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# Corporate Media - An Approach for Corporate Community Management

Victor Porak
*University of St. Gallen*

Ulrike Geissler
*University of St. Gallen*

Sabine Einwiller
*University of St. Gallen*

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Victor Porak, Ulrike Geissler, Sabine Einwiller, MCM Institute, Müller-Friedberg-Strasse 8, CH-9000 St. Gallen

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***Abstract* – With the rapid development of Information and Communication Technology companies face several problems today. The increasing speed of product development leads to the problem that products and services need to be communicated and explained to potential customers. Shareholders and investors should gain a certain insight into the company's activities - also the public domain and journalists demand to be better informed. At the same time the information overload of corporate community members, like journalists, analysts, customers, shareholders, employees, etc., lead to the problem that the scarce source today is attention. How should companies react to those challenges? A solution could be the design of Corporate Media, which integrate all corporate (sub-) communities to give them tailor made services. Based on the concepts of agent, media, and community, we develop an integrated platform for the exchange of tangible (e.g., products) and intangible (e.g., knowledge) objects.**

***Keywords* – Media, Communication, Multi-Agent System, Media Design**

## I. Motivation and Introduction

Rapid developments in the field of Information and Communication Technology have lead to radical changes and challenges for business corporations. In terms of production, a trend in backwards and forwards process integration has been observed and the speed in development has changed. Also the amount of accessible information is constantly increasing, while the cognitive capacities of human beings remain restricted.

These challenges inevitably lead to the question of how people today deal with those developments and, most importantly for the concept to be presented here, of *how corporations should react to that*. On the one hand the possibilities of new media awake expectations of an ever-growing ability to gather detailed and easily accessible information. Along with that comes a tendency for increasing pressure from various stakeholder groups, e.g., the financial community, employees or customers, for greater transparency of a corporation. On the other hand, cognitive capacities are limited and a vast amount of information will never be able to pass people's filter of attention. For companies this leads to the insight that nowadays and in the future, the bottleneck lies not so much in the factual development of new products. Cognitive capacity is becoming *the* scarce resource. As a consequence, for corporations the challenge for communicating new solutions (products, brands, etc.) becomes the most important competitive advantage. This requires a shift in focus from production management to *communications management* [14]. The objective is to manage the communication processes in such a way that information is easily accessible, structured, quickly to comprehend and appealing, as well as providing greatest transparency.

In order to meet the new challenges for an optimized communication with all corporate community members, it is necessary to provide all stakeholders with integrated services as well as to consider cognitive restrictions and preferences of users. Our solution is an integrated medium, which enables communications for various communities - be it within or between them. *Corporate Media are platforms which integrate all community members related to a company and all tools necessary to serve them.* A special feature of the media is its generation and presentation of case sensitive (e.g., personalized) information in terms of content and audiovisual representation.

Corporate Media have to establish a corporate brand resp. image by efficient communications to related communities. In times of cognitive capacity as *the* scarce source for business, we take the speed of spreading positive and targeted information about the company as an important dimension for communications efficiency. The idea of efficient communications described here is to influence certain stakeholders´ sets of beliefs (values, ideas etc.) in such a way that they internalize a positive image of the company. Referring to Richard Dawkins concept of "memes" ideas, slogans, or vogues would, similarly to cell division, reproduce through flashing over to other people's minds. An example for setting memes in the Web is the one of RCA Records that hired a team of youngsters to swarm the Web and chat positively about the singer Christina Aguilera [18].

The basic concepts used to develop the model of Corporate Media are the following: The Media Reference Model has been used as a framework for the development of transactions by applying different views and action types to the matter. The Media Model describes the relations between a medium, its channels, its acting agents and the communicated objects. For the development of the Corporate Media Platform the three dimensions of media design, according to the Media Reference Model, have been chosen. In a first step, we shall introduce the basic concepts of our model (sect. II). In a next step, we will develop the Corporate Media Model by using three design components – organizational design (sect. III.A), communications design (sect.

III.B), and IT-design (sect. III.C). Finally we provide some concluding remarks (sect. IV).

## II. BASIC CONCEPTS

In order to develop the Corporate Media Model the basic terms of media, agents, communities and stakeholders as well as the Media Reference Model (MRM), the Media Model and the three media design dimensions are used.

### A. Media

*Communication* is the exchange resp. transaction of tangible (e.g., products) or intangible (e.g., knowledge) objects between agents. *Media* are platforms for the representation, development, and exchange resp. transaction of tangible and intangible objects [13]. Depending on the focus of the exchanged objects (tangible or intangible) a differentiation can be made between knowledge media and business media. Media consist of three components [13]:

- *communication channels* connecting the various agents;
- a common *logical space* for coding (i.e. syntax) and interpreting (i.e. semantics) the exchanged objects;
- *organizational structures* (i.e. roles, protocols) and *processes*.

To abstractly represent media we refer to the MRM [10]. According to the MRM, a transaction can be split into four action types: generation of *knowledge*, building of *intention*, *contracting* and finally *settlement*. These action types reflect the dimensions of agents' interaction as stated above. They can be viewed from four different perspectives which reflect the components/layers of a medium: *community view* (structure), *implementation view* (operations, processes), *transaction view* (related services, embedded in a logical space), and *infrastructure view* (implementation of services). These actions and layers are not considered to be exclusive or linear in process; the model's distinct function is to represent and formalize the elements underlying an exchange process (see fig. 1).

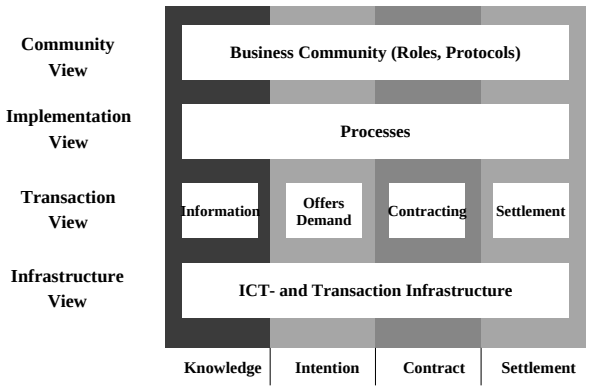


Fig. 1. The Media Reference Model

### B. Agents

*Agents* are either organizations, human beings and/or representatives, i.e. machines, that communicate on media [13]. In marketplaces agents' actions can be defined on the basis of four dynamic dimensions, which change with agent interaction [13]:

- *knowledge*: the amount of knowledge and beliefs, e.g., about products, companies, etc.;
- *intention*: assuming rational action, an agent's act always underlies an end by which to find a means for;
- *contracts*: legally binding or implicit common rules, e.g., contracts for sale, terms of business;
- *resources*: available money, time, attention, etc. necessary for the exchange of objects (i.e. for settlement).

Finally, media cannot exist without at least two exchanging agents. This leads to the third constituent concept of Corporate Media – the communities (see fig. 2).

### C. Communities

*A community is* an ensemble of communicating agents on a medium (multi-agent system) [10]. Communities are constituted by mutual interest of the agents, e.g. for business transactions, relationship, or research [15]. Depending on its business, history, size, etc. a corporation's communities may contain customers, suppliers, traders, shareholders, journalists, analysts, lobbyists, parliaments, employees, and the general public [20]. The *importance of communities* lies in their potential to realize a competitive advantage by exploiting the following possibilities:

- provide the communities with targeted corporate and product information;
- communities act as multipliers of company and product brands;
- generate information about the agents (e.g., for consumer analysis);
- generate information from the communities about the company (e.g., for image analysis, early warning);
- obtain knowledge from the agents (e.g., new product ideas, suggestions for improvement).

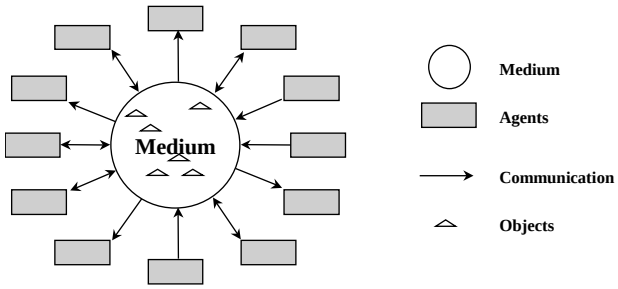


Fig. 2. A medium with communicating agents (communities)

### D. Stakeholder

Next, the classical concept of stakeholder shall be described. Stakeholders are defined as "those groups and individuals who can affect and are affected by the achievement of an organization's purpose" [4]. The concept of community and the one of stakeholder exist in parallel in such a way that certain stakeholders may be members of different communities. Community members can also be electronic/artificial agents. In the following we will use the concept of community until further notice.

### E. Media Design

As a framework for the design of the Corporate Media Model we use the MRM. According to this, three dimensions of media design have to be considered [14]:

1. *organizational design*, describes the structures (roles, protocols) and the operations (services) necessary to satisfy the needs of community members;
2. *communications design*, describes the ways and means of imparting information on the company and its products/services to the communities; this knowledge creation requires community-specific syntax and semantics;
3. *information technology design*, technically describes the architecture of media through which the agents communicate.

After an overview of the basic concepts of media, agents, community, stakeholder and the media design we will now use the three steps of media design to conceptually describe the development of Corporate Media.

## III. Designing the Community Portal

### A. Organizational design

With the organizational design the roles and protocols of the agents, and the necessary services must be defined.

A1. Roles

Roles define the functions of an agent in terms of rights and duties. In order to communicate in a specific, targeted manner the agents' roles have to be defined as precisely as possible. For reliable personalization (see chapter III.C) a role should contain several role dimensions. We suggest five dimensions underlying a role:

1. Knowledge
2. Intention
3. Contracts (rights/duties)
4. Resources (actions)
5. Socio-demographics.

The first four dimensions consist of the four dynamic dimensions of the agent description explained above, the fifth can be seen as supplementary information, needed for a sufficient personalization. *Socio-demographic data* are structural characteristics of a population (here: agents). They describe the distribution of human agents according to age, sex, income, residential status, etc. Altogether these five dimensions describe the agent's *domain of interest*, the *stage of transaction process* an agent is involved in, different individual *modes of information processing* that are important to know how agents treat information (a human being might prefer verbal thinking to spatial thinking (see chapter III.B)), s*ocial roles* that determine a person's function in a group (specialist, speaker, etc.) or the degree of conformity (insider, outsider).

Corporate Media can be seen as meme vehicles. In the shown context, a specific *social role in information distribution* is very important for the self-replication of memes: the opinion-leader. Opinion leaders are human beings, organizations, or mass media products that are perceived as being highly credible and competent. For this reason they get asked for advice very often and are capable of influencing others´ opinions and actions. The existence of opinion leaders leads to a two- and more step-flow of communication: when addressing an object to opinion leaders they influence the so called periphery – people who communicate less and do not function as multipliers of opinions, ideas, etc. as well as other opinion leaders (as shown in fig. 3).

For a company, the communication of memes to opinion leaders instead of members of the periphery will rise the speed of reproduction of memes. This demands a targeted communication with opinion leaders – not just on the web but also via classical media. On our Corporate Media the task would be to attract opinion leaders, to reach the critical mass for communication, to create possibilities for emerging community cohesion and to enforce community standards.

Once the roles of the acting agents are defined, protocols must lay down the degrees of liberty (possible actions) an agent has in a certain situation.

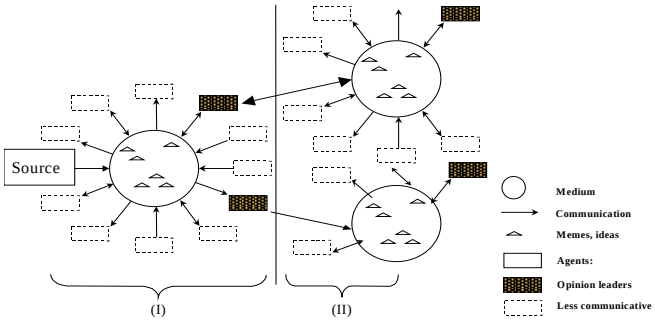


Fig. 3: Two-step-flow of communication

A.2 Protocols

Protocols lay down rule-based flows of actions, i.e. sequences and causal relations. They are necessary for all kinds of actions to be executed on the media no matter if it is about individual or collective action, doing business or entertainment, being an active or a passive user. Besides formal rules (terms of trade, netiquette, etc.) one can identify informal ones like group norms evolving and changing through social interaction.

In defining protocols at least two aspects should be taken into consideration. Firstly, the enabling of multi-dimensional role performance and the change of protocols due to different intra-agent roles. Secondly, the adaptation of protocols to human information processing. For modeling flows of *human* action it is useful to take into consideration genetic and cognitive aspects of human action.

For the organizational design of action processes it is useful to know about typical mental action sequences. Otherwise a protocol might be modeled properly in terms of technique but if it does not fit to the agents' mental scripts they might not act successfully on that certain media. A simple example out of a shopping script would be a product catalog on an E-commerce web site that does not show the product information an agent is used to in real life (for food, information on ingredients, best-before date, price, etc.).

To better understand the concept of protocols take a maze. In each situation there are five restrictions: walk straight on, walk left, walk right, walk backwards - and you can't walk on if there is a wall. These five restrictions are the protocol that describes the possibility one has in each situation. A process instead describes the way out of the maze, using the protocol for each atomic action.

A.3 Services

The services are influenced by the five role dimensions. Information will be delivered depending on the knowledge an agent has (expert, beginner, etc.), on its intention (purchase, information, etc.), on its rights and duties (security, etc.), on its actions (contracting, clicking, etc.) and last by its socio-demographic dimension (male, female, age, etc.). As we try to outline a generic model for Corporate Media, the definition of personalized services can not be elaborated in the present paper. Some possibilities for services will be mentioned together with the IT-Design in chapter III.C.

A4. Requirements for Corporate Media

As shown, the organizational design of the Corporate Media Model lays down the roles of the different agents of such system. Roles are defined through five dimensions which enable a classification of agents. Protocols lay down the actions an agent can undertake in a certain situation. These have to be redefined for each media design process. The services finally define what is delivered to the agents. Services have to best adapt to agent's preferences.

The next step, the communications design, will ensure that services are designed in such way that they are easy to use and best understood by different types of agents.

## B. Communications design

The communications design is concerned with designing communication successfully. This means, designing the contents and the mode of communication in a way they meet the demands and goals of all agents interacting on Corporate Media. On the one hand, human agents (stakeholders of the corporation) demand to obtain the wanted information quickly and effortlessly, thus generating a feeling of satisfaction. The corporation on the other hand strives for creating positive beliefs towards the corporation and for establishing a strong and highly positive image or brand in the minds of the stakeholder agents. The ultimate goal of the corporation is to establish beliefs that become self-replicating ideas, "memes", which move through time and space without further effort from the source.

To meet the goals of the corporation it is essential to meet the demands of the stakeholder agents to complete satisfaction. This can only be achieved if contents which are being exchanged between agents are structured in a way that they can quickly and correctly be identified and understood by the potential sender and receiver. This requires an adequate design of the structure of the contents, its syntax. Syntactic rules comprise for example the font, rules of grammar and layout. Additionally, successful communication demands that exchanged contents between the agents are interpreted in the same way on both sides. The interpretation of contents is called semantics. Syntax and semantics make up the *logical space* of the medium. To design this logical space in a way that it meets the demands of all agents by using adequate syntax and ensuring concurring interpretation (semantics) is the job of communications design [13].

In order to design the logical space of Corporate Media in a way it leads to the fulfillment of the goals of all agents – stakeholder and corporate agents – the *content of the presented information* (What is presented?) as well as *the presentation of the information content* (How is it presented?) have to be constructed in a way to be quickly and correctly identified and comprehended. To achieve this various requirements have to be taken into consideration:

- Requirements based on principles of human information processing
- Requirements based on the interest domain of the agent
- Requirements based on principles and rules of the corporation

- Requirements based on technical restrictions of the media

One part of these design requirements can be viewed as *general requirements*, meaning they can be applied to all agents alike. These include certain principles of human perception and memory as well as principles and rules of the corporation (e.g., coporate identity[1]). The other part of the design requirements are *specific requirements* because they are specific for a particular community or agent. These derive for example from differences in the domain of interest or differences in processing the information (e.g., cognitive style). Design requirements derived from principles of human information processing are of great importance when designing for human agents. With increasing automation human principles play a decreasing role. Nevertheless, since Corporate Media will to a large extent be used as platforms for human agents the requirements derived from principles of human information processing are of outstanding importance.

The principles of human information processing to be considered when designing the logical space embrace perception as well as cognition. Regarding perception attention has to be paid to certain physiological principles, like for example the Gestalt principles [17]; color perception, visual acuity and foveal vs. peripheral vision [5, 7]. Regarding cognition findings from the research on memory and learning have to be considered. These include limitations of short-term memory to 7 +/- 2 “chunks” of information [11], schematic knowledge structures of information stored in long-term memory and cognitive style which refers to how people think about and solve problems. Both fields, perception and cognition, account for general requirements that apply for all human agents alike (e.g. Gestalt principles or visual acuity) as well as specific requirements, that vary from agent to agent (e.g. different cognitive schemata or style).

B.3 Requirements for Corporate Media

In order to ensure common understanding and quick comprehension the design of the logical space needs to consider firstly general requirements of perception and cognition as well as of the corporation which should be applied to all agents alike. Secondly and most importantly the system needs also to adapt dynamically to the specific requirements of the agents, like individual schemata, cognitive style or interpretation of color depending on cultural background. In order to make the system adapt to these specific requirements, behavior has to be tracked to find out the agent’s mode of processing the information and the underlying schematic representation. The sequence and logic of content structure can then be adapted according to the schemata, scripts or mental models of the agent. Differences in cognitive style of the agent have to be taken into account when displaying information. Which form of presentation an agent prefers can be found out by leaving the choice of different presentation modes. Even if the agent could not specify her own style in the personal profile herself, tracking the behavior will reveal the preferences. This knowledge is then applied to select the suitable presentation mode according to the agent’s cognitive style.

Having defined organization and communications design, we finally present the IT-design of Corporate Media which puts into effect all restrictions acquirements stated by organizational design and communications design.

### C. IT-design

The IT-design is the technical and conceptual description of electronic media or products. This embraces the architecture of IT-systems with its applications and data sources as well as the design of community and agent interfaces. The expectations regarding the design of Corporate Media being rather ambitious, we initially want to develop a generic model that shows the necessary modules and the interaction required for such system in a general way. Advice for implementation will not be given at this stage but will rather be subject to further research.

*Generic model of Corporate Media.* A generic model has to abstract from existing solutions. Data sources, applications, networks and agent interfaces are not the key objectives of interest. Our interest lies in the abstract description of services to best fit the expectations and goals of agents and communities. The only restrictions to be seen and demands to be met lie in the cognitive capacity of human beings. As the expectations of agents and communities are in a constant flow of change Corporate Media have to be designed to a great extent in a non static way. Corporate Media need to be able to adapt constantly to the changes in their surrounding, like viable systems [2, 3]. We identified several modules that are necessary to build Corporate Media taking care of the restrictions and requirements mentioned in the preceding chapters (see fig. 4).

*Data and Applications Interface.* Corporate Media gets data and applications out of various data sources like the internet, intranet, extranet, file systems, groupware systems, electronic communities, and more. Using all possible and accessible internal and external data sources the system is able to dynamically combine text with graphics depending on the demands of the agents that are actually on the platform (pull) or depending on the analyzed needs in chosen communities (push). This can be achieved by, for example, applying the concept of operational data stores (ODS) [8, 9, 19]. One big advantage of introducing ODS is that an organization doesn’t need to change legacy systems, only their data is collected and restructured.

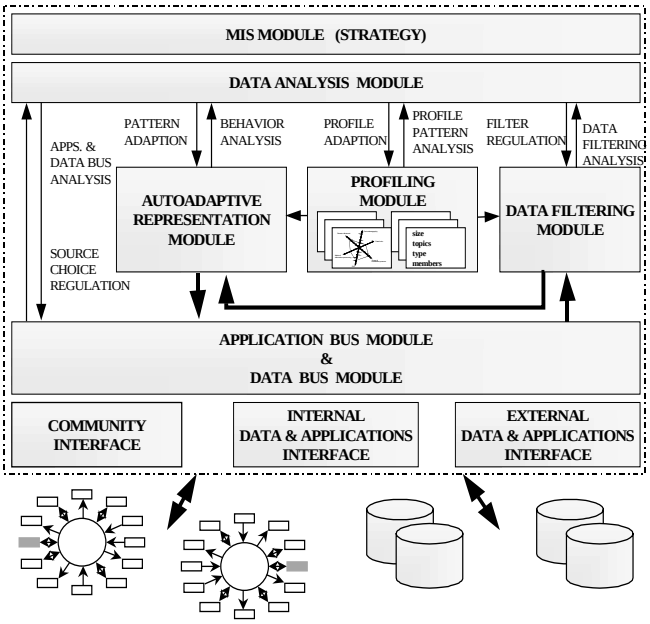


Fig. 4. Generic model of the Corporate Media

For the purpose of Corporate Media, a Class I ODS is required which constantly "sniffs" transmitted packages and evaluates them instantly. Data have to be linked to applications to enable collaborative work with shared data and shared applications.

*Community interface.* The community interface is an interface to internal and external communities of an organization. We call it community interface because it is supposed to enable communities and agents to access the organization's web site and to enable the organization to access its target communities. This interface links to those communities in electronic media that have been chosen relevant for corporate and product communications for example. All accessible communities are scanned for relevant information to find new communities that match the search criteria of the organization. All electronic communities chosen relevant are analyzed for their content (topics discussed), their size (number of members), their type (professional community, community of interest, etc.) and for possible opinion leaders within the communities. This information about communities as well as agents are stored in community and agent profiles. Depending on the organizations target groups and its strategy the identified communities can be supplied with corporate and product information, can be scanned for negative voices or analyzed for special trends so that the corporation can react in an appropriate way (early warning system), opinion leaders can be used as multipliers for communication (viral marketing). The different interfaces have to enable communication using various protocols so that they can serve web browsers, file systems as well as mobile devices like cellular phones using the wireless application protocol (WAP) or handheld computers for example using the new communication standard bluetooth.

*Application Bus & Data Bus Module.* As mentioned above, data and application sources for Corporate Media are plugged in and out dynamically, depending on the preferences of agents and communities. The application & data bus module reconfigures the subset of data that can be accessed by each agent and or community. This is specified either by the agent or community profiles or through periodically data analysis of external and internal information sources.

*Profiling Module.* To meet specific demands of the different agents in communities, profiles of communities and agents are needed to store preferences in. In the future most people will send their personal electronic agents into the web to fulfill a task or just as their digital representative (avatars) with their personal profile. Agent profiles are specified through the five dimensions that have been mentioned in the organizational design: socio-demography, knowledge, intentions, actions and rights/duties plus the personal profiles that has been brought by the agent. These personal profiles might not contain enough information we need for Corporate Media. In that case the additional information is stored in the Corporate Media's profiling module in a way that it is possible for agents to access and edit the additional information. These profiles are generated through real time analyses and determine the set of data that is delivered to certain communities, data subsets that agents can access and preferences communities and agents have – for content (organization design) and representation (communication design) [16]. Data will not only be filtered according to preferences, but will also be autoadaptively represented according to profile information. For that purpose we have to store several kinds of information in different profiles:

- community profile: size, topics, community type, opinion leaders, etc.
- agent profile: personal profile (predefined by the agent and automatically transferred or to be edited by the agent) plus additional information (automatically created through real time analysis of agent transactions)
- organization profile: corporate identity, corporate design, general requirements from information processing, etc.

The whole web is scanned for accessible communities. The identified communities are analyzed for their profile information and the profiles are stored for further analysis. Analyzing the community profiles an organization can determine which communities are relevant for what purpose. The community profiles can be clustered according to certain interests of the organization. Agent profiles store relevant data about the agents that access the organizations site (note

that agents can be human beings and electronic software agents). These profiles are updated according to agent's interactions. Certain information in the agent profiles can be actively (agent edits its profile) or automatically (personal profile brought by agent) changed by agents like credit card information or personal preferences. Organization profiles store information about corporate identity and design as well as general requirements from information processing which are equal to a large number of human beings like earlier mentioned in the communication design. Anonymous logins have to be treated through an "anonymous profile" which regulates general access rights to data and applications and generally restructures the data that is being presented to the accessing agent. After a few clicks that anonymous profile will change into an agent profile and depending on what the agent wishes is either stored or rejected.

*Autoadaptive Representation Module:* Every agent has different preferences and cognitive schemes and every community has different topics and needs different information – therefore all data delivered to communities and agents must be adapted in terms of content and representation. As mentioned above, those preferences are stored in the agent and community profiles. The representation of data is done by an autoadaptive representation module. An accountant for example might prefer to see numbers in a table while a marketing person prefers to see diagrams and a customer just wants to see nice pictures with a little note. The data for all those representations can absolutely be the same, it has to be presented in different ways. Some people might prefer a quick overview while others want to be informed in depth. The representation module takes care of those preferences stored in the profiles and uses its set of representation styles to best adapt the way data is brought to agents and communities. To accomplish this task the autoadaptive representation module uses a specific set of design patterns according to the corporate design for the representation of text, graphics, video, and more [6].

*Data Filtering Module.* In order to get the right information to the right agents and communities, some kind of filtering system is needed that searches all data sources based on the profile and on interactions of an agent (organization design), finally composing the best subset of data. These data can consist of text, graphics, audio, video, etc. and are transferred to the autoadaptive representation system. The filtering itself has to be done by analytical data processing partly using artificial intelligence concepts, neuronal networks, and context search to deliver better results [12]. One of the biggest advantages of neural networks is that they work even when given incomplete information and they grow better in time with training. In Corporate Media either the filtering mechanism itself has to understand different interface-protocols in order to be able to search various data sources, or the data & application bus has to do some kind of translation. This is a question of implementation techniques and shall not be discussed in this paper.

*Data Analysis Module.* The heart of the design lies in the data analysis module, which is coupled to an MIS/DSS module. The data analysis module analyses the behavior of agents and communities in the system and modifies the corresponding profiles. The autoadaptive representation, profiling, data filtering, data bus & application bus modules must be constantly analyzed in order to provide the best match possible between the agent's implicit and explicit preferences and the information system. This is carried out by a (meta) data analysis module, which constantly analyzes all events in the information system and tries to adapt the settings of the implied modules to best fit the agent's expectations. The data analysis module reports to an MIS/DSS system through which the whole information system can be influenced either autonomously (close to a viable system), or manually by the system managers.

*MIS / DSS Module.* Management Support Systems refer to a collection of computerized technologies whose objective is to support managerial work and especially decision making. In Corporate Media all the gathered information in the data analysis module is reported to an management information system (MIS) which informs the system managers about the overall status of the whole system by generating reports. The coupled decision support system (DSS) helps the system managers to decide how to set parameters that influence the whole system. The MIS takes system-information from the data analysis module like agent profile pattern information, data filtering pattern information, autoadaptive representation pattern information, etc. Using that information system managers can decide which system-parameters to adapt to the changing environment. If the DSS is directly coupled to the systems parameters, the whole model becomes likely to a viable system, because management is linked to the executing devices using feedback channels.

### D.3 Information Modeling

After having outlined the architecture of the Generic Model of Corporate Media the next step towards implementation would be to give advice how to build a matching data model and how to build such system. All these upcoming questions can't be discussed in depth in this paper. The information modeling therefore will be subject to further research

## IV. Concluding Remarks

Taking as a starting point today's challenges of ever increasing amounts of information, a demand for transparency and restrictions in cognitive resources, we have developed a possible solution in order to meet those challenges: the ge-

neric Corporate Media. Corporate Media unify all services of a company for all agents and communities and by doing so create positives frames for interaction within the goals defined in the introduction.

In further research, this generic model needs to be specified and implemented by defining all its processes, the definition of data, logic, and interfaces. The construction of a prototype will allow the model to be tested.

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