Introducing Innovative Business Processes in Enterprise Functioning: Case of Telemedicine Processes

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Abstract. Introducing innovative Business Processes in Enterprise functioning is dealt with according to a specific approach; different from that generally adopted in Business Process Reengineering projects. This is the case of introducing telemedicine processes in hospitals/clinics functioning. The main characteristic of the proposed approach is the fact that it doesn't take into consideration existing processes but directly examines objectives and vision of to-be processes. This work is based on two case studies, both related to telemedicine. They respectively concerned tele-radiology process and tele-consultation process. These case studies allowed us to validate the proposed approach which was well adapted in both cases.

Keywords: Innovative business process, Business process reengineering, Case study research, Telemedicine, Tele-consultation, Tele-radiology.

1 Introduction

Technological change and globalization nowadays oblige contemporary firms to be efficient in order to ensure their sustainability. Change in nowadays companies has become a necessity rather than a circumstance. Change is generally defined as any transformation of an enterprise or a part of an enterprise in order to track changes in its environment [1].

Multiple methods of change management exist in literature [1] such as TQM (Total Quality Management) which provides a gradual improvement in business processes but is very spread out over time, benchmarking which consists in learning how successful companies are organizing their processes and BPR (Business Process Reengineering) to which we are interested in this paper.

BPR (Business Process Reengineering) is defined as the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service, and speed [2].

Several methods of conducting BPR projects are defined in literature [3], [4], [5], [6], mainly including the steps of vision, initiation, diagnosis, re-design, implementation and evaluation. All these methods use a task of process modeling for both existing business processes and newly designed ones.

Several problems arise during BPR projects undertaken by contemporary companies, such as: the difficulty to model as-is and to-be business processes, the lack of

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guidance and the failure to consider contexts in BPR projects. Such contexts include the nature of the considered processes and their specificities.

Our paper focuses on issues concerning BPR projects integrating innovative processes. The proposed solution is a methodology which deals with different concepts involved in reengineering projects integrating innovative processes. This methodology is adapted to BPR projects concerning innovative business processes.

This methodology of BPR, taking into consideration the specificities of innovative processes, has been instantiated in two case studies both related to the area of telemedicine. In these case studies, instantiating the methodology allowed the understanding and then the integration of innovative processes.

This paper is organized in the following way: in section 2, special consideration of innovative processes is presented. In section 3, case studies related to BPR projects integrating telemedicine innovative processes are presented. In section 4, deductions are presented. Finally, a conclusion and future works are presented.

2 Special Consideration of Innovative Processes

Business Process Reengineering Projects related to "innovative processes" have to be treated in a particular way. The "innovative processes" are those to which people and companies have not yet developed traditions (or habits) and have not yet established the best way to practice them. They must be managed in a different way [7]. Thus, they could be studied without requiring prior detailed consideration of the old processes. For such processes, innovating aspects and especially technological aspects appear from the beginning of the project through goals that have to be reached, generally expressing the new ways of proceeding and the technologies that must be adopted [7]. In such a context, a new organization of actors and tasks is necessary.

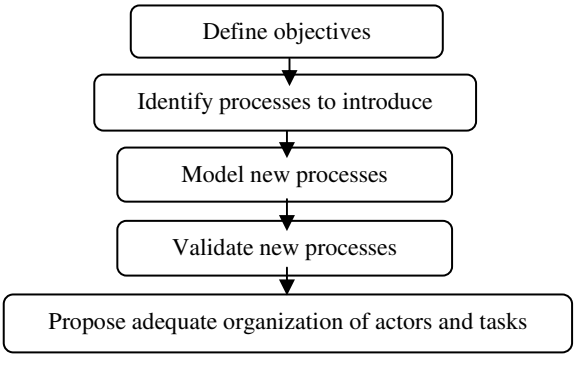

Fig. 1. Modeling of the BPR approach proposed to address the case of innovative processes

The proposed methodological contribution to this kind of processes is a method which is specific to innovative processes. It doesn't take into account the step of analyzing and understanding existing processes but goes directly to the identification of new processes to be introduced in the functioning of the company. This approach is represented in Figure 1 by a UML activity diagram.

Some examples of processes lying in this situation are: the process of tutoring in distance education [8] [9], that of collaborative learning in distance education [10], that of instructional design and online courses development [11], but also processes of telemedicine [12]. In this paper, we are more precisely interested in this last category of processes.

3 Telemedicine Case Studies for Innovative Processes Reengineering Projects

Technological developments in communication industry revolutionize the relationship between individuals and communities. This is the case of telemedicine. More specifically, the advent of ICT can give new ways to practice medicine and provide specialized medical services in areas that until now were disadvantaged. Telemedicine is the electronic transfer of medical data including sound, static or dynamic images and text in real time or offline for practicing telemedicine, to increase scientific and clinical exchange, and facilitate access to expertise. It allows professionals to communicate more while avoiding the constraints of time and space. Telemedicine essentially includes five processes: tele-consultation, tele-monitoring, tele-training, Tele-staff and tele-radiology [13] [14].

Reengineering projects related to telemedicine processes were treated in a rather particular way. We present below some of the case studies considered in this context, outlining approaches that have been considered for their reengineering. Processes considered in this paper are: process of teleradiology and tele-consultation.

These case studies allowed us to draw a number of deductions. We present below first the case of tele-radiology and then that of tele-consultation.

3.1 The Case of Tele-radiology

The process considered in this case study is tele-radiology process which is a medical procedure that covers two types of situations [15]:

- Tele-diagnosis that allows a local non-radiologist doctor to obtain the interpretation of an imaging examination,
- Tele-expertise that enables the exchange of opinions between two radiologists.

Two approaches have been experimented to ensure the reengineering of these tele-radiology processes:

- Define the objectives of existing medical activities, understand the old processes (radiology, diagnosis, expertise exchange, etc.), diagnose them and finally propose new processes.
- Define the objectives of tele-radiology, provide corresponding models of processes and then verify and validate these new models. This last step required several iterations until the new models have been validated. The obtained model concerning tele-diagnosis in the context of tele-radiology process is presented in figure 2.

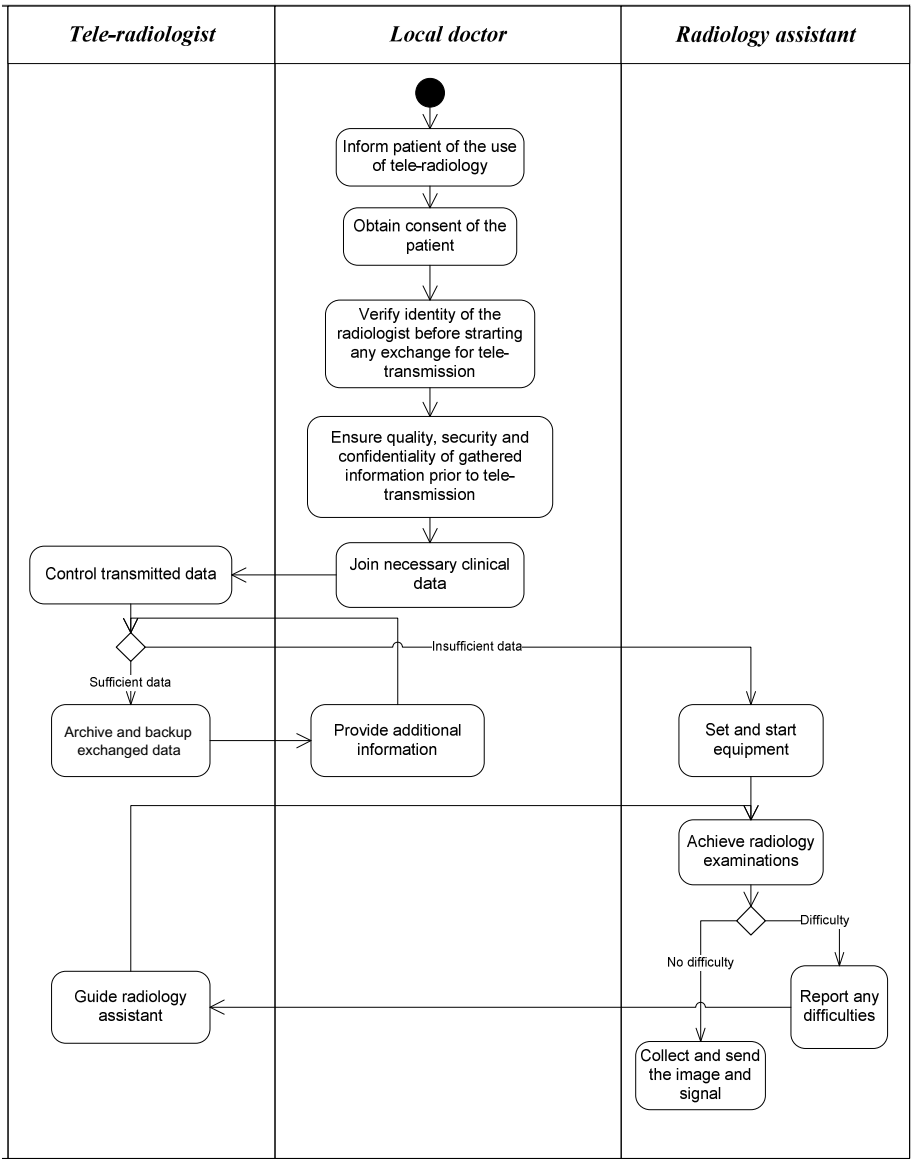

Fig. 2. UML Activity Diagram of tele-radiology process

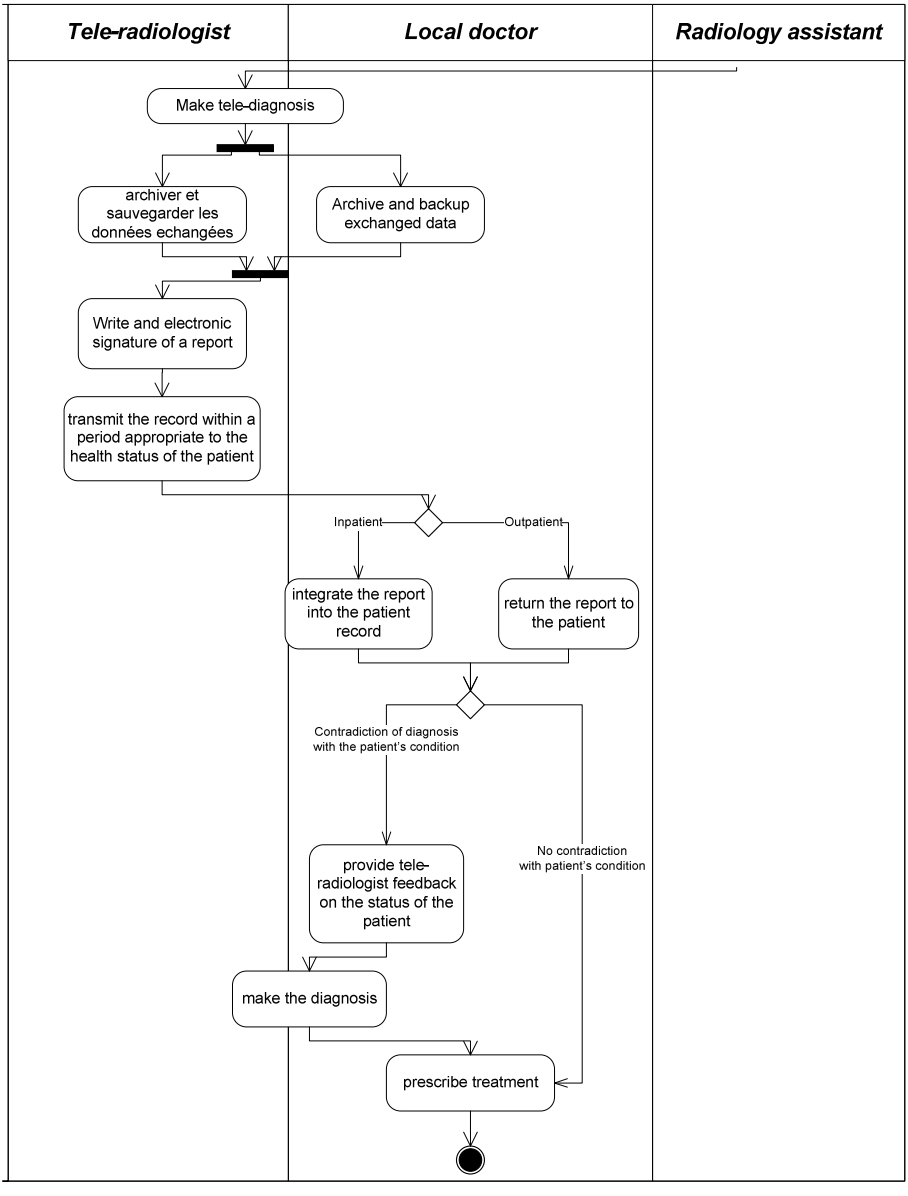

Fig. 2. (*Continued*)

3.2 The Case of Tele-consultation

The process considered in this case study is tele-consultation which is the assessment of the state of health or data of a patient via a telecommunication system, without direct physical interaction. It includes requests for opinions from a colleague, organization of emergency care, referral of a patient and arrangement of a possible transfer... [16].

Transmission of data can be done either in a synchronous or asynchronous way. There are two main types of tele-consultations [16]:

- A patient consults a doctor via a telecommunications network,
- The local doctor is seeking the opinion of another remote practitioner.

Two approaches have been also experimented to ensure the reengineering of tele-consultation processes:

- Define the objectives of medical activities, understand the former processes of consultation (patient-doctor consultation or doctor-doctor consultation), diagnose them and finally propose new processes.
- Define the objectives of tele-consultation, propose corresponding models of processes and then verify and validate these models. This last step required in this case study also several iterations until the new models have been validated. The obtained model concerning tele-consultation process taking place between a local and a distant doctor is presented in figure 3.

4 Deductions

We conclude that "innovative" processes where people and businesses had not yet time to develop traditions and habits can be addressed in two ways, through which models of these processes could be integrated into the functioning of a business. The first way consists in studying the existing processes, diagnosing them and then proposing the corresponding “e-processes" or new ways of working. The second way consists in directly studying new processes directly via the steps presented in figure 1.

This second way was considered in our experiments as the most appropriate. In fact, it has been adopted in both cases, since it was considered as the most efficient and there was less waste of time than in the first way of working. More generally, we believe that it is better adapted to the case of innovative processes as they require no prior detailed consideration of old processes which are very different from the new ones.

More generally, processes for which we actually applied this Methodology for Introducing Innovative Business Processes are the following:

- The processes of e-learning including tutoring in distance education [8] [9], collaborative learning in distance education [10] and instructional design and implementation of online courses [11].
- The processes of telemedicine [12], from which tele-radiology and tele-consultation processes are dealt with in this paper.

Models that have been designed for the different previously presented processes are in fact coherent with the idea of introducing new processes without necessitating to go deeper in understanding their previous way of working. In fact, innovating aspects appear as objectives of the project. Such innovating aspects are expressed through the new concepts to be introduced such as new rules or new technologies to be introduced. The completion of the BPR project leads to a new organization of actors and tasks.

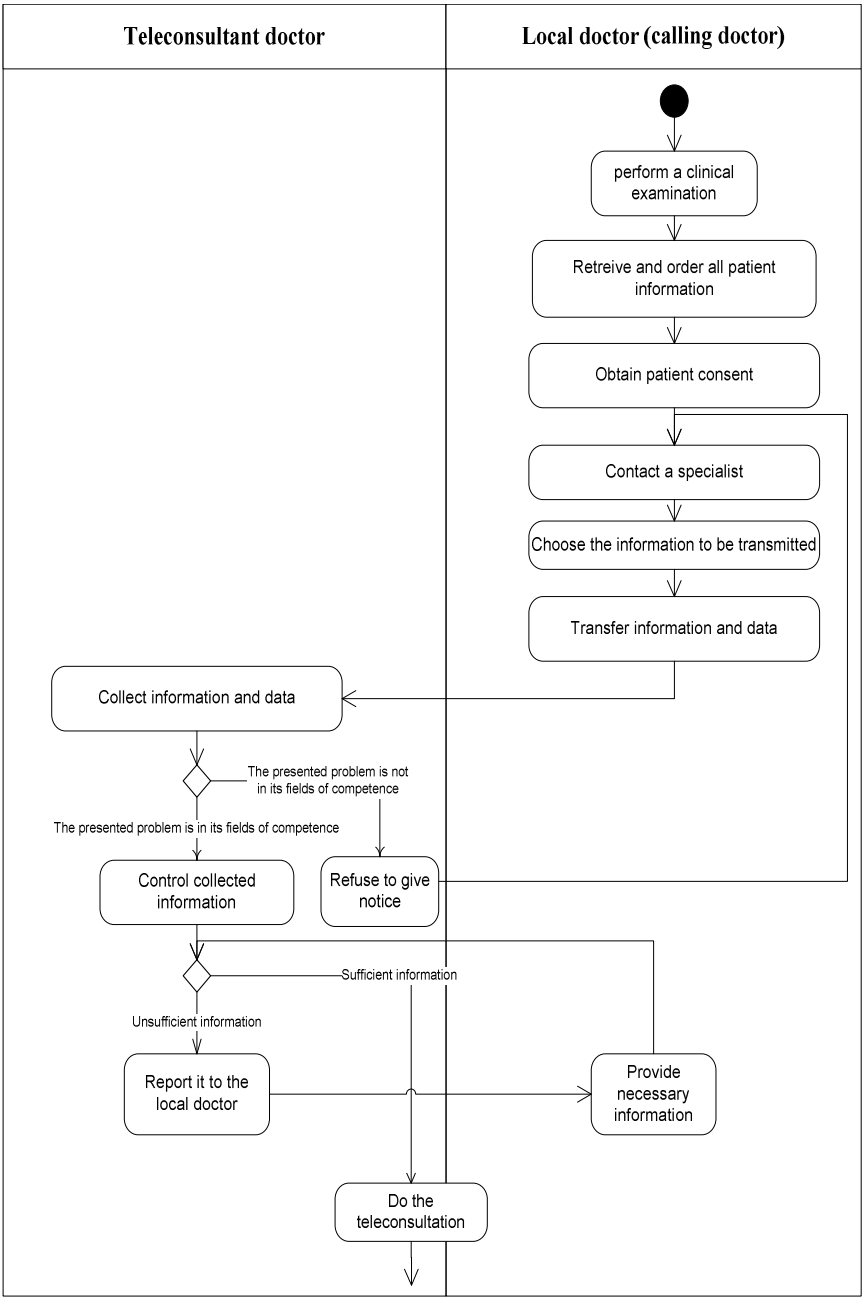

Fig. 3. UML Activity Diagram of the tele-consultation process

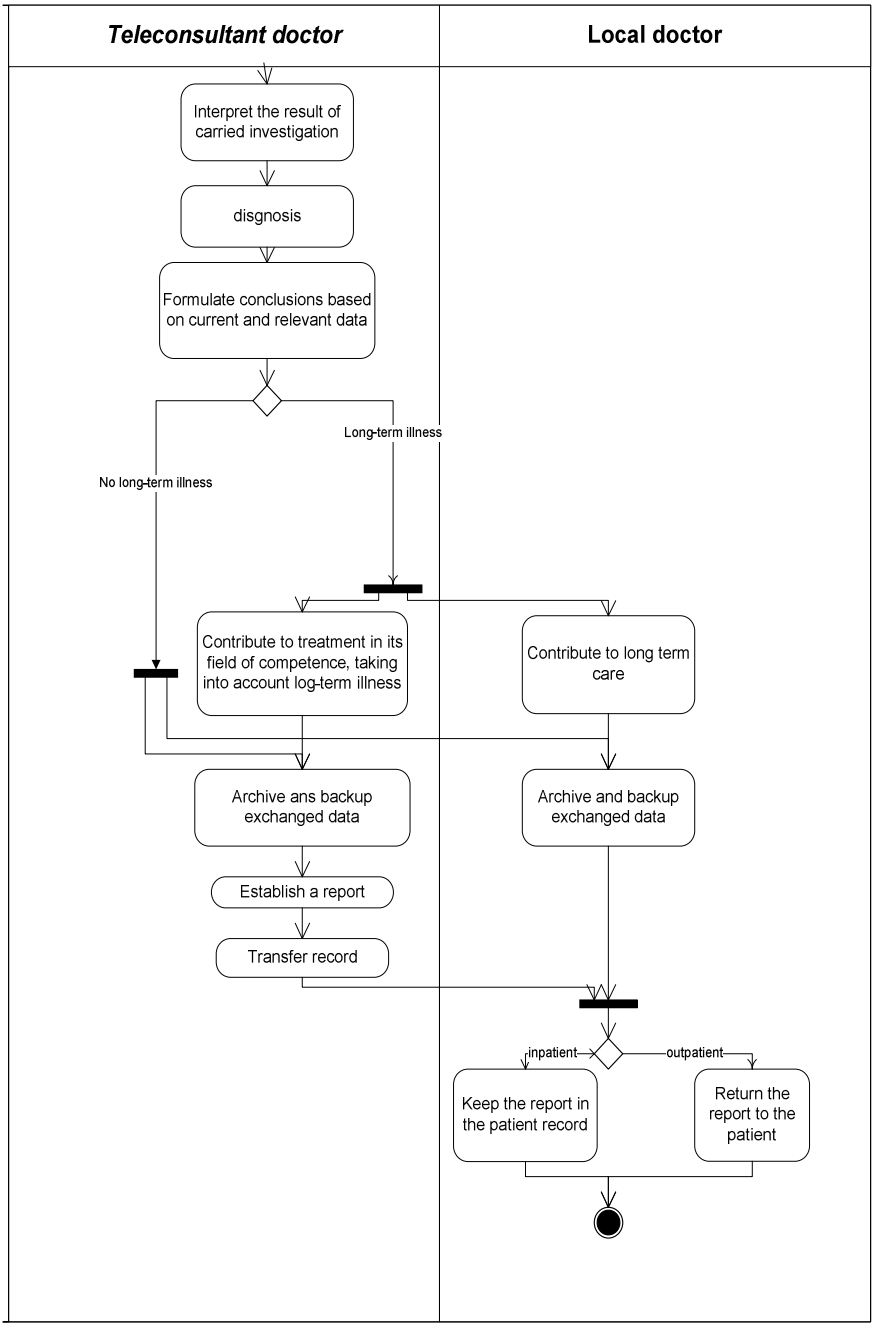

Fig. 3. (*Continued*)

5 Conclusion and Future Work

BPR (Business Process Reengineering) which is defined as the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service, and speed, is considered in this paper with the special case of considering Innovative processes.

More precisely, we proposed in this paper a specific methodology for introducing innovative processes.

In order to validate this proposed methodology, case studies were considered. Those presented in this paper are in the field of telemedicine.

Our case studies in telemedicine gave results that confirmed the adequacy of the specific proposed methodology to the considered cases and consequently to introducing innovative processes.

This work is still open to a number of future works. In fact, in the field of telemedicine, more effort still has to be done in order to improve the gap between urban and rural telemedicine. In this context, multiple innovating technologies have to be tested and their potential influence has to be assessed [17]. The way in which such technologies can improve the quality, safety, efficiency, and effectiveness of health care still has to be studied [18].

Another future work will concern the proposition of a meta-model for innovative business process reengineering, including all involved concepts. This will allow a better understanding, assistance in modeling and will give more precise recommendations related to the way of reengineering concerned processes.

Moreover, a specific environment for introducing innovative processes in enterprise functioning will be designed and developed. This environment would be very helpful for guiding modelers and work teams involved in reengineering projects concerned with innovative processes.

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