will make choices.

The tests with representative samples of subjects will show the impact of the modification of incentives on the preferences and choices made by the subjects. It is doubtful if the results obtained with samples of subjects selected from a random population would be valid for the ACTIVE applications.

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## **Section 2: Applied organizational incentive systems**

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## Executive summary

In the second section of this deliverable, the organisational view on incentives is summarised. For grounding this work, it is necessary to again introduce in short some general theories about organisational incentives and their relation with intrinsic motivation. Building upon these theories, section 2 describes typical organisational incentives. In 3 a short digression is given upon incentives for knowledge sharing in organisations, as some findings are also relevant for the context of ACTIVE. Sections 4 and 5 describe methods of implementing incentives into IT systems and give some prominent examples. Section 6 gives an overview on finding on incentives for web 2.0 applications. Finally section 7 summarises the results and gives an outlook on the recommendations, which can be structured in three areas: changes in organisational structure and culture, system-immanent incentives that are provided by the functionalities themselves, and artificial incentives implemented in the AKWS (e.g. star system). The recommendations concerning these three areas are given in D 4.3.2.

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# 1 Applied Organizational Incentive Mechanisms

In the following section, practical issues of applied organisational incentives are given. Nevertheless, it is still necessary to build the ground for this application by describing general theories about organisational incentives and their relation with intrinsic motivation. This is done in section 1 Building upon these theories, section 2 describes typical organisational incentives. In section 3 a short digression is given upon incentives for knowledge sharing in organisations, as some findings are also relevant for the context of ACTIVE. Sections 4 and 5 describe methods of implementing incentives into IT systems and give some prominent examples. Important in these two sections is the differentiation between artificial incentives and incentives which are provided by the functionalities of the system itself (incentive functionalities). Section 6 gives an overview of findings on incentives for web 2.0 applications. Finally 7 summarises the results and gives an outlook on the recommendations for organisational incentives in D 4.3.2.

## 1.1 Motivation Theories as a basis for Organisational Incentives

In this section the groundwork for the overall topic of incentives in organizations will be laid. The most influential and known motivation theories will be shortly discussed again with regards to their organizational impact, as organizational incentives are built up on these concepts. There exist several motivation concepts about how to best motivate employees at work. The most popular approaches are the goal-setting theory from Locke and the need theories from Maslow and McClelland.

### *Goal Setting Theory*

The concept of goal setting theory claims that individuals can be motivated by giving them goals as orientation for their work. However, these goals have to be specifically defined, and they have to fulfill a certain level of difficulty in order to increase work performance. Furthermore, feedback has a positive effect on performance. The foundation of the goal-setting theory was developed by Locke, who proves with empirical studies the above mentioned basic assumptions:

“Hard goals produce a higher level of performance (output) than easy goals; Specific hard goals produce a higher level of output than a goal of “do your best”; and behavioural intentions regulate choice behaviour.” (Locke 1968)

The benefit of difficult goals is that they point ones attention to the task and prevent distraction. In addition, difficult goals can motivate employees to work harder in order to accomplish them. They continue in order to attain them and while trying this, employees learn new strategies that help to perform tasks and the job more efficiently (Robbins/Judge 2007).

In addition, a prerequisite of the underlying theory constitutes that an individual is directly committed to the task. This involves, on the one hand, that the individual expects the goal to be accomplishable, and, on the other hand, the individual needs to be eager to achieve the goal (Klein et al 2001).

### *Maslow's Need Theory*

In the segment of need theories, Maslow's theory is the most famous one, though he has never tendered evidence for his theory. This hierarchical theory assumes that within every human being there exists a hierarchy of five core needs: physiological, safety, social, esteem and self-actualization needs (Maslow 1954). Maslow's Need Theory is visualized as a pyramid with the consecutive needs.

The physiological need addresses bodily needs, for instance, thirst, hunger, and shelter. The second part of the hierarchical pyramid is composed out of safety needs. This step incorporates security and protection from emotional and physical damage. After physiological and safety needs, individuals develop the desire for friendship, acceptance and belongingness. The feeling of affection counts to the attributes of social needs. Esteem needs are divided into internal and external esteem factors. Internal esteem factors include, for example, self respect, achievement, and autonomy. Whereas external esteem factors emphasize the need for recognition, status and attention. The highest order of the need hierarchy is concerned about the drive to become what one is capable of (Robbins/ Judge 2007). This comprises self-fulfillment, growth and achieving one's potential, and is called self-actualization need.

Maslow's hierarchy of needs is built up in form of a pyramid. According to Maslow, the individual moves up the need hierarchy step by step. For this reason, he suggests that after one need is satisfied, the next need becomes pressing. In order to motivate employees with the help of Maslow's hierarchy of needs theory, it has to be figured out on which layer the employee is situated at the moment and focus on satisfying the needs at or above that layer.

To make the distinction between those needs easier, Maslow divided the five needs into two categories: low-order and high-order needs (Maslow 1954). Physiological and safety needs are satisfied by external factors, for instance, by pay or tenure, and they are called lower-order needs. The other three levels, social, esteem, and self-actualization needs present the higher-order needs. Compared to the lower-order needs, the higher-order needs can be satisfied internally, within the person.

#### *McClelland's Need Theory*

A more contemporary theory of motivation, with an emphasis on human needs, is McClelland's Theory of Needs. Compared to Maslow's Hierarchy of Needs, this theory presents a non-hierarchical approach in the area of need theories.

The main focus lies in the distinction of three needs: the need for achievement, the need for power, and the need for affiliation. The stimulus to outperform, to accomplish with regard to a given range of standards, and to aim for success, can be perceived as the need for achievement. Similar to the findings from goal-setting theory, high achievers circumvent very easy and very difficult tasks. Goals need to be challenging but preferably on an intermediate difficulty level.

The next need is concerned with the desire to have impact and control over others (Robbins/ Judge 2007). The need for power is defined as the need to influence others in such manner that they would usually not behave. Prestige and reputation is of high significance for those persons.

In contrast to the need for power, the need for affiliation deals with the pursuit of gaining friendly and close interpersonal relationships. While persons with a high need for power prefer competitive situations, persons with a high need for affiliation favor cooperative situations. Overall, it is concluded by Winter (2002), that the best managers are high in their need for power and low in their need for affiliation.

In the following sections, the general theories shortly described in this section will be taken to explain further organizational incentive systems.

## 2 Organisational Incentives

Before certain types of organizational incentives are described, first a general definition will be given. In the job context, incentives can be defined as “inducement or supplemental rewards that serve as a motivational device for a desired action or behavior”<sup>1</sup>.

### 2.1 Classification for Organisational Incentives

In the following section, possible incentive classifications are addressed. Most empirical research agrees that reasons for acting can be divided into intrinsic and extrinsic ones. Intrinsic reasons for actions are more suitably described with “motivation” than with “incentives”. Still, literature sometime differentiates these two entities or uses them synonymously.

As described by Frey and Osterloh (2002), (intrinsic) motivation appears, when the motivated action itself fulfils the satisfaction of wants directly. Consequently, motivation is driven by internal needs and beliefs. Intrinsic motivation has an immaterial character and is closely tied with the work and its design (Zaunmüller 2005). For instance, self-affirmation and self-realization are intrinsic motives, as they satisfy internal needs. Oppositely, extrinsic incentives fulfill needs which are not directly connected with the actual work (Frey/Osterloh, 2002, p.24). This means that they are only loosely connected with the achievement of certain working, but refer to rewards and goals that are not straightly associated with the accomplished working results. Different to intrinsic motivation, extrinsic incentives can be material and immaterial. The simplest extrinsic organizational incentive is the salary, which fulfils the employee’s needs – but not on a job level but rather – according to Maslow – his safety needs.

Of course, an employer is not only able to offer extrinsic incentives, but he can also appeal to his employee’s behavior on an intrinsic level through specific job design. However, this job design again can be grouped under “incentives”. Some authors therefore split up material and immaterial incentives into different subdivisions, which are not totally consistent with each other. Therefore, the most reasonable combination of these various distinctions will be further used. An interesting division is given by Staiger (2003), who divides motivation and incentives in the job context according to the following structure:

**Table 1: Division of motivation and incentives in the job context (Staiger 2003)**

Extrinsic Motivation			Intrinsic Motivation (job is an incentive in itself)	
Material Incentives		Immaterial Incentives		
Financial Incentives		Social Incentives		Organizational Incentives
Direct Financial Incentives	Indirect Financial Incentives			

Building on a similar structure, the following table gives a self-developed overview of the different types of organizational incentives and their possible subclasses.

**Table 2: Overview on types of organisational incentives**

Material Incentives		Immaterial incentives	
Monetary	Non-Monetary	Social	Organizational
Fixed Salary	Company car	Title	Job autonomy
Efficiency bonus	Incentive journeys	Esteem	Job variety
Christmas bonus	Sport facilities	Power	Feedback

<sup>1</sup> Retrieved from <http://www.businessdictionary.com/definition/incentive.html> on 22nd June, 2009.

Spontaneous bonus	Children care	Prestige/ Reputation	Job enlargement
Extra vacation payment	Additional medical service	Attention	Job enrichment
Company pension scheme	Legal advice	Information	Job rotation
Disability insurance	Individual office equipment	Belonging/ Affiliation	Career opportunities
Equity stake	Bonus presents	Moral commitment	Training Opportunities
Equity options	Own office	Respect	Flex-time
Time pay	Reserved parking spot	Social Interactions	Partial retirement
Piece rate pay	...	Group dynamics	Job sharing
Profit sharing		Events/ Parties	Part time work
...		...	Business Trips
			Trainer tasks
			Participation in decisions
			Security/ Reliability
			Sabbatical
			Playful incentives (games)
			...

Monetary incentives are part of material incentives, which are mostly defined through variable-pay programs. The non-monetary incentives do not lead to payouts but could generally be compared to cash values.

Additionally to this classification, Maier and Weissman (2003) differentiate between two kinds of material incentive systems: an obligatory and an optional part. The obligatory part includes fixed salaries, which are adjusted to the reflection of the overall job market, social benefits, and several auxiliary services as, for example, a company car or child care. The optional part offers the possibility to pay employees on a variable basis; in this case it is possible to bind the employee to the financial success of the organization. It further includes giving employees more responsibility for other organization areas, or to pay employees direct-profit sharing wages (Maier/ Weissmann 2003).

According to literature, immaterial incentives consist of social, promotional and educational incentives. Other authors subcategorize immaterial incentives into two parts: social and organizational incentives. According to Bau and Dowling “social incentives include incentives created by information distribution and communication with employees” (Bau/ Dowling 2007), whereas organizational incentives address characteristics of the organization itself, such as “the size of the company, organizational structure, and leadership style.” (Bau/ Dowling 2007)

Next to financial, social and organizational incentives Bau and Dowling suggest to further categorize incentives into two additional groupings: formal ones and ones arising by chance. Accordingly, formal incentives embrace pay-for-performance systems and incentives arising by chance incorporate, for example, the helpfulness among employees.

Apart from all these different classifications, it should be concluded, that either the work itself can motivate the employee, or the job environment can foster working behaviour by social or organisational measures, or material rewards can be used as incentives. How these three categories can be transferred to IT systems is discussed in section 4.

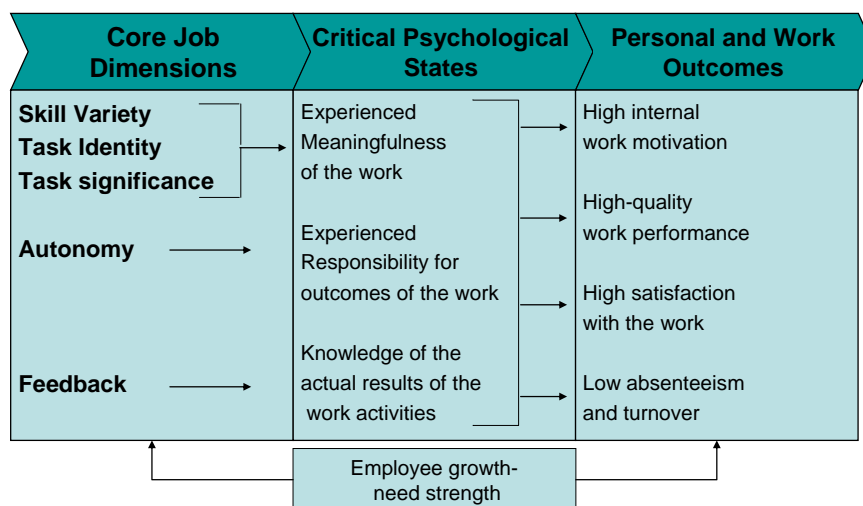
## 2.2 Selected Immaterial Organisational Incentive Systems

In the following sections, organizational incentives in the scope of psychological job designs are described. The theories are described in short to deepen the understanding of incentive mechanisms. From some of these mechanisms also design suggestions for IT systems for knowledge could be derived, e.g. mechanisms to make situations controllable for the user (Management by objectives) or mechanisms for fulfilling the

need of autonomy (Job Characteristics Model). As already mentioned in Maslow's theory, the need for esteem plays a significant role in motivating employees. One of the internal esteem needs illustrates autonomy, which points out the importance of the employee's freedom of action. This implies that his scope for tasks and decision-making has to be broadened in order to achieve a job design with scope of action (Rosenstiel 2007). The following job design concepts facilitate the emphasis on providing employees with room for autonomy.

### *Job Characteristics Model*

The job characteristics model (JCM), developed by J. Richard Hackman and Greg Oldham proposes that any job can be described in terms of five core job dimensions (Hackman/ Oldman 1976) (Hackman Oldman 1980): skill variety, task identity, task significance, autonomy and, feedback. According to this theory, employees are higher motivated, if jobs offer a variety of different activities, the completion of a whole and identifiable piece of work, a substantial impact on the lives of other people, considerable freedom and clear information about the effectiveness of their performance (Robbins/ Judge 2007). As Figure 1 shows, a combination of skill variety, task identity and significance can create meaningful work and thus increase the intrinsic work motivation. Overall the JCM assumes that internal rewards are obtained by individuals, when they learn that they personally have performed well on a task that they care about (Hackman 1977). The following approaches give an overview how the JCM can be implemented into practice to make jobs more motivating.



**Figure 1: Job Characteristics Model (Hackmann 1976)**

### *Job Rotation*

The job rotation approach (also known as job change) suggests that employees with specialized tasks change their work place with each other in a predetermined rhythm – or in other words, a periodic shifting of an employee from one task to another. Robbins and Judge (2007) mention that “When an activity is no longer challenging, the employee is rotated to another job, usually at the same level, that has similar skill requirements.”

However, it only addresses the employee's scope for tasks, but the scope for decision-making is only minimal incorporated. Nevertheless, the job's monotony can be reduced and consequently a diversified and interesting job content is created.

### *Job Enlargement*

In contrast to the concept of job rotation, job enlargement focuses on enlarging the workers tasks horizontally. Therefore, the employee gains more responsibility, as more tasks are assigned to him, including taking over the work of several specialized workers (Rosenstiel 2007). Similar to the job rotation design, this concept only supports the scope for task and hence doesn't allow for a total achievement of scope for action.

### *Job Enrichment*

According to Robbins and Judge (2007) job enrichment is defined as “the vertical expansion of jobs. It increases the degree to which the worker controls the planning, execution, and evaluation of the work.” Rosenberg argues that this type of job design is not only expanded vertically, but also horizontally (Rosenstiel 2007). This includes that the employee does not only work on horizontal working elements but also carries out part of the planning and controlling of results. In compliance with these findings, Maier and Weissmann add that this job extension leads to more autonomy, extensive independence and self-control (Maier/ Weissmann 2003).

#### *Management by Objectives - MBO*

A well-known type of incentive job design is Management by Objectives. This approach can be described as a practical application of the Goal-Setting Theory (Robbins/ Judge 2007). It focuses on specific goal setting within an explicit time period, and on feedback about the progress and performance made in order to achieve the goals. This approach emphasizes participative setting goals that are tangible, verifiable, and measurable for the whole organization and for each employee. This can be achieved by converting overall organizational objectives into specific objectives for organizational units and individual members. Thus, a hierarchy is formed linking objectives at one level to those at the next level and an overall cooperative leadership style is required by top management.

According to Robbins and Judge (2007), Management by Objectives has four different ingredients: goal specificity, participation in decision making, an explicit time period, and performance feedback. These four ingredients enable the satisfaction of individual demands, security requirements, self-realization and social needs (recognition and a sense of belonging). Jahnke et al. (2006) additionally mention the connection of goal achievements with variable pay programs to supplementary increase employee’s motivation. Hereby, the activation of intrinsic motives plays an important role, since employees’ actions are motivated by the task itself.

In the MBO’s design stage, it can be recommended that it should not be used in very small working groups or teams. Even though, Jahnke and Yalcin propose the connection with variable pay programs, this cannot be advised. Overall, the MBO illustrates a powerful tool in motivating employees, as it has a direct interconnection with intrinsic motives and contributions.

All the above mentioned methods are elaborated in organizational practice. How they can be applied for ACTIVE use will be discussed below. Before that, a short insight into incentives for knowledge sharing is given in the following section.

### **3 Applicability of incentives for knowledge sharing in organisations**

As knowledge management and especially knowledge sharing is important in the context of ACTIVE, it is crucial to have a look at incentives, which are supposed to facilitate knowledge sharing behavior.

Several different definitions of knowledge management exist, however one can say that knowledge management embraces every possible human and technically-oriented method and intervention, which are suitable for optimizing knowledge goals, identification, acquisition, development, distribution, preservation, usage and the knowledge evaluation for a company's success (Zaunmüller 2005).

One of the most common incentives for knowledge management is the knowledge market. Herewith, the knowledge of each party can be sold and bought in a market (comp. Davenport/ Prusak, 1998) based on a demand and supply basis and thus is similar to an auction. This kind of motivation is rather material based, as knowledge distributors obtain monetary compensations for their knowledge contributions. Further, the market place can be implemented as an IT system. Still, this system is (as explained above) not helpful to foster the employee's intrinsic motivation for unrewarded knowledge sharing.

Hall mentions additional insights about how a knowledge management environment should be designed. First he points out that knowledge contributions and sharing with colleagues should be a key responsibility of the entire staff. Further, knowledge sharing can be eased when communities of knowledge sharing are promoted and the environment leaves space and encourages experimentation (Hall 2001). Still, he leaves open, how this could be done explicitly.

Besides these practical advices, in 2001, Bullinger et al. published a comparative study about incentives in knowledge management, combining results of 314 companies. This study reveals that the most motivating factor for knowledge sharing is the company's organisational culture. But also training, communication and participation were found as helpful. Over all, he postulates that immaterial incentives based on the organisational view have much bigger influence on knowledge sharing behaviour than material incentives. Still, there are different examples for incentives supporting and hindering knowledge management (comp. Staiger 2003) and a concluding recommendation is hard to give.

## 4 ICT-systems and Incentives

This section deals with the implementation of incentive systems in IT systems. It is not concerned with the surrounding organisational culture but posits the “culture of the system” as influential on user’s behaviour. In the following sections, the interplay between ICT-systems and incentives is regarded three-fold: First, there are social theories, which are used as underlying but broad information for system design. Secondly, these theories have to be brought into a technical framework with different variables. Thirdly, based on these theories, several technical implementations can be derived, stimulating the user’s interests in using the system.

### 4.1 Incentives fostering ICT use

As already mentioned before, extrinsic and especially immaterial incentives are important for motivating employees to share knowledge in the organization. This is for the reason that employees pursue social recognition, contacts, and safety. Thus, Brocke and Hermans (2006) propose four different kinds of incentive sources which are supposed to improve knowledge sharing across employees via ICT-systems (Brocke, vom Hermans 2006).

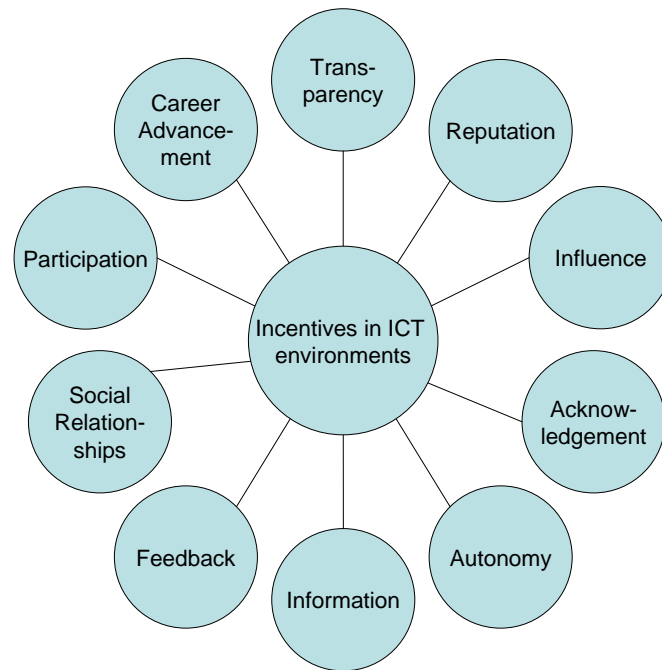
The first one is **reputation** which includes being known as an expert in various knowledge areas. Hall classifies reputation as a soft reward and stresses the importance of acknowledgement from peers: „we feel cheated when our good deeds go unnoticed, and refrain from bad deeds lest they become known” (Nowak/ Sigmund 2000). This quote, said by an engineer at IDEO, shows that employees really highly value the state of being an attractive working colleague.

**Transparency** is also very crucial to make the user understand the mechanisms the system follows when it conducts his inputs. Only if users can estimate the results of their actions, they are ready to act. In a narrow sense, transparency also refers to the visibility of mechanisms behind artificial incentives (see below) like appraisals or rankings.

Furthermore, **influence** represents a valuable incentive which can be implemented by creating room for giving feedback. This can be either in the form of appraisal or constructive critique, as well as in a quantitative way, for example, with the help of an evaluation model. As some users are afraid to express critique face-to-face, this can illustrate a very useful way for the purpose of circumventing this problem.

**Social contact** represents the last mentioned incentive by Brocke and Hermans. It can be embodied by the creation of a personal profile in which the user can introduce himself/ herself exceeding the topic of the platform (personal interests etc.). Consequently, this can lead to more interaction possibilities between normally quite separated (in terms of location) users. This in a way allows for the creation of new and more contacts in the network and hence increases the amount of knowledge flow.

Figure 2 gives an overview on the four above-mentioned dimensions of incentives for ICT systems, enhanced with findings from other literature.

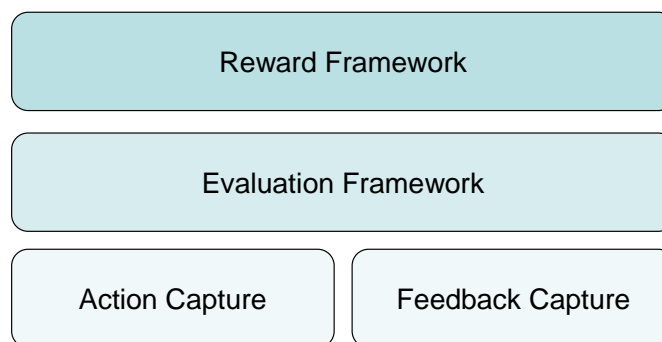


**Figure 2: Incentives which could be covered by ICT systems**

All these immaterial incentives could be covered by the design of an IT system. Therefore, it is assumed in the following sections, that an IT system can also have its own “organizational culture”. Within this culture, social interactions on the basis of common symbols (e.g. special icons or idioms) take place. To realize such a “social and interactive” platform, its incentives have to be embedded into a professional concept which can be used by technological means. An approach towards this is given in the following section.

## 4.2 Functional application of incentive technologies

Brocke and Hermans suggest dividing the conceptional framework into four different parts: the compilation of users’ actions, feedback gathering, performance rating system, and a reward system as shown in Figure 3 (Brocke, vom/ Hermans 2006).



**Figure 3: Incentive systems for knowledge networks (Brocke, vom/ Hermans 2006)**

This framework helps to provide the incentives mentioned in Figure 2. Still, the actions, which are proposed in this framework, are only realized in the IT system itself. The framework does not help to provide an adequate organizational culture external to the system. Nevertheless, it is posited that also an IT system for knowledge sharing can develop a system-immanent culture, which again can be influenced by an integrated incentive system.

In the feedback capturing, users can subjectively rate each other in the network. Feedback can be given for different kind of published documents and news group contribution etc. The rating scale consists of, depending on the wanted dimension, three to five intuitive icons, for instance stars. Consequently, users are able to rate network contributions of other users negatively, neutral or positively (with interstages or not). In this process, it is important to record the feedback's author consecutively to avoid multiple and manipulated ratings. After obtaining the results of the user's action and the feedback rating, the performance rating system combines both outputs to a so called "activity index" which in the end helps to determine the user's position in the reward systems.

In the action capture, the activities of each user are monitored and recorded in order to reach an "activity status". The activity status retains the time and type of action and the user itself. Semar (2004) differentiates further categories for action and feedback capture, which should be integrated into the evaluation framework. These categories and the according examples are given in Table 3.

**Table 3: Categories for Action Capture (comp. Semar 2004)**

Entity	Peculiarity
Time of Contribution	Reaction Time Processing Time ...
Frequency of Contribution	Amount of contributions Amount of readers Amount of quotations ...
Type of Contribution	Link Comment Question Article/ Document Summary Suggestions Dataset ...
Quality of Contribution	Outline Structure Understandability Completeness Novelty Relevance Validity ...
Role of Contributor	Beginner Guest Moderator Expert Group Member Lecturer ...
Reaction Type	Inquiry of a Group Member Request from a Lecturer ...

To transfer these entities into the evaluation framework is the biggest challenge for IT-incentive designers. In a multi-dimensional approach, discrete values for each contribution and for each feedback have to be

defined. These values are often materialized as stars or points. These points can be either given by the system itself or by other users. In both cases, underlying guidelines should be developed by matching all entities in a multi-dimensional way and obtaining points for each particular combination.

Whenever this has happened, the evaluation framework has to be transferred into a reward framework. This reward framework can be only of virtual nature (some examples are given in the next section), which is supposed to support the social side of incentives, or it can include material rewards. Still, as pointed out later, material rewards rather inhibit system use than supporting it.

Semar further distinguishes a personalizing system and an anatomizing system. The first one gives the user feedback about his own status including his strengths and weaknesses; the second one shows the user ranking according to other system users in an anonymous table. These two procedures reflect the advice, not to foster open competition between single users. Semar also points out, that off-line meetings and trainings could support the motivation for using the system.

Finally, it has to be mentioned that an incentive system for IT use does not have to be as complex as described above. The wish for recognition could already be fulfilled by leaving a profile with a certain entry. Still, in the following sections, some more complex incentive systems are presented.

## 5 Implementations of incentive systems

Incentive systems can be realized as described in the previous section. Still, there is also a broader view on incentives, as interesting IT functions can become incentives for system use themselves. In the following table, first “artificial” incentive systems are described. Afterwards, system-immanent incentives are discussed.

**Table 4: Implementations of artificial incentive systems**

<i>Hall of Fame</i>	The Hall of Fame is a ranking system that rates the knowledge network’s members which hold a high “activity index”. Hence, the Hall of Fame represents a user list of the knowledge network, which is sorted by the level of their activity index. Preferably, this should be published on frequently displayed areas of the networks, as for example the start/home page so that peer recognition is increased. This leads to an advanced reputation model which in the end is supposed to facilitate the motivation of contribution in the knowledge network.
<i>Virtual career ladder</i>	Another kind of reward system can be a virtual career ladder. This type of reward takes account of the incentives through career opportunities and promotions. The virtual career ladder shows the user’s internal status (career function), which includes textual description of each user’s status and therefore increases comprehensibility of each mechanism. The status is visible for the user itself and everyone else in the network. In the end, this leads to an incentive effect that is generated through the possibility for the users to achieve higher positions through network contributions.
<i>Expert List</i>	Furthermore, the expert list can be a means of rewarding users in internet communities. This listing represents a composition of different experts in different network areas or objects. Consequently, users know which people to ask for advice, which then in turn can increase recognition of peers and leads to an increasing motivation to share knowledge with other users.
<i>Expertise</i>	Another tool can be the Expertise, which is an additional feature to the expert list. Building up on the expert list, Expertise describes the members of the knowledge network with the help of the subject area in which they count as experts. The goal lies in the official appraisal of one member through the demonstration of the areas, in which the system classifies a user as an expert.
<i>“What’s hot”</i>	Similar to the Hall of Fame, the “What’s hot” also is built upon a user ranking. It differentiates itself through the list’s intention, since it depicts the most recent contributions and their authors. This can be published on several positions in the network so as to recognize them officially.
<i>Bonus/Point-system</i>	Jahnke, Yalcin and Bauer suggest the use of a so called bonus system to enhance knowledge contribution. Every employee obtains a fixed number of points for a given time frame which can be distributed to other colleagues. The allocation of points depends on the employee’s view on who has, in a given time, made the most productive knowledge contribution to other colleagues. The incentive’s impact aims at the prestige of employees, as employees with a minimal amount of points could harm their reputation. With a combination of personal career development the incentive’s impact can also be improved. For instance, employees with a higher amount of points might have better chances in getting a promotion earlier. This can also be converted on a network or virtual basis. Another idea might be to disseminate virtual bonuses which can be exchanged for prizes.
<i>Inviting of new members</i>	The idea of inviting new members illustrates a function for the community’s expansion through personal recommendation. Therefore, with a larger member community the long-term quality of content and contributions in the knowledge network are progressively more assured. This incentive system is close to the system-immanent ones.

*System-immanent incentives*

Next to the possibility to introduce “artificial incentives” like point systems or virtual career ladders, it should be stressed, that the system-immanent incentives are at least as important. System-immanent incentives are understood as the functions, which attract the system itself to the user. Only if a system’s functionality is perceived as useful, employees will make use of its functions. Or to put it simple:

The system itself has to be the biggest incentive.

If this is the case, employees are interested in their work and enabled to increase their productivity time through functionality. These system-immanent incentives should already be taken into account during the requirements capturing phase.

For Web. 2.0 and Social Applications, these system-immanent incentives are justifiably important, as these normally do not include another “reward” than the displayed functionalities. Therefore, in the following section, a list of possible functional incentives for Web 2.0 applications is given.

## 6 Motivation theories and incentives for Web2.0 applications

Before evaluating the incentives for a current hype/ trend called Web 2.0 we should briefly highlight the main technologies considered for Web 2.0. Generally, Web 2.0 can be described as a sum of internet technologies, which are fostering user actions. Different to former times, when websites were static and centrally supplied with contents, web 2.0 technologies allow the user to add content himself. According to numerous sources, the following could be compiled as main components of Web 2.0 trend (comp. e.g. Back et al. 2008):

- **Blogs** (short for Web logs) are online journals or diaries hosted on a website and often distributed to other sites or readers using RSS (see below).
- **Collective intelligence** refers to any system that attempts to tap the expertise of the group rather than an individual to make decisions. Technologies that contribute to collective intelligence include collaborative publishing and common databases for sharing knowledge.
- **Mash-ups** are aggregations of content from different online sources to create a new service. An example would be a program that pulls apartment listings from one site and displays them on a Google map to show where the apartments are located.
- **Peer-to-peer networking** (sometimes called P2P) is a technique for efficiently sharing files (music, videos, or text) either over the Internet or within a closed set of users. Unlike the traditional method of storing a file on one machine - which can become a bottleneck if many people try to access it at once - P2P distributes files across many machines, often those of the users themselves. Some systems retrieve files by gathering and assembling pieces of them from many machines.
- **Podcasts** are audio or video recordings-a multimedia form of a blog or other content. They are often distributed through an aggregator, such as iTunes.
- **RSS** (Really Simple Syndication) allows people to subscribe to on line distributions of news, blogs, podcasts, or other information.
- **Social networking** refers to systems that allow members of a specific site to learn about other members' skills, talents, knowledge, or preferences. Commercial examples include Facebook and MySpace. Some companies use these systems internally to help identify experts.
- **Wikis**, such as Wikipedia, are systems for collaborative publishing. They allow many authors to contribute to an online document or discussion.

Individuals do use different variations of these technologies for personal gain. Partially some work based research and collaboration is done, but truly in an enterprise environment the compatibility and use of these technologies is still limited. This is because most of them require a critical mass of users before the system runs independently. Thus far there are no concrete studies done for incentives on web 2.0 technologies within enterprise environment, but there are bits and peaces spread throughout the web claiming some impact as described in the following section.

Though, unfortunately no concrete research results have been found for incentive systems for Web2.0 applications, incentives mechanisms mentioned in the section above in ICT environments can be to some degree applied in a Web2.0 environment as well.

Furthermore, in the article "Ausziehen 2.0" by Inge Kutter (2008), she discusses incentives for social network users to contribute in such networks. Those findings can be first hints and requirements for the way incentive systems for Web2.0 applications should be designed.

The most striking incentive for contributing in social networks is that of obtaining attention from other users and in the overall network. Thus, Groebel argues that for everything that one reveals from oneself, this will be rewarded with attention by peers (Weiß/Groebel 2002). In the end, this interest flatters one's ego and, hence, increases motivation in contributing in social networks. Another reason why people use social network sites is the fact that, especially, students' narcissism values have increased drastically over the last

ten years<sup>2</sup>. Additionally, Kutter mentions the simplicity of use as a further incentive. In other words, in Web 2.0 applications users do not have to program by themselves and everyone can easily contribute without a special expertise.

Concluding, attention, recognition and reputation might be the most crucial incentives in motivating users for Web2.0 applications.

Thus, the incentive systems as discussed in the section above could also be applied in a Web2.0 environment. A virtual career ladder, a bonus/point system, and a “Hall of Fame” generate recognition by peers and the overall network. They could give users the necessary attention they require to satisfy their narcissism.

Nevertheless, by experience only in a little amount of Web 2.0 applications available, artificial incentives are necessary to attract users. Most of these applications rather attract people due to their functionality itself by combining content generation with self expression. Therefore, fetching functionalities should also be taken into account as an incentive when designing web 2.0 systems for organizational use. Next to the systems described above, the following functionalities could be embedded in an application:

- Forums
- Tweets
- Testimonials
- Personal Sites
- Communities of Practice
- Voting Mechanisms (like Doodle)
- Tagging possibilities (like del.icio.us)
- Readers can decide, whether articles are further published or not (like DIGG)
- readers answer questions and the group decides, which answer is the best (like YAHOO ANSWERS)
- ...

Daily new web 2.0 ideas like these are generated and brought into the World Wide Web. The publicity on these new applications attracts new users and helps the systems to reach its necessary critical mass. Hence, the ACTIVE consortium is free to develop its own ideas and realise them in an attractive system.

Nevertheless, they have to take into account that the “critical mass” in a limited group of people in an organisation is harder to reach. Therefore, it can be expected that additional mechanisms have to be installed in the case of ACTIVE. The following section gives a summary of these mechanisms and an outlook for the upcoming work.

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<sup>2</sup> Narcissism can be defined as “a trait of excessive self-love based on self-image or ego, as well as lack of empathy for others”(Wikipedia)

## **7 Applicability of organisational and IT incentives for ACTIVE**

Generally, three levels of incentives can be taken into account for ACTIVE technologies: organisational culture, incentive functionalities and artificial incentives.

Though ACTIVE is not aiming at changing the organisational culture or structure at the case study partners, in the subsequent deliverable some recommendations could be given concerning the interplay of ACTIVE technology introduction and handling with the organisational background. E.g. different options during the introduction phase could be given to the user, to fulfil his general need of autonomy. These recommendations at the border between IT and organisational culture will be discussed with the case study partners and presented in the upcoming incentives deliverable.

At the level of incentive functionalities, on the one hand, the recommendations from the case study partners can be taken into account, on the other hand, the technical partners have to estimate, which functionalities are applicable in the ACTIVE context. The partners have already stated their interest in a Wiki, but perhaps further Web 2.0 functionalities might make the Knowledge Workspace even more attractive. Therefore, interviews with the case study partners will provide the input to D 4.3.2.

The last aspects to bring into a match with the case study partner's needs are the artificial incentives. First, it has to be generally decided, if these are needed. If this is the case, then Brocke's and Herman's components of an incentive system (action capture, feedback capture, evaluation framework and reward framework) have to be specified. For the reward framework, also other departments of the case study partners could give their input, e.g. concerning the question if material awards are generally realisable or not. D 4.3.2 will afterwards give recommendations to the consortium on how to implement adequate incentives into the AKWS.

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