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# 4 Summary of R&D Projects

The company has developed a unique solution for both customers and brands by providing them with unadulterated information regarding consumer needs and patterns. This highly unique platform enables brands to use consumer authenticated and provided, browser, mobile, and productivity data alongside large social media feeds, to analyse and identify trends in customer needs and desires and incorporate those into their products and services.

Significant research and development activities have been, and are continuing to be, undertaken. These activities continue to show solid research based results, which is evident in the continued development of the products.

For users, they have built a personal insights and data monetization tool to help consumers understand patterns in their online footprint through metrics and graphs.

For brands we’ve built research products that can perform thorough cross-examination of consumer behaviours and provide important analytics related to their trends from data collected through the company’s proprietary technology and algorithms, various digital platforms, devices and technologies including social media, music apps, fitness tracker, productivity tools. This year they have further innovated to bring about instant data and instant analytics offering to help business decision makers keep at-pace with the continually changing digital world.

The company are also using various Application-Programming-Interfaces (APIs), building browser extensions and mobile apps with proprietary algorithm in order to further expand their data collection sources. Their core analytics engine can make any user data anonymous while extracting insights from it that are utilised by brands for creating desired products and developing effective marketing strategies.

# 5 Baseline Technology

The company conducted a thorough analysis of the competitive marketplace and studied many different offerings that were available for both the customers and the brands.

Existing competitors relied primarily on indirect methods for collection of large amounts of consumer data through focus groups, survey, website cookies and web scraping. This comprise an inefficient method for analysing consumer behaviour since only a small number of consumers can be contacted / interviewed in order to gain insights for developing products and strategies for larger audiences. Their target market required large volumes of online consumer data through social media that is live, natural and unaltered; however, the existing baseline technologies were unable to meet such demands.

Competitors are also looking at intrusive technology to collect consumer data with an “all data” or “no data” approach, where the user has to either provide permission to everything on their devices which makes their solution only viable for a small portion of consumer. This type of technology is now also being barred from the approved mobile app stores.

Lastly the time to get actionable insights from these data sets make it difficult for brands to keep up with the pace of change in the digital landscape. Specifically the creation of the instant data and instant analytics services has been a huge step forward in research technique built by the company.

# 6 Scientific / Technological Uncertainties

There are a number of scientific/technological uncertainties within these projects where knowledge of whether or not the project/activity was technologically feasible, or how to achieve it in practice, was not readily known by a relevant competent professional.

The main uncertainties are detailed below:

a) Will it be possible to capture instant data on laptops/PCs to enable real-time data sharing with permission?

b) Would we be able to analyse browsing behaviour activity in real-time to deliver instant insights?

c) Whether the system will be able to perform filtering, grouping and complex analysis based on user queries on different types of unstructured data in real-time?

d) Is it feasible to extend the functionality to capture details of activity on specific sites by user from desktop/laptop to mobile devices?

e) Whether the system would be compliant with EU data GDPR regulations?

f) Will it be possible to create a personal identity for the digital world which will enable users to port their data as an asset class?

g) Would it be possible to enhance user behaviour data on mobile devices given the changing app store requirements on iOS and Android platforms?

h) How can we capture browsing behavior data beyond Chrome and Safari extensions on desktop/laptop devices?

i) Whether it is possible to rollout a seamless proxy-based solution to capture additional behavioral data from users with their permission?

# 7 How the Uncertainties Were Overcome

The scientific/technological uncertainties outlined above required substantial research & development work and were addressed as follows:

a) The company pioneered a solution to bring an instant data offering to the market in a privacy-led approach. Traditionally market research industry solutions have focused on solely the type of information gathering that can be done. The company has developed a way to capture valuable behavioraly data with up to 90 days of browsing behavior captured in less than a minute using broser extension store approved technology. The proprietary solution is now under testing to be packaged as a SaaS offering to brands, agencies and research companies. Further research will need to be done to see if it is feasible to bring the instant data offering to mobile platforms

b) Developing the instant data offering has been a great break-through for research, however the data is only meaningful when it can be analyzed in a timely fashion too. The company undertook the challenge to automate the data cleansing and analysis of 3 pices of key information URL, user journey with visit date/time and referrals, and parsing URLs for data such as customer journey, search terms, qualifiers or referral sources. After developing the algorithms to do so, the company iterated on how to make it work in almost real-time by optimizing the way the data is sent to the server, loaded into data tables and analyzed to display results in a visual dashboard for clients to use

c) The company had developed instant data and analytics to begin the presentation of 'big data' in a byte-sized insights format. In order to analyze data for audiences for media planning and strategic insights, the client also neeed filtering, grouping and custom analysis capabilities built into the tool. The challenge with these functions was to ensure that the user's data continued to be anonymized while providing clients the ability to segment the audience and analyze further. The company started the research to provide filtering capability on the online platform. Further research is being undertaken on how to group and do custom queries on these large data sets without having lag due to database connection issues and query related timeouts

d) Continuing the research on capturing on-site behavior from browser extensions, the company has built their own mobile browser on both iOS and Android platforms to provide consumers with a privacy centered experience, more control of their web experience and a way to capture on-site behavior on the mobile browser at the same time to drive further value for users and clients. The enhancements allow the company to capture shopping habits in detail from basket value to products purchased on e-commerce sites. They were also able to further optimize the data capture process to allow for remote changes to be introduced. Further research is being undertaken to streamline the idnetification of elements to track on a site, and only referencing a single place across all platforms to create a sustainable way for capturing these behaviors

e) The company has always been operating under a customer first mind-set with transparency at the core of the business model. As EU GDPR regulation requirements have been clarified however, it has been an interesting few challenges on the type of details to be provided to the user at each point of contact, without overwhelming them, and to get an informed consent on every activity undertaken by the user. There has been a renewed focus on evaluating and designing a user experience so that the platform not only met but exceeded the requirements set out under GDPR. This was especially challenging when communicating the details of data related transactions on smaller, i.e. mobile screens as there is limited on-screen space to work with. The company has been able to finalize a solution and implementation is underway across all its platforms.

f) Designing with the right technical infrastructure and a broad product vision has been crucial to creating a consumer data hub that can grow as the digital world changes with different services, platforms and devices. With over 10,000 users now using the platform to curate their data and use it to their own benefit, the company is now looking at ways to work towards the next stage of the personal data economy. Research was undertaken to find a technically sound, cost optimal way to architect access to the company's data hub through APIs that will allow developers to now build further services on top of the data hub with user permission. The team has been researching how best to implement microservices and considering technical decisions on whether to continue working with Windows or Linux based servers in order to create access to the data hub by individuals/developers at scale. Initial testing has been done with a microservice created to authenticate this data for third-party services. Further research is now being undertaken to convert services into microservices

g) With the evolving requirements of the Apple App Store and Google Play Store, the company has researching ways to allow users to maintain control of their data as best possible within the legal terms specified for the app stores. The company therefore undertook research, testing and enhancements to the mobile apps and introduced their browser solutions on mobile to provide control to the users on who uses their data and for what purpose

h) As the company's user base is growing, there are increasingly more requests from users to extend our services on capturing browsing activity to go beyond just the top browsers. To that end, the company has undertaken research and rolled out browser extensions (in compliance with the specific browser terms) to Mozilla Firefox and Opera as well

i) With the limitations of the iOS platform, the company tested out rolling out a proxy-based app on iOS devices to capture detailed app usage behavior from users. However, there were a few roadblocks in meeting the requirements of the solution intended (1) proxies have limitations to be setup on specific networks which inherently makes the experience difficult for the user to maintain as they move from network to network. The company found that users were not interested in reprogramming the app with every new network as it got to be quite tedious (2) the quality of the data recieved when using a proxy-based solution is quite messy and it requries a lot of manual data cleanup as there are too many scenarios on the type of data that is captured (3) users were not always comfortable to allow for such broad access to their mobile devices