Characteristics of Public E-services: Investigating the E-diamond Model

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Abstract: The issue of the paper is how to characterize public e-services mediated through the web. One common kind of characterization is made through stage models (e-ladders). Such models are frequently used for policy-planning, evaluation and bench-marking of public e-services. E-ladder models have been criticized and as an alternative the e-diamond model has been formulated, which consists of twelve categories in three polarities (informative vs performative; general vs individualized; separate vs coordinated). The differences between e-ladder and e-diamond models are described in the paper. Empirical investigations of some public e-services based on the e-diamond model are pursued. A theoretical analysis of the e-diamond model based on the language-action perspective is performed. This follows the view that public e-services are seen as government – citizen communication. The empirical and theoretical investigations give further support to the e-diamond model.

1 Introduction

There is a rapid growth in the development and launching of new public e-services over the web to citizens. When doing this, government agencies base their work on national and international programs for e-government development, e.g. [EE05]. Such programs usually incorporate a 24/7-vision for governmental agencies. Citizens should always be able to reach, through the web, government agencies and also be served by them. Many such e-government programs include stage models for public e-services. A common division of stages is: 1) information, 2) interaction, 3) transaction and 4) interaction; e.g. [St00]. Such a stage model can be seen as a descriptive instrument for public e-services; as a kind of typology of such services. Stage models are however also used for prescriptive and evaluative purposes. The stages are sometimes considered as growth stages prescribing an appropriate evolution of e-services; i.e. as a kind of prescriptive maturity model. This way of viewing stage models is also fully in line with the use of such models for evaluation and bench-marking of e-service levels of agencies or nations. Examples of such assessments can be found in [EE02; EE05; UN03]. This prevailing view on public e-services has been challenged by some scholars; e.g. Andersen [An04], and Goldkuhl & Persson [PG05], [GP06]. Several critical questions have been raised:

Are the categories of a stage model well chosen as a typology of e-services? Do e-services evolve through such a series of stages? Is there a real advancement between the different stages? Should one always strive for higher stages? Are higher stages inherently better than lower stages? Is a stage model a proper yardstick for evaluation and benchmarking?

Based on such questions, we have pursued a critical analysis of stage models or what can be called "e-ladder models" [GP06]. We have formulated an alternative conceptual model consisting of three polarities. This alternative model is called "e-diamond model". The earlier paper [GP06] is mainly conceptual; only minor empirical illustrations are given. We state in our conclusions (ibid) that more empirical research is needed in order to validate the e-diamond model.

The rapid expansion of public e-services over the web entails a need to investigate the conceptual foundations for such web-based services to citizens. Departing from the formulation of the e-diamond model, we will in this paper go in two directions; one empirical and one theoretical. The empirical part (section 3 of this paper) will consist of an analysis of some public e-services. This investigation will utilize the conceptual structure from the e-diamond in order to assess its descriptive usefulness. The empirical analyses will be pursued with openness and sensitivity in order to assess conceptual adequacy and possibly other categories than those suggested in the e-diamond model. The theoretical part of the investigation (section 4) will contribute with possibly more explicit grounding of the e-diamond model. We will apply an explicit language-action view on the e-diamond model. How are the different concepts in the polarity model (e-diamond) to be understood when applying a language-action perspective? These complementary investigations are aimed to contribute to an improved understanding of the meaning of interactions between governmental agencies and citizens through the media of web-based e-services. This view of e-services as web-mediated communication is in accordance with the Pragmatic Web conceptualization [SDD06]. The purpose of the paper is to contribute to empirical and theoretical grounding of the e-diamond model [GC03, Go04]. This means that, methodologically, we follow the general principles of the Multi-Grounded Theory approach (ibid).

Before we pursue these empirical and theoretical investigations, we need to go through the e-ladder and e-diamond models. This is done in section 2. Conclusions of the paper are found in section 5.

2 From e-ladder to e-diamond

This section presents the evolution from stage models or e-ladders to the e-diamond model [GP06]. Important e-ladder models are briefly presented and the e-diamond model is presented in detail.

2.1 E-ladder models

Early forms of stage models were founded to discuss the adoption and maturity of information systems management strategies in corporations [No73]. In IS research stage models are well known and discussed [KK84]. This concept of prescribing the evolution of maturity was later used in describing Intranet adoption [DS00]. In eGovernment practice early contributions were the Australian National Auditing Office [An99] and Swedish Agency for Administrative Development [St00]. The research community of eGovernment has contributed with various variants of this concept. Most referenced are the Layne & Lee model [LL01] and the Hiller & Belanger model [HB00]. As stated earlier several of these models have been used in benchmarking eGovernment progress, readiness and maturity. The Swedish model has been used, in a slightly altered form, to benchmark the European eEurope program [EE02; EE05]. The stage models (e-ladder models) mentioned above divide the evolution of e-service from the supply side into 4, 5 or 6 stages. Despite this difference between the models they share the common foundation and concepts. The Swedish model is widely used among municipalities and agencies in Sweden for positioning and describing the progress of their e-service supply [GP06]. One of the common features are that these models implicitly state the progress or increasing maturity when implying that stage 4 is better than stage 3 and so on. Another feature is the deterministic character of the models when stating that the actual evolution will occur through these stages in this prescribed order. Andersen [An04] state that this feature will not be the actual evolution since the stages in practice will occur simultaneously and be parts of different elements of eGovernment. As one example, we describe briefly below, the model by the Swedish Agency for Administrative Development [St00]. This model describes the evolution as passing trough 4 stages; *Information, Interaction, Transaction* and *Integration* (figure 1).

The model is manly designed to influence agencies in their aspirations for fulfilling the 24/7 vision of eGovernment in Sweden but also to categorize e-services in order to benchmark the progress in current e-service output. *Stage 1: Information* pivots on the presentation of static material such as publications and information about the services provided by the agency. This information is seen as "packaged" by the agency with only limited possibilities to interact with the website. *Stage 2: Interaction* is providing "interactive information". This includes the possibility for basic interaction with the website. At this stage services as searching in agency databases, ordering printed publications, downloading and ordering forms relating agency services and subscribing to newsletters from the agency. *Stage 3: Transaction* includes picking up and leaving personal information related to the services provided by the agency. This includes initiating and following agency specific services by the agency. *Stage 4: Integration* addresses the integration of services between government agencies. This is the realisation of a one-stop government that

regardless of organizational boundaries provides services at one point of entry even where several agencies are involved.
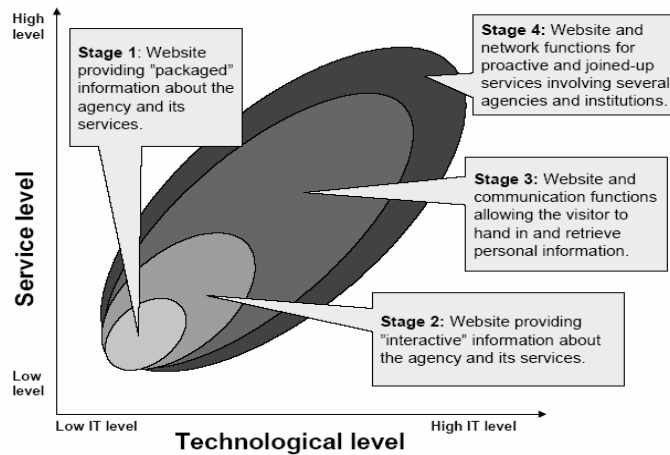

Figure 1: Stage model from the Swedish Agency for Administrative Development [St00]

More thorough literature reviews and analyses of e-ladder models have been pursued in [PG05] and [GP06].

2.2 The e-diamond model

The e-diamond model is based on an analysis of the stages in the stage model described by the Swedish Agency for Administrative Development in pairs [St00]. In [GP06] we *deconstructed* the stage model into the three polarities described in figure 2. Besides a re-naming of several stages into components of the polarities additional categories have been identified. The analysis of stage models resulted thus also in two additional categories only implicit in the stage models. As the polarities are constructed of opposites the two additional categories are *general* e-services in opposite to *individualized* e-services and the category *separate* e-service is the opposite of *coordinated* (integrated) e-services. We state that these additional categories are fundamental aspects when theorizing and strategizing on e-services [GP06]. The three identified polarities are firstly *separate* e-services with the opposite in *coordinated* e-services. The second polarity spans from *general* to *individualized* e-services. The last and third polarity spans from *informative* e-services to *performative* e-services.
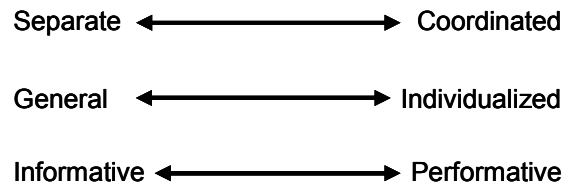
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Separate ⟷ Coordinated

General ⟷ Individualized

Informative ⟷ Performative

Figure 2: Three polarities of e-services [GP06]

We also identified a sub-categorization for three of the categories that distinguish key differences within a category [GP06]. *Separate* e-services are those services that stand alone with only one agency involved in providing the e-service. The opposite to *separate* e-services are *coordinated* e-services. The re-naming of the integration category into the category of coordinated e-services is done since not all such e-services means a full integration. Some coordinated e-services may be *fused* together, but others are still separable, only *aligned*. In fused e-services there is a total amalgamation of services.

The second polarity spans the division between *general* e-services and *individualized* e-services. *General* e-services are those provided to the general public without any identification of the client. This is typically the case in publicly available agency websites. We differentiated, in [PG05], between constrained actions and directed actions and in this differentiation separated the degree of individualization of the clients in relation to the agency. The constrained actions are those actions where the client is securely identified and surely made known to the agency. Directed are actions that require the client to be known to the agency. In this case secure identification is not of interest but the information transmitted to the client is of little use to anyone but this particular client. From this differentiation follows a sub-categorization of *individualized* e-services into *secure* and *non-secure*.

The third polarity spans from *informative* e-services to *performative* e-services. *Informative e-services* are only aimed at reading information from the agency. *Performative services* afford the user to pursue communicative tasks [GP06]. The *informative* end of this polarity is further divided into *pre-arranged* and *selected* sub-categories. *Selected* information is generated based on some search criteria. The sub-category of *pre-arranged* information is valid when the client is browsing the pre-packaged information on an agency website. This involves some interaction even if it is only navigation in pre-published information pages. The sub-categorization of the categories of *coordinated, individualized* and *informative* are shown in figure 3

Separate	Coordinated	
	Aligned	Fused

General	Individualized	
	Non-secure	Secure

Informative		Performative
Pre-arranged	Selected	

Figure 3: Categorisations of e-services based on three polarities [GP06]

Deconstructing stage models lead to a number of important questions. One pivotal question is how polarities should be compared? In stage models the common understanding is that e-service evolution goes from less advanced services as providing information to more advanced services where agencies are integrated. The equivalence of this concept of stage models in relation to the e-diamond model would be that the evolution goes from informative e-services through performative, individualized in order to end up at coordinated e-services. As said earlier in this paper there seems to be little evidence that this evolutionary transformation would be true [An04].

In [GP06] we recognize that the categories on the left in figures 3 and 4 are less advanced than features on the right. This is however only applicable within the polarities. The same differentiation in relation to evolution of e-services by comparing polarities is however not fruitful [GP06]. The polarities instead represent different dimensions or aspects of e-services rather than stages in an evolutionary strive for excellence. Based on this argumentation the e-diamond model is constructed not as of stages in a ladder but as polarities describing a diamond shaped model (Figure 5). The e-diamond model is constructed so that the top categories in the polarities in the diamond shaped figure represent the categories or ends of the polarities that could be described as more advanced. The polarities are not however ranked as more or lesser advanced since the polarities are not automatically per se more or less advanced.
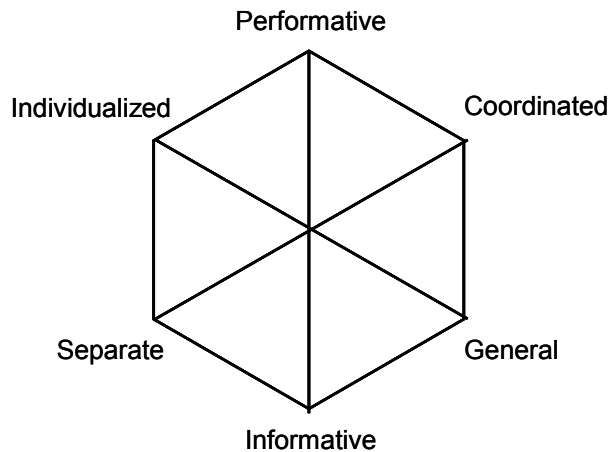
Figure 4: E-services according to the e-diamond model (three polarities)[GP06]

3 An empirical analysis of public e-services

[GP06] does not include a thorough empirical validation of the model. Only some small illustrations were given and a need for further empirical testing was stated. We will perform further empirical investigation of the e-diamond model, but it is beyond the scope of the paper to make a broad investigation. Six cases of e-services are selected for analysis. This section contains an empirical evaluation of the e-diamond model by categorizing existing e-services using the three polarities from [GP06].

3.1 Online application for commercial traffic license

This e-service provides the opportunity to apply for a commercial traffic license at the County Administrative board in Stockholm. As such this is a clear case of a *performative* e-service. The applicant can conduct the act of communicating the request for a license towards the agency. There is however also *informative* components in the surrounding environment of the e-service application that helps the applicant to review the demands and definitions of key components reviewed in the application process. This is done in order to help the applicant to review if key demands are met or not how the applicant can change key elements in the business in order to meet these demands. This e-service is *individualized* as the applicant provides information about himself and about the business that applies for the commercial license. There are however two variants of the e-services when it comes to the distinction between the sub-categories of individualization in secure and non-secure. The variants are that the applicant chooses whether or not to use

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an electronic identification certificate in the application process. If the applicant chooses the full online variant with usage of electronic identification certificate the client provides a *secure* communication act towards the agency. In this variant the application is transmitted fully online to the agency. The other variant is *non-secure*, but still individualized. In this case the application is not transmitted online to the agency instead the form is to be printed out and sent in by traditional mail. This e-service is a prototype to be rolled out on all county administrative boards in Sweden after evaluation. This provides the opportunity to compare the e-service to the manual process in other county administrative boards. This service should preferably be categorized as a fused e-service since the manual process of application in other county administrative boards requires additional steps to be taken by the applicant. In these manual counterparts the applicant need to request and attach additional documents from other agencies as an extract from the enforcement agency register and a certificate of registration from the Swedish Companies Registration Office. These additional documents are gathered electronically through back-office integration in the prototype e-service. This makes the classification of the e-service as a *fused coordinated* e-service clear.

3.2 Local weather prognoses e-service (SMHI)

This e-service, at the Swedish Meteorological and Hydrological Institute (SMHI), provides the opportunity for citizens to view weather forecasts on different levels of detail and for any of the 5 coming days. The citizen can interact with the e-service by entering which municipality or region that is wanted for display. Additional possibilities are to input the timeframe for display. The citizen is interacting with a database incorporating different geographic levels of detail and timeframes for prefabricated weather forecasts. This is an *informative* e-service providing interaction possibility for reviewing a citizen specified *selection* of information. Along the separate – coordinated polarity this service is characterized as a *separate* service as it is provided by a single agency. There is no coordination of fused or amalgamated e-services. Along the last polarity, general - individualized this e-service is clearly of *general* character. The citizen is in no way made known, identified in any secure or non-secure fashion.

3.3 Support service for choice of fund based pension portfolio (PPM)

This e-service affords to review the possibilities of different layouts of the fund based pension portfolio and conducting the actual update of the portfolio based on the decision of desired risk level. The e-service is accordingly a two-step e-service that first provides the opportunity to input the desired risk; age of citizen and the salary in the current occupation of the citizen and later by securely identifying himself the client can change the layout of the fund portfolio according to the de-

cided portfolio layout. The first step can independently be used to evaluate the current layout of the portfolio. As such this first step of the e-service is characterized as an *informative* and *selected* e-service. Further the e-service is of *separate* character as this is a single agency e-service and further on categorized as *general* as the client is not in any way transmitting or providing information other than of general character. The second step of the e-service is that the citizen can update the fund portfolio according to the desired risk; age and salary of the citizen. This second part is then to be categorized as a *performative* e-service as the citizen pursues communication tasks in relation to the agency. On the other two polarities the e-service is categorized as an *individualized* and *secure* e-service and along the last polarity the e-service is categorized as *separate* as no inter-agency integration of different services occurs.

3.4   The portal to government information and services (sverige.se)

This portal e-service is positioned as a single point of entry to services in Swedish agencies and provided by VERVA (Swedish Administrative Development Agency). No particular e-services are hosted at this portal. It is merely a portal for navigation purposes. The particular services are located at the different agency websites. This e-service is to be categorized as an *informative pre-arranged* e-service along the informative-performative polarity. This e-service does not provide performative communication tasks or any input of more or less advanced search criteria that can motivate another classification along this polarity. The character of the service is strictly *general*, the citizen or business is in no way identified or made known to the e-service. On the separate-coordinated polarity this e-service is clearly a *coordinated* e-service. This is because of the purpose of the e-service to provide a single point of entry focused on the tasks the client to the public administration need to conduct instead of the focus of the agency websites that focus on what the agencies can do to the client. Along the subcategories of the coordinated category this service is characterized as an *aligned coordinated* e-service. This categorization is natural because of the portal's nature as a collection of e-services located elsewhere.

3.4   Portal and application service for higher education (studera.nu)

This application service and portal to information on courses and programs in higher education is a joint effort of the Swedish national agency for higher education, the National Agency for Services to Universities and University Colleges and the Swedish Universities and University colleges. This e-service provides the possibility for students to browse and apply for most higher education programs and courses on Swedish universities and university colleges. The student chooses programs and/or courses and can apply online for the selected courses. Applying for higher education is a clear communicative task and along the informative – per-

formative polarity the categorization is clearly as a *performative* e-service. Browsing for higher education is on the contrary not performative communication tasks. This aspect of the surrounding environment of the application services is instead to be categorized as an *informative – selected* e-service.

3.5 E-service for registration of new businesses

This e-service integrates several steps and actions conducted towards two agencies involved in company registrations in Sweden. The actions are to register and protect the name of the company and several issues of taxes as registering for VAT payments, employment taxes etc. These actions are directed towards two different agencies. In the e-service these agencies are fused together, but they operate totally independent back-office. The citizen provides information in a web form that after registration is separated as messages to the different agencies. The following responses come from the different agencies. Along the coordinated – separate polarity this e-service is *coordinated* and *fused*. Further the e-service is categorized as an *individualized* and *secure* as the client by using an electronic identification certificate provide personal information about the business operated by the citizen in a secure fashion. Along the last polarity the e-service is naturally categorized as a *performative* e-service; an application for registration of a new company.

3.6 National portal for information on bird flue prevention

This e-service provides information about the bird flue (Avian Influenza) with the purpose of fore filling the interest and need for information by the general public. The e-service is by pursuing that purpose categorized as *informative* and *pre-arranged* as there are no interaction possibilities besides pure navigation tasks provided in the e-service. The purpose of the e-service in providing information to the general public indicates that the citizen is neither made known or identified in the e-service leading to a categorization as *general*. Further on along the last polarity the classification becomes more difficult. The e-service combines information from many different agencies involved in bird flue prevention leading to a categorization as *coordinated*. But the categorization in sub-classes is more difficult. The main purpose is providing the generally requested information in one place and this indicates a categorization as *fused*. But another purpose is acting as a directing agent towards further information in the bird flue prevention and the role distribution. This indicates a sub purpose of the e-service as having an *aligning* purpose.

4 A language-action view on the e-diamond model

The e-diamond model was formulated as an alternative to e-ladder models [GP06]. Besides empirical testing, as performed in section 3 above, there is a need for theo-

retical grounding of the e-diamond model [GC03], i.e. through theoretical matching to relate it other theoretical frameworks. In [PG05] and [GP06] we used information systems actability theory, e.g. [GCS04] and [SG04], as a theoretical basis for our analyses, which means that this theory served as a kind of theoretical grounding.

An appropriate candidate for a theoretical analysis of the e-diamond model is the language-action perspective (LAP) since it is a well established framework for conceptualising communication aspects in the IS area [We06]. The language-action perspective [e.g. WF86] is built from speech act theory [Au62, Se69]. Speech act theory and LAP are founded on theoretical pillars such as 1) speech is action and 2) every utterance consists of propositional (referential) and illocutionary (relational) parts (ibid). When someone performs a communicative act, he does several things at the same time; he relates his utterance to a world talked about and also to the inter-personal world of speaker and listener [Ha84].

How can the different categories of the e-diamond model for public e-services be understood in the light of the language-action perspective? This is the core question in our theoretical inquiry. We will below perform a theoretical matching between the e-diamond model and the language-action perspective.

We start with the polarity of informative vs performative. One of the core insights of speech act theory is that all speech acts actually mean performance of actions. Does this mean that a polarity of informative vs performative is inadequate? Should all e-services be considered as performatives? In speech act theory there is distinction between different types of speech acts. Searle has presented a taxonomy of speech acts that is often referred to [Se79]. In this taxonomy, one class "assertives" is singled out as a special case of descriptive and informative acts. There are other classes as e.g. directives, commissives and declaratives (ibid). The informative category in the e-diamond model corresponds well with the speech act class of assertives. The performative category means that a kind of communicative action is performed or offered by the agency, which goes beyond pure informing. Performative actions correspond to the directives, commissives and declaratives in the speech act taxonomy (ibid). This means that this aspect is concerned with the *illocutionary aspect of communication* following speech act theory.

The polarity of general vs individualized has to do with what is talked about. An individualized e-service is concerned with a particular citizen or some other subject talked about (a group, organisation or suchlike). The opposite is a general e-service that is not concerned with information concerning individuals. This polarity is thus concerned with the *propositional contents* of the e-service.

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The polarity of the separate vs coordinated has to do with how many governmental agencies that are involved in the e-service. A separate e-service means that it is just one governmental agency that interacts with the citizen. A coordinated e-service means that there are several agencies involved in the e-service. This polarity has to do with the *communicator*, who says something; who affords the e-service. This means that the three polarities are associated with three different aspects of communication if one applies a LAP reasoning:

- Communicator: separate vs coordinated
- Illocutionary force: informative vs performative
- Propositional contents: general vs individualised

These are three different communication aspects which can vary independently of each other. This *principle of orthogonality* gives credit to the claim in the e-diamond model that there are three independent polarities rather than a linear model of continuous stages, where each stage depends on the on those below. What was thus shown in the empirical section is fully in line with this theoretical analysis.

This analysis leads to possible alternative labelling of the polarities or at least to a joining category for each polarity. One such proposal is:
- Type of communicative action (informative vs performative)
- Degree of individualisation in proposition (general vs individualised)
- Amount of involved agencies (separate vs coordinated)

This analysis has thus shown that communicative categories from speech act theory/LAP can mapped onto categories in the e-diamond model. However, can LAP not be used, in this theoretical matching, to challenge the e-diamond model? Can LAP not contribute to new categories in the e-diamond model or some need for clarification or modification?

In order to address this challenge, let us dig into the informative – performative polarity following [GP06]. An informative e-service means that the governmental agency informs the citizen about something, i.e. the agency is the locutor. A performative e-service means that either the agency performs some communicative act towards the citizen (e.g. a permit is given) or that the citizen is afforded by the e-service application to perform some communicative action (e.g. applying for a permit). In the category 'informative e-service' the sender is fixed (the government agency), but the 'performative e-service' means that either party can be locutor. This means that there is a need to define the locutor and the addressee of each e-service. One can also wonder if not an informative e-service from citizen to agency can be the case? It sure can be. A citizen can deliver information, e.g. about him-

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self to an agency. This special case will be an information collection 'service'. This analysis reveals a need to clarify the *communicative roles of agency and citizen* in an e-service. The type of communicative action (i.e. the informative - performative polarity) should probably be sub-classed in relation to locutor and addressee roles.

Are there other possible contributions of a LAP-informed analysis? We look into the sub-classes of informative e-service according to the e-diamond model (pre-arranged vs selected). This distinction is due to different degrees of activity by the citizen. In pre-arranged informative services, the citizen is limited to a pure reader. In selected informative services, the citizen must enter some search parameter, through some retrieval mechanism, in order to receive the requested information. Selected information, in such an e-service, is thus dependent on preceding actions by the citizen. There is obviously a specific communication pattern at stake here. It can be considered as a kind of a question – answer construct. Classical speech act theory is not directly concerned with interactive and dialogical issues. This is different to IS oriented language-action theories, where communication patterns have a prominent position [WF86] [Go03]. This differentiation in the sub-class of informative e-service is due to different communicative patterns between agency and citizen. The issue of communicative pattern is probably not restricted to this type of e-service. We hypothecate that communicative pattern is a dimension that one should consider in more detail in future development of the e-diamond model.

5 Conclusions

The empirical investigation reported in section 3 above gives further evidence for the e-diamond classification in relation to e-ladder models. There are examples of coordinated, general and informative e-services (sections 3.3 and 3.6). This means that such a coordinated (integrated) e-service does not contain individualized (transactional) and performative (interactional) elements contrary to the claims of e-ladder models (cf e.g. figure 3.1 above). To make a proper characterization of all investigated e-services, we needed the full classification scheme of the e-diamond model.

In this empirical analysis of the e-diamond model we have identified a couple of previously known and unknown difficulties in classification of e-services. The first is the crucial and previously known difficulty of defining the borders of a service. In some instances the e-service is noticeably delimited from its surrounding environment. Informative aspects are a natural component of the surrounding environment as well as integrated in any performative e-service as in the case of applying for a commercial traffic license. However in other cases, as the portal and application service for higher education, these are depending but separate components. The surrounding environment of browsing for the courses is informative and selected and the e-service for applying is performative. These are by themselves of

lesser use to the citizen and should probably be analyzed as depending services of integrated character.

This difficulty points to a need to differentiate more clearly between the *e-service application* and its *constituent e-services*. An e-service application (a website) may contain several e-services and each such e-service may be characterized in a singular way. An e-service application may contain both informative and performative elements for example; and it can also contain general information and features for individualized performatives.

Another issue detected in this paper is the differences between different classes of the *coordinated* and *fused* category. In the case of business registration the e-service is fused front-office and messages containing the applications are independently sent to the different agencies collaborating in the e-service. Responses in terms of decisions from the agencies are independently sent to the client by contemporary mail. In the case of applying for a commercial traffic license the fused character of the e-service takes place entirely back-office. In the manual counterpart the client needs extracts from registers of several agencies but in the e-service these extracts are automatically collected electronically from these other agencies.

There are several other conceptual issues, identified above in section 4, that demand for further elaboration: the principle of orthogonality between polarities; communicative roles of agency and citizen in an e-service; communicative patterns in e-services.

The empirical and theoretical investigations in this paper have shown the e-diamond model to be a promising classification scheme for public e-services. The investigations have however also shown a need for further empirical and conceptual research indicated above.

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