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► **To cite this version:**

Roberta Tassi, Agata Brilli, Donato Ricci. Digital Methods for Service Design. ServDes2018 - Service Design Proof of Concept, Jun 2018, Milano, Italy. Service Design and Innovation Conference, 2018. hal-01901090

HAL Id: hal-01901090

<https://sciencespo.hal.science/hal-01901090v1>

Submitted on 22 Oct 2018

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ServDes2018 - Service Design Proof of Concept

Politecnico di Milano

18th-19th-20th, June 2018

Digital Methods for Service Design

Experimenting with data-driven frameworks

Abstract

From logs and information left in online spaces to data points self-generated by connected devices, digital traces have become more and more diffused over the past years. Along with some big-data approaches, Digital Methods of research - treating the actual content of users' manifestation online (i.e. tweets, Instagram pictures, comments) - offer the opportunity to better understand people and behaviors through their online activities. This paper investigates how Digital Methods can be repurposed as a full-fledged approach for the Service Design practice, by offering a method to outline service design frameworks from a corpus of web data. This quantitative methods, in combination with the traditional qualitative approaches, leverage the continuous exchange of information that is happening in the digital space and suggest the possibility to automate parts of the data collection and analysis processes in support of service design activities. Grafting on several case studies - we will explain how Digital Methods could be used to identify and describe a set of personas by extracting and interpreting data from their online activities, and we will inquire into the application of the same methodological approach to map other frameworks - such as experience journeys or system maps - that are critical to Service Design.

KEYWORDS: Service Design; Digital Methods; Personas; Service Design Tools

1.Design disciplines in transition

In the last two decades, we are acknowledging an entire disciplinary field experimenting with new “ways of thinking and doing” (Manzini 2016) in the face of growing environmental, technical and political issues in our society (Cross 2011; Ehn et al. 2014). Using design to address those type of challenges is now a global phenomenon and is raising important questions around design itself as the discipline seeks to make sense of its new role in the world (Yee et al. 2013). The Service Design practice is playing an important role in this transition by offering an approach that helps entire organizations shift towards a user-centered or customer-centered mindset, and transform the way they offer their services as well as they way they operate. This transition also leads towards an increasing system-level thinking, enabling organizations to approach and tackle broader issues (Tonkinwise, 2015). The design practice utilizes a deep understanding of people and communities to understand the continuously evolving context, but also need to consider that those communities are place-based and globally-connected, in a continuous exchange of technology, information and culture. On one hand this require to expand not just the overall approach and process, but also to elaborate on the tools and techniques that support our understanding of the user, the system and the constantly evolving context around them (Ostrom 2015). On the other hand, more germane fields of study to such complex socio-technical issues and problems (i.e. Science and Technology Studies, Political Sciences, Media Studies and Public Affairs) are experimenting new methodologies fitting into the so called digital-turn, expanding the notion

of design research to the online domain. Research approaches based on the digital traces left over the Web and conducted in the framework of digital (Rogers 2009) and quali-quantitative methods (Venturini & Latour 2009) are opening the possibility to collect and analyze a wealth of data to observe and describe such complex environments. The hypothesis of the present paper is that a promising way to cross these two tendencies is to continue and reinforce the circulation of approaches and methods between Design and Social Sciences, re-imagining the use of digital data and methods in specific, controversial and complex Design Research and Service Design contexts.

2. The evolution of Service Design frameworks

The design of new services is an activity that should be able to link the techno-productive dimension (What is the realm of the possible?) to the social (What are the explicit areas of demand and what the latent ones?) and cultural dimension (Manzini, 1993). This definition given by Manzini at the start of the scientific debate around service design suggested that the methodological approach of industrial designers should have been expanded in order to embrace the possibility of designing services (Morelli, 2002). The new practice was asking designers to deal with an intangible subject matter and a constant need of engaging other stakeholders in the process: it was not immediately clear what techniques could have better supported those purposes and several tools have been tried and borrowed from Social Science, HCI Marketing and Business Management (Tassi, 2008).

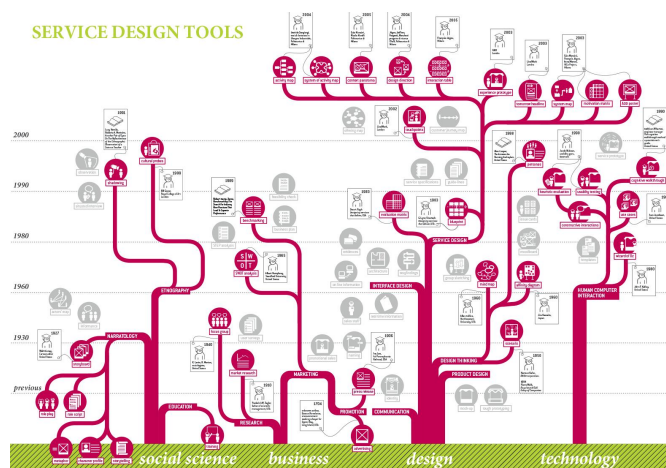


Figure 1 - The origin of service design tools

In the years, we saw a gradual convergence around a set of frameworks that have become essential assets for design practitioners, such as the human archetypes or personas to represent the key user behaviors, the user or customer journey map to describe the experience of interacting with a service, or the system and ecosystem maps to describe the wider context and what the different players exchange in the service delivery. These types of Service Design frameworks have helped bringing the service design approach and user-centered mindset to organization, and have become an essential component of systemic transformation processes. However, the expansion of the design scope and context of action is raising some new methodological questions around methods and tools. The existing frameworks are mostly relying on a qualitative approach to describe users, experiences and systems - but if design is transitioning to focusing on a local-based globally-connected community in continuous exchange of information, values and culture (Tonkinwise, 2015), we could consider better integrating data coming from all the relevant sources available nowadays, and embracing that evolving context and dimension with a mixed of quantitative and qualitative approaches. Furthermore, we could also look at a partial automation of the data collection and exploration processes to provide new ways to efficiently observe specific

behaviors over time and reflect on their constant evolution, through self-generated frameworks.

3. The opportunity to work with Digital Methods

We argue that using digital data and analyse them both qualitatively and quantitatively can be extremely useful in complex social, technical and economic contexts where design is called to intervene. Proving this hypothesis requires to address different lingering challenges facing design theory and practice (The Design Collaborative 2014): How to cope with a heterogeneous and conflicting spectrum of values and interests? How to collaborate with other disciplines. How to stabilise specific research methods and protocols? How to test them in large scale empirical experiments? While we will try to tackle the latter two questions further in the article, the first two ones are related to the controversial nature of the issues faced by design intervention. This is the case of all those issues where their very same definition is questioned by various actors and is redefined by the means of new technologies, governance settings and social representation (Venturini 2009). To study them, a specific research methods emerged, called Controversy Mapping (Latour 2007). Controversy Mapping proposes a data-acquisition protocol drawn on the theories and practices of Digital Methods of research (Rogers 2009, 2013). They exploit the wide range of traces that are left on the Web by the very actors of the issue under analysis. Digital methods further a social research approach taking advantage of the empirical capacities embedded in online activities (Schneider & Foot 2004) with their unique dynamic nature - a mixture of ephemeral and permanent elements - (Hewson 2003). Digital Methods differ from the big-data research programs. The emphasis of Digital Methods is not in the magnitude of digital data analyzed but in the critical affordances deployed by the data-acquisition protocol. Digital Methods protocols are deriving significant findings from relatively small, ad-hoc designed, data-sets (Marres and Weltevrede 2013). By following a series of iterative steps and refinement procedures, the final formatted data are carved out of informational disarrays and unformed mass of online digital objects. This process has the advantage of avoiding the risk of projecting pre-existent categories on the issue in analysis. Being a challenge of data selection and curation, they provide, through the redaction of their protocols, an evident and traceable inspection of the qualitative decisions taken to compose datasets and corpora.

4. Data-Driven Personas case studies

To propose an example of fertile synergy between Service Design and Digital Methods and set the ground for a replicable empirical methodology, a full scale test has been conducted by focusing on one specific design framework. The initial hypothesis for this research is that it is possible to understand the behaviors, needs and expectations of the users we are designing for by collecting and studying their online traces. Distilling relevant information out of these online traces can lead to the identification of clusters of users to be then described as *personas*.

4a. The process of distilling Data-Driven Personas

The Data-Driven Personas method could be summarised into four macro-phases (FIG. 2).

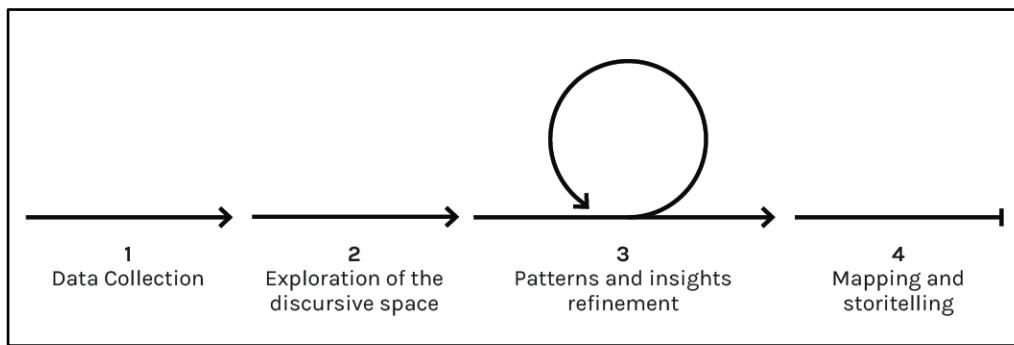


Figure 2 - The four steps of Data-Driven Personas

1. **Data collection:** aims at defining the nature and scope of the data harvested as well as their limitations, by defining the research protocol used to generate the corpus of data. Before the harvest starts, a deep reflection is required concerning what data could be relevant for the exploration and when they should be collected. Similarly to the moment in which service designers and researchers craft a research plan to set up some interviews with users or observation sessions, the first step is the identification of a relevant space in the online context where users are discussing a certain topic. A deep understanding of the bias induced by the kind of user traces (e.g. hyperlinks, tags and hashtags, threads, ranks or edits) and by the kind of platforms that are offering them (e.g. Facebook, Twitter, Wikipedia, blogging platform, search engines) is needed. According to the specific theme and objective of the exploration, the protocol could for example rely on observing how people generally talk about a topic on a specific social network, versus look at search results in the existing engines.
2. **Exploration of the discursive space:** aims at finding an entry point to analyse the investigated topic, displaying the constellation of debates emerged from the collected data, and highlight research insights and patterns. The corpus of data extracted from the web is visualised in order to get a synoptic view on the issue under analysis and identify the main components. Similarly to the synthesis moment in which service designers or researchers start mapping their data point and insights in order to quickly identify affinities and patterns, this visualisation is aimed at providing an overview of all the data points collected, and start explore them. For example, this is the phase that allows to start identifying the clusters of people who relate to the investigated theme in the same way, and can lead to outline a first set of personas (Cooper, 2014).
3. **Patterns and insights refinement:** aims at iterating on the emerging clusters of information in order to enrich their understanding and further detail the research insights. While the exploration of the discursive space allows to quickly highlight the most relevant topics and clusters composing a complex issue, through a deeper analysis it is possible to closely identify the cohesive groups of users and needs behind those clusters, refining the set of personas and enriching their understanding. To achieve this objective, it is necessary to detect some distinctive features characterizing each cluster, by analysing the verbal space or visual imagery that are associated to their debates.
4. **Mapping and storytelling:** aims at outlining the complete description of each persona, making use of the most relevant qualitative and quantitative aspects related to the data emerged during the research process. Vivid descriptions of user types enable to bring fictional user profiles to life (Cooper, 1998; Grudin & Pruitt, 2003) and - as regards to Data-Driven Personas - this can be done by using the data generated by users during their online activities. An advantage of the Data-Driven method is that researchers can build the profiles in a semi-automatic way by using existing information to narrate the various aspects of the user profile. At this stage,

data visualisation shifts its objectives from an analytical research tool to a way of synthesising the main aspects of each persona - or eventually their experience journey.

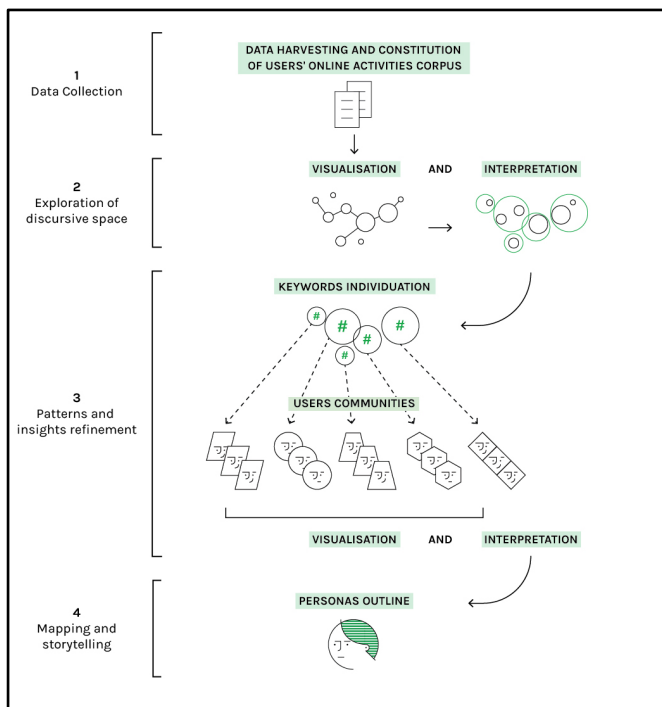


Figure 3 - A representation of the process used to distill Data-Driven Personas

4b. Case Study: Naturpradi

NATURPRADI is a research project aimed at observing and describing the effects of the many initiatives endorsed by the Paris municipality to revegetate the city. These initiatives are trying to produce smart solutions to a growing range of issues created by urban growth. Nevertheless, there is no agreement on the imaginaries and technical practices that should be included into this new urban nature (Gandy 2006). To observe, monitor and, eventually, produce elements of reflections for future urban policies, the NATURPRADI project is mapping the symbolic and material elements of the urban nature debate (Ricci et al. 2017). The research project is aimed at exposing the different social, political and technological issues associated to urban nature, its actors, and the controversies caused by alignment and misalignment of interests. To achieve its objective, NATURPRADI started a Digital Method campaign by collecting digital-native content produced on Twitter. The online news and social networking platform has been chosen since it is broadly used by a variety of actors getting spontaneously organised around discussion topics by using hashtags. Twitter, presenting the concrete opportunity for “empirical sociocultural research” (Burgess and Bruns 2015), has become, over the years and despite its transformation, an object of study and a data source for research scopes (Rogers 2013b). The core of the NATURPRADI project is to investigate and elicit different viewpoints and perspectives on urban nature, how they are sustained by specific communities and populated by identifiable users, each of them proposing an instantiated vision of the future vegetation in Paris. For this reason, NATURPRADI has provided the great opportunity to test a new process moving from user-generated content to personas, following the four-step process defined above.

1. Data Collection

After having chosen Twitter for collecting the manifestations of interest, the

Streaming API ¹ has been adopted to retrieve online data related to the topic of nature in Paris. This process requires to acknowledge and consciously embrace Twitter limitation², specificity and embedded politics (Gillespie 2010; VanDijk 2013), as they are technically, rhetorically and culturally expressed (Gillespie 2014): only their clear understanding allows later on in the process to mitigate and validate the results of the research. Among the different approaches for Twitter corpora building (see Mayr and Weller 2017) it has been chosen one based on key expression query. Through a collaborative and participatory procedure among the members of the NATURPRADI consortium, a list of 158 expressions (FIG. 4) has been used to capture the tweets in which they were mentioned. To assure a territorial specificity to our corpus we queried only for French word. Furthermore, all the keywords were queried by adding the word “Paris”³.

agriculture - agricultures - agriculture biointensive - agriculture verticale - agroforesterie - agrosylviculture
 - alimentation proximité - #AMAP - aquaponie - arboriculture - arbre - arbre alignement - arbres alignements - arbre urbain - arbre_remarquable - arbres - arbres urbains - arbres_remarquables - arbuste - arbustes - architecture écologique - aromatique - aromatiques - association_végétale - bande_enherbée - biodiversité - biodiversité bâtiment - biodiversité jardin - biodynamique - biointensive - botanique - botaniques - cartographie végétation - chantier nature - compost - composts - compostage - compostages - conservation nature - corridor biologique - corridors biologiques - "coulée verte" - "coulées vertes" - développement - durable - éco-habitat - ecoagriculture - écocitoyenneté - écoconstruction - écologie urbaine - écologique - écologiques - écoquartier - écoquartiers - espace vert - espaces verts - ferme verticale - fermes verticales - fleurie - fleuries - flore des murs - floriculture - forêt - forêt urbaine - fragmentation écologique - fruitier - fruitière - fruitiers - génie écologique - génie_écologique - gestion différenciée - graminée ornementale - "guerrilla gardening" - horticulture - horticulture urbaine - flot - flot chaleur - flots chaleur - incroyables comestibles - infrastructure verte - jardin - jardins - jardin communautaire - jardins communautaires - jardin ouvrier - Jardin-forêt - jardinage - jardinage collectif - "jardin familial" - "jardins familiaux" - "jardin public" - "jardins publics" - "jardin sauvage" - "jardins sauvages" - jardinage urbain - jardins ouvriers - matrice écopaysagère - micro-agriculture - micro-ferme - micro-fermes - mur végétal - mur végétalisé - murs végétalisés - murs végétals - naturalité - nature - observatoire paysage - patrimoine naturel - paysage urbain - paysages urbains - permaculture - plan climat-énergie territorial - plante - plante grimpeuse - "plante utile" - plantes - plantes grimpantes - polyculture - potager - potagère - potagères - potagers - prairie - prairies - prévégétalisation - "produit local" - "produits locaux" - alimentation proximité - renaturation - "réseau écologique" - "réseaux écologiques" - résilience écologique - soutenable - soutenables - stratégie biodiversité - sylviculture - système d'information sur la nature et les paysages - terrasse végétalisée - terrasses végétalisées - toit-terrasse - toits-terrasses - toiture - toitures - trame verte - trame verte - trames vertes - végétale - végétales - végétalisation - végétalise - végétalises - végétalisée - végétalisées - végétation - verger - vivrière - grenelle environnement - effet serre

Figure 4. The set of keywords used for the data collection on Twitter

2. Data Exploration

The data collected were used to generate a series of graphs showing how different users are connected to each other and the specific words used in the tweets. In the map, we can recognize clusters of conversations, such as the central institutional cluster featuring linked to the municipality (@Paris, @Anne_Hidalgo, @PKOMITES and @vegetalisons). On the left of this group, there is a cluster concerning urban farming and bio-agriculture activities, where we see for example the initiative of the municipality named Parisculteurs. On the right of the institutional accounts, lays a cluster about participative initiatives deployed by the municipality of Paris to promote the citizens' engagement, like the Permis de Végétaliser. Another relevant cluster is located under the institutional accounts, featuring ecology and recycling related topics. Looking at the right edge of the discursive space, there is the cluster where all the famous green areas of Paris are mentioned. Finally, at the opposite edge, can be detected the cluster about innovative agricultural techniques and startups. On the basis of this quali-quantitative interpretation of the graph, sustained by a visual analysis of the network, five key clusters can be identified (FIG. 5) :

¹ These API offers the possibility to retrieve only live data, imposing a bandwidth limitations coming into effect when the requested tweets exceed the 1% of the all traffic flowing in the platform.

² A limitation affecting Twitter based researches is linked to its representativeness (see Blank 2016). Although Twitter is widely used all across the world, its adoption rate changes accordingly to different social milieux and the way it is used may differ significantly from country to country. In the NATURPRADI project there is no assumption about the possible exact extension of the observed digital population to the general one.

³ To assure that the final corpus would not be biased by tweets not related to Paris or to the urban nature, a further curatorial procedure has been applied. Through a custom and open-source software (the source code is available here: <https://github.com/medialab/catwalk>.), every tweet has been read by the research team and evaluated in terms of its pertinence. This approach, distinguishes the NATURPRADI project from many other big data ones. Furthermore, the close reading of the tweets enabled us to have a constant overview of the state of the discussion, gaining a deep understanding of the dynamics of the issue. This aspect resulted to be extremely useful in the analysis and interpretation of the data.

- A. *Technological Development*, featuring innovation initiatives and project in the agricultural field;
- B. *Urban-Agriculture*, featuring bio-agricultural projects developed inside the city of Paris;
- C. *Co-design of Public nature*, featuring all the debates around the participatory activities endorsed by the municipality;
- D. *Ecological attitude*, featuring the concerns about the ecological transition like the domestic recycle of wastes.
- E. *Relaxed Contemplation*, featuring the discussion about outdoor activities around Parisian gardens.

The exploration of the discursive space and the description of the key-clusters allowed to identify the most vibrant and relevant topics for the users. But who are the groups of people populating those clusters? And what is their approach towards urban nature? Drawing upon this overlapped delimitations, the process has moved towards a more precise description and characterisation of the users present in each cluster.

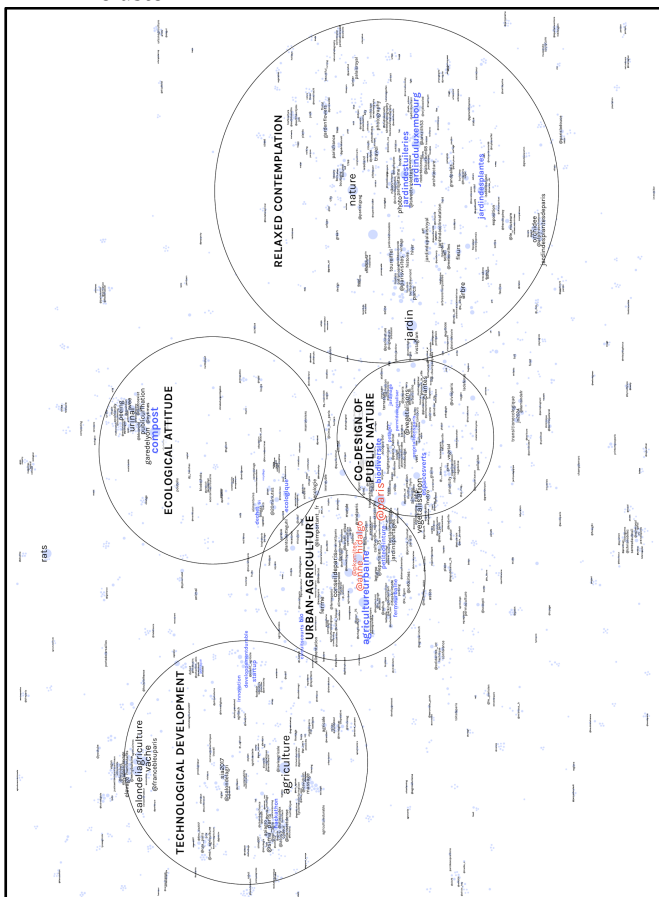


Figure 5 - The user-object networks

3. Clusters Refinement

For each cluster, a list of keyword has been produced to identify the users belonging to one or more of them. For example, a user is identified as part of the Ecological Attitude group whenever he or she used at least one of the keywords compost, ecologique, dechet, tri. If that same user wrote any of the keywords related to the other clusters, she would also appear in those communities (Fig. 6). The so obtained corpus is then used to understand if, besides debating about the same topic, they also debate in a similar way. Just like when the researcher carries out field

investigations to collect more insights about how people live, the visualisation and interpretation of different aspects of their online activities allows to progressively validate the cohesion of communities. This iterative process consists in visualising the multiple dimension of the corpus (e.g. images, texts, links) and then interpreting the results to understand if there are similar groups which can be merged together and considered as a unique behaviour or, on the contrary, if inside a cluster more than one distinctive behaviour can be discerned. In our test, we have focused on the two main elements of a tweet, its textual content and the possible images attached to it.

| SELECTED KEYWORDS |
|---|
| A. Technological development: <i>startup, innovation, developpementdurable, hackaton</i> |
| B. Urban-agriculture: <i>agricultureurbaine, fermeurbaine, petiteceinture, circuitscourts, bio</i> |
| C. Co-design of public nature: <i>biodiversite, espacesverts, vegetalisonsparis, potager, jardinage, permidevegetaliser</i> |
| D. Ecological attitude: <i>compost, ecologique, dechet, tri</i> |
| E. Relaxed contemplation: <i>jardindestuilleries, jardinduluxembourg, jardindesplantes</i> |

Figure 6 - The selected keywords for each cluster used to retrieve the communities of users which used these words in their tweets

Digging into the textual sphere

Analyzing the most frequent and relevant vocabulary elements that a group of people use to discuss a given issue is extremely relevant to identify both the commonalities and distinctive traits of each cluster. In our test, the visualisation of the textual sphere shows the 150 most recurrent terms for each group, sorted from the most to the least frequent (FIG. 7). The size of each bubble is proportional to the frequency of the word. The color of the bubbles describes how much each word is shared with other clusters: the lightest the color, the most shared the word; the darkest the color, the least share the word - which means that it is uniquely used by a specific community. While the most used words by the Technological development, Urban agriculture and Co-design of public nature have proved to be in accordance with the initial depiction of these communities, the interpretation of this visualization lead to an interesting observation concerning the Relaxed contemplation and the Ecological attitude communities. In the Relaxed contemplation cluster, the names of several famous French photographers occurred among the most frequent words. This could suggest the presence of a smaller community within that cluster, with an interest in photography and in the historic representation of the city. Whereas the Ecological attitude community seemed mostly linked to the recent news of the urinal-vases installed in Paris by the municipality, and their textual sphere appeared similar to the vocabulary used by the Urban-agriculture community: this suggested that the two clusters share parts of same debates and are likely representations of the same attitude.

and those who appreciate the aesthetic role of the Parisian nature. In the lower part of the network there is a significant group of historic images, which corroborates the presence of a sub-community of Nostalgic users. Repeating the process for the other clusters, the visual sphere analysis helps to understand the cohesion of the identified groups (Fig. 9-12) . The Start-up entrepreneur works on agricultural research and innovation, the Sustainability aware consumer is interested in locally grown and produced products, the Overactive neighbor participates in every municipality greening initiative, the Forever tourist always looks at paris with enchanted eyes, the Nostalgic remembers the better time of Parisian nature with a bitter smile (FIG. 13).

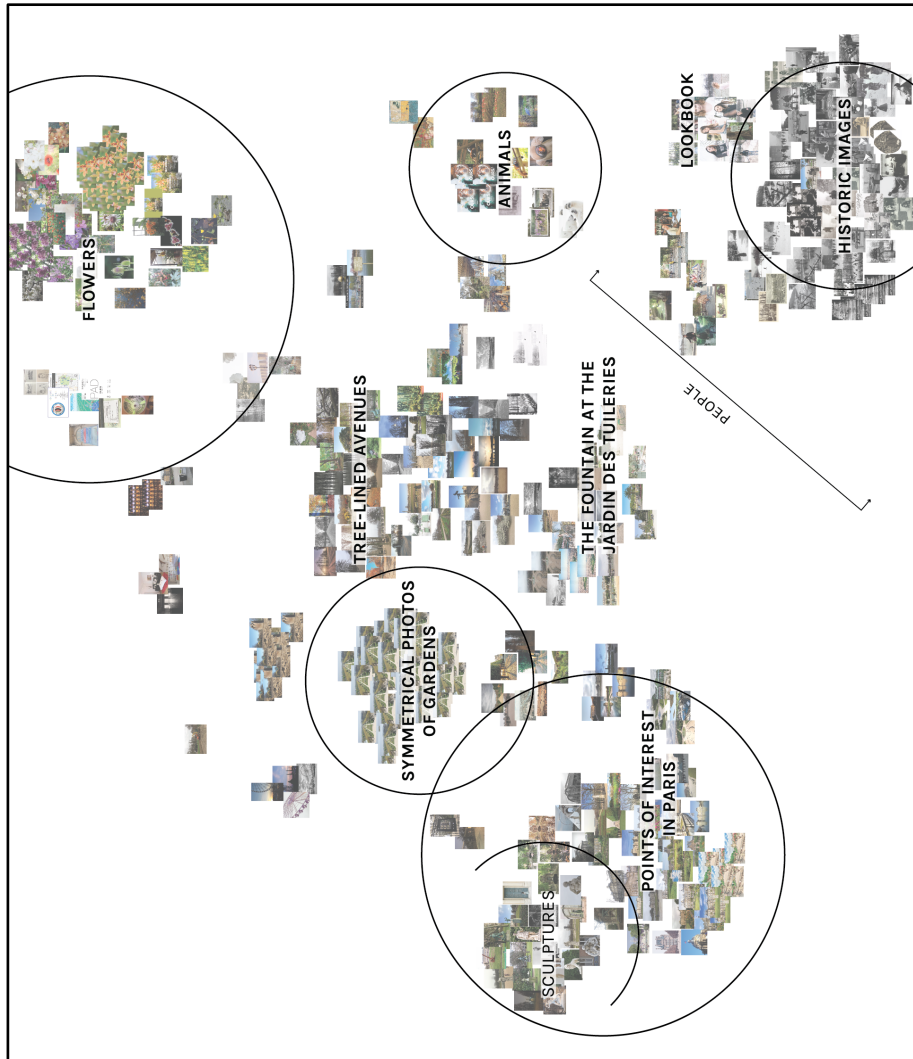


Figure 8 - The visual sphere of the “Relaxed contemplation” community

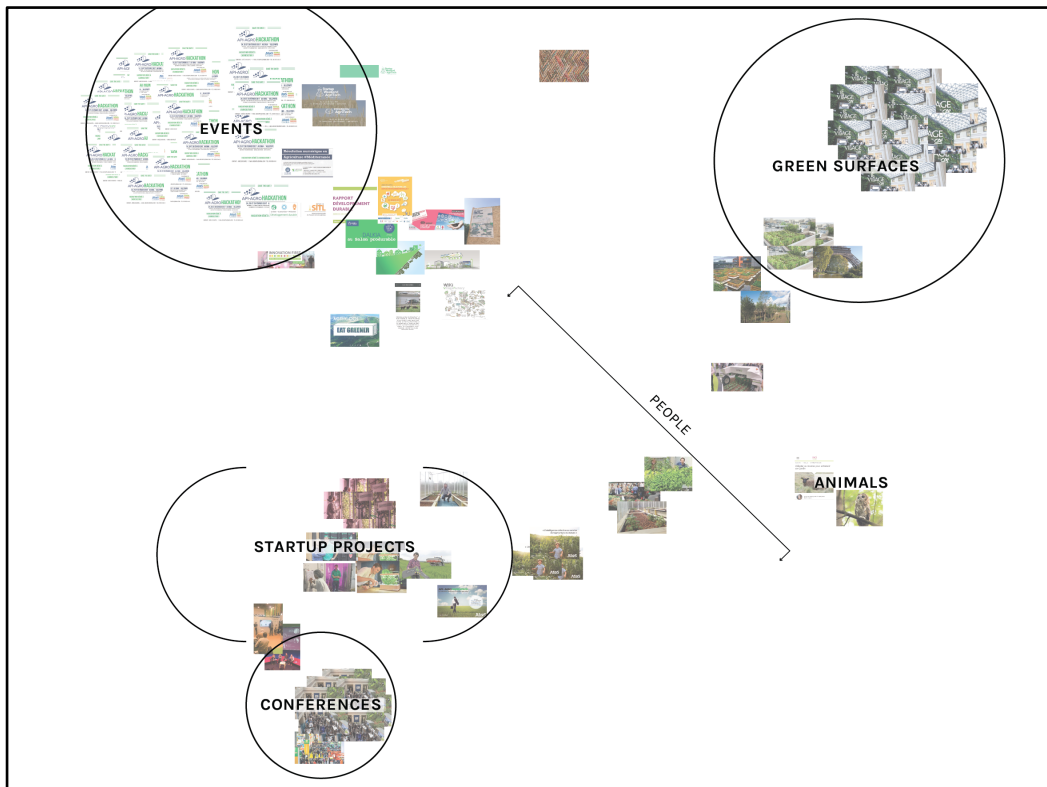


Figure 9 - The visual sphere of the “Technological development” community

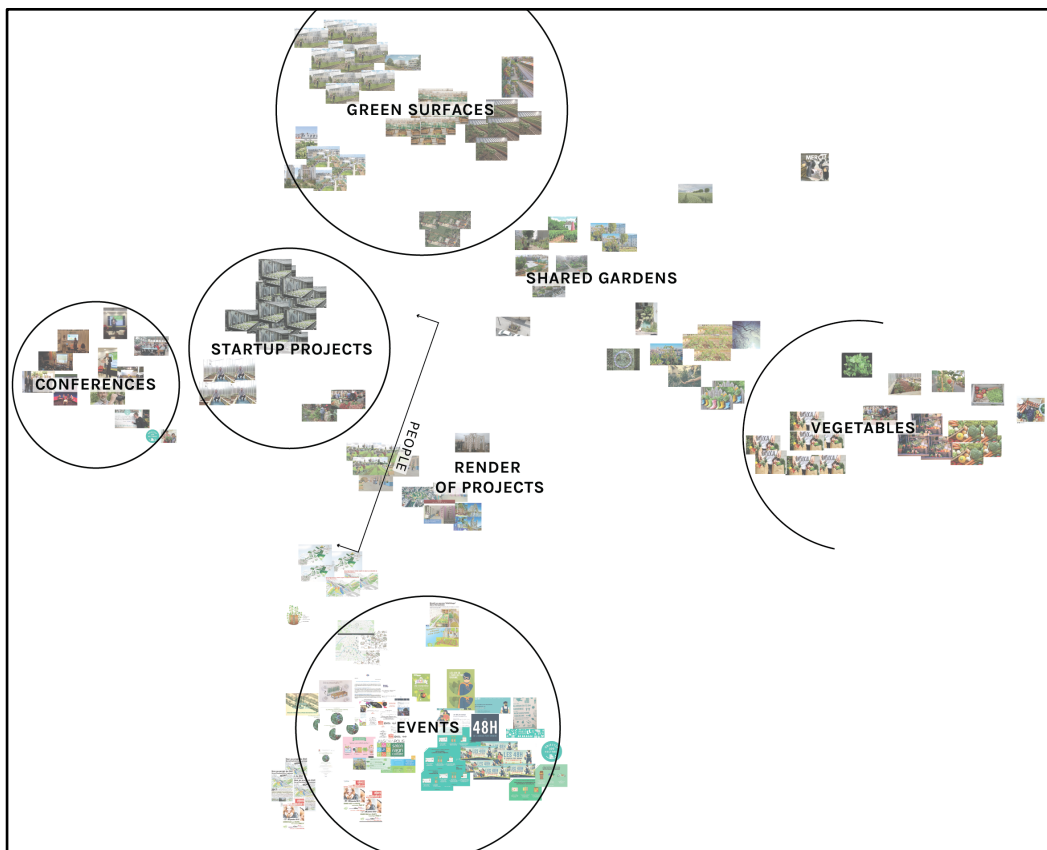


Figure 10 - The visual sphere of the “Urban-agriculture” community

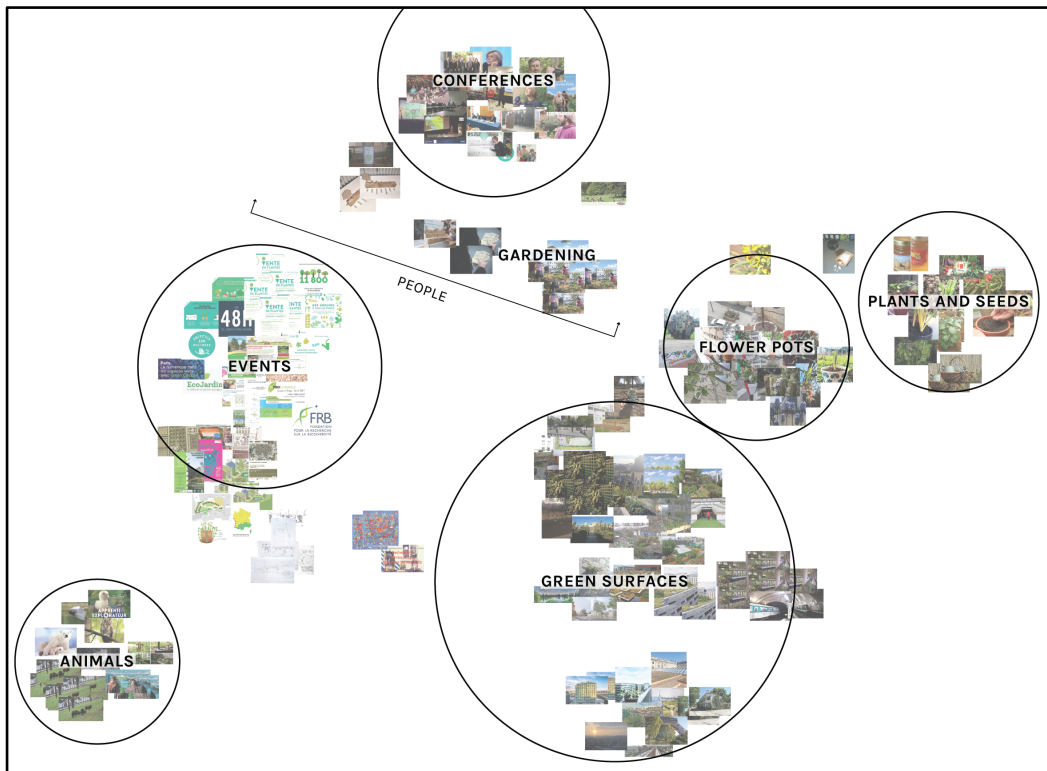


Figure 11 - The visual sphere of the “Co-design of public nature” community

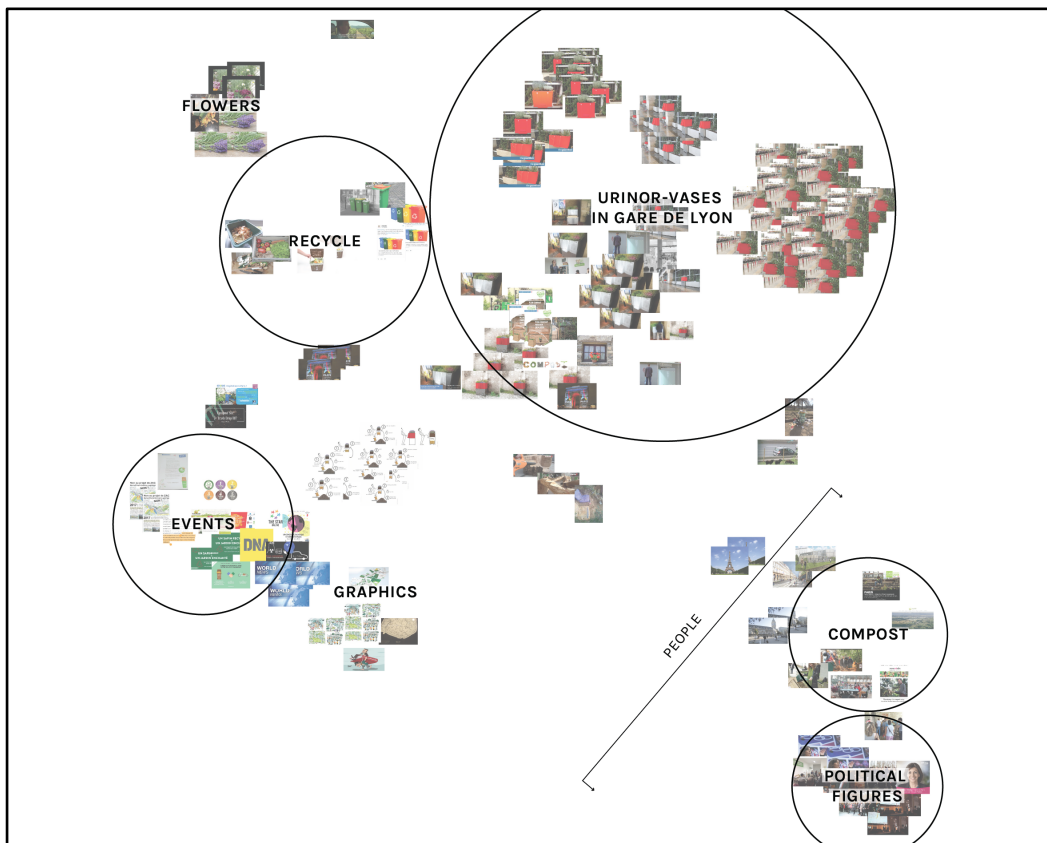


Figure 12 - The visual sphere of the “Ecological attitude” community

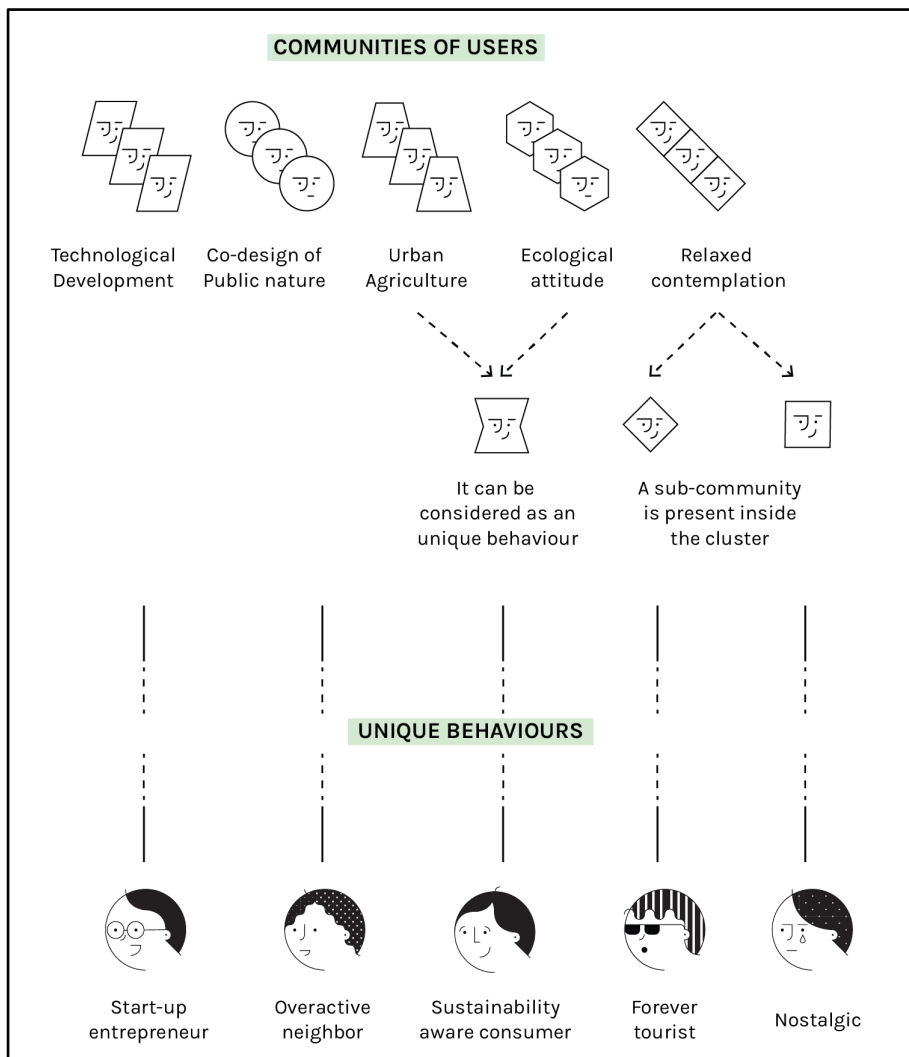


Figure 13 - The analysis of the textual and visual imagery of each community allows to individuate the unique behaviours of the research

4. Mapping and Storytelling

Finally, each persona has been outlined with the data produced by the group of users from whom that personas was created. The narration starts with the picture and the name randomly picked from the real users belonging to that persona. The keywords which initially brought to the definition of the community and then of the relative persona are listed as the most connoting hashtags. A tweet has been selected from the data corpus, in order to represent the usual way that persona would talk about urban nature in Paris (the persona's quote or motto). The Twitter descriptions of users are used to narrate how each persona would describe themselves: a bubble chart visualise the most occurred terms. The most recurring images of each personas are also part of the narration, showing their visual imagery. The relationship between personas, as well as their similarity, is represented by a diagram showing how many users are unique to that personas and how many are shared with other personas, since a user could be present in more than one cluster. Each persona can be also located on the initial map of the overall discourse, telling us if - in their relationship with nature - they show a more contemplator or expert approach. Finally the tweets activity over time of each personas can help understand the engagement with the topic (FIG. 14-18). The final personas could be used as a starting point to imagine different services that the municipality of Paris could propose - related to nature - or different needs concerning the existing services.

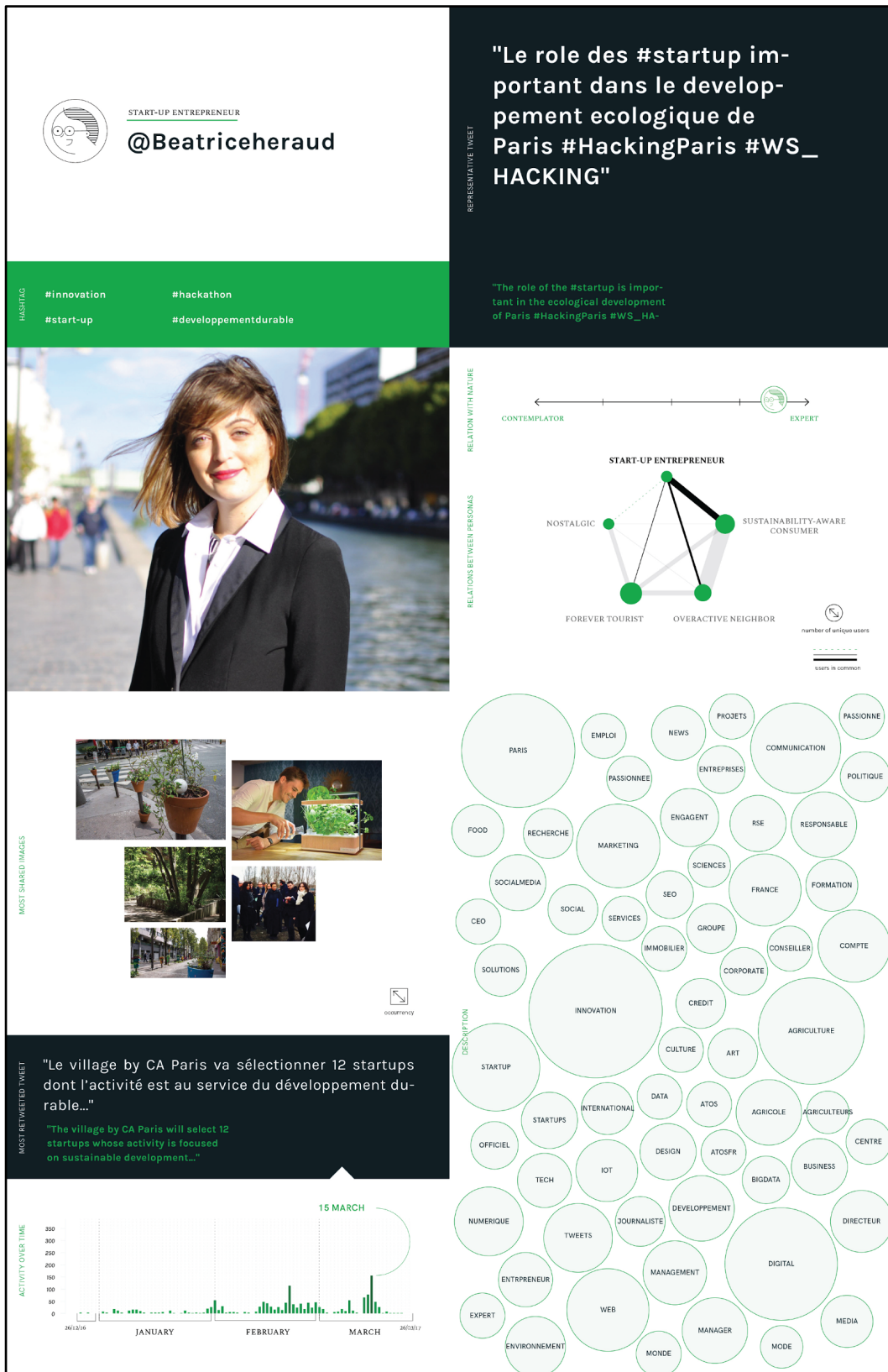


Figure 14 - Description of the "Start-up entrepreneur" persona

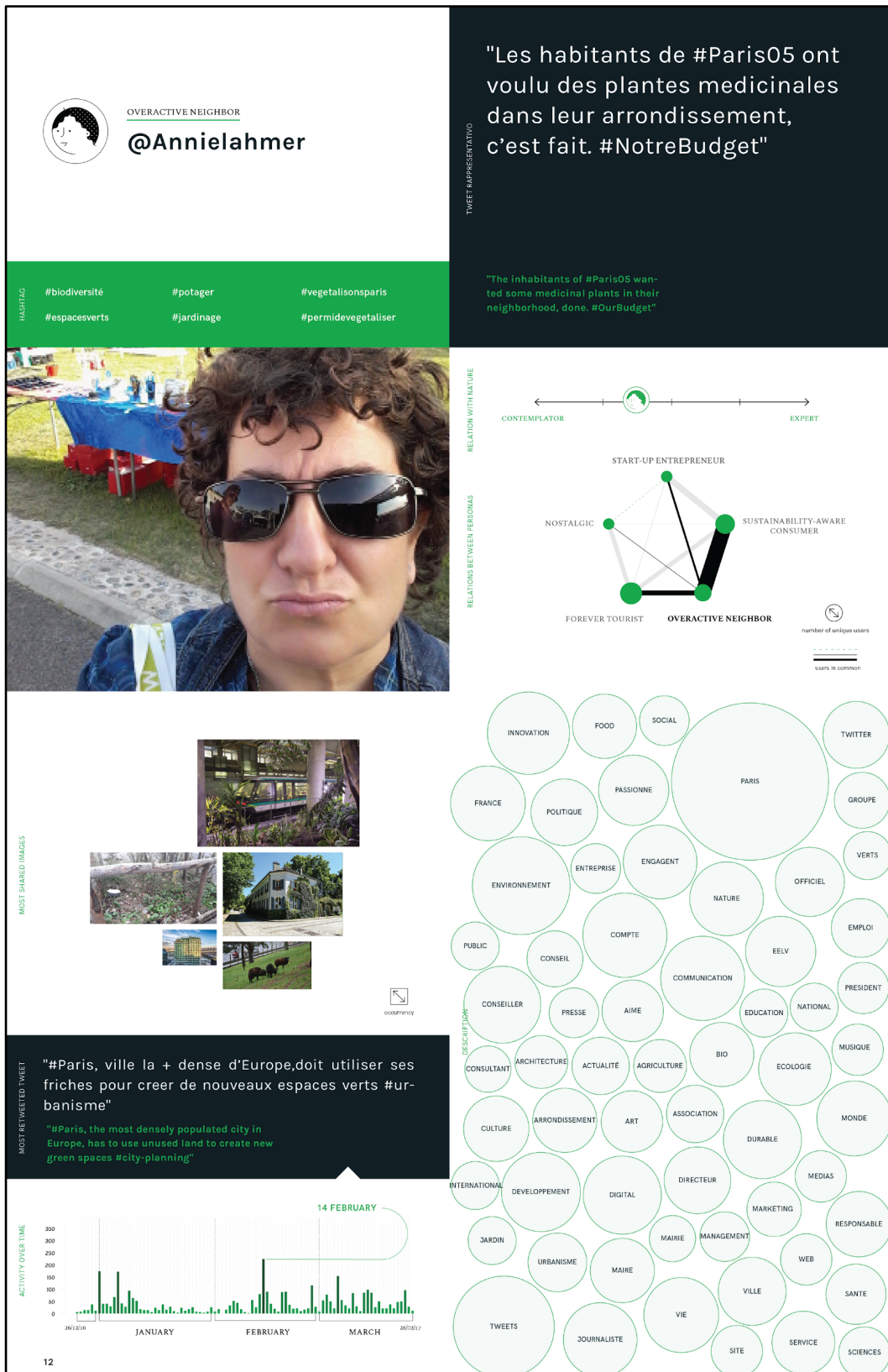


Figure 15 - Description of the "Overactive neighbor" persona

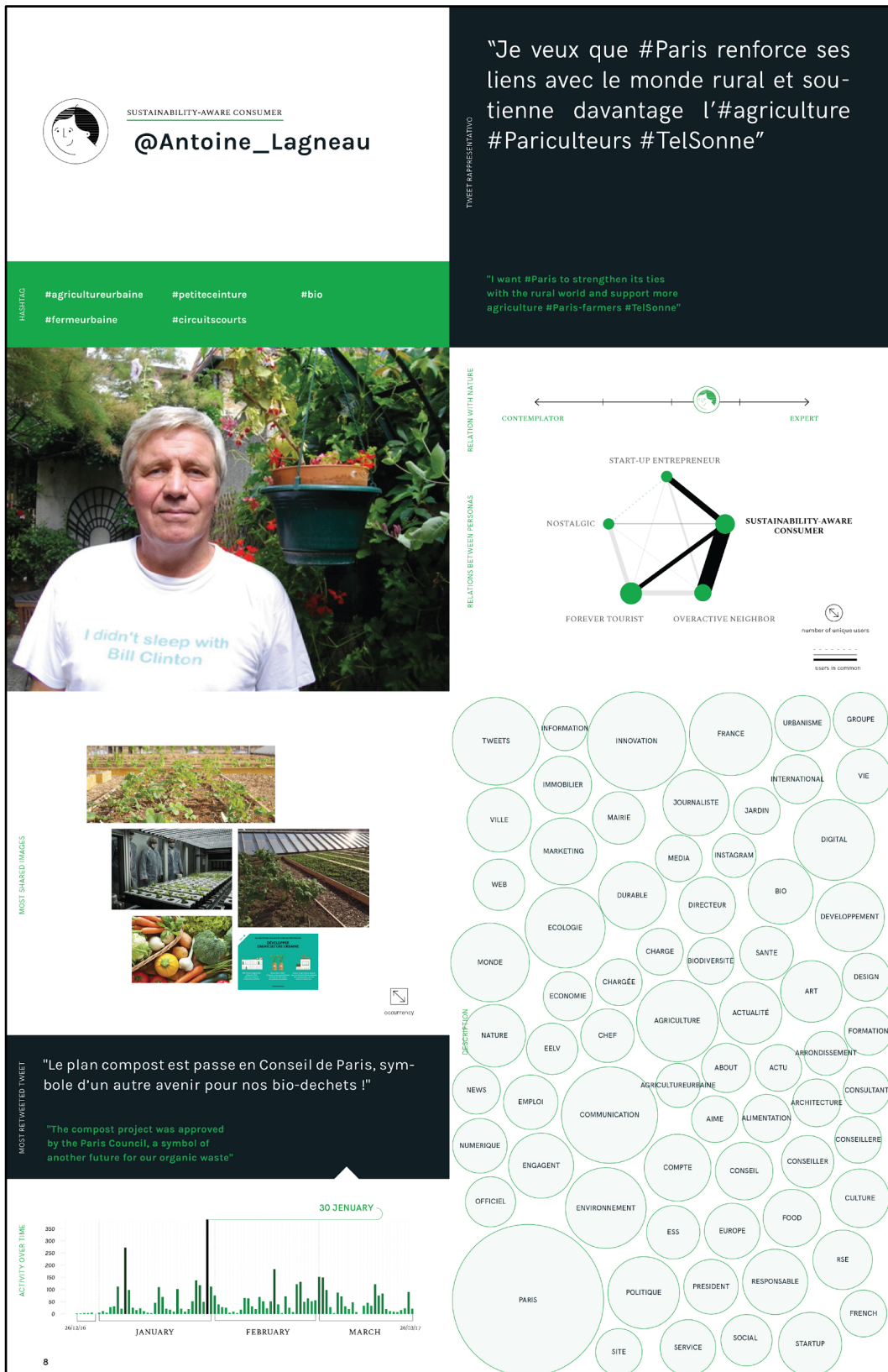


Figure 16 - Description of the "Sustainability aware consumer" persona

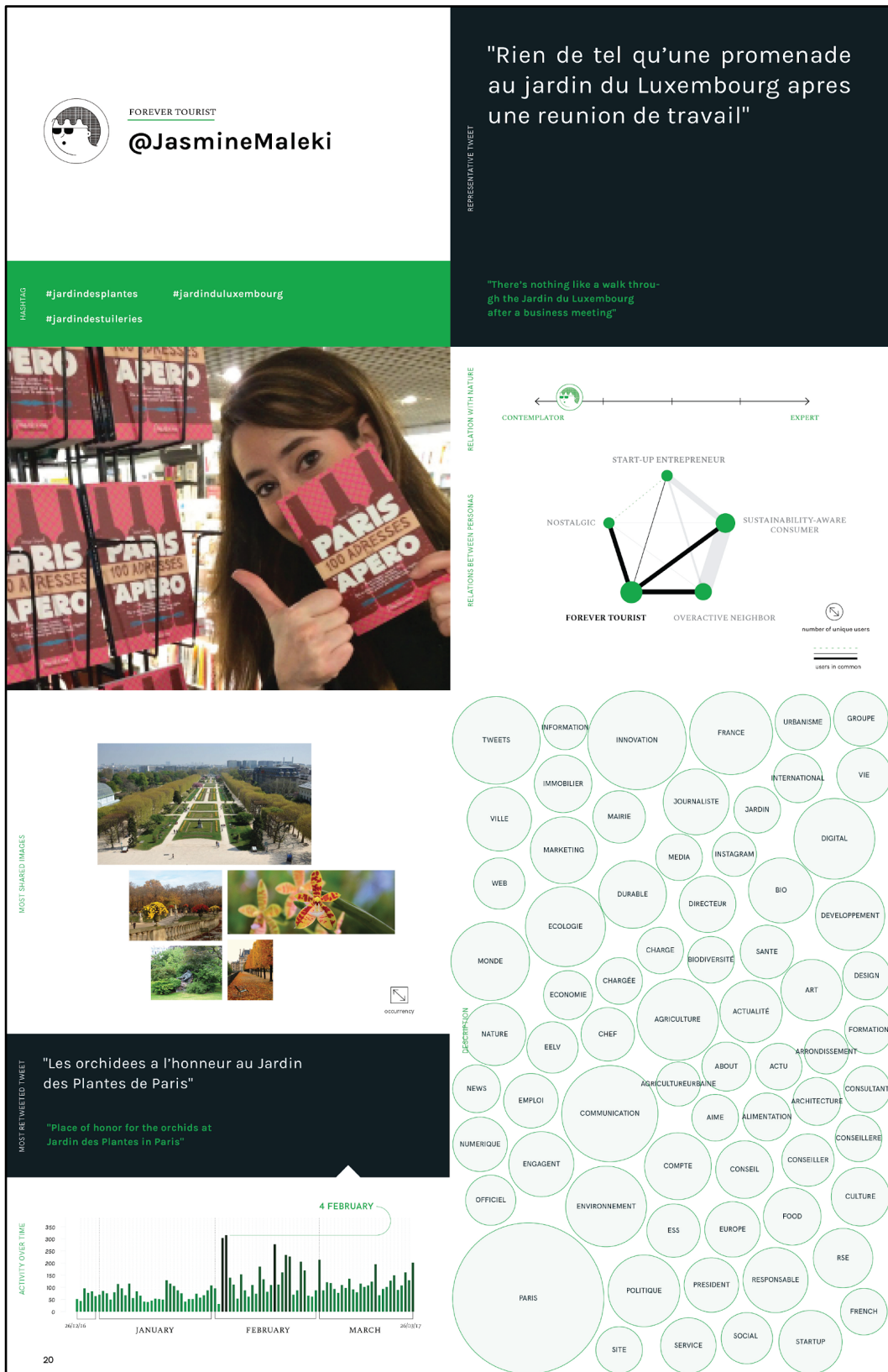


Figure 17 - Description of the "Forever tourist" persona

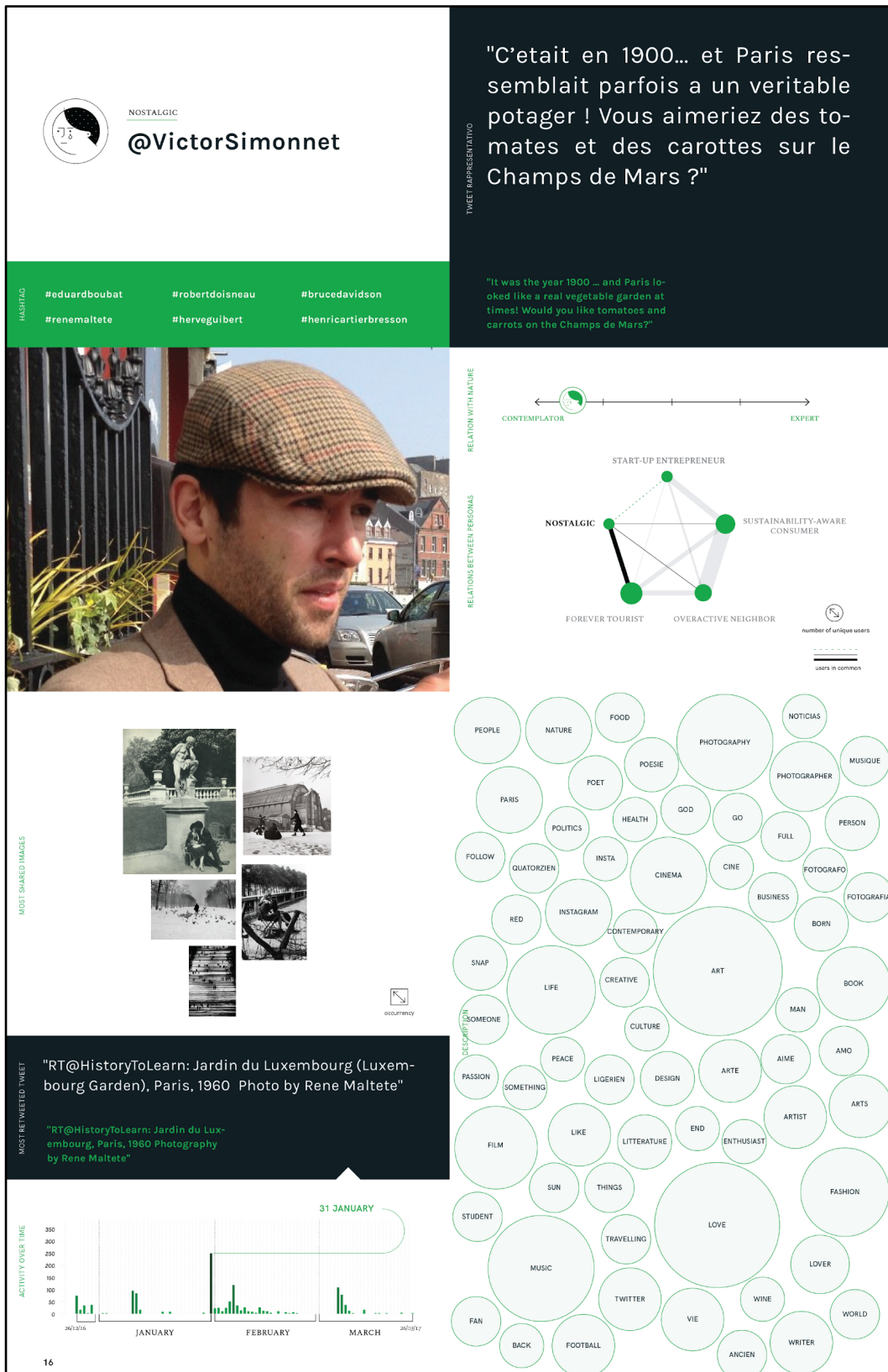


Figure 18 - Description of the "Nostalgic" persona

4c. Case Study: Co-design workshop on gender violence

In the context of the World Usability Day hosted in Rome in November 2017, the same approach piloted during the NATURPRADI project has been adopted to facilitate a collaborative workshop around the topic of Data-Driven Personas. The topic we approached this time was the one of gender violence in the Italian context. The research question we asked ourselves was how we could map all the different attitudes towards the topic of gender violence in order to identify opportunities to design new information services that could reach a multitude of subjects. This project offered the opportunity to validate and refine the approach introduced with NATURPRADI, by having other designers playing with the same method during the workshop.

1) **Data Collection**

As for the NATURPRADI project, Twitter was identified as the appropriate space for the analysis since in the Italian context it collects a lot of opinions on this topic, in relationship to specific news and public debates. A set of keywords were identified (FIG. 19) in order to obtain the data corpus, following exactly the same strategy adopted during the previous experimentation. The data collection took place during the period of October 1st to 15th, in 2017.

violenza sessuale - violenza di genere - violenza sulle donne - #nonviolenza - #nonunadimeno - #adessobasta - #365giorniconledonne - #orabasta - #liberedi - #riprendiamocilalibertà

Figure 19 - The set of keywords used for the data collection on Twitter

2) **Data Exploration**

The overall map representing the online discourse on Twitter was used as a starting point for the collaborative session. Participants were asked to look at the map and highlight the key clusters they could recognize in the visualization, based on the affinity of themes and keywords used to talk about gender violence. The clusters covered a wide range of perspectives (FIG. 20):

- A. *The activist community*, featuring the organizations and associations that belong to the Italian feminist movement, who exclusively talk about violence against women and gender rights.
- B. *The area of short-term reactions*, linked to single episodes coming out in the news, which tend to disappear fast, till the moment in which the next violence-related fact happens.
- C. *The anti-migrant space*, where the vocabulary associated to gender violence is blended with racism and hanger against foreigners.
- D. *The area of social and ethical reflections*, where we can find a generic variety of conversations around the topic, featuring media and intellectuals.
- E. *A small area of institutional prevention*, giving space to the institutions that are trying to tackle the violence issue through education programs and awareness initiatives.

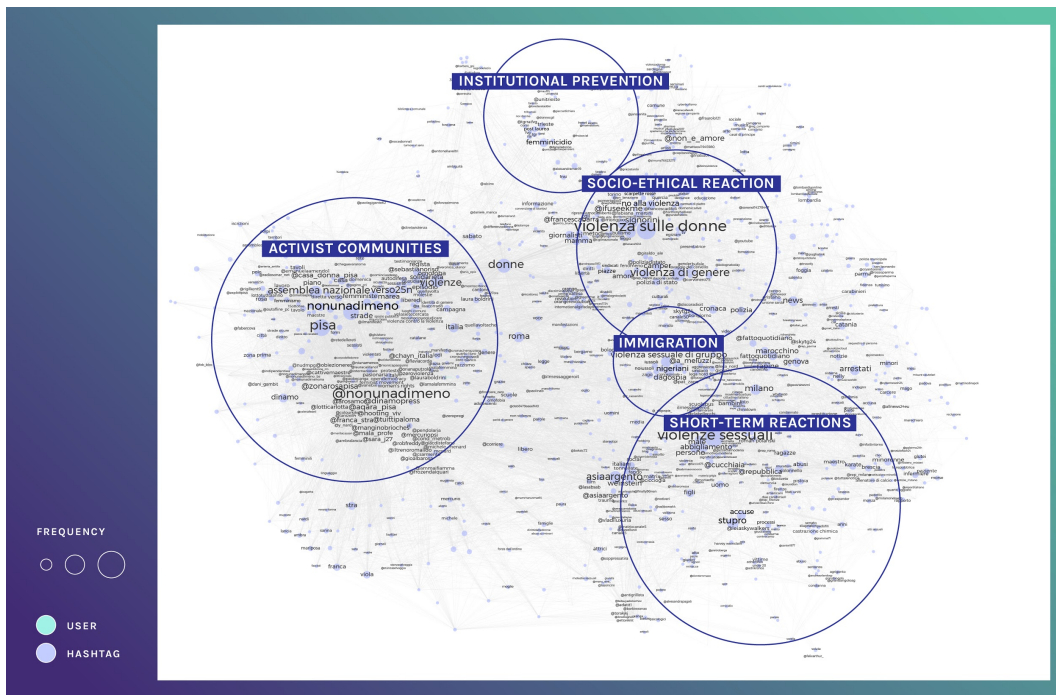


Figure 20 - The tweets user-object networks

3) Cluster Refinement

In a second moment, participants were asked to filter a cluster of reference and start digging into it. By qualitatively reading some of the tweets and checking some of the relevant twitter profiles emerging from that specific debate, they could understand if the cluster was really sharing the same approach or if it was hiding different nuances. Based on that they could decide whether to map one or more personas within each group, and start characterizing that persona (FIG. 21) with an identifying attribute and quote.



Figure 21 - A first description of the identified persona

4) Mapping and Storytelling

Finally, each persona could be described by combining a set of automated

information extracted from the corpus (e.g. random image profile, tag cloud of the profile description, most used keywords, most used images) and some qualitative information derived from the understanding developed by the team during the exercise (e.g. a qualitative description of the behaviour, needs and challenges of that persona). By putting together all the results obtained by the different teams during the workshop session, we had the map of seven key personas (FIG. 22-23).



Figure 22 - Personas description



Figure 23 - The process of ideas generation, starting from the persona identified

4d. Case Study: Glamour

The initial corpus of data used to distill the Data-Driven Personas doesn't necessarily need to come from social networks. Web analytics could provide interesting insights around user behaviours, as well as a dataset built ad hoc through a quantitative survey or diary study. In this last case study we worked with the Glamour team of Condé Nast to setup a model aimed at observing user behaviours with a mixed qualitative/quantitative research approach. We first looked at their web analytics, which were showing clear patterns in terms of readers' engagement and reaction to the content offered by the online magazine. It was easy to detect different types of behaviours by collecting and aggregating that information, but still hard to understand the motivations, needs and wishes behind those behaviours. That has led to the decision of adding another step of research, by distributing a dedicated diary study to be filled by a large number of readers - with the aim of collecting photos and comments in answer to specific research questions, and use that material to look deeper into the clusters emerged from the initial analysis of web data.

1) **Data Collection**

The analysis of patterns related to the interaction with app and web content has initially lead to the identification of several clusters, representing the different levels of users' engagement in relationship to the type of content they consume. The clusters helped screen for a sample of research participants (50 in total), with the objective to ask them to share their experiences, stories and desires through a digital diary. The diaries generated a large amount of information (photos and comments), that was analysed through visualisations and maps in order to see differences and similarities in the response of the participants.

2) **Data Exploration**

The first step was analysing all the comments in relation to the specific topics discussed in the diary. For example, they were invited to talk about their idea of make-up and their make-up routine, and we mapped all the users and words used to describe those aspects. They were also invited to share their idea of self-care and their self-care habits, and we mapped all the users and words used to describe those aspects in a second visualisation. By looking at those two maps, we started to see some emerging clusters, in particular a clear distinction among all the women who interpreted those topics more on the makeup and aesthetic side of beauty, versus all the women who talked more about wellness and beauty as an intimate way of taking care of themselves (FIG. 24). We could also see the groups of users talking about these topics in a very general way, and the groups of users characterized by their own vocabulary developed thanks to a deeper interest and expertise in the topic.

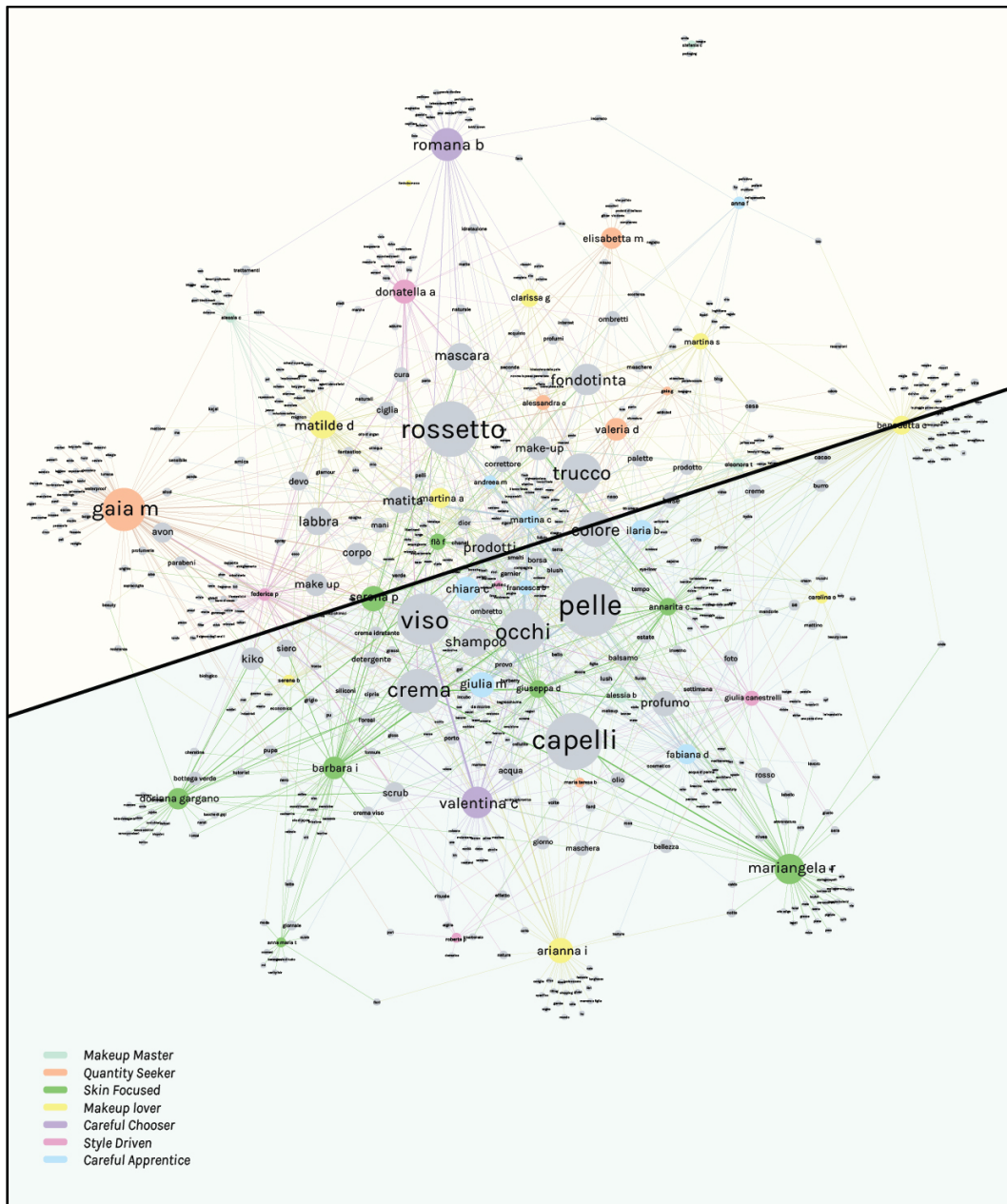


Figure 24 - The user-object network about the concept of make-up

3) Cluster Refinement

In a second moment we looked at all the images (we had a total 1950 images took by the participants) in order to understand if the clusters identified through the initial semantic maps were cohesive, and start understanding more about each of them (FIG. 25). The refinement was conducted by simultaneously looking at the digital map and all the printed photos stucked on the walls, to immediately double-check the interpretation of the visual map with the entire set of materials produced by each cluster of participants. The refinement exercise has led to the identification of seven main personas.

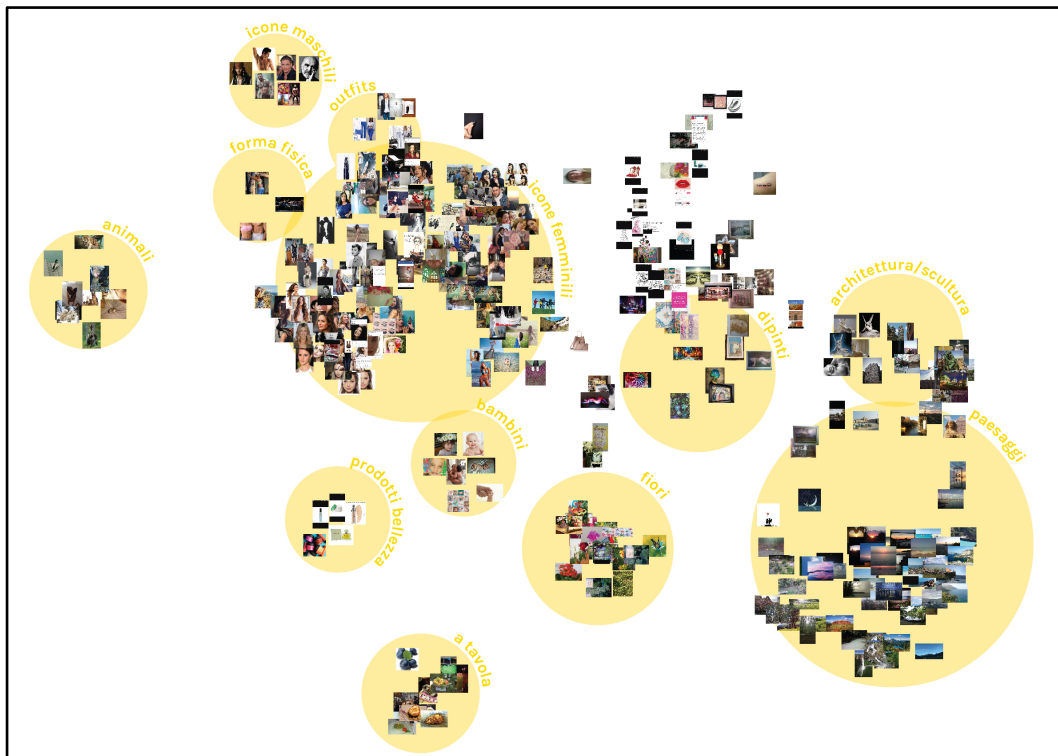


Figure 25 - The images produced by the users to represent their concept of beauty

4) Mapping and Storytelling

Finally, the personas were described by extracting some of the images and quotes from the diary of each cluster. In this case we favored a curated selection of that material (instead of an automatic extrapolation of those items) because we wanted to make sure the outcome was visually capturing the essence of each persona in an appealing and exhaustive way (Fig. 26).

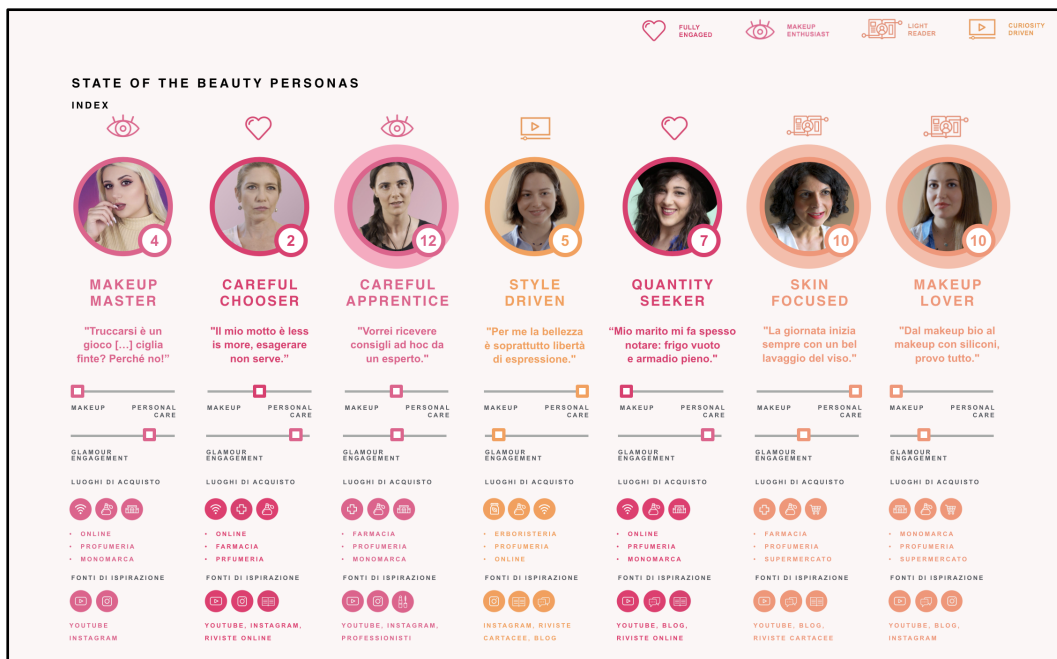


Figure 26 - The "State of Beauty" personas

At the very end of the process, a final round of individual interviews was conducted on a small selection of participants (one person per each type of persona) leading to an enriched understanding of their needs and motivations and to the closure of the study. This approach suggests the possibility of an integration of Digital Methods into a more traditional ethnographic research process. The final outcome was a set of personas as well as a replicable model that allows to bridge a quantitative and qualitative understanding, and to leverage web analytics to structure an efficient ethnographic field-work.

5. Limits and opportunities

The new Data-Driven personas method aims to expose how Digital Methods can be integrated into design practices, deploying new “techniques which communicate, interact, empathize and stimulate the people involved” (Giacomin, 2014). Digital Methods could allow to scale up the magnitude of data and information collected. The proposed approach offers significant advantages in terms of time and costs, if compared to traditional qualitative research and analysis techniques: it allows to quickly collect and analyse a wide dataset and develop key insights even before activating the field-research and start investing on it. Nevertheless, there are some activities in the process that shouldn't be underestimated, such as:

- Data collection: setting up the necessary infrastructure for collecting data might take some time. Depending on the scale of the data to be collected, simple solutions like storing it into spreadsheets or plain text files (i.e. CSV) might be not appropriate and the setup of a proper and efficient database might be required. Furthermore, the API provided by the digital platform, as well as the interface through which the data might be scraped, tend to change rapidly. This may affect the quality of the harvesting, or at least, require a continuous monitoring, tracking and adjustment of the collection procedures. Working with digital data means to respect the ever-changing privacy policies and terms of use of the platforms involved in the research. Along with the respect for these standards, an ethical reflection on how to handle personal identifiable information is always needed.
- Data cleaning: in some cases sorting noise out of the stream of data collected can be done in a quick way (e.g. filtering out objects that are less frequently encountered, or conversely, the ones that are mentioned too much). In other cases, as for the NATURPRADI project, a careful reading of the collected data is necessary. Regardless the specific strategy adopted for reviewing and cleaning the dataset, a constant control of the data harvested is always necessary. While this operation helps the researcher explore the material they are going to work with, it also requires the setup of an appropriate infrastructure (i.e. from generating reports containing random samples of the data to reading the single data points one by one).
- Data visualisation: distilling information out of a dataset is more and more simple thanks to the growing numbers of techniques, libraries and software. Nevertheless the ultimate scope of the visualization, exploratory visualisations and procedures are needed in order to continuously offer different views on the data through multiple and non-exclusive visual models, especially in the first part of the process. The production of interactive visualisation should be preferred to the static ones, to better support the exploration of the views and ease the identification of key insights and learnings.
- Data interpretation: what Digital Methods offers is a better understanding of the user space and a reduction of the risk of projecting pre-existing categories, or missing unknown parts of the debate. The insights and clusters that emerge during this type of analysis need to consider possible limitations and bias. Collecting data

over social media, for example, implies to cope with the digital divide issue and with the different platform culture (e.g the more or less marked propension to use hashtags) that might be present in different geographical location. The outcome of this type of analysis needs to be seen as part of a wider range of research and design thinking activities aimed at understanding the people and context of use. The insights can be used for example to inject new hypothesis in a user research phase, or to enrich the existing knowledge with a different perspective.

Digital Methods need to be considered an opportunity in integration, and not in replacement, of current service design tools and techniques. For example, along the process of creating Data-Driven Personas, the researchers may use the emerging clusters as a way to define potential participants for a set of in-depth interviews. The interviews will provide both a validation of the analyses carried out previously and, above all, add a deeper qualitative layer to the understanding of the different personas. Following this example, Data-Driven Personas can ease the preparation of a field-research, by raising important themes upfront and offering an alternative strategy to recruit research participants.

The Data-Driven Personas protocol is a first attempt to provide a sustainable and replicable approach to effectively apply Digital Methods to support the service design process. This protocol is applicable to all those cases where the research environment involves a community of users who drive a series of debates inside an online space. Other protocols could be explored in the future, investigating the possibility to derive other key Service Design frameworks - such as experience journeys and system maps - from the analysis of the online discourse. The expansion towards additional frameworks would require to think about spaces where to find that information, ways of clustering the data collected and strategies for refinement and visualization, by relying on a four-steps model similar to the one introduced and discussed in this paper.

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