Role Approach for the Amplification of Individual and Higher Levels of Intelligence

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Summary

"Organizational Intelligence" (OI) is an approach for the management of social systems that aims to amplify *intelligence* on four organizational levels with strong support from information and communication systems (ICS). The *"Role Approach"* (RA) can sustain this amplification since the RA provides a method to *classify, aggregate and retrieve* information consistently and future-oriented. *Designers of ICS*, e.g. groupware, can derive guidelines for the architecture of group or organizational memories which are capable of supporting OI. *Managers* can use the RA to deal with the increasing amount of information during their ongoing careers. The use of the RA in the ICS-environment of one of the top-ten US-American Management Schools, *The John E. Anderson Graduate School of Management* at UCLA, points to the potential contribution of the RA for OI.

1   Intelligence as a Driver of Competitiveness

In today's and tomorrow's business environments the competitiveness of enterprises may be strongly determined by their *intelligence*. Intelligence enables organizations to *adapt* rapidly to new situations in their environment, *anticipate* future situations and *actively influence* these situations. For organizations intelligence presents the foundation for their survival and prosperity. The *intelligence of organizations* emerges from the intelligence of its individuals and from the value-adding coordination of individuals' intelligence in groups.

"Organizational Intelligence" (OI) is understood as a management approach to design and operate social systems, intensively supported by information and communication systems (ICS) to generate and utilize information, knowledge, and opinion and to enhance the ability of individuals, groups, organizations and networks to survive and prosper (section 2). In this context, the OI addresses four organizational levels and *four corresponding levels of intelligence* (section 3). Therefore, OI requires ICS designed to support the generation and utilization of information, knowledge and opinion. The *"Role Approach" (RA)* is a method to classify, aggregate and retrieve information (section 4). Embedded into ICS, the RA can make a strong contribution to OI and applies to the four levels of intelligence. For designers of ICS the RA delivers guidelines on how to design the classification, aggregation and retrieval of information to support OI. For managers and prospective managers the RA is valuable in helping to deal with a growing amount of information and the challenges induced by an ongoing career of a manager. An example of how to apply the RA is shown in the context of one of the top-ten US-American Business Schools, The John E. Anderson Graduate School of Management at UCLA (section 5).

2   Management Approach *Organizational Intelligence*

The foundations of Organizational Intelligence (OI) are originally found in the late 1960s in the USA [Wilensky 67]. Afterwards, an independent development of OI came up first in Japan with Matsuda in the 1980s [1992, 1993] and then in different research directions and areas in Germany, with Kirn [1995, 1997] in the *field of computer science* and with Müller-Merbach [1995, 1996, 1998], Jacobsen [1996] and Momm [1997] in the *field of management* of intelligent enterprises. With the popularization of concepts for the learning organization, e.g. Senge [1994], and their strong support with information technology (IT), e.g. Davenport [1997], Tapscott [1996], research on OI regained broader consideration in the USA in the mid 1990s. Quinn [1992] with his book the "Intelligent Enterprise" laid the foundation for a series of further works.

Matsuda [1992, 1993] suggests OI should be the interaction of its products and its processes. Müller-Merbach [1996] then assimilated and advanced the ideas of Matsuda. For Müller-Merbach, *OI as a product* must be embodied as *information, knowledge and opinion.*

Following the idea of the organizational *"learning mechanism"* of Leavitt [1958], a set of four types of (sub)processes makes up *OI as a process: "Input"* (Perceive), *"Process"*

(classify, aggregate, generate, evaluate), *"Store and Retrieve"*, and *"Output"* (Utilize) (also according to [Müller-Merbach 98]). In the context of this article the processes "classify" and "aggregate" as entities of the type *"Process"* gain further consideration.

According to Eysenck [1980] and Müller-Merbach [1996] intelligence is a *concept* and not a *thing* which has discernible characteristics (e.g. a chair or an information system). Intelligence is considered as an abstraction of perceived facts and of a set of abilities of an individual or a system of individuals. A definition of intelligence can consequently never be false or correct. It can only be expedient or unexpedient [Müller-Merbach 96]. Here, according to Guilford [1959] (but also McMaster [1996] without cross reference), intelligence is contemplated as the comprehensive *ability* of individuals or social systems (Guilford's terminology in parentheses and quotation marks)

1. to *perceive* their own situation and that of their environment by assimilating information ("cognition");

2. to *store* and *retrieve* information, knowledge and opinion ("storage and retrieval");

3. to *classify* and *aggregate* information, knowledge and opinion ("convergent thinking");

4. to *generate* new information, knowledge and opinion creatively and deductively ("divergent thinking");

5. to *evaluate* information, knowledge, and opinion ("evaluating") and

6. to *carry out actions* to change its environment and itself ("utilization", "action") e.g. through communication with others.

Intelligence is considered to enable individuals or social systems to deal successfully with a current situation, to anticipate future states and to prepare prosperous actions to deal with these future states [Stern 32]. Intelligence as an *ability* can be assigned to individuals, groups, organizations and networks. The assignment of intelligence to these subjects on organizational levels leads to four corresponding levels of intelligence (see Figure 1).

In this context, clarifying between information, knowledge, and opinion appears to be appropriate as *information* is considered to be storable on and transferable through ICS and *knowledge and opinion are only to be carried in subjects* according to their nature. Following Drucker [1988], Müller-Merbach [1998] and Matsuda [1992,1993] *information* is considered as a subset of data, endowed with relevance and purpose to a specific user.

In contrast, *knowledge* is conceived as information that is understood and *enables to act* [Polanyi 66]. Due to its requirement to be understood, knowledge – as opposed to information – *cannot be stored* on ICS. But knowledge can be described and documented and hence communicated between subjects as information.

Finally, *opinion* is contemplated as a set of basic values, opinions, experiences and contemplations. Opinion embraces tacit aspects as suggested by Polanyi [1966] and Nonaka [1992] and is hence hard to describe through information. While knowledge represents "objective" facts, opinion primarily complies a "subjective" perception and convictions for which the individual lacks or has lost deductive explanation, as Müller-Merbach [1998] explains. Opinion emerges over a relatively long period of time and can only be influenced intermediately.

In summary, OI is a management approach to design and operate social systems. OI is understood as the interplay of its four types of processes and three types of products. OI intends to amplify intelligence on four different levels. In section 3 these levels are examined and in section 4 the processes *classify, aggregate*, and *retrieve* will be examined more specifically in the context of the RA.

3 Four Levels of Intelligence

Examinations on intelligence have been reported for a long period of time. Plato (427-347 B.C.) and Aristotle (384-322 B.C.) were already concerned with intelligence [Müller-Merbach 96]. But far into the 20th century, intelligence has been deemed to be a characteristic exclusively inherent in individuals. With the research of Wilensky [1967] and Matsuda [1992], concepts of intelligence were extended from a purely individual to an *organizational* contemplation. To apply the concept of intelligence in a business environment, it is textured here into four levels: intelligence of *individuals, groups, organizations*, and *networks,* which are supported separately by different forms of ICS. In this context, a *higher level of intelligence* is understood as a level of intelligence assigned to a higher organizational level.

Individual intelligence can be intermediately supported by personal computing, like Frand and Broesamle [1996], Müller-Merbach [1986, 1992] or Quinn et al. [1997] have shown, personal computing supports storing and retrieving of information, assists classifying and aggregating of information outside a human memory (external information), and fosters generating information, knowledge, and opinion. *Thus, personal computing can amplify personal intelligence.*

In a business environment, when several individuals perform in direct interaction to obtain a joint objective (in a project or task), they form a *group*. When interacting, a group is holding its own level of intelligence (group intelligence) which is more than the aggregated individual intelligence of its members (implicitly shown by Nonaka and Takeuchi [1997]).

Intelligence of groups (alike higher levels of intelligence of social systems) is inherent only in a group, and when the group dissolves, this form of intelligence dissipates. Due to the direct interaction of their members and hence short and fast feedback loops, groups have a large potential for holding a form of intelligence that surpasses the aggregated individual intelligence of its members [Hongo & Stone 97]. Accordingly, the actions of the group lead to a *improved assimilation to the current situation*, a more *profound image of the future* and a *higher variety and quality* of possible actions to cope with future situations. *Groupware* can help the individuals to coordinate their interaction liberated from restrictions of location or time [Schwabe & Krcmar 96; Nunamaker et al. 91]. It can also help to perceive information, access information of others, generate knowledge based on the information of others and to help to coordinate actions of individuals and groups. *Thus, groupware can amplify group intelligence.*
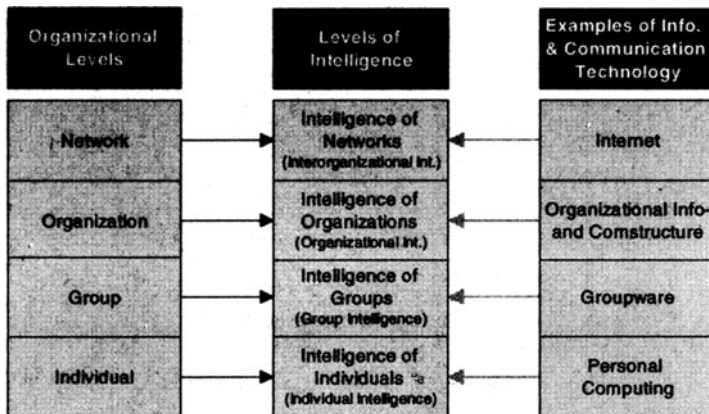
Figure 1: Organizational Levels, Levels of Intelligence and Examples of Information and Communication Technology.

The *intelligence of organizations* is a result of the synergetic interaction of personal, group and individual intelligence. The intelligence of organizations can be supported by the *organizational information and communication infrastructure* as the infrastructure makes information which has been created by individuals and groups available throughout the organization, like Jacobsen [1996], Kim [1997] and Müller-Merbach [1998] have shown. As information, knowledge and opinion can be shared and mutually influenced, their value for the organization grows dramatically or as Quinn et al. [1997] state *"exponentially." Thus, the organizational information and communication infrastructure can amplify organizational intelligence.*

Following Sydow [1992] or Benson [1975], several independent organizations form a (interorganizational) *network* when they conduct coordinated activities to fulfil joint objectives. The Internet and its services, e.g. the World-Wide Web, fulfil on the network level similar functions as the information and communication infrastructure on the organizational level. In fact, both are tightly wed, and the Internet may also amplify lower levels of intelligence [Tapscott 96]. Organizations can use the Internet and profit from synergetic effects of coordinated activities. The Internet allows networked organizations to encounter references to information, knowledge and opinion. As the Internet allows one to span the processes of OI, the *Internet may amplify the intelligence of networks.*

In summary, OI addresses four levels of intelligence. Information and communication systems help to amplify intelligence on each of the four levels.

In section 4 the RA as one possible approach for the classification, aggregation and retrieval of information is introduced and its contribution to the amplification of the intelligence of individuals and groups is shown.

4   The Role Approach

The Role Approach (RA) delivers basic guidelines for *designers of ICS* on how to design the classification, aggregation and retrieval functions of ICS with the intention of supporting OI. For *managers* and *prospective managers* the RA is a valuable help to deal with a growing amount of external information and the challenges induced by their ongoing career. The RA can contribute to OI in both cases as it increases the ability of individuals, groups, and organizations to classify, aggregate and retrieve external information, thus amplifying their intelligence.

The discussion about classification of "objects" (or forming categories) may be as old as human history. In philosophy, dividing a *whole into parts* or looking from different perspectives at a whole has a long tradition [Bohm 76; Burkamp 29; Müller-Merbach 92b; Popper 81]. This more theoretical discussion shall assess the practical environment of classifying, aggregating and retrieving external information from the perspective of an individual in it its roles on several organizational levels.

Empirical observations of Davis and Naumann [1997] suggest that individuals primarily use three different approaches for the organization of their external information:

1. *chronologically* by date (chronological approach), meaning all information is stored in the order of its creation;

2. by *activity or task* (task or activity approach), meaning all information is classified with the name of activity or task to which it contributes; and

3. by *name of person* associated with the information (name approach), meaning all information is classified by the name of the person who is the addressee, or the sender of the information or who was involved in the generation of the information.

There are benefits and drawbacks to each approach. Each approach is relatively easy to set up and to initiate the storing information; the challenges emerge in the retrieval process. Empirical research on the *information needs* of prospective managers has been carried out at The Anderson School [Frand et al. 1990] and is a basis for the development of the RA.

For the retrieval of external information the *chronological approach* requires an individual to *remember* when the information was stored. The *activity approach* requires an ongoing *creation of new categories* as further aggregation or specification. The *name approach* requires *remembering* who was involved to locate information.

On higher organizational levels the classification, aggregation and retrieval of information is determined by the design of the underlying ICS or organizational rules. But often the design of ICS on several levels does not use compatible classification, aggregation and retrieval methods and does not assume individuals to be primary users, e.g. groupware vs. personal computing. The RA has the potential to build up the missing links between designs of ICS on different organizational levels.

The RA is a *fourth approach* and is distinguished from the first three classification approaches by its potential to allow an individual to *grow* and to *mature* and its contemplation of an *individual as an entirety*. Its classification scheme is close to intuitive

human thinking and thus can be used very easily. The RA helps individuals to classify, aggregate and retrieve external information which can be stored on ICS. The storage of information on computer-based media becomes more important since computers are evolving as ubiquitous assistants to managers, supporting the human memory and human-controlled information processing. To illustrate this interaction Müller-Merbach [1986] suggested the metaphor of "Man-Machine-Tandems."

The basic assumptions of the RA are founded in the conviction that individuals define their existence through roles which encapsulate objectives, goals and basic notions about the individual itself and its environment. Each role corresponds to a specific goal for an individual and reflects *responsibilities* or *obligations* which an individual has or wants to play on a specific level for a specific social system. These roles may be assigned to different organizational levels, as an individual also plays roles in groups, in organizations or in networks.

(External) Information is in the center of the RA bow (see Figure 2). The RA bow represents a method of how to build up a *role framework* to classify information. The framework represents an intuitive classification scheme for all types of external information in forms such as computer files, paper documents, or hyperlinks. The starting point for building up the framework is the distinction of the *"private world"* and the *"professional world"* (step ❶).

The *professional world* encloses all roles and projects which are related to the professional life of an individual while the *private world* encompasses aspects related to family and the social activities, like being a member of a charitable association. These two worlds correspond to very general objectives of an individual.

Once the worlds are identified, the organizational levels (step ❷) at which the individual plays, roles need to be identified. Step ❷ requires the individual to identify its level by asking the question *"In the context of which social systems do I take up a role (for myself, for groups, for organizations, or for networks)?"* The answer to the question leads simultaneously to the organizational level and to the name of that social system. In the professional world the answer could either be to "me", "my project group", "my enterprise", or the "value net" in which my enterprise performs. Then, with step ❸ the question needs to be answered *"Which role do I play?"* For example an individual in the professional world could be a "life long student" at the individual level, an "intranet project group coordinator" at the group level, a "CIO" on the organizational level, and a "Relationship Promoter" on the network level.

The identification of roles of an individual at the group, organizational or network level needs to be harmonized with other members of these social systems. This harmonization is necessary to ensure an effective retrieval of information which has been created by another person from such a social system. In this context, Groupware can, on one hand, *require* harmonization as it builds up a "group memory." On the other hand, groupware can *support* the individuals with harmonization, since it provides the means to coordinate and facilitate the harmonization activity.
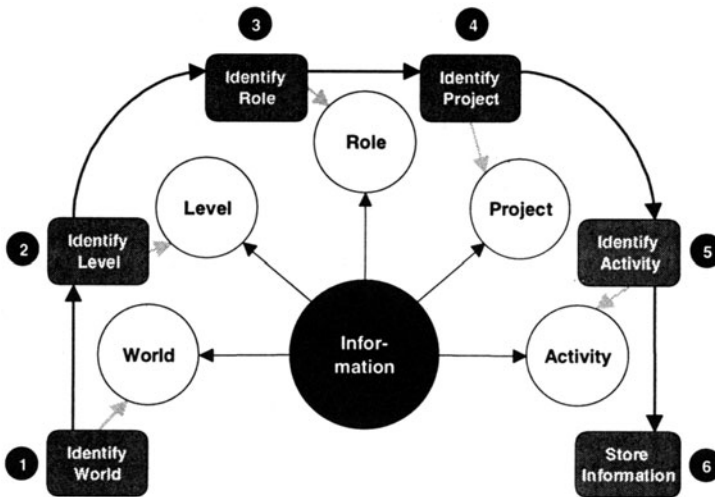
Figure 2: Role Approach Bow.

If the RA is established as a common method to classify information within a social system, e.g. embedded into a groupware system, it is easy for all members to retrieve specific information created by another member. Therefore, the RA can make major contributions to the improved design of "group or organizational memories" which may be part of groupware or enterprise systems. The RA harmonizes group, organizational or network "memories" as it harmonizes the classification, aggregation and retrieval of information.

Once the worlds, the levels and the roles are identified, the basic *RA framework* is established. The worlds, levels and roles will change very slowly for an individual and most likely for social systems as well. Thus the RA may deliver a stable and long lasting framework to classify and retrieve information. The framework can be further particularized by defining projects or tasks within the roles (step ❹) and then activities which are related to these projects or tasks (step ❺). Projects and tasks are correlated with more *complex outputs* while the outputs of activities are of a more simple structure. Steps ❹ and ❺ are widely discussed in literature e.g. Davis and Naumann [1997] and proved as an appropriate framework on a detailed level to organize information.

For actually storing the information for e.g. on a computer (step ❻) the hierarchical folder structure on the hard disk should correspond to the RA framework. Consequently, the folder structure should start on the top level with the distinction between files for the private world and files for the professional world and then proceed to the levels, roles, projects/tasks and activities. This hierarchy can also be used with paper based files as well with bookmarks for accessing information in the World-Wide Web (Web).

Often, the classifying capabilities of individuals will need support from software to visualize the structure or allow cross references between worlds, levels, roles, projects/tasks and activities. Software tools like *"The Brain"* of Natrificial, Santa Monica, or the *"Hyperbolic Tree"* of Inxight, a Xerox New Enterprise Company, Palo Alto, help

individuals control their personal RA framework and contain hierarchical stringency even if they do not offer methodological support for deriving the hierarchies and classes. A computer tool in that field must help an individual maintain *order* in the organization of its information. The Brain and the Hyperbolic Tree at least emphasize a hierarchical order, even if they do not offer methods for the classification of information. These tools – operated with the RA and embedded into groupware or other ICS – can make valuable contributions to the design of group or organizational memories.

Further, the methodological external storage of information on computers can help to amplify individual and higher forms of intelligence. On one hand the individual can successfully "outsource" a part of its memory. As the framework of externally stored information based on the RA is intuitive to access, information can be easily retrieved.

References between the information units (e.g. files) through hyperlinks can help to build up additional information and show relationships between worlds, levels, roles, projects/tasks and activities (see Figure 3, Reference EI-EI). Frand and Broesamle [1996] have noted the potential those references can have for the education of *management students*. Students who document the information about their courses on a computer can create a net of references which helps them to evaluate the content-based cross references between single courses (projects) in the future. On the other hand, Stief and Müller-Merbach [1998] have shown that references between external information and the knowledge of persons (Reference EI-K, see Figure 3) can help to transfer knowledge from one person to another and from one organization to another.
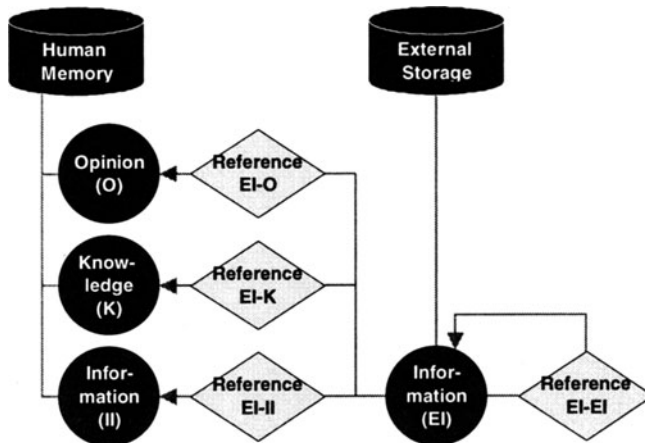

Figure 3: Reference Points from external Information to Human Information, Knowledge, and Opinion.

Consequently, on an organizational or network level, the storage and retrieval of references to individual knowledge can help to make the knowledge accessible for the organization or the network. Thus, the knowledge can be utilized more effectively and therefore amplify the intelligence of an organization or a network.

Designers of groupware or other ICS can derive guidelines for the design of group or organizational memories. Groupware or other ICS can follow the basic ideas of the RA and the reference point method and therefore contribute to the amplification of individual and higher forms of intelligence more effectively.

In short, the RA combined with the concept of reference points amplifies personal and higher forms of intelligence since they help to classify, aggregate, and retrieve information. Each individual can develop its own RA framework by proceeding through the RA bow. As the RA framework touches both individual and higher organizational levels, the classification for the higher levels needs harmonization throughout the members of the related social systems. Groupware or other ICS require this harmonization and also deliver the required support to coordinate the harmonization. The RA combined with the concept of reference points allows not only access to external information on computers or file cabinets but also to information, knowledge and opinion inherent in humans.

For both managers and designers of ICS, the RA may be of value. Managers gain control of their growing amount of information and designers get advice on how to design group or organizational memories that harmonize the classification, aggregation and retrieval of information for different social systems on different organizational levels. In section 5, the application of the RA in a business school and its benefit for prospective managers is illustrated.

5   Example: RA and Group Computing at a US-American Business School

The John E. Anderson Graduate School of Management at ULCA (The Anderson School) is one of the top ten US-American Business Schools and is ranked among the top ten schools for Entrepreneurship, Finance, General Management, Management Information Systems, and Marketing [n.n. 98]. All MBA students are required to buy a laptop computer and to develop the skills to use applications and methods for personal productivity, as the computer is an integral part of the MBA education.

Computer-network- and Internet-access are broadly available in The Anderson School. In classrooms, at library working desks, and even in the cafeteria, students can get connected. A dial-in service allows *collaborative working from virtually any location* between students on one hand, and between students and teachers on the other. Computing is an integral part of the courses and most of the homework heavily relies on the use of a computer. Today, students learn how to apply the RA and the concept of reference points in order to take down lecture notes, to work on case studies, to work on team projects, and to aggregate their learnings into models, methods and cross references.

On both the individual and group level, RA and the reference point concept play an important role as *mediators* for the mutual access of information. As the RA framework starts to become broadly accepted, it helps students to mutually retrieve information through available groupware and to determine which student has knowledge to solve a problem in a certain field or to be able to give advice. The RA harmonizes the way information is stored and provides for a fast and precise retrieval of information. Students

store their information on their personal laptop computers, on internally accessible network file servers and on public or internal Web-servers. Multiple applications to communicate and co-operate electronically enable students and teachers to *mutually access information* and to work in joint projects. Initial observations suggest that the RA and the reference point concept amplify individual intelligence and group intelligence.

Both students and teachers can profit from the usage of ICS. On one hand, students can amplify their individual intelligence and that of their group through classifying, aggregating and retrieving information about lectures and projects on ICS. On the other hand, teachers have the opportunity to evaluate the students' information and determine whether their instruction had the intended effect on the students. Furthermore, teachers can gain new insight or valuable *experience* from students and use it as *an input to the learning process*. As such, the education at a business school can change from a "one way" process to a *mutual* activity. Thus, RA, reference points and individual, group and organizational computing *jointly* seem to contribute to the intelligence of The Anderson School as an organization.

The education of the students can never be considered as "complete" even when they have graduated. Today's and tomorrow's managers need to continue their education to remain personally competitive and to contribute to the competitiveness of their organizations. The teaching philosophy at The Anderson School understands that education is a process that endures for the entire life of a manager. Therefore, the Alumni are invited to stay in contact with their educators and, on one hand, share personal experience, anecdotes, examples, methods, models, and facts about the "management reality." On the other hand, they receive ongoing education to cope with the upcoming challenges of their professional world. The organizations of the Alumni, the Alumni themselves, and The Anderson School create a network of mutual learning. The underlying models for mutually classifying, aggregating and retrieving information about knowledge and reference to knowledge and opinion can be the RA and the reference points.

Thus, The Anderson School and its Alumni have the opportunity to mutually amplify personal, group and organizational intelligence and to contribute to a network intelligence. In this context, *opinion plays a central role*. On one hand, the opinion of managers about their business reality helps to direct business education and management research. On the other hand, the opinion of educators directs the ongoing learning process for managers to fields which are considered to be relevant. Personal computing, group computing, the organizational information and communication infrastructures as well as the Internet have already helped to turn this vision into reality.

6   Summary and Prospects

The competitiveness of tomorrow's organizations may be determined by the successful generation and utilization of intelligence as the basis for survival and prosperity. Information, knowledge and opinion are the products of intelligence and the inputs and outputs of the processes of intelligence. Organizational Intelligence (OI) is a management approach to *design and operate social systems* and intends to amplify the intelligence of individuals, groups, organizations and networks. OI consists of four processes and three products which can be related to individuals and social systems.

For managers and designers of information and communication systems (ICS) the Role Approach (RA) delivers a useful method to classify, aggregate and retrieve external information. The RA helps *managers* deal with the increasing amount of information about their career and provides *designers of ICS* with guidelines for the architecture of the classification, aggregation and retrieval functions. OI and RA together form a strong *complementary set* of a management approach and a method for improving a computer based memory on several organizational levels. Combined with appropriate computing, they have the potential to amplify personal and higher forms of intelligence. Further research has to be carried out to empirically validate the impact of the RA and to further refine the approach and its methodological framework, the RA-bow. Finally, the contribution of the RA to the design of groupware and other comprehensive ICS also needs to be explored.

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