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Francesco Contini
National Research Council, francesco.contini@irsig.cnr.it

Antonio Cordella
London School of Economics, a.cordella@lse.ac.uk

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INFORMATION SYSTEM AND INFORMATION INFRASTRUCTURE DEPLOYMENT: THE CHALLENGE OF THE ITALIAN E-JUSTICE APPROACH

Contini, Francesco, Research Institute on Judicial Systems, National Research Council, Via Zamboni 26, 40126 Bologna (IT) francesco.contini@irsig.cnr.it

Cordella, Antonio, Department of Information Systems, London School of Economics and Political Science, Houghton Street, London WC2A 2AE (UK) a.cordella@lse.ac.uk

Abstract

Information systems development methodologies are still mainly concerned with the research of better ways to provide technical solutions for given organizational problems. The paper challenges the appropriateness of this scope of development methodologies when system development deals with the deployment of information infrastructures. The attempt of the Italian Ministry of Justice to deploy e-justice, a new information infrastructure for the judiciary, is taken as explanatory case. The research data suggests that development methodologies supporting information system development that focus on the solution of technical problems result appropriate to match design and adoption processes in simple organisational context, such as in the case of the automation of bureaucratic procedures supporting judicial activities. When the involved context and adoption process is more complex and challenging, as in the e-justice case, it seems necessary to change the aim and scope of the chosen system development methodologies. The conceptual shift from information systems to information infrastructures allows to grasp this growing complexity and to propose development methodologies, such as cultivation, that ease the deployment of such initiatives.

Keywords: Information systems development methodologies, Information infrastructures, e-justice, Cultivation

1   INTRODUCTION

The Italian judiciary has been faced with a dramatic crisis of performance since the late 80s. It is a crisis that has been clearly marked by the frequent rulings of the European Court of Human Rights against the Italian Government for its violations of the fair trial principle (art. 6) due to the unacceptable length of its proceedings (324 over a total of 423 violations in 2001). The last available data (2002) show that 4,4 millions civil and about 2 million criminal cases are pending in the Italian courts. To resolve this unacceptable situation a set of legislative reforms have been enacted aimed at changing the organisation of courts, procedures, and other institutional settings of the judiciary.

In this wide effort aiming at "modernizing" the judiciary, ICT played a major role. In the EU, Italy is the biggest spender in this field with 150 million Euro in 1999, 170 Million in 2000 and 200 Million in 2001 (Augusto, 2003), while the IT budget of European Ministries of justice ranges roughly from about 20 million Euro, in relatively small countries like Austria, Belgium and Finland, up to 70 million for France and Germany (Fabri, 2001). Judicial systems represent a stimulating empirical field to analyse the processes of IS development not solely for the large investments done in ICT and IS. Judicial organisations are a brand new empirical field, which has hardly ever been considered by IS and organisational scholars, and they have very specific institutional and organisational settings that can not be found, at least with the same intensity, in other public or private organisations.

Generally speaking the development of ICT in the Italian judicial sector is comparable to the level reached by the majority of the European countries. Automated Case Management Systems (CMS) are widely used to keep track of judicial cases and automate office activities. Virtual private network (VPN), e-mail and web resources are becoming part of the system and also legal information systems based on collection of laws, regulations and case-law are available on line for the great part of European law professionals.

After 15 years of considerable investment in ICT the Italian Ministry, as are other European countries, is attempting to develop "e-justice" i.e. the application of an "e-government approach" to the judicial sector. All over Europe these projects are faced with difficulties and unsolved problems. Only Money Claims on Line in England (Woolfson and Timms, 2003), the Austrian Electronic Legal Communication System (Bauer, 2001) and the Finnish *Tuomas* and *Santra* (Kujanen and Sarvilinna, 2001) are currently using ICT solutions, that can be envisaged as e-justice.

The Italian government has the most ambitious strategy in Europe. Its expectation is that e-justice will allow full on-line transaction between courts and lawyers. Moreover, it is also expected that this projects will lead to the complete digitalisation of judicial civil proceedings that will further improve efficiency, accountability, and access to the judicial services. Very few results have, however, been achieved after four years of effort. This paper investigates the strategies and actions taken by the Italian Judiciary in deploying ICT to support e-justice. By analysing the strategies followed in the last 15 years by the IT Department of the Ministry of Justice, the paper argues that ICT development in this complex case has been addressed as a problem of information system development rather than as the challenge of deploying an information infrastructure (Hanseth and Lundberg, 2001). This is clearly reflected in the choices of structured development methodologies used to guide the development of the specific applications. The paper discusses these choices arguing that they are not adequate to promote ICT in the field of e-justice. Although they had some acceptable results in developing applications to automate the handling of paper registries and internal procedures, they are far from being adequate to boost the deployment of a new information infrastructure such as "e-justice". Following this rationale we are calling for a change in the approach toward system development taken by the Italian IT Department of the Ministry of Justice. It is argued here that the complex socio-technical nature of e-justice should be managed with development methodologies that put an emphasis on the evolutionary nature of information infrastructure and that approach the problem of their development from this perspective.

In accordance with Hanseth (2003), we propose that the problem facing by the Italian IT Department of the Ministry of Justice to deploy the project of e-justice should be addressed as a problem to ease

and support the evolution of a complex socio-technical network. It is suggested that traditional information system development methodologies should be substituted by approaches that can deal with this evolutionary dimension better. An example is cultivation, that considers technological systems as "organisms with their own life" and hence their management and design is an action that infers the support and control of a "natural" process.

2   CONCEPTIONS OF TECHNOLOGY AND INFORMATION SYSTEMS

When IT was first introduced into organisations, it was mainly considered as an agent of automation similar to the machines introduced by manufacturing firms during the industrial revolution. Following the characteristic and dominant understanding of technology that was typical of the industrial revolution, information technology was considered as a mechanical means of substituting human actions with more efficient, regulated, and standardised processes. In this context, the new technology was used to provide a better production infrastructure by improving efficiency through the automation of human activities within work processes. From this perspective, IT is regarded essentially as an *industrial* technology (Curley and Pyburn, 1982). This views technology as a "fixed set of functionalities" (Lee, 1999) whose purpose is self-evident. Thus, there is little uncertainty about the procedures and consequences of information technology implementation: it is under control, its consequences are planned and problems are related only to technical issues concerning the automation of tasks.

A broader and better understanding of the complexity associated with the adoption of IT in organisational contexts emerges when information technology is recognised as an *intellectual* technology (Curley and Pyburn, 1982), i.e. a technology that defines its characteristics in the interaction with the humans who use it. Following similar arguments, Zuboff (1988) claims that IT has two different impacts on organisation: computers can either *automate* work or *informate* work. In the former case, technology can be considered as *industrial* technology. In the latter, computers change the quality and quantity of available information because they not only provide more data or other capabilities for dealing with it, but also because they modify the context in which the information is used. As a consequence, the skills needed to perform a specific activity are qualitatively different from those required for doing the same work before the information technology was introduced.

The importance of technology and its form (design) to understanding the configuration of an organisation is not new. It has been recognized since the seminal work by Woodward (1965) and Thompson (1967) in the late sixties and, in general, by the technology studies of organisation that considered technology as an essential determinant of organisational structure. Consequently, technology has often been conceived as the material cause that determines the structure of the organisation (Orlikowski and Barley, 2001). In this understanding, technology develops independently from social contexts - but directly affects society. The design process is thus concentrated with the attempt to embed in the technology a path of functionalities, identified ex ante as superior way of executing organisational activities.

Nevertheless, this explanation does not seem to be adequate to account the changes of technology within its use. It takes into consideration only one of the aspects of the interplay, the process of social construction of technology. What is missed by this approach is the recognition that the characteristic of the object/technology is an essential element to consider when we are aiming at understanding the possible ways it can be shaped (Law, 1992). A better understanding of the complexity of the process of designing information systems can be gained when these dichotic assumptions on the role of technology and organisation are overcome. In this case the design of information systems is not relegated to mere production of an artefact in a planned, sketched and anticipated work using a process "that had been rendered in the form of normative regulation often called methodologies" (Lyytinen, 1987). Here it is rather conceptualised as the management of a process where the design emerges out of the relational dimension among the various actors, both human and non human, involved in the

process. Following this path we are aiming to overcome the limitation associated with the assumption underpinning socio and techno deterministic approaches.

3 FROM INFORMATION SYSTEMS DEVELOPMENT TO INFORMATION INFRASTRUCTURE CULTIVATION

The process of designing information systems and the associated methodologies to support these processes reflect the underpinning assumptions on the role played by technology in organisations. Obviously, the aim of getting a richer understanding of the role of technological artefacts in organisational also provides new challenges for the design process of the information system. Information systems methodologies are in fact defined as "a recommended collection of philosophies, phases, procedures, rules, techniques, tools, documentation, management and training for developers of information systems" (Maddison, 1984). This set of philosophies, phases, procedures, etc, is closely related to the assumptions on the role and hence the nature of an information systems when is implemented and used in an organisation. Accordingly, the choice of a specific methodology to support a design process will affect the nature of the output of the process. The methodology is not in fact neutral to the definition of the object of the design, as well as the process that defines the actual design and finally the implementation of the designed system. An information system methodology is something more than a set of techniques to develop software: it is the set of assumptions and actions that defines and enacts this process.

Checkland (1985) argues that information system development must be considered as being the matching of three components: the intellectual framework that comprises the ideas and assumptions we formulate to make sense of the work; the methodology that represents the execution of these concepts and finally the application area that consists of the tangible context that is supposed to be complex and worthy of study.

The emergent challenges in the development of technological solutions in e-government projects are often addressed as problems related to the construction of the appropriate technology. In this paper we propose addressing the problem from a different perspective. It is our opinion that e-government projects, such as e-justice in Italy, constitute problems of information infrastructure deployment rather than information system development.

Many European Judicial systems are now attempting to integrate existing databases as well as exploring (and exploiting) the possible uses of ICT to improve the exchange of information within the whole judicial sector. This requires the development of systems that cut across the borders of the single organisation, and that links different prosecutors' offices, courts, and lawyers. We argue that these projects do not simply develop information systems, but try to change the existing information infrastructure by redesigning the shared "resources" in the large and non homogeneous user community that characterises the judicial sector. The aim of these projects (and foremost of the Italian one) is in fact to radically change the paper based infrastructure underlying the formal communication exchange within judicial proceedings. This implies a radical change in a well established communication infrastructure characterised by a complex, intertwined and interdependent set of shared functionalities which are typical characteristics of Information infrastructures. (Hanseth, 2003)

As emerges from the cases discussed here, information system development methodologies deployed to support the construction or evolution of stand alone technologies are helpful to solve problems related to the design of office automation technologies but are less appropriate when the object of the development is an information infrastructure rather than a specific information system.

Information system development methodologies can historically be classified in three phases (Mathiassen, 1997): a *first phase,* where system development was mainly conceived as a technical problem. The aim was to automate existing manual procedure and hence development methodologies were related to technical development. A *second phase,* where system development was mainly conceived as a problem of the use of IT. The aim was to simplify the use of the technology and hence

methodologies mainly dealt with problems related to the identification of users' requirements, their analysis and quality development shifting the attention from mere technological aspects towards issue related to the use of technology. The *third phase* of system development is characterised by the change brought by global networks which reshaped the traditional boundaries for using it. In this phase development methodologies are more concerned with architectural and integration issues needed in order to be compliant with networks and integrated applications, what Hanseth identifies as the switch from information system design to information infrastructure deployment. Hence, development methodologies for information infrastructure are concerned with the processes of development and with the technical and cultural environments that shape them. The designers have to take into consideration the complexity of the socio-technical network that pre-exist and is intertwined with the development process. In addition to the phases identified by Mathiassen (1997) a further development can be identified associated with the concern of ICT adoption and use. In this case the aim of the system development is to match the requirements of technology and users within the development phase and it is focused on the contextualization of technological artefact in their use. Especially in information infrastructure deployment, traditional system development methodologies are potentially outdated because they "generate the false appearances […] and the array of symptoms that points to the fact that such methodologies play ultimately a limited role in actual system development, despite their claims to the contrary, buttresses by their appeals to superior management of knowledge" (Ciborra, 1999). In this case the change of focus is from the construction of the artefact to the contextualization of its use, identified by Dahlbom and Mathiassen (1993) as the paradigmatic switch in system development from construction to intervention.

Accordingly, these methodologies require mixed representations of the information systems and some of the key environmental aspects associated with their deployment. Information system development methodologies based on context models focus on several components of the IS context, including external, organizational, user, and development environments.

The switch in the assumptions that underpin the understanding of the complexity of the process that leads to the development of information systems provide the proper terrain to conceptualise the new challenges associated to the development of information infrastructures. In this paper we recognize the *emergent* nature of information systems and information infrastructure (Lyytinen, 2002) and propose cultivation as an appropriate approach to survive the challenges as those faced by the Italian Ministry of Justice in the development of e-justice projects and their infrastructures.

The development of information infrastructure is a complex and intricate task that requires the understanding and management of a large number of interdependent factors. Information infrastructures are characterised by being shared among different organisational units and organisations, grounded on other complex and networked IT hardware and software platforms, and evolving over time and space. Because of these characteristics Hanseth (2003) re-proposes the ideas if Dahlbom and Janler (1996) addressing the problem of the making of new technologies, in this case information infrastructure, as a task more similar to that of cultivation that of construction.

Cultivation, considered as an undertaking that supports the natural evolution of a live organism, is seen as an appropriate tactic to manage and support the evolution of interlined, interdependent and socially constrained technological development employed to support the work of diverse, widespread and interdependent organisational actors: information infrastructures. Cultivation is thus a solution to the problem of information infrastructure development that considers the management of the evolutionary nature of these technological systems as an open ended activity that is itself characterised by drift, improvisation, patchwork and deviation from the plan.

4   JUDICIAL ORGANISATION AND INFORMATION SYSTEMS DEVELOPMENT: THE ITALIAN CASE

It is well known that the main institutional functions of judicial systems are disputes resolution and law enforcement. Courts are organisations that solve "*conflicts*" and "*disputes*" between two or more parties applying and enforcing the laws. Their decisions are taken following formal rules that prescribe the procedures that have to be taken in prosecution or in defence of actions. In performing their institutional functions they operate in an intricate organisational *network* where lawyers, police, prosecutors' offices, prisons departments and other agencies exchange data and documents with a substantive and formal value. These exchanges as well as the general functioning of judicial systems are highly formalised. For these reasons, judicial proceedings can be considered as certified and formal exchanges of data and information that lead courts to take decisions.

These institutional settings are common to all the democratic systems so that the Italian case, obviously with its own characteristics (Di Federico, 2004) has not to be considered isolated and unique. In the Italian judicial system, all *procedures* are strictly regulated by codes of procedure (enacted by the legislation) and detailed regulations passed by the Ministry of Justice, the Judicial council, and other public agencies. These rules describe and prescribe in detail when, what and how a certain action can be taken by a party. They prescribe the "technical" features of each *working tool.* Each record of a paper docket, and even its size, is formally prescribed by rules, as is the specific data that has to be entered. Finally all the regulations that describe in detail the functioning of judicial organisations are binding *erga omnes*, - e.g. for all judicial actors, and for every judicial office - and are enforced in several ways (appeal process, inspections, internal hierarchy and various sanctions). Consequently judicial proceedings and the organisational structures of judicial offices are expected to be identical in every court and prosecutor's office. This *installed base* is the result of a couple of century of slow evolution. Until the early nineties, paper has been the sole medium used to collect and exchange information within the judicial system. The installed base has been taken for granted by all the actors involved in the judicial procedures, such as clerks, lawyers, judges. It is our opinion that the features and the "power" of the installed base have not been adequately considered in the development of ICT.

Information system development has mainly been conceived as a process of automation of existing processes and tools. Moreover, being these processes strictly defined by legal norms and rules, the requirements analysis has mainly stuck with the study of the formal rules that strictly define the overall process. IS developers can take a page of a paper docket to have the precise picture of the mandatory data set used by courts. At the same time they can have a detailed description of organisation workflows reading the codes of procedures and the other relevant regulations. Following this rationality, it is even possible to design a new automated case management system without analysing a single office, since its real functioning is expected to be described in the regulations. Finally, since the regulations are *erga omnes* judicial offices are supposed to work in the same way all over the country. For this reason, once an application has been created, it is supposed to be used without relevant adaptation by each judicial office.

Therefore technology is conceived a useful tool to boost the efficiency and to reinforce the standardised application of rules where the level of inscription of laws, regulation and paper based working tools is not sufficient to guarantee the identical application of the rules all over the offices.

These organisational and institutional settings reveal some of the key assumptions about the current concept of technology in this system. Formal rules are the basic technology within judicial offices and are enacted to reduce uncertainty. All the properties of the rules are defined during the design process, and there is – or there should be – little leeway for their interpretation. We could argue that they are considered as industrial technology. These assumptions related to the rules are transferred to information systems understood as a means to reinforce, via automation, the correct application of norms and rules and with properties fully defined during the design stage.

As we will see hereinafter, they are conceived mainly as automating tools, useful to improve the efficiency of a court and, at the same time, useful to make more consistent the application of the law. This rationality fits perfectly with a vision of IS development that counts the role of technology in organisation in a deterministic way and consequently conceive its design as a technical problem. This conception and the related development methodologies, yielded some positive results in office automation, but are inadequate as far as communication technologies are concerned, as with the case of e-justice.

The processes that lead to the development of specific systems to be used in the Italian judicial system have followed a well defined and regulated process. This process can be summarised in a sequences of steps controlled by the IT Department of the Ministry of Justice and by CNIPA (the Centre for IT in public administration). The project starts when the Ministry outsources the feasibility study and the requirement analysis. This first action is mainly focused on the general technical features of the new application and normally sets up the meta-guidelines for the development of the new system. Once the basic requirements are identified, the Ministry tenders out the work. When the selection of the company that will carry out the system development is over, the task of completing the *design* of the application is delegated to the contracted company.

Usually the design process adheres to the organisational constraints in view of the regulations that specify the features of the working tools and of the judicial workflows, typically integrated by on site workflow and dataset analysis, carried out in one or few offices. This analysis is generally considered adequate to understand both the formal blueprint of the organisation and also possible (and eventually dysfunctional) local implementations. After this stage, the developer realises a prototype. A project leader of the Administration normally follows the whole process supporting the developer in the detailed design as well as in the following construction phase. The prototype is then tested in pilot offices to make any final technical adaptations and to produce the final release which is supplied to the Ministry of Justice.

Once the application has been developed, integration and implementation on site is not considered particularly problematic. It is, in fact, assumed that rules and regulations, applied in the same way throughout the different offices, explain the majority of its organisational settings and working methods.

The overall process described here is considered adequate so as to guarantee the development of the technological artefact and its implementation in the technological platform of the judicial offices. It is however not enough to guarantee its real use by the office. It has happened that courts have postponed *sine die* the use of case management systems (CMS), or even rejected it outright once it was tested. In these cases the Ministry of Justice can do very little due to reasons, related to the independence of the judiciary that cannot be discussed here.

The approach adopted in the development process seems to identify the problem of system development in terms of the technical requirements of the application, and with the automation of existing paper based procedures.

Although it is possible to recognise that lately more attention has been paid to users' requirements and architectural and integration issues, very little attention seems to have been given to the study of the role played by context in the definition of the application (Ciborra, 1999) and by the interplay between technology and organisation as an endogenous characteristic of the process that leads to the development of an information system (Lyytinen, 2002). Also the "power" of the installed base and of the information infrastructure has not been considered in ICT development (Hanseth, 1996).

5   A FIRST ASSESSMENT OF IS IN THE ITALIAN JUDICIARY

In the Italian Judiciary the main problem is "still the implementation of numerous projects that in many cases are stuck in the feasibility study or in an everlasting piloting stage" (Fabri, 2001). Given

this extraordinary difference between the ambitious projects of the Ministry and the modest results in terms of diffusion in the use of the developed applications, Italy seems to be a special case to highlight the gap between design and implementation results. A quick analysis of development methods and results obtained by IS project undertaken by the Italian Ministry of justice will illustrate the point.

During the last decade the IT Department of the Italian Ministry of Justice launched a large number of projects (Augusto, 2003, Carnevali and Di Cocco, 2001) that cover almost every feature of judicial activity. We will discuss some of them as indicative cases to examine the relationships between the chosen design methodology and the effectiveness of the developed system for the organisation using it. These projects have been classified into four broad categories, defined in relation to the complexity of the organisational context where the innovation takes place. We argue that resistances and failures in the implementation phase are consequence of the mismatch between the level of complexity of the organisational context and the one considered during the development of the application. System development methodologies that consider the development process only related to the production of the technological artefact seem to be successful only when the technology is not having any impact on the context *receiving* it. More problematic is the case when the designed technology requires some change in the context where it is going to be uses. In this case it seems to be necessary to consider dynamics of change and the complexity of the environment involved in it as one of the elements of the development. It is therefore necessary to use development methodologies that acquaint these factors. Finally, when the projects radically affect the judicial information infrastructure and the organisational context of several intertwined organisations, such as e-justice, the above mentioned methodology seems to be completely unable to reach any goals in reasonable time.

1) A first group of technologies is identified for cases where the organisational context involved in the development and in the adoption process is quite simple so that structured methodologies seem to offer the right solution to the design. The "*mise en place*" of technology does not necessary require organisational change or adaptation. Legal information systems, such as the old *Italgiure-find* or the new web based *Norme in rete* can be clustered in this group of technologies. Judges, prosecutors, attorneys or clerks can use them for legal research exactly as they can carry out their search with the paper resources available in the court's library. We put, in this group, also the judicial VPN (intranet, internet and email), and the related security features. All these systems are only extra available resources that every organisational actor can freely use or ignore. Unlike CMS, they do not force to replace pre-existing tools, and therefore they do not necessarily require changes in the previous organisation of work, even if they can also make changes possible. All these cases reflect a proper balance between the complexity of the context where the system will be implemented and the one considered by the chosen development methodology. All the cases are in fact developed by considering the development as a technical problem that has to be solved in order to offer new resources to judicial actors.

2) A second group of applications can be identified among those who require changes in the organisational practices of courts and prosecutors' offices. These changes are essentially related to the replacement of old paper-based working-tools with new automated ones. All the CMS developed by the Ministry, such as Situs, Res, Sitpm for criminal procedures, Sicc, Real Estate Executions, Bankruptcy, and Labour case in the civil sector, belong to this category. The level of IS development in the Italian judiciary is still mainly related to these automated CMS.

In this case the changes in the working practices in the offices are limited to the bureaucratic side of the organization (clerks and administrative staff). The complexity of the receiving context is relatively low mainly because these systems are designed to automate the existing status quo. Their main function is still to keep track of judicial proceedings.

The contextualisation of these CMS does not provide many opportunities to the development of new organisational functionalities associated to the technological deployment. ReGe, the most important criminal CMS was designed as a simple automation of the previous paper docket, integrated by statistical reporting and some automated functions to draft standard judicial documents.

However, we must acknowledge that these cases of "mere automation" represent a good balance between the chosen design methodology and the underlying complexity. It seems that the conceptualisation of the role of technology matches the development process and the characteristics of the context in which it is going to be implemented, i.e. highly formalised procedures in a mechanical bureaucracy. In this case the focus of the development process is on how to develop the right technology to support and enhance the existent case management system. Development aims at providing users with an improved substitute to the paper based system. Nevertheless the limits of the adopted methodology and of the underlying assumptions emerge here too. In some cases, the refusal to make use of a specific CMS has been motivated by the impossibility to match the functions of the CMS with the needs of the users in the office.

3) The projects we have discussed so far are mainly concerned with attempts to automate administrative work done by clerks and administrative staff, i.e. the administrative branch of the office. We can however describe judicial organisations as a two levels structure where these administrative functions just represent a first organisational layer. A more complex dynamic is associated to the adoption of an information system when the deployment affects the second layer of the judicial organisation: judges and prosecutors. In this case, the complexity of the organisational context increases even further, due to the different nature of tasks (here become professional) and of relationships involved in the execution of the judicial activities. When new information systems are developed to support this second layer of the organisation, a very specific factor has to be taken into consideration. Judges and prosecutors are guaranteed with a very high level of *autonomy* by the constitutional principle of the judicial independence. This principle, introduced to protect judicial decision making from possible pressures enacted by executive or legislative powers, endows judges and prosecutors with individual freedom of choice to accept or reject changes, constrains and some organisational features, such as the use of an IS.

This local autonomy guaranteed to judges (and prosecutors) can dramatically increase the complexity of the organisational context that has to be taken into consideration when the design of new information systems is undertaken. It can, in fact, lead to failure or to a very slow diffusion of IS projects that attempt to support the jurisdictional function in the organisation. This is indeed what happened to a *third group* of applications, such as Minerva (an IS developed to simplify prosecutors' routines activities and the management of case files) and Polis (created to support the writing of judicial documents, their classification and their retrieval). In these cases, despite the great effort made by the IT Department of the Ministry of justice, projects are still running in never-ending pilot phases or are facing severe delays in terms of their organisational implementation and adoption.

Judges and prosecutors represent a complex social system and, due to their judicial independence, they develop very individual working practices. Information systems like Minerva and Polis were designed to support judges' and prosecutors' work flow as if it were uniformly defined once for all. The design process did not take into consideration the complexity of the socio-cultural environment it was going to have an impact on.

The mismatch between the focus taken by the development methodology and the consequence of the deployment of the technology created bigger problems than in the previous cases. Here, the complexity and the low homogeneity of the contextual environment affect the deployment of the application more radically. In this case we can affirm that the chosen methodology did not properly consider the contextual environment. As a consequence, the supposedly well-designed IS did not affect the working procedure as was expected when the requirement analysis was carried out. It seems that too much attention has been paid to analysing the hypothetical optimal workflow and too little to the driving logic of actions of the involved actors.

4) As an outcome of the above mentioned projects, the IT installed based in a typical Italian court is an office automation system running on client-server architecture to exchange data within the court. The client server systems are not interoperable with other courts or lawyers applications despite the full development of the Judicial Virtual private network. In judicial proceedings the exchange of

communication is still paper based and rooted on a complex set of formal rules, work practices and local adaptation and it is strategically used by the parties in an attempt to gain some advantage in the trial.

Several years ago the IT department of the Ministry launched its most ambitious projects grounding on this installed base. This initiative, the so called "*processo civile telematico*" (full civil trial on line) and a number of associated projects, such as the digital signature and PKI, thought to be essential requirements for security and reliability of data interchange (Brescia, 2003). The ambition of the project is to completely redesign civil procedures allowing lawyers and courts to exchange judicial documents via electronic means (e-filing) and leading to paperless procedures in the civil sector. In the Italian case it must be observed after several years of discussion and feasibility studies, none of the applications are running yet, not even at the pilot stage. Only recently was a contractor commissioned by the Ministry for the development of a first pilot application.

The challenge of e-justice plans is greater than those of the previously mentioned projects. First of all e-justice does not simply deal with the automation of old paper based technology. It is rather concerned with the creation of new shared working practices and new "technological artefacts" with juridical value, such as electronic summons, electronically signed documents, public (or restricted) access to data collected in CMS or document management systems. The reliability of a widespread ICT infrastructure becomes a critical requirement. Besides this, the e-justice challenge implies a difficult change in the medium and communication means normally in use, i.e. from paper to digital means. Furthermore, from a governance point of view it demands the involvement of lawyers and BAR association, with agreement not only on general principles, such as the need of PKI, but also on detailed procedures (Contini, 2001). Unlike the application considered in the previous groups, e-justice is not a tool or an information system restricted to the boundaries of a court, as the other applications developed by the Ministry. E-justice, allowing for the interchange of data and document among different judicial actors and offices, is a shared resource for the exchange of information within the judicial community. Similar to e-commerce or telemedicine, e-justice aims at offering a robust and secure platform to exchange information among users and applications. Therefore, it is appropriate to consider e-justice as an *information infrastructure,* the development of which entails the replacement of the pre-existent paper based communication system. It must be clear that in this case e-justice and its deployment cannot be conceived simply as a technical problem of developing the right technology to automate the exchange of documents. The complexity of the institutional and organisational contexts that will have to use the applications is too high to permit the smooth change envisaged by this methodological approach that has been followed by the Ministry so far.

Instead of moving gradually from the existing installed based supporting its evolution and increasing the number of users adding web-services and improving the reliability of the information exchange, the Ministry is spending its time trying to design the "perfect tool". The goal of the project is the total automation of the information exchange for each kind of civil cases. This means solving three difficult problems: security, infrastructural complexity and changes of the formal rules.

The solution to the problem of *security* is a dogma: digital signature based on PKI and smart card is an indispensable requirement to secure judicial transactions. This choice leads to a very high level of infrastructural complexity: each lawyer must be certified by the local bar association (167 in the country), judges and staff must be certified by an external certification authority (the Postal Service), and all the transactions have to be controlled and addressed by a centralized application. To verify the "identity" of a lawyer who needs to digitally sign a document requires the interoperability of a number of systems. This procedure leads to high *infrastructural complexity*, but other considerations on this point are untimely, since much crucial information is still secret.

To enable the electronic exchange of information within judicial proceedings requires several amendments in the existing *rules*. Looking at the results, also this problem seems to be underestimated. Despite the legislative changes that since 2002 have established the wide framework of the so called "full civil trial on line", there is still a gap in the regulatory framework. As some

insiders have admitted it is difficult to regulate such a complex field without any experience about the real functioning of the system. A more evolutionary approach in the development of the installed base, and some piloting in a small number of case studies, would have made the elaboration of the formal rules easier. The intricacy and complexity of this project is making very difficult to manage the overall development and deployment phases following linear procedures. Too many actors, rules and technologies are intertwined with this project. The Italian Ministry has to accommodate the technological deployment with the development of new legislative solutions. The lawyers and magistrates have to change their institutionalised habits to exploit the opportunities provided by the digitalisation of judicial proceedings. Technologies, legal norms and institutionalised habits of many actors with divergent interests have to reciprocally accommodate to make the e-justice project successful. This process of accommodation cannot be managed following the typical managerial rationalities that have informed, with doubtful success, large part of the infrastructural deployment projects in the private sector (Ciborra, 2000). This ought to lead to the enactment of had hoc solutions enforced to solve emerging and unpredictable problems keeping alive the project cultivating its growth. Aim of the Ministry should be to manage the evolution of the project rather then to manage the project that enforces a predefined solution.

6   CONCLUDING REMARKS: METHODOLOGICAL IMPLICATIONS

To avoid more failures in the developments of E-government complex IT infrastructural projects, such as e-justice in the Italian case, it seems necessary to abandon the idea that sees technological development as a mere process to automate procedures in simple contexts. The development methodologies for the design of these large, pervasive, and social embedded information systems cannot be based on the assumption that organisations and information systems are distinct entities which in one way or the other will adapt to each other.

The analysis conducted in the previous paragraph shows that the deployment of e-justice cannot be managed following the same approaches used to develop tools for office automation. E-justice plans are attempting to change the information infrastructure that support and guarantee the formal exchange of information within the civil procedure. The obstacles currently faced by the Italian Ministry, can be explained as a wrong understanding of the infrastructural nature of e-justice. Following the rationale that sees infrastructure development and deployment mainly concerned with the designing of "perfect tools" and "perfect rules", the approach is focusing on the technicalities of the new information infrastructure. The project does not consider the intricacy of this project with the existing social and technological installed base. Our concern is that such a complex information infrastructure, even if it will be successfully developed from a technological point of view, it will face overwhelming barriers in its organisational adoption. Project leaders will face the challenge of "imposing" the "perfect tool" to 167 courts with different local judicial procedure, where each of the 3 or 4 thousands judges involved have different working practices, and where the expected users of the infrastructure are more than 100.000 lawyers, many of them with some limited ICT practice.

This paper calls for a change in the rationalities that underpin the approach to information infrastructure development and deployment. Information infrastructures are not standing alone IT projects that can be managed following structured project management agendas. Information infrastructure are, by nature, shared and rooted in technological and social installed base. The management of projects that are aiming at changing this intricate socio-technical systems have to handle the unpredictable nature of the dynamic interplays that is characteristics element of these socio-technical systems. Cultivation is here proposed an alternative managerial approach that recognises as basic and fundamental element of information infrastructure development and deployment the evolution supported by tinkering of the existing socio-technical installed based rather than the design of a new office automation tools.

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