

Digital Transformation of Public Services from the Perception of ICT Practitioners in a Startup-Based Environment

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Abstract: In 2021, the Brazilian government created the StartUp GOV.BR program to accelerate the digital transformation of the public sector in Brazil. Inspired by the business's culture of startups, this program gathers ICT practitioners with multiple competencies dedicated to the planning, development and delivery of digital transformation projects. This article aims to investigate and understand the perception of these ICT practitioners about the StartUps GOV.BR program in order to identify possibilities for improvement. For this, we conducted 23 focus groups with up to 12 people, totaling 175 participants. Then, we fully transcribed and qualitatively analyzed the data from each of the focus groups based on the Grounded Theory. The results were organized and structured through the construction of models of relationships between categories, along with narratives that help to explain and understand the members' perception of the StartUp GOV.BR program. As results, we present 34 improvement points and 62 actions to be carried out towards program improvement. The results achieved in this work can contribute to delineate growth strategies, as well as the assets and capabilities required in order to successfully transform digitally public services not only in Brazil but also in governments around the world.

1 INTRODUCTION

The evolution of Information and Communication Technologies (ICT) has provided numerous relevant resources for managers in private and public organizations to rethink their processes and services (Leão and Canedo, 2018). For the public sector, each service or process integrated into the digital environment contributes a little more to the efficiency of the machinery of government. This movement has been called Digital Transformation, which is the transition from a conventional, manual and even inefficient operational model to integrated, agile and interconnected environments that bring efficiency and quality to work (Canedo et al., 2020); (Leão and Canedo, 2018); (Pedrosa et al., 2022). Governments around the world have been very attentive to the importance of digital transformation (Ines Mergel

et al., 2019); (Scupola and Mergel, 2022); (Bravo et al., 2021). However, for this transformation to occur, a plan is needed to create procedures, techniques and tools that improve both planning and teamwork (Correa et al., 2022).

The implementation of methodologies for structuring and controlling Digital Transformation activities is a major challenge for governments around the world (Gong et al., 2020). In Brazil, one of the methodologies adopted by the government to accelerate Digital Transformation was to implement an innovative program, called StartUp GOV.BR, which is analogous to the business process known as a startup. In startups, companies that have recently begun operation and thus have no operational history must develop or improve a business model in a scalable and disruptive way (Bortolini et al., 2018). In the StartUp GOV.BR program, instead of companies, services or processes are created using digital technology and/or other more profitable and practical solutions towards a more effective and efficient digital transformation.

The StartUp GOV.BR program was established in March 2021 by the Digital Government Secretariat

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(SGD) of the Brazilian Ministry of Economy (ME), which selects strategic digital transformation projects that have a high impact on the population and allocates a group of ICT practitioners dedicated to the planning, development, and delivery of these projects. The expertise of the ICT practitioners covers several areas of knowledge, including project management, information security, user expertise, software development and data science. Allocating this multidisciplinary team aims for meeting the demands for technological and innovative solutions, making digital transformation processes more practical and agile.

This paper aims to investigate and understand the perception of ICT practitioners (members of StartUps) about the program after 1 year of its beginning. For this purpose, we conducted 23 focus groups with up to 12 people, totalling 175 participants. Data from each of the groups were fully transcribed and analyzed qualitatively based on Grounded Theory (Carver, 2007).

2 METHODOLOGY

We adopted a methodological process consisting of four phases: Planning; Data collection; Data analysis and interpretation; and Writing. The data collection procedure comprised 23 interviews with focus groups (Kontio et al., 2004) composed of up to 15 people that played different roles in several startups. Two weekly meetings were held to ensure the participation of at least one startup professional in at least one of the weekly meetings. The guiding questions were:

- Q.1. What is your perception of the StartUp GOV.BR program?
- Q.2. How do you perceive the performance and internal functioning of the startups?
- Q.3. How do you perceive the external context of the startup?
- Q.4. How do you perceive the relationships between the startup, ME and other organizations?

All meetings were online and lasted up to two hours. An interview script was followed: 1. First contact: the facilitator started the meetings by introducing himself and explaining the purpose and relevance of the research, as well as the need for collaboration of the interviewees. The confidentiality of all the information disclosed during the session was emphasized. The interviewees also introduced themselves by telling their name, their background, and the StartUp they belonged to. 2. Question

formulation: the guiding questions were made one at a time, and participants were free to speak at will. Further details were requested when necessary. 3. Recording of responses: all sessions were transcribed (with consent from the participants) to ensure greater accuracy and veracity of the information. 4. Closing: the interviews were closed cordially.

The principles of Grounded Theory were applied in the analysis and interpretation of the results. According to (Carver, 2007), elements of Grounded Theory can help researchers both in exploratory studies (to generate hypotheses) and in confirmatory studies (to identify evidence that does or does not support the hypotheses). According to (Merriam and Tisdell, 2016), analyzing data means answering the research question. This is often conducted through the coding approach established by (Corbin and Strauss, 2014), which is divided into three phases: 1) Open coding: it is performed at the beginning of data analysis and consists of marking any data unit that may be relevant to the study and outlining concepts to represent blocks of raw data. At the same time, concepts are qualified in terms of their properties and dimensions (Corbin and Strauss, 2014), (Singer et al., 2008); 2) Axial coding: it is the process of relating the categories and subcategories identified in open coding, refining the category scheme (Corbin and Strauss, 2014); and 3) Selective coding: it means to develop the central categories, propositions, or hypotheses. To do so, the researcher must reflect on how the categories and their interrelationships can lead to the development of a model or even a theory to explain the phenomena (Corbin and Strauss, 2014), (Seaman, 2008).

Parallel to the three coding phases, three levels of abstractions were used to organize the data: 1. code, extracted from raw data; 2. concept, which points the researcher's interpretations of a set of codes; and 3. category, a grouping of concepts that allows the researcher to reduce and combine data. Data were constantly compared during the analysis. According to (Merriam and Tisdell, 2016), comparing one data segment with another helps to determine similarities and differences between them. The general objective of constant comparison is to identify patterns in the data. Patterns are then organized in terms of relationships with each other in the construction of the theory (Corbin and Strauss, 2014).

Twenty-three interviews were carried out with the focus groups from February 2022 to May 2022 with the participation of 175 ICT practitioners. This sample represents practitioners from all 25 startups of the StartUp GOV.BR program and the 7 roles played by them. The focal group sessions

were held remotely through Microsoft Teams, which made it possible to connect people from the Federal District and 13 states of Brazil. The participants work in different entities of the Brazilian Public Administration.

Data analysis was performed using Ground Theory ((Corbin and Strauss, 2014). The codes, concepts and categories were identified based on the data collected, avoiding the use of preconceived logical hypotheses. The entire process of coding was performed by three authors of this research with the help of the MAXQDA¹ tool. First, the open coding of focus groups was done based on the selection of text segments and the assignment of codes to them. For each participant of each focus group, codes were generated that were constantly compared with each other (within the same focus group and between focus groups) to identify similarities and differences and, consequently, patterns in the data (Merriam and Tisdell, 2016). Furthermore, the codes were structured iteratively. Three researchers participated in this coding phase. Thus, every time the files used by the researchers were unified, the lead researcher compared the codes created by the two other researchers for coherence. It is important to mention that the researchers participated in different focus groups. Second, the categories were built. The codes were grouped into concepts, and the concepts were grouped into categories. As the coding process took place, a set of relationships between concepts around categories was identified. Based on this, narratives were constructed that helped to answer each of the guiding questions. It is important to highlight that the entire process of data analysis was supported by the writing of memorandum, which helped the researchers to keep their partial records and their reflections on the codes, concepts and categories that emerged throughout the research process (Corbin and Strauss, 2014), (Glaser, 2011).

3 RESULTS

The participants' statements in all focus groups were transcribed and duly anonymized. This transcription generated 23 documents with 1,490 coded text segments, which gave rise to 73 concepts (groupings of text segments) and 20 categories (groupings of concepts). In the following, the obtained results will be presented with a focus on the categories and the derived concepts, according to the four guiding questions.

¹<https://www.maxqda.com/pt>

3.1 Q.1

Q.1 is a broad question related to the perceptions of ICT practitioners about the StartUp GOV.BR program. The data that helped to answer this question are organized within the category 'StartUp GOV.BR program', which is composed of six concepts as shown in Figure 1. The concepts of the category 'StartUp GOV.BR program' are:

- **Idea:** this concept encompasses data referring to the practitioners' perception of the idea of the StartUp GOV.BR program. Repeatedly, the evidence points to a shared perception that it is an 'excellent', 'very good', 'sensational', 'positive', 'relevant' idea. There are also reports on the scope of the program. Several experts reported that they had no idea of such scope, which they see as a very positive thing. Also, some data show that the idea of the program is revolutionary, audacious, ambitious and necessary for the government.
- **Government:** repeatedly, the evidence indicates that experts are concerned about the change of government and the continuity of the StartUp GOV.BR program. There is a strong consensus among focus group participants that the program must be kept independent of the government. In addition, data indicate that the Brazilian State will be much more agile and digital as the program continues in the future.
- **Innovation:** the data indicate that the innovative character of the StartUp GOV.BR program is one of the great motivations and appeals for specialists to want to take part.
- **Maturity:** the evidence points to a strong consensus among specialists that the StartUp GOV.BR program needs to mature in terms of its work strategy, allocation of practitioners, and choice and definition of projects. In addition, certain amateurism is still reported in the program, conceding that there is a learning process for those involved (SGD, startup, partners organizations) and expecting great perspectives for the future.
- **Startups:** the data indicate that practitioners like the mode of work, structure and organization of startups, and are excited to see their benefits. Some data point to startups as a driving force that enables projects in various government bodies. Also, some reports register the impossibility of using agile methodologies, as well as practitioners frustrated with the difference between the idea of the StartUp GOV.BR program and the daily

experience of startups. The prior preparation of the startups is considered essential in terms of planning and business knowledge before establishing a solution.

- **Digital Transformation:** this concept concerns the practitioners' view of digital transformation in the government. The evidence points to two groups of data: 1) Benefits of Digital Transformation: the most mentioned benefit is the ease and improvements in the provision of government services to the citizen. Some reports point to digital transformation as a disruptive and evolutionary process. 2) Barriers to Digital Transformation: bureaucracy and the government's need for a change in mentality are indicated as major barriers to digital transformation.

The following narrative helps to answer Q.1:

“Specialists believe the StartUp GOV.BR program is an excellent innovating idea which presents itself as a great appeal and motivation for practitioners interested in being part of the startup. The possibility of facilitating and improving citizens' lives through digital transformation is seen as an important benefit of the program. Practitioners like the startups' work modes, structure and organization, and are excited to see the possible results of the program. Currently, it is understood that the program needs to mature in terms of its work strategy, allocation of practitioners, choice and definition of projects. Finally, practitioners are concerned about the continuity of the StartUp GOV.BR program as the government changes. For them, the program must be kept independent of the government, so that the Brazilian State can be more agile and digital in the future.”

3.2 Q.2

To answer Q.2, Q.3 and Q.4, the participants of the focus groups addressed not only the internal functioning of the startup but also its external relations (with the organization in which it is located, with third parties, and with the Ministry of Economy) and political and bureaucratic context, work processes external to the startup, work agreements, etc.—that is, a set of other aspects that impact the performance and functioning of startups to a greater or lesser extent.

To support the identification and organization of the set of categories, concepts and relationships, we used the models on teamwork proposed by (Gladstein, 1984), (Cohen, 1993), (Hoegl and Gemuenden, 2001), (Lindsjörn et al., 2016) and (Marsicano, 2020). This strategy aims to make sense

of the grouping of code sets into a given concept and category, thus bringing greater consistency and meaning to the data, given the complementary use of empirical data and conceptual models.

To answer Q.2, it is important to highlight that the internal context of startups means everything that involves their members (essentially, the practitioners), their internal relationships, the composition and structure of the team, their infrastructure and work characteristics, and their results. The organization, the work agreements and the availability of information, which have a direct relationship with the startup, are also considered part of this context. Thus, the internal context of the startup has two groups of categories: core and support. Core categories are those that relate to a set of essentially internal characteristics and support categories are those that refer to a set of characteristics that directly support the core categories. Figure 1 the concepts of these two categories. Based on the set of data resulting from the focus groups (categories, concepts, codes and models), we present the narrative that helps to answer Q.2:

“Startups work centered on teamwork, whose inputs are team design, organization and work agreements. In team design, startups have a facilitating and committed leadership, as well as clarity about work objectives, even though teams are inadequately sized and lack a proper understanding of their roles and responsibilities. The teams are made up of mature, proactive, resilient, heterogeneous people with technical skills suited to the job. However, startups lack autonomy. Practitioners face difficulties in being allocated to activities according to their experience. When this happens, they feel underutilized and have an increased need for training courses to improve their individual performance. The work agreements need to be clear from the beginning of the contract and the lack of health insurance and a career plan, as well as the low salary and the duration of the contract, are factors that contribute to weakening the relationship between practitioners and the StartUp GOV.BR program, increasing the high turnover rate. On the other hand, remote work strongly favors the feasibility of startups. According to practitioners, the team members are aware of the need for evolution and maturation in the use of agile approaches, help each other, share their knowledge and experiences, have fluid communication and good internal coordination, and have feelings of belonging and unity. At the individual level, practitioners report learning (new technologies, roles, work models), satisfaction, engagement and commitment to work and deliveries. On the team's

side, meeting deadlines is difficult, although there is satisfaction with the quality generated and the results produced for society. Regarding teamwork and the results expected, practitioners mention the lack of an adequate work infrastructure (tools, processes and reference methods) and the difficulty to obtain the necessary information for carrying out the work as points that make it hard to generate results. This is enhanced by characteristics such as work overload and pressure, the need for interaction with different actors (entities, areas, technical partners), the size and complexity of the products, and the lack of compliance with some premises needed for carrying out the work of startups.”

3.3 Q.3

Q. 3 is related to the perception of ICT practitioners on the external context of the StartUp GOV.BR program. The external context is understood as everything that goes beyond the internal context, that is, the organization in which the startup is located, as well as its work processes, structure, political and bureaucratic context, and partners. Figure 1 shows the categories of the external context of a startup. The narrative that helps to answer Q.3 is:

“Practitioners perceive the external context of a startup as the context of the organization in which it is located, encompassing the political and bureaucratic scenario, the environment (culture and technical infrastructure) and the work processes; the relations and communication between the startup, the organization and technical partners; and the organization’s knowledge and understanding about the startup. According to the specialists, the political instability, the vertical and segmented structures of the organizations, a non-agile culture, the lack of an adequate technical infrastructure, the delay in hiring public or private software factories and in signing Technical Cooperation Agreements are obstacles for the startups to carry out their work. When looking at the startup’s relationship with the organization in which it is located, although there is support and sponsorship from the top management, startups are viewed with distrust in the beginning. Over time, it is possible to establish a good (enriching) partnership between startup and organization, although some are more resistant to it. Specialists also feel a lack of engagement from in-house servants and business areas with the project that is being developed. Associated with this and the lack of knowledge about the organization, the greatest difficulty for startups is in identifying and/or having access to people with whom they must have a technical or

business relationship. Regarding the relationship between startups and technical partners, there is a lack of alignment and integration between the startup and the IT of the organizations; therefore, the relationship with public or private third parties tends to be difficult, conflicting and/or limiting. The communication with the organizations has some noise, which tend to be solved due to the good inter-locution carried out by the project managers. Finally, some organizations lack knowledge about what the startup is, its projects, objectives, roles, and responsibilities; startups are sometimes seen as inspection and audit teams, and specialists as are seen as outsourced.”

3.4 Q.4

Q.4 is the work of the SGD (institution coordinating the program) and its relations with startups and organizations involved in projects of digital transformation. Based on the qualitative analysis of the focus groups, we defined one category (‘Role of the SGD’) and we identified six concepts, as shown in Figure 1. The narrative that helps to answer Q.4 is:

“For practitioners, although there is a feeling of satisfaction with the individual and collective support that the SGD offers to startups, problems are mentioned regarding the (inadequate and slow) allocation of personnel and the communication between the startup and the SGD, which is sometimes seen as stressful and lacking proper disclosure of projects, technologies, tools and standards that can be used or serve as a reference by startups day to day. There is a lack of guidance from the SGD, especially during the startup formation and the beginning of work. Regarding the monitoring of the work, some participants of the focus groups believe it makes no sense to compare and rank the startups because their projects differ in nature and their contexts are unique. In addition, an incongruity is pointed out regarding the requirement for long-term planning, since startups are required to act based on agile methodologies. Concerning the practices implemented by the SGD, the specialists wish the meetings of tribes were carried out separately to discuss more technical topics. Finally, concerning the relationship between the SGD and the partner organizations, specialists believe there is a lack of communication, proximity, alignment and knowledge about what happens in the organizations and in the startups day-to-day.” Figure 1 presents the 20 categories and the 73 concepts identified during the qualitative analysis of the data.

4 DISCUSSIONS

In the StartUp GOV.BR program, the initial idea is that the StartUp teams are oriented towards agility, based on the following premises: cross-functional teams, working from end to end, using agile approaches, and making quick and frequent deliveries. With regard to cross-functional teams, the temporary hiring model favored the construction of teams of specialists. However, the lack of one or another specialist causes the non-completion of a set of activities, for example. From an agile point of view, cross-functional teams should be made up of people capable of performing multiple roles, not just specialized roles (data science, developer, UX, etc.). Even for the formation of teams with several specialists, StartUps suffer from a lack of human resources (quantity and skills). For example, there are teams with only a manager, a process analyst, and a data scientist. In addition, a group of junior professionals is identified, or those looking to change careers, and make StartUp their first experience.

The idea of end-to-end work is for StartUp to be able to carry out all the work until the delivery of the software solution to the customer. During this research, some barriers to end-to-end work were identified: professional profile restrictions (inadequate skills or quantities); software product development policy of some public Institutions that hinder or prevent StartUps end-to-end work; and in many cases, StartUps began to relate beyond the SGD and its public Institution, with technical partners (public or private), thus losing their ability to act from end to end. In this scenario, a set of StartUps has acted only as a kind of project relationship and follow-up team, which: helps to establish the scope, performs the planning and follow-up of the project, identifies high-level requirements and, in some cases, builds prototypes, and sends them to technical partners (public or private), who will, in fact, build the software solutions.

On using agile approaches, what gives support and meaning to the use of agile practices are their values and principles. If these values and principles are weakened, then practices tend to become inefficient. In some cases, this is the scenario of StartUps. To overcome this drawback, each StartUp tries to use one or another agile practice that can facilitate their work but also has to maintain practices and/or artifacts of plan-driven approaches.

Difficulties in adopting agile approaches in the StartUp GOV.BR Program causes: fragility in sustaining agile values and principles; the lack of knowledge and experience, from top management to

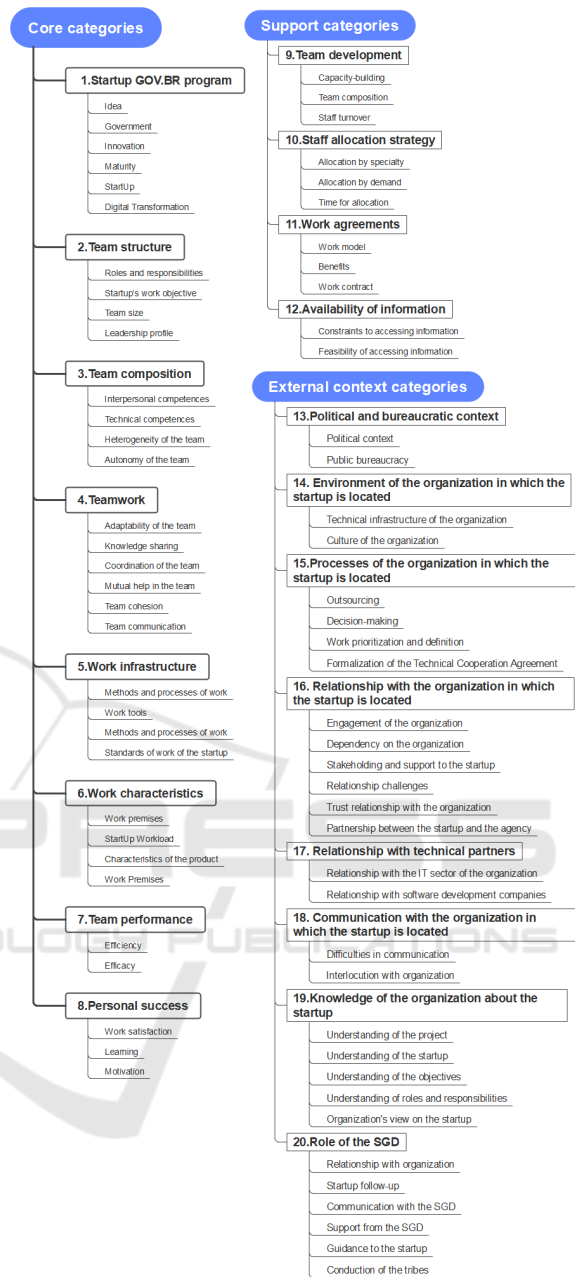


Figure 1: Categories and concepts of the internal and external contexts of startups.

the technical level; vertical structures and difficult communication; the need for command and control, with the requirement of long-term planning; the political environment of public Institutions, which sometimes makes decisions to the detriment of the technical context; treatment of requirements as fixed or stable from the beginning of the project (in some cases); the resistance from a non-agile culture on the part of some public Institutions. Given all this context, making quick and frequent deliveries also

becomes a major challenge for StartUps. The culture of some public institutions makes it difficult to carry out small partial deliveries, favoring the delivery of large scopes over a longer period of time. On the other hand, it is still possible to identify a set of public institutions that are favorable and support the implementation of an agile culture in their internal processes. Which favors part of the StartUps in carrying out fast and frequent deliveries.

Faced with so many challenges and possibilities related to the StartUp GOV.BR program, we proposed 34 points for improvement and 62 actions in order to help to maximize the generation of results, to mature the program, as well as to define strategies for the coming years. Each point of improvement and action was related to one or more categories and concepts identified in the data analysis process. In addition, for each action, those responsible for its execution, the target public, and its possible impacts are identified.

5 THREATS TO VALIDITY

To increase internal validity, we performed data triangulation using (i) multiple methods and (ii) multiple data sources. Concerning (i), data was collected through complementary methods: interviews, document analysis and questionnaire (Easterbrook et al., 2008), (Merriam, 2009), (Creswell, 2017). Regarding (ii), data were collected longitudinally with the same people, but with different roles and perspectives (Merriam, 2009). Another strategy adopted was member checking (Merriam, 2009), in which some participants gave feedback on the emerging results.

In qualitative research, the most important question is whether it was supported by data collected without bias from the researchers. To minimize this threat, field journals were kept which can be verified by external auditors. Regarding external validity, the results of this study will be transferable rather than generalizable. To improve transferability, the “rich, thick description” strategy was used (Merriam, 2009) to provide a detailed description to the reader, enabling them to replicate the study and verify whether the results of the original study can be transferred (Merriam, 2009). In addition, we used the maximum variation strategy, in which teams were selected randomly to achieve greater diversity and allow a greater range of applications of the results of this research.

6 CONCLUSIONS

This paper presented an analysis of the data collected from 23 interviews with professionals participating in the StartUp GOV.BR program. According to the perception of ICT practitioners, building multi-functional teams to work on projects that use agile methodologies, which aim to generate quick and frequent deliveries, had difficulties in finding a friendly work environment. Startups suffer from a lack of qualified human resources to compose cross-functional teams. The general shortage of software development profiles skilled in requirements, construction and testing imposes technical restrictions on startups. There is also a lack of UX professionals, which limits the ability of startups to act from the point of view of user experience. Practitioners reported that their startup teams were composed only of project managers, process analysts, and an infrastructure and/or data science profile.

Regarding the profile of temporary practitioners, it was reported that hiring generalist professionals instead of specialists may be more appropriate within the work context of startups. In other words, it may be better to hire professionals who have multiple knowledge, or even to define a mixed contract, involving specialists and generalists, to provide greater flexibility in the allocation and work of these practitioners in the phases of the life cycle. About startups working end-to-end on their projects, the restrictions of professional profiles, combined with the policy of some organizations on the development of software products, need to be improved. In many cases, startups began to relate with technical (public or private) partners, besides the SGD and the organization. Thus, they lost the possibility to work end-to-end. Currently, a set of startups act as a kind of project relationship and follow-up team—they help to establish the scope, do the planning, identify high-level requirements, in some cases even build prototypes, and pass the material on to third parties and/or private software factories that will actually build the solutions.

Regarding fast and frequent deliveries, the culture of some organizations makes it difficult to make small partial deliveries, favoring the delivery of large scopes in a deadline longer than six months. Despite this, some startups have managed to make smaller deliveries. This needs to be carried out little by little, gaining the trust of the customer who is unfamiliar with a culture of agile deliveries and is used to receiving large systems at once.

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