Modelling the Human Values Scale in Recommender Systems using Sales Pitch Modulation

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ABSTRACT: *This is a novel attempt to anticipate the reasons for key purchase decisions of individual customers and use them in recommender systems. Modern techniques are available to do this, such as data mining, user models, direct marketing and recommender systems. The most common, state of the art approach to recommender systems is to find out what is the right product for the right customer at the right time. Although our approach is diferent, it shares the same goal of increasing sales: how to convince any given customer that this is the perfect product for him and that he should buy it now! This is done with sales pitch modulation, a method that highlights the key benefits of a product according to what is important for a customer, according to what he thinks it is worth. The human values scale (HVS) model is an approach from modern psychology, normally applied to the human resource selection process in companies, that reveals which key values rule the decisions made by people across all domains of their life. This paper presents a method to calculate the HVS through existing user models, and shows how to apply it to a real case, a campaign to sell banking products, where the recommender system chooses the right message for every single customer, with good, solid results*
Keywords: *Recommender Systems, User Models, Human Values Scale, Sales Pitch Modulation, Personalization.*

I. INTRODUCTION

In a highly competitive world, differences are measured by ideas that open up enterprises, with an eye towards constant improvement and a balance between the objectives of the company and those of the customer. Thus, the incorporation of new strategies requires new responsibilities, which will be based on offering solutions with positive and significant results. Every process that means companies must adapt more and more to demanding customers also requires a constant search for strategies that help identify, attract and retain them; to fulfill this requirement, new techniques or methodologies are needed to establish a relationship of mutual benefit, total customer satisfaction and company yields. The search for information about customers and the establishment of relationships are part of a planning process in which customers are not only recognized, but also have some influence on the direction of the company to meet their needs and seek differentiation through emotional factors beyond commercial transactions. This desire to satisfy requires a high level of knowledge about the needs of individuals. Customer loyalty programs, when they affect emotional values, are called awarding programs, in part because their benefits stimulate customers' choices, offering what is truly motivating: for example, a trip, an agenda, a birthday call, etc. The role of the company, regarding the necessities of the customer, must be focused on adapting the ofer to the consumer based on the experience of previous customer behaviours. Companies need to increase their knowledge about customers in those aspects which are less accessible, mainly personal, emotional and character data. Therefore, the company creates an atmosphere of confidence and relaxation in which the flow of communication has a different style, in the hope that the customer will find it friendly.

Knowing customers and their attitudes and preferences is a vital resource in product development and sales strategies. A company's ability to know the initial exact segmentation of customer data (sex, age, preferences, etc.) and perhaps to broaden that knowledge (personal preferences, basic likings, tastes, favourite brands) is a very valuable resource. The reason why it is important to take that into account is that "carrying out a sale means penetrating into the mind of the customer to know it and to know what he or she wants". All of that can be obtained by knowing his or her HVS.

The personalization of services using a user's Human Values Scale (HVS) can improve user satisfaction. According to Jensen [1], the information society will be followed by a society in which individuals will prioritize their decisions in interactions that involve a high degree of emotion, which will be a relevant issue in their values scale. Therefore, we are witnessing a cyclical transformation of society that is affecting its values scales. In traditional psychology [2], the HVS defines a set of desirable and non situational goals; their significance can vary from one person to the next and govern their lives like a set of individual principles.The

HVS in RS using Sales Pitch Modulation (SPM) are obtained through surveys and, up to now, have been applied in human resources management. Their advantages are to predict the behaviour of every employee in any given work scenario or role.

Customers value individualized service and prefer to be served with care and by a service that makes an effort to understand their specific situation and necessities. Customers want service providers to listen to them, explain options to them in terms they can understand and assure them that the problems can and will be solved. When the providers of services do not cover these necessities, it is possible that frustrated customers will give up on them. Increasing competition and consumer demands force companies more and more to supply their products in a differentiated way to targeted groups of consumers called segments. To do this, they must know all consumers individually and provide perfectly customized and adapted commercial goods to each of them. In this sense, recommender systems are tools that help us to solve this problem. Recommender systems represent user preferences for the purpose of suggesting items to purchase or examine. They have become fundamental applications in electronic commerce and information access, providing suggestions that effectively prune large information spaces so that users are directed toward those items that best meet their needs and preferences [3].

However, in the next stage of recommender systems, users will be situational humans who make decisions based not only on their preferences, tastes and interests, but also on their perceptions about them. Therefore, the need to develop more advanced recommendation methods is even more pressing for applications of this type [4]. In recommender systems, emotional sensibility can be defined as the emotional response of the user to the suggestions, advice or predictions of interest made by the system in each particular context and obtained through the objective, subjective and emotional attributes of the User Model (UM) [5]. Our contribution is a methodology that allows suitable user messages to be generated (sales pitch modulation), or the sales argument to be adjusted to generate the HVS, an automated version of the Schwartz Value Survey (SVS) [2].The first step of automation is calculating, from a given UM (without surveys), the relative impact of 10 human values and 4 general human values to cope with preferences and interests of users, presumably through multidomain cross recommendations. The paper is organized as follows. In Section 2, a brief introduction to work related to the HVS is presented. Section 3 presents a brief introduction to the Sales Pitch Modulation. Section 4 presents a study of the HVS in user modelling to understand the human factor response in RS. In Section 5, we describe the method proposed to obtain the HVS of the user from a UM. Next, in Section 6, we illustrate the method we propose through a recommender system of banking services. In Section 7, we show the study's results. Finally, Section 8 ofers some conclusions and suggestions for future work.

II.   RELATED WORK

Research studies [6] have proved the influence of human values on the perception and decision making of human beings. These studies reveal the value structure of each individual, in particular the values to which a greater or smaller importance is assigned, as they play as determining a role in perception as they do in decision making. We carried out an analysis of the most widely used scales for measuring human values [7]. Some do not measure the range of human values relevant in many life domains; others, despite their aim to cover the range of human values comprehensively, leave out critical content (e.g., tradition and power values); in other cases some items are highly sensitive to prevailing economic conditions and measure individuals' values only indirectly.

We believe that the most suitable technique to apply in this research is the Schwartz scale of values, as it covers 56 human values representing 10 basic values. The reliability and validity of the Schwartz Value Survey (SVS) have been demonstrated in several studies ([8] and [2]). The Schwartz Value Survey [2] consists of 56 items, each one associated with an asymmetric scale from one (opposed to personal values) to six (of supreme importance), indicating the importance of this value as a guiding principle in the user's life. The survey items are distributed among 10 universal dimensions (Power, Achievement, Hedonism, Stimulation, Self-direction, Universalism, Benevolence, Tradition, Conformism and Security), as shown in Fig. 2.a, which respond to various underlying motivations of the values integrating them. We call these dimensions meta-attributes. They are grouped taking into the account compatible typologies and the diametrically opposed incompatible typologies, shown in Fig. 1, which represent a contradiction of objectives that would generate a conflict in the user.

The procedure for scoring agreement to the SVS is as follows:
1. apply the SVS;
2. to obtain the personal score in a typology, add the points that have been assigned to questions associated with that typology;
3. divide the result by the number of questions associated with the typology;
4. mark the score of each typology in the corresponding axis of the Dynamic Structure of Values; and,
5. connect the points until a polygon of 10 sides is completed.

This procedure allows the HVS of a user to be developed from existing UM [7].

III. SALES PITCH MODULATION (SPM)

Improvement to traditional approaches of data retrieval systems is achieved through the use of user profiles containing information about their tastes, preferences and necessities. The information from the user profile can be obtained explicitly, e.g. through questionnaires, or implicitly, i.e. learning about transactional behaviour in a certain period of time [4].Peppers and Rogers [9], show the importance of establishing a dialogue with customers and ofer a set of directed techniques to personalize the message provided to potential customers through dialogue and customized contact that provides a valued plus to the relationship with them.

Dialogue with an individual customer will change the RS behavior toward that single individual, and change that individual's behavior toward the RS. As human beings converse and collaborate, their attitudes, actions, and future thoughts are affected. A genuine dialogue with an individual customer can only be engaging if your future course of action is altered in some way as a result of the exchange. This means that companies must be willing and able to change their behaviour toward each individual customer to (mass) customize communications, services, and probably even products. For the same reason, the customer will also react to a dialogue [9].
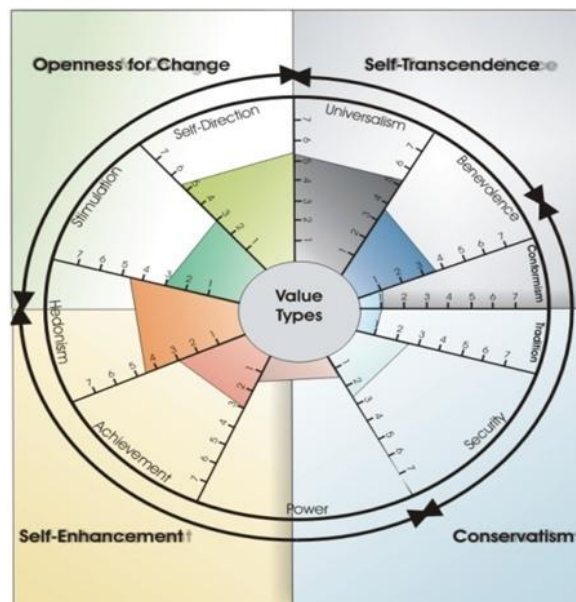
Figure 1. Dynamic Structure of Values according to the Universal Theory of Schwartz

The technological innovations of today make it possible to employ a diferent approach, based on collecting information about each customer and handling it individually. Our research aims to prove that this individual pursuit, which is given by the user models, not only leads to the elaboration of tailored products or services, but also of customized messages especially designed for each user, considering his or her HVS. This allows the RS to foment an interactive dialogue with users in benefit of an eficient strategy in the recommendation process. With suitable technology the delivery of the messages can be automated to include hundreds of thousands of customers at the same time. This degree of continuous personalization means customers will receive messages based on their attributes, preferences and attitudes, with coherent communication and a true and natural relationship created between the user and the RS.

This communication turns into an evolutionary process of learning that becomes more and more intelligent with each interaction. Permanent harvesting of the HVS allows an increasing number of products and services to be made to adequately fit the growing needs and tastes as well as the individual desires of each customer. Progressively, this interactive process increases the degree of personalized interaction even more. The bonds of the relationship become stronger and stronger with each interaction. The message is adapted taking into account the HVS of the user, which increases the level of persuasion of each message, and therefore the degree of response from the customer. SPM consists of extracting the HVS from the UM so that we might know the user's preferences better, allowing the RS to ofer products and services that are better adjusted to the user's profile, designing special services and customizing, modifying and adapting messages for each kind of user. This helps the RS ofer each customer the right product at the right time. For example: given a beer that is A) cheap and B) healthy, the RS will prepare a message highlighting the low price of the beer for those customers who value price. For other people who think that health is more important, the RS will modulate the sales pitch as follows: "This is to live forever...".

IV.   THE HUMAN VALUES SCALE IN USER MODELLING FOR RECOMMENDER SYSTEMS

User modelling represents assumptions about the user's knowledge, beliefs, preferences, and other user characteristics [10]. One of the most important challenges in user modelling is to build UMs that can be used in different domains across several applications. These models are therefore built at a metalevel, as opposed to a profile of a specific user. HVS can be introduced in user modelling to respond to this challenge. A values scale in user modelling can be defined as a set of rules to manage the behaviour of a flexible autonomous entity, which is related with the attributes of the user [7]. Adomavicius and Tuzhilin [11], present a framework for building behavioural profiles of individual users and claim that better results can be obtained in models based on behaviour than in models based only on demographic data.

In our research, general information about a user is useful for the recommendation process because one can deduce that the values scale can be applied to autonomous and flexible entities, for instance a multiagent UM [5], for the following reasons.

• It is useful to measure the interests and preferences of a social entity.
• It motivates actions and gives them direction and emotional intensity.
• It functions as a criterion scale to evaluate and justify the actions.
• It is acquired both through the experience of individual learning and through the socialization in the values of a group of socially intelligent agents.

Values act as a central means of rationalizing actions within the human mind. Given a goal, values dictate the way in which the goal will be accomplished [12]. The values scale is represented by goals (implicit or explicit) that reflect the needs of every flexible and autonomous social entity. The scale can:

• establish social relationships and coordinate them;
• express goals, objectives and interests explicitly;
• create clusters with similar characteristics and social interests;
• establish the value of users over time, and identify diverse opportunities to handle them in individual ways or according to the segment to which they belong;
• really know the behaviour of users to start of any dominion.

The HVS is an integral approach to user modelling and can take advantage of the UM by using its objective, subjective and emotional attributes to adapt messages to customers and to use them in the recommendation processes [7].

V.   HUMAN VALUES SCALE FROM SMART USER MODELS (HUVAS-SUMM) METHODOLOGY

In this section we present the HUVAS-SUMM Methodology. To calculate the Human Values Scale of a user, we must first obtain the user's general characteristics from the Smart User Model by applying the Portrait Values Questionnaire. Then, through the proposed method, support will be given to the Recommender System to make suggestions as a function of the Human Values Scale of the user and generate better recommendations. This methodology was divided into four phases, as described in the following paragraphs.

5.1 Phase 1: Defining the Smart User Model's data

The values of the attributes from the Recommender System provide relevant information about the user, from which we hope to obtain the Human Values Scale. In our model, the technique represents the values as points in a multidimensional space. Distances between points reflect empirical relations between the values that can be measured by the correlations between the scores that give their importance for the person. A larger conceptual similarity between two values shows that they are more related empirically, and therefore they will be closer in the multidimensional space. Fig. 2 shows the items related to the Human Values Scale. In order to obtain the Human Values Scale of the user from the Smart User Model of the domain or domains, formed by the set of objective (Ao), subjective (As) and emotional (Ae) attributes, we will define the following.

$$A_1^o = \{a_1^o, a_2^o, ... a_n^o\} \; A_2^o = \{a_1^o, a_2^o, ... a_n^o\} \; A_3^o = \{a_1^o, a_2^o, ... a_n^o\} ..., A_d^o = \{a_1^o, a_2^o, ... a_n^o\}$$

$$A_1^s = \{a_1^s, a_2^s, ... a_n^s\} \; A_2^s = \{a_1^s, a_2^s, ... a_n^s\} \; A_3^s = \{a_1^s, a_2^s, ... a_n^s\} ..., A_d^s = \{a_1^s, a_2^s, ... a_n^s\}$$

$$A_1^e = \{a_1^e, a_2^e, ... a_n^e\}, A_2^e = \{a_1^e, a_2^e, ... a_n^e\}, A_3^e = \{a_1^e, a_2^e, ... a_n^e\} ..., A_d^e = \{a_1^e, a_2^e, ... a_n^e\}$$

where *A* is the set of attributes *a*, which can be objective (*o*), subjective (*s*) or emotional (*e*).

$$MDA_o = \{A_1^o, A_2^o, A_3^o, ..., A_d^o\}$$

$$MDA_s = \{A_1^s, A_2^s, A_3^s, ..., A_d^s\} \qquad SUM = \{A_o, A_s, A_e\}$$

$$MDA_e = \{A_1^e, A_2^e, A_3^e, ..., A_d^e\}$$

$$SUM\_MD = \{MDA_o, MDA_s, MDA_e\}$$

where the MDA is the set of objective (o), subjective (s), and emotional (e) attributes in different domains. SUM_MD is the set multi-domain attributes. According to Fig. 2, the set of parameters that define the Human Values Scale are:

$$Evh = \{Vu_1, ..., Vu_n\} \tag{1}$$

where the Vu are the universal values such as openness to change, conservatism, self-transcendence and self-enhancement.

$$Vu = \{Vh_1, ..., Vh_n\} \tag{2}$$

The Vh are the human values corresponding to the 10 types described by Schwartz: universalism, benevolence, conformity, tradition, security, achievements, power, hedonism, self-direction, and stimulation.

$$Vh = \{a_1 ..., a_n\} \tag{3}$$

The a values correspond to attributes or particular items, such as equality, intelligence, social order, richness, or creativity. In this way, we have:

$$\forall a_i \in Vh \text{ has a } val(a_i) \in [0,1]; \forall Vh \in Vu \text{ with } val(v_i) \in [0,1]; \text{ and, } \forall Vu \in Evh$$

At the end, each $a_i \in Vh$ has a value. Once the corresponding values are obtained, the user Human Values Scale is generated from the Smart User Model with $val(u_i) \in [0,1]$.

Figure 2. List of values, items, and questions according to the Universal Theory of Schwartz

5.2 Phase 2: Preparing data's Smart User Model for the Human Values Scale

The objective of this phase is to take advantage of the user's Human Values Scale to provide information to the Recommender System to improve the recommendations made to the user. To achieve this objective, the following method will be used.

Step 1: The Smart User Model is evaluated to verify that it contains a representative percentage of objective (*Po*), subjective (*Ps*), and emotional (*Pe*) attributes

$Po = (Ao / Sa)\%$

$Ps = (As / Sa)\%$

$Pe = (Ae / Sa)\%$

where: Sa = Sum of attributes from the Smart User Model.

Step 2: The user's general characteristics are obtained through the Smart User Model that computes the user data for the Recommender System. Normalizing the values from each attribute in the user model means defining them in the range [0,1] [5], depending on the type of attributes.

Traditionally, modifications of the fuzzy sets called linguistic labels, equivalent to the adverbs, have been used. The interpretation in the fuzzy model of these involves the assignment of the belong function with a simple arithmetic calculation. For example, according to the Portrait Values Questionnaire, the answer to the survey items range from it "is *not like me*" to it is "*very much like me*". In this case, we represent this fact by defining each of the sets in a way that each of its elements belongs to it with a certain degree (possibility). More formally, a fuzzy set A is characterized by a belong function $\mu A: U \rightarrow [0,1]$ that associates to each element *x* of U a number $\mu A(x)$ from the range [0,1], that represents the degree that *x* belongs to the fuzzy set A. U is called the universe of speech. The fuzzy terms for the example studied can be defined by the following trapezoidal fuzzy set:

$$\mu \tilde{A}(x) = \begin{cases} 0 & ; & x \leq a_1 \\ \dfrac{x - a_1}{a_2 - a_1} & ; & a_1 \leq x \leq a_2 \\ \dfrac{a_3 - x}{a_3 - a_2} & ; & a_2 \leq x \leq a_3 \\ 0 & ; & x \geq a_4 \end{cases}$$

In this way, the graph showing a representation of the linguistic variable *x* by the fuzzy logic is obtained (Fig. 3)

Step 3: The Smart User Model attributes are classified with their corresponding meta-attribute and associated Portrait Values Questionnaire item to obtain the scores for each attribute.

Step 4: Each meta-attribute is classified with its corresponding values to do the mapping between the normalized values from the Smart User Model and the items from the Portrait Values Questionnaire,

Step 5: If there are several attributes corresponding to one associated item, the average of the qualifications of the repeated value is obtained.
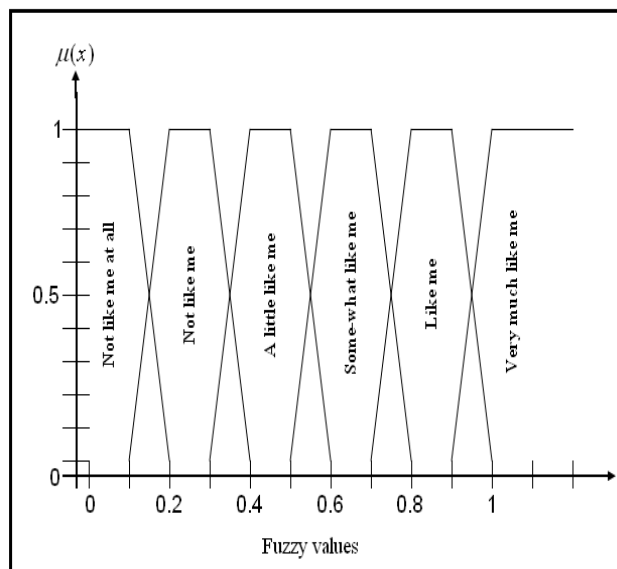
Figure3. Functions [0, 1]

5.3 Phase 3: Obtaining the Human Values Scale from Smart User Model

At this stage, calculations are made to obtain the user Human Values Scale, following a series of steps.

Step 1: In this step, the value *val(Vh)* of each *Vh* is obtained by composing the user Human Values Scale. For each *Vh* there is a set of values (attributes, items) given by:

$$val\ (Vh_{\ i}) = \frac{\sum_{j=1}^{j=n_a} val\ (a_{\ j})}{n_{\ a}} \in [0,1] \qquad (4)$$

where $n_{\ a}$ = number of attributes evaluated in *Vh*.

Step 2: In this step, the qualification $val\ (Vu)$ of each Vu is calculated for the user Human Values Scale. For each Vu there is a set of universal values given by:

$$val\ (Vu_{\ i}) = \frac{\sum_{j=1}^{j=nVh} val\ (Vh_{\ j})}{nVh} \in [0,1] \qquad (5)$$

where *nVh* = number of type values evaluated in *Vu*.

Step 3: In this last step, the final value *Evh* corresponding to the user Human Values Scale is calculated as follows:

$$Evh\ = \frac{\sum_{j=1}^{j=nVu} val\ (Vu_{\ j})}{nVu} \in [0,1] \qquad (6)$$

where *nVu* = total number of universal values in the Human Values Scale.

Step 4: Finally, the mapping normalized by each meta-attribute in the corresponding axis of the dynamic structure of values is drawn.

5.4 Phase 4: Making a recommendation

5.4.1 Making a recommendation

As was mentioned in the previous sections, in our investigation, the recommendation process takes advantage of the marketing strategies to generate the recommendation to the user. The segmentation takes place from the Human Values Scale [2] obtained from the Smart User Model; establishing the extreme segmentation presented in one-to-one marketing, generating the correct personalised message for the user and trying to persuade the user to accept the proposed recommendation (Fig. 4).

Besides the segmentation groups of the Human Values Scale, shown in Fig. 5, other subunits can be generated that allow for an even more personalised recommendation to the user. These subunits, among others, can be as follows:

$$Cluster_{\ 72} = Cluster_{\ 1} + Cluster_{\ 2}$$

$$Cluster_{\ 73} = Cluster_{\ 3} + Cluster_{\ 4}$$

$$Cluster_{\ 74} = Cluster_{\ 5} + Cluster_{\ 7}$$

$$Cluster_{\ 75} = Cluster_{\ 5} + Cluster_{\ 6} + Cluster_{\ 8}$$

$$Cluster_{\ 76} = Cluster_{\ 10} + Cluster_{\ 12} + Cluster_{\ 13} + Cluster_{\ 14}$$

$$Cluster_{\ 77} = Cluster_{\ 17} + Cluster_{\ 22} + Cluster_{\ 29} + Cluster_{\ 33} + Cluster_{\ 42}$$

$$\vdots$$

$$Cluster_{\ n} = [Cluster_{\ x}\{+ Cluster_{\ x}\}]$$

The algorithm for generating the correct message for the user that will complement the sales message is shown in Fig. 4. In Fig. 4, NumClusters is the number of segments of Human Values Scale to be included in the process; ValClusteri corresponds to the value between 0 and 1 that contains the segment i; ValMax is the largest value of the selected segments, and mssg is the number that corresponds the message to be used for the recommendation.
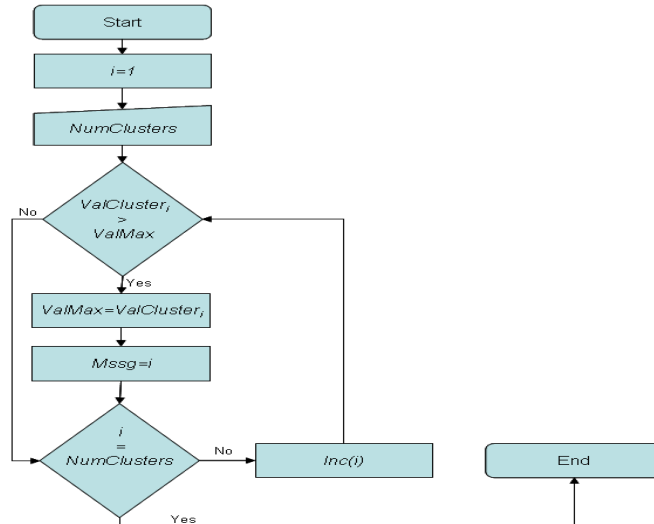
Figure 4. Algorithm for generating the correct message for the user

Figure 5. Segmentation clusters according to Human Values Scale

VI.   ILLUSTRATION

We illustrate the proposed method through a recommender system for banking services developed for CC. Nowadays, banks use RS to offer their customers products and services, taking into account their interests, preferences and attitudes, and user interactions with the system.BUM registers user movements so that the RS can offer more suitable solutions that will increase customer confidence the HVS in RS using SPM in the banking organization. This allows the bank to know the customer better, interpreting his or her necessities, capacities and attitudes toward consumption.Banking transactions that would help the recommendation process include card contracts, relationship indicators, movements of current account, payments by direct debit, card movements, and income.

6.1 Description
The CC Bank:
* Is an institution with its own personality, committed to new social needs;
* is a participative and integrated organization with the goal of offering the best quality and service to customers and with an innovative project in the sector;
* has a highly competent human team able to work in an intelligent manner;
* strongly believes that the best way to reciprocate the trust their customers have placed in them is by working hard to improve their service each and every day; and,
* is very aware of the importance of listening to their customers when adapting their products and services, because their contributions can help them achieve their aim of constant improvement.

6.2 The database
The case study was undertaken for the campaign of card re-activation in September 2014. A CC database containing more than 3 million customers, and with data corresponding to operations made between 2008 and 2013, was used to develop the case study. The database includes general information and reproduces the behaviour of the customers.Some of the fields in the data base from CC are represented in Table 1.a and Table 1.b.

6.3 Target customers
The case study includes one of the many campaigns which consist of making an impact on a group of bank customers. This target group corresponds to customers who have low credit card use but form an invaluable group for the company because they belong to a medium high acquisition level.
* A representative sample of 206,297 sufficiently diverse customers is required.
* The information will be extracted from the pool of CC customers.
* The project is made up of 206,297 customers, of which:
o 28,383 were selected by the marketing department according to the criteria of high value for CC and no usage of their credit cards with this company.
* 177,914 were selected randomly among the customers who were:
o Physical persons on 30/06/2014.
o Active customers on 31/01/2012 (indicator non-active customer 1st titular (t1)).
o Not deceased on 30/06/2014.
o Neither employees of CC nor of any of their branches.
Then in June 2014, these information is loaded into the RS.

6.4 Setup of the experiment
The main objective of this experiment was to increase credit card use among CC customers who do not use credit cards any longer.The campaign consisted of sending e-mail messages and letters to those customers who had not used their credit card during the month of September 2014. The e-mail and letter contain information about the benefits of paying with any of the CC cards. Furthermore, customers were told that they would be given extra points if they made 3 purchases, and they received a new catalogue from the "Total Plus" programme to see all the gifts they could exchange their points for.
Part of the target customers received a personalised e-mail and letter that took into account the top values detected in the Human Values Scale.The success of the campaign depended on the increase in the usage of the cards.To measure the effectiveness of the campaign, the following steps were taken:
* The responses (in terms of behavior) of those customers who received the winning argument and those who did not were compared.
* The response was measured in terms of the average increment of activity (number of operations and invoicing volume) from two periods and a comparison between the two groups of customers.
* The goal was to obtain an increase between the two groups that exceeded 10%.

6.5 Implementation of the Method to obtain the Human Values Scale from the customers of CC Bank

Initially, Human Values Scale from 60,000 objective customers from the experiment were studied. Of these customers, approximately 51,000 received a personalised message, and the remaining 9,000 did not receive any message because they did not represent dominant sensibilities in their values scale. CC selected 28,383 customers to be sent messages (via e-mail and letter). The selection criterion was such that the contacted customer was to have not made any purchases in September of 2014 with a CC credit card. These customers were selected because all the others had already made a purchase and, therefore, had already received the balance statement for their card. In the end, 206,297 customers were selected: 28,383 received a personalised message according to the Human Values Scale, and the rest (177,914) got a standard message.The letters were sent progressively from the end of November to the middle of December 2014.

6.5.1.1   HUVAS-SUMM in this case

One essential part of this campaign was sending advice in the personalised message that was in agreement with the Human Values Scale obtained from the user model of the CC customer, taking into account their objective (O), subjective (S) and emotional (E) attributes. An example of the Human Values Scale extraction method from customer John Doe is shown below. In this study, we perform the analysis using attributes from John Doe. The procedure to obtain the John Doe Human Values Scale is shown in the following.

6.5.1.2   Phase 1: Defining the Smart User Model's data of John Doe

In order to obtain the Human Values Scale from Smart User Model formed by the set objective (Ao), subjective (As) and emotional (Ae) attributes, we do the following:

$$A_o = \{[AccountNumber, 90304565128], [Name, "JhonDoe"], [Age, 36], ..., [MonthlyIncome, 1870]\}$$

$$A_s = \{[EconomicCapacity, high], [Exigency, high], [Satisfaction, normal], ..., [ToBelongtogroup, no]\}$$

$$A_e = \{[Unconcerned, yes], [WarmthHearted, weak], [Satisfied, normal]\}$$

$$SUM = \{A_o, A_s, A_e\}$$

We refer to Fig. 6.a, in which we represent the values for each of the items extracted from the Smart User Model to obtain the corresponding calculations.

6.5.1.3   Phase 2: Preparing data's Smart User Model for the Human Values Scale of John Doe

Step 1: Following the methodology proposed in subsection 5.2.2, the percentages are obtained (*Po*, *Pe* and *Ps*) for the objective (*Ao*), subjective (*As*) and emotional (*Ae*) attributes in the following way:

$Po = Ao / Sa = 11 / 64 = 0.1718 = 17.18\%$
$Ps = As / Sa = 50 / 64 = 0.7812 = 78.12\%$
$Pe = Ae / Sa = 3 / 64 = 0.04687 = 4.68\%$

In this case, sufficient objective, subjective and emotional attributes exist in the Smart User Model to enable us to obtain the Human Values Scale of John Doe.

Step 2: The general characteristics of the user are obtained through the Smart User Model, which computes the user data for the bank's Recommender System to normalize the values from each attribute in the Smart User Model.

Step 3: We obtain the scores for each attribute, then sum up the values assigned to each associated question corresponding to each meta-attribute (see Fig. 7)

Step 4: The mapping between the normalised values from the Smart User Model and the meta-attributes from the Portrait Values Questionnaire is in shown Fig. 7.

Step 5: The average of the qualifications of the repeated meta-attributes is shown in Fig. 7.a in the Human Values part.

	a) Human Values Scale					b) Smart User Model	
HVS	**Universal values**	**Basic human values**	**Item**	**Human values**		**User model attributes**	
HUMAN VALUES SCALE	SELF-TRASCENDENCE	Universalism	1	equality	1,00	Control of the environment	0,50
			2	harmony sends inland	0,00	-	-
			10	to give meaning to my life	0,00	-	-
			17	a world in peace	0,00	-	-
			24	unity with nature	0,00	-	-
			26	wisdom	0,00	-	-
			29	a world of beauty	0,00	-	-
			30	social justice	0,17	Solidary	0
			35	opened mind	0,17	Warmth hearted	0
			38	environment protector	0,00	-	-
		Benevolence	7	sense of property	0,17	To belong to group	0
			19	mature love	1,00	Familiar bows	1
			28	real friendship	1,00	Familiar bows	1
			33	loyalist	0,00	-	-
			45	honest	0,00	-	-
			49	that helps	0,17	To belong to group	0
			52	reliable	0,72	Degree of Bad debt	0,7
			54	not spiteful	0,00	-	-
	CONSERVATISM	Conformity	8	social order	0,38	Satisfaction, Responsibility	0,5; 0
			11	good manners	0,17	Responsibility	0
			40	honoring parents and elders	0,00	-	-
			47	person in charge	0,32	Availability of time, Tranquility, Good work, , Knowledge	1; 0,3; 0,5; 0; 0
		Tradition	6	spiritual life	0,00	Cultural level, To be informed, Facility of comprehension. Sedentarismo. Mimetism. Control of the expense, Unconcerned	1; 0,3; 0,5; 0,5; 0,5; 0,5; 1
			18	respect for tradition	0,49		
			21	unconcern	0,79		
			32	moderated	0,38	-	-
			36	humble	1,00	Personal treatment	1
			44	accepting my portion in life	0,51	Personal treatment, Loyalty, Conformist	1; 0,3; 0
			51	devout	0,00	-	-
		Security	13	national security	0,17	Tax system	0
			15	reciprocity of favors	0,72	Exigency, Confidence	1; 0,3
			22	family security	0,54	Security, Confidence, Tax system	1; 0,3; 0
			42	recover	0,00	-	-
			56	clean	0,00	-	-
	SELF-ENHANCEMENT	Achievement	34	self-seeker	1,00	Capacity of indebtedness	0,7
			39	influential	0,00	-	-
			43	capable	0,17	Saving	0
			48	intelligent	0,58	Tangibility, Tendency to the change	0,5; 0,5
			55	successful	0,58	Tendency to the change	0,5
		Power	3	social power	0,69	Economic capacity, Price	0,7;0,5
			12	wealth	0,72	Profitability	0,7
			23	social recognition	0,00	-	-
			27	authority	0,79	Economic capacity	0,7
			46	preserving my public image	0,00	-	-
	OPENNESS FOR CHANGE	Hedonism	4	pleasure	0,90	Leisure, Prestige, Caprice, Luxury, Satisfied	1; 0,5; 1; 1; 0,5
			50	enjoying life	1,00	Leisure, Trips, Caprice	1; 1; 1
			57	indulgent	0,72	Comfort	0,7
		Self-Direction	5	Freedom	0,72	Efficiency, Preferential treatment	0,5; 1
			14	Self-respect	0,00	-	-
			16	Creativity	0,86	Innovator, Technology, Advertising	1; 1; 0,5
			20	self-discipline	0,17	Taxes	0
			31	Independent	0,72	Privacy	0,7
			41	choosing own goals	0,65	Efficiency, Privacy	0,5; 0,7
			53	curious	0,58	Small letter	0,5
		Stimulation	9	an exciting life	0,00	-	-
			25	a varied life	0,79	Mobility, Car	0,5; 1
			37	daring	0,58	Risk	0,5

Figure 6. Parameter tree to classify the Human Values Scale from Smart User Model

6.5.1.4 Phase 3: Obtaining the Human Values Scale from Smart User Model of John Doe

The following steps are used to calculate the Human Values Scale user.

Step 1: According to (4), and as a result of applying the Portrait Values Questionnaire, we obtain the following results. We calculate the user's Human Values Scale from the Smart User Model.

Applying equation 4, we obtain the 10 human values of the user as follows:

$$Val(Universalism) = \frac{val(social\_justice) + val(equality) + val(opened\_mind)}{3} = \frac{2.40}{3} = 0.44$$

$$val(Benevolence) = \frac{\begin{pmatrix} val(sense\_property) + val(mature\_love) + \\ val(real\_friendship) + val(that\_helps) + \\ val(reliable) \end{pmatrix}}{5}$$

$$= \frac{0.17 + 1.00 + 1.00 + 0.17 + .072}{5} = \frac{3.06}{5} = 0.61$$

In the same way, we calculate the other human values:

$$val(Conformity) = 0.29$$
$$val(Tradition) = 0.63$$
$$val(Security) = 0.48$$
$$val(Achievement) = 0.58$$
$$val(Power) = 0.73$$
$$val(Hedonism) = 0.87$$
$$val(Self\_direction) = 0.69$$
$$val(Stimulation) = 0.69$$

Step 2: Using equation 5, we calculate the 4 groups that correspond to the universal values of the Human Values Scale

$$val(Self\_trascendence) = \frac{val(Universalism) + val(Benevolence)}{2} = 1.05 / 2 = 0.53$$

Analogously we can compute the next 3 universal values, obtaining:

$$val(Conservatism) = 0.47$$
$$val(Self\_enhancement) = 0.73$$
$$val(Openness\_to\_change) = 0.73$$

Step 3: In this last step, we calculate the user Human Values Scale using equation 6.

$$Evh = \frac{\begin{pmatrix} val(Self\_trascendence) + \\ val(Conservatism) + \\ val(Self\_enhancement) + \\ val(Openness\_to\_change) \end{pmatrix}}{4} = \frac{0.53 + 0.47 + 0.73 + 0.73}{4} = \frac{2.45}{4} = 0.61$$

Step 4: With the data shown in Fig. 6.1, and after applying the method proposed, a series of data are obtained (as shown in the Table 1) and, from here, it is possible to plot the Human Values Scale of the customer (as is shown in Fig. 7).

6.5.1.5 Phase 4: Making a recommendation to John Doe

According the data obtained by the Recommender System using the Human Values Scale from the Smart User Model, the letter with the personalized message, "Exchanging your accumulated points for the latest technology?" is sent to John Doe because he is a client who is sensitive to hedonistic values.
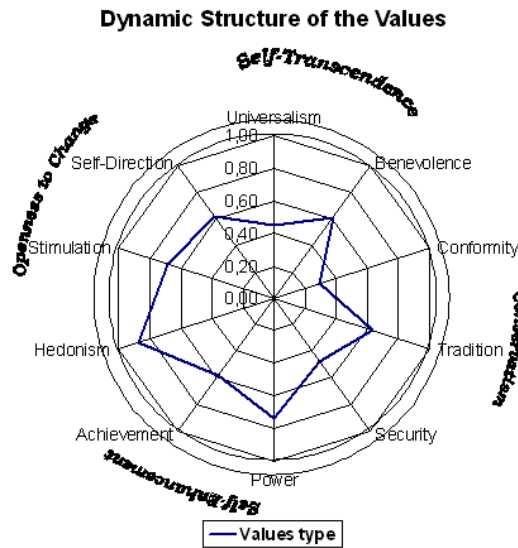
Figure 7. John Doe's Human Values Scale graph

Table 1: Mapping between Human Values Scale and consumer's Smart User Model

a) Smart User Model				b) Human Values Scale			Associated item PVQ	
Attribute	Type	SUM value	Normalized value	Qualif (PVQ)	Qualif PVQ normalized	Meta-attribute	1	2
Account number	O	90304565128		–	–	–	–	
Name	O	John Doe		–	–	–	–	
Age	O	36		–	–	–	–	
Sex	O	Male		–	–	–	–	
Civil state	O	Married		–	–	–	–	
City	O	Girona		–	–	–	–	
Region	O	Girona		–	–	–	–	
Country	O	Spain		–	–	–	–	
Phone	O	349728578		–	–	–	–	
Occupation	O	Computer Sc		–	–	–	–	
Monthly income	O	1870		–	–	–	–	
Economic capacity	S	high	0,70	4,75	0,79	Power	3	27
Exigency	S	high	1,00	6,00	1,00	Security	15	
Satisfaction	S	normal	0,50	3,50	0,58	Conformity	8	
Capacity of indebtedness	S	high	1,00	6,00	1,00	Achievement	34	
Comfort	S	normal	0,70	4,33	0,72	Hedonism	57	
Degree of Bad debt	S	normal	0,70	4,33	0,72	Benevolence	52	
Cultural level	S	high	1,00	6,00	1,00	Tradition	18	
Profitability	S	normal	0,70	4,33	0,72	Power	12	
Personal treatment	S	good	1,00	6,00	1,00	Tradition	44	36
Familiar bows	S	strong	1,00	6,00	1,00	Benevolence	28	19
Control of the expense	S	half	0,50	3,50	0,58	Tradition	21	
Availability of time	S	much	1,00	6,00	1,00	Conformity	47	
To be informed	S	few	0,30	2,67	0,44	Tradition	18	
Innovator	S	much	1,00	6,00	1,00	Self-Direction	16	
Mobility	S	normal	0,50	3,50	0,58	Stimulation	25	
Risk	S	normal	0,50	3,50	0,58	Stimulation	37	
Security	S	much	1,00	6,00	1,00	Security	22	
Technology	S	much	1,00	6,00	1,00	Self-Direction	16	
Tranquility	S	normal	0,30	2,67	0,44	Conformity	47	
Confidence	S	few	0,30	2,67	0,44	Security	15	22
Tangibility	S	normal	0,50	3,50	0,58	Achievement	48	
Car	S	yes	1,00	6,00	1,00	Stimulation	25	
Taxes	S	no	0,00	1,00	0,17	Self-Direction	20	
Leisure	S	yes	1,00	6,00	1,00	Hedonism	4	50
Solidary	S	no	0,00	1,00	0,17	Universalism	30	
Trips	S	yes	1,00	6,00	1,00	Hedonism	50	
Control of the environment	S	normal	0,50	3,50	0,58	Universalism	1	
Efficiency	S	normal	0,50	3,50	0,58	Self-Direction	5	41
Facility of comprehension	S	normal	0,50	3,50	0,58	Tradition	18	
Loyalty	S	low	0,30	2,25	0,38	Tradition	44	32
Small letter	S	normal	0,50	3,50	0,58	Self-Direction	53	
Price	S	normal	0,50	3,50	0,58	Power	3	
Prestige	S	normal	0,50	3,50	0,58	Hedonism	4	
Tendency to the change	S	normal	0,50	3,50	0,58	Achievement	48	55
Advertising	S	normal	0,50	3,50	0,58	Self-Direction	16	
Sedentarism	S	normal	0,50	3,50	0,58	Tradition	18	
Good work	S	normal	0,50	3,50	0,58	Conformity	47	
Preferential treatment	S	high	1,00	6,00	1,00	Self-Direction	5	
Tax system	S	small	0,00	1,00	0,17	Security	22	13
Privacy	S	normal	0,70	4,33	0,72	Self-Direction	31	41
Liquidity	S	nulo	0,00	0,00	0,00	Conformity	47	
Saving	S	no	0,00	1,00	0,17	Achievement	43	
Caprice	S	yes	1,00	6,00	1,00	Hedonism	4	50
Conformist	S	no	0,00	1,00	0,17	Tradition	44	
Mimetism	S	no	0,00	1,00	0,17	Tradition	18	
Promotions & Offers	S	no	0,00	1,00	0,17	Tradition	18	
Responsibility	S	no	0,00	1,00	0,17	Conformity	11	8
Knowledge	S	nothing	0,00	1,00	0,17	Conformity	47	
Luxury	S	yes	1,00	6,00	1,00	Hedonism	4	
To belong to group	S	no	0,00	1,00	0,17	Benevolence	49	7
Unconcerned	E	yes	1,00	6,00	1,00	Tradition	21	
Warmth hearted	E	weak	0,00	1,00	0,17	Universalism	35	
Satisfied	E	normal	0,50	3,50	0,58	Hedonism	4	

III. RESULTS

Table 2 is a summary of credit card usage between: October 2013 to January 2014 and October 2014 to January 2015.The first result shown in Table 2 is the recovery in the number of customers that used their credit cards at the beginning of 2014.

Table 2: Cost with the credit cards

		Number of consumer who bought		Number buys customer		Spending by the customer	
		# Customers	%	Total	by customer	Total	by customer
2013	October	22,625.00	10.97%	111,763.00	4.90	5,903,039.00	260.91
	November	23,127.00	11.21%	114,844.00	5.00	6,099,850.00	263.75
	December	23,038.00	11.17%	115,650.00	5.00	6,730,487.00	292.15
14	January	20,650.00	10.01%	94,736.00	4.60	5,214,616.00	252.52
2014	October	6,895.00	3.34%	31,027.50	4.50	2,574,861.00	269.43
	November	15,420.00	7.47%	68,799.00	4.50	4,416,702.00	286.43
	December	29,336.00	14.22%	133,665.00	4.60	8,675,127.50	295.72
15	January	29,280.00	14.19%	132,200.00	4.50	7,982,148.50	272.61

The highest number of customers using credit cards (23,000) was attained at the end of 2013. This number decreased in January and, although there is no data gap between February and September, it is understood that the number of customers using their cards dropped progressively and finally reached 0 in September (otherwise, they would have not been objects of the campaign). After the campaign, an increase in the number of customers that bought something with their credit cards was observed (up to 20,000); the number of customers using their cards returned to the previous levels. Table 2 also shows that the average amount spent by customers had increased and that the number of purchases made by the customers had decreased compared to the end of 2013. Therefore, at the end of 2014, the customers had bought less but had spent much more. Other conclusions extracted from the results are that December is the month when customers spend the most and that, in January, there is a significant decrease; additionally, there is a recovery in the spending that is far above the 4% inflation rate.

7.1 Results of the recommendation by means of Sales Pitch Modulation

Table 3 shows the differences between the customers who received a recommendation with a personalised message and those who did not during two periods (Period A=Dec'13 and Jan'14, and Period B=Dec'14 and Jan'15). Furthermore, the Table 3 shows the percentage of recovery among customers who bought items because of a recommendation with a personalised message.

Table 3: Differences between the customers who received e-mails and letters and the rest of the customers

	Consumers who have bought		Situable Message (Base 28,383 Consumers)		Standard Message (Base 177,914 Consumers)	
	No. Consumers	%	Total expense	Avg/Cust	Total expense	Avg/Cust
Period A	17.142,00	8,31%	1.425,00	5,02%	15.717,00	8,83%
Period B	31.485,00	15,26%	3.105,00	10,94%	28.380,00	15,95%
% Increase		83,67%		117,89%		80,57%
Improvement				46,33%		

Table 3 compares the number of customers that have used their card during Period B with those that used it in Period A. A seasonal increase of 8.31% is observed for purchases at Christmas in 2013, but in 2014 there was a strong increase (83.67%) following the campaign; thus, one of the objectives was accomplished. With respect to message modulation, an increase in the response from the customers with an adjusted message (117.89%) compared to those with a standard message (80.57%) is observed.

This 46.33% difference shows the effect of a recommendation using Sales Pitch Modulation, surpassing the 10% increment. Additionally, the Table 3 compares the percentage of recovery from the group of customers with Sales Pitch Modulation and the rest. As observed, the two groups of customers have a significant percentage of recovery. In any case, the percentage increase for the group with a message (117.89%) was higher than the percentage increase for the group without messages (80.57 %).Specifically, the percentage of recovery for customers with a message was 46.33% higher than that for customers without a message.

7.2 Amount of card usage

In this section, we illustrate how the amount that the customers spent grows. See Table 4. Also, to verify the increase in the cost of the customers using the card Table 4 shows the results from the periods of the previous year before and after the campaign of 2014. Here the improvement is also over 10%, with an increase in the cost with the card of 11.0% for the customers who received an adapted message, compared to 8.35% for the customers who did not receive one. In both cases, the increase in the cost is more than double the inflation rate in Spain (4% in 2014). This confirms the effectiveness of the global campaign. Finally, adjusting the message, subtly and effectively, nearly triples the rate of inflation, indicating an extraordinary result.

Table 4: Amount of the cost of the customers

	Total Expense	Average Consumer	Situable Message		Standard Message	
			Total Expense	Avg/Cust	Total Expense	Avg/Cust
Period A	11.945.103,00	272,34 €	1.535.455,04	283,62 €	10.409.647,96	259,48 €
Period B	16.657.276,00	284,18 €	1.656.988,00	314,90 €	15.000.288,00	281,15 €
% Increase		4,35%		11,03%		8,35%
			Improvement		32,06%	

IV. CONCLUSIONS

Through the method proposed, it is possible to calculate the human values scale from the user model without disturbing the user with surveys. In this paper, we show a method to improve the RS based on user HVS. This scale is obtained directly from the user models. The results obtained from the case study of banking services show that the HVS of the users is feasible and may improve the content based RS. We present a method to obtain the Human Values Scale of a user from the Smart User Model, and put it into practice in the Recommender System of the banking organization CC, whose objective was to increase the use of bank cards with regard to customers who did not use the cards during a certain time period.

The proposal was to generate a suitable message (Sales Pitch Modulation) for each customer, considering his or her Human Values Scale, the results of which, using the method shown, were satisfactory for the organization. The results of the project are that:

- The campaign has obtained very good general results.
- The campaign has recuperated the lost consumption of the customers at their respective levels.
- Message customized for the customers produced better results:
o the percentage of recovery was 46.33% better than the rest;
o they have increased the cost by 32.05% more than the rest; and,
o they have decreased the number of purchases by 21.88% less than the rest.

We managed to improve the customer recommendation process by generating the customers' Human Values Scale from their objective, subjective, and emotional attributes and used this value scale to generate suitable messages that were in agreement with customer preferences, interests, and attitudes.

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