

# Framing the Role of IT Artefacts in Homecare Processes

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**Abstract** Based on the preliminary results of a case study, this qualitative research explores the meaning of the technological decisions implemented by a voluntary care association, which we will call Gamma. A provider of home assistance to terminally ill patients living in Lombardy (Italy), Gamma recently introduced an IT artefact to support its socio-care teams, equipping all the members with a Personal Digital Assistant (PDA) to remotely access the patients' electronic medical files, which are then updated in real time after each home visit. The article uses organisation studies to respond to two questions: how is the relationship between the technological and the organisational choices shaped by the new device? In what terms does the IT artefact help *make the difference*, or influence the decision processes at the diverse levels? It is argued that the artefact enters the caring processes as an additional source of regulation. The PDA makes the difference in terms of broadening and extending the control exercisable by Gamma's management, but also enables the care providers to affirm their autonomy.

## Introduction

The overall epidemiological and technological scenario in developed countries demands a health service whose offering can be structured into a coordinated “network” of the organisations and institutions responsible for ensuring that citizens receive continuity of assistance at the different levels and intensity of healthcare [1, p. 190]. The populations of the more industrialised regions are ageing rapidly and progressively. In addition, the effect of extending the lifespan of people suffering from chronic or degenerative diseases has created new patient categories to which the public health service must deliver integrated response strategies aimed at continuing and constant care.

The demand for integrated health and social services is significant in the palliative care sector. Palliative care is offered to patients diagnosed with life-threatening diseases – mainly tumours and, to a lesser extent, AIDS and neurological diseases – whose life expectancy is reduced to a matter of weeks. Such conditions require the provision of specific local services, from assistance in the home to hospices, integrated with the hospital in a continuum of care [2], which can offer adequate responses to both the patients and their families. This is a field where care prevails over treatment.

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Lombardy, home to almost 10 million people, was the first Italian region to implement (in late 1998) concrete initiatives in the palliative care sector. The region has between 40,000-54,000 patients in the terminal stage of their illness, i.e. those with a life expectancy of less than three months, who require care and assistance every year.

Home palliative care is distinguished by its multidisciplinary features with the work organised and assigned to a team made up of several types of professionals, underscoring the special conditions in which the palliative care organisations are called to operate. The work practices implemented by those who interact with the patients and their families, along with the uniqueness and complexity of the issues dealt with, provide a fertile and interesting terrain for organisational reflection. The selection, the combination, and the sequence of the services implemented, which vary in kind and in time [3], are determined by patient feedback. That means the team's activities are guided by the patient's physical and mental conditions, translating into intense relations in a highly uncertain and ambiguous scenario. But what happens when an IT-based artefact enters the caring process?

The purpose of this paper is to highlight and understand – based on the preliminary results of a case study still in progress – the meaning of the technological decisions implemented by a private care association, given the pseudonym of Gamma, which provides home assistance to terminally ill patients living in the Italian region of Lombardy. Gamma recently introduced an IT artefact to support its socio-care teams, equipping each member with a Personal Digital Assistant (“PDA”, also called a palm organiser) to remotely access the patients' electronic medical files, which are then updated in real time at the end of every home visit.

From the technological standpoint, Gamma's decision was not especially original. PDAs were first used in the medical field around ten years ago, when they were initially adopted for diary management, and later for processing clinical data, both within the healthcare structures and between geographically remote units [4]. On the other hand, from the organisational perspective, the issue is significant because it touches Gamma's ‘technical core’ [5, p. 43]. Following Cook et al. [6, p. 197], changes in the in the service/production activities of the healthcare sector are particularly expensive and complex to implement, not only due to the specialisation of productive inputs, “but they are also the types of changes that the professionals in the organisation (e.g. physicians and nurses) care the most about”. The Gamma case thus opens valuable horizons for researchers interested in analysing the organisational response to IT implementation.

This article seeks to add to our understanding of the organisational implications of the PDA. Specifically, it asks how this artefact is relevant to Gamma's structuration choices, by which we mean the coordination and control actions performed in this organisational setting. Therefore, the field of interest is the relationship between technological change and organisational change, a theme of fundamental importance yet highly difficult to address because it is a generator of contradictions, misunderstandings, and even “illusions” [7, p. 164], also in the current debate. Two interrelated questions will guide the discussion: how is the relationship between the technological and the organisational choices shaped by the new

device? In what terms does the IT artefact help “make the difference”, or influence the decision processes of the different organisational levels?

We have used multiple data sources (interviews, various documents, official reports) to develop the qualitative case study proposed here. We point out that analysing the impact of the IT artefact on the clinical outcomes is beyond the scope of this contribution.

The article is structured as follows. After the introduction, the first section outlines the theoretical background. The next section focuses on the research method and data, while the section after provides a short description of the research setting. The choices made by Gamma are then commented. The preliminary findings of the study are summarised and discussed in the last section, which also sets out their implications.

## Theoretical Background

The relationship between technological change and organisational change has always been a major cause for reflection, as attested to in an article published in 1958 in the *Harvard Business Review* [8] only four years after the launch of the first commercial computer application (i.e., a payroll management program implemented by General Electric). Since then, numerous proposals have been formulated with the aim of interpreting the phenomena that accompany the introduction of technologies to organisations.

Many studies have significantly contributed to the generation of a considerable amount of research over the years. However, the overall picture we have today is highly heterogeneous, given that the research settings adopted make it hard to assess the theoretical proposals: each time the dependent variable is the organisation: “the organisations must adapt to technological change” [9, p. 333]. Proponents of this school tend to attribute a predominantly explicative role to the intrinsic traits of the technology or artefacts, such as the absence of personal or social cues and the presence of new features [10, p. 125]. On the other hand, alternative perspectives claim that the dependent variable is the technology: “[technology] is the means to achieve the goals of those who use it” [11, p. 102]. This view argues that the social outcomes do not depend on the capabilities of the technology as such, but on the result of the behaviours and personal beliefs of the users.

The limitations of the predominant literature have been the object of a number of contributions with a critical accent (see, for example: [12-16]). Among many such voices, the reflection proposed by Masino [7, p. 71] stands out because it spotlights the conceptual question. The first observation made by this author is that the studies that pose the problem of the relation between technology and organisation in terms of “technological imperative” and those that support the so-called “organisational imperative” – despite being based on opposing assumptions – both share a common denominator in that they perceive the technology “object” and the organisation “object” as distinct and separate entities. That separation (actually a *reification*) leads to the attribution of a presumed, as it has never been demonstrated,

capacity to solve organisational problems. In addition, the predominant rhetoric on organisational change helps to fuel the illusion that the technologies are always and anyway an opportunity to emancipate working conditions and practices. Ultimately, Masino (*ibidem*, p. 166) confutes the mainstream's presumption that technology is neutral when it affirms the superiority of technical rationality over organisational rationality, and over the rationality and interests of the parties.

Therefore, is it possible to capture the overall sense of the organisational change by using an interpretive key that avoids misleading simplifications? The answer, once again, can only be found on the conceptual side. Mainstream literature relies on opposite ways of perceiving organisational change. A framework that does not conceptually separate the two environments is the Theory of Organisational Action (TOA) [3; 17]. According to this proposal, technology is understood as technical knowledge, not as an element *outside* the organisational process but, to all effects and purposes, an *intrinsic* choice of the organisation, a bounded rational decision made by actors in a framework of constraints and opportunities.

Artefacts embed multiple technologies and help perform numerous tasks [18, p. 318]. Specifically, IT artefacts translate past knowledge accumulated into a visible form and guide the representation of the knowledge in the definition of a problem. They help achieve particular tasks and actions and are considered as good solutions for recurrent problems [18].

Simon [19, p. 6] observes that an "artefact can be thought of as a meeting point – an "interface" ... – between an "inner" environment, the substance and organisation of the artefact itself, and an "outer" environment, the surroundings in which it operates. If the inner environment is appropriate to the outer environment, or vice versa, the artefact will serve its intended purpose". The appropriateness of which Simon says is not absolute and unchangeable, and excludes deterministic relations between organisations and actors and between structure, technology and environments reduced to "things" [3, p. 71]. From that perspective, to understand the way in which the artefacts influence organisational regulation, we need to distinguish between the decisional processes of the design, adoption and use of artefacts.

## Research Method and Data

To explore the role of the IT artefact in Gamma's structuration choices a case study [20] was conducted. This research-in-progress is based on the data collected in seven semi-structured interviews with two doctors, two nurses, and the family of a patient assisted by Gamma at home. Of the care givers, the doctors and nurses were chosen as they are the key reference points for both the patient and their family. To elicit an understanding of current practices, the interviews were guided by the following objectives: collect, through the words of the care givers concerned (doctors and nurses), opinions on the use of the PDA and understand how it influences the care processes.

Each 90-minute interview was transcribed and used (in two cases) for a follow-up interview (about one hour long), to validate and comment the impressions

received. Additional information was obtained from official documents, Gamma's website and that of the IT supplier who developed – for the association – the application software to support the care teams.

## The Case Study

Gamma is an “Onlus” (an Italian acronym for a “not-for-profit socially useful organisation”) that for more than 20 years has been providing integrated and regular (weekends and public holidays included) home care free of charge to patients in the terminal stage of irreversible diseases. Gamma operates in Milan and about 50 other municipalities in Milan province, providing local services through its own pain-relief and palliative-care specialist teams (composed of about 70 professionals in total, paid but not employees of Gamma), made up of doctors, nurses, social workers, psychologists, personal hygienists and physiotherapists. The teams visit the patient at home at least twice per week and are supported by more than 100 volunteers. Gamma operates in conjunction with Italy's public health service structures which entrust it with the care of those patients to whom they can no longer give a hospital bed. As soon as a patient enters Gamma's care, the association ensures the ongoing involvement of a general practitioner (“GP”) and the definition of a personal program – consisting of diverse levels of “care intensity” – by the medical team, which can be redefined at any time to meet the changing needs of the patient and their family. Gamma has capacity to care for up to 160 patients per day, guaranteeing coverage 365 days per year backed by a 24/7 on-call telephone service. It also supplies various healthcare materials to ensure the patient the appropriate overall level of home assistance.

Gamma introduced a computerised solution based on a PDA, a handheld device with wireless connectivity. Each PDA is installed with special software enabled with a multidisciplinary clinical records function. The PDA enables the data collection and specifies the services provided to the patient and family. That information, duly transmitted and received in wireless mode, immediately updates the personal files of the patient's care giver and the central database where all the medical records of Gamma's patients are stored.

In short, the new artefact enables the care givers to:

- record the services provided by each professional, making the relative information immediately accessible to all the care givers;
- communicate in real time and from wherever they are directly with the Gamma central database;
- print out at the patient's home the description of the care-giving processes and practical information of use to the family members involved in the care plan;
- keep the family's GP informed of the clinical decisions made concerning his/her patient.

The IT solution was created by a specialist software house that, guided by Gamma, performed the functional analysis and developed the application programs. The

system was piloted, the users trained and, after a last fine-tuning, the application was rolled out. Although the electronic file was designed to resemble the traditional paper medical record or “chart” (PDA use was made compulsory in 2004), the computerised version expanded the scope of the chart, sparking additional opportunities. For example, the PDA systemises and supports the collection of the clinical data both at the time the patient enters Gamma’s care and after the home visits made later. The software is programmed to alert the user to any input errors and runs checks on the coherence of the information entered. The central archive (hosted by the remote server) enables several people to share information at the same time without risking its integrity. In addition, the use of a standard archive format and structure facilitates the reuse of the information for management, administrative and scientific research purposes.

The PDA has replaced the previous paper files, the originals of which were kept at the patient’s home. In the past, the completeness of these documents varied considerably from one case to the next, therefore, the effective usefulness of their information content depended on the care giver’s personal attitude and focus on their manual compilation. The IT system produces detailed reports on the usually complex and demanding therapies and medications given to patients with life-threatening diseases. This functionality is highly appreciated by the patient’s family. For instance, printing the file update directly from the PDA removes any transcription errors and eliminates the risk of misinterpreting the GP’s handwriting. No less important, the report gives key practical information on the telephone numbers and shifts worked by the respective care givers.

The central database enables the doctor and the duty nurse (on call weekends and public holidays) to consult the patient’s records and use the information to determine and implement the best response to a specific circumstance even if they have no direct knowledge of that patient. One particular benefit of the procedure is that it prevents unnecessary hospitalisation and visits to A&E. In addition, the contents of the patient’s medical records can be used by the professionals who stand in for absent colleagues, while the patient’s GP can use the system documents as support information.

Each team attends a weekly meeting at the Association’s HQ to discuss the more important aspects of their respective cases, drawing on the data contained in the electronic archives. The meetings enable the professionals to update patient diagnostic and therapeutic programs, protocols and guidelines, share information on the services given or completed, evaluate their congruency, and report key aspects. Monthly meetings – attended by all the local care teams – are held at head office and led by a Gamma manager (the socio-healthcare director) in a format that ensures the assessor’s direct interaction with the person assessed, in line with the ‘peer review method’ [21].

## Commentary

Using a non-deterministic way of approaching organisational phenomena enables us to interpret the Gamma case by concentrating on the decisional processes (*design, adoption and use*) in which the technological artefact is “organisationally relevant” [22] as it is the bearer of rules originated by diverse sources at different levels. These decisions triggered opportunities and constraints that were absorbed into the [17] care process, contributing to its structuration.

The *design* process involved several bounded rational decisions to materialise the designers’ technical knowledge, whose bounded and intentional rationality led to the definition of the architecture, the equipment features, the technical standards, the type and format of the data, the user interface, etc. By choosing a handheld device like the PDA, Gamma’s top management has assigned a crucial role to aspects such as: portability and, therefore, information access anywhere and at any-time [23], and inter-professional communication among spatially distributed co-workers. The small size of the device means it has been given a menu interface and requires the use of a special pen directly on the screen. The team workers also have a portable printer linked to the PDA for generating paper copies of the patient’s updated file, usually at the end of each visit.

The central database containing both the historical archives and the current patient records is kept in the server of an external supplier in ASP (Application Service Provisioning) mode, which means the external supplier hosts the technological facilities (processors, infrastructure, databases, programs and computer files) and makes them accessible to authorised users via secure connections. Given the nature of the information managed (the clinical file is a public act with sensitive data), Gamma is legally responsible for the treatment of the data collected.

Gamma’s top management wanted to retain strategic control over the application design processes of the software solution despite commissioning an external supplier with its development. Likewise we can interpret Gamma’s decision to out-source the technical management of the programs and equipment, choosing a contractual formula that curbs running and maintenance costs.

The *adoption* processes, also guided by bounded and intentional rationality, defined the recipients of the artefacts and the timing and methods of use of each user category. Gamma’s management held the multidisciplinary team care processes the determining level for harnessing the potential fostered by the new system. The system calls for each professional to record the services and processes they carry out each time. Adoption of the PDA, preceded by training courses and practice sessions, subjects the medical team’s field of action to a new, heteronymous constraint: the obligatory use of the tool every time they are called to assist or when a decision is made regarding the patient. In parallel, this user constraint has generated a new rule for Gamma’s managers: the obligation to check that the system is used according to the conditions established by the internal norms. The artefact introduces a kind of HQ-operated “remote control” on the care team personnel. In turn, the remote control is the result of the architectural decisions applied to the design process: standardising the contents of the clinical file has created a kind of

“common language” that didn’t exist before, thanks to which documentation that meets minimal qualitative standards is produced along with all the advantages of conserving, reproducing and transmitting the information. Prior to 2004, such information was difficult to obtain but, today, management can use the data as a basis for assessments, to monitor particular situations or individual cases or to support decisions on the general organisation of Gamma’s activities. More rules (in the form of authentication procedures) were also introduced to ensure secure access to the system and archives.

Finally, the *use* process, the real crux, marks the moment in which the artefact become an integral part of the team’s work process. In this sense, the ‘artefact-in-use’ fully expresses its organisational relevance [7]. The users, based on their own bounded rationality and personal beliefs, have “appropriated” the system and gradually grasped its possibilities and constraints. This explains why, without fail, it generates forms of self-regulation that contrast sharply with the official provisions.

The new system imposes an order on the data selection and processing: inputting data into the system has to be done in the precise sequence established by the software program and cannot be modified by the user. The design and adoption choices mean that entering data to the system is slower than using a PC keyboard.

The medical condition of a patient is reported through the collection (guided by the system) of several closed answers to preset questions. The user can enter text notes (via the PDA’s small keyboard) to enrich the standard Q&A information, although, in practice, this option is little used due to the user’s poor keyboard skills. Sometimes, the note-taking window is too small to adequately communicate a specific situation: “I can’t key in detailed notes, it would take me too long”, observed one doctor. As a result, the information entered in parts of the patient record can appear, too generic or impersonal, which reduces an individual’s perception of the usefulness of the PDA. In other words, to fit the limited computational and physical capabilities of the device, the software ‘shapes and squeezes’ [19] the reality. The artefact returns a hyper-simplified patient “picture” compared with the actual situation of each patient treated, it records “only what can be articulated” [24, p. 25]. “It’s like asking us to play Beethoven’s Fifth Symphony with a whistle”, remarked one nurse.

The use of the PDA tool in the complex social practice of medicine and nursing – we underscore that this latter field is where patient interaction takes on a holistic connotation [25] – requires a material time (for logging on to the system and to enter the data) that cannot be compressed in which the professional is exclusively focused on the technical-procedural aspects. The GP perceives that the PDA distances him/her from the main reason for their visit to the patient, creating an element of unease: “I feel like the gas inspector”, said one doctor. The room for interaction is filled instead by the professional’s total focus on the “machine”. On the other hand, before the advent of the IT system, the care giver kept up their dialogue with the patient also during the manual compilation of the paper charts. “In the eyes of the patient or their family, the time dedicated to the PDA eats into the time of the visit”, observed one nurse. It is an added burden that often causes



embarrassment: “When I get out the PDA at a patient’s home, I explain that I have no choice”, one doctor told us.

The electronic medical record is used in tandem with the other communication means, such as the telephone and the e-mail, or direct personal contact. The PDA enables the doctor, for example, to follow changes in patient conditions reported by another professional and to control the treatment or indicate the most suitable procedures remotely. The care giver can also enter confidential notes in “freehand”, using that part of the file not accessible to the patient. Each member of the team is kept abreast of the actions of the other members.

Generally, we can say that the IT system orients the medical team’s actions in the “desired directions” [22]. Management has established some heteronomous user rules for the artefact. In parallel, its introduction has given the users room for self-regulation. If, on the one side, the updating of the patient file is performed systematically by all the professionals after each home visit, on the other, the electronic file is less frequently updated after the doctor/nurse has been in phone contact with the patient or a family member. “Minor changes are rarely recorded”, affirmed one GP. Generally, the decision not to use the PDA is more frequent in all those cases in which the care giver perceives the artefact as incapable of bringing concrete improvements in the form of lowering the margin for error, less cognitive effort, better service to the families and patients.

It remains to be seen in which way the concerted action of the socio-care teams – using the IT artefact – comes about through coordination. Above all, we underscore that the selection, combination, and sequence of the actions implemented, variable in type and timing, are determined by patient feedback, which means that the team’s work is guided by the patient’s physical and mental conditions. Creating intensive relations [5] in a highly uncertain and ambiguous scenario. Under these conditions, the adoption by all the members of the team of “mutually consistent decisions” [26, p. 190] can only proceed through reciprocal adaptation, which are also “privileged moments of the production and transmission of new information” [3, p. 68].

Also after the introduction of the IT artefact, the goal of the Gamma’s ‘technical core’, i.e. the integrated care processes, remained the same: to ensure the active, continuing and total care of patients at home, meant as a place for the humanisation of treatment, pain-relief and other symptoms. In terms of the coordination between the various care givers, the need to directly exchange information remains: “Dialogue with colleagues is irreplaceable”, reported one doctor. The healthcare and the socio-care dimensions interweave continuously, both during the provision of the service (i.e. at the patient’s home) and at Gamma’s head office, nevertheless the ‘relational density’ [7] between the care givers diminishes when the artefact tends to absorb a good part of the social relations that were essential before its arrival. For example, if the patient needs a wheelchair or a special mattress, the program enables the automatic transmission (at a few clicks by the doctor or nurse) of the detailed request to the operations centre, whose staff take care of such needs – from its initial purchase or reuse and deposit in the association’s warehouse through to delivery to the patient’s home. The same standard procedure can be used to send a

request to a social worker, for example, to support the patient's family in dealing with administrative practices, or to a psychologist or spiritual counsellor.

Head office meetings are organised with unchanging regularity. Investments in operational upgrades, training and internal communication continue as before. The decisions are made, as usual, by each professional, although the external visibility of the actions and outcomes of the care processes has been heightened (see the paragraph above on the architectural decisions). The care givers are aware they are being observed remotely and thus adapt their working patterns (e.g. input of data at the point of care) to those dictated by Gamma's management. The artefact has introduced a heteronymous constraint into the organisational workflow, which is delegated to the subjects of the constraint itself. Managerial control of the care-giving processes extends and reinforces itself in an indirect way.

## Conclusions

This paper has explored the importance of the technological artefacts on organisational processes by tracing the key steps in Gamma's experience. Fundamentally, this study indicates that assumptions about a straightforward causal relationship between the IT solution deployed in the integrated home care processes and organisation processes are oversimplified and misleading. The interpretive key adopted to understand this case differs from both the objectivist and the subjectivist proposals. Specifically, it distinguishes three decisional processes analytically: the decisions of the design, adoption and use of IT artefacts. The meeting of these processes – interacting and in continuous evolution – derives a notion of technology undistinguishable from the other organisational decisions.

In seeking to answer the first research question on the shaping of the relationship between the technological and the organisational choices, the Gamma case indicates that the innate nature of (information) technology leads to change that cannot be grasped and understood through dichotomist approaches (centralisation vs. decentralisation; autonomy vs. heteronomy; control vs. independence, etc.). Indeed, our analysis has highlighted the diverse, also opposing, effects in line with the decisional levels (and actors) in question.

As to our second research question on how the technological solution helps “make the difference”, or influences Gamma's care practices, we have seen that the IT artefact enters the work process as a bearer of constraints and opportunities. Constraints because it limits the decisional alternatives, opportunities because it unfolds new possibilities of action and decision for the actors in conditions of bounded and intentional rationality. The PDA did not significantly change the logic of the multidisciplinary teams. However, the artefact has changed the way in which the clinical information is treated. Information that – we shouldn't forget – translates into crucial decisions from the administrative and managerial perspectives. In turn, these latter also become premises for other interrelated processes of action and decision.

How does this research enhance our understanding of the social impacts observed in the Gamma case? From a theoretical standpoint the TOA opens up horizons that cannot be adequately grasped and understood through dichotomist approaches. For example, the TOA can help us to analyse the spaces of action and decision generated by the process of organisational regulation to clarify the meaning of the outcomes of technological change. On a practical level, the study suggests how the rules laid down by management do not always “work” as expected. Planners make their move, i.e. design solutions and implement artefacts in everyday practice, while those who are affected by them alter their own behaviour. The use of the PDA *makes the difference* because it broadens Gamma management’s power of control, but at the same time there is always room for the care providers to become ‘themselves designers who are seeking to use the system to further their own goals ... in the changed environment’ [19, p. 153-4].

The analysis has its limitations, above all, the small sample size. Flick [27] proposed that a researcher could stop collecting interview data at the point of ‘theoretical saturation’, namely, when no further data are being found that add to the theory that is being developed. This study has a lot of ground to cover before achieving Flick’s cut-off point. The gap will be the object of future study, which will take two directions: conduct at least 30 to 50 interviews and include other categories of stakeholders, comprising Gamma’s top management and the external provider who developed the software application.

We believe other interesting insights could be provided by the field studies that investigate the relations with the other organisational process levels that shape the action of Gamma. Recently, the Association opened a residential centre (hospice) in Milan to assist about 20 patients whose medical condition is not compatible with staying at home. The services offered by the new structure focus less on the medical profile and more on the care and relational side. And, like home care, this new service also demands the work of a team of different PDA-enabled specialists. The kind of strategy implemented by Gamma could be read as an enlargement of the organisational domain (the organisation operating intensively on the client seeks to place their boundaries around that client [5, p. 43]). An interesting way to extend the research would be to analyse the crucial constraints and contingencies that ensue from this extension of the organisation’s technical core.

Therefore, this study is merely the point of departure in a research pathway that has yet to bear its ripest fruit.

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