


Digital Transformation of Public Services in a Startup-Based Environment: Job Perceptions, Relationships, Potentialities and Restrictions


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Abstract: Digital transformation in public administration needs to be accompanied by more dynamic and intelligent strategies, which effect cultural change. Inspired by the business culture of startups, in 2021 the Brazilian government created the StartUp GOV.BR program to develop and accelerate the development of digital transformation projects within the Federal Government. This program aims to make digital transformation processes more proactive and flexible and generate more profitable operations. In this work, we investigated the perception of ICT practitioners (members of startups) about the program and the issues that surround it. Our goal was to identify relations, potentialities and restrictions of this program to contribute to outlining growth strategies, as well as the assets and capabilities needed to successfully transform digital public services in a startup-based environment. For this purpose, 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 Grounded Theory. As a result, we developed maps of relationships between categories, along with narratives that help explain and understand the members' perception of the StartUp GOV.BR program. We also listed 34 points for improvement and 62 actions to be taken to improve the program. The results achieved in this work can contribute to a research agenda of initiatives towards the Digital Transformation of public services in governments around the world combining innovative digital strategies based on the perspective of professionals.

Keywords: Digital Transformation, Public Services, Perception of ICT Practitioners, Enterprise Content Management

Categories: D.2.1.1, D.2.2, D.2.4, I.2.4

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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 & Canedo, 2018, Heberle et al., 2017]. 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 & Canedo, 2018, Pedrosa et al., 2022].

Digital Transformation emerged as a way to simplify procedures and processes, transforming them into less bureaucratic actions [Leão & Canedo, 2018]. The optimization of these activities in an organization can lead to a reduction in time and resources that are used to execute a process. In addition, Digital Transformation can lead to an improvement in citizen service, leading to resource savings, both by citizens and by the public administration, which is essential in the current scenario [Sarwar et al., 2023, Zygiaris & Maamari, 2023, Irani et al., 2023]. Therefore, governments around the world have been very attentive to the importance of Digital Transformation [Ines Mergel et al., 2019, Scupola & 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].

Nowadays, digital transformation has an increasingly notable impact on the development of non-urban and urban areas, allowing their inhabitants to communicate with the authorities, benefit from novel products and services, and access services advanced solutions. The experience of developed countries shows that dynamic improvements are observed in those regions where industrial or innovation clusters are formed. A good example of such an innovation cluster is the Finnish city Oulu. After the bankruptcy of the a big organization, the previously created innovation cluster made it possible to overcome the crisis quickly, allowing to generate new jobs and attracting new organizations [Demin et al., 2023].

Digital transformation and resultant business model innovation have fundamentally altered citizens' expectations and behaviors, pressured traditional organizations, and disrupted numerous services. Citizens have access to dozens of media channels, actively and effortlessly communicate with organizations and other citizens, and pass through rapidly increasing number of touchpoints in their citizen journey, many of which are digital. At the organization level, many traditional organizations have been surpassed by innovative fast-growing digital entrants, and suffered as a result of this [Verhoef et al., 2021].

Despite all the benefits found in the literature, the Digital Transformation presents some challenges for all organizations, although they significantly contribute to the country's economic growth. Despite its medium- and long-term benefits, studies show that digital transformation goes ahead with significant challenges for organizations. They struggle with introducing to introduce digital innovations, and to remain competitive in an increasingly digital environment. Thus, organizations must overcome these challenges [Petzolt 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 similar to the business process known as 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 (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]. 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 professionals' perception of the StartUp GOV.BR program. We point out 34 issues and 62 possible actions to be carried out towards program improvement.

This paper contributes to building a scientific knowledge base and development of a research agenda to stimulate the cumulativeness of future research in the multiple domains of the Digital Transformation. The results of this study may enhance and improve not only the StartUp GOV.BR program but also the initiatives of other governments and countries towards the Digital Transformation of their services. Table 1 explains the abbreviations necessary for understanding the research.

Abbreviation	Definition
SGD	Digital Government Secretariat
UX	User Experience
ME	Ministry of Economy
DGS	Digital Government Strategy
P	Potentiality
R	Retraction
SEME	Special Secretariat for State Modernization
DOU	Official Diary of the Union
IPO	Input-Process Outcomes
IC	Internal Context
OC	Organizational Context
EC	External Context
RC	Relational Context

Table 1: List of Abbreviations

2 Background

2.1 StartUps

In March 2021, the Digital Government Secretariat (SGD) of the Brazilian Ministry of Economy (ME) instituted the StartUp GOV.BR program, which is analogous to the business process known as a startup. Startups are emerging companies aimed at growing quickly and offering innovative products or services to meet a market need or bring incremental innovation to existing products [Choma et al., 2022]; [Lermen et al., 2023]. Most business models of startups are based on digital technology [Weiblen & Chesbrough, 2015]. The main goal of digital startups is to develop a plethora of viable and innovative products and services, focusing on delivering value to potential users [Lermen et al., 2023]. Also, startups can enhance their own growth and develop solutions in a more profitable way [Souza et al., 2021].

The teams involved in startups and in the StartUp GOV.BR program help in the digital transformation focused on providing citizens with more intuitive and accessible services. The teams are organized to be focused and agile in the delivery of products since the professionals dedicate themselves exclusively to each challenge or project. As the objective is to improve the quality of digital services, even those already available to citizens, the teams count on specialists in user experience, security of the information and data science, for example. There is also continuous contact with users, collaboration with the private sector and fast testing and adjustment cycles throughout the projects.

The implementation of each StartUp goes through well-defined milestones, aiming at greater control of end-to-end projects:

- Prospecting - Preliminary feasibility study, adequacy to the Digital Government Strategy (DGS) and analysis of the impact on the citizen of each project to be implemented.
- Executive Summary and Executive Meeting - Meeting with the leadership of each agency involved in the project for the definitions, initial goals and approval of the inclusion of the project in the StartUp GOV.BR program.
- Leader Appointment and Leader Presentation - Effective employee of the agency responsible for leading StartUp, which acts as an interlocutor between the SGD and the agency responsible for the project.
- Scope Definition and Validation - Clear, objective and quantifiable definition of project deliverables.
- Technical Cooperation Agreement and Digital Transformation Plan - Contract signed by the parties which, when published in the Official Diary of the Union (DOU), initiates the project. It is the formalization of StartUp, in accordance with Ordinance SGD/ME nº 2.496, of March 2, 2021 ¹.

After each startup is deployed, follow-up work is started which takes place cyclically until the end of the project. It includes backlog reviews, update of indicators, project status reports, executive meetings, and communication between the teams involved. The project monitoring strategy includes weekly project status reports; biweekly meetings between startup leaders and focal points at the SGD and the Special Secretariat for State Modernization (SEME); and Strategic Plan Committee meetings. Currently, the program has 25 startups – 9 in operation, 10 in development and 6 in diagnosis.

¹ <https://portal.in.gov.br/web/dou/-/portaria-sgd/me-n-2.496-de-2-de-marco-de-2021-306217522>

2.2 Temporary Practitioners

The ICT practitioners are hired on a fixed-term basis and allocated exclusively to projects of the StartUp GOV.BR program. Most of them work remotely from 14 Brazilian cities. Fixed-term specialists were hired from the following areas: 1. Business Process Analysis; 2. Data Science; 3. Software Development; 4. User Experience (UX); 5. Project Management; 6. Infrastructure of Communication and Information Technology; and 7. Information Security and Data Protection.

The expected deliveries for each of the profiles were designed according to their specializations, seeking the best results for the federal government's strategic digital transformation projects. Each of the projects presents several deliveries with important milestones throughout the trajectory of planning, development and execution. The teams use agile methodologies in the development of their day-to-day activities at StartUps.

2.3 Agility

According to Dybå and Dingsøyr [Dybå & Dingsøyr, 2008], agile development attracts enormous interest from the software industry worldwide. In the US and Europe, for example, a survey reveals that 14% of companies started using agile methods, and 49% became aware of them and interested in adopting them. The authors also point out that the Agile Conference has grown in just six years, attracting a larger audience than most other conferences in Software Engineering. Among the various agile methods used by software development teams in organizations, Extreme Programming [Beck, 2000],[Schümmer & Lukosch, 2009] and Scrum [Mishra & Abdalhamid, 2018] are still the best known and adopted. The latter has become more evident in recent years and has been adopted by most professionals in the software development area [Canedo et al., 2021].

According to Brietzke and Rabelo [Brietzke & Rabelo, 2006], organizations have sought to improve their processes to produce with higher quality, in particular the public sector, which has been under constant pressure to improve its performance to better serve modern contemporary society in the last 20 years [de Biazzini et al., 2009]. Agile methodologies generate both positive and negative perceptions, and they highlighted some gaps in the evidence on the application of agile methods in the software development process [Dybå & Dingsøyr, 2008].

The Agile Manifesto was configured as a tool that does not reject processes with their diverse documentation or the planning itself, but lists the importance of individuals and interactions and, mainly, the working software with the customer, enabling quicker responses to change [Fowler et al., 2001]. The Agile Manifesto contains 4 values and 12 principles. The values are [Fowler et al., 2001]: 1) Individuals and interactions over processes and tools; 2) Working software over comprehensive documentation; 3) Customer collaboration over contract negotiation; and 4) Responding to change over following a plan.

The Agile Manifesto principles are [Fowler et al., 2001]: 1) Prioritizing customer satisfaction through early and continuous delivery; 2) Welcoming changing requirements, even late in development. This will provide the customer with more satisfaction and competitive advantages; 3) Delivering working software frequently, within a few weeks; 4) Developers and business rules people working together side by side; 5) Seeking the staff's motivation invariably, giving them the necessary support; 6) Prioritizing the face-to-face conversation to convey the necessary information for development; 7) The software working in a short period as the measure of success; 8) Sustainable development. Sponsors, developers and users must be able to maintain a constant pace

indefinitely; 9) Increased attention and technical excellence, combined with good design, to enhance agility; 10) Simplicity; 11) Energized and self-organized teams; and 12) The team meeting at the end of each release to reflect on the work done, on where it went right, where it went wrong, and thus being able to improve its actions.

Studies on stakeholder perceptions reported their satisfaction with the opportunity to interact with development teams [Dyba & Dingsøyr, 2009]. Dybå and Dingsøyr [Dybå & Dingsøyr, 2008] presented evidence on the benefits of the presence of interested parties in the development team, mainly in the accuracy of defects. However, having stakeholders on site can be stressful and unsustainable for long periods. Regarding the benefits, some organizations that use agile methodologies also reported that employees are more satisfied in conducting their daily activities.

Regarding pair programming, some developers considered it an exhausting practice because it requires greater concentration [Dyba & Dingsøyr, 2009]. University students also perceived agile practices as relevant to their professional training for improving team productivity. On the other hand, pair programming was considered the most successful agile practice, as it allowed novices to assimilate programming techniques more accurately [Dyba & Dingsøyr, 2009].

According to Williams and Cockburn [Highsmith & Cockburn, 2001], agile methods work best with small teams of up to 50 people, who have easy access to business rules experts, when the project is large-scale. Despite that, there are challenges regarding small teams, as they must take care to maintain continuous improvement and automated testing [Nerur et al., 2005]. The StartUp GOV.BR program uses an agile methodology [Berg et al., 2020] in the execution of its projects and deals with these challenges in daily activities.

Startups inherently operate in environments characterized by considerable uncertainty and tight time constraints, aiming to deliver high-quality products or services. Faced with limited resources, a lack of organizational structures, operational challenges, and intense competition, startups often struggle to survive. To enhance their viability and ensure agility in service provision, startups must evolve their business strategies [Lima & Cursino, 2021, Lima & Cursino, 2021].

Agile software development methods play a crucial role in enabling startups to navigate this landscape by allowing quick responses to changes through iterative work cycles and continuous feedback loops. Aligning agile software development methods with a startup's business strategy promotes integration between teams and facilitates the digital transformation of services [Zielske & Held, 2021, Weiblen & Chesbrough, 2015, Ghezzi & Cavallo, 2020].

In practice, startups commonly apply agile software development methods implicitly, leveraging innovation to differentiate their products. The use of startup methodology further reinforces the benefits of the agile approach. Both approaches share fundamental principles, emphasizing flexibility, rapid iteration, and efficient adaptation to change [Lima & Cursino, 2021, Lima & Cursino, 2021, Berg et al., 2020].

The startup methodology, embracing an agile attitude, facilitates innovation, quick adaptation to the market, and the delivery of solutions based on continuous user feedback. Consequently, the integration of these two approaches—startups and agile methodology—complements each other, offering a dynamic and adaptable approach to project and product development, particularly within government contexts [Lima & Cursino, 2021, Lima & Cursino, 2021, Goncalves et al., 2020].

The adoption of agile methodologies extends beyond swift delivery; it encompasses broadening vision, meticulous process monitoring, proactive impediment management, and the capability to identify bottlenecks before they manifest. Teams embracing agile

techniques are more adept at responding assertively and safely to changes, consistently adapting to project and environmental demands. This approach offers increased flexibility, efficiency, and responsiveness—crucial elements for success in dynamic and ever-evolving environments [Gonçalves et al., 2021].

In this context, the methodology proposed in this research diverges from traditional approaches by offering greater flexibility, enabling organizations and teams to enhance the delivery of public services provided by the government.

3 Study Settings

This study aims to answer the following research questions:

- What is the perception of ICT professionals (startup members) regarding the StartUp GOV.BR program?
- What set of actions and improvements can be extracted from the perception of ICT professionals, for the maturation of the StartUp GOV.BR program?

Therefore, we adopted a methodological process consisting of four phases:

1. Planning: this first phase concerns defining the objective and planning the phases of the work, including research procedures and data collection techniques.
2. Data collection: at this phase, field research using focus group [Kontio et al., 2004] interviews (that is, participants were interviewed in group) was defined as the procedure to collect data. The focus groups aimed to: i) monitor the onboarding of the ICT practitioners in the startups; ii) promote the exchange of experience between professionals; iii) identify themes of interest and necessary topics to be taken to the meeting of the tribes; and iv) identify professionals or groups of ICT practitioners interested in speaking at the meetings of the tribes.
3. Data analysis and interpretation: at this phase, the data collected during the interviews are analyzed and consolidated through a process of encoding in which researchers use elements of the grounded theory to answer the research questions.
4. Writing: at this last phase, a final report is produced which presents the analysis of the results and the actions proposed.

3.1 Data collection

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 (focus groups) were held to ensure the participation of at least one startup professional in at least one of the weekly meetings. The research questions the focus groups were:

RQ.1 What is your perception of the StartUp GOV.BR program?

RQ.2 How do you perceive the performance and internal functioning of the startups?

RQ.3 How do you perceive the external context of the startup?

RQ.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.

3.2 Analysis and interpretation of the results

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 & Tisdell, 2016], analyzing data means answering the research question. This is often conducted through the coding approach established by [Corbin & 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 & 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 & 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 & 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 & 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 & Strauss, 2014].

3.3 Focus groups

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.

3.4 Qualitative Data Analysis

Data analysis was performed using Ground Theory [Corbin & 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 MAXQDA² 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 & 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. Figure 1 presents an example of the relationship construction process. It is important to highlight that the entire process of data analysis was supported by the writing of a 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 & Strauss, 2014], [Glaser, 2011].

3.5 Validation of the models

During the conduction of the research, the models were validated in three forms based on the qualitative analysis of the data: 1. **Coders' peer review**: four cycles of review were carried out by the researchers to ensure the integrity and accuracy of the reporting of the findings. In this phase, not only the models but also all the intermediate products generated during the coding process were reviewed. 2. **Review with the SGD**: The models resulting from the data analysis were presented to at least two representatives of the SGD per session. After appreciation and discussion, the models were adjusted to meet the demands of the review process whenever necessary. 3. **Review among researchers**: the focus group interview sessions were conducted and observed by different researchers. Therefore, the models were also reviewed by the other authors of this paper.

4 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, defined in Section 3.1.

² <https://www.maxqda.com/pt>

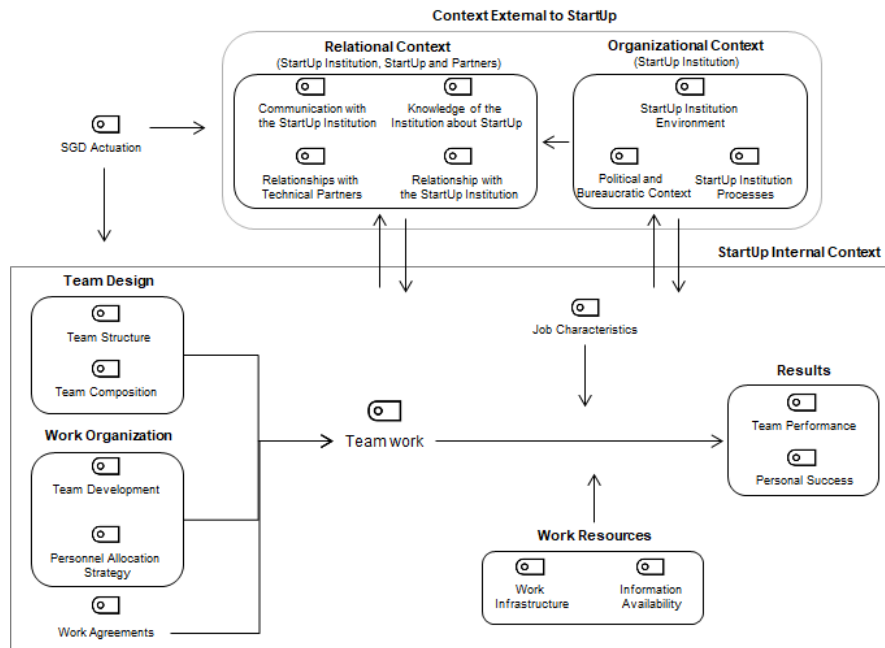


Figure 1: Map of categories, concepts and relations with a focus on the internal context of the startups.

4.1 RQ.1. What is your perception of the StartUp GOV.BR program?

RQ.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 2. 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 agencies. 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.

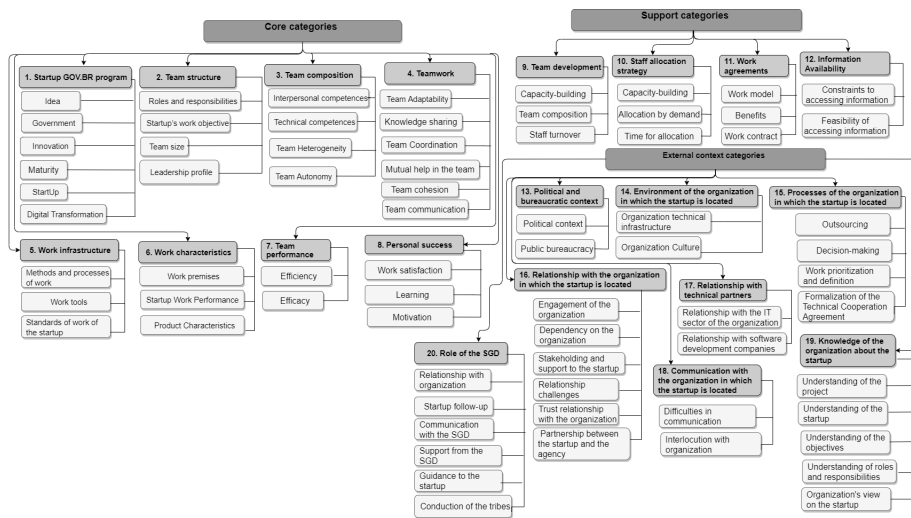


Figure 2: Categories and concepts of the internal and external contexts of startups.

Given the dataset resulting from the focus groups, the following narrative helps to answer RQ.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.”

4.2 RQ.2. How do you perceive the performance and internal functioning of the startups?

To answer RQ.2, RQ.3 and RQ.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, and so on, –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 & Gemuenden, 2001], [Lindsjorn et al., 2016], [Marsicano, 2020] and [Marsicano et al., 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 RQ.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, namely 1) Startup Gov.Br Program, 2) Team structure, 3) Team composition, 4) Teamwork, 5) Work infrastructure, 6) Work characteristics, 7) Team performance, and 8) Personal success, as shown in Figure 2. Support categories are those that refer to a set of characteristics that directly support the core categories: 9. Team development, 10) Staff allocation strategy, 11) Work agreements, and 12. Information Availability. Figure 2 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 RQ.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”.

4.3 RQ.3. How do you perceive the external context of the startup?

RQ. 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 2 shows the categories of the external context of a startup. The narrative that helps to answer RQ.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”.

The categories of the external context of a startup, as shown in Figure 2, are: 13. Political and bureaucratic context; 14. Environment of the organization in which the startup is located; 15. Processes of the organization in which the startup is located; 16. Relationship with the organization in which the startup is located; 17. Relationship with technical partners; 18. Communication with the organization in which the startup is located; 19. Knowledge of the organization about the startup; and 20. Role of the SGD.

4.4 RQ.4. How do you perceive the relationships between the startup, ME and other organizations?

RQ.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 2. 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 2 presents the 20 categories and the 73 concepts identified during the qualitative analysis of the data. Based on the qualitative analysis of the focus groups, one category, “Role of the SGD”, and six concepts were identified: Relationship with organization; Startup follow-up; Communication with the SGD; Support from the SGD; Guidance to the startup; and Conduction of the tribes, as shown in Figure 2.

5 Understanding the Maps of Relationships

After answering the research questions and identifying the categories and concepts that support the results presented in Section 4, this section analyzes the relationships between the categories identified in this study. Relationships are observed based on the frequency of evidence in two perspectives, **potentiality** and **retraction**, where:

- A relationship of **potentiality (P)**³ indicates that a category or concept tends to establish a relationship that favors and/or improves the conditions of the other category; and
- A relationship of **retraction (R)**⁴ points out that a category or concept tends to establish a relationship that disadvantages and/or harms the conditions of the other category.

At this point, it is important to make some things clear:

1. a relationship of potentiality or retraction means that, in general, given the evidence that characterizes the relationship between the categories, there is a greater indication of potentiality or retraction (and not of the existence of only one or another type of data, even though this may occur in some cases);

³ Potentiality: quality of potential; virtuality; related to potentiate; to make even more effective or more active; intensify: enhance an idea. Source: <https://www.dicio.com.br>.

⁴ Retraction: action or effect of retracting; act of withdrawing; withdrawal. That which tends to return to a previous condition; retreat: retraction of influence; related to retract: not to manifest, repress. Source: <https://www.dicio.com.br>.

2. The maps presented in this chapter are not intended to address cause and effect relationships, but potential **correlations between categories**;
3. The organization of the category maps presented in this report is based on an IPO (Input-Process Outcomes) structure. Therefore, the maps do not indicate, for example, feedback relationships between outcomes and input, direct relationships between input and outcomes, or any-to-any relationships, although these may eventually be indicated based on the evidence.

5.1 Map of General Relationships between the Categories

To start the analysis, a map of general relationships is presented (Figure 3) which shows the types of relationships (P or R) between the categories (or set of categories).

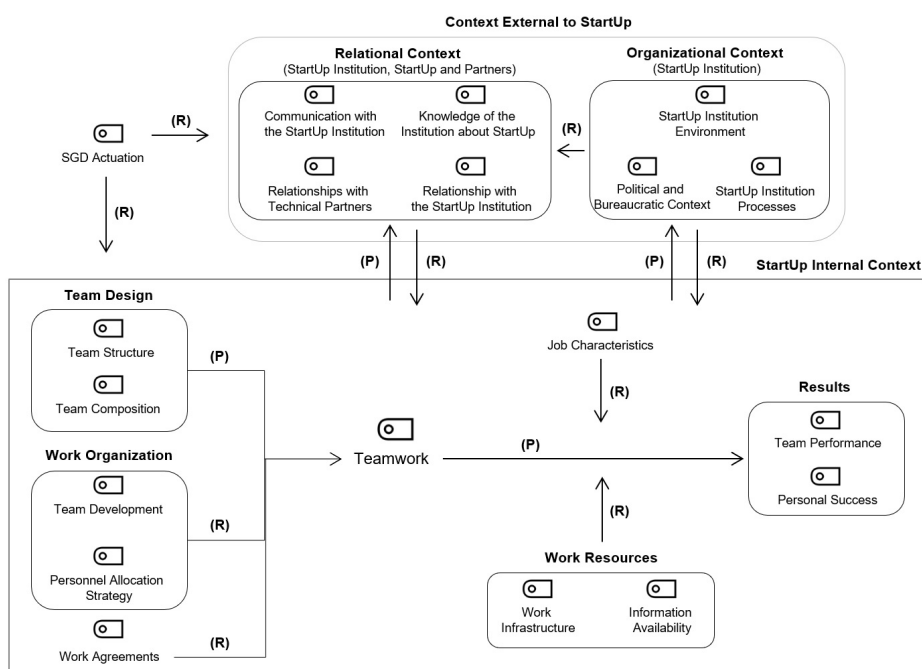


Figure 3: Map of general relations between categories.

The map of general relationships shows four relationships of potentiality and eleven relationships of retraction, as the participants of the focus groups detailed more the issues related to the problems, difficulties, situations with which they are dissatisfied, or aspects requiring changes and/or improvement. The themes with which there is contentment, in general, were approached more broadly or abstractly through generic adjectives, for example:

Potentiality: influence of the leadership profile on teamwork.

	Categories	Concepts	Potentiality (P) or Retraction (R)
Team Design	Team Structure	Leadership Profile	P
		Team Size	R
	Team Composition	Roles and responsibilities	R
		Goal of StartUp's Work	P
		Interpersonal Skills	P
		Technical skills	P
		Team Autonomy	R
		Team Heterogeneity	P

Table 2: Relationships of (P) or (R) between Team structure and Team composition.

"... the leader made us very comfortable, so we ran the project from Monday to Friday, keeping the project manager and all the technicians aligned." (GF-21: P21.10)⁵

Retraction: influence of the work infrastructure of the startup on teamwork.

"About work tools, in my case—I'm a UX specialist—, we need to prototype some solutions in Figma, Adobe. However, we are limited to a free license. I think the Government should have licenses for some specific programs that are necessary for our work". (GF-12: P12.5)⁶

The greater number of relationships of retraction shown in Figure 3 does not mean that everything is wrong but that the SGD currently has important inputs on its hands, since each of the retraction points sheds light on possibilities for improvement, enhancement and maturation of the StartUp GOV.BR program.

5.2 Focus on Teamwork

The specialists believe the startups work centered on Teamwork. Therefore, the relationships, categories and concepts that orbit around teamwork will be approached.

5.2.1 Inputs to Teamwork

The analyzed data point to three inputs (categories) that provide the primary conditions for teamwork to be possible. The first two refer to Team Design, in which the evidence points to a relationship of potentiality (P). This means that most of the data concerning concepts that form the categories of team design belong to themes that tend to favor or improve teamwork, even though there are some which disadvantage it (R). This is presented in Table 2.

Regarding the concepts of the Team Structure category, the number of relationships that tend to potentialize or retract teamwork is equal. However, the concepts of team size and roles and responsibilities have a larger set when it comes to the frequency of

⁵ Focal Group (FG) number 21, Participant (P) number 10 of Focal Group 21.

⁶ Focal Group (GF) number 12, Participant (P) number 5 of Focal Group 12.

	Categories	Concepts	Potentiality (P) or Retraction (R)
	Work Agreements	Benefits	R
		Employment Contract	R
		Work Model	P
Work Organization	Staff Allocation	Allocation in Specialty	R
		Allocation by Demand	P
		Time for Allocation	R
	Team Development	Team Building	R
		Training Promotion	R
		Staff Turnover	R

Table 3: Relationships of (P) or (R) among Work Agreements, Staff allocation and Team development.

occurrence of evidence. In any case, there continues to be a certain balance. By delving further into the data, we observe a substantial consensus among specialists on the inadequate size of startup teams and the lack of necessary profiles for product development (applications, portals, panels, and so on), especially the absence of developers, testers, and requirements. Therefore, one notices a tendency for startup teams to have less technical profiles (focused on software engineering) and a higher level, such as project managers, startup leaders, product owners, and analysts.

Regarding Team Composition, it should be noted that its heterogeneity is seen as a differential since it tends to increase the ability of startup members to exchange knowledge and experiences, problem-solving, scope of action, and so on. On the other hand, the lack of autonomy of the team is seen by the specialists as a limiting factor to their performance. It is also a counterpoint to the characteristics of agile teams, which are supposed to have the necessary autonomy to carry out the work. The other sets of inputs for Teamwork are the Work Organization and Work Agreement categories, both of which are trending considerably to retraction (Table 3).

Regarding Personnel Allocation, experts agree about the delay in allocation to startups and specialties. The allocation of specialists in roles outside their specialties may reveal that, within the work context of startups, it is more appropriate to hire generalist professionals instead of specialists. This finding relates to Team Development, in which professionals who lack the knowledge and experience suitable for the activities they are supposed to undertake (outside their specialty) tend to increase the demand for training. At the same time, those who are allocated outside their specialties feel underutilized.

A recurring point made by the specialists regarding personnel allocation was the possibility of allocation by demand, or even the possibility that specialists themselves apply for opportunities within different startups. This can be a strategy of the StartUp GOV.BR program to use staff turnover as a lever for sharing knowledge and experiences, solving problems, disseminating solutions, standards, practices and processes, (individual and collective) learning, motivating and so on.

Staff turnover is related with the concept of Work Agreements. Even though the specialists know in advance about all the characteristics of the contract and work benefits, this concept helps to lever the turnover of personnel and to retract Teamwork, since it can weaken the relationships and commitment of the specialists with the work. Specialists commonly reported carrying out free-lance activities, in addition to their work at the

Categories	Concepts	Potentiality (P) or Retraction (R)
Teamwork	Team Adaptability	P
	Knowledge Sharing	P
	Team Cohesion	P
	Mutual Help in the Team	P
	Team Coordination	P
	Team Communication	P

Table 4: Relationships of (P) or (R) of the Teamwork.

startup, to increase income and/or being continuously looking for better opportunities in the job market. On the other hand, the remote work model tends to enhance Teamwork, because it allows counting on people from several Brazilian cities whose experiences, cultures and complementary knowledge also favor their heterogeneity.

5.2.2 Results of Teamwork

Observing Teamwork as a generator of (individual and collective) results, one finds a tendency towards a relationship of potentiality (Table 4). That is, the internal work dynamics and relationships established between startup members (experts and the leader) tend to contribute to the generation of results. It is important to highlight, as shown in Figure 3, that Teamwork has five categories as input. Two of them have a relationship of potentiality (Structure and Composition of the Team) and the other three have a retraction one (Team Development, Personnel Allocation Strategy and Work Agreements). Given the characteristics of the concepts that make up Teamwork, it seems that the strength that enhances the Structure and Composition of Team categories tends to generate more benefits than the three retraction categories. These relationships can also be influenced by the characteristics of the individuals that make up the startups, such as personality, maturity, experience, and so on.

At the individual level (Personal Success), Teamwork has favored the learning of StartUps members mainly through knowledge sharing and mutual help. The team's good coordination, fluid internal communication, cohesion and ability to adapt, in addition to the possibility of delivering results that generate benefits for the lives of Brazilian citizens, help to motivate and promote a sense of satisfaction with the work done.

As for the collective results (Team Performance), coordination and adaptability to the context of the startups strongly contribute to achieving the expected results. A fact that can be considered very relevant within the context of Teamwork and its Results is that no reports were found about conflicts between members of startups, which could harm relations and work dynamics and, consequently, the (individual and collective) results of the team.

Another point is about team coordination, to which specialists attach great importance when talking about teamwork and their relationships and results, even though potentializing and retracting profiles are identified when dealing with the team structure and leadership profile.

Categories	Concepts	Potentiality (P) or Retraction (R)
StartUp Work Infrastructure	Work Tools	R
	StartUp Work Standards	R
	Work Methods and Processes	R
Job Characteristics	StartUp Workload	R
	StartUp Work Performance	R
	Product characteristics	P
	Work Premises	R
Information Availability	Impediments to Access to Information	R
	Enabling Access to Information	P

Table 5: Relationships of Potentiality (P) or Retraction (R) between Teamwork and Results.

5.2.3 Midway between Teamwork and Results

Midway between Teamwork and Results are the categories Work Characteristics, Work Infrastructure, and Availability of Information, which tend to establish relationships of retraction in the view of specialists, as seen in Table 5. In other words, they make the startup's life more difficult in terms of achieving the results expected.

Regarding the Work Characteristics, the overload and pressure exerted on the startup team and the need to carry out dialogues with different stakeholders (political, business and technical), added to the lack of compliance with some work premises, make the day-to-day of startups difficult. This can lead to delays in deliveries and dissatisfaction among customers and members of startups. On the other hand, the characteristics of the products to be generated (benefits, scope, technology) are commonly seen as motivators by specialists.

Concerning Work Resources (StartUp Work Infrastructure and Availability of Information), the lack or scarcity of adequate tools, standards, methods and work processes means that startups need to seek alternative solutions to their problems; for instance, the storage and sharing of information about the project in personal solutions, Google Drive, Dropbox, and so on., or even the use of temporary, free of charge and/or limited licenses of tools. The specialists also bring up the lack of references (standards, methods and processes) for carrying out the work. In addition to helping day-to-day life, these could serve as a facilitator for the exchange of professionals between startups, since all of them would start from the same knowledge base.

Availability of Information is a unanimous retractor among specialists. The daily difficulty that startups face to have access to information or environments makes their work not only delayed but also paralyzed.

5.2.4 Teamwork Results as Levers

Although not fully represented in the general map of relationships (Figure 3), Team Performance and Personal Success tend to leverage other categories, as shown in Table

Categories	Concepts	Potentiality (P) or Retraction (R)
Team Performance	Efficiency	R
	Efficiency	P
Personal Success	Learning	P
	Motivation	P
	Job Satisfaction	P

Table 6: Relationships of (P) or (R) between Team performance and Personal success.

6. They function as a feedback system for Teamwork itself, in a cyclic motion, and also in the relations between the internal and external context of the startup.

As for Team Performance, one piece of data that may draw attention is the fact that there is a retraction concept (efficiency) and a potentiality one (efficacy). Going a little deeper into the data, one notes that efficacy has almost twice as much evidence as efficiency. In this sense, the data reveals that, even with difficulties and delays in deliveries, both the startup team and customers are satisfied with the products generated. And, to some extent, this is being considered more relevant by experts.

5.3 Relationships between the internal and external contexts of startups

The relationships between the internal context (IC) and the (organizational and relational) external context (EC) of the startups refer more directly to some core categories of the IC (Teamwork, Job Characteristics, Work Infrastructure, Team Performance, and Personal Success) and a support category (Availability of Information). Figure 3 presents such categories within the shaded area. At this point, a relationship of mutual influence between the two contexts is identified.

Starting from the startup to the Organizational Context (OC) of the agency in which it is located, there is an indication of a relationship of potentiality, since the startup helps to create an agile culture within the agency as well as its actual and potential results. This favors the reduction of (i) internal and (ii) external bureaucracy of the agency and (iii) (operating and personnel) cost reduction. About (i), it mainly refers to the organization and structuring of information in panels, which provide support for decision-making, eliminating or reducing the need to keep requesting information from different areas of the agency. Regarding (ii) and (iii), it is directly related to citizen service.

On the other hand, the OC tends to generate a relationship of retraction on the startup. Table 7 presents a mapping between the categories and concepts of the OC and the categories of the IC. For example, the Political Context has a relationship of retraction with Teamwork, the Formalization of the Technical Cooperation Agreement (delay) disfavors the Availability of Information, the Technical Infrastructure of the agency (the lack) disfavors the Work Infrastructure and so on.

The Organizational Context also has a relationship of retraction with the Relational Context (RC), mainly influenced by its vertical structure, which does not favor easier and faster communication between those involved in the project of the startup.

The RC established between the startup agency, the startup itself and other partners involved in the project has a bidirectional relationship with the internal context of the startup (shaded area in Figure 3). In other words, it is a relationship of mutual influence. The evidence points to a tendency of retraction when the relationship is initiated by the RC, as shown in Table 7.

Categories	Concepts	StartUp Internal Context					
		Teamwork	Job Characteristics	Work Infrastructure	Information Availability	Personal Success	Team Performance
Political and Bureaucratic	Political Context	R	R				
	Public Bureaucracy	R	R		R		
StartUp Agency Environment	Organization's Culture	R		R	R		R
	Technical Infrastructure of the Agency			R	R		R
	Hiring of third parties	R			R	R	R
Organizational Context	Formalization of the ACT		R		R		
	Prioritization and Definition of Work						
StartUp Agency Processes	Decision Making	R	R			R	R

Table 7: Relationships of (P) or (R) between the Organizational Context and the Internal Context of the StartUp.

In Tables 7, 8, and 9, blank cells mean that no relationship ('R' or 'P') was identified between the observed items (categories and concepts). Table 7 shows that all concepts of the RC categories are linked to the categories Teamwork, Personal Success and Team Performance (IC of the startup). In Figure 3, this indication means that the link between the RC and these IC categories is about the relationship between Teamwork and Results, that is, in the same place where the Work Characteristics and Work Resources relationships are indicated.

When the relationship is initiated by the startup, a potentiating bond is indicated. In this case, the startup actual and potential results favor the relationships, mainly with the startup agency, through the creation of a space of trust, engagement, support and partnership, as well as through the interaction startups carry out between the stakeholders (agencies, business areas and technical partners).

5.4 Relationships between the internal context, the external context of the startups and the Ministry of Economy

The Performance of the SGD is an important strategic influencer since it can generate impacts from the political and top management level to the operational level, including the assembly of startup teams, the dialogue with the agencies and the technical support. Though the specialists who participated in the focus groups widely recognized the work of the SGD, most of the evidence points to relationships of retraction, starting from the SGD, with the Internal Context of the StartUp, the External Context and the Agency's Knowledge about the StartUp.

Table 8 shows the relationship between the Performance of the SGD and the Internal Context of StartUps. The concept Support from the SGD stands out, which relates directly with most of the categories of the Internal Context, especially those that refer to Team Design, Work Organization and Work Agreements, all considered as inputs to teamwork; that is, they provide the basic conditions for work among startup members. In this direction, it is believed that improving the support from the SGD can generate a high impact on startups.

Categorie	Team Design					Work Organization					Work Resources			Results	
	Concepts	Structure	Team Composition	Staffing	Team Development	Work Arrangements	Teamwork	Job Characteristics	StartUp Work Infrastructure	Information Availability	Personal Success	Team Performance			
SGD's Atuation	Startup follow-up Support from SGD	R	R	R	R	R	R	R	R		P	R			
	Communication with SGD						R	R	R						
	Startup Guidelines				R		R				R	R			
	Realization of the Tribes SGD's relationship with the Agencies				R		R			R	R	R			

Table 8: Relationships of (P) or (R) between the Performance of the SGD and the Internal Context of the StartUps.

The Teamwork category was also brought up, which is related to practically all the concepts that form the Performance of the SGD category. That is, the improvement in how the SGD monitors the work, the support, the communication, the guidance provided and the meeting of tribes in a more technical way tend to enhance teamwork in startups.

Finally, Table 9 presents the relationships between the Performance of the SGD and the (Organizational and Relational) External Context of the StartUps. In this relationship, the categories Support from the SGD and Relationship of the SGD with Agencies play a relevant role since they are linked to all categories of the Organizational and Relational Context. Thus, the data reveal the preeminent need for proximity between the SGD and the partner agencies. Another relevant piece of data refers to the link between the performance of the SGD and the processes of the startup agency (Hiring Third Parties, Formalization of the Technical Cooperation Agreement, Prioritization and Definition of Work and Decision-Making), which generate results that tend to influence the performance and /or the project of the startups.

Category	Concepts	Organizational Context				Relational Context			
		Political and Bureaucratic Context	Startup Agency Environment	Startup Agency Processes	Relationship with the Startup Agency	Relationship with Technical Partners	Communication with the Startup Agency	Knowledge of the Agency about Startup	
SGD's Actuation	Startup follow-up Support from SGD Communication with SGD	R	R	R	R	R	R	R	
	Startup Guidelines Realization of the tribes SGD's relationship with the Agencies	R	R	R	R	R	R	R	

Table 9: Relationships of (P) or (R) between the SGD Performance and the External Context of the StartUps.

6 Discussions

In this section we will return to the main research questions:

- What is the perception of ICT professionals (startup members) regarding the StartUp GOV.BR program?
- What set of actions and improvements can be extracted from the perception of ICT professionals, for the maturation of the StartUp GOV.BR program?”

6.1 Perceptions about StartUp GOV.BR

To answer the first research question of this study: “What is the perception of ICT professionals (startup members) regarding the StartUp GOV.BR program?”, we present a summary of what was reported in detail in the sections 4.1, 4.2, 4.3 and 4.4.

The StartUp GOV.BR program is seen by specialists as a promising innovation, attracting professionals with the prospect of using digital transformation to benefit citizens. While the program seeks to refine its strategy and project definition, startups, with their focus on teamwork, face challenges related to autonomy and training. Remote work has proven to be an ally, solidifying cohesion among team members.

The environment in which the startup operates, encompassing the political, bureaucratic, and technical infrastructure landscape, has its complexities. Despite the support from senior management, initial mistrust is a barrier that, over time and effort, has been overcome, strengthening the partnership between startups and organizations. Communication is a critical aspect, and the ability of project managers to mediate and clarify misunderstandings has been essential. Professionals, while recognizing the support of SGD, also point out areas that need refinement, emphasizing the importance of more integrated and aligned communication with partner organizations.

6.2 About Startup Teams and Agile

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 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.

6.3 Improvements and Actions

To respond to the second research question of this study: "What set of actions and improvements can be extracted from the perception of ICT professionals, for the maturation of the StartUp GOV.BR program?", we extracted and 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 (see Table 10). In addition, for each action, those responsible for its execution, the target public, and its possible impacts are identified. Table 11 presents an extract from the worksheet that has the entire set of improvements and actions.

Categories	Number of Improvements	Number of Actions
Team Structure	9	15
Team Composition		
Team Development	5	10
Staff Allocation		
Work Agreements	2	2
Teamwork	6	9
Job Characteristics	5	9
StartUp Work Infrastructure	6	11
Information Availability		
Team Performance	6	10
Personal Success		
Political and Bureaucratic Context	9	12
StartUp Agency Environment		
StartUp Agency Processes		
Relationship with the StartUp Agency	11	16
Relationship with Technical Partners		
Communication with the StartUp Agency		
Knowledge of the Agency about StartUp		
SGD Actuation		

Table 10: Number of improvements and actions per category.

Categories	Concepts	Improvements	Actions	Responsible for the Action	Action Target Audience	Impact
StartUp Organization Environment	Organization Culture	Implement an agile culture in the Organizations.	<ul style="list-style-type: none"> - Provide agility specialists for the implementation of an agile culture in partner agencies; - Conduct workshops, courses and other actions aimed at raising awareness of the importance of an agile culture in the Organizations; - Establish and provide a set of standard software tools for general use by StartUps; 	SGD / Organizations	Organizations	<ul style="list-style-type: none"> - Agile Culture of StartUps - StartUp Desktop - StartUp Work Process - Team Training
StartUp Organization Environment	Organization Culture	Support in raising awareness about the importance of an agile culture in the Organizations.	<ul style="list-style-type: none"> - Establish and provide a set of standard software tools for general use by StartUps; 	StartUp / SGD / Organizations	Organizations	<ul style="list-style-type: none"> - Agile Culture of StartUps - StartUp Desktop - Work Process of StartUps - Team training
StartUp Organization Environment	Organization Technical Infrastructure	Technical work infrastructure	<ul style="list-style-type: none"> - Establish and provide a set of standard software tools for general use by StartUps; 	StartUp / SGD / Agencies	StartUp	<ul style="list-style-type: none"> - StartUps Desktop - Work process - Development of solutions
SGD Actuation	Conduction of the Tribes	Support on the standardization of processes and methods to be used for the development of the software product.	<ul style="list-style-type: none"> - Keep the realization of the tribes with the technical focus between specialties; 	SGD / Organizations	StartUp	<ul style="list-style-type: none"> - Team training - Individual motivation - Sharing knowledge and experiences - Development of solutions

Table 11 continued from previous page

Categories	Concepts	Improvements	Actions	Responsible for the Action	Action Target Audience	Impact
Work Characteristics	StartUp Workload	Project planning and organization strategy.	<ul style="list-style-type: none"> - Establish a "pull" work system, not a "push" system for StartUps; - Carry out planning with successive refinement throughout the project, not long-term planning; - Involve the technical team in carrying out the project planning; 	SGD / Organization Partner	StartUps	<ul style="list-style-type: none"> - Team Effectiveness - Team Autonomy - Team Engagement - Fast and frequent deliveries - Sustainable pace of the Team - Quality of the software
Team Performance	Efficacy	Product quality	<ul style="list-style-type: none"> - Establish criteria and methods for evaluating the quality of software products; - Establish techniques and methods for measuring the quality of software products; 	SGD / StartUp	StartUp	<ul style="list-style-type: none"> - Work process - Decision making - Development of solutions

Table 11 continued from previous page

Categories	Concepts	Improvements	Actions	Responsible for the Action	Action Target Audience	Impact
Team Performance	Efficiency	Project planning and organization strategy.	<ul style="list-style-type: none"> - Establish a "pull" work system, not a "push" system for StartUps; - Carry out planning with successive refinement throughout the project, not long-term planning; - Involve the technical team in carrying out the project planning; 	SGD / StartUp	StartUp	<ul style="list-style-type: none"> - Work process - Team Effectiveness - Team autonomy - Team Engagement - Fast and frequent deliveries - Sustainable pace of the Team - Quality of the software

Table 11: Extract from the worksheet that has the entire set of improvements and actions.

7 Threats to Validity

According to Merriam [Merriam, 2009], one of the strengths of case studies is that they are anchored in real-life situations, resulting in a rich and holistic account of a phenomenon. They offer insights and illuminate meanings that expand on the experiences of its readers, thus playing an important role in advancing the knowledge base of a field. On the other hand, case studies may be limited by the sensitivity and integrity of the investigator, who is the primary instrument of data collection and analysis and must rely on their instincts and abilities during most of this research effort. The work in [Merriam, 2009] reports other issues that may limit the study, such as internal validity, reliability, and transferability. We adopted the following strategies to minimize these threats.

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.

8 Contributions and Future Work

Based on what was presented in this work, the main contributions and future work that can be derived from this study are highlighted here.

In practice, this work contributed, primarily, to the identification of actions and points of improvement aimed at maturing the StartUp GOV.BR program. It should be noted that this is a strategic program for the digital transformation of services offered by the Brazilian Federal Government to its citizens. The study also contributed to the construction of a shared vision among managers and professionals participating in the StartUp GOV.BR program. On the managers’ side, understanding the perception of IT professionals about the day-to-day life of StartUps is of fundamental importance with a view to improving, for example, working conditions and infrastructure, thus ensuring everyone’s engagement. On the professionals’ side, being able to share their context and day-to-day life, as well as being clear that their situation, whether positive or requiring improvement, may be occurring in other StartUps, for example, and that other people outside their team can contribute to their work.

From the academic point of view, the work used a real context, regarding the use of StartUps in Government. From this, a qualitative and exploratory research strategy was defined, based on grounded theory, which carried out data triangulation using multiple methods and multiple data sources. Interviews were also used, and carried out through focus groups, which prioritized participation and collaboration between participants. The

study also presents a large volume of information collected, transcribed and analyzed, which was represented through the use of relationship maps. Finally, the methodological rigor and details presented in this study can be used to guide and serve as a basis for other work. Therefore, the research contributes to the expansion of knowledge concerning digital transformation in the public sector.

In our forthcoming efforts, we plan to actively track and oversee the implementation of the improvement actions suggested in this study. Additionally, we aim to evaluate the impact of the StartUp GOV.BR program on the lives of citizens, assessing the tangible results it has generated.

9 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. They also reported that the teams are made up of several junior-level professionals or practitioners looking to change careers, being the StartUp GOV.BR program their first experience. These factors are barriers to building cross-functional teams.

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.

There is also difficulty in the adoption of agile approaches, such as Scrum, XP, SAFe, FDD, Kanban, and Lean. Some of the barriers encountered by startups are the lack of knowledge and experience, from top management to the technical level; the verticalized structures and difficulty in communication; the need for command and control, with the requirement of long-term planning; the political environment of the organizations, which sometimes make decisions to the detriment of the technical context; the treatment of requirements as fixed or stable from the beginning of the project; and the persistence of a non-agile culture within the organizations. In view of this, each startup tried to use one

or another agile practice that could facilitate their work while also having to maintain some practices and/or artifacts of traditional approaches, such as waterfall, spiral, RAD, or unified process.

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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