Research Strategies According to the Pragmatic Paradigm

3

Reading Guide: In this chapter we will explore the main research actions conducted alongside three research strategies of the pragmatic paradigm: the case study strategy, the design science research strategy and the grounded design strategy. Each of them is described and discussed in a subsection of this chapter, which is broken down into specific topics of interest for each strategy.

As addressed in the subsection "1.5.3 Pragmatic Research Paradigm", pragmatic research approaches focus on the practice of the field context. In medicine, it focuses on what happens in hospitals, clinics and patients' homes; in Administration, on occurrences in the context of companies, suppliers and their customers' locations; in Law, what happens in courts and justice forums. In short, pragmatic strategies that deal with some level of practical knowledge are more suitable for researchers linked to what we call professional schools (van De Ven, 2007), areas where we clearly have a set of well-defined actors as practitioners.

3.1 Case Study

We will approach the case study strategy starting with its definition, first highlighting the false synonyms that usually generate confusion among beginner researchers. We will address the issue of the number of cases to be analyzed, the interaction of the researcher with these entities, as well as the commonly employed analysis techniques. We will highlight the importance of theoretical constructs for the definition of dimensions to have their data collected and analyzed, which will allow the discussion of theoretical questions from the context of practitioners, from the reality of the case or cases analyzed. Finally, we will conclude by discussing the different ways of exposing the findings, the new knowledge derived from the case study strategy.

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False synonyms. Before defining the case study research strategy we will address what it is not, exploring some of the similar terms that are erroneously considered by many as synonyms. In this list are terms such as: success case, case-based learning and case report. The success case is widely used by sales and marketing departments of companies, with the purpose of sensitizing potential clients and market analysts about their products and services, exclusively for business purposes. Meanwhile, case-based learning documents are educational tools that do not aim for a complete and meticulous interpretation, as the purpose is to present and establish a situation for debate. Finally, the case report, used by professionals in some areas, especially in the health sector, aims to present unusual situations to be discussed by their peers. In medicine, for example, a doctor may gather data from his patient, from atypical situations, which may require more attention and deeper studies. Case reports can even be seen as a first step toward conducting scientific research.

Definition. In the field of social science, case studies are more geared toward exploratory research, addressing research questions of the "how" and "why" type. This strategy is more appropriate for the analysis of a particular situation, where the boundaries are not clearly defined, that is, a new or changing reality. For this and other reasons, the case study turns to research questions that cannot be manipulated in laboratories like experiments. They cover situations that need to have their complexity understood and analyzed within their own environment. Taking the business environment as an example, we have the analysis of interventions that occur within the company. This includes the collection and analysis of data from transactions carried out by the company, it can be about a pioneering and innovative project that is starting, or something that has been happening for some time in the company and that has some aspect that arouses the researcher's interest. The unusual and new aspect can be in the way of doing something or in the results achieved, something new that justifies the interest in conducting the research.

Number of cases analyzed. In the case study strategy, one does not work with data volume from different entities, as occurs with the random samples of quantitative research, one works with data from some entities, intentionally or theoretically selected. The collection can occur with only one entity (single case), configuring an extreme and rare situation, or it can occur with some entities (multi-case), configuring the most common situation to occur (Eisenhardt, 1989). It is important to note that studies involving a single case are extremely rare. Hence the single case study arouses interest and suspicion, as it can be something highly relevant (innovative case in its essence) or merely disappointing (difficulty or limitation of the researcher in collecting data from multiple entities).

Interaction of the researcher with the entities. Due to the need for the researcher to go to the location of the transactions or intervention, the researcher must adapt to the environment, schedules and norms of the entities where the data collection activities will take place. As innovative events are usually poorly structured, it is up to the researcher during the collection to have the sensitivity to perceive the aspects of interest according to his theoretical and practical experience. In short, the researcher cannot delegate to third parties the work of going to the field

to collect, as is very common with quantitative research. Thus, we have a more mental effort, of observation and analysis of the novelties in their own locus. The main collection techniques used in the case study are natural observation, semi-standardized interview and the collection of evidence in the form of documents, records and artifacts.

Dimensions of analysis. Normally the new aspect that arouses interest in the case to be analyzed leads the researcher to make conjectures or propositions from the abductive logic, of what can occur in a certain situation. These conjectures are elaborated from a mix of theoretical and pragmatic knowledge of the researcher, that is, a good level of knowledge of what is happening in the field, as well as theories that help to understand and interpret this reality. From this initial awareness of the field in light of theories, the researcher defines his dimensions of analysis. The analytical dimensions help to define characteristics of the cases to be analyzed and can even compose groups of antagonistic or polar cases between them. Sometimes the proposition is so rare that it can be linked to a case that, luckily, the researcher has knowledge and authorization to be able to follow in loco the transaction or the intervention that will occur.

Data analysis. The most initial and simplistic form of analysis associated with the case study strategy is merely descriptive. Here the analyses are more restricted to the definition of attributes, types and definitions associated with entities that help to describe and understand a certain reality. A more elaborate and interesting situation for analysis would be the comparison of the situation found in the field, with the entities of this context, with the standard situation expected, according to the most recent literature in the area. This type of analytical technique is called "pattern matching" (Yin, 2018). A second more elaborate form would be "explanation building", which uses theoretical propositions for discussion of the data found in the field. This technique is highly interactive, consisting of a cycle of refinement of successive ideas. Another analysis technique is the "time-series", where events and occurrences are analyzed in terms of their results at different times. The idea here is the comparison of the status of the entity before a certain intervention, the status during the moment of intervention and the subsequent status, for example, the final situation of the entity after 12 or 24 months of intervention (Yin, 2018).

The analytical techniques of pattern matching, explanation building and time-series are not exclusive, on the contrary, they integrate to compose a more robust and consistent analysis to address more structured complex contexts. Within this perspective of combination and interposition of analytical techniques, the technique "logic-models" stands out, which presupposes cause-effect relationships (pattern matching) that are interconnected over time (time-series).

The analyses are done in the first moment case by case, only with the data from that entity, a process called "within-case analysis". With each new case collected, the researcher may, in his process of immersion in the field, perceive new dimensions. In this case, the researcher should return to the entities or cases already documented in order to verify the situation for that new dimension. It is important to note that in qualitative research the process of collecting information is permanently open, that is, new sources and new inputs can be incorporated

into the research protocol at any time (Sect. 1.3.3). After the first collections, the researcher should already be conducting the "cross-case analysis" which will allow the researcher to perceive the moment of "theoretical saturation", that is, the moment to stop with the process of data collection with new cases (Sect. 1.3.1).

Writing the research report. The case study research can result in multiple forms of result, it can be merely descriptive or more elaborate, and can even be used for the development of new theories. Obviously, these different levels of complexity will require different ontological strategies from the researcher to structure and present the new information resulting from the research. Yin (2018) describes six types of possible structures for a research report with a case study strategy: linear-analytic structures, the most common structure closest to traditional post-positivist research (introduction, literature review, methodology, findings, conclusions); comparative structures, a case is described many times, comparing various descriptive explanations; chronological structures, events are presented and discussed within a temporal sequence; theory-building structures, thinking about the best way to reveal and support a theoretical argument; suspense structures, the results achieved are initially presented to, then, explain and discuss their meanings; and unsequenced structures, any other order that may make more sense.

3.2 Design Science Research

The research strategy design science research (DSR) does not start from a conventional research problem, but from a pragmatic problem experienced at work by a group of professionals (practitioners). The researcher, to have the insight of a useful artifact to the group of practitioners, must have good interaction and knowledge of the actions performed by them, that is, full understanding of what we call the problem space. The understanding and the concern with regard to this demand from practitioners, associated with the knowledge of scientific concepts and constructs, usually from two or more areas of knowledge, are necessary ingredients for the generation of the insight for the proposition of an artifact that can be considered as a solution for a type or class of problem of the practitioners. The solution is usually designed for a very specific purpose, that is, design-oriented, according to a logic cause-effect (causation). The practitioners assist in defining the meta-requirements, as well as in testing the design of the artifact, whose Meta-design is being improved with each new test cycle by practitioners in their natural work environments, that is, the artifact is evaluated in real field situations. We will discuss below the main concepts and actions taken by the researcher during the conduct of a research based on the DSR strategy.

Problem space. In terms of philosophy of science, the design science research (DSR) research strategy shifts the researcher's attention from the necessary truth of traditional science to the contingent truth. While the necessary truth must prove true in all locations and contexts, the contingent truth is true in the way things happen or how things are, but it does not need to be an absolute and broad truth

in all locations and contexts. The result of the DSR strategy is a valid and useful artifact for a specific context, which Simon (1996) calls the "problem space". The users of this artifact are the professionals (practitioners) who operate in this space where the problem is inserted. Thus, we have that DSR is oriented toward pragmatic scientific knowledge, applied contingently and characterized by concern with the design of the solution. For the correct perception of the problem space, the researcher must have experience in the field of application of the artifact, in the practices and difficulties faced by its practitioners, an aspect addressed in the next paragraph.

Researchers and practitioners interact strongly. An important aspect of the DSR strategy is the insertion of the researcher into the area of application of the artifact. In this sense, he must have a broad mastery of the problems of the area, especially of the one that is the object of action of the artifact that is being proposed, as well as of the artifacts already available and in use by the professionals (practitioners) of the area. The proximity of the researcher to the reality of the group of practitioners of the artifact brings several benefits, one of them is to avoid the proposition of unnecessary or useless artifacts. For Hevner et al. (2004) a new artifact does not make sense when: it does not holistically and rigorously meet all necessary dimensions (financial, ergonomic, environmental, …); the new artifact does not solve the problem; existing artifacts are adequate; utility cannot be proven; or utility cannot be clearly and objectively evidenced. Thus, the proposed artifact must meet a specific and clearly delimited type or class of problem.

Type or class of problem. The DSR strategy works within the specificity of artifacts, not so broad and not so specific. As Van Aken and Romme (2009, p. 8) well defined: "it is not a specific solution for a specific situation, but a general solution for a type of problem". We return at this point to the concept of contingent truth, that is, valid and useful artifacts for a specific context, for a type of problem or better describing, characterized and directed to a problem space. Thinking about class or type of problem well equates the issue of scope, not being something so macro and not so micro. It is a generalized solution for a specific type of problem. It is not a specific solution to a specific problem, but a conceptual solution, whose design specification meets a type or category of problem, which seeks to serve a category of professionals or a business context (not necessarily linked to a group of specific professionals, considering that not every business problem or challenge is specific only to a group of professionals).

Design-oriented solution. The term design implies designing something as a solution to a need, these human creations being called artifacts. The function of design according to Simon (1996, p. 114) is "devising artifacts to attain goals". The artifact can manifest in different physical or virtual formats. In computing, for example, an artifact can take the form of "constructs (vocabulary and symbols), models (abstractions and representations), methods (algorithms and practices), and instantiations (implemented and prototype systems)" (Hevner et al., 2004, p. 77). The design and proposition of an artifact follow the same logic of a predictive hypothesis: the designed artifact is our premise (case) that we understand to be able to meet our needs (result) according to our theoretical understanding

(rule). There is the typical application of abductive logical reasoning, where from the terms "rule" and "result" one imagines a "case" that can solve the problem in question. We can make an analogy with the generation of cause-effect-type hypotheses, where we make inferences about a satisfactory explanation for a specific consequence that we aim for (Lee et al., 2011).

Conceptual sources of the artifact. Just as in the construction of new theories, which is derived from many triangulations of theoretical perspectives on the same set of data (Yin, 2018), the development of artifact in DSR is the result of triangulation between different concepts and knowledge. In the DSR research approach, in the generation of concepts, Taura and Nagai (2012) highlight the importance of the researcher in identifying the attributes (properties) of each concept, in order to better understand its function, cooperating with the identification, differentiation and selection of the appropriate concepts to integrate and compose the solution to a certain problem. The importance of attributes is similar to the discussion in various research approaches. In grounded theory, for example, in the open coding phase the objective is to find concepts with the analysis of attributes being fundamental for the structuring of concept categories from their similarities and differences (Corbin & Strauss, 1990).

Example of conceptual sources. As a way to illustrate the composition of concepts for the constitution of an artifact, Taura and Nagai (2012) gave examples of physical artifacts and people's daily lives, making it more understandable to researchers and professionals from various areas. One of the examples is the design of an art knife conceived from the junction of two concepts: broken glass and chocolate segments. These concepts substantiated the project of a cutting blade composed of segments, like the divisions present in a chocolate bar, which can be easily broken, just like a thin ice blade. With this, the knife always remains with the possibility of several sharp cuts, as many as the segments available along the length of the blade.

Design science research method. The DSR approach has some variations regarding the method for its application, that is, variations of design science research method (DSRM), but the most widespread is the one proposed by Peffers et al. (2007). The most recent DSRM proposals are all based on the text by Peffers and his colleagues. The six phases of the DSRM proposed by Peffers et al. (2007) are: problem identification and motivation; define the objectives for a solution; design and development [of the artifact]; demonstration; evaluation; and communication. In the phase of problem identification and motivation, the problem space and the type or class of the problem to be solved for a certain group of practitioners are worked out and defined. In the next phase, define the objectives for a solution, the main result is the creation of the meta-requirements, that is, the functions to be performed by the artifact. In the design and development phase, the artifact is created to meet the functionalities (meta-requirements) defined in the previous phase.

Meta-requirements and meta-design of the artifact. The researcher in the role of solution architect develops and presents successive versions of the artifact (meta-designs). This interactive process is referred to by Hevner et al. (2004) as

generate/test cycle. To meet a meta-requirement the designer identifies and tests various options of meta-design, hence the use of the term *testable design product hypotheses* "which can be used to verify whether the meta-design satisfies the meta-requirements" (Walls et al., 1992, p. 43). This interactive process with generation of design versions repeats until the moment when the designer understands that they have achieved functional saturation for all the meta-designs of the artifact. At this moment there is the understanding that the characteristics present in the project are sufficient for the resolution of the problem in a full and comprehensive way, capable of meeting that class of problem.

Meta-specifications. In DSRM the final set of meta-requirements and meta-design of the artifact is called meta-specification. These meta-specifications facilitate the actions of critical analysis and evolution of the proposed artifact, as well as the design and proposition of new artifacts for the same problem class. Although it is a fundamental element within the concept of continuous evolution of science, not just to generate the new (epistemology), but to understand the new aspects (ontology), allowing adaptations and evolutions of this knowledge, many DSR studies do not evidence or highlight the meta-specification of the artifact. Knowing this limitation of DSR articles, we present an example of meta-specification in a very simple and useful way, in the form of a table. The example highlighted in Table 3.1 is the extract of a meta-specification of an artifact, in this case, a typology to assist entrepreneurs and future entrepreneurs in perception of other creative tactics (heuristics) for generating new products and services beyond invention and copy tactics.

Artifact testing by practitioners. In DSR, the tests of the artifact being proposed occur in the field, with it being used by typical practitioners, in real field situations (not in laboratories or other researcher control environments). This is the greatest expression of collaborative work between researchers and practitioners. The evolution and improvement of the artifact is interactive from the feedback of practitioners, the clients of practitioners (beneficiaries of the action of the artifact) and the data generated (outputs) by the artifact itself. The important thing to highlight here is the record, the log of data resulting from the action of the artifact and coming from one or more sources. With

Artifact development
Implementation
Artifact development
Evaluation
Artifact evaluation
Performance indicator [new]
Artifact evaluation
Conclusions
Conclusions

Table 3.1 Example of meta-specification recommended by DSRM

Meta-requirements (The artifact must…)	Meta-designs (For this, its design must…)	Contextualization (In the design process that was achieved)
[…]	[…]	[…]
Demonstrate that when working with renewal it is necessary to consider not only the things that are deemed useful but also less desirable things, viewed as useless by the organization	Bring to the central display of the artifact a dichotomy centered on the subject of "aptitude [of the existing resource]", with "useful" as one of the options and "useless" as the other	Dichotomy between the two tactics associated with the "useless" (residue/byproduct and creative failures) and the other tactics associated with the "useful"
Demonstrate that the alteration of the form of a product or service may have different goals: to alter performance, reduce costs or make the product or service more adaptable to the needs of the end-user	Bring to the central display of the artifact a trichotomy centered on the subject of "orientation [of the alteration to the form]", indicating the options "cost", "performance" and "customer"	Trichotomy that presents five creative tactics associated with alteration of the form: custom-made, adaptation, frugal, improvement and degradation
Demonstrate that the alteration of performance of a product or service does not always mean an improvement; the opposite can also occur, with a reversal, a reduction	Bring to the central display of the artifact a dichotomy centered on the subject of the "direction [of the alteration of performance]", indicating the options of "superior" and "inferior"	Dichotomy between the "improvement" tactic and the "degradation" tactic
[…]	[…]	[…]

Source De Sordi et al., (2022, p. 28)

The Internet of Things (IoT) has made data collection from these various entities or processed resources simpler and more straightforward. Data records should characterize the conditions of the entity/resource at least two moments: before the use of the artifact and after its use. With this, we can discuss whether the artifact promotes the transition from status A to status B, that is, if it is capable of covering the distance from the current situation to the desired situation that characterizes the problem space for which the artifact was designed.

Artifact evaluation. As Hevner et al., (2004, p. 98) highlighted, "the design-science paradigm seeks to create 'what is effective'". For the researcher who is proposing an artifact with the DSR approach, it is fundamental to reflect on two fundamental questions: (a) "What utility does the new artifact provide?"; and (b) "What demonstrates that utility?". An editor or reviewer of an article developed with the DSR approach will pay attention, among many things, to these two questions. They are structuring questions for research projects conceived with the DSR approach. To answer the first question, the researcher must have clarity of the problem space to be able to clearly explain the functionality to be delivered by the new artifact. For the second question, we often answer it using indicators already

Table 3.2 Fundamental themes to be included in the DSR research report

Development of the artifact
Cycle of interaction with practitioners
Development of the artifact
Performance indicator [with the use of the artifact]
Evaluation of the artifact

available in the application area itself. Let's imagine that we are proposing an artifact in the form of a cutting tool for cranial incisions to be used by neurosurgeons. Let's imagine that one of the modalities of neurosurgery, for which the artifact is intended, has an average post-surgery hospital stay of 10 days and a risk of bacterial infections varying between 5 and 12%. These two indicators, post-surgery rest time and hospital infection rate, can be two good indicators for analysis and demonstration of the potential of the new artifact.

Writing the research report. The DSR strategy is quite young compared to the others. There are no studies on variations of report structures under some conditions, as occurs with the case study strategy. However, there are topics that cannot be missed in the structure of reports of research conducted with the DSR strategy. We point out in Table 3.2 the main themes to be included in the report, distributed by sections of the report.

3.3 Grounded Design

Rohde et al. (2017) proposed the grounded design (GD) strategy aiming to overcome some difficulties faced by interventionist approaches, such as self-referentiality and contingency. The stance of self-referentiality results in a closed system, instead of a system-environment relationship, the organization develops a system centered on itself, system-system. The open system allows exchanges with the external environment, facilitates the inclusion of improvements and advances, while the self-referenced system is closed and, therefore, much more difficult to accept exchanges with the external environment. The artifacts proposed by researchers through the design science research (DSR) strategy can be perceived by the organization's practitioners (the insiders) as an external element to the organization. The term contingency is related to the issue of social dependence, that is, the acceptance and use of the artifact goes through the appropriation of the artifact by the people of the organization.

The GD approach can be understood as a triangulation between the DSR strategy and the Grounded Theory (GT) strategy (Corbin & Strauss, 1990; Glaser & Strauss, 1967). Rohde et al. (2017) proposed the triangulation between DSR and GT to provide a method that allows the insertion of technological artifacts with less rejection and more acceptance by the organization's user community. GD can be understood as a set of principles for the development of artifacts, described in

Table 3.3, which are supported by concepts coming from practice theory. In the next subsection we will discuss the central concepts of practice theory.

Practice theory. The artifacts developed from the DSR, such as the GD, can be operated within the context of a personal tool, for example, by a freelance professional, or be directed to a community of professionals who collaborate within an organization or a set of organizations that operate in a network. The broader the community of people involved in the operation of the artifact, the more complex and challenging the process of appropriating the artifact by the community of

Table 3.3 Principles of Grounded Design

Principle	Description
Pre-study/context study	The designers must have a strong involvement and insertion with the community of future users, that is, those who experience the difficulty that is the object of the artifact, in order to understand their social practices
Working on the artifact	The design of the artifact should be understood as an appropriation process of the artifact by future users. For this, it is essential that the inputs, actions and outputs of the new artifact are interpreted by users within the context of their social practices. The central idea here is to ensure the use and effectiveness of the artifact
Working with the artifact	To evaluate the utility and usability of the new functions of the artifact, users must use it. From the use, they try to make sense of the new functions for carrying out their work, considering new ways of performing their work, as well as new improvements necessary to the artifact in development. In this way, a process of *learning by designing* is established
Building the knowledge base	Each tentative design of the artifact should have the results of its use properly observed and recorded in the form of *design case study* (DCS). This record should contain information on the design options considered, as well as the appropriation process and the effectiveness of the artifacts' functions and the emerging new social practices
Meta-analysis	The results of various DCS recorded in the knowledge base can undergo meta-analysis with the aim of identifying cross-sectional similarities and differences. This can lead to some patterns or common design characteristics (structural configurations) that can be typified for the artifact already considering specific properties or requirements of social practices for necessary appropriation activities
Evolutionary project organization	Create the organizational culture of developing and updating artifact designs in a strongly participative way with users and adhering to the requirements of social practices for necessary appropriation activities

Source Rohde et al. (2017)

practitioners will be. The GD addresses this aspect of the effective use of the artifact by the practitioner(s), which often implies a change in behavior, abandoning one practice and adopting another. This transformation of the practice developed by a professional requires not only the replacement of one tool with another, but is characterized as a systemic change that involves structures and social relations.

Practice theory helps practitioners of pragmatic approaches, like DSR and GD, to understand the various systemic components involved in the effective appropriation of an artifact by a social group. According to practice theory, a work practice involves various dimensions such as: materiality and embodiment, structure, and cognitive-mental processes. According to Giddens (1984), the structure dimension is characterized by rules (shared knowledge). The materiality and embodiment dimension is composed of artifacts, bodies or natural objects that contribute to the formation of practices. The cognitive-mental processes dimension covers non-material aspects, such as emotion and affectivity linked to practice, it is configured as codes that characterize for the practitioner the essence of the practice.

The researcher, by following the use of the artifact by practitioners, in terms of what they are doing and saying in relation to the new artifact, constitutes a path to understand and analyze how to overcome resistances or difficulties arising from the force of habit linked to internalized routines. The recording of this information with each new adjustment in the artifact's design, through the design case study (see principle "Building the knowledge base" in Table 3.3), as proposed by GD, brings important inputs. The application of coding and content analysis techniques to these inputs, as proposed by Grounded Theory, allows researchers to analyze the effectiveness of the artifact in terms of its appropriation by practitioners.

3.4 Examples of Pragmatic Research in the Field of Administration

As examples of research that applied the strategy **case study** in the field of Administration we have:

Gianiodis, P. T., Ettlie, J. E., & Urbina, J. J. (2014). Open service innovation in the global banking industry: Inside-out versus outside-in strategies. *Academy of Management Perspectives, 28*(1), 76–91.

Obermayer, N., Kővári, E., Leinonen, J., Bak, G., & Valeri, M. (2022). How social media practices shape family business performance: the wine industry case study. *European Management Journal, 40*(3), 360–371.

Raffaelli, R., DeJordy, R., & McDonald, R. M. (2022). How leaders with divergent visions generate novel strategy: Navigating the paradox of preservation and modernization in swiss watchmaking. *Academy of Management Journal, 65*(5), 1593–1622.

As examples of research that applied the strategy **design science research** in the field of Administration, we have:

> Moretto, V., Elia, G., Schirinzi, S., Vizzi, R., & Ghiani, G. (2022). A knowledge visualization approach to identify and discover inner areas: A pilot application in the province of lecce. *Management Decision, 60*(4), 1132–1158.
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> Trabucchi, D., Buganza, T., Bellis, P., Magnanini, S., Press, J., Verganti, R., & Zasa, F. P. (2022). Story-making to nurture change: Creating a journey to make transformation happen. *Journal of Knowledge Management, 26*(11), 427–460.
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> Xu, H. (2020). Minimizing the ripple effect caused by operational risks in a make-to-order supply chain. *International Journal of Physical Distribution & Logistics Management, 50*(4), 381–402.

At the time of writing this book, there were no articles published in the main journals in the field of Administration developed with the use of the strategy **grounded design**. It is important to remember that this is a recent approach and originates from the area of technology.

Questions for Reflection:

1. Identify in the repositories of scientific articles (web of science, ProQuest, EBSCO, Jstor, …) some research that used the case study strategy and check which analytical techniques were employed. Try to identify if there are indications of the application of the techniques pattern matching, explanation building, time-series and logic-models.
2. What is the relationship between the meta-requirement and meta-design in the development of an artifact through the DSR strategy?
3. How does the grounded design strategy expand and improve the design science research strategy? Consider in the development of your answer the terms: self-referentiality, contingency and design case study.

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