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CUSTOMER ACCEPTANCE OF PRO-ACTIVE SERVICES - A SCENARIO-BASED EMPIRICAL STUDY

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Research Paper

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Abstract

Advances in Information Technology (IT) have changed the nature of services, letting it become increasingly digitized. Pro-active services represent a new kind of digital service delivery model promising added value for the receiver of the service who can consume a service without being concerned about its initiation. However, research has provided neither adequate conceptualizations for these novel digital services nor insights into customers' attitudes and readiness to accept them. To our knowledge, the present study is first in filling this research gap. We provide three metaphors, simplification, enhancement and outsourcing, for different classes of pro-active services. Moreover, we develop a causal model for explaining customer acceptance of pro-active services that is evaluated quantitatively adopting a scenario-based approach for an enhancement service. As an example we choose the readiness of students to accept a pro-active digital service from their education provider. Our findings reveal outcome evaluation as the strongest predictor of attitude. Additionally, attitude is determined by control beliefs and trust. Attitude towards pro-active service affects the customer's willingness to accept the pro-active service. The presented findings help service organizations in designing pro-actives services that are presumably accepted by customers.

Keywords: Pro-active service, digital service, reasoned action approach, scenario-based study

1 Introduction

The nature of services and the way they are provided have been changing rapidly in the last ten years (e.g. Barrett et al., 2015; Srivastava and Shainesh, 2015). One trend that has attracted a great deal of attention is the notion of "pro-active" services. "Don't wait for customers to make the first move"[1] urges one blogger, while industry analysts Forrester predict "Companies will explore pro-active engagement"[2]. Pro-active services are offered to customers individually with the assumption of a customers' need and are closely connected to digital possibilities as these allow to gather relevant situational data continuously.

[1] https://www.comm100.com/blog/customer-service-trends-2016.html

[2] https://www.zendesk.com/resources/forresters-top-10-customer-service-trends-2016/

There is a high level of urgency in this field as the provision of digital services is at the core of many disruptive innovations across a wide range of industries (Christensen and Raynor, 2003; Ostrom et al., 2015). If organizations lead the market or fail to understand customer readiness, they risk customer dissatisfaction and desertion, legal "grey areas" and challenges, unstable and unsustainable operating models. Accordingly, understanding and evaluating customer readiness for new types of digital services is a core competency in the digital economy (Zeelenberg and Pieters, 2004). Also, as more and more digital services are delivered to a wider range of customers (e.g. Graupner et al., 2015; Thorseng and Jensen, 2015), both the range of services available, and the diversity of the users of the services are multiplying. Thus, research to derive general principles regarding the readiness of customers in different segments to adopt new digital services of different types is required.

Our existing conceptualizations of services, including understandings of the way organizations and customers collaborate and interact to develop, deliver, consume, and co-create services, are proving inadequate for such new generations of digital services (Tate et al., 2014). There is no traditional demand setting, but rather an analysis of individuals' activities and the pro-active recommendation of services regarding a next step. Accordingly, it is necessary both to offer fresh conceptualizations of digital services, and to understand customers' attitudes and readiness to accept new service delivery models.

Thus, the underlying research question of this paper is 'What constitutes the user acceptance of different types of proactive service models?'

In order to answer this question, we define and describe a new generation of "pro-active" digital services, and offer three metaphors for pro-active service types. We assume that neither the services nor their users can be assumed to be homogeneous. We then develop a model and survey instrument for customer acceptance of pro-active services, and evaluate the model quantitatively with one selected pro-active service (enhancement) and customer segment, specifically, the readiness of millennial IT users to accept a pro-active digital service from their education provider. Choosing an enhancement example provides a robustness of the results as it is between simplification and outsourcing regarding pro-activity.

With the present study, we contribute to an important research gap in service research namely the successful design of new services using digital possibilities (Ostrom et al., 2015). The developed pro-active service acceptance model (PASAM) provides insights into which concepts influence the customer's willingness to accept a given pro-active service offer. It can be used by organizations to understand better which design features of pro-active services are important to offer successful services.

2 Theoretical background

2.1 Pro-active services

In typical business-to-consumer (B2C) interactions, individuals must actively seek out the services or value propositions they require, e.g. visiting a lawyer to seek for help and receive consultation. Such traditional interactions follow the pattern of a "pull"-oriented model. Through offering pro-active services to customers, such customer-initiated B2C interactions are substantially shifted towards a business-initiated service co-creation. Pro-active services use a "push" model, where the service organization pro-actively and seamlessly delivers just-in-time information and services based on needs, circumstances, personal preferences, life events, and locations (Linders et al., fortcoming). Hence, pro-active services require organizations to participate in their customers' lives, i.e. get access to personal data from individuals.

Personal data are gathered from the individuals' processes, i.e. their everyday behaviour and activities. Based on the gathered personal data, pro-active services seek to influence the individuals' processes, thereby aiming to improve their efficiency. Pro-active services therefore must be distinguished from related service systems, such as recommender (e.g., product recommendations as suggested by Amazon) and assistant systems (e.g., driver assistance systems), as latter systems make decisions based on users'

preferences for a set of items (e.g., movies and songs) and contextual data (e.g., lane tracking and weather information for safety controls), but not information derived from individuals' processes, such as the identification of everyday routines (Ziefle et al., 2008; Bobadilla et al., 2013). Furthermore, recommender and assistant systems usually follow a "pull"-oriented, but not "push"-oriented model, so customers must actively request these kinds of services (e.g., customers must visit Amazon's website to receive product recommendations and advanced driver assistance systems first must be activated by customers).

While the idea of pro-active service delivery might seem promising, the crucial question if and why individuals are willing to accept such pro-active services is a major issue. To assist in understanding and investigating pro-active digital services, we propose a series of metaphors for different types of pro-active services. Metaphor has been proposed as a technique for developing fresh ways to understand digital services; and developing a new and intuitive vocabulary for different service types (Tate et al., 2014). It has further been argued that the traditional metaphor for service performance of the "stage" is inappropriate for digital services, since the "line of visibility" that separates the front-office service delivery and performance "stage" and the activities that occur in the back-office "backstage" is "*in danger of disappearing altogether*" in a digital deliver context (Tate & Johnstone, 2011).

2.2 Metaphors of pro-active services

We use three metaphors to conceptualize digital pro-active services: Simplification, enhancement, and outsourcing. They are in line with the conceptualization of process simplification, enhancement and outsourcing within the domain of business process redesign (Reijers and Mansar, 2005).

Simplification: This underlying metaphor here is that of a smart diary. This form of pro-activity lets a customer know that something has occurred or is due, and informs customers of the options that are available to them, reducing the latency of service discovery and access. For example, the e-Housekeeper platform in Taiwan is an integrated messaging platform for push-notifying citizens of useful information from across agencies and layers of government. This provides a unified platform for over 200 services, for instance alerting car owners when their toll fees or registration are due, or to schedule an emission inspection (Linders et al., fortcoming). In another example, a chimney-sweeping company is aware that for fire safety purposes, people should have their chimneys swept once per year, but many forget to organize it, and of those that do, all request the service at the same time in the first week of winter. Pro-actively scheduling an annual time to sweep each customer's chimney allows the company to spread out its workload, and their customers to maintain a safe fireplace. This is the simplest form of pro-active service and could also be facilitated by available peer-to-peer platform providers. For example, a bicycle shop in Australia racks the distances cycled by its customers on Strava and offers maintenance services accordingly. Thus, the simplification service mainly aims at simplifying predictable aspects of people's lives.

Enhancement: This uses the metaphor of a personal assistant, who engages with and supports a user to make their life and work more effective. An enhancement service may evaluate options and suggest a particular service or course of action and even prioritize potential actions. Suggestions are made through advanced analytics or machine learning (e.g. deep learning) approaches that are able to take into account multiple variables to compare a customer's situation to a set of outcome scenarios derived through the analysis of very large datasets of comparable experiences (e.g. Pournarakis et al., 2013; Kuehl, 2016). This might include, for example, informing a customer when there will be an expected traffic jam on his daily way to work due extensive road works, suggesting him alternative transport facilities, such as by train or subway, that promise a faster arrival time. Based on these information, customers could decide to take one of these alternative transport facilities and to purchase a train or subway ticket. The enhancement has more knowledge of the customers' habits and preferences than the simplification, but the decision still ultimately lies with the customer.

Outsourcing: The metaphor of outsourcing describes proactive service providers that act on behalf of the customer, automating decisions and actions for them. This requires an established, trusted relationship with the customer, and the authority of the customer to take specific actions for them. This might include, for example, processing routine payments for rates and utilities, or automatically processing tax returns for them.

These three forms of proactivity are appropriate to different services and in different context, depending on the sensitivities or complexity associated with these services. For example, routine and repetitive services that typically do not require a lot of consideration by the customer - such as paying rates or renewing car registration - may be well suited to outsourcing. However, services that are one-off and require customer consideration - such as applying for a grant or seeking housing, may be more suitable for enhancement.

We extend the related understanding with some scenarios of the various service metaphors using daily life examples. A first attempt of clustering pro-active service activities offerings is provided by Leyer et al. (2016), who grouped activities into primary categories (personal care, education, professional work, domestic work, leisure and travel) as well as supporting categories (individual organization, procurement, information gathering and self-expression). The following table provides an overview of the potential applications of pro-active services based on the different service metaphors.

	Simplification **Provision of information**	**Enhancement** **Decision is still on me**	**Outsourcing** **Automation of decision**
Personal Care	Suggestion of product based on age and skin type	Suggestion of newly products based on prior orders	Delivery of products on a regular basis
Leisure	Netflix: Recommendation of series and movies	Wedding planner software, e.g. WeddingHappy	Netflix: Automatic renewal of subscription
Travel	Offering trips based on one's Facebook likes	Referring to rental cars, guided tours or other add-ons suitable for a booked trip	Booking holiday activity based on known customer preferences
Education	Suggestion of courses relevant for a specific profession	Learning software, e.g. Math 42	Registration for a recommended lecture schedule on behalf of the student
Domestic Work	Recommending groceries that are convenient	Proposing a budget based on prior expenditures	Ordering groceries taken from the refrigerator automatically
Professional Work	Recommendation of job offers	Developing an education program for a jobless person	Automatic transmission of application documents to interested employers
Individual Organization	Customer segmentation analysis	Recommendation of delivery based on schedule	Replenishment of production factors on a regular basis
Procurement	Amazon: Others bought as well	E-Procurement: Suggesting favored suppliers based on price comparisons	Dash button
Information Gathering	Facebook: User-centric advertisement	Google Now: Providing user-centric feeds	Automatic picture upload with Dropbox

Self-expression	Facebook: Advising users to complete their profile information	Tinder: Introducing people nearby that could interest you	Facebook: Facial detection in uploaded photos

Table 1: Examples of proactive services according to context and service metaphor

We suggest that different metaphors of proactive service will be perceived as more or less desirable depending on the customer, service metaphor and type of activity. While there are some disadvantages to scenario-based research, it has been widely used in business contexts where accessing genuine experiences for research purposes is challenging (Weber, 1992). In our wider research program, we propose to use scenarios to investigate the attitudes of a diverse range of customers towards different types of pro-active services in a range of contexts.

2.3 Acceptance of pro-active services

While pro-active services provide many potential benefits for consumers, there is a fine line between the value of such a service and intrusiveness. For example, many people welcome the offer of 24-hour air-ticket sales. If this were extended further, so that booking an air-ticket also initiated hotel and rental car bookings, which you needed to cancel if you did not require them, this might be considered inappropriate and too pushy by the majority of people. However, some segments, such as time poor regular business travellers, might welcome just such a proactive service. The aim of the wider study is to conduct a series of related studies, centred around different pro-active services and different user segments to derive a sound understanding of the attitudes of a wide range of users regarding pro-active services of different types.

There are a large number of competing models and instruments to measure user acceptance of information technology. These include the Unified Theory of Technology Acceptance and Use (UTAUT) (Venkatesh et al., 2003), the Technology Acceptance Model (TAM) in its various versions (for example, Davis, 1989; Venkatesh and Davis, 2000; Venkatesh and Bala, 2008), and the Theory of Planned Behaviour (TPB) (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980). While UTAUT and TAM variants are popular within the information systems discipline, we note that outside IS, although TAM and UTAUT are moderately well-cited (Williams et al., 2012), the TPB is very much more widely used. Another issue with the many TAM variants, is that the practice of freely modifying models and theories makes the results incommensurate and difficult to compare and aggregate (Tate et al., 2015). The TPB by comparison has been widely used in a consistent form and confirmed using quantitative meta-analysis techniques (Armitage and Conner, 2001). Our intention to carry out cross-study comparisons is also an important justification for selecting the TPB. Finally, we note that the latest iteration of the TPB (Fishbein and Ajzen, 2010) is more recent than UTAUT and TAM-3, combining the Theory of Reasoned Action and the TPB into the Reasoned Action approach (RAA). The main difference from previous versions of TPB is that RAA includes beliefs that form an attitude, norm or perceived control.

RAA holds that, besides subjective norm and perception of behavioural control, the attitude toward a behaviour influences the formation of a behavioural intention (Ajzen, 2012). According to the expectancy-value model embodied in RAA, the attitude toward a behaviour is determined by the subjective values of its associated outcomes and the subjective probabilities (beliefs) that it will produce (Ajzen, 1991). In the case of service usage, the value the customer expects to realize from using a given service contributes to the formation of the customer's attitude toward service usage.

$$A \propto \sum_{i=1}^{n} b_i v_i \Leftrightarrow A = m \sum_{i=1}^{n} b_i v_i, \quad m = \text{constant}, \quad \forall i = \{1,2,\dots,n\} \in \mathbb{N}^+ \tag{1}$$

As depicted by equation (1), the attitude toward a behavior (A) can be measured by multiplying each outcome's value (v_i) by the related strength of behavioral belief (b_i) and summating the resulting products over the number (n) of associated, evaluated outcomes and beliefs (Ajzen, 1991). There exists a direct proportionality ($\propto$ or m) between A and the expectancy-value index ($\sum_{i=1}^{n} b_i v_i$) (Ajzen, 2012).

$$A = m\sum_{i=1}^{n} b_i v_i = m\sum_{i=1}^{n}(b_i v_i) + b_j v_j - b_j v_j \Rightarrow b_j e_j = \frac{A}{m} - \left(\sum_{i=1}^{n}(b_i v_i) - b_j v_j\right)$$
$$= \frac{A}{m} - \left(\sum_{i=1}^{j-1} b_i v_i + \sum_{i=j+1}^{n} b_i v_i\right) \Rightarrow v_j = \frac{\frac{A}{m} - \left(\sum_{i=1}^{j-1} b_i v_i + \sum_{i=j+1}^{n} b_i v_i\right)}{b_j}, \quad (2)$$
$$\forall j = \{1,2,\dots,n\} \in \mathbb{N}^+$$

Equation (1) can be rewritten to highlight the assessment of the value (v_j) of a specific outcome j. The method for arriving at this rewritten equation is illustrated by computation (2). In the context of the present study, equation (2) can be applied to measure the value v_j, a customer expects to realize with the probability of b_j when using a given service to produce service outcome j.

2.4 Research Model and Hypotheses

Summing the theoretical considerations up, there is a need for an explanation of the reasons for signing up for and using proactive services. Such an explanatory model is proposed in this article and termed as Proactive Service Acceptance Model (PASAM, Figure 1) which is based on RAA which is adapted to the context.

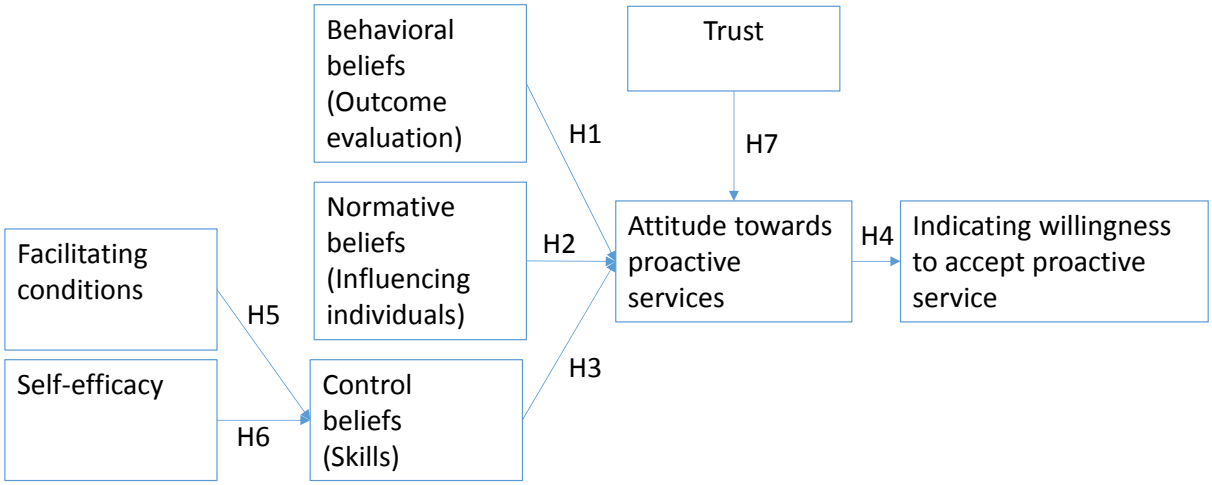

Figure 1: Proactive service acceptance model

Using RAA as theoretical foundation, we follow the argumentation of Fishbein and Ajzen (2010) that attitude is often most important. Thus, our model places attitude as the single predictor of the willingness to accept proactive services. The attitude towards proactive services is influenced by the three types of beliefs: behavioral, normative and control. Behavioral beliefs are tied to an outcome evaluation, taking the value perspective into account. Normative beliefs are related to influencing individuals that are friends and family regarding proactive services. Control beliefs relate to the ability to act without the proactive service while additionally being influenced by the availability of data and the perceived need of such a service (Bandura, A., 1977). If an individual has all relevant data available or no need of a proactive service, then the skills are very high and do not require a proactive service. In addition, trust

is an important factor as proactive services are based on digital data that is processed by a third-party provider (Palvia, 2009). The model is summarized in Figure 1.

According to the model, we formulate the following hypotheses:

H1: Behavioral beliefs regarding a proactive service have a positive influence on the attitude towards a proactive service.

H2: Normative beliefs regarding a proactive service have a positive influence on the attitude towards a proactive service.

H3: Control beliefs regarding a proactive service have a positive influence on the attitude towards a proactive service.

H4: The attitude towards a proactive service has a positive influence on the willingness to accept a proactive service.

H5: Facilitating conditions of a proactive service have a positive influence on control beliefs regarding a proactive service.

H6: Self-efficacy regarding the activity has a negative influence on control beliefs regarding a proactive service.

H7: Trust regarding a proactive service has a positive influence on the attitude towards a proactive service.

3 Data and Research Method

Students across subjects of a public university are chosen as the example of a proactive service, i.e. an automatic course recommendation service. The exemplary proactive service offer is described as follows to the respondents: "Please consider the following potential proactive service offer. Please note that this offer is fictional, is not considered to be introduced and is solely used to understand your motivation in accepting or not such a proactive offer."

The university is receiving many job offers continuously from companies within diverse industries. Imagine the university would automatically analyze the text of these offers and would use this information to suggest potential courses to sign up for next semester. The idea would be that after taking courses for one semester that are documented in the existing student system, suggestions would be made that are in your interest (based on the previously taken courses) and match as many job applications as possible to increase your employment chances. Suggestions would be displayed in the existing student system with no data being send out of the system." This service is "enhancement" as the outcome is a set of recommendations based on prior course selection.

Data regarding this scenario is collected with an anonymous online survey. It is distributed to students of the university covering every study area in the beginning of October 2016. Semester starts mid of October so students were in the phase of choosing courses, i.e. we could assure that such a proactive service offer would be relevant in students' life at this moment.

Our sample consists of 379 students who fully filled out the questionnaire. 147 students (38.8 %) are male and 231 (60.9 %) are female with one (0.3 %) not indicating gender. Average age is 24.31 (SD = 6.034). The sample contains 210 undergraduate (55.4 %) and 155 graduate students (40.9 %); 14 did not fill out their study level (3.7 %). The distribution according to faculties is as follows: Faculty of Agricultural and Environmental Sciences: 12 (3.2 %); Faculty of Computer Science and Electrical Engineering: 26 (6.9 %); Faculty of Law: 6 (1.6 %); Faculty of Mechanical Engineering and Marine Technology: 27 (7.1 %); Faculty of Mathematics and Natural Sciences: 55 (14.5%); Faculty of Medicine: 51 (13.5 %); Faculty of Humanities: 95 (25.1 %); Theological Faculty: 5 (1.3 %); Faculty of Economic and Social Sciences: 67 (17.7 %); No indication: 35 (9.2 %).

The measures regarding beliefs, attitude and willingness are adopted from Fishbein and Ajzen (2010) who provide sample questionnaires regarding the RAA in the appendix of their book. There has been a variety of studies using these questionnaires that justifies their validity and reliability in general (e.g.

Hinsz and Nickell, 2015; Shamim et al., 2016). The items are adapted to the context using the respective proactive service as reference object. Facilitating conditions and trust are self-developed scales based on the theoretical background whereas self-efficacy is based on the work of (Bandura, A., 1977). The relevant scales can be found in the appendix.

4 Analysis and results

4.1 Validity and reliability

To test the proposed model, a PLS approach for structural equation modeling (SEM) is used. Compared to covariance-based SEM (CB-SEM), the PLS method is particularly adequate if the research objective is to explain and predict the target construct in structural models or to identify key drivers (Hair et al., 2011). Like multiple regression analysis, variance-based SEM generates parameters that "maximize the explained variance of the dependent constructs" (Hair et al., 2011, p. 148). We use SmartPLS 3.2.4 for our study. The weightings are estimated with a path method, and the path coefficients' significance was provided using a bootstrapping procedure with 5,000 resamples (Hair et al., 2011).

Following the requirements of Hair et al. (2011) and Hulland (1999) for reflective measurement models, the properties of our measurement variables are analyzed in terms of (1) internal consistency reliability, (2) indicator reliability, (3) convergent validity and (4) discriminant validity. All loadings are above .7 (with the exception of three indicators that are however over .4 and CR does not improve), the AVEs are above .5, and the composite reliabilities (CR) are larger than .7 (see Table 2).

Finally, we analyze the discriminant validity of our measures using the AVE and the indicators' loadings. Following the Fornell-Larcker criterion, discriminant validity is approved if the AVE of a construct exceeded the construct's "highest squared correlation with any other latent construct" (Hair et al., 2011, p. 145). Additionally, we test whether an indicator's loadings exceeded "all of its cross loadings" (Hair et al., 2011, p. 145). Both conditions are fulfilled by each construct. Because all the requirements proposed by Hair et al. (2011) and Hulland (1999) are met, adequate reliability and validity of the measure properties can be concluded.

Construct	**CR**	**CR**
Facilitating conditions	.865	.764
Self-efficacy	.788	.664
Control beliefs	.883	.718
Behavioural beliefs	.906	.624
Normative beliefs	.949	.824
Trust	.842	.640
Attitude	.940	.759
Willingness	.971	.894

Table 2. Measurement Model Validation

Because our study relies on responses provided by respondents at the same time (Campbell and Fiske, 1959), common method bias might have occurred. To reduce this bias in advance, we follow Kortmann, Sebastian (2015)'s procedure regarding anonymity, confidentiality, the placement of dependent and independent variables.

Regarding common method bias, we employ Harman's (1967) single-factor test. The results show that the first factor only accounted for 41.10 % (resp. 36.45 % using varimax rotation) of the total variance, while six factors with eigenvalues greater than 1.0 accounted for 66.06% of the variance. Based on our results, we conclude that common method bias is either absent or negligibly low.

Global fitness of our model is also fulfilled with a value of .388 (threshold .36) regarding average R^2. Stone-Geisser Q^2 values are also positive according to the blindfolding procedure. Both indicate a strong overall predictive power (Kortmann, Sebastian, 2015).

4.2 Test of the research model

Table 3 summarizes the descriptives and correlations of our variables.

Construct	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Facilitating conditions	4.22	1.76	-	.13*	.13*	.04	.13*	.04	.10*	.08
(2) Self-efficacy	5.42	1.30	.14**	-	-.06	-.14**	-.09	.07	-.12*	-.12*
(3) Control beliefs	4.50	1.43	.13*	-.07	-	.29***	.82***	-.25***	.79***	.79***
(4) Behavioural beliefs	4.45	1.32	-.01	-.23***	.28***	-	.32***	-.10	.34***	.30***
(5) Normative beliefs	9.26	6.61	.14**	-.11*	.78***	.32***	-	-.28***	.83***	.76***
(6) Trust	3.75	1.54	.04	.06	-.24***	-.11*	-.26***	-	-.38***	-.32***
(7) Attitude	4.28	1.35	.12*	-.13**	.75***	.32***	.78***	-.37***	-	-79***
(8) Willingness	4.53	1.70	-.11*	.74***	.29***	.71***	-.31***	.75***		-

*Table 3. Measurement Model Validation (Notes: M = Mean, SD = Standard Deviation; Above main diagonal: Pearson correlations; below main diagonal: Spearman's nonparametric rank correlations; * p < .05; ** p < .01; *** p < .001; two-tailed tests)*

The results for testing our research model are presented in the following figure.

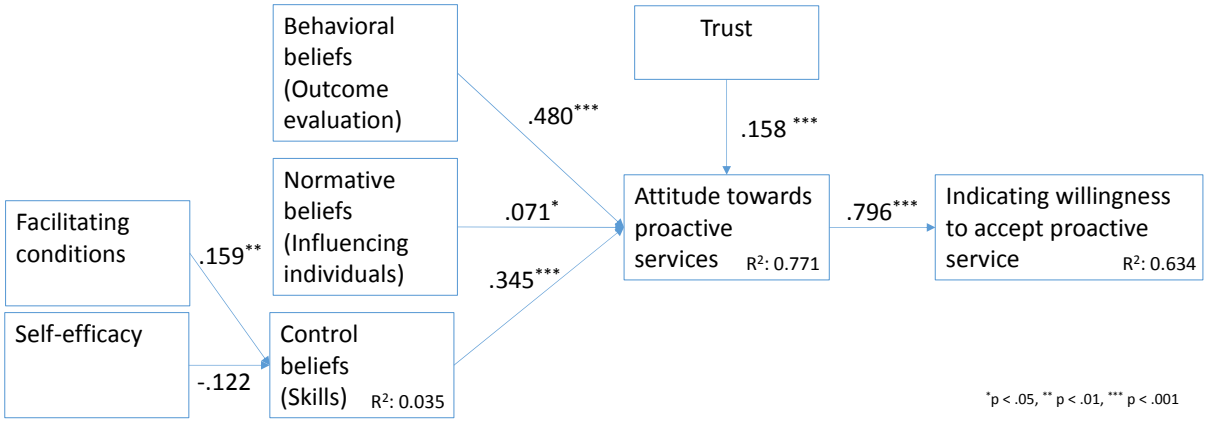

Figure 2: Results of the pro-active service acceptance model

Our findings show a strong support that the model predicts how students are willing to accept proactive services. Hypothesis 1, stating that behavioral beliefs regarding a proactive service have a positive influence on the attitude towards a proactive service, is supported by the results. Hypothesis 2, stating that Normative beliefs regarding a proactive service have a positive influence on the attitude towards a proactive service, is corroborated as well. The same holds true for hypothesis 3, stating that control beliefs regarding a proactive service have a positive influence on the attitude towards a proactive service. We also find empirical support for hypothesis 4, stating that the attitude towards a proactive service has a positive influence on the willingness to accept a proactive service.

Regarding the influence on control beliefs, we can corroborate hypothesis 5 stating that facilitating conditions of a proactive service have a positive influence on control beliefs regarding a proactive service. Hypothesis 6, stating that self-efficacy regarding the activity has a negative influence on control beliefs regarding a proactive service, has to be rejected.

Finally, hypothesis 7, stating that trust regarding a proactive service has a positive influence on the attitude towards a proactive service, is supported.

Additional control variables show that age and belongingness to a faculty have no influence on the model. Gender shows a significant relationship with behavioral beliefs (0.164, $p < .01$) and control beliefs (0.171; $p < .01$) indicating that female students have higher beliefs than male students. The study

phase has a significant relationship to self-efficacy (0.235, $p < .001$) indicating that master students have a higher self-efficacy.

5 Discussion

Our results show a number of similarities and areas of clear difference from other studies of behavioral intentions to use new technologies (for example), indicating that pro-active services are a truly novel form of digital service delivery model, at least in terms of customer perceptions.

First of all, we note that, consistent with previous studies, the r-square values are high (.77 on attitude towards pro-active services, and .63 on intention to use proactive services). This supports our choice to use the RAA. The RAA is parsimonious, well-established, and has a high explanatory power for explaining attitudes towards novel technologies. Using similar models, Taylor and Todd (1995) (1995) explained 60% of the variance in intention to use a computer resources centre, and Tate et al., (2016) explained 58% of the variance in intention by students to bring their own device in the classroom. The explanatory power of the model has been fairly consistent in multiple studies over a 20-year period in novel technology adoption contexts.

In line with previous studies, outcome evaluation remains the strongest predictor of attitude. Hence, according to PASAM, the value of the pro-active service outcome or experience (v_i) contributes to the customer's attitude (A) in direct proportion to the degree of the behavioral belief (b_i; see Equation (1) for a formalization of this relationship). Drawing upon the expectancy-value model of attitude, it is possible to assess the expected value of a specific pro-active service outcome (v_j) based on the customer's known attitude, as depicted by Equation (2). Our findings are consistent with multiple studies in related domains. In the UTAUT model, Venkatesh et al., (2003) established the essential similarity between the constructs of performance expectation (Venkatesh et al., 2003); perceived usefulness (Davis, 1989); extrinsic motivation (Davis et al., 1992) and outcome expectations (Compeau and Higgins, 1995), all of which have been shown to be significant predictors of attitude.

However, the differences to previous technology studies using the RAA are more interesting than the similarities, especially with regard to normative beliefs and control beliefs.

Considering the impact of normative beliefs (the influence of significant individuals) in determining attitude, although this relationship was statistically significant, the effect size was very low. There are two possible explanations. The first is that pro-active services are very highly personalized. The hypothetical service scenario we outlined first matched courses completed by each individual with job vacancies. It followed by suggesting future courses a student could select to allow students to increase the marketability of their qualification. It is possible that since job aspirations and course choices exhibit a high degree of variability, that students did not perceive that the experiences of others with the service would be of great value or relevance in evaluating it for their own use. Drawing briefly on aspects of diffusion of innovation theory (Rogers, 2003), the pro-active technology scenario we describe does not have the characteristics that make it likely to diffuse through social pressure. It is not "trial-able" (you cannot try it out before you commit to receiving it) and it is not "observable" (you may be able to see the benefits to others, but they will not necessarily translate to benefits to you).

A second explanation is that our study was scenario based, and did not include a real, tangible service that respondents and their wider community had recent experience with. This means that there was, in fact, no opportunity to socialize attitudes towards the service with influencing individuals. It would be interesting to see if this effect was observed in future scenario-based or "readiness" studies, and would suggest that this factor has limited relevance for predicting attitudes in contexts that the user has not yet had a chance to experience first-hand and discuss in their social circle.

Considering the impact of control beliefs in determining attitude, our results are extremely interesting. Control beliefs, operationalized as the easy availability of the service and any alternatives, and the person's sense of control over authorized and unauthorized use of the data used by the service were an important determinant of attitude. However, two other constructs that are frequently associated with

control beliefs, self-efficacy and facilitating conditions, had (respectively) weak, and negative effects. These results speak to the essential point of difference between pro-active digital services and digital services that use a "pull" model, requiring the user to identify, initiate and access them using their own skills and resources. Our results suggest that self-efficacy – the user's perception of their own ability to carry out or co-create the service (Bandura, A, 1977; Compeau and Higgins, 1995), is simply becoming irrelevant in a pro-active environment. In fact, there is a weak negative relationship between self-efficacy and with control beliefs in our model. This is a very important finding. Computer self-efficacy (Compeau and Higgins, 1995) has been considered to be an essential component of effective computer use in a wide range of contexts from online learning (for example Pellas, 2014) to clinical settings (for example Lindblom et al., 2012) in studies that span several decades. Although ours is a single study in a relatively narrow context, our findings provide preliminary evidence that as digital services become smarter and more pro-active, users will need to invest less effort, and to depend less on their own self-efficacy with technology. Even sophisticated digital services may become sufficiently pro-active so that they can be offered as a value-proposition to users without a correspondingly large investment of skills and ability by the user. This may potentially open up access to advanced digital services to whole new constituencies of less sophisticated users. Even amongst sophisticated users, reducing the effort and skill-level required to access complex digital services may increase their attractiveness.

We included trust as an independent determinant of attitude and intention. This is in keeping with previous studies particularly in the electronic commerce domain (e.g. Palvia, 2009). In our model, trust had a relatively weak but significant effect in our model. There are a number of possible explanations. First of all, our study context, the tertiary sector, is usually characterized by a relatively high degree of trust. Other sectors of society trust universities to educate and credential students, and students trust universities to educate and assess them. A large number of institutional mechanisms exist to ensure the trustworthiness of the course completion data that forms the basis of our scenario. Thus we would expect our participant's levels of trust to be relatively high, and for this to be a determinant of their attitude towards other pro-active services offered by their institution. The hypothetical proactive service in our scenario is directly related to other services (such as assessment) which students already participate and trust in.

Taking a more nuanced view, while the other model constructs and trust showed adequate discriminant validity in our model, we believe this is an important area for further research. There is a fine line between welcome, timely, and useful pro-active services, and intrusive, invasive and "creepy" ones.

Considering our three metaphors of pro-active service, our example scenario showed an "enhancement" example, where the service makes recommendations based on analyzed information on the customer. However, the outcome was only a set of recommendations, which reduces the risk to students (although they are still required to trust in both the treatment of their personal data and the quality of the recommendations). This appeared to be represented in our results. Further research is required to understand which metaphors are most appropriate in different pro-active service contexts. It is possible that various types of pro-active support could be provided in the same general service domain – for example, job portals such as those that already exist which allow you to take tests or compare your CV with the job requirements on a "pull" basis (simplification types); or the ability for the user to configure alerts (enhancement) – might increase a user's sense of control while requiring more investment of time and greater self-efficacy in configuring the system to meet their needs. We intend to conduct further studies to determine if these effects are observable based on the different pro-active service metaphors.

People who have made personal data available with relatively little regard to privacy may sometimes be shocked (as well as pleased) and what can be predicted based on that data. It has been said that Facebook arguably now knows us better than friends and, potentially, even our therapist (Youyou et al., 2015). Our model showed concerns about control over the personal information required to deliver proactive services to be important in addition to a sense of trust. People need to exercise controls and use facilitating conditions not to obtain the digital services they want of need but to stop unwanted ones. We

suggest the relationship between control and trust, and their respective influences on customer attitudes require further research.

Thus, practical implications are that companies should be careful in designing pro-active services. Our results suggest that the main emphasis of achieving a positive attitude is the additional value of a pro-active service. At the same time it should be accessible in an easy way, i.e. it should be integrated neatly bin an individual's life. Considering both justifies market entrance with issues regarding trust possibly established beyond basic features after a certain time. The model should however be used by companies to evaluate their specific pro-active service to determine relative weights of the variables.

6 Conclusion

The landscape of digital services is changing. While we do not want to over-claim our contribution based on a relatively limited, scenario-based study, our results provide interesting preliminary insights into major service delivery trends that will change the nature of the way we interact with technologies. Smart technology service offerings will increasingly find us before we are aware of a need for them, some of them will be wanted, and some of them absolutely unwanted, the digital service equivalent of junk mail. How welcome they are will depend on many things – primarily their usefulness (outcome evaluation) but also our sense of trust and control. Our study also provides interesting insights into approaches regarding the evaluation of these future services. We may see a gradual "redrawing of the map" of the determinants of attitude towards proactive digital services, as control replaces self-efficacy, and increasing individuation reduces the importance of normative beliefs. The ability to balance control, privacy, trust in the provider, and the rich value propositions of increasingly smart and pro-active services will become an essential digital competency for citizens in the future. Our study represents an early insight into the nature of this change.

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Appendix

Facilitating conditions	I document the planning of executing my course selection digitally.
	I use digital support to execute my course selection.
Self-efficacy	I am confident that I can perform my course selection on my own.
	I have the necessary data to execute my course selection properly.
Control beliefs	I could use other offers similar to The Proactive Course Suggestion.
	I would use The Proactive Course Suggestion, because it would be easily available.
	I would use The Proactive Course Suggestion, because it would be beneficial for me.
Normative beliefs	My friends would support me in adopting The Proactive Course Suggestion.
	My friends would support me in the decision of adopting The Proactive Course Suggestion.
	Generally, I want to do what my friends am thinking I should do.
	My family would support me in adopting The Proactive Course Suggestion.
	My family would support me in the decision of adopting The Proactive Course Suggestion.
	Generally, I want to do what my family is thinking I should do.
Behavioral beliefs	The Proactive Course Suggestion would be an effective way to support my course selection.
	The Proactive Course Suggestion would help me to achieve a high quality in my course selection.
	Using The Proactive Course Suggestion would be easy.
	The way of using The Proactive Course Suggestion would give me a reassuring feeling that everything will be fine with this activity.
	The way of using The Proactive Course Suggestion would allow me to support my vision regarding this activity.
	The support of The Proactive Course Suggestion for my course selection would be good.
Trust	I would be afraid of losing control over my activity when using The Proactive Course Suggestion. (reverse)
	I would be afraid of unauthorized access to my data stored with The Proactive Course Suggestion. (reverse)
	I would be afraid of someone stealing my stored data regarding The Proactive Course Suggestion to threaten me. (reverse)
Attitude	Using The Proactive Course Suggestion is good.
	Using The Proactive Course Suggestion is satisfactory.
	Using The Proactive Course Suggestion is important.
	Using The Proactive Course Suggestion is pleasant.
	Using The Proactive Course Suggestion is favorable.
Willingness	If it would be available, I intend to use The Proactive Course Suggestion.
	If it would be available, I will use The Proactive Course Suggestion.
	If it would be available, I am willing to use The Proactive Course Suggestion.
	If it would be available, I plan to use The Proactive Course Suggestion.