



Digital Storytelling by Women in Tech Communities

Renata Loureiro Frade^(✉)  and Mário Vairinhos 

Universidade de Aveiro, Campus Universitário de Santiago, 3810-193 Aveiro, Portugal
{renatafrade,mariov}@ua.pt

Abstract. Women have found in communities a safe space to learn and develop skills in STEM (Science, Technology, Engineering, Mathematics). These groups bring together specific operational and communicational characteristics related to feminist, design and interaction aspects. They share common goals of inclusion, empowerment and education. They are formed by leaders and founders, work team and target audience. One of the strategies for increasing members is the use of narratives by female role models in technology, successful people such as researchers, entrepreneurs or occupants of jobs in technology companies in face-to-face and online events. Testimonials are also present on the digital platforms used by these collectives.

This work aims to present results obtained in a focus group carried out with people impacted by the female community in IT (Information Technology), São Paulo WiMLDS. It was verified that the use of narratives and storytelling strategies in digital environments can become an important catalyst for the achievements of these collectives. This case study, inserted in a context of digital ethnography in online platforms and interviews carried out in this community for two years, in addition to two other case studies (Minas Programam and Geek Girls Portugal), integrates a broad empirical work of an ongoing doctoral research which involved more than 100 female IT communities in Brazil and Portugal. This work will present preliminary results of the potential of digital storytelling in initiatives already formed in the communication and interaction of these groups.

Keywords: Storytelling · Online Communities · Women in Tech

1 Introduction

Gender equality in IT (Information Technologies) is still a major challenge to be overcome, including the measurement of indices related to women's work. According to the World Economic Forum [1], technology is an industry that predominantly hires men (30%) in leadership positions. Women and girls are underrepresented in all digital technology; UN Women believes that around \$1 trillion could be added to the GDP of low and middle-income countries if this problem was ended [2]. Men are 52% more likely to be online than women in the world's least developed countries [3].

The still scarce statistics on the presence of women in the technology job market reveal the gender disparity far from being solved. In addition to the need to promote

greater education, inclusion, and awareness of empowerment among females, there is a lack of knowledge about the historical importance of women in technological development, from the first person considered a programmer in the world, Ada Lovelace, to countless role models worldwide. Women have been erased not just from the hardware and software development industry, but from the history books.

Narratives of important female characters in technology have been taken up again as an instrument for the inclusion of young people and women. Almost 15 years ago, female IT communities emerged in Brazil and Portugal with similar goals, seeking to expand access to professional opportunities in companies, but also to promote entrepreneurial and academic skills in STEM careers. Most of these collectives followed communicational and organizational models developed by pioneering groups, created in the USA between the 70s and 80s, such as Systers (now AnitaB.org). This emergence can be attributed to a natural evolution of the Web, whose emergence led to the creation of online communities and activism [4, 5]. Minorities such as women began to use digital platforms to access information. The development of devices and computational and computer programs became more accessible to women in an unprecedented way, now gathered in a network of connections beyond geographic borders.

Having a hybrid space (face-to-face and online), learning about IT and networking, female technology communities found an ideal space for introducing and improving a woman in technological careers, as well as obtaining empowered narratives of overcoming and conquering opportunities. These groups have been incorporating digital platforms developed by Big Techs such as Meta (Facebook, Instagram, WhatsApp), Slack, X (Twitter), LinkedIn and Telegram for sharing institutional, educational and other information for the exercise of their work. These platforms are free and used worldwide but have limited to interaction and participation rules defined by these companies, which consequently generates an impact on activism, engagement and the results obtained in promoting computing literacy related to STEM.

Based on an ongoing doctoral research which intends to propose solutions for inclusion, education and female empowerment in technology on the work of more than 100 Brazilian and Portuguese women in IT communities, it was found that narratives are used as a resource for engagement and the development of a critical awareness of gender equality in technology, in face-to-face events with speakers who report their success stories (with defeats), as well as spontaneous and sporadic testimonials published on the timelines of these online platforms. However, despite the use of narratives there is no regular storytelling strategy (digital and interactive) as part of their communicational ecosystem.

Women in tech groups study have a complex nature due to the superposition of layers and factors related to their emergence and development. The Social Sciences are used to contextualize motivations and phenomena that occur in these communities and in STEM domains, essentially related to the Exact Sciences, Computer Science. There is an intersection of perspectives and theoretical bases between sciences to configure these collectives in organizational and communicational terms and threats to be faced in the activist exercise.

Most of the communities' members, whether they are leaders, volunteer workers or the target audience to be impacted, have a background in exact sciences, IT, computational knowledge not related to training and communication skills, above all. Therefore, this work aims to characterize contexts of narratives use in digital environments of these groups, based specially on data obtained in a focus group in the São Paulo WiMLDS community, a case study in which a digital ethnographic work on digital platforms had been developed for two years. This work also aims to point out suggestions for digital storytelling strategies based on communication, organizational and interaction characteristics. It is intended to understand whether narratives - from leaders, volunteers and target audience - predominantly shared on digital platforms have potential in strategic planning of actions aimed at increasing and maintaining participants.

This research aims to evaluate the impact of narratives on female communities in technology as an empowerment and work instrument from a theoretical and empirical communication perspective. Therefore, raising positive narratives within the community, from the bottom up, are fundamental for proposing a communication intervention and a storytelling strategy to improve the work of inclusion and training of women in IT.

2 Theoretical Contributions

Studies of technofeminism [6, 7], transmedia [8] and human-computer interaction [9] form a necessary theoretical triad to perceive traces of feminism and activism, as well as potentials of engagement and communication, and characteristics of interaction and survey of functionalities on digital platforms that can catalyze the achievement of results by these communities. When analyzing the exchanges on the communities' platforms (whose empirical work will be discussed in the Methods section), it was noticed that the digital narratives generated commotion and impact, but their sharing could be improved to further expand the reach of the communities' initiatives.

Civic participation, social inclusion and justice, community engagement and feminism have become HCI research and development studies. Through digital communities and platforms, feminism had reached new contours due to the wide and multifaceted interactions between women. Online feminism and the collective female activism in Technology emerged [10, 11].

A participatory culture [12] embraces values of diversity and democracy based on interactions and shows we can make individual and collective decisions, as well as expressing ourselves through a wide range of forms and practices. Individuals participate in something, interact with something. Cultures also exercise their participation through technological means. Carpentier [13] relates the participatory culture to the exercises of power, implicit and explicit. There are privileged and non-privileged actors "in formal or informal decision-making processes". Media engagement is understood to be internal forces that lead people to act in society (or, in this case, in communities) as citizens, motivated by affection and identity similarities. Engagement would be a prerequisite for participation [14].

Human-computer interaction (HCI) studies the communication mediated between the end-user and the system designer, who must structure the system so that it can be understood by the user and so that the user can be guided by a sequence of actions to

achieve results [15]. Social computing has become one of the fastest-growing areas in HCI. It is related to systems that support the collection, processing and dissemination of information distributed among social collectives [16]. Information is the main link between people, it mirrors and represents identities in common. Social computing systems can generate value by integrating knowledge among participants, by carrying out tasks based on human skills and by producing legitimate results from a community.

Despite these scientific domains occupying a central place in women in tech collectives study, there is an important link in the informational component exchanged, above all, on digital platforms (environments where most of the communication and interaction between leaders, voluntary workers and the public are concentrated): narratives. Narratives are shared in online environments are relevant to understanding the participants' engagement and participation in non-fiction content.

Narratives shared by women in technology groups members contain life stories based on overcoming obstacles, heroic moments, and defeats, but also important education and technological training information, allowing the development of a computer literacy transmitted from woman to woman. This feature is about the power of engagement through a broader literacy, also developed and combined with storytelling skills and the use of media. As will be addressed in this work, the narratives of stories in female IT communities, such as São Paulo WiMLDS, are not part of a storytelling system or interactive strategy. Narratives are dispersed on digital platforms in audio recordings, video and text timelines. However, they provoke interaction and interest between members when appear on digital platforms. There are no features on these social platforms that allow them to be highlighted or easily found in a specific area. On the platforms developed by the communities there is also no such emphasis. However, it is a rule to find these testimonials in all online and face-to-face events in this research, as role models are still a way of making success tangible in the job market in technology, even with scarce evaluation statistics on inclusion and performance of women.

Stories that bring together potential interactive narratives allow developments between readers, to navigate between various platforms, being able to share new authorial stories [17]. In this sense, Crawford's concept of interactivity [18] fits perfectly with the dynamics of producing and receiving testimonials from members of these communities, "a cyclic process between two or more active agents in which each agent alternately listens, thinks, and speaks".

Because they are shared in online environments, above all, it can be considered that women in technology groups narratives can be incorporated in the characterization of what digital storytelling is beyond fiction, because agents are not passive to the exposure of stories, but also play an authorial role. Within the classification of characteristics of digital storytelling [19], the participatory character, the fluidity of navigation through which stories are produced and transmitted, the possibility of present role models becoming characters (or a set of characteristics of these members provide the creation of personas and avatars), offer a shared experience in the community, enable changes in points of view, are an element of empathy that leads to increased interaction between participants.

A still small number of communities have developed their own digital platforms, which will be discussed later. These media also do not have storytelling features and

strategies. Therefore, in addition to the importance of narratives in the collective work of female inclusion in IT, it is important to consider the incorporation of elements that enhance interaction. Interactive Digital Narratives (IDN) can serve this purpose, through a digital medium in which participants influence the production and continuation of the unfolding experience in new stories [18].

In addition to the affordances raised by Murray in digital media (procedural, participatory, spatial, encyclopedic), according to Koenitz, Barbara and Eladhari [20], “IDN allows dealing with limitless amounts of data (encyclopedic), enabling the exploration of a space (spatial), which reacts (procedural) to decisions by the audience (participatory) to create a narrative experience”. It is possible to refer, in an analogous way to the female communities in IT, to what Brown & Chu [21] propose for therapeutic processes, allowing patients (or audience) the ability to build non-linear narratives because our lives do not follow a defined timeline, which can open up possibilities for new stories.

3 Related Work

There are few specific studies on storytelling in female technology communities around the world. There are two cases that apply to this work related to digital storytelling: groups that used online environments and platforms with storytelling as a strategy for engagement and success of initiatives (not necessarily feminine or feminist) and groups of women in technology that created their digital platforms, share narratives but without a storytelling strategy present in the communicational and organizational dynamics expressed in shared content.

Despite being a proper and specific space for exchanging information and developing activities, the dimensions of transmedia and storytelling were not verified, as well as attributes present in the Feminist HCI frameworks studied in the investigation.

A – More Women in Tech

Created by WomakersCode Brasil, which calls itself the largest community of women in technology in Latin America, Mais Mulheres em Tech is a platform with essentially educational objectives, training in IT. The online page mentions that it is “the first Brazilian platform created by women, with the mission of training women in technology and innovation”.

The site brings together live and recorded courses, free of charge, with certification, aimed at training in the areas of Cloud Computing, Infrastructure, Information Security, DevOps, Development and Data Science and Artificial Intelligence. There are links to the community’s social profiles on Twitter, Facebook, Instagram and LinkedIn, newsletter registration, and the community’s online page.

The Mais Mulheres em Tech platform acts as a depository for these courses, as well as a reserve of data on enrolled students, in particular.

B – Professions Game

Gamified content platform created by Raparigas do Código, in partnership with the Women in Tech Portugal community, Portuguese Republic, Center for Social Studies of the University of Coimbra, among others. The Portuguese community developed an online memory game in order to provide simple, interactive, inclusive and educational games, as well as content and information on these topics to the educational community and families.

C – PWIT Community Platform

Private online platform created by Portuguese Women in Tech, with an interface like Facebook (hybrid of individual and professional page, and group) and Slack (division by subject channels). There is a timeline of posts where any member can share content, as well as areas reserved for job opportunities, sources of content such as reports and scientific articles.

Admission to the platform takes place according to the authorization of the community managers through registration. There are rules of interaction, communication, and socialization. This is an opportunity to promote more networking with the target audience, capture information about members, test initiatives based on surveys. An online environment whose dynamism is guided, above all, by content proposed by the managers. There is no emphasis on theoretical content related to feminism, as well as the extension of information from there to other platforms in a transmedia logic, without storytelling.

4 Method

This doctoral research from which this work originated is part of the interpretive paradigm, of a qualitative nature, but will use quantitative data, such as statistics. A bibliographic survey was carried out for three years to define the theoretical-conceptual field, objectives, and hypotheses of the thesis [22]. For the development of the fieldwork in particular, the adopted design methodology integrates ethnographic nature, experience design, participatory design.

Despite the author having been the leader of a female community in technology for 3 years and having been a technological entrepreneur for more than 10 years, the author assumed a stance of neutrality as a scientific researcher, adopting an observant participation when following content published on digital platforms, thus as a presence in online and in-person events of these groups. However, the author's experiences can enrich the content analysis of the phenomena observed due to a greater knowledge about the founding and development collectives contexts, such as social, economic, cultural and educational. It is also possible to have a clearer understanding of the intentions and meanings of focus group statements from volunteer members. Impartiality is also important for ethical reasons.

More than 100 groups were surveyed in these countries and informal monitoring was carried out in them for a year on the respective digital platforms (DP) to perceive organizational, operational and communicational characteristics. After this period, for about two years, case studies had been developed with São Paulo Women in Machine Learning and Data Science (full internal and external DP access), Minas Programam (focused on transmedia storytelling approach and proposed model) and Geek Girls Portugal (interaction design study focused on Slack platform related to other DP of the community) in order to deepen the analysis in an ethnographic research method on internal and external DP, associated with participant observation, interviews and focus group. Fundamentals of Design Based Research (DBR) and design methodology guided the fieldwork. The communities were chosen to become case studies due to their relevance and scope in technology activism, and the number of members present on digital platforms.

The investigation was divided into 5 phases, as shown in Table 1: 1 (Community's Digital Platforms Survey); 2 (Case Studies Planning and Development); 3 (Conceptual model construction); 4 (Participatory design of a tech proposal impact evaluation); 5 (Results analysis and thesis writing).

In phase 1, Communities' Digital Platforms Survey, more than 100 Portuguese and Brazilian female communities were surveyed and informally monitored on their digital platforms for one year. After online follow-up and observational participation in some events in some communities, three were chosen for case studies. Exploratory interviews were conducted with some community leaders to understand the profile of leaders, volunteers, and the target audience.

In phase 2, Case Studies Planning and Development, three case studies were chosen for bringing together aspects related to the theoretical framework of the investigation and the characteristics of the work they carry out. Another selection criterion was the possibility of accessing all platforms for internal use to understand how the operational and communication strategies of these groups were set up. Monitoring began using the ethnographic method of Geek Girls Portugal and Minas Program communities, where interaction potentials were evaluated, with emphasis on the Slack platform and engagement potential via transmedia storytelling.

After the beginning of this work with the first two communities, a third one, São Paulo WiMLDS, was incorporated. Only this one allowed access to digital platforms for internal use (institutional email and WhatsApp group), which enabled a daily ethnographic immersion in the group's routine, before and during the covid pandemic.

Phase 3, Conceptual model construction, is being developed after surveying problems and opportunities, classifying groups by similar objectives, proposing models of communicational and organizational functioning. Phase 4, Participatory design of a feminist tech proposal impact evaluation, is also ongoing.

The stages of the two-year ethnographic work in the São Paulo WiMLDS community and case study are divided, in chronological order, into definition of topics to investigate, identification and selection of community, participant observation of the community (immersion), data collection (guarantee ethical procedures) and data analysis and interpretation of results. The collection of all data from the São Paulo WiMLDS ethnographic case study was carried out manually. Despite the variety of data collection and analysis tools in social media, it was a choice with the proposal of immersion and integration of the researcher into the group's observing coexistence. 3,188 media were collected and verified, published in text spaces on the group's internal digital platforms (WhatsApp, Telegram, Email).

Ten hours per week were spent extracting and archiving data on WhatsApp and Telegram from São Paulo WiMLDS during the seven months of collecting work, totaling 280 h. Data analysis for each month took place in the week following the end: 320 h per month (4 full days), 2,240 h.

In May 2023 a new community, Mulheres em Inteligência Artificial (Women in Artificial Intelligence), became the fourth case study as the São Paulo WiMLDS community, the main case study community, had its activities suspended due to the impact of the covid-19 pandemic. It aims to raise features that help activism on a new platform. For

this, transmedia storytelling will still be tested in a communication campaign on the group's digital platforms.

Investigation methods and techniques used were:

- A – Interviews: more than 15 with female community leaders in IT;
- B – Focus Group: carried out with the target public of São Paulo WiMLDS. There will also be sessions to be held with the Women in Artificial Intelligence community to design a communication campaign with storytelling and a tech prototype.
- C – Ethnography: two communities had their digital platforms monitored for a period of 7 months (Minas Programam and Geek Girls Portugal) to perceive aspects related to transmedia storytelling and interaction design, respectively. The São Paulo WiMLDS community had been monitored for 2 years, ending in December 2022, in order to understand organizational, hierarchical, communicational and interactional elements among all members, in order to perceive opportunities and problems, how information and initiatives are developed, objectives and impacts obtained.
- D – Three case studies were finished. A new case study under development with Women in Artificial Intelligence is going to test a storytelling strategy on a digital platform communication campaign. Its results will be tested and part of a tech prototype which will be designed and developed to propose tools to help women in tech communities work with storytelling as a tool and part of routine strategy.
- E – Participatory design: co-creation of a communication campaign and prototype of a technological proposal for communities with Women in AI, which incorporates elements of HCI, feminism, transmedia and storytelling.
- F – Observant participation in more than 50 events in Brazilian communities and on technology with content related to topics studied in the investigation.

5 São Paulo WiMLDS: Focus Group in a Case Study

On July 9, 2022, a focus group was held with six participants from São Paulo WiMLDS. The selection criterion is to integrate the target audience, without any kind of active participation as a leader or volunteer until the day of the dynamic. The participant should consider the community to be extremely important for professional growth. These people were recruited on the Telegram group, which brings together the largest number of members among the group's platforms, through posts published by the researcher and the leaders with the invitation. The meeting was held on the Zoom platform and recorded on video, lasting one hour. After the focus group, a questionnaire was applied with questions about more subjective and personal aspects related to the trajectory of the members in the technological career, to identify a common profile.

Despite being a proper and specific space for exchanging information and developing activities, the dimensions of transmedia and storytelling were not verified, as well as attributes present in Feminist HCI frameworks.

The following Table 1 gather the questions asked and a summary of the participants' responses, which will be anonymized as Person 1, Person 2, Person 3, Person 4, Person 5, Person 6.

1 - How is your involvement with women’s technology communities, especially SP WiMLDS? How did you find out about this community?

Person 1	Person 2	Person 3	Person 4	Person 5	Person 6
I was already following the community because I am part of several communities. I follow it mainly on Telegram; the first contact was in 2019	A friend recommendation who was part of women data science communities. I didn't know any other machine learning community. I was interested in following this career. I joined the Telegram group. I follow more on Telegram than on Instagram profile	I follow several more communities on Telegram. In addition to workshops and lectures, it also has a lot of publicity for affirmative vacancies for women	I met the girls from the community at an event in 2019. My path is a little different because I participated since 2019 helping to organize the events. Now I have been following the vacancies on Telegram	I started participating in the community in 2019 at an event. I am currently active in other women’s communities	I started participating in the middle of the pandemic, in 2020. I think the PyLadies girls nominated me. As I wanted to go into the data area, I started to participate. I follow on Telegram, sometimes I post vacancies

2 - How could communication with this community have contributed to your work and study in technology?

Person 1	Person 2	Person 3	Person 4	Person 5	Person 6
My first contact with the community was because of its dataton, which was worldwide. I believe the community has helped me to open the range of options and take a closer look at what is happening out there. I think this expansion of perspective from the technical and social part adds a lot	I worked in technology; I was interested in machine learning. A data science friend recommended the community. It made possible to participate in worldwide workshops Since 2020 I haven't actively participated but I see vacancies and studies on Telegram	I participate in Telegram. I found it very interesting in the pandemic, classes from a book on Machine learning were broadcast on YouTube. Feminine communities empower us. We meet other women who are going through what we live. One supports each other	I think more empowerment and networking. Being in a position of leadership, of creating, of organizing these things, you get to know the data community in general in São Paulo a lot. You end up knowing how relationships work. Empowerment in the sense of being leading. I was very young, but I was there. I felt very empowered	When I joined the community, I didn't work with development and IT. Opened the mind to know new opportunities. It was through the community that I got my jobs. I learned a lot of things on Telegram. It brought me social and technical enrichment	I tend to look for new events, things not advertised in other communities. I think it's a cool place to advertise vacancies, it has a lot of feedback

3 - What are the contents that are most engaging? Do you consider that testimonies and personal narratives make a difference in your life?

Person 1	Person 2	Person 3	Person 4	Person 5	Person 6
<p>What interested me in this community were the advanced and more technical subjects. I also like testimonials</p>	<p>As a black woman, the testimony of another black woman empowers me to be able to enter a community, to feel embraced, to learn. The statement is very, very important because the woman feels: “wow, I didn’t know I could do such a thing”. I feel embraced. Here I can speak openly, feel heard. It is essential to have these testimonials in a community. I joined this SP WiMLDS community based on a statement from a friend of mine who participated. This pushed me to join because I didn’t know there was a community dedicated to ML and DS</p>	<p>Narratives are good for encouraging those at the back of the organization to be empowered to bring newer content. As much as these spontaneous testimonials do not happen on Telegram, in everyday life, when we are in person, they happen a lot. I’ve met women who are outside my bubble that I’ve been talking to has impacted me a lot. In the same way that I have impacted other women with my own story. I think that within the group itself, sometimes it ends up getting lost because women are much more interested in the technical issue than in the narratives of women who have succeeded. I think that the communities themselves are already giving this empowerment. Offline is where we really support each other</p>	<p>Testimonials add. I think that those who participate and want to spread the word, it can be through Telegram, it can be super interesting for sure, because it engages you to participate</p>	<p>I agree it really helps on the community engagement</p>	<p>I came from another profession. When I went to technology, I felt insecure. I was 38 years old. Testimonial make a lot of difference. Definitely to bring people to the area, to encourage to stay and become a developer. Testimonial is important</p>

It was verified in the focus group the valorization of the testimonies, which consist of personal narratives about success or defeat trajectories that influence and inspire participants of the group or outside it to participate in it and attract new members. However, despite realizing the potential for empowerment and engagement, the focus group members fail to see where these narratives could be used in the context of existing digital platforms, as well as in the context of campaigns or specific initiatives related to them. Even participant 3, a former community leader, considers storytelling to be an important resource, but has not had the experience of developing engagement and empowerment strategies on digital platforms.

During the monitoring of digital platforms carried out for two years in São Paulo WiMLDS, it was found that whenever a testimony and statement were published by leaders, volunteers and target audiences, especially on Telegram (the most used platform), there were several associated comments also on the form of new narratives whose contents are related to overcoming obstacles in entering and growing in technological careers, to how the community was important for raising wages and more technical knowledge, for example.

It was not an objective for the focus group to assess the technical knowledge of the participants, but to see if communicational and storytelling dimensions could be proposed, which did not happen. However, the value of shared narratives on digital platforms has been proven as an element of unity, strengthening and growth of female technological communities.

6 Preliminary Results

The elaboration and incorporation of narratives by all members (leaders, volunteers, and target audiences) in the communication ecosystem of women in technology communities occurs spontaneously, sporadically, without measured reach in social networks, or regularly incorporated in the planning of actions.

In the Focus Group carried out with six members of the target public of São Paulo WiMLDS, as well as in the more than 15 interviews with leaders of female IT communities in Brazil and Portugal, it was verified that the testimonies content from the target public who represent engagement occurred in the form of acknowledgments, job promotions, job openings, improvement of technological knowledge by communities. These narratives usually yield prolonged interactions on the timelines of digital platforms, due to the commotion they provoke among the members. These are reports of a human, personal nature, full of authenticity and point out that, in fact, communities are an important catalyst for inclusion, training and empowerment of women in technology.

From the empirical work carried out and to be developed in the doctoral research in four case studies it was possible to outline some communication initiatives in the dimensions of storytelling and transmedia to be proposed.

Ciancia [23] highlights the concept of transmedia storytelling (TS) each medium makes distinctive contributions to our understanding of the world from stories spread across multiple media platforms. Pratten [24] believes “transmedia storytelling is a design philosophy”. Gambarato, Alzamora, Tarcia [25] states TS “is a contemporary communication logic in social practices and in specific communication dynamics”.

The concept of activist transmedia can be applied to the context of female communities in IT and storytelling and the use of its logic in a campaign or in the development of a technological and design proposal. According to Srivastava [26] it is a social impact framework with storytelling by authors who share and create content through media to influence social action. Gambarato, Alzamora, & Tarcia [25] define transmedia activism as a process related to collective in media connections that “foster awareness, engagement, and social change”.

Stages of storytelling strategies to be incorporated into the ecosystem of digital platforms of female communities in technology:

1 – Immersion:

Raise which narratives were the most important, on which platforms, results for the community and individuals, if any work was carried out by the leaders in this regard. Evaluate the potential for action of the proposed narratives.

2 – Proposals for building a storytelling strategy:

Create personas from selected women in the target audience. Define a message for the campaign action. Evaluate the possibility of capturing and sharing narratives from the target audience on digital platforms.

3 – Execution of the transmedia storytelling strategy:

Build narratives from narratives: presentation of the characters, dramatic development, difficulties, and opportunities, when they joined the community as a milestone, group gains and elevation.

4 – Evaluation of the effectiveness of storytelling.

These stages will be tested in the communication campaign to be developed in the Women in Artificial Intelligence group and in the technology prototype for communities with an emphasis on storytelling as a feature in the design of digital platforms which will be codesigned with the community.

7 Conclusions

Ethnography on digital platforms in São Paulo WiMLDS, Focus Group and interviews with leaders and target audience showed testimonials generally take the form of personal narratives related to advances in their professional careers based on group interaction, whether in the form of a request for help with some information about programming, or in the form of winning job vacancies, insecurities in the career transition to IT, for example. These testimonies are usually the target of interactions in the form of emojis and also congratulations, sources of encouragement for women at different levels of knowledge in technology to gather strength for their own lives and even seek other women in support of the cause. However, despite the high level of engagement, as they represent participation at a deeper level, linked to the identification of stories and values, these testimonies are not used to be highlighted in communication on internal and external digital platforms, as well as in events.

In a face-to-face meeting that took place in August 2018 with one founder and leader, the question was raised about whether narratives as testimonies are relevant in communication. It was noticed that they are not perceived as relevant, contrary to what was demonstrated with the target audience in the focus group.

There were diverse reports about difficulties, fears and requests for help among members on Telegram about current discontent in jobs, trajectories in the transition from areas of professional activity to data science. The group acts as a social and solidarity protection network for these people; it is important for black women to have greater motivation to join and work in IT, especially reported by other black women from the same community. Knowing and communicating directly with leaders encourages them to create more and better content. Participating in the community allows you to meet women outside of the target audience's online and in-person social networks and the narratives around the construction of their life trajectories are an element of great inspiration and engagement. There has been a considerable increase in the exposure of personal narratives among community participants, which further encourages participation and engagement.

The empowerment narratives reinforce how fundamental São Paulo WiMLDS was in improving members in technology in digital platforms, focus group and interviews preliminary analysis. These are not praise for the group's work, but examples of social, professional, and personal transformations experienced by the people impacted. These narratives will still be compiled and analyzed in the final empirical work with the Women in Artificial Intelligence community in the communication campaign and in the technology prototype for communities that will be developed soon.

There is a communication and interaction space to be filled in female technology communities. Before creating transmedia systems, models, and frameworks for these communities, it's necessary to establish verification, editing and treatment processes for narratives and storytelling that are disregarded by agents of the entire multiplatform communication chain of these groups. There are scattered stories of overcoming, conquests, losses, sisterhood, among many other personal stories of those involved, with stories of local role models (Brazil and Portugal) and international role models that today are wasted in their potential by the platforms, which will make the difference when inserted in a specific communication and transmedia proposal.

Acknowledgement. *This work is financially supported by national funds through FCT – Foundation for Science and Technology, I.P., under the project UIDB/05460/2020. Renata Frade's PhD investigation is sponsored by Fundação para a Ciência e Tecnologia (FCT) doctorate scholarship (2020.06640.BD reference).*

References

1. World Economic Forum: Global Gender Gap Report (2022). https://www3.weforum.org/docs/WEF_GGGR_2022.pdf
2. UN Women: Power on: How we can supercharge an equitable digital future (2023). <https://www.unwomen.org/en/news-stories/explainer/2023/02/power-on-how-we-can-supercharge-an-equitable-digital-future>
3. World Wide Web Foundation: Women's Rights Online: closing the digital gender gap for a more equal world (2020). <https://webfoundation.org/research/womens-rights-online-2020/>
4. Castells, M.: A sociedade em rede. Editora Paz e Terra, São Paulo (2002)
5. Castells, M.: O poder da identidade. Editora Paz e Terra, São Paulo (2018)
6. Wajcman, J.: El tecnofeminismo. Ediciones Cátedra, Madrid (2006)

7. Frade, R., Vairinhos, M.: *Technofeminism: Multi and Transdisciplinary Contemporary Views on Women in Technology*. UA Editora, Aveiro (2023)
8. Jenkins, H.: *Cultura da convergência: a colisão entre os velhos e novos meios de comunicação*. Aleph, São Paulo (2009)
9. Carroll, J.: Human computer interaction – brief intro. In: Soegaard, M., Dam, R.F. (eds.) *The Encyclopedia of Human-Computer Interaction*, 2nd edn. The Interaction Design Foundation, Aarhus (2013)
10. Dimond, J.P.: *Feminist HCI for Real: Designing Technology in Support of a Social Movement*. Georgia Institute of Technology, Atlanta, Ga (2012)
11. Riera, T.: *Online Feminisms: Feminist Community Building and Activism in a Digital Age*. Claremon Graduate University, Claremont (2015)
12. Jenkins, H., Shresthova, S., Gamber-Thompson, L., Kligler-Vilenchik, N., Zimmerman, A., Soep, E.: *By Any Media Necessary: The New Youth Activism*. New York University Press, New York (2019)
13. Carpentier, N.: Além da escada da participação: Ferramentas analíticas para a análise crítica dos processos midiáticos participativos. *Revista Mídia e Cotidiano* **12**(3), 245–274 (2018)
14. Dahlgren, P., Hill, A.: *Media Engagement*. Routledge, Abingdon Oxon (2023)
15. de Souza, C., Preece, J.: A framework for analyzing and understanding online communities. *Interact. Comput.* **16**(3), 579–610 (2004)
16. Erickson, T.: *SocialComputing*. In: Soegaard, M., Dam, R.F. (eds.) *The Encyclopedia of Human-Computer Interaction*. Interaction-Design.org Foundation, Aarhus (2013)
17. Gupta, S., Tanenbaum, T.: Shiva’s Rangoli: tangible interactive storytelling in ambient environments, pp. 29–32 (2019). <https://doi.org/10.1145/3301019.3325145>
18. Crawford, C.: *Chris Crawford on Interactive Storytelling*. New Riders, Berkeley Calif (2013)
19. Miller, C.: *Digital Storytelling: A Creator’s Guide to Interactive Entertainment*. CRC Press, Boca Raton, FL (2020)
20. Koenitz, H., Barbara, J., Eladhari, M.: Interactive digital narrative (IDN)—new ways to represent complexity and facilitate digitally empowered citizens. *New Rev. Hypermedia Multimedia* **28**(3–4), 76–96 (2022). <https://doi.org/10.1080/13614568.2023.2181503>
21. Brown, S.A., Chu, S.L.: “You write your own story”: design implications for an interactive narrative authoring tool to support reflection for mental health in college students. In: Mitchell, A., Vosmeer, M. (eds.) *ICIDS 2021. LNCS*, vol. 13138, pp. 312–321. Springer, Cham (2021). https://doi.org/10.1007/978-3-030-92300-6_30
22. Coutinho, C.: *Metodologia de investigação em ciências sociais e humanas: Teoria e prática*. Almedina, Coimbra (2013)
23. Ciancia, M.: Transmedia design framework: design-oriented approach to transmedia research. *Int. J. Transmedia Lit.* **1**(1), 131–145 (2015)
24. Pratten, R.: *Getting Started with Transmedia Storytelling: A Practical Guide for Beginners*, 2nd edn. CreateSpace, London (2015)
25. Gambarato, R., Alzamora, G., Tarcia, L.: *Theory, Development, and Strategy in Transmedia Storytelling*. Routledge, New York (2020)
26. Srivastava, L.: *Transmedia Activism: Telling Your Story Across Media Platforms to Create Effective Social Change* (2009). <https://web.archive.org/web/20130515174049/>, <http://www.namac.org/node/6925>. Accessed 06 July 2023