Personal Choice Point:
Helping users visualize what it means to buy a BMW

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ABSTRACT

How do we know if we can afford a particular purchase? We can find out what the payments might be and check our balances on various accounts, but does this answer the question? What we really need to know is how this purchase would affect our other goals. What do I have to give up to afford this purchase?

Personal Choice Point is a financial planning tool that addresses these questions by enabling a user to explore the repercussions of her decisions at the level of her lifestyle goals, not just her accounts. The user is presented with a graphical representation of primary lifestyle goals such as home, car, vacation, education, etc. As the user selects goals and modifies them, it presents the impact on the user's life by graphically depicting the impact of a decision on her other goals. In effect, Personal Choice Point is a planner that helps restrict the user's search for a suitable allocation of resources among goals to the likely set of allocations, from the much larger space of possible ones. The result is a system that changes the focus of the user's task from managing the mechanics of resource allocation to the evaluation and selection of likely ones.

Categories and Subject Descriptors

H.5.2 User Interfaces -- Interaction styles, J.1 Administrative Data Processing – Financial, I.2.8, Problem Solving, Control Methods, and Search – heuristic methods.

General Terms: Design

Keywords: Recommendation systems, personalization, user modeling, goal conflicts, visualization, financial planning, decision theory.

1. INTRODUCTION

Suppose you drive a Toyota Camry. Now you'd like to move up to a BMW. How do you know if you can afford it? Or suppose you decide to buy a house. Lenders are willing to lend you great sums, but what will your lifestyle be like when you assume such debt?

Many tools exist that tell you what your payments will be, but that doesn't answer the question. Suppose you learn that a BMW will cost you an extra $400 per month. What do those extra $400 mean

to you? What you really need to know is what the effect of such a purchase will be on your lifestyle. What are the tradeoffs with your other goals? What *can't* you have if you get the BMW?

While the fact that the BMW will cost an extra $400 is worth knowing, it doesn't answer any of these larger questions. Ultimately it is a lot more meaningful and useful to know that I will have to, say, downgrade my vacations for a while or postpone a house purchase for a year.

Personal Choice Point is a financial planning tool that employs a model of a user's preferences over competing financial goals to suggest tradeoffs they might be willing to make. In doing so, the interaction with the user is changed from managing the mechanics of accounts - as is typically found in financial planning tools - to what might be viewed as a conversation with a user about her lifestyle.

In this paper we describe the user model employed by Personal Choice Point and the algorithm used to allocate funds. Next, we discuss the evolution of the interface and the issues that led to subsequent redesigns Lastly, we discuss our preliminary experience with Personal Choice Point, and relate it to other work. At this point Personal Choice Point is a research prototype that has not undergone formal evaluation, but has been presented in numerous industry settings and tested by many people.

1.1. An Example

Let's take the case of the previously mentioned problem – upgrading from a Toyota Camry to a BMW. How does Personal Choice Point go about addressing this issue? Part of the system's model of my preferences includes the range of cars I'd consider. I'd earlier indicated I'd probably never get something less than a Honda Civic, or more expensive than a BMW 540. I'd also specified that within this range what I actually expect is something like a Camry.

In addition to knowing my car preferences, Personal Choice Point contains a model of my preferences for eight other goals important to me including vacations, desired home, monthly savings, monthly spending allowance, furniture, appliances, kids education, and retirement (throughout this paper we will refer to such desired spending categories as *goals*). So I tell Personal Choice Point that I am changing my car preferences. I now expect a higher quality car.

My raised expectations means I'm less satisfied than before with the idea of getting another Toyota Camry – the car I am currently scheduled to purchase. Consequently Personal Choice Point now has the task of reallocating my money among the various competing goals mentioned above in such a way that it will help address my diminished car satisfaction without becoming overly dissatisfied with any of my other goals. Note that Personal Choice Point isn't trying to save me any money, instead, it's just trying to suggest a

new allocation of funds among my various goals with which I'm likely to be content.

Personal Choice Point now takes my newly revised set of preferences, along with financial information about me and the cost of my various potential goals, and arrives at a new allocation of funds between my goals. This new allocation is shown to me in the form of a graphic depiction of what I can expect to receive in each of my goals. This allocation is, in effect, the *lifestyle* that Personal Choice Point suggests I consider. I am also presented with a summary of what has changed – *the tradeoffs that were made to accommodate my revised preferences*. I learn that yes, I'm now getting the BMW, but I'll have to keep my current car for another 6 months. Moreover, my vacation has been downgraded from Club Med to camping. And I have to wait an extra 19 months to afford the kind of house I was planning on buying. And Personal Choice Point shows me a cheaper furniture option I might have to consider.

So, can I afford the BMW? Well, if I'm happy with these changes, then yes, I can. Otherwise I have two choices. I can revert to my previous set of preferences, or, I can continue adjusting my preferences for my various goals (e.g. home, vacation, furniture, retirement, etc) until I arrive at a *lifestyle* – an allocation of funds among my various goals - that I am most satisfied with.

In this case I decide that my vacation is too important to sacrifice. So rather than revert to my previous set of preferences, I raise the priority of my vacation goals. It's not like with cars where I said I expect a higher quality goal. I still expect the same quality vacation. I'm just trying to convey to Personal Choice Point that it should raise the priority of meeting my expectations with respect to vacations. I'm now less willing to sacrifice vacations.

This revision in my preferences once again results in Personal Choice Point suggesting a new allocation. So now, yes, I've gotten my Club Med vacation back, but now I'm told I'll have to wait even longer for my house, and my allocation to monthly savings is dropping fast. And I'm still getting my BMW, but now I have to wait even longer.

This interaction -- reviewing Personal Choice Point's "suggested lifestyle", updating my preferences and examining the tradeoffs – continues until I settle on one I can live with. Just as a good real estate agent knows what I'm looking for and helps restricts my search to appropriate homes, Personal Choice Point helps me navigate through the relatively small space of possible lifestyles I'd consider, from the much larger space of lifestyles that are possible.

It is possible, of course, to arrive at the same information using a spreadsheet or traditional personal finance software. The difference is that because traditional tools don't know how I feel about my different goals, they are not in a position to suggest reasonable tradeoffs. Therefore rather than focusing on whether a lifestyle might be right for me, I'll spend all my time staring at numbers and trying to figure out where I can draw money from to be able to support my new car. More likely, however, is that I won't bother getting this information at all and end up making a much less informed decision. It's almost certain that given the extra work involved, I would consider far fewer possibilities than with a tool like Personal Choice Point.

2. PERSONAL CHOICE POINT'S USER MODEL

The Personal Choice Point prototype contains a model of one specific user's *preferences* for each of nine primary *goals* including: *home, automobile, vacation, furniture, home appliance, children's education, retirement, monthly savings,* and *monthly spending allowance.*

The user model refers to the set of preferences for these goals. While each user will include the goals that are relevant to him or her, what makes Personal Choice Point tractable is that most people will tend to use a subset of a manageably small set of goals. Most of the goals listed above, for example, cover the main spending priorities of a considerable part of the population. But certainly some will exclude certain goals and include others.

Personal Choice Point's primary task is to suggest new resource allocations given a revised set of user preferences. The new allocation reflects particular tradeoffs with respect to the previous allocation. The user model employed by Personal Choice Point was designed to enable certain kinds of tradeoffs to be performed. Personal Choice Point uses *goal, time,* and *quality* tradeoffs which are described below.

2.1. Goal Tradeoffs

At the most general level, Personal Choice Point allows users to trade off across goals. We may decide that furniture is not as high a priority as, say, cars, so we will want to ensure that our car goals are addressed more diligently than our furniture goals. If cuts need to be made we will want Personal Choice Point to tend to take money from our furniture goal rather than from our car goal.

2.2. Time Tradeoffs

The relative priorities we place on various goals may tell us which goals are more important, but it is not enough to tell us how to allocate our resources. There are multiple ways of adding or withdrawing money from particular goals. One way is to adjust the expected time of attainment for a goal. For example, we can postpone or hasten the target date when we intend to buy a car. Naturally, postponing a purchase gives us more time to save money for a goal, while hastening it requires additional resources.

2.3. Quality Tradeoffs

In addition to adjusting the time of attainment for a goal, we can add or remove funds from a goal by adjusting the quality of the options we choose to satisfy a particular goal. That is, we can decide to get a cheaper car rather than wait for a more expensive one.

In sum, we can change the relative priorities between goals, and then we can also trade off between the time we attain a goal and the quality of the option we choose for a goal. These tradeoffs are not possible for all goals because some goals are time-independent. For example, by definition a user's monthly allowance goal and savings goal can't be hastened or postponed. They can only be increased and decreased. Similarly, a child's education and a planned retirement tend to be pretty fixed in time.

Personal Choice Point relies on three classes of information to manage these tradeoffs: First, a model of the user's preferences over the goals under consideration. Second, information about the user's finances and expected changes to income. Lastly, economic assumptions are made about expected changes to inflation for

various product categories. Our work thus far has focused primarily on modeling the user's preferences.

2.4. The User's Preferences

Personal Choice Point does not try to extract a user's preferences by monitoring the user's activity or other indirect means. Instead, the user's preferences are at the forefront of the system. Users interact with Personal Choice Point by continuously adjusting their preferences.

The *user model* consists of the following information:

2.5. Goals

First and foremost is simply the set of goals the user wishes to address with Personal Choice Point. These goals will typically include some set similar to the previously mentioned list such as home, vacation, automobile, etc. Different users might choose to address a different set

2.6. Goal Priority

Goal Priority is used to adjust for the relative importance of each goal, as opposed to determining how funds are used to address a goal. Every goal is assigned a priority between 0 and 1. In practice, the user does not select a number, but rather estimates a preference with a slider control. The user never sees numerical values for any of the preferences we discuss. The precise numerical values aren't shown because the meaning of these preferences lies not in their absolute values, but in the effect on the resulting lifestyle that *changes* in the preferences cause.

2.7. Goal Options

Including a goal such as "automobile" simply indicates that we're interested in automobiles, but does not identify what kinds of automobiles we might be interested in. For each type of goal the user indicates a range of goal *options* they would plausibly consider, from the most modest in the worst case to the most extravagant in the best case. For the automobile goal, for example, the range of options might be delimited by a Honda Civic on the low end to a BMW 328 on the high end, rather than a Yugo and Rolls Royce. After all, it is rather unlikely that someone who could find himself buying a Yugo might also be in the market for a Rolls Royce. Therefore restricting the range eases the users task and helps prevent absurd suggested tradeoffs.

For each of the selected options, the user indicates the *option quality* rating qualitatively (using a slider from zero to one e.g. Civic .3, Camry .6, BMW .9). Importantly, these ratings of the options are only relevant to other options within the same goal. They need not be meaningful across goals. Each option also has an associated cost.

2.8. Time and Quality Expectations

Knowing the range of options a user might consider for a goal does not tell us what they actually expect and when they expect it. Moreover, a user's *quality expectations* will vary from goal to goal. For example, someone might plausibly consider a BMW, but really only *expect* a far more modest Honda Civic. This same person, on the other hand, might harbor vacation expectations closer to the high end of the range of options she has chosen to include. Consequently, it would be inappropriate to simply aim for allocations where each goal has options of similar quality. It is therefore necessary for the user to indicate her *quality expectations* for each category. Once

again, the user does so using a slider that indicates a value from zero to one.

Just as quality expectations vary from goal to goal, so do *time expectations*. Some goals are simply addressed at different intervals. People buy cars at different frequencies than vacations. And some people will keep a car for 15 years, others insist on changing cars every 2 years. Therefore users indicate their time of attainment expectations for each of the time-dependent goals.

2.9. Time-Quality Tradeoff Preference

The expectations described above provide a sense of what will satisfy the user in these ways for each goal. However, what if we have to choose between the time we attain a goal, and the quality of the goal option we are attaining? We may be more or less willing to sacrifice our expectations with respect to quality versus time. For example, it may be very important to someone to get a new car every three years and less important to worry about the class of the car. The user is therefore asked to describe for each goal the degree (from 0 to 1) to which they tend to favor a higher quality option versus attaining it sooner. (A value of 1 is a preference for time expectations, while 0 is for quality.)

2.10. Financial Models

In addition to the user's preferences Personal Choice Point employs a financial model including information about the user's income and economic assumptions such as the expected rate of return on investments, and the inflation rate for various goals (e.g. education, real estate, etc.). Since our research focuses on enabling users to explore goal tradeoffs, the financial models included have been developed as far as necessary to support this objective.

3. The Resource Allocation Algorithm

The problem addressed by Personal Choice Point is essentially a resource allocation problem: allocate a user's money among the user's goals. For each goal Personal Choice Point must select a goal option and time of attainment that maximizes the user's overall satisfaction .

It is important to establish what we mean by the user's overall satisfaction. *First and foremost, Personal Choice Point is not specifically intended to help the user save money.* Personal Choice Point is about how to *allocate* money, not save it. Savings, after all, are just another financial goal. The degree to which income will be reserved for savings is thus treated the same as other goals.

Satisfaction, therefore, will come from how well the user's goals are being addressed, not how much money is being saved. The degree of satisfaction will vary by goal. It would be inappropriate, however, to search for the allocation where the sum of the goal satisfactions is highest. Such states may correspond to allocations where some goals are extremely satisfied, while others are starved. Differences in the importance of goals are accounted for by normalizing the satisfaction with the user's goal priority preferences. Therefore rather than seeking to strictly maximize satisfaction, the algorithm we use actually seeks to *minimize differences in satisfaction*.

The degree of satisfaction for a particular goal is a function of our time and quality expectations, as well as what our current allocation indicates we will receive. Generally speaking, we are satisfied when we get what we expect. We refer to the difference between an expectation and what we are allocated to receive as *tension*. Personal Choice Point therefore seeks to minimize tension for our

various goals. For time-dependent goals we model the quality tension QT and time tension TT separately. For example, if we expect a BMW in 14 months but are allocated to receive a Camry in 21 months there is a time tension and a quality tension. Users may prefer to have their time of attainment expectations addressed more or less diligently than their quality expectations. This preference is represented by P_g a variable ranging between 0 and 1, where 1 is a total preference for their time of attainment expectations, and 0 favors their quality expectations.

Therefore, for a given goal g, the quality tension QT_g is simply the difference between QE_g, the *quality expectation* the user has for g, and QO_g the user's rating of the *quality* of the *option* currently allocated for g. This difference is normalized with P_g to account for the priority the user places on their quality expectations:

$$QT_g = (1 - P_g)(QE_g - QO_g)$$

The *time tension TT_g* is calculated in a similar fashion:

$$TT_g = P_g\left(\frac{TE_g - TO_g}{TS_g}\right)$$

Where TE_g is the user's *time expectation* for g (i.e. the time they expect to attain g), and TO_g is the *time of attainment* specified in the current allocation (e.g. the time at which the current allocation enables us to purchase a Camry). TS_g is a goal dependent constant selected to reflect the *time scale* within which we typically address goals of this type. The intent is to capture the fact that, for example, the time scale at which we buy cars is different than vacations. In general, the shorter the transaction cycle, the more sensitive we are to changes in the time of attainment. Time independent goals such as monthly savings have a P_g of 0.

Finally, goals must be normalized for different goal priorities I_g. Therefore the overall tension T_g of a time dependent goal g is:

$$T_g = I_g(TT_g + QT_g)$$

3.1. Allocating funds

The allocation algorithm seeks to minimize the differences in tensions among all goals. Moreover, for each goal, the algorithm strives to minimize differences between TT_g and QT_g. The allocation algorithm is employed whenever a change in the user model or financial model occurs. The algorithm involves the following steps:

1. For each goal g:
   Set allocated funds of g to 0.
   Set null quality option (i.e. minimum quality)
   Set attainment time to TS_g (i.e. max attainment time)

2. Sort goals according to their tension.

3. Allocate funds to upgrade the goal with the highest tension where the cost of upgrade is less than the remaining funds.

4. Resort the goals.

5. Repeat steps 3 and 4 until funds are exhausted or no further improvements are affordable for any goal.

Step 3, upgrading a goal, entails making the smallest incremental improvement to a goal. Time-dependent goals can be improved in two ways: we can upgrade QO_g, the quality of the goal option (e.g. upgrade from a Toyota Camry to a BMW) or we can decrement TO_g, the time of attainment for the goal (e.g. get the Camry in 39 months instead of 40 months). While the cost of these two options are different, the decision is not a financial one. Instead, it chooses the one that results in a smaller absolute difference between QT_g and TT_g – the time and quality tensions for the given goal. Time-independent goals are far simpler since they can only be improved by upgrading QO_g.

This algorithm does not provably arrive at the allocation with the minimum difference in tension, but does produce reasonable approximations. Because the financial models that estimate the costs of satisfying goals under different conditions are treated as "black boxes", it would be impossible to arrive at a provably optimal state without performing an exhaustive search.

Ultimately, a reasonable approximation is all that is needed. After all, an optimal solution would only be optimal with respect to a set of subjective preferences. The value of the algorithm lies not in its ability to identify optimal states. *Instead, given an existing allocation and a change in the user model or financial data, the value of the algorithm lies in its ability to produce a new allocation that reflects a reasonable set of tradeoffs.*

Personal Choice Point users do not have strong feelings about the precise values of their preferences. Instead they recognize allocations they like. Just as a good real estate agent would not seek to "prove" that a given house is for me, Personal Choice Point is not intended to be used to prescribe an outcome given a user model, but rather simply to guide exploration through the relatively small space of allocations the user is most likely to prefer within the much larger space of possible allocations.

4. INTERACTING WITH PERSONAL CHOICE POINT

To be usable Personal Choice Point must collect the considerable amount of user information in a manner that is not overwhelming.. Rather than ask the user to enter manually every preference and at the outset, Personal Choice Point asks the user to provide basic demographic information and then presents a few default profiles for the user to adopt. These profiles contain preferences for many of the most popular goals that can be customized as needed. While this still involves some work on the part of the user, it is far simpler than entering everything by hand.

In addition to collecting information, a lot of information must be presented to the user. The space of possible allocations is quite large, and each allocation is complex. There are nine goals, each of which have multiple options, many of which can be fulfilled at varying times. Conveying these allocations effectively proved to be quite challenging. We are now on our third interface, having redesigned and improved the interface as problems have arisen.

Our first interface represented each goal as one picture depicting the allocated option surrounded by information about the goal such as the scheduled time of attainment, along with controls that reflected the user's preferences for the goal and allowed them to be adjusted (see Figure 1). As allocations changed, the graphics for the selected options changed, as well as the values for the time of attainment.

The problem with this approach proved to be that we had far too much information present, and too many controls to consider. While the quality of the goal options was readily apparent, time of attainment was often lost in the clutter. And there was no way to see easily other information of potential interest. For example, while a

user could check to see what the priorities were for any individual goal, there was no way to easily see the relative priorities of goals.
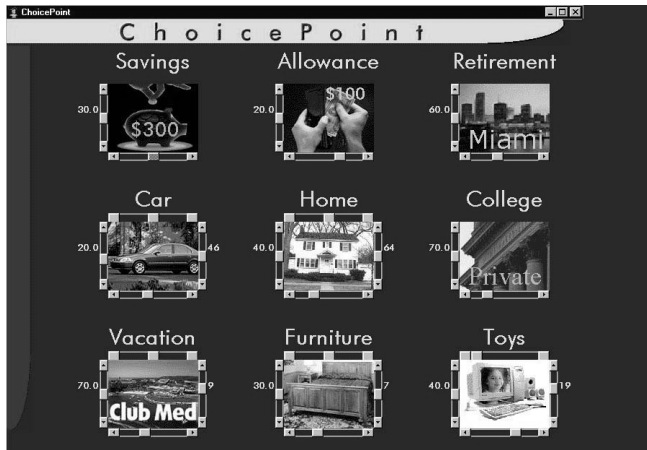

Figure 1: The initial interface

We decided to present this kind of relative information by varying the location of the goals on the screen to reflect different relationships. The second interface allowed the user to plot the goals according to different criteria, such as goal priority, time of attainment, and relative changes in the cost of increasing satisfaction, to name a few (see Figure 2).

While this approach seemed reasonable at the time, the result was an even more confusing interface. Goals moved about the screen reflecting a variety of changes. While this looked impressive, so many changes were occurring, and so many different views were possible, that it was often quite difficult to understand what was being shown. What had initially seemed like a wasted opportunity – using fixed locations for goals – turned out to have a key advantage. Users knew where to look to find a given goal.

More importantly, many of the relationships we'd worked so hard to present in the second interface missed the point. Knowing these relationships contributes little to knowing what preferences to adjust to increase satisfaction. For example, if the current allocation doesn't provide a satisfactory car, it doesn't matter what the relative priority of the goal is with respect to, say, furniture. What you know is that you may want to increase the priority of automobiles. It soon became apparent that what really needed to be conveyed well is the current allocation *and the changes from the last one*. The changes, after all, reflect the tradeoffs that were made. In the end, it is these tradeoffs that represent the cost and benefits to the user for any given decision.

We therefore designed our current interface to present holistically the user's entire lifestyle. Each region of the screen once again corresponds to a particular goal, but the goals together comprise one scene. Rather than using numbers that would simply be lost to convey the time of attainment, the transparency of the goal option is used to convey how distant it is. The farther off the goal is in time, the less visible it is in the scene. This way, the user can quickly get a sense of when he will attain his goals. Selecting the goal presents more precise information.

Figure 2: The second interface

To highlight the tradeoffs between the previous and new allocation we employ two strategies. First, rather than simply displaying the new allocation, goals that undergo a change have their changes animated in sequence to call attention to the change. For example, if we change from a Camry to a BMW, the Camry drives off, and the BMW drives in. Secondly, a list of the changes is presented. Changes are described in terms of the goal option that changed (e.g. Vacation declined from Club Med to Camping) , Home postponed 19 months, etc.).

Figures 3 and 4 show the current interface and illustrate two allocations. The controls along the bottom of Figure 3 reflect the user's preferences for automobiles, the currently selected goal, and enable the user to update them if so desired. Specifically, the preferences are presented as "I favor (time vs. quality)" the priority of the selected goal, and "I expect:" a quality range up to 'best' and a time range up to "now". When a user changes a preference resulting in a new allocation, this control panel is temporarily replaced by a scrolling list of resulting changes.

Figure 4 displays an allocation that results from raising the quality expectations for automobiles. Although it may be hard to see here, various parts of the scene have changed. For example, the car has been upgraded to a BMW, the furniture has been downgraded, the vacation has gone from Club Med to Camping, and the House has become more transparent, indicating a longer wait. Some of these changes are visible in the lower, scrolling panel.

4.1. Initial Experiences with Personal Choice Point

The current implementation of Personal Choice Point is a research prototype intended to illustrate and explore how to enable new services and customer relationships between financial services companies and their clients. While it is a working prototype, it is not a deployed system. The current financial models used are not rigorous enough for actual use. The intent is for potential clients to adopt this approach and enter their own financial models. We therefore have not conducted any formal user studies. Nevertheless, we have presented Personal Choice Point in its various forms to numerous clients, internal meetings and conferences. It has become a very popular tool to explore future directions in financial services with clients. We have developed a Norwegian version in response to requests to pursue opportunities in Europe.

Figure 3: The current interface displaying a particular allocation. The controls on the bottom reflect the preferences for "automobile" the currently selected goal.

**Figure 4: A revised allocation after raising the quality expectations for automobiles.
The control panel is temporarily replaced to present the resulting changes**

Through informal use it has become clear that users are able to consider many more potential allocations than they would if they had to hand choose all of the tradeoffs. Users are most enthusiastic about having the repercussions of their actions expressed in terms of changes to other goals. Many people have remarked that they would have loved to have such a tool available to them when buying a house because the sums of money involved were so unfamiliar that they ceased to have meaning. They had no real way of gauging the implications of their decisions. After a short period of experimenting with the system users usually found that they could adjust their preferences in a manner that led to intuitive and reasonable tradeoffs.

5. RELATED WORK

Personal Choice Point can be viewed as a kind of recommender system. Given a user model, Personal Choice Point in effect recommends a lifestyle - an allocation of funds across the user's goals. Personal Choice Point differs from traditional recommender systems in important ways. Most recommender systems don't consider the impact a recommendation might have on other user goals. Collaborative filtering techniques are often used to suggest a particular music CD, book, restaurant, movie, articles, etc, [5, 6]. In these domains it is not necessary to consider interference with other goals. However, as we see in the automobile example discussed earlier, the decisions we make in one area of our lives can often have very real consequences in others.

Decision theorists have developed techniques to address the problem of arriving at decisions when faced with multiple objectives. For a good overview see 4. Ultimately, the problem with these approaches is that they rely heavily on a user's ability to accurately and consistently assess their preferences. Moreover, most systems typically need an exhaustive set of preferences to be elicited from the user before the decision theoretic techniques can be applied. Some work has explored the use of incremental elicitation of preferences (e.g. [2, 3]) but the emphasis is still on the acquisition of accurate user preferences that enable an outcome to be prescribed. However, in many cases users are more likely to feel confident in their assessment of the desirability of an outcome than the particular preferences upon which the decision was based. In Personal Choice Point the emphasis is reversed. Rather than accepting an outcome because you know you have the right preferences, here we arrive, incidentally, at the "right preferences" because we recognize an outcome (i.e. an allocation of funds across goals) as desirable. Personal Choice Point, in other words, is not intended as a tool that prescribes a particular outcome. Instead, by turning this into an iterative process, the user collaborates with Personal Choice Point to arrive at a desirable allocation. In effect, Personal Choice Point helps the user explore the large space of *potential* allocations by using the user's loosely specified preferences to restrict it to the small space of *likely* allocations. In this respect, Personal Choice Point bears some similarity to mixed initiative planning systems in which users cooperate with the system to achieve a desired result [7]. The process of soliciting a recommendation by modifying a known state is somewhat similar to the FindMe system [1], which recommends restaurants in response to users specifying an example of the restaurant their interested in, but with a change on a certain dimension (e.g. "I'd like a restaurant like Charlie Trotter's but in Denver").

6. DISCUSSION

Personal Choice Point is not intended to replace current financial planning applications. Instead it is intended to complement them and provide a different view of the decisions being contemplated. Most existing tools such as Quicken, focus on individual transactions. While financial planning tools do typically include tools, in these instances it is ultimately up to the user to specify what goals funds will be added to or removed from in order to establish a balance. Personal Choice Point employs the user's preferences to simulate the likely allocations. Furthermore, Personal Choice Point does not simply allocate funds between a static set of options. Instead it dynamically changes the target options for a goal from the set of plausible options for that category specified by the user. Because the mechanics of resource allocation are handled automatically, many more allocations can be tried and considered in less time.

In the long run, however, we feel the true potential of this approach lies not only in enabling people to plan multiple goals, but rather in enabling their execution. For example, a financial services company that deployed such a tool need not restrict themselves to planning the purchase of a car. They could finance and broker the purchase. Naturally this would involve alliances with many third party service and product providers. At a time when banks are becoming increasingly commoditized and reduced to mere lines on a price comparison sites (e.g. bankrate.com) this approach offers a new differentiator. Rather than only competing on the basis of who can provide .125% better rate on a given loan, financial service institutions and their partners may compete on who can provide their customers with a better lifestyle. One step we have taken towards integrating services from potential partners is enabling users to configure their preferences for Saturn automobiles on Saturn's existing web site and incorporate that data into Personal Choice Point's model.

More generally, the approach described here is not limited to personal financial planning. We believe that such goal-oriented systems can help enable service providers to assume an important role in their customers' decision-making process. In doing so they are not only being helpful to their customers, they are placing themselves in the position where they can naturally provide the products and services needed to address their customers' goals.

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