Big Data as a source for Designing Services

Discovering Social and Business Opportunities through Big Data Analysis

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This paper defines a conceptual framework for defining social and business opportunities through Big Data analysis in a range of different sectors, and builds on this framework to identify potential use cases in innovative mobile services. Towards this end, the paper first highlights the benefits of Big Data analysis in service design methodology and presents a comprehensive list of use cases of Big Data, commenting on state-of-the-art and emerging technologies. Emphasis is given to consolidating 4 potential areas of usage that could be leveraged through developing a big-data enabled understanding of human behavior and benefit service design. As a demonstrative example, concept of 'Power Users' is explored further, and three initial mobile service concepts are proposed.

Key words: Big Data, service design, human behavior, sentiment analysis, network of influence, density maps, real time analysis, strategic framework, case collection

1. Introduction

1.1 Big Data Phenomenon and Drivers for Change

The widespread use of communication devices has prompted the creation of huge quantities of data. We create 2.5 quintillion bytes of data on a daily basis, constantly leaving a digital footprint of our lifestyle in the form of behavior preferences and choices. Relevant data can be extracted and consolidated from numerous sources like networked sensors, posts to social media sites, browsing and click stream stories, purchase transaction records, mobile phone communications and GPS signals to name a few. Technological advancements in fields of mobility and digitalization as well as the gradual convergence of these two domains within the society enable three drivers of change: (i) **Mobile Revolution:** In the coming years, Internet traffic will mainly be generated through mobile devices, data will be enriched with geographic context, real-time information and proximity relations. (ii) **Mass digitalization:** In the digital era, the mass production concept turns into mass digitalization. Every person who has access to a digital world through mobile phone applications, web interfaces and sensor networks creates a massive amount of digital information over time. (iii) **Social Networks:** Self-expression and sharing are significant shifts in today's society. Digitalization makes it easy for people to share with their loved ones or within the networks that they belong to.

At its entirety, such huge amounts of data is often referred to as 'Big Data' and provide analysis at such a fine granularity level that was not attainable earlier. Availability of such finely granular data can be an opportunity for the design community to develop insights into defining new types of content. Hidden patterns in human behaviors, attitudes and emotions can be unveiled and used to radically change the way individuals make decisions and evaluate their choices. The big volume of data generated, stored, and mined for insights has thus become economically relevant to businesses, governments, and consumers. It is now possible to obtain a large mass of data about human communication and communication of behavior which leverages social and business opportunities in Big Data analysis. Social media sites collect data as people socialize and mobile devices gather usage data. Data measurement in Google searches, Facebook posts, and Twitter messages makes it possible to measure behavior and sentiment in real time. Users fill out profiles including information like age, gender and email, and some people give additional details such as their relationship status and their historical info such as where they lived and worked. They post messages and photos, which are often tagged with specific locations, and share news, songs, and articles within their network. With features like Facebook's 'Like' button, they can track which people are interested in a brand or a piece of digital content. Combining that kind of information with a map of social connections, social media site users could make an incredibly rich record of their lives and interactions, and service designers can find new data collection models to develop new services. Consequently, today, companies leverage data driven strategies to innovate and capture value and to tailor new services for their customers. [1] In order to do this, companies are also collecting customers' information, payment transactions and data on everything they have ever bought or even looked at. For example**,** Amazon stores, analyze and use such information to enhance relationships with their customers and increase loyalty. This type of information could possibly enable new services that benefit users and industrial opportunities.

1.2 Big Data as a Source for Designing Services

So far, data has been embedded in service science for measuring service quality with tools such as success measurements, service metrics, and analytics as well as key performance indicators. However, little value has been found in mining data on social relationships. Yet less is being developed on how Big Data can be used for improving social welfare. In this perspective, it is evident that the service design community can investigate ways to utilize Big Data in designing innovative services that strike a balance between the industry demands and social welfare. Big Data analysis could be utilized in the early and later phases of design process to frame a problem, understand user needs, visualize data analysis, and interpret them into ideas. In addition to that, this type of analysis could also contribute to methods and tools that are used in the design process. The traditional service design approach has aspects that are inherently imported from both Iterative Design and Human Centered Design paradigms with numerous methods. [2, 3, 4] The service design process starts with the identification and discovery phase which involves understanding the human behavior to define the problem, mostly through tools as contextual interviews, diaries, observational studies, and online research, persona, self-exploration, and stakeholder maps. In particular, personas help to identify relevant behavioral patterns and serve as surrogates for millions of potential users who have similar characteristics and goals, based on qualitative and quantitative research insights. [5] While some persona experts acknowledge that occasionally it is necessary, due to budgetary and time constraints, to develop personas based solely on designer anticipations, stakeholder expectations, and subject matter expert opinions [6], most persona experts recommend doing empirical fieldwork instead, in the

form of end- user interviews or observations to create data-driven personas. [5] Data-driven personas often involve a large researcher workforce and large investment of time to create. [7] Big Data analysis could support such tools as personas where quantifiable knowledge can be extracted with less investment of time and effort.

In product and service innovation, the users' role may vary from proactive participation, where users contribute to solving and framing design challenges, to an inactive role where designers interpret user data without direct engagement with the user community. [8] In the design field, understanding the users' needs and desires is mostly analyzed using qualitative research methods, which are often employed to answer the whys and **how**s of human behavior, opinion and experience information. [9] However, as with most industries and professions, the Internet and mobile technologies are changing the practice and process of user research and understanding user behavior as well as the context quality of digital data. Emerging online research platforms are opening up new ways to gather data on consumers' lives and raise important issues with regard to methodology. [10] The mobile and digital media combine to form a powerful set of new data collection tools, while also giving us access to wide audience across geographies and time zones. Huge amount of data collected through these emerging technologies could be an opportunity to obtain datasets from various resources such as social media, mobile communications, location, and real time processing technologies that could help to map out complex service contexts. Thus, service designers could consider new ways of understanding human behavior through developing different combinations of structured datasets to develop new services.

Visualization of Big Data can be useful in enhancing creativity to combine the right datasets to find innovative service opportunities. Visualizing quantities, distributions, composition, correlations, interconnections, growth, temporality, movements, causal relationships, geography of data could help service designers to translate numbers into the visual patterns. It is notable that designers are often recognized for being visualizers due to their tendency to convey and understand messages through images while designing. [11, 12] The use of visual stimuli in problem solving has been widely discussed in several fields. Thus, such use of Big Data can help designers in framing data collection, prioritizing and categorizing information and interpreting outcomes into visual graphs.

2. Strategic Framework Development for Potential Use Cases

In this section, we define a conceptual framework focused on the user centered approach for discovering social and business opportunities through Big Data analysis. In determining these opportunity fields, a collection of more than 60 case studies in various sectors have been considered and evaluated in technological, visual and trend based dimensions. Cases are collected from existing web or mobile applications, info visualization samples, research projects, white papers, magazine articles or other sources and are used to understand how Big Data techniques are used in innovative and competitive services and products. Case collection is analyzed through the 'Card' method—clustered in technology, trend, and visualization cards—accompanied by an evaluation grid with defined indicators for each group. Each card has been prepared by defining the title, type of solution, description of the cases that uses the Big Data technology and clustered into specific uses. The collected trend cards have been evaluated with optimization, resource allocation indicators, visualization cards have been evaluated by use case, required data and levels of interactivity, and technology cards have been evaluated in terms of efficiency, cost, real

time analysis, batch analysis, online support, and scalability. While selecting the cases, we have mainly focused on certain types of Big Data content and relevant sources of the data obtained. We have looked at healthcare, banking and tourism services where and how Big Data has been utilized and selected to look at datasets as telecom data, social media and open government data which has an impact on user or the content is generated by user. Based on the secondary research presented, four main opportunities areas identified for innovation: Sentiment Analysis, Networks of Influence, Density Maps, and Real-Time Analysis. (Figure 1)

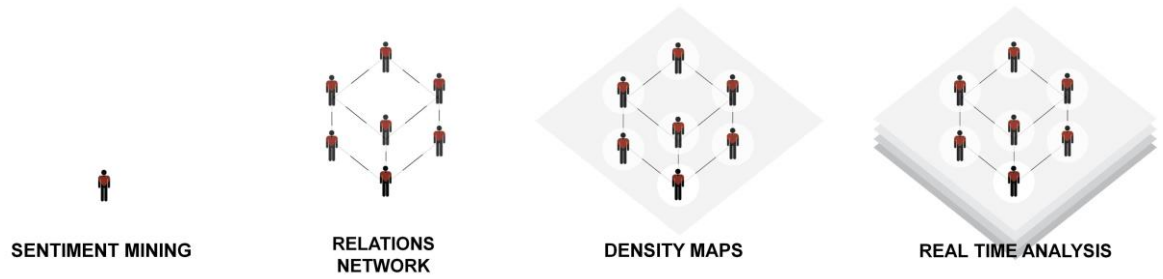

Figure 1. Four opportunity areas identified for user-centric innovation in Big Data analysis.

The Networks of Influence area is further analyzed with a particular focus on the concept of the "Power Users". In particular we have defined three main issues that need to be taken into consideration when defining new service models based on analysis of "Power Users": 1) What kind of data is accessible; 2) What types of customers profiles can be built; 3) What strategies of customer engagement can be defined. A number of initial concepts have been presented to illustrate how the roadmap may inform the definition of new service design models and how choices need to be made for each of the issues presented before.

3. Results

3.1 Big Data Opportunity Areas

The four layer opportunity map (Figure 1) firstly defines a single user—who has mobile connectivity, performs digital transactions and activities and is a part of a social network—and his or her sentiment toward particular topics, products and themes. Once we understand the user's sentiments and attitudes, the next step would be to explore his position in the network in order to map out his or her influence within the information flow. Identifying the sentiment of a user and user's location within the power network, the next layer could be the dimension of time. Using real-time analysis we, can gather data about their positioning and communication patterns to understand their behaviors and lifestyle choices. Merging these layers into specific domains to develop social and business applications, we could utilize Big Data to explore hidden patterns in human behavior and communication to deliver innovative services.

3.1.a Sentiment Analysis

Sentiment Analysis is the empirical analysis of sentiment and mood from individuals or groups of people at any given point in time. This opportunity area aims to study social networks in order to reach a better understanding of

people's opinions, attitudes, and emotions towards entities such as products, organizations, events and their attributes. With explosive growth in social media, individuals and organizations are increasingly using these types of content for decision-making. The process of subjectivity classification refers to the task of classifying texts as either objective or subjective from phrases and identifying whether the text is positive, negative or neutral in terms of attitudes and emotions e.g. "I like Avea's new phone!" (positive), "This new music app is horrible!" (negative), "Apple may be in the market" (neutral), or "BMW's Mini is cool, but way too expensive." (mixed). By analyzing these subjective texts into classification of attitudes and emotions, we can understand how they are linked to certain products, services or brands. Correlation of these semantic words from emotional content of reviews, forum discussions, blogs, micro-blogs, comments and posts in social networks provides some clue as to individuals' lifestyles. This type of prediction, on a larger scale, seeks to measure the public moods of fluctuations of macroscopic socio-cultural events, ongoing trends and real time occurrences as concerts, elections, and stock-market fluctuations. According to the study by Tumasjan (2010) Twitter sentiment was applied to predict election results, and this type of data has also been used by Mittal and Goel (2011) in order to understand the effect of sentiment on stock values for investment by weighing and scoring the findings on a numeric scale to detect fraud or corruption. [13, 14]

The analysis of these sentiments can be used to explore new business opportunities such as monitoring opinions (reactions to and opinions on specific products and services or any other relevant issues can be tracked, identified, and monitored), early warning detection (the emergence of specific topics, opinions or sentiment can be identified early in specific niches or communities), tuning and enhancing services, and forming predictive models to help promote or give recommendations to customers based on past customer activity. The Pulse of the Nation project done by Harvard University and Northeastern University is a good example for monitoring opinions through Big Data analysis. The project explores the mood of US nation throughout the day by analyzing 300 million tweets collected between September 2006 and August 2009 and representing them as density-preserving cartograms. The sentiment analysis results indicate that, on weekdays, users were happiest during the early morning and late night times, and that happiness peaked on Sunday mornings. Geo-location results indicate that users residing on the West coast were, on average, were happier than their East coast counterparts.

The predictive power of Big Data is mainly being explored in public health and economic developing and forecasting through sentiment analysis. For example, 'UN Global Pulse' is an initiative by the United Nations to leverage Big Data for global development using digital early-warning signals to guide assistance programs aiming to, for example, prevent poverty. The group analyzes the sentiment of text and chat messages in social networks to predict spending reductions, job losses and disease outbreaks in a given region. Food-related conversations on Twitter have shown very strong correlations with food price inflation. Researchers can also find from Google search requests for terms like 'flu symptoms' or 'flu treatments' a couple of weeks before there is an increase in flu patients coming to hospital emergency rooms in a region. Through analyzing sentiments and acquiring public and consumer opinions, companies can recommend the best path or strategy given information about the current and past situations of their customers. This type of analysis is useful for predicting future trends, popular themes on a certain product or service. BBVA Compass, which is a bank, monitors the importance of its name relative to other banks and determines the services that customers value the most. Another example, overbooking loopholes

at airline companies or health institutions, analyzes overbooking seats, guessing no-shows for flights or doctor's appointments to determine overbooking policies.

In addition to traditional objective customer surveys, polls and focus groups, the sentiment analysis opportunity provides more accurate subjective information, which refers to aspects of language used to express opinions, feelings, evaluations, and speculations on customer feedback and future desires. [15] The study by McGlohon et al. (2010) tries to measure the true quality of the products from a wide range of authors and several reviews to rank products and merchants. [16] One example in this domain is Sentiment140, a Twitter sentiment analysis tool that allows discovering positive or negative opinions toward any brand or product. Another example is Twitter Mood, which plots moods for millions of tweets in order to understand how people are responding to particular events, topics or products. This opportunity area provides service ideas around monitoring opinions, predictive models, and forecasting where designers can predict their users' emotional state or lifestyle, design new services based upon those findings and get feedback from users on the products or services developed.

3.1.b Networks of Influence

Networks of Influence studies network connections leading to a better understanding of social influence and human behavior. This opportunity area derives from the network science research field, which allows us to understand hidden correlations among people to uncover subtle data patterns. The study of relations between bonds of social phenomena within the network defines power edges, strong and weak bonds, and contiguous areas allows companies to be aware of the specific points of action where the information, idea or power spreads within the network. This allows them to segment and differentiate their customers better, providing them with the ability to act upon their network. Identifying the high and low risk points within the network, companies can provide preventive actions for risky situations.

Today, social network research involves mining huge digital data sets of collective online behavior. Data scientists can see the patterns of influence and peaks in communication on a subject. For example, in face-to-face networks proximity in social interactions affects others' behaviors, such as the spread of obesity within a network. [17] The spread of information, disease, a resource or an idea through such different types of social dynamics as conformity, social influence, and persuasion could provide different models of service ideas. To exploit the potential of social networks, it is necessary to classify users in order to identify the most relevant ones. Power users are extraordinary users, who identify and target the node of the network with a higher influence power. In a recent study of Pew Research (2012) partnered with Facebook discovered the majority of users have a Facebook friend who is extra-engaged in one or more activities on the social network. These people are invisible drivers of most of the site's activity and power users of the network. Another concept in the network of influence is peer influence, which leverages the persuasion power of small groups to favor product adoption. There is strong evidence of peer influence within the social network, meaning adoption of a product by an individual is more likely if the product has been widely adopted in the individual's social neighborhood. This is evidence of the threshold model, which suggests that each individual has a threshold representing the proportion of a user's friends who must adopt the product before the user decides to do so. A study conducted by Aral and Walker (2012) found that social neighborhoods that are already rich in adoptions continue to add new adoptions at a higher rate than neighborhoods that are poor in adoptions. [18] Individuals with the highest propensity for future adoption can

be targeted with suitable ads or social neighborhood marketing, which involves messaging to members of the social network who are most effective in using the power of their network to convince their friends to adopt.

For example, Klout is a web-based platform which measures influence by using data points from Twitter, such as following count, follower count, re-tweets, list memberships, how many spam or dead accounts are following you, how influential the people who re-tweet you are, and unique mentions. This information is blended with data from a number of other social networks such as comments, likes, and the number of friends in your network to come up with a "Klout Score" that measures a user's online influence. Other samples in this area are Zynga, which is an online gaming platform that provides promotions and perks to power users, Trip Advisor, which suggests trip destinations by analyzing where their friends travel, and Bing, the web search engine from Microsoft, which analyzes 'what are my friends saying about a certain topic.' This type of data could be useful also in the healthcare industry, as the correlation of behavior data with medication data could make drug therapies more effective and help medical professionals detect drug instructions more quickly. [19] The data, through the concept of preferential attachment, could illuminate the etiology and preconditions of disease and serve as an early warning system for epidemic diseases such as SARS.

3.1.c Density Maps

Density maps are opportunities that study urban mobility—pathways, flow, and spatial distribution—enriching our understanding of cities and communities. Real-time tracking and open data initiatives can lead to the development of accurate density map able to inform decision-making processes from individual to urban scale. New geospatial density maps use color coding in order to represent different types of information levels such as geospatial concentrations such as customers in proximity to retail stores, sales by region, customer traffic by department in a store, and productivity on a manufacturing production line.

In economic forecasting, research has shown that trends in increasing or decreasing volumes of housing-related search queries on Google are a more accurate predictor of home sales in the next quarter than the forecasts of real estate economists. As an example, Trulia is an online real estate resource for open data initiatives. The website links crime density, real estate, and population clusters together. Furthermore, the company leverages Big Data and consumer behavior to launch the "Trulia Insight" service for real estate professionals, built upon expanding datasets of consumer-submitted preferences, online search behavior, email traffic patterns and hyper-local real estate information. For consumer goods, this type of analysis could also be added as a complementary service through geo-targeting or personalized ads based on customers' movements and prediction of future paths. Analyzing networks superimposed on a map, it is possible to identify, monitor and target emergent communities of interest by tracking changes in the composition of the communities, gauging what is going on within communities by analyzing their Twitter messages, or checking the effectiveness of marketing by looking at how each community tweets about a particular event, product or a brand. For example, the Centre for Advanced Spatial Analysis (CASA) analyzes where people board buses or tweet to understand where people go and the structure of city to analyze their everyday travel patterns and their interests during the day. Another dimension of utilizing density maps is creating solutions for urban planning through modeling large group activities and plan urban services accordingly. For example, the Urban Hamilton Plan project provides information through GIS-

based methodology on population densities near grocery stores, so that the city planning board can make strategic decisions on building new grocery stores in densely-populated areas that lack grocery stores.

Visualizing Big Data at the urban scale can also be exploited in healthcare, specifically in disease tracking. This is exemplified in a project done by researchers from Center for Communicable Disease Dynamics at the Harvard School of Public Health (2012). In this study, researchers mapped precisely how human travel affects the spread of malaria in Kenya by using cell-phone location data, calls and texts over the course of a year. They found that people moving from one place to another imported a surprisingly large percentage of infections during the investigation period. By using disease prevalence data, researchers can estimate the probability that each person is carrying malaria parasites and build a map of parasite movements between "source" areas (areas that mostly emit disease) and 'sink' areas (areas that mostly receive disease). This kind of research—coupling Big Data from mobile phones with detailed malaria incidence information—will be an important tool for understanding the spread of the disease and designers could find opportunities for new service ideas.

3.1.d Real Time Analysis

The rapidly increasing use of large-scale and location-aware social media and mobile applications is driving the need for scalable, real-time platforms that can handle streaming analysis and processing of massive amounts of data, adding considerable power to prediction. Companies can provide instant services such as real-time processing of social media streams, dividing of customers into micro segments, risk minimization, action-driven infrastructure and processing, instant decision-making, trend setting, and preventive action thanks to real-time processing and analysis. A good example to illustrate this domain is Sense Networks, which collects and analyzes billions of data points about people's locations from cell phones, taxi cabs, cameras, RFID and GPS devices to predict human behavior and develop applications accordingly. The company transforms raw location data into intelligent real-time data streams that drive a variety of applications and interface with map-based programs, and supports location-aware ad serving.

Using real-time technologies, companies can track the behavior of individual customers from Internet click streams, update their preferences automatically, model their likely behavior in real-time and make real time personalization. They will then be able to recognize when customers are nearing a purchase decision and nudge the transaction to completion by bundling preferred products, offered with reward program benefits. For example, Nearbuy helps merchants predict the next top-selling item and reduce out-of-stock situations. The company also offers an in-store Wi-Fi guest platform that allows retailers to view which sites shoppers view before making a purchase, and analyze data across multiple store locations. This real-time targeting, which would also leverage data from the companies' rewards programs, increases purchases of higher-margin products by its most valuable customers. As an example, Sears sets prices in near real-time, and provide coupons to loyal customers.

Access to real-time information is also critical for risk minimization, preventive actions, and tuning services to the evolving needs at proper time for reacting promptly to sudden changes As an example, New York Presbyterian Hospital and Microsoft work to analyze warning signs and risk factors to make snap decisions on emergency treatments, and Bank of America mines data from branch ATM's, online banking, mobile banking, call center, and social media sites in real-time to help detect fraud.

3.2 Roadmap to Service Design: From Networks of Influence to Power Users

Mapping these four opportunity areas that we have identified, the network of influence seems to be the most important and challenging field to develop services for telecom industry, where detecting churn, tuning services, personalized segmentation, and real time targeting are the relevant applications that has been analyzed through Big Data analysis. Another reason is the priority of data content and feasibility of the technology of the telecom company. Most of the collected cases aim to pinpoint people who are most likely to influence the decision of others, what is so called **'Power Users',** similar state of Gladwell's 'The law of the few'. [20**]**

The roadmap has been identified to develop strategies based on 'Power User' analysis for a mobile telecom operator AVEA. In particular, the roadmap identifies the elements that need to be taken into consideration, and that define the decisional space. In order to exploit power user analysis, companies have to consider three important aspects: i) **Access to data:** What kind of data is available? What data can potentially be accessed and what are the economical and organizational costs to access and process it? ii) **User profiling:** Depending on availability of different datasets, different user profiles can be created. Their level of specificity depends on the information available, and moreover on the ability to integrate them into a coherent picture. iii) **Engagement:** How can profiled customers be engaged in innovative service models and marketing strategies based on Power User analysis?

3.2.a Accessing

A mobile operator such as AVEA can have access to three main sources of data: i) ***Avea Customers.*** Through the analysis of the internal AVEA customer network, it is possible to identify who is influencing whom. This determination is based on the analysis of real life relationships that can be dynamically mapped over time and space; however, an efficient technological infrastructure should be in place and privacy issues should be carefully considered. ii) ***Social Network Services.*** Through the analysis of social network content, it will be possible to understand who is talking about what and define their influence. However, access to this data is constrained by privacy issues that in relation to the content shared on social network could be very problematic. Customers have to share their social network data with AVEA. iii) ***Vertical Sectors.*** Access to data related to a specific Vertical Sector (i.e. healthcare, banking, retail) may enable us to describe people's use of products or services. In this case, a strategic partnership needs to be established.

3.1.b Profiling

Through the access to different sources of data, it is possible to create: i) ***Social Influencer*** (AVEA Customers Network). A specific score can be assigned to different customers to represent their power to influence the other nodes of the network. This profile can be built by analyzing the structure of phone calls (frequency, duration, etc.) and/or SMS. ii) ***Opinion Leader*** (AVEA Customers Network + Social Network). The Opinion Leader profile is built starting with the social network activity of specific users. This data is based on analysis of both content and sentiment of their activity. Combining this data with the analysis of AVEA customers, it is possible to understand who is influencing whom and how opinions toward products or services spread throughout the social network. iii) ***Product Expert*** (AVEA Customers Network + Vertical Sectors). The Product Expert profile is built starting with the information collected and analyzed by a company or public institution (i.e. bank, healthcare system). This data

describes how people behave in a specific market sector. Combining this data with the analysis of AVEA customers, it is possible to understand who is influencing whom and how this affects the behavior and the habits of people.

3.1.c Engaging

Based on different profiling models, it is possible to envision three main strategies to engage customers in marketing campaigns: i) ***Targeting:*** Customers are selected on the basis of their potential to spread ads throughout their network of influence. To maximize the message value, we can take proximity and temporal dimensions into consideration. ii) ***Involving:*** Power Users can be involved in special loyalty programs that provide them special benefits based not only on their fidelity to the brand, but also on their social influence. iii) ***Activating:*** Power users can be activated as agents to spread a message or to rethink existing business models. Customers can access additional benefits by performing certain tasks or achieving specific goals.

3.3 Initial Concepts using the Roadmap

The roadmap previously presented defines a conceptual framework of Power Users to elaborate design strategies. In what follows, three main ideas have been presented. (Figure 2) They are examples of how the roadmap can be used as a tool to unpack ideas and drive the creation of innovative service models.

Normally, **targeted advertisements** are delivered in relation to space and time. Understanding the network of influence and the utilization of Power Users maximizes the impact of the message. Power Users can be addressed when they are in proximal relation to their friends, at the proper time, in the right space. In this case, the access to the AVEA customer database is needed; the profile is based only on this data and the strategy is Targeting.

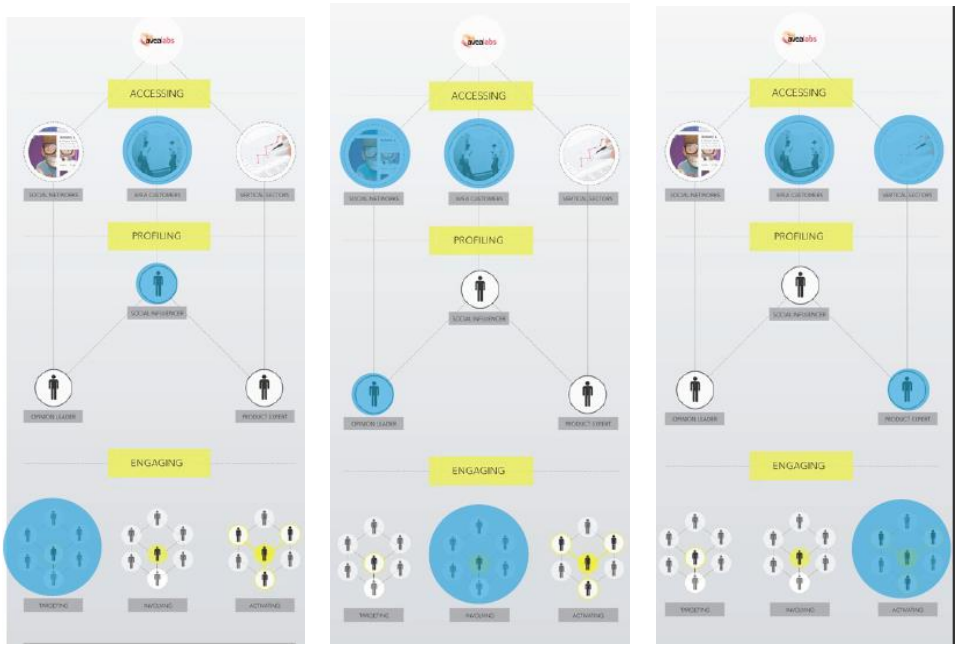

Figure 2. Strategic Framework utilizing Big Data analysis to design service ideas.

Another service idea is **Free Benefits**. Loyalty programs are generally based on the frequency of use of a certain product. Addressing opinion leaders who are Power Users in a certain community can lead to the development of new loyalty programs based on social influence. Free perks could be used to distribute product trials and benefits over a network. In this case, in order to build the profile of an Opinion Leader, the mobile company has to integrate its own data with social media contents. This can lead to the definition of a strategy based on the involvement of the customer in advanced loyalty programs, providing benefits according to his or her social influence capability.

Coupons 2.0. Coupons usually target individuals. Also, recent services like GroupOn or LivingSocial promote individual offers. The Coupons 2.0 concept leverages the idea of proximity: special coupons can be delivered when the customer is in a certain place, with certain people. A coupon 2.0 is based on the idea that the discount or the promotion is better if shared with friends. This idea is based on the integration between information about consumers' behavior taken from vertical sectors and their network of influence: it is possible to build a profile of Social Influencers and engage them in more active campaigns based on the sharing of benefits with friends.

4. Conclusions

In the era of mobile connectivity and social media, many sources such as users, governments and companies have direct or indirect access to a tremendous amount of data that can illuminate a large variety of behavioral patterns. Understanding and using the human behavior data obtained by Big Data analysis could be useful in service design process in four aspects: i) **Frame the problem:** Service designers could frame the research question to define the right datasets for targeting human behavior approach in Big Data analysis, so that they could possibly use and combine results to develop human-centered service ideas. ii) **Direct access to datasets analysis:** Service designers can have direct access to information that has been conveyed or transmitted through other entities. This type of access allows retrieval of information about focus groups improves the content of data driven persona and enables to get feedback about a relevant service. iii) **Complementary tool:** The technological features of Big Data analysis could be a complementary tool to qualitative methods to understand human behavior and provides measurable evidence, helps service designers establish cause and effect, creates the possibility of replication and generalization to a population, and facilitates comparison of groups. iv) **Visual clues:** Designers could develop new visual solutions to analyze and structure datasets translating them into patterns of correlations, compositions, temporality and distributions.

Today through Big Data analysis, it is possible to mine user data for insights for better services for citizens, campaign optimization, generating retail coupons at the point of sale based on the user's current and past purchases, sending recommendations to mobile devices at just the right time, and analyzing data from social media to detect new market trends. However, in order to develop valuable outcomes, a number of social, and cultural challenges need to be addressed and proposed. This could be an opportunity for service designers to utilize this type of input to create socially enhanced services, yet more scientific work is needed to be done for understanding and developing new methods and tools for the design process.

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