SEWA

"Automatic Sentiment Analysis in the Wild"

Innovation Action

Horizon2020

Grant Agreement no. 645094

Deliverable D7.1

User requirements for SEWA applications

Deliverable Type:	R (Report)
Dissemination level:	CO (Consortium)
Month:	M12
Contractual delivery date:	January 31, 2016
Actual delivery date:	February 5, 2016
Version:	1.0
Total number of pages:	41

Document Information

Grant Agreement no.	645094	**Acronym**	SEWA
Full Title	Automatic Sentiment Analysis in the Wild		
Project URL	http://www.sewaproject.eu/		
Document URL	http://www.sewaproject.eu/deliverables/		
EU Project Officer	Philippe Gelin		

Deliverable	**Number**	D7.1	**Title**	User requirements for SEWA applications
Work Package	**Number**	WP7	**Title**	Integration, Applications & Evaluation

Authors	Caroline Star, Kam Star, James Allsopp, Razvan Pistolea, Fabian Ringeval Elnar Hajiyev, Gabor Szirtes, Martin Salo			
Responsible Author	**Name**	Elnar Hajiyev	**E-mail**	elnar@realeyesit.com
	Co-ordinator	Elnar Hajiyev	**Phone**	+44 7910391007

Version Log			
Issue Date	**Rev. No.**	**Author**	**Change**
20 Dec 2015	0.1	Caroline Star, Kam Star, James Allsopp, Razvan Pistoled	First draft of PlayGen Application
5 Jan 2016	0.2	Elnar Hajiyev, Gabor Szirtes, Martin Salo	First draft of RealEyes Application
18 Jan 2016	0.3	Fabian Ringeval	Feedback and peer review on PlayGen Application
19 Jan 2016	0.3	Jie Shen	Feedback and peer review on PlayGen Application
19 Jan 2016	0.4	Kam Star	Incorporation of both applications into single document
22 Jan 2016	0.5	Maximilian Schmitt	Feedback and peer review on RealEyes Application
23 Jan 2016	0.5	Elnar Hajiyev, Gabor Szirtes	Completion of incorporation of both applications into single document
25 Jan 2016	0.5	Maximilian Schmitt	Feedback and peer review on combined applications
25 Jan 2016	0.5	Jie Shen	Feedback and peer review on combined applications
26 Jan 2016	0.6	Caroline Star, Kam Star	Peer review feedback amendments
26 Jan 2016	1.0	Teresa Ng	Minor final revision

This project has received funding from the European Union's Horizon2020 Programme under grant agreement no 645094.

Table of contents

Executive summary

To demonstrate the power of enabling technologies developed in SEWA, two applications will be implemented and launched to market: One application (Ad Recommender Engine by RealEyes) aims to recommend multimedia content to consumers based on the content and user profiles created from behaviour analysis. In particular, we want to build a service that helps to optimise advertisement placement in digital media ("the right message to the right audience at the right time"). The second application (Chat Social Game by PlayGen) aims to develop a novel, online tool that can help to improve our communication skills via fast and automated feedback on the expectations and reactions from the partners. As online communication becomes part of our daily life, it is increasingly important to make it more efficient and pleasant despite the fact that several (non-verbal) communication channels are not easily accessible. In turn, ability to pay attention to the available information has great value.

Regarding future users of the final products, it is quite clear that the two applications are on the different ends of the spectrum: content recommendation is an embedded service, so its users are diverse players of the industry of digital advertising. In turn, enhanced, automated sentiment and behaviour analysis will have an implicit impact on the users by providing more meaningful information – messages in the ads - in a less annoying way than what we experience today. Chat Social Game, on the other hand, is designed to engage users in a more direct way and to explicitly utilise the rich information provided by the SEWA tools. Due to the differences between the targeted prospective user groups, the results of the analyses on the user requirements will be discussed in two separate sessions. Despite the differences, there are some common themes in the requirements worth mentioning upfront.

- **Meaningful information**. There are many sources of media competing for the attention and appeal of the users. We need to show how information provided by the applications in the two different contexts can actually be put in practical use.
- **Validation**: It is important to properly disseminate the results and modelling approaches to distil confidence in the users.
- **Feedback**: In both application environment, it seems relevant to be able to provide a two-way communication to maintain flexibility. On the one hand, users want guidance how they can actually capitalise on what they have learnt from our applications. On the other hand, users also want to inform the systems, if conditions or requirements are changing. In turn, adaptability is a key feature.

1 Introduction

SEWA project aims to develop novel, robust technology for machine analysis of facial, vocal and verbal behaviour *in the wild* as shown by a single person or by two (or more) interactants. The economical impact of this technology will be demonstrated by the two main applications built on top of this technology. This user requirements report delves deeper into the practical requirements of the target user groups of the two applications and details out functionalities to address those requirements.

One such application presented here is a SEWA *Ad Recommendation Engine*. In the area of product advertising, research findings show that liking product ads is critically determinant of its success. Hence, automatic inference of sentiment ratings elicited by a product ad in a fast, reliable, and unobtrusive manner, and while human observers can remain in the comfort of their own home, will greatly facilitate market research because this will offer the possibility of conducting massive market-research studies and make better, more accurate and faster ad recommendations based on the collected information.

The SEWA *Chat Social Game* on the other hand is targeting young people aged 18+ who are shortly embarking on the world of work and would benefit from a light touch, fun and accessible way of practicing the negotiations and discussions that are critical for employment and a part of everyday life. This application has been targeted for this group and usage for a number of reasons; younger people are more likely to use video-chat services, existing gaps in young people's communication skills is reducing their employment opportunities, this type of communication skill training is particularly suitable for digital games involving two participants, the topic is a good fit with automated emotion detection owing to the role of emotions in communication, and finally since employers and government are calling for innovative solutions to support the development of employability skills of young people. Thus, the application is aiming to provide opportunities for significant social impact for young people in Europe.

The main objectives of this report are presented in the next chapter. We then proceed with identification of target user groups, the discussion of user group requirement, their analysis and summary for each of the two applications. Finally, we present the details of the initial functionality to be developed by both applications and how such functionality could be evaluated against some of the presented user requirements.

2 Objectives

The main objective of this deliverable is to summarise the findings on user requirements for the two main SEWA applications – Ad Recommendation Engine and Social Chat Game. First, we identify the corresponding user groups for each application, comprising of people or organisations that are likely to use these applications once they are released and then elaborate on their requirements with regard to sentiment analysis. Having user groups and requirements detailed out will enable us to have a more realistic application evaluation protocol in subsequent stages of the applications' development.

We clarify and refine initial requirements defined for the development of the two SEWA applications, by analysing the needs and preferences of the potential users. To do that we had a number of avenues to explore: past accumulated experience of RealEyes and PlayGen businesses, our clients and partners, SEWA Valorisation Advisory Board provided access to a large end-user population, finally we also resorted to traditional focus group methods.

Two groups were assessed: one group composed of members of Valorisation Advisory Board and one group composed of users and professionals being interested in online (social) services. For the purposes of the initial collection of requirements for SEWA Ad Recommendation Engine, RealEyes consulted users of already existing recommender systems to share their thoughts about advantages and disadvantages of the existing technologies and approaches. Similarly, in order to elicit collection of further requirements for SEWA Chat Social Game, PlayGen invited potential users over the course of two focus groups to share their experiences of existing systems and "ideal" features of a video-chat-based social game designed to support the development of influencing and persuasion communication skills. In addition, by developing a functional prototype for a debate chat game, called Sumobate, where two participants are matched in an online video debate, PlayGen was able to carry out a detailed user study and enhance user input and requirement based on running applications.

Targeted as well as target-free feedback was elicited, summarised and translated into a list of functionalities to guide the initial design of the SEWA applications. Subsequent validation studies can now revolve around these initial guidelines, so that they are refined and implemented in each subsequent version of the system.

3 RealEyes Application : Ad Recommender Engine

3.1 Summary of Application

Marketing is about delivering the right message to the right audience at the right time. One of the key objectives in marketing research is then to identify ways by which efficiency of this information passing can be increased. In turn, marketing research is looking for methods and tools that enable reliable and quantitative measurements of each aspect of the impact.

Our goal is to provide a tool that can help optimise the match between message and audience by providing reliable metrics via emotion and sentiment analysis. In addition to the fundamental demand for better metrics, key requirements are speed and scalability. In the era of digital marketing, analytical tools are expected to deliver results quickly regardless of the sample size and if possible allow for personalisation [Ad Age, 2015].

One of the fastest growing segments of digital media is programmatic advertisement that is essentially a complex system between media (platform) owners, content providers and advertisers. Guided by our business analysis, we want to become an indispensable part of programmatic advertising by tailoring our recommender tool to the need of the so called digital media platform (DMP) owners, who play a central role in the functioning of programmatic advertising.

Based on the feedback of our existing and prospective DMP partners we focus on the following requirements:

- Effectiveness of recommendations based on emotional profiles needs to be proven.
- Emotion profile based recommendation would allow for user segmentation that is predicting which target group would respond well to a given ad.
- Reliability of the recommendations can be provided
- User segments can be defined by emotion profile similarity
- User profiles can be incrementally updated or extended as new data (or different types of data) become available
- There should be a default mode of the recommender that provides reasonable matches even if emotion profile data is not yet available (the so called “cold start problem” is handled)
- As a technical requirement, the recommendation engine should be interoperable with programmatic advertising ecosystem
- As another technical requirement, emotional profiles provided to other DMPs should have a standard form

3.2 Definition of user group

3.2.1 Definition of programmatic advertising

Programmatic Advertising or programmatic buying is a computer aided process designed to optimise advert placement by analysing user/customer profiles (demographic data, interest and history), advert content (product category, region) and cost of media (space on a website, broadcasting on television, etc). In other words, programmatic advertising allows the use of audience insights and technology to tailor messages to a particular individual, at a particular moment and in a specific context.

Ideally, the automated decision making is expected to lead to higher user satisfaction (less, but more relevant adverts seen) and increased business value for advertisers as well as for media owners.

Marketing is most effective when you deliver the right message to the right person at the right time. Relevance makes all the difference in getting consumers interested. Consumers penalise one-size-fits-all messages by tuning them out. In contrast, they reward relevant messages with engagement. By optimising for relevance, brands can turn passive observers into an interested, participatory audience.

Programmatic buying helps advertisers do just that in real time and at scale. Over the past few years, programmatic buying has graduated from being an experimental technology to a must-have in marketers' and media publishers' toolkit. The way media is bought and sold has fundamentally changed. Today, it happens automatically using programmatic technology where advertisers bid for the most relevant consumer and the most relevant media to get their advertisements out.

In Advertising Age’s 2014 Programmatic Buying & Selling Survey, conducted for DoubleClick, 307 respondents from marketers, agencies and media companies cited “audience targeting” (40.1%), “real-time bidding” (36.5%) and “automation” (30.0%) as the phrases they most associate with programmatic buying. The fundamentals of programmatic buying are straightforward: It is the practice of using technology and audience insights to automatically buy and run an ad campaign in real time to reach the right consumer with the right message in the right context – the three Rs of marketing.

Moreover, programmatic buying is no longer just for direct response campaigns, where consumers are expected to take some immediate action, such as a click. It is now also used for brand campaigns. It is helping brands realise the ultimate promise of advertising in the digital age: to efficiently and effectively run highly relevant, creative, responsive and measurable campaigns, at scale.

Brands are embracing programmatic to:

- Connect 1:1 with audiences, at the right moments and at scale
- Engage across screens, and with rich formats
- Access top-quality inventory
- Measure what matters

Figure 1 summarises the benefits of programmatic buying in the marketing industry.

Figure 1: Benefits of programmatic buying in marketing industry [Ad Age, 2015]

3.2.2 Programmatic advertising ecosystem

The ecosystem of programmatic video advertising is complex and consists of a number of different types of organisations and technologies that all work together in order to enable programmatic buying. The complexity of the industry and some of the biggest players are visible from a corresponding ecosystem landscape graphic in Figure 2. Let us take a quick look at some of the most important technological pieces of this industry [Walmsley, 2015], as it helps us to define the targeted users of SEWA powered recommendation engine later in the report:

Figure 2: Graphical mapping of an ecosystems of players in programmatic video advertising [Lumascape, 2015]

Real-time bidding is one of the key facets of programmatic advertising. It enables the buying and selling of digital advertising through auctions which take place in a timeframe of milliseconds – the time it takes for a webpage to load. Auctions take place via media marketplaces such as ad exchanges that connect buyers and sellers, and the price paid for impressions is based on immediate demand.

Ad exchanges are auction-based, often highly automated, digital marketplaces that enable multiple parties including advertisers, publishers, ad networks, demand-side platforms, and sell-side platforms to buy and sell display, video and mobile inventory. There are dozens of ad exchanges and the most popular ones are Google Ad Exchange, AppNexus and Facebook Exchange.

These auctions rely on data that is available in such market places through data providers about the ads to be shown, the online properties where the ads to be shown, the users to whom the data to be shown.

For example, a data management platform (DMP) is a centralised platform used by agencies, publishers and marketers to manage and merge user data such as cookie IDs. A variety of data sources can be combined within the platform to generate audience segments for improved advertising strategy and targeting. The finer and more accurate such audience segments are the better can be the targeting.

A demand-side platform (DSP) enables advertisers and agencies to automatically plan, target, execute, optimise and analyse the purchase of display, video, mobile and search ads. A DSP assesses the attributes of every single ad impression and can assign a bid based on those attributes. By removing rate negotiation and manual ad insertion orders, the purchase of targeted advertising across a wide variety of publishers and platforms becomes quicker and more efficient.

A supply-side platform (SSP) is a software platform that enables publishers to automatically sell display, video, and mobile ad impressions, maximising the price they can charge for these. An SSP allows publishers

to access a large pool of potential buyers including ad exchanges, networks and DSPs in real time, and to set a minimum price known as a price floor.

Finally, an ad server is a platform that stores and delivers digital ads to web browsers or mobile apps. It also provides reports on the performance of those ads, measuring all activity by the same methodology for the purpose of fair comparison.

All this machinery is essentially a huge recommendation engine, which recommends ads to users on certain media platforms. To do so, it relies on various kinds of data and the higher the quality of the data the better the recommendation machinery can work. Sentiment and emotional profiling of ads, users and media content is currently not available in this ecosystem. Yet the promise of emotions driven targeting is simple to understand for marketers and as we will see later in the report, can help to address many of the challenges of the programmatic advertising ecosystem. The goal of SEWA ad recommendation engine with respect to programmatic advertising is twofold: 1) to prove the value of emotion profiling data and 2) to enable integration of emotion profiling data into programmatic advertising ecosystem by means of data management platforms.

3.2.3 Definition of target user group

Now that we have outlined the ecosystem of programmatic advertising, it is time to also define the targeted user groups. In this section, we aim to give an initial high level definition of user groups and detail it further out as we discuss particular requirements of the user group.

There are three ultimate benefactors of a better advert recommendation engine:

1) The advertiser (brand owner) – as they would like to advertise their product or services most efficiently, spending less money, maximising the reach of their advertising campaign, among the right audience and making as positive impact with it as possible
2) The consumer (audience) – as they would like to see only relevant advertisements, at the right moment in time and feel positive about it
3) The publisher (content owner) – as they would like to monetise their content through advertisements, making maximum financial wins, but without offending and losing their audience.

Programmatic advertising ecosystem is an ecosystem of different technological companies that help the three benefactors to achieve their goals in the most effective and transparent way. It would be naïve to try to build a recommendation engine to compete with the whole ecosystem. Instead, our plan is to join the ecosystem and provide value to the companies that are already operating in this field, have access to much of the needed user profile and content/ad metadata, have relationships with advertisers and publishers, have long experience of recommendations and effectiveness measurement of those recommendations. Although our ultimate benefactors are advertisers, consumers and publishers, our primary target user group will be data management companies in programmatic advertising in collaboration with whom and guided by their requirements we will be building and evaluating our sentiment profiling based ad recommendation engine.

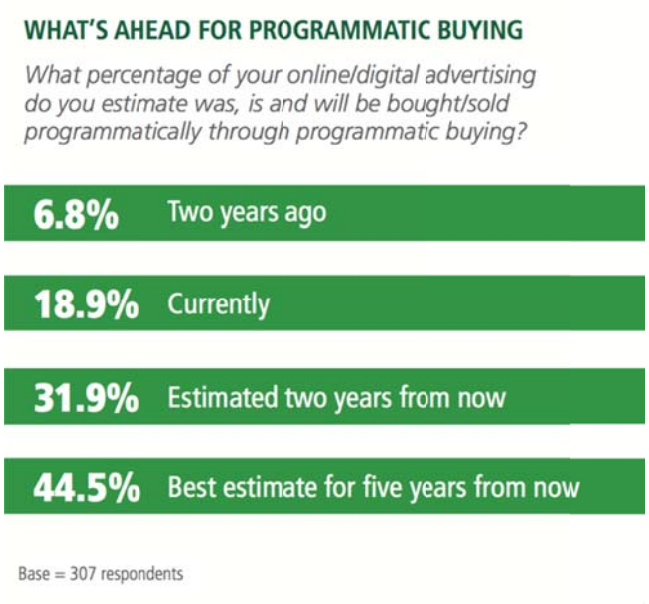
By working together with data management platforms as our target user group for the ad recommendation engine we will be able to:

1) test effectiveness of sentiment profiling based ad recommendation in real life advertising campaigns
2) obtain access to ad campaign effectiveness measures currently available for certain campaigns, such as clickthrough and viewability rates or potentially even have other performance indicators from advertisers
3) build a recommendation engine that better fits the ecosystem requirements and needs

Of course working with data management platforms as our primary target user group does not deny the fact that in particular consumers are also among users affected by the performance of the ad recommendation engine. For this reason, it is also rightful to define consumers as our secondary target user group. In addition, although the impact on consumers should be indirectly reflected in effectiveness measurements of ad recommendation engine conducted with data management platforms; we also plan to evaluate the impact directly with consumers by obtaining and measuring the changes in their emotional and reported feedback. Since overall advertising serves all levels of our society, it makes no sense to differentiate particular segments of consumers that would be among our target user group.

3.3 Economic potential of programmatic advertising

There is no question that programmatic buying is growing quickly. Magna Global, the buying arm of Interpublic Group of Companies, projects that programmatic spending will reach $9.8 billion in the U.S. in 2014, or about 20% of the overall digital ad market [Ad Age, 2015]. More than half of the media respondents (56.3%) in the Ad Age survey reported that agencies and marketers are requesting a programmatic approach to media buying.



As the march of automation continues, programmatic is expected to play a role in every type of media, including the premium inventory typically limited to direct sales. Online video is already going programmatic in spite of limited high-quality inventory and will make further progress with the emergence of viewability standards.

3.4 Analysis of challenges and user requirements in programmatic advertising

3.4.1 Role of emotions in consumer behaviour

Observation methods have always been around as one of the five basic tools in market research (surveys, focus groups, personal interviews, field trials and observation methods). Observation is used to refer to techniques that actually help us watch people's actual consumer behaviour. The rationale of these methods is that individual responses to surveys and focus groups are sometimes at odds with people's actual behaviour.

Detection of particular buying patterns or the actual interaction between products and consumers, however, is unfortunately not only costly, but comes a bit too late. Instead, approaches that are more modern try to observe prospective customers while (or right after) they are being exposed to information about the products (that is during the initial advertisement stage). The observations are then used to design better ads by delivering the message in a more efficient way.

Behavioural observations may include activity on social media (number of likes or sharing links), analysis of induced changes in the private state of the subjects (affect analysis or detection of emotions being elicited, for a comparison of emotion research methods in consumer behaviour studies, see [Chamberlain and Broderick, 2007]) or monitoring the most direct bodily responses to stimuli (physiological measurements, like EEG, skin conductance, eye tracking, and so forth). A quick look at the trends in applied methods [GRIT Report, 2015] clearly shows that observation methods are on the rise. Of the 21 new technologies that marketers started to use or consider, ten methods are based on observations.

The premise of RealEyes business is also built on understanding consumer behaviour through measurement of emotional response, affect and behaviour. In the last year, we have seen the interest in our products to grow several times compared to the year before, confirming current trends in marketing.

3.4.2 Challenges of programmatic advertising with consumer targeting and role of emotions to address those challenges

As we have introduced earlier, the core problem of programmatic advertising is optimal match between users and content, which is essentially a recommendation problem. The more we know about the users and the content, the higher the chance for a successful advert placement. With the help of SEWA tools, we can enhance programmatic advertising by:

1) expanding customer characterisation (e.g. information stored in cookies) with multi-modal sentiment/emotion profiles
2) expanding advert characterisation with multi-modal sentiment population responses and
3) measuring relevance via immediate multi-modal sentiment analysis of the spontaneous responses of a small number of selected users.

RealEyes has conducted its own internal research assessing what impact "emotional" data could have on programmatic advertising. As a company, we are collaborating with a wide array of players operating in the programmatic advertising ecosystem and are aware of the challenges and needs of its users.

Of course, the most direct impact lies within improvements of audience targeting. For better targeting of ads to users ad exchange and data management platforms need higher quality data both on ads and on users. There are many data out there, but much of it is hard to understand and can be of questionable value, therefore difficult to use for accurate recommendations [Marshal, 2015]. Linking ad impressions with user impact is one of the most difficult challenges of the programmatic buying. We believe that emotions and

sentiment data provides additional dimension of information that offers such a link. Emotions are also intuitively much simpler to understand compared to other types of data.

For some campaigns, like ads for cars or house purchases can be months or even years away from seeing an advertisement [Nielsen, 2015]. There are no good existing metrics to accurately optimise such campaigns for. Another example would be measurement of an effectiveness of a social awareness campaign. Measures like viewthrough rate and clickthrough rate indicate general interest, but cannot tell what the overall reaction was. Emotions are an important piece of information in exactly such cases. Once emotions become part of the data exchanged in programmatic buying, advertising campaigns can optimise for overall emotional impact as a better metric than viewthrough or clickthrough.

Advertising campaign optimisation is not just about targeting. Media publishers, who provide main content among which advertisements are shown, want people to come back and spend more time with their content. Therefore, they are also interested in making sure they do not upset their viewers/visitors with poor ads. They know their visitors will be less likely to come back if their content is flooded with poor ads [Goldstein, 2015]. Media publishes want to increase good interactions with their content by ensuring advertisements shown on their premises are emotionally well matched with their visitors. For example, mood of the advertisements could be matched with the mood of the movie where the ads are shown. Another example, would be matching the mood of pre/mid/post roll ads on YouTube with the mood of the YouTube content.

Unlike viewthrough or clickthrough rates, emotional data is granular (available for every second of video content). It can therefore be used to identify moments in time when to best make an interruption for an advertisement. For example, when measuring audience response to a movie, media publishers or TV channels could identify the best points in the movie where to show an ad and target them to individual viewer responses as opposed to fixed moments in time. Initially, such recommendation can be made based on the overall audience response. As the technology advances and becomes real-time such decisions when to show an ad could become specific to every individual user. RealEyes has submitted a patent application to protect this idea [RealEyes, 2014].

Another factor that comes into play in advertising campaigns is the audience reach - how much audience should be reached with the given ad. Knowing how emotionally good or bad an advertisement video is helps advertisers to budget the amount of money they need to spend to get to the planned reach. Ads that are boring are likely to be charged more by publishers [Goldstein, 2015]. Also, ads that are boring are likely to require many more views to achieve the required viewthrough rates compared to more emotionally engaging ads.

Emotional data can also be used for various types of psychometric and personality traits analysis, for example, to identify if someone is an introvert or an extravert. When this information is available, a type of targeting can be made where introverted viewers see a different set of ads than extraverted. Companies like VisualDNA specialise in collecting psychometric (or emotive) data and selling psychometric user profiles to programmatic advertising for better targeting [Marketing Week, 2014].

One of the best testimonies to the importance of the role emotions play in programmatic advertising can be found in Apple’s patent application from 2012 [Apple, 2012]. Patent details out many mechanisms for understanding user characteristics to enable better user targeting and ad recommendation, such as channel characteristics (channel through which content is delivered to the user), demographic characteristics (age, gender, etc.), behavioural characteristics (user behaviours for one or more different types of content), spatial-temporal characteristics (location, date, time, etc.), and mood-associated characteristics (heart rate; blood pressure; adrenaline level; perspiration rate; body temperature; vocal expression, e.g. voice level, voice

pattern, voice stress, etc.; movement characteristics; facial expression; etc.). Different user characteristics are available from different data providers and recommendations based on those characteristics play a different role in the overall recommendation process. Our task is to build a sentiment and emotions based recommendation engine, clearly demonstrate its capabilities and make it available as a new type of user characteristic that can be provably used for improved user targeting.

Data platforms operating in programmatic ecosystem collect, update, merge and store tremendous amounts of data to enable better targeting. The breadth and width of data available for targeting optimisation today is huge. For example, Xaxis instantly responds to changes from more than 2 trillion anonymous data points and Rocketfuel uses their data on users to create more than 20,000 unique audience segments for better ad targeting.

First-party data comes directly from the advertising client or a publisher and can include consumer's contact information, behaviour and purchase history. This data type is generally considered the most accurate and originates from container tags on a site, a data management platform, or CRM/offline data. Third-party data is provided to marketers by external data providers. Third-party data can come from a variety of places, including surveys/panels, opt-in online tracking, cookie-based tracking, registration data, public records, and offline transaction data such as loyalty cards. Contextual data provides context of the consumer's experience, including browser used, time of day purchases are made and other signals that help identify an audience. It is becoming increasingly important for ad exchange platforms to be able to navigate all this data and differentiate it based on quality.

Quality of data available for targeting is of paramount importance in the programmatic advertising industry. Marketers have serious doubts about the accuracy of some of the data they purchase from data vendors. The information is expensive, they say, and it frequently does not deliver the improved performance it purports to [Marshal, 2015]. Yet marketers constantly need to find proves that their advertising campaigns work and are worthwhile the spend. Return on Ad Spend (ROAS) is one of the basic metrics that marketers try to optimise for. According to Programmatic Buying and Selling Survey conducted by Advertising Age for Google's DoubleClick platform in 2014 - 80% of marketers would buy more if there were greater emphasis on quality of viewable impressions [Google, 2014]

3.4.3 Rationale for targeting data management platforms in programmatic advertising

As we have seen earlier from the complexity of programmatic advertising ecosystem marketers today buy media across a huge range of different sites and through various middlemen, including DSPs, SSPs, ad networks and exchanges. A DMP is used to store and analyse data. Information is then fed from a marketer's DMP to its DSP to help inform ad buying and targeting decisions. On the publisher side, DMPs can also be linked to SSPs and other technologies that can help them sell their ads for more. In those cases, the DMP is also storing publisher information on its readers.

Agencies, publishers and marketers all use DMPs. Agencies use the technology to collect and analyse the data collected from their client campaigns, which is sometimes pooled across multiple clients to create vast and rich datasets. Some clients have begun licensing their own DMP technologies and managing those platform themselves. A growing number of publishers are also making use of the technology as a way to help them better understand their reader information and extract more value from it as a result [Marshal, 2014].

DMPs help tie all that activity and resulting campaign and audience data together in one, centralised location and use it to help optimise future media buys and ad creative. As a crux of data management in

programmatic advertising DMPs represent the best user group to develop an ad recommendation engine with:

1) DMPs know what marketing campaigns are being executed and what the goals of those marketing campaigns are.
2) DMPs are also fully aware of the challenges both on the demand side (advertisers and their clients) and supply side (publishers). The last two points put DMPs into a position that enables them to decide where and how to best apply emotional profiling based targeting.
3) DMPs compete to get higher quality data into their platforms to drive more decisions that are accurate. Therefore, it is in their direct interest to assess the value of emotional profiling and utilise it once it has been shown.
4) DMPs are driven by the needs and interests of advertisers, consumers and publishers, the main benefactors of programmatic advertising.
5) DMPs have the necessary data to apply look alike modelling on combination of emotional profiling and other data types.
6) DMPs have the necessary data to also measure the effectiveness of emotional profiling based targeting.

3.5 Development and evaluation

3.5.1 Stages of recommendation engine development

We anticipate the development of the recommendation engine to go through three main stages:

The first stage of the project will be to implement and test methods to create user emotion profiles and to learn population response based similarity metrics between adverts (advert emotion profiles). Users are paid participants who watch pre-selected ads under home testing conditions in several sessions. Their responses to the advertisements are used to create an emotion profile.

> To measure the performance of the emotional profile based predictions we plan to follow several directions. On one side, we plan to work independently by measuring performance of our predictions through comparison with a baseline model (random advert selection). We plan to use viewthrough metrics, lift in emotional response and surveys.
> Separately, we will engage with at least one programmatic advertising partner and start evaluating our approach of audience segmentation based on emotional profiling of ad viewers.
> For this stage of the project, we can reuse much of the data we have collected today.

During the second stage of recommendation engine development, we will enhance it by incorporating the multi-modal sentiment analysis tools developed in WP2-WP5. The tools are expected to provide additional measures about the users' sentiment towards the content. These measures will be used to extend the previously learnt representations to make the user and advert profiles more informative. The testing and evaluation framework will be similar to that of the previous stage.

> During the final stage of the project, we plan to productise the prototype of the recommendation engine for broader usage. First, we need to ensure speed and scalability of the recommendation engine is in line with the data management platform requirements. We need to develop API for automated data transfer integration between DMPs and the recommendation engine. Finally, we aim to run recommendation engine tests with multiple DMPs on real-life projects to evaluate effectiveness of the engine's recommendations and to outline directions for further development.
> Third stage of recommendation engine development will require a lot of additional data collection for each of the trial project with our partners. We would like to complete at least three additional tests with at least one ad tested in each test on 1,000 viewers.

3.5.2 Working with online panels

Building emotional profiles based recommendation engine requires a lot of data. We have built a framework to collect audio, video and questionnaire data in response to video content. A lot of data for control and exposed groups watching the same advertisements has already been collected. This data consists of hundreds of advertisement videos and tens of thousands of participant recordings. This data can be used as a starting point for emotion profile creation. During the validation phase of the first stage of building the recommendation engine, we are likely to collect additional data.

To collect participant data online we are using so-called online panel providers. Our worldwide participant research is conducted with a few big panel platforms, such as Cint, Instantly, Toluna, Fulcrum, SSI, Lightspeed GMI. We also use local panels in specific markets like Data Springs and AIP in Asia, Netquest in South America, and MarketAgent and Data Diggers in Eastern Europe. Cumulatively, these panels have access to tens of millions of participants worldwide.

Typically, participant costs range between €3.00 and €5.00 on average per participant for population segments with high incidence rate. The cost does vary however and can be significantly higher depending on the specifics of the demographics group that we need to target, geographical location and overall duration of the study that needs to be conducted. For example, costs tend to be lower in UK, US, Russia, India where panels can achieve a large number of completes in a short time. Some countries will have much higher costs than the average due to high demand, low population, low spread of webcams or broadband internet connections.

Online panels also have the capability of inviting the same users again to participate in follow up tests (as long as the rule of seven days quarantine is ensured). This is an important requirement for us to be able to conduct (re)evaluation of our emotion profiling methods with the same participants. All participants taking part in our tests have unique IDs assigned to them by their panels. When the same participants need to be recalled again we use participant IDs recorded in our database. This capability is usually offered by online panels free of charge. However, based on their historical data only 35% of recalled participants take part in subsequent tests. This indicative measure is important to take into account to know what sample sizes are required when collecting data and how many times participant recalls can be used.

3.5.3 Working with data management platforms

So far, we have already identified a number of interested partners with whom we will be evaluating the impact of sentiment profiling and ad recommendation engine driven by emotional data:

- Xaxis [http://www.xaxis.com] – Xaxis is a global digital media platform that programmatically connects advertisers to audiences across all addressable channels. Through the expert use of proprietary data and advertising technology along with unparalleled media relationships, Xaxis delivers results for over 2,800 clients in 45 markets across North America, Europe, Asia Pacific, Latin America and the Middle East. Advertisers working with Xaxis achieve exceptionally high return on advertising spend through the company’s proprietary media products, as well as through its specialist companies, Light Reaction, Bannerconnect, and ActionX.
  Xaxis is one of the Valorisation Board members and has already shared their initial interest in the technology during the first board meeting. Following that meeting, RealEyes and Xaxis joined forces in creating first emotion based audience segments to conduct initial feasibility study. The efforts of this project are currently ongoing and we plan to work closely with Xaxis during the entire duration of SEWA project.

- Rocketfuel [http://www.rocketfuel.com] - is a full programmatic marketing platform designed to go beyond 1:1 marketing by learning to predict what marketing actions to take with a particular person in a particular moment of time. It offers brands and agencies managed services, as well as a SaaS-based Data Management Platform (DMP) and Demand Side Platform (DSP), to optimize performance, awareness, and lift across marketing objectives, channels and devices. Rocketfuel has one of the best audience segmentation capabilities in the world, which they would like to improve using our emotional profiling data. We are already in touch with Rocketfuel about possibilities of SEWA research for programmatic advertising.

- AOL platforms also enable the world's top marketers and media brands to reach consumers across desktop, mobile and TV through premium experiences, programmatic buying and performance-driven campaigns. It is the global partner of choice for leading publishers, advertisers and agencies seeking to maximise the value of their brands online. ONE by AOL [http://www.aolplatforms.com/onebyaol] unifies multiple advertising technologies in a simple, open

and intelligent solution.
AOL is a long-standing client and partner of RealEyes and we have conducted numerous emotion analysis projects together. In preliminary discussions about emotional profiling and recommendations with AOL, they have shown a strong interest in this direction and would therefore be a great partner to work together during the later stages of SEWA project.

- Annalect [http://www.annalect.com] - provides customers with a data driven marketing strategy, powered by a connected system of technology, tools, consultants and activation. Data management platform (DMP) that they use give their clients access to hundreds of third party data providers, thousands of consumer segments and a multi-billion record cookie pool.
  Similarly to AOL, Annalect has shown a strong interest in emotion profiling based audience segmentation and targeting and will be a great partner to work together during the later stages of the project.

- VisualDNA [http://www.visualdna.com] - combines big data and psychology to reveal more about people and why they do what they do. They are the world's leading provider of psychographic audience data, using patented technology that creates unique, detailed and accurate personality profiles. By combining the approaches of data scientists, psychologists, creatives and engineers VisualDNA has developed new ways of understanding the human personality, allowing people to understand themselves and businesses to serve their customers better.
  VisualDNA is also a member of SEWA Valorisation Board and has significant experience of building psychometric profiles of audiences and using them for better recommendation. In one of the cooperation projects we have started with VisualDNA, we evaluated the emotional response differences between introverts and extraverts and found several significant differences. We plan to use the results of that work and further joint projects in construction of the recommendation engine.

3.6 Proposed functionality

Determinant	Proposed functionality
A. Effectiveness of recommendations based on emotional profiles needs to be proven.	1. **Proven effectiveness:** Data management partners will be presented with results of an internal measurement of effectiveness of ad recommendation based on emotional profiles. The results will contain a comparative study of emotional, viewthrough and survey difference between control groups of viewers vs exposed group of viewers. Data management partners will be offered to conduct their own measurement of effectiveness by relying on recommendations of our recommendation engine.
B. Using emotional profile of an ad it should be possible to recommend user segments that would respond well or poorly to the ad	2. **Good/bad ad user segments:** Recommendation engine will have a capability to cluster viewers based on significant differences in emotional response. It will then be able to differentiate good emotional response from bad emotional response. The more data will be available the fine will be user segmentations possible.
C. Recommendation of a user segment for an ad should have a confidence score	3. **Confident recommendations:** Recommendation engine will assign a confidence score for each recommendation, which will depend on the amount and quality of emotional data available for a particular recommendation.
D. Using emotional profile of a user it should be possible to infer general user segments (such as introvert/extravert), which can be used for ad recommendation	4. **Emotional traits:** Recommendation engine will have the capability to abstract user emotional information into a more general profile information, such as users' psychological traits.
E. Emotion profile of user should be updatable as new emotional or other types of data become available	5. **Updatable emotional profiles**: Recommendation engine will have a capability to automatically update user and ad emotional profiles as more data will be collected.
F. Recommendation engine should be able to make recommendations even for users or ads for which no emotional information is yet available	6. **Look alike modelling:** Recommendation engine will use ads metadata (e.g. genre, brand, duration, etc.) for lookalike modelling against other similar ads in the database to be able to make user segment recommendations for a newly added ad. Similarly, recommendation engine will use users' profiling data (e.g. age, gender, location, etc.) for lookalike modelling against other similar user segments in the database to be able to make ad recommendations for a given user profile.
G. Recommendation engine should be interoperable with programmatic advertising ecosystem	7. **Ready for DMP integration:** In the first stages of development of recommendation engine main focus will be on the performance of the actual recommendations. During that stage, pilots with data management platforms can rely on manual data synchronisation between RealEyes and third party platforms. In the last stage of the project, we should aim to automate data synchronisation between SEWA Ad Recommendation Engine and its potential users in the programmatic advertising ecosystem. It will require development of an API through which data can be transmitted to and from RealEyes platform.

Determinant	Proposed functionality
	Speed and scalability will also be an important part of the final stage prototype development.
H. Emotional profiles provided to other DMPs should have a standard form	8. **Standard form:** As we develop emotional profiles for users and ads, we will standardise the format in which this data will be available from our platform to our DMP partners.

4 PlayGen Application: Chat Social Game

4.1 Summary of User Requirements

The proof of concept Chat Social Game is targeting young people aged 18+ in education institutions who are shortly to embark on the world of work and would benefit from a light touch, fun and accessible way of practicing the negotiations and discussions that are part of everyday life. The group has been targeted because:

- Younger people are more likely to use videochat services
- There are gaps in young people's communication skills
- Employers and government are calling for innovative solutions

The Chat Social Game will focus on influencing skills. This is partly because employers have identified skills gaps in this area. It is also because this aspect of communication is particularly suited to a digital game and automatic emotion detection – there are measurable objectives, simulations could be particularly beneficial and reading and reacting to emotions is a key component of competence.

Emotions play a varied and complex role in influencing as demonstrated in personal relationships (Clark & Taraban, 1991), parent-child interactions (Klinnertet al., 1983), the political arena (Glaser & Salovey, 1998), customer-service situations (Sutton & Rafaeli, 1988), and leadership settings (Van Kleef et al.,2009). Many models of influencing are linked to the interpretation, demonstration, manipulation and reaction to emotions. An in-depth literature review was carried out in order to identify the type of influencing scenario and emotional objectives that would be most useful and effective for a Chat Social Game.

We looked first at the role that emotion plays in persuasion. Whilst evidence is mounting on the important role that emotion plays in persuasion (Andre et al., 2011), the evidence is not clear cut on whether particular interpersonal or intrapersonal emotional responses are always more or less effective in changing views. This means that it would be difficult to automatically generate insightful feedback on the basis of emotions detected in a general persuasion scenario such as a debate game. We therefore concluded that the Chat Social Game should cover a more specific, closed scenario where measures of success can be more closely tied to emotional response.

We looked next at the role that emotion plays in negotiation. Again the literature suggests that emotion can play a range of roles in negotiating and that the size and nature of the effect can be context dependent (Elfenbein, 2007; Overbeck et al. 2010). We conclude that an 'integrative' scenario where there is the need to develop a long-term relationship and there is potential for a win-win scenario would give the clearest emotional objectives. In these cases, there is stronger evidence that eliciting a more positive emotional response in your partner is important for maximising the outcome and setting foundations for future success. The presence or absence of these emotional responses could also be verified and highlighted using automatic emotion detection.

Another conclusion drawn from the literature on negotiation was that the game could incorporate recognition of the different role played in intrapersonal and interpersonal emotional effects. User testing should explore which is most useful: feedback on your own emotions, your partner's emotions or both.

Finally, we carried out two focus groups with the target user group in order to further explore hypotheses generated on the basis of desk research. A number of different topics were explored in the focus groups:

- User experience of existing systems to develop influencing skills
- User vision of an ideal Chat Social Game to develop influencing skills
- User feedback on factors that could influence their engagement with a Chat Social Game

- User views on emotion detection and other feedback that would be useful for improving their influencing skills

The findings from the focus groups and the literature review were used to compile a set of determinants and functionality for the Chat Social Game. The Beta test version will now be designed on the basis of the functionality set out in section 4.5. The main area to be tested in the Beta testing round will be the type of emotion detection feedback that could be possible and useful. Users were not able to give very specific suggestions due to their lack of experience in developing and applying influencing skills. It will be necessary to test a range of possible models with users in order to identify the most useful and effective way of integrating SEWA automatic analysis into human-human interactions.

4.2 Existing evidence based on user needs

4.2.1 Definition of user group

Analysis of exploitation opportunities showed that development of communication skills is a promising objective for a proof of concept Chat Social Game.

The target user group for the proof of concept application will be young people aged 18+ in education institutions who are shortly to embark on the world of work and would benefit from a light touch, fun and accessible way of practicing the negotiations and discussions that are part of everyday life.

A number of educational institutions based in London have agreed to support user engagement during the process of developing and testing three prototype versions of a Chat Social Game. These groups of students have been selected to give a balance of motivation and experience in developing communication skills.

- CASS Business school (City University): Business undergraduates and younger MBA students
- City University: Computer science undergraduates
- Queen Mary's University of London: School of Electronic Engineering and Computer Science undergraduates

The potential end user group for this kind of application would be:

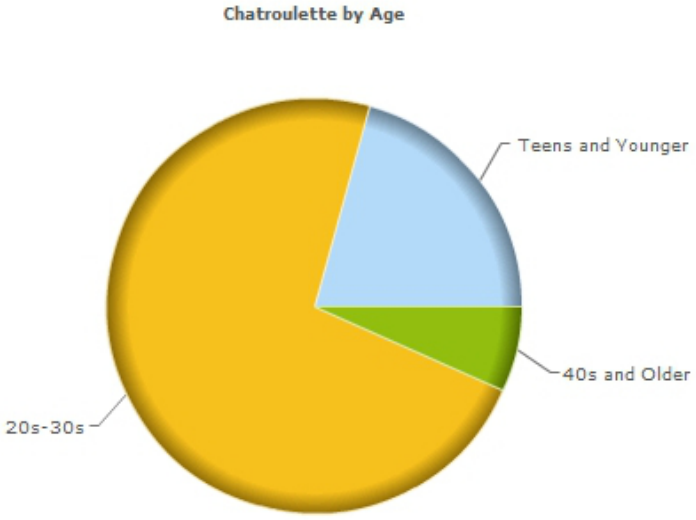
- Young people studying in education institutions or undertaking work-based training
- Education institutions offering communication skills development courses and services
- Apprenticeship training providers and awarding bodies
- Employers running graduate training schemes
- Employment agencies offering value-added recruitment services to recruiters and jobseekers
- Welfare to work providers offering training and support to jobseekers

4.2.2 Rationale for targeting this user group

4.2.2.1 Younger people are more likely to use video chat services

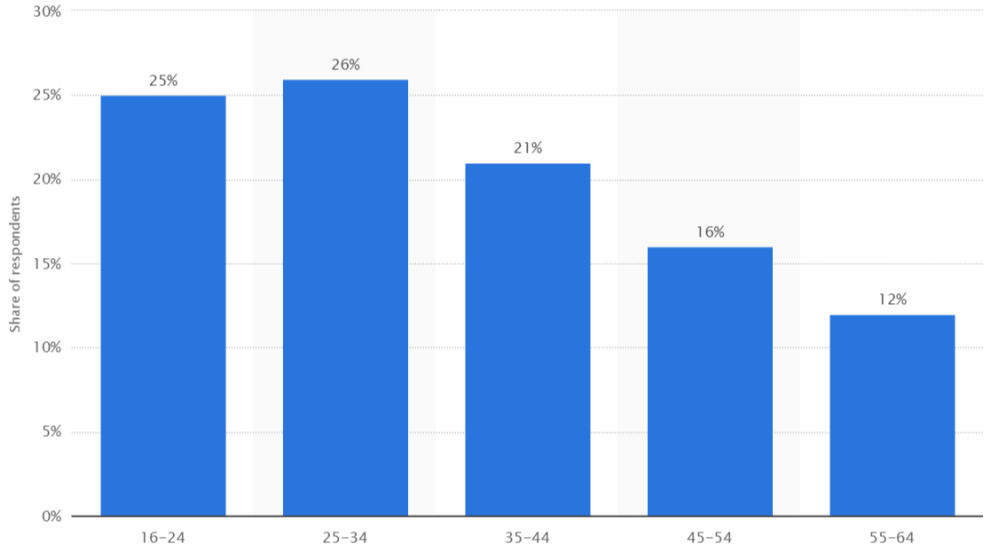
PlayGen's application focuses on computer-mediated human-human interactions i.e. videochat. For a proof of concept study, it is important to target users who already feel familiar using videochat. If it is a less comfortable or familiar experience then any feedback captured may relate more to the user's views on the videochat interface rather than the presence or absence of automatic emotion detection.

A study done during the height of the Chat Roulette craze in 2010 showed that 90% of users were teens or young adults under the age of 30 (RJMetrics 2010).



More recent analysis of the global penetration of Skype, the most popular videochat service, shows that it is higher amongst 16-34 year olds than older age groups (Statista 2015).

Global Skype usage penetration among internet users worldwide (2015)



The experience of SEWA project members during the data acquisition phase of the project (Task 1.2) also points to prioritising younger age groups. All project members found that it was far easier to recruit and successfully carry out videochat recordings with the 18 to 30 age group than any other. This was partly due to having the right technical equipment 'in the wild' to conduct, record and upload a videochat and partly due to willingness to participate in a videochat exercise.

The user group targeted for the Chat Social Game will therefore be young adults aged 18-30. Whilst under 18s are increasingly using videochat services there are many ethical issues related to safety and consent that must be addressed in a research project. The decision was therefore taken to focus on young people over the age of 18.

4.2.2.2 There are gaps in young people's communication skills

Businesses are increasingly recognising a lack of soft skills in younger candidates. A recent UK survey showed that over half of the employers questioned (57%) said that young people lack basic soft skills such as communication and team working (ONS 2014). Another survey revealed that four of the five top skills that

applicants are lacking are soft skills such as oral communication, teamwork, customer handling skills and planning and organisational skills (UKCES 2013). Influencing skills have also been identified by employers as an area that is important in the labour market (European Commission 2014). Taken together, these are the attributes that enable somebody to interact effectively with other people and are closely associated with emotional intelligence – the ability to be aware of, control and express emotions.

This perspective from employers is not necessarily shared by young people who may underestimate their need to develop skills in this area. The Advisory, Conciliation and Arbiteration (ACAS) report found that young people entering the labour market recognised that employers sought soft skills such as the ability to communicate well. They also understood that qualifications alone could not be relied upon to secure employment. Most young people cited in the report believed that they possessed such skills having gained them at school, college or university. However the majority of employers believed that young recruits lacked these skills (ACAS 2012).

These individual's skills gaps impact society. The total of young people not in employment, education or training is currently around 14 million in the EU. The annual economic loss to society is estimated at €162 billion in addition to the long-term personal and social costs. It is recognised that cultural, social and economic capital is being wasted and underused. Reliable training through education to secure employment no longer exists. There is also a significant mismatch in the ambition of those gaining employment, from the job they get to the vision of what they wish their role could be (European Commission 2014).

The European Commission has identified a need to concentrate efforts on improving the development of 'transversal skills'. Modern, knowledge-based economies require people with higher and more relevant skills. European Centre for the Development of Vocational Training forecasts predict that the proportion of jobs in the EU requiring tertiary level qualifications will increase from 29% in 2010 to 34% in 2020, while the proportion of low skilled jobs will fall in the same period from 23% to 18%. Transversal skills such as the ability to think critically, take initiative, solve problems and work collaboratively will prepare individuals for today's varied and unpredictable career paths (European Economic and Social Committee 2013).

4.2.2.3 Employers and government are calling for innovative solutions

The European Commission has called for a scale-up of the use of information and communications technology (ICT) in learning and teaching (European Economic and Social Committee 2013). Digital learning and recent trends in Open Educational Resources (OER) are enabling fundamental changes in the education world, expanding the educational offer beyond its traditional formats and borders. New ways of learning, characterised by personalisation, engagement, use of digital media, collaboration, bottom-up practices and where the learner or teacher is a creator of learning content are emerging, facilitated by the exponential growth in OER available via the internet. Europe should exploit the potential of OER much more than is currently the case (Eberle et al., 2015).

In particular, member states have been invited to take action to introduce transversal skills across all curricula from early stages of education up to higher education, using innovative and student-centred pedagogical approaches.

The European Commission is also keen to promote the recognition and validation of knowledge and skills gained through non-formal learning. Skills and competences such as interpersonal skills and self-management skills are often more highly valued than formal education qualifications (European Commission 2014).

4.2.3 Focus on influencing skills

The Chat Social Game will focus on influencing skills. This is for a number of reasons:

- Employers have specifically identified **gaps in influencing skills**
- This aspect of communication is **particularly suitable for a digital game**. There is a clear objective and it is possible to assess whether that goal has been met.

- It is also an area where the **real life stakes may be very high**, for example, persuading an employer to give you a job, convincing a landlord to reduce the rent from your apartment, persuading tutors that your project should be the winning one. It would therefore benefit in particular from opportunities to experiment in a simulated setting.
- This topic has a **good fit with automatic emotion detection**. An important component of competence in this field is emotion awareness, i.e., reading and reacting to other people's emotions.

Influencing skills can be defined as being able to persuade others and negotiate to reach agreement. Persuasion and negotiation are both subsets of influencing skills. Persuasion involves convincing others to take a particular view or action. Negotiation involves discussing and agreeing to a mutually satisfactory agreement.

4.3 Emotion and influence

There are many different theoretical models of persuasion and negotiation (Dillard, Pfau, 2002, DellaVigna, Gentzkow, 2009). Across all these models there are some consistent components of success, many of which are linked to the interpretation, demonstration, manipulation and reaction to emotions.

a) Understanding yourself
   - Self-awareness: understanding your personal style and strengths
   - Self-motivation: belief in yourself and your ideas
   - Self-regulation: ability to control your feelings

b) Understanding your audience
   - Active listening: eye contact, affirmation / confirmation (head nodding)
   - Building rapport / showing empathy: consider beliefs and position before responding, give other speaker time
   - Making accurate socio-affective judgements: emotion awareness

c) Communicating information effectively
   - Using effective verbal communication: arguments, facts, logic
   - Using effective non-verbal communication: manner to express verbal information
   - Using effectively emotional and social information: contextualise the discourse

The process of influencing others by working through differences in opinion and trying to negotiate a settlement can feature a wide range of emotions, e.g. happiness, pleasure, surprise, astonishment or contentment on one side, pain, displeasure, fear, anger, frustration and conflict on the other side (Kelly and Barsade, 2001). During this interactive process, the emotions that each person expresses may or may not be perceived accurately by their counterpart. Success in the negotiation depends mainly on the ability to interpret accurately and affect appropriately feelings of others (Druskat and Wolff, 2001). Although this information (i.e. emotions) may not be explicitly revealed in all cases. An enhanced ability to understand subtle emotional cues could thus help to improve effectiveness in influencing.

There is a range of theoretical models of influence setting out a wide range of different tactics (Cialdini 1987, Tanford and Penrod, 1984). Books and courses instruct people on heuristics, techniques and analysis to carry out. Several of the training products reviewed report that people are more likely to be persuaded by people that they like, feel comfortable with and who behave in a similar manner (Cialdini, 2001).

A more in depth review of literature on the role of emotion in influence was undertaken in order to identify the type of influencing scenario and emotional objectives that would be most useful and effective for a Chat Social Game aimed at improving communication skills. This is particularly important given that most applications of automatic emotion detection so far have focussed on human-computer interactions (either content or avatar). We therefore need to identify a context when emotion detection can improve the outcome of an interaction for two humans conversing.

The review shows a more complicated picture – high sentiment might not always be the emotional state correlated with success and a more nuanced model of feedback may be required.

4.3.1 The role of emotion in persuasion

The original concept for the Chat Social Game was a fairly open persuasion game where players would be tasked with changing each other's opinion on topical issues. After the interaction, it was proposed that they would be given feedback both on the extent to which they changed the other person's views and on some strong emotions felt / expressed during the interaction. In order to inform decisions about the most appropriate and useful feedback mechanism, we have reviewed literature on the role that emotion plays in

persuasion, with the aim of identifying links between particular emotional states and outcomes that could be used to automatically generate insightful feedback.

There are a number of roles that emotions can play in persuasion. They can serve as heuristics or rules of thumb to guide decisions (e.g. “I feel good, so I must like it”) (Petty and Brinol, 2008). They can stimulate selective information processing. Some theories suggest that the depth and direction of information processing is determined by the type and intensity of emotion experienced, where salient pieces of information are promoted over others (Petty and Brinol, 2008).

The picture is mixed when it comes to the precise role that different emotional states play in persuasion. Different models make different predictions. A general arousal model predicts that arousal should increase the effectiveness of heuristic persuasion models. An affective valence model predicts that effectiveness should depend on whether the context elicits positive or negative affect. Empirical findings suggest that effectiveness of persuasion depends both on the specific emotion elicited and on the context (Griskevicius 2013).

One of the limitations in this area is that research on emotion and persuasion has primarily focussed on the role of fear. Empirical findings suggest that fear is positively correlated with attitude and behaviour change, even though age and perception of efficacy can moderate this effect (Dillard 2002).

There is also some evidence to suggest that other negative emotions such as guilt and anger can increase the success of persuasion messages and media. There has been minimal theorising regarding the effects of guilt on attitude change or information processing. However, the literature suggests that guilt can enhance attainment of positive goals if evoked at moderate levels (Coulter and Pinto 1995). Additionally, some studies suggest that a positive relationship exists between anger and attitude change (Dillard 2002). The effect seems to depend on whether anger is intentionally or unintentionally induced. Indeed, there is a risk that unintentionally elicited anger is directed against the message creators in light of what the receiver considers unjust attempts to manipulate their emotional responses.

It is not universally the case that those negative emotions have been shown to correlate positively with attitude change. For example, Consolvo et al. (2009) highlight sadness as motivating contemplative behaviour and more systematic information processing, although it has been shown to correlate with attitude change only for some topics and circumstances. Going further, disgust has actually been correlated negatively with attitude change in some studies (Gross, 2008), potentially due to an effect of rejection of the source of abhorrent messages.

Less is known about the persuasiveness of messages and interactions that elicit positive emotional responses. However, some of the most widely applied models of persuasion rely heavily on the role that feelings about the other person play. Cialdini’s principles of persuasion give evidence for six key principles that have been shown empirically to change attitudes and behaviour. (Cialdini, 1987, 2001) One of these is the principle of liking: Cialdini says “People prefer to say ‘yes’ to those they know and like”. People are also more likely to favour those who are physically attractive, similar to themselves, or who give them compliments. Feelings towards another person play some part in this but do not completely cover this concept. Mimicry and physical similarities also play a role (Cialdini, 1987, 2001).

Overall, whilst evidence is mounting of the important role that emotion plays in persuasion, the evidence is not clear cut on whether particular emotions are always more or less effective in changing views. The main conclusion that can perhaps be drawn for emotion detection is the potential usefulness of detecting a presence rather than absence of emotional response, e.g. flagging boredom, disengagement. If the other participant is showing no emotional response at all, which may be dependent on the other person’s personality, this could be less effective than a strong negative emotion.

Implications:

- *The role that emotion plays in persuasion is complex and context dependent.*

- *In a debate scenario, it will be difficult to draw straightforward conclusions about likely success of a strategy based on detection of either player's emotions.*

- *It will also be difficult to automatically generate evidence-based, insightful and specific feedback on the basis of emotions detected. In some situations, greater enjoyment of the interaction may indicate rapport with the other person and a greater likelihood of being persuaded. However, in other situations more negative emotions and lower enjoyment of the interaction could indicate a heightened emotional response that contributed to a change of position.*

- *The Chat Social Game should cover a more specific, closed scenario where measures of success can be more closely tied to emotional responses. This will enable meaningful feedback to be generated.*

4.3.2 The role of emotion in negotiation

Whilst the original concept for the Chat Social Game was a debate scenario, given the varied role that emotion plays in persuasion, we have also explored the literature on emotion in negotiation. A negotiation game where there is a clear decision to be made at the end of the interaction could also provide an appropriate context to practice and develop communication skills.

Traditional thinking has favoured the role of rationality over emotion in negotiation. However, since the mid-1990s, an increasing body of research has argued that the cognitive aspects of joint decision making have been over-emphasised at the expense of the emotional aspects of social interaction that occur when two or more people negotiate (Barry 2004).

The literature suggests that emotion can play a range of roles in negotiating and that the size and nature of the effect can be context dependent – though it is still an emerging field and there are few firm conclusions. There is an inherent trade-off when negotiating between creating joint value for all negotiators to share (cooperation) and maximising value for yourself (competition). The practical reality is that many negotiations are mixed-motive involving elements of both cooperation and competition between two parties. To achieve success, negotiators will therefore need to share enough information to accomplish cooperative goals whilst holding back enough information to maximise personal gain.

Interpersonal and Intrapersonal effects

When considering the interactions, it is useful to distinguish between two types of effect: intrapersonal and interpersonal. Intrapersonal effect refers to the effect of a negotiator's emotions on his or her own negotiation behaviour. Interpersonal effect refers to the effect of a negotiator's emotions on the other negotiator's behaviour. The literature for both has been reviewed in order to identify areas where automatic emotion detection could provide new insights and improve the negotiation process and outcome.

Starting with intrapersonal effects, the emotion of both parties at the start of the negotiation can have an impact on their behaviour. Several studies have explored the effect of inducing pre-negotiation mood. Overall, positive mood induction led to more cooperative behaviour and enhanced joint outcomes. Negative emotional induction led to lower joint gains (Barry 2004). However, it is more difficult to influence positively the mood of someone than negatively (Göritz and Moser 2006).

There is some difference in the role that emotion plays depending on whether the negotiation is one-off or whether the parties may have a need to negotiate and work together on an on-going basis. Some researchers argue that frequent agreements between the main parties can give rise to positive emotions and the development of an on-going relationship. The result is emotional commitment that can set the stage for future interactions (Lawler and Yoon 1995). Post-negotiation affect/emotion has also been shown to influence participants' desire for future interactions and key behaviours such as the readiness to implement a negotiated settlement (Barry and Oliver 1996). Therefore, a positive emotional experience can be an important contributor to the overall impact.

Overall, the prevailing view coming out of research into intrapersonal effects is that positive emotions improve negotiator effectiveness whereas negative emotions decrease effectiveness.

Less evidence exists about the role of emotion in interpersonal effects – the effect that your emotion has on the other person's behaviour. Some research has explored emotional contagion in negotiation. This is when emotion is transmitted from one party to another through mimicry (imitation of another's non-verbal behaviour) or through 'catching' others emotions (genuine experience of the other party's emotional state). Negotiators may adopt strategies to try to influence emotion stat of the other parties in this way. They may also buffer or supress emotion where this is undesirable (Thompson 1999).

Job interviews are a particular context where the regulation of expressed emotions has been explored. Each participant is judging the potential fit of the other and the objective of the interviewee in particular is to present a positive impression that fits the qualities the interviewer is looking for (Posthuma et al 1982). It is normal or even expected that the display of real emotions may be regulated or supressed (Sieverding 2009). It can therefore be more difficult to detect and interpret emotional responses in these scenarios. There could be a particularly useful role for automatic emotion detection both in picking up these subtle cues and in training people to behave in a way that leads to a more positive emotional response in the interviewer.

There are mixed views about whether emotional expressivity plays a positive or negative role in negotiation. More emotionally expressive people may find it easier to share information and deploy emotion management tactics. However, it may also be interpreted as a poor ability to regulate emotions leading to them being perceived as a weak negotiator. Given the insufficient evidence, there does not seem to be a case for using emotion detection to encourage negotiators to be either more or less emotionally expressive.

The most conclusive findings on intrapersonal effects actually suggest an alternative view on the relative effectiveness of expressing positive vs. negative emotions during negotiation. One study found that when negotiators completing a sales task received information about an opponent's emotion (anger, happiness or none), via a computer-mediated interaction, they conceded more to an angry opponent than a happy opponent (Van Kleef 2001). It suggests that in this type of scenario, anger elicits cooperation and happiness elicits competition a reversal of the findings for intrapersonal emotional effects. Emotion awareness thus appears to be a key component for a successful negotiation (Iyer and Leach, 2008).

Follow-up to this work explored when participants are most affected by feedback on the other negotiators emotions (Van Kleef 2004). It was found that participants are only affected by the other's emotions if they have low power or are in situations of low time pressure – negotiators are only affected by their opponent's emotions if they are motivated to consider them. A further paper explored the interpersonal effects of happiness and anger and the moderation of these effects by power. Across a number of scenarios, the expression of anger led low-power participants to concede much more than participants in any other situation (Van Kleef 2006).

Another study also found that negotiators who expressed anger were more likely to gain concessions from their counterparts, particularly when the counterpart had poor alternatives. Sinaceur and Tiedens showed that perception of the angry negotiator as 'tough' mediated the effects of the anger (Sinaceur and Tiedens 2006).

These starkly different findings show that there is a balance to be struck in the interplay of intrapersonal and interpersonal emotional effects. It also shows that different emotional responses can be more or less responsive in different scenarios. Intrapersonal studies have often focussed on integrative negotiation tasks where the objective is maximising joint benefit. Interpersonal studies have often focussed on distributive negotiation tasks where there is a 'fixed pie' and each player is trying to maximise their own individual share of it. Anger seems to be more effective in increasing value in distributive negotiation tasks whereas happiness appears to be more beneficial in integrative negotiation.

In both scenarios, emotion is hypothesised to play an important informational function. Anger might communicate the negotiator's toughness and unwillingness to accept a suboptimal outcome to his or her counterpart. Happiness might communicate interest in reaching agreement.

One study has explored the different role that emotion plays in negotiation depending on whether a negotiator is in a low or high power situation (Overbeck 2010). It was found that anger played an intrapersonal function for high power negotiators, helping them to claim more value as a result of responding to their own emotional state. However, angry low-power negotiators became less cognitively focussed and claimed less value. Some interpersonal effects of emotion were also observed, with low-power negotiators outcomes predicted better by high power negotiators emotions than by their own. High-power negotiators facing tough low-power negotiators also appeared to exert greater effort to reach an integrative deal: value creation increased as the number of angry negotiators increased.

Research on the relationship between emotion recognition accuracy and negotiation performance suggests that better emotion detection can improve performance in either a distributive or integrative scenario. In an experiment by Elfenbein (2007), participants were given a mixed-motive negotiation exercise and assigned randomly to the role of buyer or seller. Those given the role of seller who scored highly in emotion recognition accuracy both cooperated more effectively to create greater value for the pair and also competed more effectively to capture a greater proportion of the value for themselves (Elfenbein 2007). The authors note the lack of any conclusive findings across literature on individual differences (such as personality) that are reliable predictors of negotiation outcomes. They suggested, however, that individual differences in emotion recognition accuracy might be linked to negotiation performance.

Implications:

- *Distributive negotiation scenarios may offer less opportunity for users to benefit from automatic emotion detection without detailed training in strategies to adopt.*

- *An integrative scenario where there is the need to develop a long-term relationship and there is potential for a win-win scenario would give the clearest emotional objectives. In these cases, there is stronger evidence that eliciting a more positive emotional response in your partner is important for maximising the outcome and setting foundations for future success. The presence or absence of these emotional responses could also be verified and highlighted using automatic emotion detection.*

- *The game could incorporate recognition of the different roles played in intrapersonal and interpersonal emotional effects.*

- *User testing should explore which is most useful: feedback on your own emotions, your partner's emotions or both.*

4.4 Primary analysis of user requirements

4.4.1 Focus Group Methodology

Two focus groups were carried out with the target user group in order to further explore hypotheses generated on the basis of desk research. A total of 17 students attended from City University and Queen Mary's University of London. The size of each focus group was limited to a maximum of ten participants to enable full discussion and participation to take place. The agenda of the focus groups explored the following themes:

- Discussion groups on the concept of a chat social game to develop influencing skills: this included a combination of open, closed and multiple choice questions to elicit feedback
- Interactive activity to design a game that could develop influencing skills: this gave participants a framework and tools that enabled them to identify more specifically the game mechanics that could support their needs
- Feedback on a functional prototype concept for a debate game called Sumobate: this gave the students a specific proposal to react to

4.4.2 User experience of existing systems to develop influencing skills

Participants were asked how they currently practice and develop their influencing, persuasion and negotiation skills. Participants gave examples of times when they had needed to deploy influencing skills for success in academic projects or work placements. They felt that these skills were very important for presenting their ideas and increasing their impact.

However, the students that attended the focus groups had little to no previous training or support to develop their influencing skills and had not sought out tools independently. They appeared to lack basic opportunities to practice influencing skills and many had low confidence in their abilities. They therefore were unable to give feedback on the advantages and disadvantages of existing systems.

The main disadvantage that came out of the feedback was that they did not find university websites very useful for developing these kinds of skills. One participant said that it could be hard to find tools on university sites: "It has to be accessible but 'cool', not like university websites".

Given the low level of confidence and experience with existing systems, focus group facilitators explored participants' views on what would help to increase their confidence. Responses fell into three main categories: practice, understanding and personal attitudes. Simply having an opportunity to practice techniques was the point most often raised:

- Opportunities to practice and gain experience in a social context
    - "Practice to build up my confidence of using these skills. Along with feedback on strengths, weaknesses to improve."
    - "Playing more group games to increase my skills and have fun at the same time"
    - "A lot of exposure to it"
    - "More experience"
    - "Working in teams"
    - "Actually testing some strategies by playing some negotiation games."
    - "More successful negotiation attempts"
    - "Having more conversations about my ideas and gaining feedback."
    - "Speaking to a familiar audience (friends for instance) when practicing."

- Better understanding of specific techniques and strategies
    - "More knowledge or persuasive tactics; something to negotiate with."
    - "Specific technique or methodology on how to persuade and negotiate."

- "Reading/watching/talking about alternative strategies."
- "More training"
- "Being more knowledgeable about different techniques."
- "To be better at reading the strategies other people are using e.g. bluffing"

- Personal attitudes and beliefs
  - "Personal confidence and confidence about our ideas."
  - "Adjusting your attitude so that when you keep positive when things don't go well."
  - "The more knowledgeable I am, the more confident I feel."

Overall, the current approach of 'learning in real life' is not giving students sufficient opportunity to practice their skills and try out different techniques in an environment where they have less personally at stake.

4.4.3 User vision of an ideal Chat Social Game to develop influencing skills

Users engaging in the focus groups identified a number of features that they felt would be particularly important to include in a Chat Social Game to develop their influencing skills. These built on the factors that they felt were important to increasing confidence:

a. **Meaningful:** Users want to develop their skills but this only gains meaning when put to practical use. They wanted to see that they are having an impact on changing other people's minds about a subject that they care about, or in a context they are likely to face in real life.

b. **Guidance**: Users felt that they were starting from very low knowledge on these topics and wanted some input to guide their influencing behaviours.

c. **Modelling:** Users would value seeing practical examples of people influencing well and people doing it badly. They also wanted to see particular tactics and behaviours put into practice.

d. **Safe environment to practice:** Users thought that a game that teaches resilience and allows space for failure was important. It was clear in both focus groups that students did not feel confident in their skills and needed a safe and supportive environment to develop. Users expected that there would be a lot of trial and error before they identified successful strategies and improved their skills in deploying them.

e. **Feedback:** Users want suggestions that can improve their influencing skills. Some specifically mentioned that it would be useful to have expert review recordings and give feedback.

4.4.4 User feedback on factors that could influence their engagement with a Chat Social Game

A number of different techniques were used to gather feedback from users on the specific factors that could influence their engagement with a chat social game. Firstly, they were introduced to PlayGen's proprietary creativity toolkit and participated in a facilitated game design session which brought out ideas about design features that could be effective. Secondly, they were asked open questions about the factors that would either motivate them to use a chat social game or get in the way of them doing so. Finally, they were presented with a specific scenario of a general persuasion Chat Social Game – http://sumobate.com – using a basic prototype and feedback was elicited. This combination of techniques drew out a number of determinants that could influence their motivation or ability to engage either positively or negatively. Ten key themes emerged from this process:

i. The critical factor overall is having a clear purpose for playing the game that will motivate people to use it.
   - "If the game is just negotiation for the sake of it then people won't use it"

- Users need to see how their ideas and personal choices affect the outcome
- There needs to be a clear purpose in order for players to be willing to put effort into the persuasion and negotiation process
- Real-life situations and topics of personal significance are more motivating than an artificial debate topic, e.g. getting a job, negotiating with a landlord, pitching a project
- A clear objective with a sense of progression is important

ii. Several expressed concerns about how they would be paired with other players. If users lose confidence in this process it could adversely affect engagement.
- A number of users expressed concern that there could be users on the platform who do not have good intentions, e.g. people who abuse the game for fun or behave inappropriately. This was felt to be a particular risk for newcomers to the game who might be abused by existing users.
- Users also highlighted the importance of the matching algorithms in creating an appropriate level of challenge, which could have a significant impact on motivation. They thought it was important that entry-level participants were not unfairly disadvantaged and that there should be some way of balancing resources between more and less experienced players. The importance of being paired with somebody with matching skill level was raised.

iii. The social element is a key motivator to build on...
- Users liked the potential of practicing with a variety of players and practicing under different circumstances
- People felt that discussion and talking to others is the main way to develop and feel more confident in negotiating skills
- The potential for live feedback was flagged as a key motivator
- Some users thought a multiplayer mode would be good in addition to one vs. one

iv. ...though some users were more apprehensive about the social element of the game
- Some users reported shyness and nervousness as a potential barrier to using a Chat Social Game
- One explicitly said that they are afraid of losing or looking bad in front of their friends or team

v. Practical factors could be a barrier to participation
- Time to practice these techniques was a bigger barrier than motivation for some people
- One participant felt that it should be possible to complete a training session in less than ten minutes
- The game has to be easy to find and accessible
- Most participants expected the game to run on their phone
- Poor connection or slow-running speed would affect the experience and could put people off using it

vi. Whilst videochat has many advantages, there are potential disadvantages that would need to be addressed
- Seeing somebody face to face was generally seen as an advantage.
- However, it was also pointed out that some people do not feel comfortable seeing their own face or reviewing recordings of their performance.
- Some participants felt that the lack of direct contact when using videochat would be an issue as a lot of contextual information is lost over videochat. They therefore felt that people could be less motivated to negotiate over videochat. It will be important to success that the SEWA automatic analysis incorporated into V2 of the game helps to minimise the information lost.
- Most participants expected to be able to use the camera on their phones for videochat
- One user felt that a wide angle for video was important for this type of game

vii. Some guidance on approaches should be built into the game

- This should include specific examples of more and less effective behaviours
- In the practical demo, it became clear that users would just have a friendly chat if not steered to take a particular position or achieve different behavioural and emotional goals.

viii. Simplicity was another core requirement
- The ability to understand the game was identified as a basic determinant of engagement. Users expect easy to understand rules and a very user-friendly interface.

ix. Users were positive about the potential of game dynamics to increase engagement
- Game mechanics were seen to provide feedback and tangible insight to users. Elements such as points, goals, leaderboards, time-limits and peer feedback were all suggested as core components: "Games would motivate me to win by rewarding me with points and challenges for me and my friends".

x. However there is a balance to be struck between competitive and collaborative dynamics
- Several participants felt that competition between players would motivate them to use the game: "I would want to win which would mean I would have to develop myself more".
- Others thought there were limits to this: "you don't want to upset anyone".
- Building confidence was mentioned many times as a key objective. Users wanted to be able to explore a topic in a safe context. Those less confident in their skills may be put off by a game that it is too competitive or based solely on putting across personal opinions.
- Some users thought that collaborative goals could be more effective, e.g. if the game encouraged players to work together to try different techniques and improve their skills.

Workshop facilitators also asked participants closed questions about the type of feedback that they would find most useful to support them to develop their influencing skills. This was based on the initial concept for the Chat Social Game and the automatic emotion analysis that will be most feasible to deliver from facial analysis in v2 of the Chat Social Game (a wider range could be available from audio analysis). Users were asked to indicate which of the following feedback would help them to develop their skills, or suggest alternative options:

- Whether the other person agreed with me (*self-reported, automatic SEWA analysis*)
- Whether the other person liked the discussion (*self-reported, automatic SEWA analysis*)
- Whether the other person changed their view (*self-reported*)

Feedback element	% of participants who felt it would help them to develop skills
Whether the other person agreed with me (*automatic SEWA analysis*)	35%
Whether the other person liked the discussion (*automatic SEWA analysis*)	47%
Whether the other person changed their view (*self-reported*)	59%

These findings combined with the literature review show that further work is needed to define a model of emotional and behavioural feedback that will be useful to users in developing communication skills. Less than half the users felt that agreement or sentiment would be useful. The views explored in the workshop show that users are expecting more detailed guidance and feedback on the non-verbal behaviours that can lead to more effective influencing.

Only a few participants identified additional types of feedback that would be useful. Three participants felt that a discussion afterwards about what prompted the other player to change their minds would be helpful. One participant wanted more detailed feedback on the other person's perceptions: "did they see me as arrogant, interested, interesting, an idiot". One participant wanted harder outcome information – did the other person do what I asked them to do.

The fact that only a few participants identified other types of feedback is likely to reflect their lack of knowledge of and experience in influencing strategies, as pointed out in the rationale of the targeted group, cf. section 4.2.2. This issue needs yet to be further explored in the beta testing round.

4.5 Proposed functionality

Determinant	Proposed functionality
I. Discussion material needs to be relevant and meaningful	9. **Meaningful topic:** Users will be presented with a scenario that they are likely to face in real life and where success means a lot to them. e.g. interviewing for a summer project placement where it would be relevant to students at different stages of their education and its outcome would mean a lot to them.
J. Users want to see the direct impact of deploying their influencing skills	10. **Outcome quantified:** Users will get instant feedback on how the other player felt they came across and the likelihood of offering them a position.
K. Users would welcome some suggestions of different influencing tactics to try	11. **Practical objectives:** The game will give players specific emotional and behavioural objectives to achieve in order to create a positive impression. Success in achieving these objectives will be measured by SEWA automatic analysis.
L. New users in particular need to be matched with an appropriate partner	12. **Intelligent matching:** In version 2 of the game SEWA voice and face analysis can be used to predict which partners might be more enjoyable for a new user.
M. Users are concerned about inappropriate behaviour and expect measures to protect against this	13. **Peer moderation**: Alerts and feedback mechanisms will be built into the game so that any abusive, inappropriate or uncomfortable behaviour can be flagged in real time and users blocked.
N. The platform needs to be a safe environment that supports experimentation, failure and development of resilience.	14. **Progression metrics:** The platform will use game dynamics that highlight and motivate personal progression rather than comparison with other players. The objective will be to improve individual skills rather than to 'beat' other players at all costs.
	15. Role playing: Players will be given a specific role: interviewer or interviewee, with further details about the tone and content to get across. This can help players who are less confident in their opinions and abilities to get started with practicing communication skills. It is also less confrontational.
O. Users broadly agree that feedback on outcomes and emotions could help them to improve their influencing skills.	16. **Summative feedback:** A combination of self-reported and automatic emotion analysis will give instant feedback on the impact and experience of the discussion. Given their lack of experience, students found it hard to predict what feedback would be useful. The user testing for v2 should explore a broad range of emotion detection, e.g. nervousness, stress, disengagement, boredom, conflict, rapport as well as sentiment in order to identify what would be most useful. It is likely that the automatic emotion detection will need to go beyond sentiment to be most useful in a human-human context.
P. Users also want suggestions on specific behaviours to adapt	17. **Suggestions from chat partner:** Functionality to support users to make suggestions to their chat partner about specific areas to improve.
	18. **Feedback on audio and facial behaviours:** Users may find it useful to get feedback on the features that underpin the automatic emotion detection of sentiment, stress, nervousness and conflict, e.g. frequency of eye contact, pausing, smiling,

Determinant	Proposed functionality
	tone of voice. Then users would not only be told that they came across as nervous/stressed/unhappy but the behaviours they should adapt in order to affect this perception. This is an approach that has been used successfully in a human-computer interaction in the EU commissioned TARDIS project. These need to be explored as part of the user testing on automatic emotion detection incorporated in V2.

Overall, we propose testing four different levels of feedback in order to test how SEWA automatic analysis can be integrated most usefully and effectively:

Control (v1): The game provides a safe environment to practice and get overall feedback on the likelihood of being offered a project placement.

i) Emotion: Users will be given feedback on overall emotions detected in themselves (intrapersonal) and their partner (interpersonal). They will draw their own conclusions about how they should adjust their approach. This may include influence on the partners' emotions (e.g. Who was leading the interaction and on which parts of the discussion?)

ii) Behaviours: Users will be given automated feedback on specific behaviours detected that could affect the way they come across, e.g. speech fluency, voice pitch, speed of speech, eye contact, head and body motion. They may draw their own conclusions about how they should adjust their approach.

iii) Coaching: Emotion and behaviour detection will be carried out and translated into targeted feedback, e.g. "You may be coming across as too aggressive. Try to look more positive and slow down your speech", "You didn't seem very interested. If you really want the project, listen to the other person more and give signs you are doing so. Nodding, smiling and looking at them can help". This approach could also be used to translate high level emotion detection scores into more detailed and useful practical insights.

iv) Real time: Over the course of the project the game should explore whether real-time or summative feedback is most useful for all types of feedback. For instance which type (real-time or summative) support better corrective action and improved learning or causes distractions? Are there elements of feedback which may be better suited to one or the other?

5 Conclusion

The purpose of WP7 is to develop two different applications based on sentiment analysis technology developed in WP3-5. In order to guide the functionality of the two applications and make sure those have a practical use in the respective industries of the two industrial partners of SEWA project, user requirements were collected and summarised in this report. These user requirements helped both industrial partners to clarify the targeted user groups, their expectations and needs.

In particular, user requirements report covered the following topics. It first identified the targeted user groups, which are quite different for the two applications, confirming the wide applicability of the underlying emotional technology. It then presented literature review of the potential impact that emotions would have in each of the respective areas of the two applications along with analysis of the specific challenges that respective user groups are looking to address. Finally, an initial outline of the required functionality and a discussion of how the functionality will be developed and evaluated are presented.

Information detailed in this report will serve as guiding principles during the development of the two applications and set the ground for subsequent validation studies of them.

6 References

6.1 References for RealEyes Application

[Ad Age, 2015]: the programmatic revolution: how technology is transforming marketing.

https://think.storage.googleapis.com/docs/the-programmatic-revolution_research-studies.pdf

[Lumascape, 2015]: Graphical mapping of an ecosystems of players in programmatic video advertising: http://www.lumapartners.com/lumascapes/video-lumascape/

[Walmsley, 2015]: Programmatic advertising: Key terms and acronyms explained:

http://www.brandrepublic.com/article/1356716/programmatic-advertising-key-terms-acronyms-explained

[Marshal, 2015]: Marketers Question Quality of Ad-Targeting Data Providers:

http://blogs.wsj.com/cmo/2015/02/23/marketers-question-quality-of-ad-targeting-data-providers/

[Marshal, 2014]: What is a data management platform: http://digiday.com/platforms/what-is-a-dmp-data-management-platform/

[RealEyes, 2015]: Method of generating web-based advertising inventory, and method of targeting web-based advertisements:

https://patentscope.wipo.int/search/en/detail.jsf?docId=GB137563187&recNum=8&office=&queryString=FP%3A%28Realeyes%29&prevFilter=&sortOption=Pub+Date+Desc&maxRec=23

[Apple, 2012]: Inferring user mood based on user and group characteristic data: http://appft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&u=/netahtml/PTO/search-adv.html&r=2&p=1&f=G&l=50&d=PG01&S1=(706/47.CCLS.%20AND%2020140123.PD.)&OS=ccl/706/47%20and%20pd/1/23/2014&RS=(CCL/706/47%20AND%20PD/20140123

[Google, 2014]: Think with Google. Programmatic: The Evolution of Media Buying: https://think.storage.googleapis.com/docs/programmatic-the-evolution-of-media-buying_infographics.pdf

[Google, 2014]: Think with Google. Programmatic: The brand era.

https://think.storage.googleapis.com/docs/four-ways-brands-win-with-programmatic_infographics.pdf

[Chamberlain and Broderick, 2007] Laura Chamberlain, Amanda J. Broderick, (2007) "The application of physiological observation methods to emotion research", Qualitative Market Research: An International Journal, 10(2), pp.199 - 216

[GRIT Report, 2015] GreenBook Research Industry Trends Report, Q3-4 2015 http://www.greenbook.org/pdfs/2015GRIT_WINTER_Q3-4.pdf

[Nielsen, 2015] When it comes to long-term ad effectiveness, know your numbers: http://www.nielsen.com/us/en/insights/news/2015/when-it-comes-to-long-term-ad-effectiveness-know-your-numbers.html

[Goldstein, 2015] Daniel G. Goldstein, R. Preston McAfee, and Siddharth Suri. 2015. The cost of annoying ads. SIGecom Exch. 13, 2 (January 2015), 47-52. DOI=http://dx.doi.org/10.1145/2728732.2728739

[Marketing Week, 2014] VisualDNA white paper: know your customer — smart online marketing through unique personality profiling: https://www.marketingweek.com/knowledge-bank/white-paper/visualdna-white-paper-know-your-customer-smart-online-marketing-through-unique-personality-profiling/

6.2 References for PlayGen Application

ACAS (2012). Young people entering work: A review of the research.

André, E., Bevacqua, E., Heylen, D., Niewiadomski, R., Pelachaud, C., Peters, C., ... & Rehm, M. (2011). Non-verbal persuasion and communication in an affective agent. In Emotion-oriented systems (pp. 585-608). Springer Berlin Heidelberg.

Barry S, Fulmer IS and Van Kleef GA. The handbook of negotiation (2004).

Barry, B., & Oliver, R. L. (1996). Affect in dyadic negotiation: A model and propositions. Organizational Behavior and Human Decision Processes, 67, 127-143.

Cialdini, R. B. (1987). Influence. A. Michel.

Cialdini, R. B. (2001). Harnessing the science of persuasion. Harvard Business Review, 79(9), 72-81.

Clark, M.S., & Taraban, C.B. (1991). Reactions to and willingness to express emotion in two types of relationships. Journal of Experimental Social Psychology, 27, 324–336.

Consolvo, S., McDonald, D. W., & Landay, J. A. (2009, April). Theory-driven design strategies for technologies that support behavior change in everyday life. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (pp. 405-414). ACM.

Coulter RH and Pinto MB (!995). Guilt appeals in advertising: What are their effects? Journal of Applied Psychology, 80, 697-705.

DellaVigna, S., & Gentzkow, M. (2009). Persuasion: empirical evidence (No. w15298). National Bureau of Economic Research.

Dillard (2002). The persuasion handbook: Developments in Theory and Practice.

Dillard, J. P., & Pfau, M. W. (2002). The persuasion handbook: Developments in theory and practice. Sage Publications.

Druskat, V. U., & Wolff, S. B. (2001). Building the emotional intelligence of groups. Harvard Business Review, 79(3), 80-91.

Eberle, J., Lund, K., Tchounikine, P., & Fischer, F. (Eds.). (2015). Grand Challenge Problems in Technology-Enhanced Learning II: MOOCs and Beyond: Perspectives for Research, Practice, and Policy Making Developed at the Alpine Rendez-Vous in Villard-de-Lans. Springer.

Elfenbein, H A et al (2007). Reading your Counterpart: The Benefit of Emotion Recognition Accuracy for Effectiveness in Negotiation. Journal of Nonverbal Behavior December 2007, Volume 31, Issue 4, pp 205-223

European Commission (2014). Developing the creative and innovative potential of young people through non-formal learning in ways that are relevant to employability. Expert Group Report.

European Economic and Social Committee (2013). Rethinking education: Investing in skills for better socio economic outcomes.

European Foundation for the Improvement of Living and Working Conditions (2012). NEETs – young people not in employment, education or training; Characteristics, costs and policy responses in Europe.

Glaser, J., & Salovey, P. (1998). Affect in electoral politics. Personality and Social Psychology Review, 2, 156–172.

Göritz, A. S., & Moser, K. (2006). Web-based mood induction. Cognition and Emotion, 20(6), 887-896.

Griskevicius, et al (2009). Fear and Loving in Las Vegas: Evolution, Emotion, and Persuasion. Journal of Marketing Research 2009 46:3, 384-395.

Gross, K. (2008). Framing persuasive appeals: Episodic and thematic framing, emotional response, and policy opinion. Political Psychology, 29(2), 169-192.

Iyer, A., & Leach, C. W. (2008). Emotion in inter-group relations. European review of social psychology, 19(1), 86-125.

Kelly, J. R., & Barsade, S. G. (2001). Mood and emotions in small groups and work teams. Organizational behavior and human decision processes,86(1), 99-130.

Klinnert, M.D., Campos, J.J., Sorce, J.F., Emde, R.N., & Svejda, M. (1983). Emotions as behavior regulators: Social referencing in infants. In R. Plutchik & H. Kellerman (Eds.), Emotion theory, research, and experience: Vol. 2. Emotions in early development (pp. 57–68). New York: Academic Press.

Lawler, E. J., & Yoon, J. (1995). Structural power and emotional processes in negotiation. In R. M. Kramer & D. M. Messick (Eds.), Negotiation as a social process (pp. 143- 165). Thousand Oaks, CA: Sage

Office for National Statistics (2014). Labour Force Survey 2014.

Overbeck et al (2010). I feel, therefore you act: Intrapersonal and interpersonal effects of emotion on negotiation as a function of social power. Organizational Behavior and Human Decision Processes 112 (2010) 126–139.

Petty, R. E., & Briñol, P. (2008). Psychological Processes Underlying Persuasion A Social Psychological Approach. Diogenes, 55(1), 52-67.

Posthuma, R.A., Morgeson, F.P., Campion, M.A.: Beyond employment interview validity: A comprehensive narrative review of recent research and trends over time. Personnel Psychology 55(1) (1982) 1-82

RJMetrics (2010): analysis of 2883 Chat Roulette sessions published online in Techcrunch magazine: http://techcrunch.com/2010/03/16/chatroulette-stats-male-perverts/ (accessed 11 November 2015)

Sieverding, M.: Be cool!: Emotional costs of hiding feelings in a job interview. International Journal of Selection and Assessment 17(4) (2009) 391-401

Sinaceur, M., & Tiedens, L. Z. (2006). Get mad and get more than even: The benefits of anger expressions in negotiations. Journal of Experimental Social Psychology, 42, 314–322.

Statista (2015). Global Skype usage penetration among internet users worldwide as of 2nd quarter 2015 www.statista.com (accessed 12 Nov 2015)

Sutton, R.I., & Rafaeli, A. (1988). Untangling the relationship between displayed emotions and organizational sales: The case of convenience stores. Academy of Management Journal, 31, 461–487.

Tanford, S., & Penrod, S. (1984). Social Influence Model: A formal integration of research on majority and minority influence processes.Psychological Bulletin, 95(2), 189.

Thompson, L. L., Nadler, J., & Kim, P. H. (1999). Some like it hot: The case for the emotional negotiator. In L.L. Thompson, J.M. Levine, & D.M. Messick (Eds.), Shared cognition in organizations: The management of knowledge (pp. 139-161). Mahwah, NJ: Erlbaum.

UK Commission for Employment and Skills 2013. Employer skills survey 2013.

Van Kleef et al. (2004). The Interpersonal Effects of Emotions in Negotiations: A Motivated Information Processing Approach. Journal of Personality and Social Psychology, Vol 87(4), Oct 2004, 510-528.

Van Kleef, G. A., De Dreu, C. K. W., & Manstead, A. S. R. (2001). Why the happy negotiator shouldn't be so happy: The interpersonal effects of anger and happiness on negotiation behavior and outcomes. Paper presented at the 14th conference of the International Association for Conflict Management, Cergy, France, June 2001.

Van Kleef, G. A., De Dreu, C. K. W., Pietroni, D., & Manstead, A. S. R. (2006). Power and emotion in negotiation: Power moderates the interpersonal effects of anger and happiness on concession making. European Journal of Social Psychology, 36, 557–581.

Van Kleef, G.A., De Dreu, C.K.W., Pietroni, D., & Manstead, A.S.R. (2006). Power and emotion in negotiation: Power moderates the interpersonal effects of anger and happiness on concession making. European Journal of Social Psychology, 36, 557–581.

Vladas Griskevicius, Noah J. Goldstein, Chad R. Mortensen, Jill M. Sundie, Robert B. Cialdini, Douglas T. Kenrick (2009) Fear and Loving in Las Vegas: Evolution, Emotion, and Persuasion. Journal of Marketing Research: June 2009, Vol. 46, No. 3, pp. 384-395.