A RESOURCE GUIDE TO EVALUATION IN THE CONTEXT OF NEW PRODUCT DEVELOPMENT

(A learning module and resource for all interested or engaged in product development)

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ABSTRACT:

New products that are successful in the marketplace and beneficial to users are quite often outcomes of a formal and structured development process. At various stages throughout this process, evaluation acts as an invaluable and indispensable guide to managers, enabling them to make enlightened decisions as needed. With systematic evaluation, both process efficiency and product effectiveness are ensured, and achieving unmet needs of end users becomes a more likely reality; and without it, we are in the dark about whether and why results were achieved (or not) as expected. In this document we describe the role and methods of evaluation through and beyond the development process, bridging it both to new product success and its impact on users. We provide practical tips on the optimal use of evaluation for deriving maximum benefits to stakeholders, and illustrate key points using case studies from our three cycles of experience of developing new and improved products for persons with disabilities at the Rehabilitation Engineering Research Center on Technology Transfer (T2RERC), which transferred technology and technological products using a model developed for this purpose.

CHAPTER ONE

Module Overview

The resource guide on evaluation is brought to you by the Rehabilitation Engineering Research Center on Technology Transfer (T^2RERC) that has transferred over fifty new and improved products into the market place since 1993 under funding by the National Institute for Disability and Rehabilitation Research (NIDRR), working to improve the life of persons with disabilities. This resource guide is part of a set of training modules on Technology Transfer prepared by the T^2RERC. There is some inevitable content overlap between modules because of our intention to make them independent of each other, which we have tried to identify; we have provided links for easy reference and navigation between the modules at such points.

What exactly is the Resource Guide about?

This chapter gives an overview of the focus and contents of the module. The central theme is *systematic evaluation* as a guiding process for new product development and for assessing its impacts; it presents the role evaluation plays in the decision-making of managers who develop new products intended to be successful in the market and to have the desired impact on the lives of its end users. It describes the methods of evaluation that seek to enlighten decisions through the development process that outputs the desired product and through the later phase to assess its impact on users. A discussion of the benefits from evaluation and the use of its findings is also included. Finally, we attempt to illustrate all key points through case studies of product evaluation we conducted at the T2RERC drawing both from our transfer efforts and post-transfer efficacy evaluations. Here we share the joys and challenges encountered as these methods are put into practice, along with lessons learnt and tips for do's and don'ts.

Target audience: Who might find the Guide useful?

It is addressed to all *stakeholders* of --- i.e., anyone who is interested in -- new product development, whether as an inventing/innovating researcher, an industry partner interested in innovation and prototype development, a manufacturer interested in development and production, a broker of technology and product (such as a university transfer office), a clinician/practitioner that prescribes/ recommends such products to clients or a consumer whose needs are targeted by such products. We hope you will find this useful as a resource in your own work as learning, training or simply, a reference module. The main document may answer concerns any or all stakeholders might have regarding the conceptual underpinnings and rationale behind evaluation methods, their application in practice, or, about the use of evaluation's findings. Additional resources referenced throughout and integrated in the final chapter might be consulted for further in-depth understanding of the material presented in the earlier sections of the document.

Contents: What follows in the remaining chapters?

The remaining chapters cover the content of the Resource Guide. Not all readers may be interested in all of the chapters or find them relevant to their work at any given moment. The chapters are deliberately structured to be stand alone sections so the reader can choose to use them in sequence or use one at a time, selected as needed. Additionally, links are provided within each chapter to take the reader to more in depth readings or references as called for, including the sister module, Flagg, Stone and Bauer (2009). Primary Market Research Training Module.

In chapter two, we present the theoretical basis necessary for the understanding of the rest of the Guide. We define and describe the basic terms and concepts of evaluation as related to new

product development and present a framework of reference in which to anchor the methods, examples and lessons presented in later chapters. The framework is based on the CIPP (Context, Input, Process, and Product) model of evaluation proposed by Stufflebeam and colleagues (1971), adapted and extended beyond development to cover product impact on users. As a result of this chapter the reader should be able to explain what is involved in the process of systematic development of new products as well appreciate the role of evaluation in turning out successful products and in judging their quality and value to stakeholders.

Chapter three addresses the *how-to* of evaluation. Methods are described considering the concerns and issues in a product development project and explaining how evaluation responds to these, by filling in the corresponding information needs. Examples are provided from the T2RERC's experience illustrating the diagnostic (needs), formative, summative and impact evaluations; they cover the major types of evaluation encompassed by the CIPP framework that correspond to the four management concerns during development, as well as impact evaluation that extends beyond development. Again, overlaps of this module with its sister modules on Technology Transfer have been identified directing the reader to them through links.

Chapters Four and Five focus on illustrating the application of the evaluation methods discussed in the previous chapter in T^2RERC case studies. In particular, Chapter Four addresses needs assessment and formative evaluation. It includes the use of focus group interviews and surveys for identifying unmet consumer needs and, and for shaping the new product through prototype evaluations. Chapter Five attempts to illustrate the application of a summative-cum-impact evaluation approach through discussion of three product efficacy assessment studies conducted at the T^2RERC focused on product quality and value.

Based on the lessons learned through the T^2RERC experience and case studies, we present some practical hints - important Do's and Don'ts - in relation to product development and evaluation in Chapter Six.

Examples of key evaluation instruments corresponding to the case studies discussed in the previous chapters are reported in Chapter Seven.

Finally, in Chapter Eight, we present a listing of literature relevant to the basic ideas treated in the resource guide, linked to our review of them. Additionally, we have a short annotated bibliography for reference. We hope they will serve the readers as useful resources in their work with product development and evaluation.

CHAPTER TWO

Understanding Evaluation in the context of New Product Development: Basic Concepts and Framework.

What is evaluation?

Evaluation is a systematic inquiry process, whose purpose is to assess merit, worth, significance and probity of something – the object of evaluation being an individual (such as a student or an employee), a product (such as a household device) or a system such as a project, a program or even an institution. Merit refers to the intrinsic quality of the object of evaluation; Worth refers to the relevance or value of the object to those interested in it (the stakeholders); Significance refers to how important it is that the object be evaluated; while Probity refers to the honesty, integrity and ethics of the object (such as institutions, projects, programs….) under assessment. (Scriven, 1991; Joint Committee, 1994; Stufflebeam and Shinkfield, 1997, 2007; See Chapter 7 for details).

Is evaluation same as research?

Not exactly, although it is easy to confuse an evaluation activity with a research activity because of their systematic and inquisitive nature. What makes the two different is their purpose. Research wants to "know and understand" phenomena, whereas evaluation's mission is to assess and judge. Although evaluation also wants to know and understand phenomena related to its own goal, the knowledge it generates is context-specific, and is not expected to apply beyond the context as "generalized knowledge". The difference is important because methods

follow purpose and purpose lends perspective for the appropriate balance between rigor and relevance in the methods we choose.

Recognize that evaluation uses research methods as a tool in order to accomplish its purpose, just as research might use statistics as its tool, for example (and we don't confuse research with statistics). In fact, the sister training module with which this guide shares much in common addresses Primary Market Research, which is research undertaken for evaluative purposes during product development, as you will see further down in this guide.

Finally, we add that although evaluation is a long known practice, it evolved into a discipline only over the past four to five decades, going from a limited view of "measurement" to a much broader view that encompasses and goes beyond research.

Who are the stakeholders of evaluation? Who benefits from evaluation findings?

Anyone who needs information about the quality, value, significance or probity of an object being evaluated, for use in whatever decision or action, is a stakeholder of that evaluation. The manager of a project who needs to know if it is worth continuing the project or not, the inventor of a product who needs to know if there is market for it, the developer of a prototype who needs to know if the quality satisfies the consumers or the funder of a program who needs to know if it has merit and worth for continued funding, and so on. In all these cases, evaluation produces the knowledge that the stakeholder is interested in. Evaluation findings that are credible and relevant to the stakeholders' needs are useful and are valued for this reason. Such findings are often mixed, combining quantitative (numerical) and qualitative (descriptive) information. New product developers are an important stakeholder of evaluation information.

How does evaluation relate to new product development?

New products (or improvements over existing products) that are successful and have a positive impact on its users are those considered as valuable and of high quality by their stakeholders. They are often results of a systematic development process, which involves sequential decision making. In managing the development process, it is easy to see how important it is to know the quality and value of these potentially successful products - in other words, to evaluate them - as they are going through and emerging from the process. If used well at the decision making points, evaluation can provide the manager the right kind of information to make the right kind of decision that will yield the desired quality product. The role of evaluation is therefore to guide the development process by enlightening the decisions. The PDMA (product development management association) describes this relationship in a continuous "stage-gate" process (Kahn, Castellion and Griffin, 2005), without separating evaluation and management steps. The work at the T^2RERC at various points was explicitly guided by the PDMA. Other authors such as Stufflebeam and his colleagues (1971) describe the relationship by separating the role of evaluation from management role. Conceptually speaking, both frameworks describe the same idea that evaluation gathers data for enlightening decisions. We choose to present and discuss the CIPP framework as our basis to understand new product development simply because this model views evaluation as a systematic process itself, and addresses it exclusively within the development process.

The CIPP (context, input, process, and product) model by Stufflebeam and colleagues connect four types of evaluation to four major decision points in the management process as shown in Figure 1.

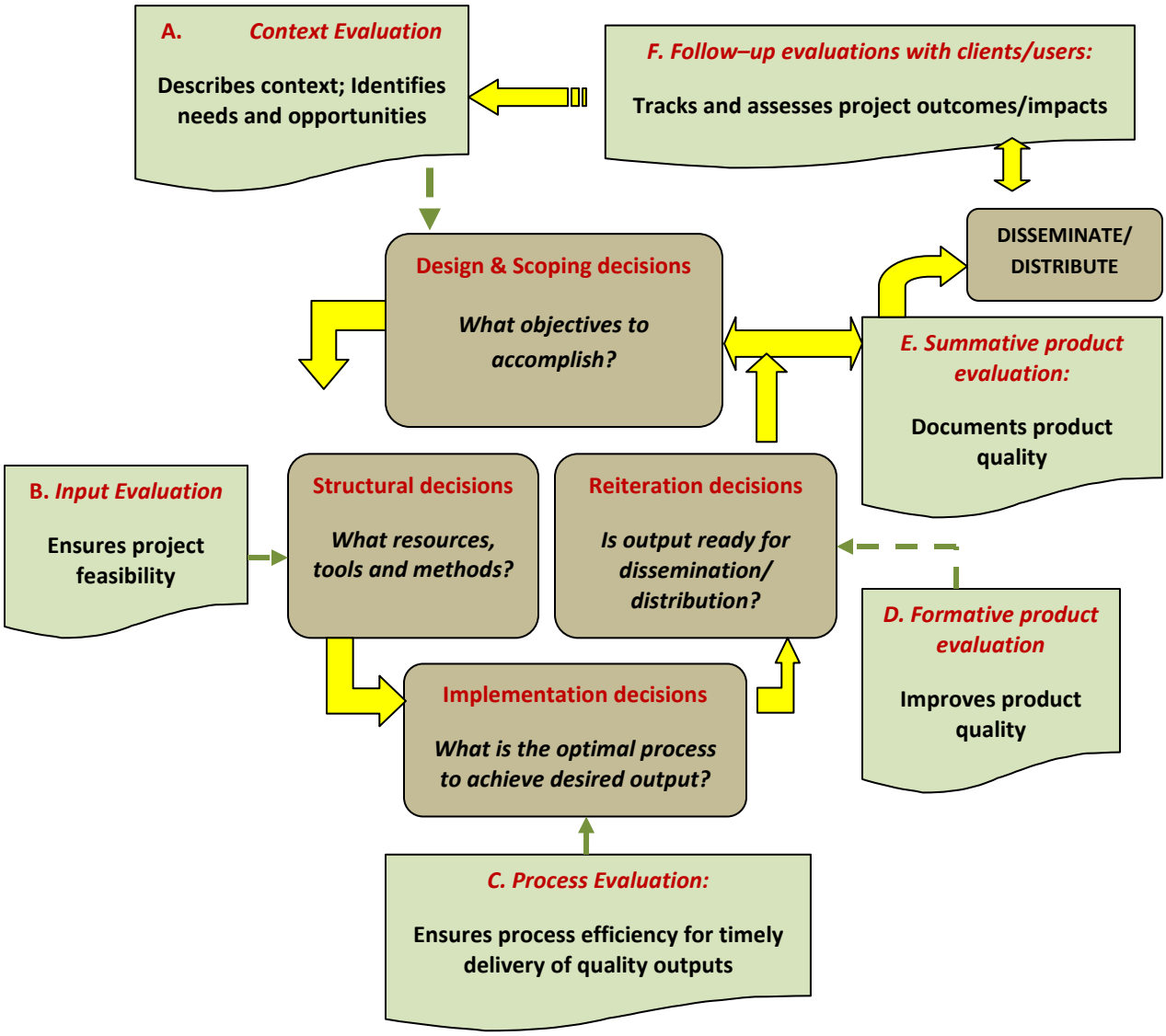


Figure 1. Evaluation enlightens development decision-making (Adapted from Stufflebeam et al, 1971)

The four central boxes indicate the four important management decisions: design decisions involve development objectives (features and functions of a product); structural decisions involve resources needed; implementation decisions involve ensuring if and how the process works (practical prototyping) and reiteration decisions involve knowing if the prototype is ready for final production and distribution or if it still needs modifications and testing. Correspondingly, the model conceptualizes four types of evaluation that obtain and provide data to guide these decisions. Needs and opportunities data comes from Context evaluation (box A)

and helps to know what features and functions are desired by stakeholders (consumers). Input evaluation (box B) provides data on needed and available resources (cost, personnel, material) and helps to put together the development project. Process evaluation tracks and monitors process (prototyping) and helps in adjusting and defining the optimal process for the targeted prototype. Product evaluation provides data on the product (prototype) itself and is helpful in two ways - *formatively* (box D) during the prototyping and *summatively* (box E) at the end. During the prototyping, formative evaluation assesses the prototype and helps improve it (features and functions). It helps decide and conduct as much iteration as needed until the desired features and quality are incorporated. Summative evaluation is a final stamp on the quality; the data helps decide if it is ready for production and distribution. Impact evaluations (box F) are not part of development, but add a lot of feedback information to the process by informing whether it met the stakeholder needs and how worthy (valuable, impacting) the product was and why. One can see how a complete assessment of a product's efficacy requires data on formative, summative and impact evaluations all together.

Why is evaluation important for the development process?

Evaluation is important for product development, and timeliness of evaluation even more so. Evaluation can enhance product success and its impact on consumers. If done before and during product development, rather than wait until after the product comes to market, evaluation can not only predict customer satisfaction/dissatisfaction but also prevent product rejection, by ensuring quality and value of products.

It is worth noting that in industrial practice, it is not common to see these evaluations take place systematically as described above. Formative evaluation is commonly part of prototype

testing and modification usually focused on technical evaluations that include bench testing. Summative evaluation before production runs is not always done. As for data from consumer, it is rarely obtained as part of context evaluation before conceptualizing the product; it is usually collected as satisfaction on the product in market. Yet, the sequence and timeliness of evaluation information as shown in the figure is critical to ensure products that will be successful and meet the needs of the consumer, at the same time being cost effective.

Later in the Resource Guide we attempt to show how to use evaluation to enlighten the product development process. We illustrate our points with lessons from the study of efficacy of 3 assistive technology products conducted at the T^2RERC project.

At what stages of the development process is evaluation information most helpful?

Evaluation is best taken advantage of by obtaining data for all decisions, and in time. It is useful before, during and after the development process. Although in practice it may be often more difficult to accomplish before and after the process, and to go beyond technical assessment during the process, it is achievable with organization and the market rewards are considerable.

Summary: Evaluation and the development context - a symbiotic relationship

We summarize this chapter by drawing your attention to the symbiotic relationship between new product development and evaluation. Just as timely and appropriate evaluation can result in good decisions, good decisions can foresee the need for further ongoing evaluation information, solicit it, support it and be helped by it. In the case of successful products, evaluation and management decisions go hand in hand.

CHAPTER THREE

Evaluation Methods and the Development project context

In this chapter we present and discuss the four types of evaluation introduced in the previous chapter as part of the CIPP model. To recall, these are Context, Input, Process and Product evaluations and they provide information useful for the four major decisions made during the product development process.

Section One: Context Evaluation

What kind of information from Context evaluation is crucial for the development process?

Relevance (worth) of the products and services for the end users for whom they are conceptualized, prototyped and produced is a crucial concern of product developers. To be successful and valued by the users, the time to take this concern into account is at the very beginning of a development project rather than at the end. Thus, evaluation can provide a major piece of information that the manager requires in order to set the development project in motion, which relates to the unmet needs of the appropriate end users. A needs assessment or a diagnostic study of user needs is an important part of context evaluation. Recognize, however, that context evaluation is a broader concept, which should cover other useful aspects such as opportunities available in the context, prevalent market needs, industry competitors and the like. These are the other context data in light of which the manager will examine the consumer needs assessment data. The needs are key information because they point to the characteristics (features and functions) of the product/service that is the goal of development.

How does evaluation obtain diagnostic information from the development project context?

Different methods are useful for obtaining different kinds of information. Focus group interviews of consumer samples drawn from relevant populations can provide consumer needs and preferences. Consumers can react to existing products or provide information from past experience. Survey questionnaires are other good mechanisms for the same purpose, especially to obtain related information such as affordability data (price preferences). For a detailed presentation of these methods, please see the sister module

Flagg, Bauer and Stone (2009) Primary Market Research Training Module . At the T^{2}RERC, we generally used the Delphi technique in focus groups followed by price point questionnaires. The process is detailed later in Chapter Four as part of two case studies.

Information about existing products competing to meet the same needs can be obtained through searches of sites such as the USPTO (US Patent and Trademark Office)

How is the Context information used?

The purpose of consumer needs data is to inform what features and functions the consumers would like to see in the product. To derive this result from the data, it has to be transformed from the consumer language into a "designers" language. At the T^{2}RERC, a multi disciplinary group accomplished this. Consumer needs would be gathered by evaluators at focus groups using pre-defined "device evaluation criteria" such as effectiveness, affordability, reliability, durability, etc. and the resulting "needs" would be transformed by the engineering group into corresponding desirable features, rank ordered later through a survey. This can be modified (features added or changed) according to simultaneous market information about competing products or lack of them. Sometimes context data might contain concrete examples of languishing inventions that can be redesigned and/or patented to fulfill consumer needs.

Section two: Input Evaluation

What kind of information from Input evaluation is crucial for the development process?

After defining the goal of the development project (for example, what product/service is to be developed) the next concern is how to do it. Key information required at this stage is the availability of resources – material, personnel and finances (funding sources) that are needed to take this project forward. Input evaluation can provide this information.

How does evaluation provide input information?

Interestingly, input evaluation can sometimes be performed, and often advantageous to perform, along with context evaluation, by focusing on opportunities available in the context. Again, surveys, questionnaires, personal contacts via emails and telephone calls to job facilitating agencies, searches through their websites – are all useful tools. Open calls with job descriptions followed by interviews are commonly known procedures for personnel hiring. Funding sources searches followed by grant applications are other means, preferably done early enough to start the project in time. Note that while input evaluation can involve several formal mechanisms, each carefully planned and executed in time, they often do not involve formal, extensive field studies as context evaluations do.

How is the input information used?

The purpose of input information is to help structure the project so it is not only feasible but will also be cost effective. In other words, the purpose is to pull together appropriate resources – in terms of personnel and material- that will yield maximum results in terms of product quality and product relevance with a minimum of cost to the project. Personnel selection

should include a multi disciplinary project team capable of conceptualizing and developing the desired product characteristics. At the T^2RERC for example, development of a hearing aid (device using hearing impairment technology) would include a clinician-audiologist in addition to designers, consumer experts, business experts and evaluator consultants. Use of funding sought through grant applications have their own guidance and requirements about how the finances are put to use. Material selection is another area of expertise that is a consideration in personnel hiring. The manager has to ensure that all these data required to set up the project (structuring) will be part of the hiring and interviewing process. A plan will necessarily precede the rest of the process in order to secure funding.

Section three: Process evaluation

What kind of information does process evaluation generate? And why is it important?

The two initial stages of the development project lay out the plan for the development process (set goals and scope the project) and its structure (operationally define resources); at this point it only represents a process that is intended to work and will potentially turn out a successful product. However, whether it will work as intended and whether any adjustments must be made to the process to achieve the desired result can only be known by implementing the plan and observing it. This is exactly what successful managers do – implement it for observation; The information needed to improve the process is what process evaluation will obtain by closely observing the implementation process, checking it at critical points to see if it works as intended, and recording the observations along with deviations if any. Timeliness of the different outputs (results) at various process points are also important as the outputs at one point usually feed the next step and so on, so that the end result is dependent on the intermediate

results and their timely occurrence. The basic process check ensuring timely deliverables is commonly known as monitoring and process evaluation can sometimes go beyond it and conduct elaborate process studies. For example, the T^2RERC observed the implementation of its technology transfer process (which involved product development) as it was being applied, and recorded the barriers and facilitators of the transfer process as and when they occurred.

The importance of process evaluation is twofold. First, the process has to be "adjusted" to enable the product to take shape as expected; in other words, it has to be appropriate at key points so the product turns out with the expected quality – when the process is said to be *effective.* Second, the process has to work with the minimum amount of delays such that the product is on schedule. This makes the process *efficient*. So the process observations are used to change it both for effectiveness and for efficiency.

Section Four: Formative and Summative Evaluation of Product

What is formative evaluation?

As mentioned in the previous chapter, formative evaluation is a product (prototype) assessment done on the prototype during the process of its development to ensure it is taking shape as expected (See Figure 1). Both its technical quality as well as its composition in terms of the desired features and functions is the focus of this evaluation. Of the four types of evaluation being discussed here, formative evaluation is the most common evaluation undertaken in practice by product developers, which speaks to the importance of the information generated by formative evaluation.

What kind of information does formative evaluation generate and how is it used?

The type of information obtained depends on the type of product targeted, the desired characteristics, the desired composition, etc. For example, the visibility of buttons on a household appliance, the accessibility of a software program to a blind user, the affordability of a wheelchair as designed using expensive material (its composition) are all targets for evaluative information. Key evaluative questions asked in each case are centered on whether the prototype characteristics meet end user needs? Meet or exceed technical quality standards? Equal or surpass market competitors in terms of value?

The main purpose of the information is to make improvements to the prototype. Features are added or modified according to the findings of the evaluation. The resulting improved version of the prototype is again formatively evaluated, through implementation of the same process and observing how it meets the desired criteria. Theoretically, this evaluation results in further improvements, leading to iterated evaluations and improvements, but in carefully undertaken practice, two or three prototype versions should suffice. At the T^2RERC, generally alpha (first) and beta (second) prototype versions were the practice, occasionally calling for a gamma (third) prototype.

How is formative evaluation information collected for prototype development?

Again it depends on the product, but generally speaking, focus groups and surveys are useful techniques. Information is preferably gathered with the consumers reacting to the actual prototype and assessing it in terms of own need, using previously defined criteria. The sister module on primary market research has a detailed discussion of these methods. For details please see:

Flagg, Bauer and Stone (2009). Primary Market Research Module

Is formative product evaluation same as process evaluation?

No. First of all, formative evaluation is an assessment of the product and not of the process. However, process changes may be necessary in order to improve the product, which may be indicated by process evaluation. But the two are not the same. The focus of process evaluation is process; the focus of formative evaluation is product.

What is summative evaluation?

Summative evaluation is the assessment of the final version of the prototype in order to document its quality status (and value) before certifying it into the production and distribution phase. It is theoretically the final iteration of a series of formative evaluations when it needs "no further improvement". At this time, evaluation focus is to record the efficacy (quality and value) levels of the final prototype, which is at the same time an indication of how effective and efficient the development process was. For this reason, a complete summative evaluation of product done at the end of the project will also include cost data so cost effectiveness and cost benefit may also be recorded.

It is worth noting that summative evaluations focused on product efficacy are not common industry practice, given the realities of the practice world. Repercussions of this omission may not be noticed, especially if formative evaluations have been well conducted. Yet, summative evaluations are important data that permit managers to better understand product performance in market and the reasons why they fare as they do. The efficacy studies conducted by the T^2RERC and presented in Chapter Six will illustrate some of these points.

Section Five: Evaluating the impact of the product: tracking the effects of the development project

What is meant by impact and why is it important to assess it?

One of the intents of context evaluation is to provide end user needs information to the development project manager so goals could be set with the right product in view, the right resources could be assembled to incorporate right characteristics into the prototype before testing, improving and certifying its performance. Although this marks the development project cycle, it cannot be assumed that the output from the production process will be sure to satisfy the end users and be a success. To be declared truly successful, the *impact* on the end user has to be positive. In the case of the T^2RERC for example, the commitment to transfer improved products to market meant ensuring an improvement in the independent functioning of persons with disabilities for whom the products were designed or re-designed. In other words, the impact on the lives of end users with disabilities was an indicator par excellence of the success of the designed assistive product.

Just as a note of clarification, sometimes impacts may be referred to as the "outcomes" or effects of a development project. This is because they represent a change in the project's external environment as a result of the project's "output"- which is the developed product.

While impact assessment is important from the end user perspective, it is important to development managers from the perspective of gauging the effects of their process. How satisfied is the consumer with the product? How might we make the process better if the satisfaction levels are not as high? How can we improve and expand the product line in the case of high satisfaction levels? If the satisfaction is differential, what is the corresponding market

segmentation? What other products might be successful with particular market segments? Impact evaluation can provide answers to these and other questions and can give the necessary feedback for managers to keep their business alive and thriving. As an example, Black and Decker, one of T^{2}RERC's partners that produced the Lids Off jar opener with great success opened up a line of products subsequently. Meanwhile, our efficacy study on Lids Off, as seen later in Chapter Five, showed the device had considerable impact on the lives of end users and had been received very well.

How are impacts assessed?

Usually these require a longitudinal study in order to track each end user regarding if and how the person is using the product. The tools may be questionnaires, telephone interviews, personal observations or a combination, linked with the details of use/ abandonment of the product. Home trials of products by consumers are very useful and informative. We dispense with details in this section as it is illustrated in the T^{2}RERC efficacy studies presented in Chapter Five. You will note that, additionally, these studies also held onsite or laboratory trials where users did hands on evaluations of the products. We clarify that this was in part to fulfill a summative evaluation mission not completed before production and distribution by our industry partner.

We hope that the theoretical perspective and concepts presented in the previous chapter coupled with methods outlined in this chapter will serve as basis for an understanding of the remaining chapters where we present actual case studies illustrating the points discussed here.

CHAPTER FOUR

Case Study Illustrations from the T2RERC: Needs assessment and formative evaluation

James Leahy, Douglas Usiak, and Sajay Arthanat

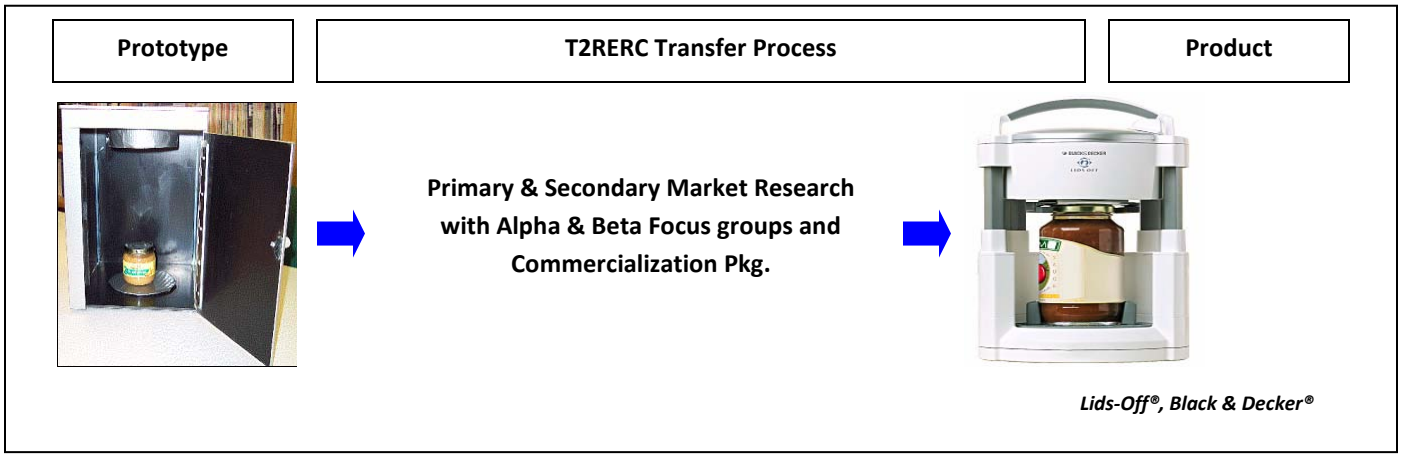
We dedicate chapters four, five and six to several case studies conducted at the T^{2}RERC which illustrate the points discussed in the earlier chapters. In this chapter we describe two cases of formative evaluation and needs assessment done in combination, which we conducted in partnership with the respective manufacturer. The partner companies were Black and Decker and Kodak - both Fortune 500 companies. The intent of T^{2}RERC's partnership was to intervene in the product design process to make sure that (a) the consumer needed features and functions were incorporated and (b) the alpha and beta prototypes were tested with consumer groups and improved to the desired point before entering the market. In other words, the concern included both a needs assessment and a subsequent formative evaluation. As pointed out earlier, although needs evaluations are ideally done at the beginning of a development project **as** part of context evaluations, they are often skipped in practice for practical reasons. These two cases were no exception.

Case A: the Black and Decker automatic jar opener, the "Lids Off".

For a better understanding of the evaluation of the Lids Off device we outline here the development of the T^{2}RERC's partnership with Black and Decker in relation to the development of the Lids Off device. For a more detailed coverage of the story, please also see the next chapter.

The Black & Decker® Lids-off™ uses a unique, motor driven gear system that grips and breaks the vacuum seal on a jar to unscrew its lid. As illustrated in Figure 2 below, the T²RERC actively facilitated the design, development and commercialization of the Lids-Off™ through intervention from its early prototype stage (Lane, Bauer & Leahy, 2003).

Figure 2: Development of the Lids-Off™ Automated Jar Opener: From Prototype to Product



The concept and prototype of the Lids-Off™ was first introduced by a college student at an intercollegiate inventor's competition. The student won the competition mostly due to the prototype's versatility to work for people with all levels of strength and dexterity, and to work with a wide variety of jars and lids. Having recognized the limitations of existing products for people with disabilities, the T²RERC contacted the student and offered to provide necessary technical assistance for its development and commercialization. In the interim, Black & Decker® had acquired ownership of the prototype. In subsequent discussions, the Black & Decker® design team expressed three key concerns to the T²RERC about the existing prototype: a) the prototype did not address their expected functionality; b) the potential market was unexplored and difficult to define; and c) the consumer need for the projected product was not

validated. Pursuant to its mission, the T^{2}RERC offered to provide supporting information to Black & Decker® regarding these three concerns.

The T^{2}RERC first conducted secondary market research by reviewing existing market data (Green & Tull, 1975; Bautista, 1999) and evaluating patented prototypes to ascertain the existence of competing products or patents. Although competing products existed, none of them were designed with the usability and accessibility features needed by the majority of people with disabilities and the elderly. A few viable patented solutions existed, but none had been reduced to a commercial product.

The T^{2}RERC subsequently conducted primary market research (see Flagg, Bauer, and Stone 2009 – Primary Market Research Training Module) involving consumer panels in order to reliably gauge and validate the consumer demand (Green & Tull, 1975) for an automated jar opener. Participants in the panel included those with and without disabilities with a preset demographic composition that mirrored the breakdown of potential consumers nationwide. The consumers were asked to rate their level of satisfaction with current options for opening jars. Their interest with respect to having a home appliance to open jars was also gauged in terms of purchase intent and an acceptable price point. The results reflected an overwhelming need for a jar opening device substantiated by the fact that consumers were very dissatisfied with current methods of jar opening. Consumers were also given the opportunity to critique several patented prototype models, each offering various mechanisms, features and aesthetics. The results of the primary market research were compiled as a *commercialization package*, a report of the T^{2}RERC's technical assessment and market evaluation. Black & Decker® reviewed the *commercialization package*, recognized the prospect of a user-friendly jar opening appliance, and decided to pursue its development.

To elicit more detailed input on product features and functions from consumers representing the target market, the T^2RERC conducted several *alpha* (*concept definition*) focus groups. Participating consumers (with similar demographics as those in the panels) listed, defined and prioritized the *ideal* functions and features required in an automatic jar opener. In all, twenty-nine specific design features and functions for the "ideal" automated jar opener were derived from the *alpha* groups. The Black & Decker® design team created a prototype to incorporate these *ideal* features. Subsequently, with this refined prototype, the T^2RERC conducted a *beta* (*prototype evaluation*) focus group to validate that the required *ideal* features were integrated into the prototype. The beta group was comprised of a subset of mainstream consumers, the elderly and people with disabilities from the alpha groups.

The beta group evaluated a revised functional prototype and multiple non-functioning models and indicated that the Black & Decker® version had addressed twenty-seven (93%) of the twenty-nine recommended *ideal* features, suggesting that the design team had meticulously taken into account the consumer input recommended by the T^2RERC. In the process, the consumers evaluated three prototype models and ranked their design features such as the overall shape, button location, button size, button shape, type of handle, and type of lock/unlock activator. The *beta* focus group evaluations guided further design iterations to the prototype and the Black & Decker® design team incorporated six additional design features into their final product version. The Black & Decker® "Lid's Off™" automatic jar opener was launched in spring of 2003.

For more details on the case, see also the following:

Lane JP, Bauer SM, Leahy JA (2003). "Accomplishing technology transfer: what works, what doesn't and why? *Assistive Technology*. 15, 1 pp.69-88.

The Lids off Alpha and Beta Prototype Assessment: the Focus Group Process

The focus group interviews addressed the Alpha prototype version and the refined Beta prototype version in Steps I and II respectively.

Step One:

Three focus group sessions were held to test the Alpha prototype. The focus groups primarily targeted women who identified themselves as the persons who were responsible in food preparation, and twenty percent of each group had persons with hand and arm disabilities that would prevent them from opening jars without assistance.

As described earlier in this guide the Alpha focus groups were run to provide the functions and features that group participants wanted in such a product. The decision of the T-2 RERC team was to focus on the *Concept definition* (Ideal Product) process to clearly exhibit to the Research and Development team of the company what was expected from a product of this nature.

Each group had 12-14 participants, held in a fully accessible facility. The facilitator was equipped with an R&D team approved discussion guide, a means to provide confidential communications with both the company's R&D team and the T-2 RERC team. The focus group room was arranged with tables and chairs set up in a horseshoe pattern, allowing the facilitator to walk down and between the participants, giving direct facilitator to participant conversation

when needed. This physical closeness allowed the facilitator to keep the conversation moving and gave the opportunity to keep all participants in the discussion.

A discussion guide was used to stimulate participant's conversation. It is presented in Chapter Seven along with other instruments. "Concept Definition (Ideal product) has a series of in depth questions that are based on the T-2 RERC's consumer 11 attributes, which define consumer's criteria for product selection (for details, see 7E. Focus Group Script, in Chapter Seven). The group began by having the facilitator review the necessary rules and protocols before entering into the topic.

The second area of concentration was "Current Status", a discussion that allowed participants to feel comfortable talking about what they knew and had personal experience with, before brain storming with the free flowing divergent discussion which provided the functions and features of the concept product. The Current Status provided the company's R&D team knowledge of what participants currently liked and did not like in technology used in their homes. It provided consumer limitations and benefits of the same technologies.

The qualitative information that was received from the three Alpha groups was analyzed and summarized down to twenty-two functions and features for an automatic jar opener.

Step Two:

Participants of the two Beta Focus groups were composed of two-thirds of the original participants. This group would be able to provide the company with appropriate specific feedback

defining the original concept. The Beta group process sought to quantify the functions and features derived from the Alpha groups, as it related to how well the prototype had met the criteria.

Once the participants provided the ranking of the functions and features, a working prototype was demonstrated to them, and then a scripted discussion was used to find out how well the company met the participants desired functions and features. This was achieved by reading off the Function or Feature and asking the group:

-Did the Product meet the expectations of this statement?

-Did the product exceed the expectations of this statement?

-Did the product miss the expectation of this statement (and why or how?)

Three Styrofoam models were then presented to the participants to show possible size, shape and operations. The participants were then led through a ranking and discussion identifying their likes and approval of the design features of the models. Results of the Beta Groups are then analyzed and presented to the Company for product development.

A Pricing questionnaire was presented to the participants at the end of both the Alpha and Beta groups. For the Script for Beta Focus Group see 7E, under Chapter Seven.

As mentioned earlier, the Lids off came to market in 2003 and was a big success.

Case B: the Kodak Easy Share Printer Dock Plus.

Each case of technology transfer by T2RERC was unique in terms of accommodating the needs and opportunities of the partnering company while achieving the unmet needs of consumers through the functions and features of the new prototype. Thus, the case of the Kodak Easy Share Printer Dock Plus was a case of Market Broadening for the company. The focus groups were run in order to convince the company to add functions and

features to a product they were already developing. The product was a Digital Imaging Printer, where the company was looking to provide ease of use for the older consumer without losing the current market niche. We now outline the partnership development and follow it with a description of the prototype assessment.

In early 2004, a T2RERC staff member attended a professional conference and met an employee of Kodak. Through casual conversation and learning what the T2RERC has to offer, the Kodak employee thought it was worthwhile to pursue our assistance with a certain product idea that was evolving at Kodak. In June of 2004, members of the T2RERC team met with Kodak representatives and discussed a proposal for development of a new product idea.

The purpose of the proposal was to develop a working relationship with Kodak and to offer various product development options, all with Transgenerational Design incorporated. Transgenerational design meant encompassing and making the product accessible for persons with disabilities and the elderly and at the same time offer a larger market for Kodak. Altogether 5 options were presented to Kodak and they chose to have the T^2RERC assist with feature identification and prioritization of a development project they had already started. The new product would be a home imaging system, where a digital camera could easily be connected to a docking station where pictures could then be edited or printed.

In our proposal, Kodak was informed of our process of arriving at the Ideal Product through consumer focus groups. Kodak was also notified of their Intellectual Property rights. Any new ideas, suggestions or product concepts that are derived from the focus groups would legally belong to Kodak. Also included in the proposal was a description of the typical procedures and methods of the Alpha and Beta focus groups as well as the time frames to

complete the project. Kodak agreed to the proposal and our working relationship began. The remainder of this chapter discusses the actual methods of the Kodak case as well as some of the findings.

The Kodak Easy Share Printer Dock Plus Prototype Assessment: the Focus Group Process

Step 1: Consumer Recruitment

The T^{2}RERC places a strong emphasis on consumer input. To ensure our market research addresses the mass-market customers for new products, we recruited people comprising a 'representative sample' of the US population. Recruitment from the general population was done primarily through mass media advertising (television and newspaper ads). As part of our sample, we insured that the groups had 80% of individuals who were both amateur and professional photographers, and also that 20% of the groups were individuals who were over the age of 60 and had some limited finger/hand limitations.

Recruitment of these consumers was accomplished through the WNY Independent Living Project's database of consumers, prescribers, and caregivers which allowed us to recruit the device appropriate participants with disabilities. Participants were screened for eligibility by asking them questions such as 1) Do you own and use a digital camera?; 2) Do you own and use a digital video camera?; and 3) How do you process your digital images from your camera(s)? Other screening questions asked participants to rate themselves on the level of difficulty they experience with their fingers such as, "How well can you locate the buttons on a small cell phone with your fingers?" Focus Group participants for the Home Imaging System groups received remuneration in the amount of $75 for their time. Participants also received light refreshments (sandwiches, soda, snacks, etc) at the sessions.

Step 2: Alpha Focus Groups

The focus group process followed the following outline

A) Part 1 (Individually)

1) Product Evaluation (one on one) – current state of the art digital cameras – product demonstration followed by actual use of camera by participant

2) Listing of features currently available on digital cameras (State of the Art) – starting point – state we are seeking something new: Goal – have people think outside the box- next generation

B) Part 2 (Group)

1) Background/current situation information – what are people seeing/feeling/know about digital cameras. What are the problem areas? Pictures lack quality because of focus, condensation on lens, red eye, centering, light adjustment, power – battery, etc.

2) Discussion of strengths and weaknesses of products evaluated

3) Discussion of ideal product – again emphasize having people think outside the box - Different size, shape, configuration, features.

4) Discussion of features wanted by consumers in Ideal product – ranking of those features

5) Price point/purchase intent on ideal product

6) Where do you (participants) go for product information – Consumer Reports, Internet, Photography or Technology magazines or publications?

Dates: We held the consumer focus groups in January/ February of 2005; the topic was to identify the key design and functional features of the Ideal Home Imaging System for printing/modifying digital pictures. Participants were asked to participate in an open forum discussion led by a focus group moderator. Information was collected on: (1) the current situation of participants in regards to what they do with their digital pictures after they have taken them; (2) a critique of a non functional Kodak prototype, 'Docking Docks', identifying strengths, weaknesses and opportunities for the device; (3) identification of key design and functional features for the Ideal Home Imaging System of the future.

Participants: The first focus group comprised of 13 professional photographers. The next two focus groups had 14 participants and 13 participants respectively. They were comprised of

Advanced Amateur digital camera users. Ages of the participants ranged from 18 to 65 years of age. These groups were mixed rather than uniform samples, so that all participants are exposed to various relevant perspectives.

Pre-handouts: Information handouts were distributed to participants prior to the focus group sessions. The purpose of the handouts was to provide a knowledge base to the participants. These were:

> Handout One: THE KODAK EASYSHARE PRINTER DOCK PLUS. It described Device Compatibility based on a listing of fifteen of its features.
>
> Handout Two: CURRENT STATE OF THE ART. This document focused on the General Features of Digital Cameras and Camcorders Currently Available in the Marketplace.

Model Evaluation: Prototype Docking Docks: The groups were conducted in the same facility that was fully accessible for all participants to equally participate. Refreshments were provided and the same table and chair set was employed as stated in the first example. Instead of having the R&D team in contact via video conferencing these groups were run with the development team in the control room watching the group through a one-way mirror. There were multiple Kodak attendees from their R&D department. All observers had immediate access to the group facilitator via a microphone that would broadcast their question to a headset worn by the focus group facilitator.

The focus group began with a product demonstration. The presentation was to insure that all participants had a common base-line of understanding of where today's technology is at. In doing so the T-2 RERC team chose a digital printer that was just introduced into the market. In

demonstrating the printer a script was read to provide a consistent means of presentation to each group. (See 7H in Chapter Seven for the Focus Group script)

Participants were then asked to provide their initial impressions of the prototype, their perceived weaknesses of the prototype; perceived strengths of the prototype and their perceived opportunities for the device. They are summarized below:

The *Initial Impressions of the prototype Docking Docks* covered a range of positive observations such as it was good for the non-professional photographer, customizable, had multiple functions, compact size, can download music, easy to use, portable as well as concerns such as its thermal print cartridge, its being technologically overwhelming, limited print size, small viewing screen, etc. Many said they "Loved it!" [Specifically: Does everything that normally takes six or seven steps; can use it as a DVD recorder for their television; No need to use cables to connect docks; Wireless Capability; Only have to buy modules that you need.]

Strengths of the Prototype Docking Docks pointed out by the participants covered a range of observations such as being good for first time digital user and those who don't use computers. It covered the size (compact; convenient), portability. viewer size on the camera, multi-functionality, aesthetic pleasantness, simplicity, rechargeable batteries, photo paper, wireless compatibility; the ability to burn both DVD and CD, high Level of print quality, modules having all options in one system and stacking easily, etc.

Weaknesses of the Prototype Docking Docks expressed by participants included concerns about: the interface, use with camera brands, size, viewing screen, buttons and labeling for functions, paper, paper tray, prints, security and safety, appearance (could be better), durability (for example, kids would be more apt to play with it and possibly break it); space occupied by the device when unstacked, repairability, battery life, outdoor use, etc.

Pricing for Prototype Docking Docks: Pricing information was obtained via a questionnaire distributed to the focus group participants. (See Chapter Seven for Questionnaire). Pricing was based on the prototype Docking Docks presented to the participants which included modules for power, printing and DVD/CD writing.

Docking Docks price ranged from a low of $105 to a high of $1500. Separate pricing for individual parts ranged from $50 to $300 for the Printer Dock; $50 to $300 also for the DVD Burner; and $0 to $1000 for the Power Share.

Descriptions of the Opportunities (product enhancements) for the Docking Docks according to participants: Participant input included suggestions and preferences such as-- a hinged lid or complete cover, ability to interface with more cameras; transferring pictures (have a fire wire; Multi-card reader built-in), audio -- among other things. These suggestions corresponded to the weaknesses they had earlier pointed out.

Description of the Ideal Home Imaging System: The focus group participants were then asked to develop their version of the Ideal Home Imaging System. The following is a listing of the features and functions of the Ideal Home Imaging System as identified by the focus group participants:

I. Functions of the Home Imaging System (HIS)
- A. Editing
- B. Storage
- C. Interface
- D. Printing
- E. Prints
- F. Monitor
- G. Controls
- H. Power
- I. Security and Safety
- J. Aesthetics
- K. Instructions

L. Consumables
M. Service
N. Miscellaneous

II. Specific Features were suggested within the above Functions. For example, the following were suggested for A. Editing

A. Editing: Options should include:
1. Photoshop type editing
a. Red eye reduction
b. Auto-enhancing (contrast, brightness, sharpness) - automatically
1. Have option to reject suggestion
2. HIS would inform user if desired size of printed picture quality wouldn't be good
3. Ability to alter all color and scene modes
c. Auto-focus
d. Cropping
e. Insert lettering
1. Label them with 25 characters
2. Date stamp on the back
f. Add audio to DVD's or CD
1. Can use voice narration to video or pictures
2. Add music to videos and stills

Pricing for the Ideal Home Imaging System (HIS): Finally, pricing information was obtained via a questionnaire distributed to the focus group participants. Pricing was based on their *'Ideal'* Home imaging System being developed and coming to market. Overall, it ranged from $ 150 to $2100. Professionals priced it from $150 to $1500. Amateurs priced it from $275 to $2100.

We close this chapter noting that the Kodak device was a highly successful product, having incorporated almost all of the features suggested in our focus groups. It came to market in December, 2005 and to the CES [Consumer Electronics Show] and PMA [Photo Marketing Association] in January, 2006. Its suggested retail price was $199.99.

CHAPTER FIVE

Case Study Illustrations from the T2RERC: Summative and Impact Evaluation

Michelle Lockett and Vathsala Stone

The products transferred through the T^{2}RERC typically undergo the stages of formative evaluation and initial summative evaluation before their licensing to the manufacturer. As it was felt that an extended summative evaluation as well as an evaluation of their impact still remained to be explored, questions were raised about the efficacy of these products. This gave rise to efficacy studies of three devices transferred by the T2RERC. These addressed the concerns for summative and impact evaluations by focusing on outcomes for the end user. The major goal of the efficacy studies was to verify the final product's overall quality, value and consequently, its importance to the user.

Each of the three products, Lids Off, Point Smart and Kelvin, has a unique story of how they came to market with varying degrees of involvement from the T2RERC. Ultimately each product follows a different path of technology transfer. The individual stories of how each product came to market is described below.

Section one: Device development stories

Black and Decker's Lids off Development Story

In 1998, Black and Decker decided to focus their efforts on their original core business unit of power tools. As a result, they sold their household products division to Windmere-Durable Holdings with the agreement that Windmere could still use the Black and Decker brand

name. The end of 1999 brought many changes to Windmere. Reorganizations and consolidations of sales, marketing and product divisions as well as manufacturing plants ended in a corporate name change in May 2000 to Applica Incorporated. With new facility locations and new directives, Applica's primary product strategy was now focusing more on creating innovative solution oriented products with the goal of linking the Black and Decker brand name to this product image. The company was looking to advance on the global market by becoming a leader in small appliances. ("Applica Incorporated," 2006).

Black and Decker (Windmere at the time) contracted with Yale University in pursuit of innovative product designs created by students. Black and Decker provided Yale with a descriptive list of their own new product ideas that would be used by students to develop into prototypes. In return, Yale handed over the intellectual property rights of all opportune inventions to Black and Decker.

Ms. Jen Davis, a student at Yale, chose to develop an automatic jar opener, one of Black and Decker's listed product ideas. She completed a prototype and called it the "Twistmaster". She submitted the Twistmaster to the BF Goodrich Collegiate Inventors Competition and won in 1999. This is when the T2RERC became involved with the development of the automatic jar opener.

Prior to the BF Goodrich Collegiate Inventors Competition, the T2RERC realized there was a need for a solution to opening jars. Our own personal experience with people of various disabilities confirmed the difficulty elderly and anyone with limited hand function has when opening jars. Additionally, the need was specifically identified by the RERC on Technology for Children with Orthopedic Impairments. When the winners for the BF Goodrich Collegiate

Inventors Competition were publicly announced, we promptly contacted Ms. Davis to see if she had plans for taking the prototype further into development and offer our assistance. She explained that Black and Decker held the intellectual property rights and we should contact them Leahy, J. (2003).

Our discussions with Black and Decker revealed they were interested in the prototype, however had some reservations. First, the prototype did not address their expected functionality. Second, the potential market was unexplored and difficult to define. Third, Black and Decker felt the consumer need for the projected product was not validated. Although Black and Decker ideally liked the prototype's potential (because it fit in with their new line of ERGO products and was indeed innovative), they still had more market research ahead of them.

The T2RERC offered our assistance with this market research because of our interest in this invention. First we identified a few competing products that did not offer the full jar opening capabilities of the Black and Decker envisioned product; nothing that both gripped the jar and twisted the lid. There were some newly patented solutions that came close but still fell short of what Black and Decker wanted to produce. We defined and quantified secondary consumer markets, which provided Black and Decker an even larger potential consumer base than they had originally anticipated. To validate the consumer need, we conducted consumer panels.

In May 2000 consumer panels consisting of participants from the primary and secondary consumer markets were held at the WNY Independent Living Project, Inc. The participants were asked to rate their satisfaction with the current methods for opening jars (very low) and their interest in having an automatic jar opener that actually worked (very high). Participants were

also given the opportunity to evaluate several prototype models, each offering various mechanisms, features and functions. Results from these panels proved very useful in developing a commercialization package to be used in convincing Black and Decker that there was indeed a market for this product. In conclusion, the product had considerable commercial potential, given the small amount of effort needed to open a variety of lids.

Following the results of the consumer panels, Black and Decker decided to move on with the development of an automatic jar opener. By October 2000, they established an internal design and development team to start the process from scratch with all new prototypes. Over many months they developed several prototypes, all slightly different. The T2RERC worked with them to uncover the ideal product through Alpha Focus Groups. A full range of desired attributes were deducted from prioritized functions and features mentioned within the focus group. These consumer defined attributes were key to developing a successful product and provided information which Black and Decker had not previously investigated.

Over the next six months the Black and Decker design team worked on refining their prototypes to incorporate some of the desired features revealed in the Alpha Focus Groups. They were able to include 27 of the 29 recommended functions and features. The next step was to have some of the same original Alpha Focus Group participants back to evaluate the refined prototypes. This second round of Focus Groups is called the Beta Groups. Three new prototypes were presented which showcased the desired functions and features each in a different way. Participants of the Beta Groups ranked the importance of each of the previously recommended functions and features and then judged how well the new prototype incorporated each of them. From these consumer evaluations, six design features specifications were finalized and the "Lids Off' product was launched in the spring of 2003.

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Infogrip's Point Smart Development Story

The original idea of Point Smart began at the University at Pittsburgh with a graduate student named, Ed LoPresti, who was working for the RERC on Wheeled Mobility. During his work there, he created a software product that would assist individuals with cursor control on a computer. The new product would help people who had limited hand function or trouble with hand stabilization to move the cursor (arrow) on the screen. It would also assist with the selection of items for those who had difficulty clicking a mouse.

To begin the process of product development, Ed contacted both the Technology Transfer Office at the University at Pittsburgh and the RERC on Technology Transfer (T2RERC) at the University at Buffalo to help bring this product to market. The T2RERC team saw potential in this product and decided to assist with bringing it to market. The University at Pittsburgh had intellectual property rights because the prototype was created there. We contacted the University at Pittsburgh's TTO and asked their permission to act as transfer agent of this new technology. As a transfer agent the T2RERC would identify types of licensees, conduct market research, and quote reasonable terms for licensing, royalties and upfront payments. All actions taken by T2RERC would be in the interest of the University at Pittsburgh. Ed LoPresti had agreed to be an advisor to the manufacturing and marketing of his new product.

Our first task was to identify a manufacturer which may be interested in producing this product. We had some previous manufacturing and distributor contacts in the assistive technology software industry and decided to contact Infogrip. After we explained to Infogrip the concept of Ed's software, they wanted to review it. We sent Infogrip the manual and CD of Ed's

software. Infogrip reviewed the materials and felt the product had potential but believed it still needed work, particularly the interfaces needed to be redesigned.

A software developer was identified and commissioned to redesign the interface and to make it compatible with different operating systems including Windows 95, 98, 2000 and XP. The project was now up and running and we agreed to evaluate the revised product and share the product development costs.

Upon evaluation of the redesigned product, we found functional flaws. Certain features would not work consistently and certain devices were not compatible with it such as touch pads. Even though the software was not perfected yet, Info grip decided to bring it to market because they had many customers requesting such software and this could bring a smaller manufacturer such as Info grip needed capital. Although they did not follow the ideal path of evaluation during product development, Info grip had the intention of getting feedback from customers to be used when producing the next generation. In fact, Info grip did use the consumer feedback from our efficacy study to make improvements to subsequent generations. The original Point Smart was released into the market in 2005 with the second generation including technical improvements released in fall of 2008.

Action Talking Product's Kelvin Talking Thermostat Development Story

The Accessible Thermostat, although never available on the market, was a predecessor to the Kelvin Talking Thermostat. The concept originated from one of Ronald Mace's universally designed household products. Mr. Mace was a professor at North Carolina University and developed the concept of universal design, which "strives to be a broad-spectrum solution that produces buildings, products and environments that are usable and effective for everyone, not

just people with disabilities". ("Universal design," 2009, "Definition," paragraph 1). Mace frequently published papers on this concept and often used household products to demonstrate how easily they can be transformed into something that is useful to a larger consumer base, not only mainstream consumers but the elderly, children or people with disabilities. Many companies adopted this concept and began creating products that were Universally Designed.

The T2RERC recognized the commercial potential of not only the concept of universally designed products but also the many product improvement ideas which Mace had already discovered. In 1995, the T2RERC together with Mace took a close look at the commercial potential of his products ideas. This is when we identified the Accessible Thermostat as a potentially promising product. Among its attractive features included user-friendly operation, voice output, fully accessibly control buttons and remote control (Leahy, 2005).

After preliminary discussions in late 1998 with our corporate contacts, we learned that companies would be very hesitant in developing this product because they could not patent it. It was publicly disclosed a few years prior, meaning that we could not protect it as intellectual property because of the "one-year from first public disclosure" time limitation. In addition, Mace had previously presented the product idea numerous times in various venues. This would leave the product idea vulnerable to competitors.

The following year, we learned of an individual, Mr. Scott Flood, who had obtained a patent on an auditory output feature which could be used on home thermostats. Mr. Flood was interested in finding an engineer to design the product, so he contacted Dr. Gregg Vanderheiden of the RERC on Electronic Technology Access at the University of Wisconsin. Dr. Vanderheiden had previously created an auditory accessory to thermostats that would "speak"

the temperature. We now knew if we could link Mr. Flood's patent with Mr. Mace's product idea then we would have a better chance of pushing this product to market.

Negotiations between Mr. Flood and the University of North Carolina State, who owned the designs for the accessible thermostat began and continued for a full year. Work now centered on building a stronger product design and a compelling commercialization package that would truly interest manufacturers. Five focus groups were held to identify consumer needs and preferences in order to streamline the product design. Additional market information was obtained to provide manufactures with even more convincing reasons why they should produce and sell this product. After presenting all of this new information to manufacturers such as, Honeywell, White-Rogers, Maple-Chase, Hunter and others not one expressed serious interest.

Three reasons appeared to be preventing us from pushing this product to market. The high technology costs associated with producing the thermostat were too much for manufacturers to invest in, particularly when they perceived the size of the market as too small. In addition to the high production costs and potentially small market, manufacturers were worried about competitors copying the design once it was available to purchase by the public.

Despite these barriers, we were convinced this product had potential and decided to revamp the commercialization package. We now approached the companies which initially showed interest in Ron Mace's original design. As we were having on and off discussions with these companies we decided to let Scott Flood try to push the product on his own using our revised commercialization package.

In 2001, Scott Flood brought the product idea to the National Federation of the Blind (NFB). The NFB referred Mr. Flood to the president of Independent Living Aids, Marvin

Sandler. Mr. Sandler was impressed with the product concept and recognized it's potential as we had. He took it upon himself to find a manufacturer. Approximately two years later, a new thermostat company was formed, Action Talking Products.

Almost 10 years had passed since the original Accessible Thermostat was invented by Ron Mace and since that time technology costs drastically decreased. In January 2005, Kelvin was officially released at the Assistive Technology Industry Association (ATIA) conference by Independent Living Aids, Inc. of Jericho, NY.

Section Two: Methodology of the Efficacy Studies

Evaluative Questions

The purpose of the T2RERC efficacy studies is to investigate the quality (merit) and value (worth) of the project's transferred products, in terms of how well they meet the needs of end-users with disabilities, the project's ultimate beneficiaries. Two main questions drove the studies.

Q1: How do products transferred through T^2RERC compare in *quality,* with other products/methods available to consumers with disabilities at the time of transfer?

Q2: To what extent do users with disabilities value the products transferred through the T^2RERC, compared to alternatives available to them?

Procedures

All 3 studies were conducted in three distinct phases. First, predictors or indicators of product *quality* and *value* were identified, which directed the design of questionnaires and interviews for data collection. Next, consumers in the study sample evaluated the product against a pre-

determined competing product in systematic *onsite* lab trials of each product. The third phase involved the same study participants in phase 2, who now evaluated the test product in their own homes. The overall design was quasi-experimental (onsite trials) followed by longitudinal tracking (of home trials).

Phase 1 – Instrument Development**:** This phase involved capturing the necessary consumer information to create accurate assessments which would be used in Phase 2 and 3. We considered both professional (engineers and clinicians) and consumer perspectives in defining quality and value indicators. For each study, our research team observed and video recorded 6 or 7 consumers in their homes performing tasks on their own current device which performed the same or similar functions as the study device. Professionals were then invited, at a later date, to observe the video recordings and asked to identify problems encountered by the consumers. The identified problems were then used to create indicators of quality and value of each product. Combining guidelines on universal design (UD) from The Center for Universal Design out of North Carolina State University with the T^2RERC device evaluation criteria (Lane and colleagues, 1997) lends a relevant structure for organizing indicators for efficacy assessment. We constructed an Indicator Matrix using these two dimensions and obtained the framework against which to map specific indicators of product quality and value drawn from designer and consumer perspectives. For more information on how we tabulated and distributed indicators for the Lids-Off study see Stone, et al (2009).

Final indicator set included effectiveness and efficiency measures, usability measures (such as ease of use, comfort, operability and learnability), and relevant others such as durability. Value indicators addressed relevance/benefits to users, including satisfaction & benefits perceived from actual use; device use/abandonment; purchase intent and response to purchase

opportunity. The indicators generated questionnaires and interview scripts which were used in the next two phases.

Phase 2 - Onsite trials: Participants were required to attend an in lab device evaluation, structured to follow a repeated measures design. For each of the three products, we had identified a device which was its competitor at the time it was released into the market. We have omitted naming them for confidentiality reasons. For Lids Off, it was a power assisted jar opener mountable under the cabinet; for Point Smart, it was the Microsoft mouse software by default; and for Kelvin, it was a thermostat with similar functionality and features (voice input and recognition). Each participant tried out the product and its competing product in a pre-determined, randomized sequence, and performed the same set of standardized tasks. The Lids Off study involved opening 5 popular food jars covering a variety of jar and lid types. The Point Smart study sample used mouse pointer features of Point Smart and Microsoft to navigate specific websites, complete a simple email correspondence and carry out simple text composition tasks (such as highlight, cut and paste) using Microsoft Word commands. For the Kelvin study, the participants used each thermostat's command functions/features and performed 5 specific tasks: reading room temperature, changing the temperature setting, setting the time, setting the day and programming the device for weekday and weekend temperatures. In all three studies, participants gave detailed evaluative feedback on each task; using questionnaires provided in accessible formats (see Chapter 7). Trained observers recorded their performance on separate sheets. Additionally, as they exited, participants were interviewed for comparative evaluation of the product against its competitor and were asked about their assessment of product value and their purchase intent. Sessions were video recorded to facilitate post trial measurements of task

time and the related analyses. To see a copy of the actual instruments used, please refer to Chapter 7 of this Resource Guide.

Phase 3 - Home trials: Following the onsite trials, participants were given the device to use at home for 6 months for Lids Off and Kelvin and 4 months for Point Smart. Beginning with Day One and then continuing once a week for two months, participants gave us feedback via questionnaire. After the end of the questionnaire period, participants were given two more months to use the product whenever they desired. Once again after this last 2 month period they were given one final End of Trial questionnaire where they were asked about the extent of use (or abandonment) of the product. Questions on key indicators of quality (efficiency, usability, comfort, appeal …) were repeated on all questionnaires so changes in participant perceptions could be tracked over the trial period. The purchase intent question from the onsite interview was repeated in a phone interview after two months of home trial, to track changes in participants' acceptance of the product and its value to them. At the end of the study, a purchase opportunity was posed to participants in exchange for part of the compensation due to them. This was a question par excellence that assessed the real value of the product to the user.

Study-to-study Variations in Procedures

Of note, there were some procedural variations and adaptations between the Lids Off and each of the other two studies:

In Design: All three studies followed the same quasi-experimental design, for onsite trials followed by longitudinal tracking of home trials. In order to minimize the effect of participant learning from device to device during onsite trials, we randomly assigned participants to the product testing sequence both in the Lids Off and the Kelvin studies. Half of the participants

tested Lids Off before its competing product. The same was done for Kelvin, half tested Kelvin first. Such control was neither possible nor made sense in the case of the Point Smart (PS). Part of the recruitment screening required participants to have a working familiarity with computers and a pointing device. Since all participants came with prior knowledge of the Microsoft mouse software, which was the competing software by default, there was no new learning on the Microsoft mouse, yet there was learning on the PS software throughout. Taking this into consideration, the research design was altered by having all participants test Microsoft first and then Point Smart. In addition, we focused on PS's effectiveness and efficiency and measured user's *baseline* performance on PS once at the onsite trial and then again at the end of the home trial (after 4 months of practice on PS). Both measures served to compare user performance against the Microsoft at onsite trial; whereas the difference between them (individual gains) indicated efficacy of the PS software. We used an objective measure (test) provided by the Compass Assessment Software designed by Koester Performance Research (2002) to capture these user performance measures. It measures eight point & click skills of computer interaction necessary for tasks such as text composition, web navigation and electronic communication. Each test can be configured and customized for the user. Compass collects speed and accuracy data during test performance and reports the results.

Video recording of the onsite trials was only necessary in the case of Lids Off in order to infer the times for various tasks by posterior video analyses. We dispensed with video recording for the PS study as objective data was obtained by the Compass tests. It was also not needed for the Kelvin study as time was recorded through direct observation using stop watches.

In Sample size: Sampling was purposive. The priority in participant recruitment and screening was to maximize consumer experience with relevant AT devices in a limited sample.

The size of target disability population and the available sample pool drove the final sample size in each case. For detailed information on the sample distribution of each study refer to Stone (2009). Onsite trials for the Lids Off, PS and Kelvin studies started respectively with samples of 50, 32 and 48. Dropout rates differed in the three cases, the lowest being for Lids Off and the highest being for the Kelvin study, as detailed later. Recruitment and screening was primarily accomplished via telephone for Lids Off and Kelvin, however additional methods were needed for Point Smart. While recruiting for the Point Smart study it became apparent there was a necessity to observationally assess the level of computer knowledge and difficulty with the pointing device for each potential participant. In some situations during the telephone recruitment it was unclear whether the potential participants were having difficulty with their pointing device because they were not very familiar with it or because of an actual physical complication. A preliminary in lab screening test was hence conducted. Asking the participants to come in for an interactive on-hands screening, allowed the researchers to more accurately assess the true cause of each individual's computer difficulties.

In Implementation Logistics: As a domestic appliance, Lids Off was fairly intuitive, and called for a relatively simple and straightforward operation, even by consumers with limited hand functions. Several logistical provisions became necessary in the case of the Point Smart software in order to accommodate different disability groups with motor and sensory (visual and communication) impairments. . Participants came with their own accessible mouse hardware (foot operated, pen mouse, head mouse, augmentative communication devices and others). In order to fairly test participants' efficiency with the Microsoft mouse software, the onsite lab computer configuration had to mirror that of each participant's home computer configuration. A

clinician expert worked with us at these trials, to set up support systems and assist the observing researchers.

In Home trial monitoring: Implementation and monitoring of home trials was complex both in the case of the Point Smart software and the Kelvin thermostat. There are a couple reasons for this complexity. One is that these two devices can be viewed as holding a higher level of necessity for everyday living, and hence a greater cause for frustration and concern when they are not functional. Another reason for their complexity is due to these devices' interaction requirements with support systems and equipment. In both cases, technical assistance from the manufacturer was called for to make the devices smoothly working and compatible with the home systems and computers. In the case of Point Smart, occasional technical assistance by Info Grip, who brought PS to market, became necessary as participants had difficulty installing the program or it was not working under certain circumstances. Compatibility with computer hardware (for example, a laptop) and assistive/adaptive mouse hardware such as foot operated mouse, and others was also an issue.

The Kelvin thermostat needed installation expertise assisting the consumers, as home furnaces and circuitry needs varied. Skilled external technical assistance became necessary, introducing delays in individual home trial start dates. Malfunctioning issues also arose throughout the home trials. When this happened, emergency numbers had to be put in place because loss of heating during the cold winter can be a serious safety concern.

Tracking of participants during home trials was least complicated in the Lids Off study as everyone started their home trials at the scheduled date and progressed smoothly through the six month study period. As explained above, the need for technical assistance and/or alternative

solutions introduced delays in the start dates in the other two studies, making the tracking more complex, demanding more individualized support through the study. Home trial questionnaires for Kelvin were modified to be delivered via phone instead of paper because the participants were either totally blind or had very low vision, making paper questionnaires inaccessible.

Section Three*: *What we found and learned from the efficacy studies (Summary and Conclusions from the Efficacy Studies)

The foregoing findings and discussion relate to three case studies that assessed the efficacy of products transferred through the T^2RERC into the marketplace to benefit persons with disabilities. Recall that Product efficacy was assessed in terms of *quality and value* to the consumer with disabilities. A uniform and systematic methodology had been used for evaluating the efficacy of all three products, whereas the resulting outcomes were varied with respect to consumer satisfaction and acceptance of the product. The difference in outcomes were attributable to differences between cases in terms of product functionality and features (absence/presence, quality….), study logistics (system needs), product cost and the nature of the sample (needs).

What can we conclude from the studies? How did the products do on *quality* – compared with their market place competitor (at onsite trials) and with their critical competitors (home trials)? Were they effective (improved user independence), usable (easy, operable, comfortable), appealing? How were they valued – accepted as a fit for their needs, used voluntarily and purchased in the end?

Lids Off was liked by an overwhelming number of participants, with high ratings on all indicators of technical quality and usability from beginning to end. At the onsite trial, it was clearly rated superior to its marketplace competitor finding it: *easier to use, more comfortable,*

and above all, improved their independence (all > 90%); *effective* (functioned longer) or *efficient* (improved speed) (around 70%). At home trials, most (96%) found it intuitive and learnable. After two months of home use, around 90% rated it high on consistent, comfortable and effortless operation, found it both satisfying and surpassing their needs. Seventy percent (70%) considered it enabling. Over 90% embraced the device as a fit for their needs because of ease of use and increased independence. The product was a success in terms of quality, more effective and usable compared to its market place and critical competitors. In evaluation terms it showed merit. Additionally, it also showed worth or value to its consumers. Users accepted it as a fit for their needs. Most (92%) used it voluntarily in preference to other alternatives during the last two months of discretionary use. A high proportion (74%) chose to buy it at the end. Technical quality or usability was rarely mentioned as a factor by those who chose not to purchase it. Money was an issue in isolated cases, but overall the product seems to have been cost-effective. In terms of efficacy, lids off was a success - it showed both merit (quality) and worth (value) for this disability population.

The Point Smart software was less successful than the Lids Off, and showed mixed results on efficacy. At onsite trials it was preferred to its competitor (Microsoft), although not as overwhelmingly as Lids Off. It improved *speed* and *independence* for most (> 90%) and the majority found it *easy to use* and *comfortable* (86% and 75%, respectively). It held great promise and the participants seemed to prefer it for use at home (88%). At home, it was fairly learnable, only 8% finding it difficult. Comments indicated need for a more accessible instructional manual version. Over the 7 week home trial period a good number (70% to 84%) found it consistent in operation, functionally superior, less effortful, more comfortable and more satisfying than other alternatives. It even ran close to Lids Off regarding “surpassing needs” of

the disability population in question, although did less well on the other key usability indicators. Interestingly it was less of an "enabler" than either Lids Off (or the Kelvin), and although most (>80%) perceived improved ease of use and independence of use over 2 months, notably only 64% embraced it as a fit for their needs. Rating trend declined after 4 weeks on reliability, operability, task accomplishment and person-device fit. Over 2 months of home use, there was a decline (from 72% to 50%) in willingness to buy the product, given a chance. Reported frustrations included unresolved technical flaws, inconsistent performance and hardware compatibility issues. During the optional home use period, more people (14%) abandoned its use, than in the Lids Off study. Interest in the product declined, with only 22% buying the product at the end. In terms of cost effectiveness, we could not relate the low purchase numbers to the software's affordability because a confounding factor was its vulnerability of duplication from the trial CD version. Although these participants returned the CD, we cannot guarantee that they deleted the program from their computers. At any rate, user comments that supported the declining trend of the initially high ratings and of the purchase intent suggest that the effectiveness levels did not outweigh the cost, at least for those for whom the product worked. In conclusion, although Point Smart started out to be more effective than its competitor, it clearly did not reach the height of its potential in terms of merit and worth with the participants. It was not effective enough to be valuable to most.

Like the Point Smart, the Kelvin thermostat was also less successful than the Lids Off and showed mixed results regarding efficacy. Unlike Lids Off and Point Smart, the Kelvin thermostat was not a big success at the onsite trials. Less than a third (15%-34%) of participants chose the Kelvin over its formidable competitor, regarding all indicators including ease of use or speed and independence improvement. At home, it was less learnable, with ratings and

comments about inaccessible instructions manual similar to Point Smart. Interestingly, usability ratings shifted upward by the end of 2 months, with over two thirds of participants favorably disposed to Kelvin's use. They reported it surpassed their needs, rated it high on superior function, comfort, effortless operation and satisfaction. Over 80% attested to its consistency of operation. It was perceived as enabling (70%) as the Lids Off, even though the usability ratings lagged much behind Lids Off and slightly behind Point Smart. However, trend of perceptions from beginning to end were mixed - rise from 71 to 89% on its independent use, but from 80 to 70% on ease of use. In all, 70% steadily embraced the Kelvin from beginning to end as a "person-device fit", comparing favorably with Point Smart. This suggests that the Kelvin did work for more persons than Point Smart did for its users. Although it was "less effective" than its competing product, it was effective for 70% who persisted with it at home. One thing that uniquely distinguishes the Kelvin from equivalent devices in the market is its voice input recognition feature.

To what extent was the Kelvin valued? User purchase behavior was interesting in the case of the Kelvin. Only 25% of the original number of participants at the onsite trials bought the Kelvin in the end. Although this dropout rate was highest, many were due to usability issues and malfunctioning units. When looking at the participants who completed the entire study, almost half (48%) bought the device, suggesting that it was valued by those for whom it worked. This did not happen in the case of Point Smart, where only 28% of the remaining people bought it. Both Kelvin and Point Smart were less affordable than Lids Off in terms of absolute dollar value, but more consumers decided to buy the Kelvin as compared to the Point Smart. This suggests that the Kelvin's effectiveness outweighed its cost for more people. It seemed more "needed" and "valued". In conclusion, although the Kelvin was not "more effective" than the chosen

competitor, it did appeal to a good proportion over the home trial in absolute terms, and was valued by about half of these. Its merit and worth did not reach the heights of the Lids Off but it did slightly better than Point Smart.

To sum up, as per our analyses, Lids Off came out successful both on quality and value counts, whereas Point Smart and Kelvin showed to be less so on both counts. Their mixed results suggested they did not reach their potential in terms of quality and in terms of acceptance by the user group studied. While Point Smart started out well but declined in user perceived quality and value over the study period, the Kelvin started out unfavorable in user perception, but was more appreciated in real life trials. It was perceived as promising, however only by a limited few, who valued it. What can we conclude about their efficacy?

A major consideration at this point is the target population of these three devices. While the T^2RERC intervened for an "inclusive" redesign of each of the three prototypes, the three products were initially targeted for different markets. The Lids Off is a home appliance targeted to the mainstream buyers, while the Point Smart and the Kelvin were more directly targeted to persons with disabilities. As AT products, the last two had more challenging accessibility issues to contend with, because of complexity of operation and dependency on hardware and system interfaces. Recognizing that AT outcomes is a function of person-device compatibility; it may be argued that a subject-by-subject analysis of the findings is a more valid way of inferring their success in terms of benefits to users, rather than basing it on analysis of group data as we did above. Such analyses might shed a different light on these results. In the meantime, what other factors explain their apparent lack of success with the participant group as a whole? What are the lessons to the intervention process? These lessons and implications to the T^2RERC intervention are discussed in Stone et al (2009).

CHAPTER SIX

Michelle Lockett, Vathsala Stone and Doug Usiak

Lessons from T2RERC Product Development and Evaluation: Important Do's and Don'ts

Over its 15 years of operation, the Rehabilitation Engineering Research Center on Technology Transfer (T2RERC) has learnt and accumulated many lessons and insights. Some lessons pertain to managerial decisions and actions along various stages of new product development (NPD) and technology transfer (TT) (see the NTK model, http://kt4tt.buffalo.edu.), while others relate to the product evaluations conducted throughout the NPD process. For the organization of this resource guide we have categorized the lessons into 3 sections; 1) Managerial and Strategic lessons for NPD and TT, 2) Formative Evaluation Lessons: in the context of NPD and 3) Summative and Impact Evaluation Lessons: in the context of NPD.

Managerial and Strategic Lessons can be viewed as tips recommended for making the new product development process more efficient and effective. All along the product development path, from the product idea generation stage to the actual product launch, we have found various tips that have proven useful for the NPD and TT processes. One such tip that has very important implications for the anticipated success of a new product is performing adequate preliminary assessments (business, market, and technical). Failure to conduct these assessments can result in a product that is extremely costly or simply not feasible to produce. Or it may lead to producing a product which is already on the market or a product that just does not measure up to consumers needs and wants. Often an inventor will be so enthusiastic about his/her invention that they forget or are unaware of the necessity for researching existing competing products. It is imperative to know who and what you are competing against. Are there other products out there

that will accomplish the same task? If so, can you make your product better or cheaper? A new product developer needs to ask themselves these questions and know the answers before continuing on through development. There are many other tips highlighted in the Need to Know Model of Commercial Devices and Services (http://kt4tt.buffalo.edu).

Other managerial lessons were brought to light through the analysis of the three efficacy studies. Three main lessons were drawn:

Lesson One: Consumer input is fundamental to ensure the quality and value of a product in development. The timing of the input is equally important – it should be captured prior to the (re)design, during the prototype improvement phase and at the end. All three product developers recognized the value of the consumer input in shaping their product, as a result of our feedback from the efficacy study, if not earlier.

Lesson Two: Commitment to product quality by the business partner is just as important for product success as by the T2RERC. Both Kelvin and Lids Off received standard evaluation support from us, but used the information differently. Kelvin's diminished value for the consumer can be explained by its omitting important features as well as its choice to invest less on quality assurance and production control by outsourcing operations to a low cost manufacturer.

Lesson Three: It is difficult to achieve product value without adequate post-commercialization technical support for the consumer. Involving consumer in development may yield the desired product; but unless the manufacturer or vendor renders the product viable for use, consumers are not able to certify and accept it as the right one for their needs. As said earlier, both Point Smart and Kelvin was complex to install and operate and sorely depended on accessible versions of instructional manuals for learning them before appreciating them. This is

a lesson to both partners – the T^{2}RERC should address this during development of the new product; and the company should build this support into its marketing plans.

The differing case contexts partly explain the differential findings in the efficacy of the three products. The Lids Off achieved the desired product quality and value levels, and it encountered the optimal conditions needed to do so, both in terms of systematic and timely evaluative support by the T^{2}RERC and by Black and Decker incorporating the recommended functions and features into the product. The final product was learnable and intuitive, and did not need extensive instructional or technical support for accessibility. In contrast, optimal conditions did not come together to achieve quality and enhance value in the case of the Kelvin, which did poorly on quality and value. It was a case of complete and timely input by the T^{2}RERC but limited corporate commitment to quality as well as limited product support in the form of accessible operating and installation manuals to (blind) users. The Point Smart was the least valued by its users in spite of its perceived potential, and it was also the case that had the least optimal conditions with which to achieve its potential quality and value. Opportunities for timely input from the T^{2}RERC's were missed because of the advanced stage of development, and the commitment to quality by Info Grip at later stages could not compensate for the lost knowledge base. The alternative was to improve the next version. Post commercialization product support in the form of accessible manual was also limited.

In summary while the T^{2}RERC successfully brings a new product to the market place geared toward a product of quality and value to its users, the corporate partner has an equally significant role to play in achieving this outcome. In this sense, the intervention into the prototype is in fact a joint effort of the T^{2}RERC and of the business partner. Effectiveness cannot be achieved without equal commitment.

Much of the **Formative Evaluation Lessons** we learned came from the focus groups and surveys we have conducted over the years. From moderator scripts to consumer questionnaires to recruitment and manufacturer partnering, we have acquired best practices for product evaluation through consumer feedback. In our early years of T2RERC we had some issues with focus group participants not showing up for the sessions. After trying a few different things we discovered that sending a confirmation letter and giving them a reminder call the night before the group resulted in fewer cancellations and no-shows. We also instituted the practice of over-recruiting by 2 people, in order to compensate for participants who did cancel. Another incentive that ensured participation was increasing the stipend to $75. Taking all of these steps ensured us of having full focus groups near to every time. More tips on running focus groups and surveys can be found in Flagg, Bauer, and Stone (2009). Primary Market Research Training Module.

Lessons learned from **Summative and Impact Evaluations** were also derived from our three efficacy studies. An important tip to consider when evaluating products is not to forget to obtain feedback on the format and content of the instruction manual. The instruction manual for both Point Smart and Kelvin were points of concern for our study participants. Neither was accessible to the targeted population. The Point Smart manual was accessed through the web, which was difficult for people who had physical challenges when controlling the mouse. The Kelvin manual was not offered via Braille and a consumer was required to make a special request for an audio recording of the manual. Even then, the audio version of the manual was of poor sound quality and was not user friendly in terms of navigating through the items. Instruction manual issues such as these caused these devices to be ineffective for some consumers.

The context in which a device functions will have implications on the design and protocols of a study. The more essential a device is for everyday living, the more necessary product support will be throughout the study. The lesson here is to have qualified staff on hand to answer participants' phone calls at almost any time of day. We realized the need to bring in professional electricians in the middle of the Kelvin study in order to check on faulty thermostats. On a few occasions we had participants calling the researchers after hours with real concerns that their heat would stop working. In the case of Point Smart we needed to set up technical support numbers with the manufacturers, we had a number of participants calling because their computers were crashing when they were using the software. These participants were rightfully frustrated as it was interfering with their work or school work.

Another lesson learned was that there will be complications when evaluating devices which need to interact with other preexisting systems which have various, non standard forms. In the case of Kelvin, many participants were forced to discontinue the study because their heating system was not compatible with it. With Point Smart, certain operating systems or pointing device hardware was not supported by Point Smart. This also resulted in some participant drop outs. One participant was able to borrow a track ball mouse from the Western New York Independent Living Project, Inc. for the duration of the study which allowed him to continue on. In these situations where an evaluated device needs to interact with another system in order to function, it is best to investigate as many if not all the possible connection configurations. Identify any potential problems before the study begins so that the problems can be avoided or well managed when they do arise.

In summary, the type of device and the context in which it operates will impact the design protocol and may require additional support resources. When creating time frames for

research projects make sure to budget enough time for preliminary investigations of device/pre-existing system interactions. This will assist in recruiting only those participants whose pre-existing system is compatible with the evaluating device. In turn this should help reduce the dropout rate. Also, be prepared to have expert technicians available throughout the study for malfunctions or participant inquiries. This will likely require additional project funds so consider this when budgeting for your research project. These are some of the bigger lessons that stood out for us. Hopefully they will prove to be useful tips for others who are planning for new product development or evaluation.

CHAPTER SEVEN

Key Evaluation Instruments used at the T2RERC

- **7A. Efficacy Assessment of Lids Off Jar Opener**
- **7B. Efficacy Assessment of Point Smart Software**
- **7C. Efficacy Assessment of Kelvin Thermostat**
- **7D. Focus Group Script for Lids Off Prototype Assessment**
- **7E. Price Point Questionnaire: Lids Off Focus Group**
- **7F. Ideal Pricing Questionnaire : Kodak Home Imaging System**
- **7G. Participant Background Questionnaire: Kodak**
- **7H. Focus Group Script for Kodak Home Imaging System**

7A. Efficacy Assessment of Lids Off Jar Opener

7A1. Observer's Script for trial administration

Lids-Off

- Unlock the top of the jar opener by pressing the release button toward handle
- Grasp handle
- Pull handle up until you hear a click-this locks the top in place
- Spin turntable clockwise until it stops
- Place jar in the center of the turntable (use the raised lines on the turntable to line up the jar)
- Grasp handle
- Push the release button on top of the opener toward the handle
- Slowly lower the top of the jar opener to the jar
- Push down the activation button at the front of the jar opener until you hear the jar pop open
- Pull the handle up until the top locks in place-You will hear an audible click
- Let go of the handle slowly (if the handle falls, pull up again until you hear the click)
- Turn bottom turntable counter-clockwise to release jar
- Remove jar from the turntable

Competing Product

- Locate switch at the top of the device

- Move switch to the left to turn device on
- Tightly grasp jar by sides or bottom
- Insert the jar into the cone, lid first
- Maintain a tight grasp on the jar
- Push jar up into the cone to activate the device
- Maintain pressure to open jar
- When jar opens you will hear an audible pop or feel the seal is broken
- Remove jar
- Remove lid if necessary from the cone

7A2. Lab Trial Observer Questionnaire: Lids Off Jar Opener

Efficacy Assessment of Products transferred by T2RERC

[Focus: Lids-Off Vs. Competing Product]

Participant Name:_____[Optional]

Participant ID:_____

Lab Trial Observer Questionnaire:

(To be used by the Observer closely following the consumer during the Laboratory trials, as the consumer completes each task- e.g., open jar 1.To be filled out separately for each opener.)

Date: _____

Observer Name: _____

Jar Opener Name: _____

Jar 1 (Brand, Contents, Wt./Vol.) _____

Actual time it took to break the seal of the jar? _____ Seconds

No: of attempts___

One handed operation_____

Any spillage/breakage_____

Any signs of pain / discomfort_____

Jar 2 (Brand, Contents, Wt./Vol.) _____

Actual time it took to break the seal of the jar? _____ Seconds

No: of attempts___

One handed Operation_____

Any spillage/breakage_____

Any signs of pain / discomfort_____

Jar 3 (Brand, Contents, Wt./Vol.) _____

Actual time it took to break the seal of the jar? _____ Seconds

No: of attempts___

One handed Operation_____

Any spillage/breakage_____

Any signs of pain / discomfort_____

Jar 4 (Brand, Contents, Wt./Vol.)_____

Actual time it took to break the seal of the jar? _____ Seconds

No: of attempts___

One handed Operation_____

Any spillage/breakage_____

Any signs of pain / discomfort_____

Jar 5 (Brand, Contents, Wt./Vol.)_____

Actual time it took to break the seal of the jar? _____ Seconds

No: of attempts___

One handed Operation_____

Any spillage/breakage_____

Any signs of pain / discomfort_____

Overall

Did the subject need cues or instructions in the use of the device?

Yes / No

If so, describe: _____

Other Comments:

_____

_____

7A3. Consumer Questionnaire for Lab trials: Lids Off Vs. Competing Product

Efficacy Assessment of Products transferred by T2RERC

[Focus: Lids Off Vs. Competing Product]

Consumer Questionnaire

(To be used by the testing consumer in conjunction with the laboratory trials – to be filled out immediately following the trial of the individual device)

Date: _____

Consumer ID: _____

Opener Name: _____

A. Please answer the questions below using a scale of **1 to 5**, where **1** represents the **least satisfaction** on your part and **5** represents the **most satisfaction**.

Jar 1. (Brand-contents-wt/vol) _____

	Question	**Your Rating**						
1	How well did you succeed in opening the jar with this device?	*Not effective – could not open the jar at all*	1	2	3	4	5	*Very effective – first time*
2	How quickly did the device break the seal of the jar?	*Very Slow*	1	2	3	4	5	*Very Fast*
3	How easy was it to insert the jar into the device?	*Very difficult- could not place it*	1	2	3	4	5	*Very easy*
4	How well did the device twist the jar open?	*Not effective-lid did not move*	1	2	3	4	5	*Very effective-lid opened easily*
5	How easy was it to remove the jar from the device?	*Very difficult – could not do it*	1	2	3	4	5	*Very easy*
6	After you opened the jar, was it in good shape?	*Damage/ broken*	1	2	3	4	5	*Good condition*
7	(After you opened the jar,) was the lid in good shape?	*Damaged- not re-usable*	1	2	3	4	5	*Good condition –*

								re-usable
8	(After you opened the jar,) what was the condition of the contents?	*Not satisfactory- there was spillage and mess*	1	2	3	4	5	*Very good- clean and non-messy opening*

Jar 2. (Brand-contents-wt/vol)_____

	Question	**Your Rating**						
1	How well did you succeed in opening the jar with this device?	*Not effective – could not open the jar at all*	1	2	3	4	5	*Very effective – first time*
2	How quickly did the device break the seal of the jar?	*Very Slow*	1	2	3	4	5	*Very Fast*
3	How easy was it to insert the jar into the device?	*Very difficult- could not place it*	1	2	3	4	5	*Very easy*
4	How well did the device twist the jar open?	*Not effective-lid did not move*	1	2	3	4	5	*Very effective-lid opened easily*
5	How easy was it to remove the jar from the device?	*Very difficult – could not do it*	1	2	3	4	5	*Very easy*
6	After you opened the jar, was it in good shape?	*Damage/ broken*	1	2	3	4	5	*Good condition*
7	(After you opened the jar,) was the lid in good shape?	*Damaged- not re-usable*	1	2	3	4	5	*Good condition – re-usable*
8	(After you opened the jar,) what was the condition of the contents?	*Not satisfactory- there was spillage and mess*	1	2	3	4	5	*Very good- clean and non-messy opening*

Jar 3. (Brand-contents-wt/vol)_____

	Question	**Your Rating**						
1	How well did you succeed in opening the jar with this	*Not effective – could not open*	1	2	3	4	5	*Very effective – first time*

	device?	*the jar at all*						
2	How quickly did the device break the seal of the jar?	*Very Slow*	1	2	3	4	5	*Very Fast*
3	How easy was it to insert the jar into the device?	*Very difficult- could not place it*	1	2	3	4	5	*Very easy*
4	How well did the device twist the jar open?	*Not effective-lid did not move*	1	2	3	4	5	*Very effective- lid opened easily*
5	How easy was it to remove the jar from the device?	*Very difficult – could not do it*	1	2	3	4	5	*Very easy*
6	After you opened the jar, was it in good shape?	*Damage/ broken*	1	2	3	4	5	*Good condition*
7	(After you opened the jar,) was the lid in good shape?	*Damaged- not re-usable*	1	2	3	4	5	*Good condition – re-usable*
8	(After you opened the jar,) what was the condition of the contents?	*Not satisfactory- there was spillage and mess*	1	2	3	4	5	*Very good- clean and non-messy opening*

Jar 4. (Brand-contents-wt/vol) _____

	Question	**Your Rating**						
1	How well did you succeed in opening the jar with this device?	*Not effective – could not open the jar at all*	1	2	3	4	5	*Very effective – first time*
2	How quickly did the device break the seal of the jar?	*Very Slow*	1	2	3	4	5	*Very Fast*
3	How easy was it to insert the jar into the device?	*Very difficult- could not place it*	1	2	3	4	5	*Very easy*
4	How well did the device twist the jar open?	*Not effective-lid did not move*	1	2	3	4	5	*Very effective- lid opened easily*
5	How easy was it to remove the jar from the device?	*Very difficult – could not do it*	1	2	3	4	5	*Very easy*

6	After you opened the jar, was it in good shape?	*Damage/ broken*	1	2	3	4	5	*Good condition*
7	(After you opened the jar,) was the lid in good shape?	*Damaged- not re-usable*	1	2	3	4	5	*Good condition – re-usable*
8	(After you opened the jar,) what was the condition of the contents?	*Not satisfactory- there was spillage and mess*	1	2	3	4	5	*Very good- clean and non-messy opening*

Jar 5. (Brand-contents-wt/vol) _____

	Question	**Your Rating**						
1	How well did you succeed in opening the jar with this device?	*Not effective – could not open the jar at all*	1	2	3	4	5	*Very effective – first time*
2	How quickly did the device break the seal of the jar?	*Very Slow*	1	2	3	4	5	*Very Fast*
3	How easy was it to insert the jar into the device?	*Very difficult- could not place it*	1	2	3	4	5	*Very easy*
4	How well did the device twist the jar open?	*Not effective-lid did not move*	1	2	3	4	5	*Very effective- lid opened easily*
5	How easy was it to remove the jar from the device?	*Very difficult – could not do it*	1	2	3	4	5	*Very easy*
6	After you opened the jar, was it in good shape?	*Damage/ broken*	1	2	3	4	5	*Good condition*
7	(After you opened the jar,) was the lid in good shape?	*Damaged- not re-usable*	1	2	3	4	5	*Good condition – re-usable*
8	(After you opened the jar,) what was the condition of the contents?	*Not satisfactory- there was spillage and mess*	1	2	3	4	5	*Very good- clean and non-messy opening*

B. Please give your **overall impression** of the opener and its performance, on the following aspects. Use the same rating scale as before, **1** for least satisfaction and **5** for most satisfaction.

	Question	Your Rating						
1	How much effort do you feel is needed to set up and use the device?	*Too much effort*	1	2	3	4	5	*Very little effort*
2	Without instructions, how easily could you figure out how to use the device?	*Not well at all – need instructions to figure out its operation*	1	2	3	4	5	*Very well – can very easily figure out its operation*
3	How easy was it for you to use the device and all its parts?	*Very difficult- could not operate*	1	2	3	4	5	*Very easy*
4	What level of effort does it take to use the device, overall?	*Too high*	1	2	3	4	5	*Very low- quite comfortable*
5	I can use the device with one hand.	*Not at all*	1	2	3	4	5	*Yes, very easily*
6	I can use the device with either right or left hand	*Not at all*	1	2	3	4	5	*Yes, easily*
7	The device lets me know whether the jar is opened.	*Not at all*	1	2	3	4	5	*Yes, quite adequately*
8	Overall, how did you like using the device?	*Very frustrating*	1	2	3	4	5	*Very comfortable*
9	How much discomfort or pain did you feel in using the device?	*Severe discomfort/ pain*	1	2	3	4	5	*No discomfort/ pain*
10	How safe do you feel in using the device?	*Not at all safe*						*Very safe*
11	Do you think the device might damage things in your kitchen?	*Very damaging- Will cause scratches/ breakage*						*Not at all damaging*
12	How noisy was the device?	*Too noisy*						*Very Quiet*
13	Do you like the way the device looks?	*Not at all*						*Very much*

14	Is the size of the device acceptable to you, for storage and use?	*Not acceptable at all*						*Very acceptable*
15	Would maintaining and cleaning the device be acceptable to you?	*Not at all – too tedious to clean and maintain*						*Very easy to clean and maintain*
16	How easily could you move the device around your kitchen?	*Could not move opener around at all*						*Very easily*
17	Do you think this device might make you more independent in preparing meals?	*Not at all*						*Very much*
18	My overall rating for the device is	*Very low*						*Very high*

C. Please add any additional or explanatory **Comments** you might wish to make in relation to the two openers you tried out

_____
_____
_____
_____
_____

7A4. Consumer Exit Interview at Lab trials: Lids Off Vs. Competing Product

Efficacy Assessment of Products transferred by T2RERC

[Focus: Automatic Jar Openers]

Consumer Interview Outline

Date: _____

Participant ID: _____

Participant Name (optional) _____

Interviewer: _____

Question 1: You have just tried out the two jar opening devices – the Lids-Off Automatic Jar Opener and the Competing Automatic Jar Opener. Consider their overall performance and appeal.

How do they compare with each other in terms of promoting an independent life style? Explain.

Probing Questions

- How many jars did you open using the Lids-off?
- How many jars did you open using the competing jar opener?

1. Which one of these devices will improve your capability in living independently? And Why? _____
2. Which one of these devices would you find more dependable in daily life? And Why? _____
3. Which one of these devices would you believe will function longer without wear and tear based on your use? And Why? _____
4. Which one of these devices would you think is safer to use? And Why? _____
5. Which one of these devices would you think is easy to use? And Why? _____
6. Which one of these devices has easy to use controls? And why? _____
7. Which one of these devices would you think is quicker to use? And Why? _____
8. Which one of these devices gives you better feedback? And why?
9. Which one of these devices did you find comfortable to use? And why? _____
10. Which one of these openers would you prefer to use in your own home? And Why? _____

Question 2:

What do you think the Lids-Off is worth in terms of a buying price?

_____

What do you think the competing product is worth in terms of a buying price?
_____

Which one would you buy? _____

How much would you be willing to pay for it? _____

7A5. Consumer Questionnaire for Day One of Home Trials: Lids Off Jar Opener

Efficacy Assessment of Products transferred by T2RERC

For Office Use Only
Project #:
Participant ID:

Participant's Name:_____

Response Form – Day 1

Please complete this questionnaire on the evening of the day you receive the device and mail it to us in the attached stamped envelope by _____**.** If you have any questions, please do not hesitate to call **Katie Beaver** at **836-0822** ext. **112**.

Thank you.

Efficacy Assessment of Products transferred by T2RERC

(Product Focus: Jar Openers)

A. Please indicate, with an "x", how you open jars currently.

a. Open manually without assistance _____

b. Get assistance from others _____

c. Use a particular method of my own; _____

Explain_____

d. Use a jar opening device you purchased _____

B. If you marked "d" above, please answer the following 5 questions. Otherwise, skip to section C

1. Please describe the device you presently use to perform the same function as opening a jar.

_____

_____

2. What is the brand name? (Please write.)

_____

3. When did you obtain the present device? (Please write.) 19____

4. Who paid for your present device? (Please circle.)

    1. Self
    2. Partially paid by external agency
    3. Fully paid by external agency

5. How frequently do you use your present device? (Please circle.)

    1. 1 to 2 times a day
    2. 3 to 4 times a day
    3. 5 to 6 times a day
    4. 7 times or more

C. Please indicate your level of satisfaction on the given scale of **1 to 5,** where **1** represents that you are **least satisfied** and **5** represents that you are **most satisfied.** Mark the appropriate box with an x

1. The instructions to operate the ***Lids-Off Automatic Jar Opener*** were ….

Very Difficult to Follow 1☐ 2☐ 3☐ 4☐ 5☐ **Very Simple to Follow**

2. The appearance of the ***Lids-Off Automatic Jar Opener*** is ….

Very Unattractive 1☐ 2☐ 3☐ 4☐ 5☐ **Very Attractive**

3. Operation of the ***Lids-Off Automatic Jar Opener*** requires ….

Assistance from Others 1☐ 2☐ 3☐ 4☐ 5☐ **No Assistance from others**

If you needed assistance, describe what type-

_____

_____

4. The ***Lids-Off Automatic Jar Opener*** is ….

Very Difficult to Operate 1☐ 2☐ 3☐ 4☐ 5☐ **Very Easy to Operate**

5. Do you think the device requires the use of both of your hands?

Yes [ ] No [ ]

5a. Can the device be used with either right or left hand?

Not at all 1☐ 2☐ 3☐ 4☐ 5☐ **Very easily**

6. The ***Lids-Off Automatic Jar Opener*** takes up….

Too much space in the Storage Area 1☐ 2☐ 3☐ 4☐ 5☐ **Just the Right Space to Store**

7. I believe that the ***Lids-Off Automatic Jar Opener*** is…

Not at all a Device for me 1☐ 2☐ 3☐ 4☐ 5☐ **Truly a Device for me**

Please answer these questions in your own words.

8. Now that you have the ***Lids-Off Automatic Jar Opener,*** what do you expect you can do that you weren't able to do before?

_____
_____
_____
_____
_____

9. Do you have any observations or comments about the ***Lids-Off Automatic Jar Opener*** at this time?

_____
_____
_____
_____

10. Where did you set up the ***Lids-Off Automatic Jar Opener*** for use?

☐ Counter top

☐ Table

☐ Floor

☐ Other

Comments – Explain why.

_____
_____
_____
_____
_____

11. Where did you decide to store the ***Lids-Off Automatic Jar Opener*** when not in use?

☐ Somewhere in the Food Preparation Area, but not plugged in ready for use,

☐ In Another Room

☐ In the same place of use; it is always plugged in ready for use.

Comments – Explain why.

_____
_____
_____
_____

12. How do you connect the ***Lids-Off Automatic Jar Opener*** to the electrical source for operation?

☐ Plug it directly into a wall outlet

☐ Use an extension cord

Comments:

_____
_____
_____
_____

PLEASE REVIEW YOUR QUESTIONNAIRE TO MAKE SURE THAT YOU HAVE ANSWERED EACH QUESTION AND MAIL IT TO US ON ***_[date]_____***

IN THE ENCLOSED STAMPED, SELF-ADDRESSED ENVELOPE.

7A6. Consumer Weekly Questionnaire for Home Trials: Lids Off Jar Opener

Efficacy Assessment of Products transferred by T2RERC

For Office Use Only
Project #:
Participant #:

Participant's Name:_____

Response Form – Week [__]

Please complete this questionnaire as you try out the device this week and mail it to us in the attached stamped envelope by_____(End of week). If you have any questions, please do not hesitate to call

Katie Beaver at **836-0822** ext. **112**.

Thank you.

Efficacy Assessment of Products transferred by T2RERC

(Product Focus: Jar Openers)

PART A – USAGE EXPERIENCE

1a. Did you open any jars this week? ☐ Yes ☐ No

1b. Did you use the ***Lids-Off*** this week? ☐ Yes ☐ No

If you said **No** to the questions, skip the remaining questions, and PLEASE RETURN Questionnaire in the enclosed envelope

If you said **Yes**, then continue with the following questions:

2. (a) How many jars did you open this week?_____

   (b) Did you use the Lids-Off to open:

   ☐ All of the jars?

   ☐ Most of the jars?

   ☐ Some of the jars?

   ☐ None of the jars?

3. Mark with an X the types of jars you opened using the ***Lids-Off***

Size	Shape	Lid Type	Material	Contents
☐ Small Jars	☐ Round Jars	☐ Plastic	☐ Glass	☐ Liquid
☐ Big Jars	☐ Odd-shaped Jars	☐ Metal	☐ Plastic	☐ Semi-liquid
☐ Tall Jars		☐ Ridged		
		☐ Thin		

Comments-

_____

_____

_____

4. What jars, if any, was the ***Lids-Off*** <u>not able</u> to open this week? Please describe the type(s) of Jar(s) – material (plastic/glass), contents, as well as shape & size of body and lid.

Did you have any accidents with the ***Lids-Off*** this week? If not, please skip to Question 7.

[ ] No

[ ] Yes

6. (a) I had ____(enter number) accidents with the ***Lids-Off*** this week.

(b) Please identify the type of accident you had while using the ***Lids-Off***:

☐ Cracked or broke the jar

☐ Cracked or broke the lid

☐ Spilled the contents while removing the jar

☐ Dropped the jar

☐ Dropped the Lids-Off

☐ Other (please explain)

Comments:

_____
_____
_____

Efficacy Assessment of Products transferred by T2RERC

(Product Focus: Jar Openers)

PART B

7. The following phrases describe what the Lids-Off Automatic Jar Opener is likely to be or do for you. Please rate **each** aspect of this device choosing a number between 1 and 5 which best describes your opinion. Then **mark** the corresponding box with an X. Remember, there are no right or wrong answers. We are only interested in your opinion.

LIDS-OFF AUTOMATIC JAR OPENER

Is very difficult to move to different locations	1☐ 2☐ 3☐ 4☐ 5☐	Is very easy to move to different locations
Operations are restricted to specific locations	1☐ 2☐ 3☐ 4☐ 5☐	Is very easy to operate at different locations
Is very uncomfortable to use	1☐ 2☐ 3☐ 4☐ 5☐	Is very comfortable to use
Has no effect on my ability to perform related task	1☐ 2☐ 3☐ 4☐ 5☐	Improves my ability to perform related task
Interferes with the use of other devices by me	1☐ 2☐ 3☐ 4☐ 5☐	Is compatible with the use of other devices by me
Works very erratically	1☐ 2☐ 3☐ 4☐ 5☐	Works every time
Controls are difficult to operate	1☐ 2☐ 3☐ 4☐ 5☐	Controls are easy to operate
Use requires assistance of others	1☐ 2☐ 3☐ 4☐ 5☐	Can operate device myself
Maintenance is very difficult	1☐ 2☐ 3☐ 4☐ 5☐	Maintenance is very easy
Is unsafe to operate …	1☐ 2☐ 3☐ 4☐ 5☐	Is perfectly safe to operate
Is very unattractive	1☐ 2☐ 3☐ 4☐ 5☐	Is very attractive
Will only last for a short time	1☐ 2☐ 3☐ 4☐ 5☐	Will continue to operate for a long time
Takes a lot of storage space	1☐ 2☐ 3☐ 4☐ 5☐	Just right to store
Can't think of myself using this device	1☐ 2☐ 3☐ 4☐ 5☐	A device for me…

8. Did the device require the use of both hands?

Yes [ ] No [ ]

8a. Can the device be used with either right or left hand?

Not at all 1☐ 2☐ 3☐ 4☐ 5☐ **Very easily**

9. Compared to your first use of ***Lids-Off Automatic Jar Opener***, how was its use this week?

[ ] Much easier

[ ] Just the Same

[ ] More difficult

10. Please record any other observations, comments, or experiences about the ***Lids-Off Automatic Jar Opener*** today. (Please write.)

_____

_____

_____

_____

PLEASE REVIEW YOUR QUESTIONNAIRE TO MAKE SURE

THAT YOU HAVE ANSWERED EACH QUESTION AND MAIL IT TO US ON *[date]*_____

IN THE ENCLOSED STAMPED, SELF-ADDRESSED ENVELOPE.

7A7. Consumer Questionnaire – End of Home Trials: Lids Off Jar Opener

End-of-Trial Assessment of Products transferred by T2RERC

(Jar Openers)

For Office Use Only
Project #:
Participant ID:

Participant's Name:_____

Response Form – End of Trial Period

Please complete this questionnaire after [***DATE***] and mail it to us by [***DATE]*** in the attached self-addressed stamped envelope. If you have any questions, please do not hesitate to call ***[Name***] at ***[Telephone #]*** between 8:30 a.m. and 5:00 p.m.

Thank you.

Sincerely,

End-of-Trial Assessment of Products Transferred by T2RERC

(Jar Openers)

PART A

USAGE EXPERIENCE

You have now used the ***Lids-Off Automatic Jar Opener*** for the past two months. In the following please describe your experience with this device by answering questions below. For each question, please mark your response by placing an "X" in the appropriate box.

How will you rate the Lids-Off jar opener as compared to the alternatives you have used in the past and/or are currently using?

1. Opening jars with different dimensions:

[ ] Much less effective

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

2. Opening jars with different types of lids:

[ ] Much less effective]

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

3. Opening jars made of different materials such as glass, plastic, etc.:

[ ] Much less effective

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

4. Opening jars with different contents such as liquid, semi-liquid, powder, etc.:

[ ] Much less effective

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

Comments

_____

_____

5. *As compared to* alternatives you have used (or currently using) to open jars, how much time does the Lids-Off take to break the seal of jars?

[ ] Much slower

[ ] Slower

[ ] Takes just as much time - no difference

[ ] Faster

[ ] Much Faster

Comments:_____

_____

_____

6. Considering your limited hand function, how much overall effort does it take to operate Lids-Off *as compared to* alternatives you have used (or currently using) to open jars?

[ ] A lot more effort - cannot use it.

[ ] Somewhat more effort

[ ] Just as much effort - no difference

[ ] Somewhat less effort

[ ] A lot less effort

Comments:_____

_____

_____

7. Are both your hands equally functional?

If yes, skip to question 8.

If not, can the Lids-Off be operated with one hand?

[ ] Always

[ ] Most of the time

[ ] Sometimes

[ ] Never

Comments:_____

_____

8. When compared to alternatives you used (or currently using) to open jars, how useful is the Lids-Off device to open with either hand (right or left)?

[ ] Takes a lot more effort

[ ] Takes somewhat more effort

[ ] Takes equal effort - no difference

[ ] Takes somewhat less effort

[ ] Takes a lot less effort

Comments:

_____

_____

9. Rate the overall comfort when using the Lids-Off compared to alternatives you used (or currently using) to open jars:

[ ] Very Uncomfortable

[ ] Uncomfortable

[ ] Equally Comfortable

[ ] Comfortable

[ ] Very Comfortable

Comments:_____

_____

10. Compared to alternatives you used (or currently using) to open jars, how do you find the use of the Lids-Off to be?

[ ] Very Frustrating

[ ] Frustrating

[ ] Not much different

[ ] Satisfying

[ ] Very Satisfying

Comments:_____

_____

11. Compared to alternatives you used (or currently using) to open jars, you found the Lids-Off to be:

[ ] More painful - caused you severe pain

[ ] Not much different

[ ] Much less painful - caused you negligible pain

Comments:_____

_____

12. When compared to alternatives you used (or currently using) to open jars, the chances of the jar breaking with the Lids-Off is:

[ ] A lot more likely

[ ] Somewhat more likely

[ ] Equally likely or unlikely

[ ] Somewhat less likely

[ ] A lot less likely - negligible

Comments:_____

_____

13. When compared to alternatives you used (or currently using) to open jars, the chances of the contents spilling with the Lids-Off is:

[ ] A lot more likely

[ ] Somewhat more likely

[ ] Equally likely or unlikely

[ ] Somewhat less likely

[ ] A lot less likely - negligible

Comments:_____

_____

14. The chances of any injury with the Lids-Off, when compared to alternatives you used (or currently using) to open jars is:

[ ] A lot more likely

[ ] Somewhat more likely

[ ] Equally likely or unlikely

[ ] Somewhat less likely

[ ] A lot less likely - negligible

Comments:_____

_____

15. In comparison with the alternatives you used (or currently using) to open jars, how much damage does the Lids-Off cause to the lid?

[ ] Very much. Lid is always damaged

[ ] Somewhat. Lid not reusable at times

[ ] Not much. Lid is always reusable

Comments:_____

_____

_____

16. The work surface after installing and using the Lids-Off had:

[ ] Significant damage

[ ] Some damage

[ ] No damage

Comments:_____

_____

17. When compared to alternatives you used (or currently using) to open jars, cleaning the Lids-Off is:

[ ] Much more tedious

[ ] More tedious

[ ] Not much different

[ ] Easier

[ ] Much easier

Comments:_____

_____

18. The Lids-Off compared to your old device has been:

[ ] Less Durable

[ ] Equally Durable

[ ] More Durable

Comments:_____

_____

19. When compared to alternatives you used (or currently using) to open jars, how consistent did you find the Lids-Off?

[ ] Much worse - never worked consistently

[ ] Somewhat worse - was sometimes consistent

[ ] Somewhat better - worked consistently most of the time

[ ] Much better - worked consistently always

Comments:_____

_____

20. Compared to my old method/device, the Lids-Off allowed me to purchase and open jars that I thought were not possible.

[ ] Strongly Disagree

[ ] Disagree

[ ] Can’t say

[ ] Agree

[ ] Strongly Agree

Comments:_____

_____

21. The Lids-Off has increased my ability to eat and prepare food.

[ ] Strongly Disagree

[ ] Disagree

[ ] Can't say

[ ] Agree

[ ] Strongly Agree

Comments:_____

_____

_____

End-of-Trial Assessment of Products transferred by T2RERC

(Jar Openers)

PART B

1. The following phrases describe what the Lids-Off Automatic Jar Opener is likely to be or do for you. Please rate **each** aspect of this device choosing a number between 1 and 5 which best describes your opinion. Then **mark** the corresponding box with an X. Remember, there are no right or wrong answers. We are only interested in your opinion.

LIDS-OFF AUTOMATIC JAR OPENER

Is very difficult to move to different locations	1☐ 2☐ 3☐ 4☐ 5☐	Is very easy to move to different locations
Operations are restricted to specific locations	1☐ 2☐ 3☐ 4☐ 5☐	Is very easy to operate at different locations
Is very uncomfortable to use	1☐ 2☐ 3☐ 4☐ 5☐	Is very comfortable to use
Has no effect on my ability to perform related task	1☐ 2☐ 3☐ 4☐ 5☐	Improves my ability to perform related task
Interferes with the use of other devices by me	1☐ 2☐ 3☐ 4☐ 5☐	Is compatible with the use of other devices by me
Works very erratically	1☐ 2☐ 3☐ 4☐ 5☐	Works every time
Controls are difficult to operate	1☐ 2☐ 3☐ 4☐ 5☐	Controls are easy to operate
Use requires assistance of others	1☐ 2☐ 3☐ 4☐ 5☐	Can operate device myself
Maintenance is very difficult	1☐ 2☐ 3☐ 4☐ 5☐	Maintenance is very easy
Is unsafe to operate …	1☐ 2☐ 3☐ 4☐ 5☐	Is perfectly safe to operate
Is very unattractive	1☐ 2☐ 3☐ 4☐ 5☐	Is very attractive
Will only last for a short time	1☐ 2☐ 3☐ 4☐ 5☐	Will continue to operate for a long time
Takes too much storage space	1☐ 2☐ 3☐ 4☐ 5☐	Just right to store
Can't think of myself using this device	1☐ 2☐ 3☐ 4☐ 5☐	A device for me…

2. Compared to your first use of this device, how was its use today?

Much more difficult	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	Much easier

3. Are there any changes you would like to see made in this device? (Please describe.)

_____

_____

4. What are two things you like most about this device?

_____

_____

5. What two things do you like least about this device?

_____

_____

6. If this device were available in the market today, how much money would you be willing to pay for it?

$_____

7. If this device were available at the price you suggest, how likely is it that you would buy it? (Please circle **one**)

[ ] Definitely would not buy it

[ ] Probably would not buy it

[ ] Might or might not buy it

[ ] Probably would buy it

[ ] Definitely would buy it

PART C

1. To what degree does the ***Lids-Off Automatic Jar Opener*** meet your needs?

[ ] Substantially below my needs

[ ] Slightly below my needs

[ ] Just meets my needs

[ ] Slightly above my needs

[ ] Substantially beyond my needs

2. How does the Lids-Off Automatic Jar Opener compare with other devices which perform a similar function?

[ ] Substantially Inferior

[ ] Slightly inferior

[ ] Same

[ ] Slightly superior

[ ] Substantially superior

3. What degree of importance would you attach to selecting a device which performs the same function as the ***Lids-Off Automatic Jar Opener?***.

[ ] Extremely important

[ ] Very important

[ ] Important

[ ] Somewhat important

[ ] Not so important

PART D

Imagine that your present device was stolen and you had to pay yourself to replace it. How likely is it that you would buy your present brand again? (Please circle one number.)

[ ] Definitely would not buy

[ ] Probably would not buy

[ ] Might or might not buy

[ ] Probably would buy

[ ] Definitely would buy

PLEASE REVIEW YOUR QUESTIONNAIRE TO MAKE SURE

THAT YOU HAVE ANSWERED EACH QUESTION

AND MAIL IT TO US ON ***DATE***

IN THE ENCLOSED STAMPED, SELF-ADDRESSED ENVELOPE.

7B. Point Smart Software Efficacy Assessment

7B1. Observer Script for administering the Onsite trials: Point Smart Software

Efficacy Assessment of Products transferred by T2RERC

[Focus: Point Smart]

Observer Script for administering the Onsite trials

Step 1: Introduction by observer:

You will be trying out two soft wares today, one after another. They are both used to drive a mouse that controls the cursor on the computer screen. One of them is the Microsoft mouse software which you are familiar with. The other one is new software called the Pointsmart.

You will be first testing the Microsoft mouse pointer and then testing the Points smart pointer. First, we will adjust your mouse settings the way you would like it and then you will be asked to perform a series of tasks with your mouse using the two soft wares.

Step 2: Consultant works with the person and establishes the settings for Microsoft mouse pointer.

Step 3: Administration by Observer

[NOTE: the compass trials are pre-set so that each task is performed in 8 trials as a try out and next in 16 trials to be performed sequentially with no interruption].

You will now perform a series of tasks with the mouse.

Part A: The Compass trials

The first set includes **three** standard tasks set by a computer program. In the first one, you will use your mouse to point and click at targets at random places on the screen. In the second task, you will click on an icon, drag it and drop it into a trashcan. In the third task, you will be given different menus on the top of the screen and you will select items from these menus.

Important:

You will receive instructions on the screen before the beginning of each task. It is important to perform the tasks at your natural speed. The tests are timed and you must not pause in between the tasks. If for some reason you need to stop, make sure to click the Pause button and then click the Restart button to resume the task.

Okay, for each task first you will get to tryout to see how it works and then you will repeat the task without interruption.

(Observer lets consumer perform the tasks).

Part B: Common Computer Applications

[NOTE: the applications are pre-set so that each task is performed twice. The settings include: Yahoo email program pre-set enabling the automatic pop up of the ID addresses of the researchers]

For the second set of tasks, you will be asked to work on a few common computer applications such as email, internet and word processing.

(a) Sending Email:

1) Open the email program from the desktop (Email Program has been set up already)
2) Open the Inbox
3) Click Compose
4) Send an email to any TWO of the following people, ONE BY ONE:
5) Type the first letter of the desired email ID and select the email ID that drops down from the address bar

vstone@buffalo.edu

Silverheels@buffalo.edu

coddo@buffalo.edu

Arthanat@buffalo.edu

dusiak@wnyilp.org

mlockett@wnyilp.org

(b) Using Internet:

- Open Internet Explorer
- Click on Favorites
- In Favorites, click on http://cosmos.buffalo.edu/t2rerc/index.html
- Scroll to the bottom by clicking on the scroll bar (do not use the mouse wheel)
- Click on the link “School of Public Health and Health Professions”
- Click the back button on the menu bar
- Close the website by clicking on the X

- Open Internet Explorer again
- Click on Favorites
- In Favorites, click on Radiolovers.com

- Scroll to the bottom by clicking on the scroll bar (do not use the mouse wheel)
- Click on the link “click here”
- Click the back button on the menu bar
- Close the website by clicking on the X

(c) Word Processing:

[Note: 2 different files have been created and saved on each computer]

- Open Microsoft word by going to start, then program and then Microsoft word
- Open the file _____from the file menu
- Save it as “test file One”
- Highlight the second paragraph within the file
- Now cut and paste the text at the end of the document
- Now drag it and drop it back into where it was.
- Close the file.
- Open the file _____from the file menu
- Save it as “test file Two”
- Highlight a paragraph within the file
- Now cut and paste the text at the end of the document
- Now drag it and drop it back into where it was.
- Close the file.

7B2. <u>Observer Report on administering the Onsite trials: Point Smart Software</u>

(Observer Report)

Efficacy Assessment of Products transferred by T2RERC

[Focus: Point Smart]

Date: _____

Observer Name: _____

Participant Name:_____[Optional]
Participant ID:_____

Compass Trials used with Point Smart mouse program

Based on your observation, what barriers did the user seem to have in relation to working the Microsoft mouse pointer for the tasks?

<u>Task I- Point & Click</u>

1. Able to keep track of the moving mouse pointer
   □ All the time □ Most of the time □ Some of the time □ None of the time
2. Able to move the mouse pointer to the target
   □ All the time □ Most of the time □ Some of the time □ None of the time
3. Able to move the mouse pointer at an optimum speed
   □ All the time □ Most of the time □ Some of the time □ None of the time
4. Able to fix or stabilize the mouse pointer at the target
   □ All the time □ Most of the time □ Some of the time □ None of the time
5. Able to activate the target with a synchronized click
   □ All the time □ Most of the time □ Some of the time □ None of the time

<u>Additional Comments if any:</u>

Task II- Drag & Drop

1. Able to lock (hold) and drag the icon
   □ All the time □ Most of the time □ Some of the time □ None of the time

2. Able to drag in all directions
   □ All the time □ Most of the time □ Some of the time □ None of the time

3. Able to unlock and drop the icon at the target location
   □ All the time □ Most of the time □ Some of the time □ None of the time

Additional Comments if any:

Task III- Menu Selection

1. Able to navigate the mouse pointer to the desired menu item
   □ All the time □ Most of the time □ Some of the time □ None of the time

2. Able to click the menu item and activate the dropdown list
   □ All the time □ Most of the time □ Some of the time □ None of the time

3. Able to accurately select the desired drop down item
   □ All the time □ Most of the time □ Some of the time □ None of the time

Additional Comments if any:

Opening Email program 1	**Comments**
Successful ☐ Unsuccessful ☐	
Took _____ attempt (s)	
Ease of use: Had trouble 1___ 2___ 3___ 4___ 5___No trouble at all	
Sending Email 1	

Successful ☐ Unsuccessful ☐	
Took _____ attempt (s)	
Ease of use: Had trouble 1___ 2___ 3___ 4___ 5___No trouble at all	
Opening Email program 2	
Successful ☐ Unsuccessful ☐	
Took _____ attempt (s)	
Ease of use: Had trouble 1___ 2___ 3___ 4___ 5___No trouble at all	
Sending Email 2	
Successful ☐ Unsuccessful ☐	
Took _____ attempt (s)	
Ease of use: Had trouble 1___ 2___ 3___ 4___ 5___No trouble at all	

Using Computer Applications (Tasks IV, V and VI) with the Point Smart mouse pointer

Opening Internet Website 1	**Comments**
Successful ☐ Unsuccessful ☐	
Took _____ attempt (s)	
Ease of use: Had trouble 1___ 2___ 3___ 4___ 5___No trouble at all	
Scrolling Internet Website 1	
Successful ☐ Unsuccessful ☐	
Took _____ attempt (s)	
Ease of use: Had trouble 1___ 2___ 3___ 4___ 5___No trouble at all	
Opening Internet Website 2	
Successful ☐ Unsuccessful ☐	
Took _____ attempt (s)	
Ease of use: Had trouble 1___ 2___ 3___ 4___ 5___No trouble at all	
Scrolling Internet Website 2	

Successful ☐ Unsuccessful ☐	
Took _____ attempt (s)	
Ease of use: Had trouble 1___ 2___ 3___ 4___ 5___No trouble at all	

Opening Word File 1	**Comments**
Successful ☐ Unsuccessful ☐	
Took _____ attempt (s)	
Ease of use: Had trouble 1___ 2___ 3___ 4___ 5___No trouble at all	
Cutting & Pasting in Word File 1	
Successful ☐ Unsuccessful ☐	
Took _____ attempt (s)	
Ease of use: Had trouble 1___ 2___ 3___ 4___ 5___No trouble at all	
Moving by Drag and drop in Word File 1	
Successful ☐ Unsuccessful ☐	
Took _____ attempt (s)	
Ease of use: Had trouble 1___ 2___ 3___ 4___ 5___No trouble at all	
Opening Word File 2	
Successful ☐ Unsuccessful ☐	
Took _____ attempt (s)	
Ease of use: Had trouble 1___ 2___ 3___ 4___ 5___No trouble at all	
Cutting & Pasting in Word File 2	
Successful ☐ Unsuccessful ☐	
Took _____ attempt (s)	
Ease of use: Had trouble 1___ 2___ 3___ 4___ 5___No trouble at all	
Moving by Drag and drop in Word File 2	

Successful ☐ Unsuccessful ☐	
Took _____ attempt (s)	
Ease of use: Had trouble 1☐ 2☐ 3 ☐ 4 ☐ 5 ☐No trouble at all	

7B3. Consumer Questionnaire at Onsite trials: Point Smart Vs. Microsoft Software

Efficacy Assessment of Products transferred by T2RERC

[Focus: Enhancing Mouse Pointer performance]

Participant Name: _____[Optional]

Participant ID: _____

Consumer Questionnaire: *PointSmart*

(To be used by the testing consumer in conjunction with the laboratory trials – each section to be filled out immediately following the completion of each set of tasks.)

Date: _____

PART A. Basic Mouse-tasks

Based on your performance of the three mouse-related tasks, tell us what barriers you found in working the mouse pointer. Check all that apply.

Task I- Point & Click at the target

[ ] Difficulty viewing the mouse pointer

[ ] Difficulty in tracking the moving mouse pointer

[ ] Difficulty moving the mouse pointer to the target

[ ] Difficulty stabilizing (fixing) the mouse pointer on the target

[ ] Difficulty synchronizing the click on the target effectively

[ ] Other difficulties ----------

Task II- Drag & Drop

[ ] Difficulty holding and dragging the icon

[ ] Difficulty with the drag in all directions

[ ] Difficulty in dropping the icon at the target location

[ ] Other difficulties_____

Task III- Menu Selection

[ ] Difficulty navigating the mouse pointer to the menu

[ ] Difficulty activating the menu button

[ ] Difficulty selecting and activating the items in the menu

[ ] Other problems_____

PART B. Common computer applications

Task IV: Opening and sending Emails

1. How successful were you in opening up the Email application using the PointSmart software?

	Opened? (yes or no)	Success at First try? (yes or no)
First Email application		
Second Email opening task		

2. How successful were you in sending the Email using the PointSmart software program?

	Sent? (yes or no)	Success at First try? (yes or no)
First Email		
Second Email		

3. Please answer the questions below using a scale of **1 to 5**, where **1** represents the **least satisfaction** on your part and **5** represents the **most satisfaction**.

	Question	**Your Rating**						
a	How satisfied were you in using PointSmart software program to open up the email application?	*Not at all satisfied*	1	2	3	4	5	*Highly Satisfied*
b	How satisfied were you in sending the email using PointSmart software program?	*Not at all satisfied*	1	2	3	4	5	*Highly Satisfied*

c	How easy was it to activate the application using PointSmart software program?	*Very difficult-*	1	2	3	4	5	*Very easy*

Task V: Internet Browsing

1. How successful were you in opening up the Internet Browser using the PointSmart software?

	Opened? (yes or no)	Success at First try? (yes or no)
First Browser opening		
Second Browser opening		

2. How successful were you in clicking links open using the PointSmart software?

	Opened? (yes or no)	Success at First try? (yes or no)
First browser application		
Second browser application		

3.. Please answer the questions below using a scale of **1 to 5**, where **1** represents the **least satisfaction** on your part and **5** represents the **most satisfaction**.

a	How satisfied were you in using PointSmart software program to open up the Internet browser?	*Not at all satisfied*	1	2	3	4	5	*Highly Satisfied*
b	How satisfied were you clicking links open using PointSmart software program?	*Not at all satisfied*	1	2	3	4	5	*Highly Satisfied*
c	How easy was it to activate the application using PointSmart software program?	*Very difficult-*	1	2	3	4	5	*Very easy*

Task VI: Using the word processing program

1. How successful were you in opening up the word processing application using the PointSmart software?

	Opened? (yes or no)	Success at First try? (yes or no)
First word processing application		
Second word processing application		

2. How successful were you in opening up files/documents using the PointSmart software program?

	Opened? (yes or no)	Success at First try? (yes or no)
First file/document		
Second file/document		

3. How successful were you in moving texts by cutting and pasting within the document using the PointSmart software?

	Opened? (yes or no)	Success at First try? (yes or no)
First cut-and-paste		
Second cut-and-paste		

4. How successful were you in dragging and dropping texts within the document using the PointSmart software?

	Opened? (yes or no)	Success at First try? (yes or no)
First drag-and -drop		
Second drag-and -drop		

5. Please answer the questions below using a scale of **1 to 5**, where **1** represents the **least satisfaction** on your part and **5** represents the **most satisfaction**.

a.	How satisfied were you in using PointSmart software program to open up the file?	*Not at all satisfied*	1	2	3	4	5	*Highly Satisfied*
b	How satisfied were you in highlighting the text using PointSmart software program?	*Not at all satisfied*	1	2	3	4	5	*Highly Satisfied*
c	How satisfied were you in cutting and pasting text within the document using PointSmart software program?	*Not at all satisfied*	1	2	3	4	5	*Highly Satisfied*
d	How satisfied were you in dragging and dropping text within the document using PointSmart software program?	*Not at all satisfied*	1	2	3	4	5	*Highly Satisfied*

PART D

Please answer the following based on your trial of the Point Smart software program in this session:

1	How easy would it be for you to set up the Point Smart mouse pointer on your computer to meet your needs?	*Very Difficult*	1	2	3	4	5	*Very Easy*
2	How easy was it for you to see the mouse pointer?	Very difficult	1	2	3	4	5	very easy
3	How easy was it for you to keep track of the mouse pointer (without losing it)?	Very difficult	1	2	3	4	5	very easy
4	How easy was it for you to move the mouse pointer as you wanted?	Very difficult	1	2	3	4	5	very easy
5	How easy was it to click on buttons and icons without over- or under-shooting?	Very difficult	1	2	3	4	5	very easy

6	How easy was it for you to lock and drag the pointer?	Very difficult	1	2	3	4	5	very easy
7	How comfortable were you in using the Point Smart software program?	Very Frustrating	1	2	3	4	5	Very Comfortable
8	Do you believe that Point Smart software program might interfere with your working on other computer applications?	Yes [ ]					No [ ]	
9	Do you believe that Point Smart software program makes working on the computer easier for you?	Yes [ ]					No [ ]	
10	Do you believe that Point Smart software program is reliable?	Yes [ ]					No [ ]	

9. Please add any other comments you would like to make regarding the Point smart mouse program:

_____
_____
_____
_____

7B4. Consumer Questionnaire at Onsite trials: Microsoft Software

Note:

Same as the questionnaire used in 7B3. Substitute Microsoft Software for Point Smart software as applicable in all questions.

7B5. Consumer Exit Interview at the end of Onsite trials: Point Smart Vs. Microsoft Software

Efficacy Assessment of Products transferred by T2RERC

[Focus: Computer mouse enhancing program]

Consumer Interview Outline

Date: _____

Participant ID: _____

Participant Name (optional)_____

Interviewer: _____

Question 1: You have just tried out the two mouse pointer driving programs, – the Point Smart program and Microsoft windows mouse software. Consider their overall performance and appeal.

How do they compare with each other in terms of promoting your ability to work independently on a computer?

Explain.

_____

_____

Probing Questions

1. How many of the applications and their features were you able to successfully use using Point-smart? _____
2. How many of the applications and their features were you able to successfully use using Microsoft windows mouse accessibility feature? _____
3. Which program will improve your capability in working on the computer independently? And Why?

   _____

   _____
4. Which program would you find more dependable when working on the computer? And Why?

   _____

   _____
5. Which program would you believe would function longer without crashing based on your use? And Why?

_____
_____

6. Which program would you think is more compatible with other computer applications? And Why?

_____
_____

7. Which program would you think is easier to use everyday? And Why?

_____
_____

8. On which program is it easier to set your preferences? And why?

_____
_____

9. Which program do you believe improves your speed working on the computer? And Why?

_____
_____

10. Which program gives you better feedback? And why?

_____
_____

11. Which program did you find comfortable to use? And why?

_____
_____

12. Which program would you prefer to use in your own computer? And Why?

_____
_____

Question 2:

What do you think the Point-Smart is worth in terms of a buying price?

_____

What do you think the Microsoft Windows mouse accessibility feature is worth in terms of a buying price? _____

Which one would you buy? _____

How much would you be willing to pay for it? _____

Instructions to exiting participant:

You are now going to try out the Point Smart software at home for 4 months. You will keep a log of your Pointsmart use and give us feedback for the first 2 months. Then you will keep the software for 2 more months and you do not need to give us any feedback. At the end of the study you will get a check for $150.

Here is a folder which has the CD with the program that you will take home and install on your home computer. There is a manual with instructions. Call us if you need help with the installation.

In the folder you will also find 7 questionnaires. You will fill them out and send us back on the due dates marked on each one of them. You are provided with stamped and self addressed envelopes.

We will be periodically in touch with you to find out how it is going. At some point, we will visit you and get data on your performance at your home computer.

7B6. Consumer Questionnaire for Day One of Home trials: Point Smart Software

Efficacy Assessment of Products transferred by T2RERC (Point Smart)

For Office Use Only
Project #:
Participant ID:

Participant's Name:_____

Response Form – Day 1

Please complete this questionnaire on the evening of the day you receive and install the software, and mail it to us in the attached stamped envelope by [***DATE*_____].** If you have any questions, please do not hesitate to call ***Michelle Lockett*** at 716-836-0822 ext. 112 between 8:30 a.m. and 5:00 p.m.

Thank you.

Efficacy Assessment of Products transferred by T2RERC

(Focus: Mouse enhancing software)

A. Please indicate, with an "x", the type of pointing device you use with your computer.

☐ Standard Mouse

☐ Trackball

☐ Head Mouse pointer

☐ Voice Activation Software

☐ Other (Please specify)_____

B. How frequently do you work on your computer? (Please mark with an "x")

☐ Several times a day

☐ Once daily

☐ Once in 2 days

☐ Once or twice a week

☐ A couple of times a month

C. Please indicate your level of satisfaction on the given scale of **1 to 5,** where **1** represents that you are **least satisfied** and **5** represents that you are **most satisfied.** Mark the appropriate box with an x

1. The instructions to upload and use the Point-Smart software were ….

Very Difficult to Follow 1☐ 2☐ 3☐ 4☐ 5☐ **Very Simple to Follow**

2. Using the Point-Smart software ….

Requires me to get Assistance from Others1☐ 2☐ 3☐ 4☐ 5☐ **Eliminates the need for Assistance from others**

If you needed assistance, describe what type-

_____

_____

_____

3. Did the installation of the PointSmart software slowdown or hinder the functioning of your computer?

Slowed the computer a lot 1☐ 2☐ 3☐ 4☐ 5☐ **Did not affect the computer at all**

4. The ***Point-Smart software*** makes **the mouse pointer…**

Very Difficult to Operate 1☐ 2☐ 3☐ 4☐ 5☐ **Very Easy to Operate**

5. I believe that the Point-Smart software is…

Not at all for me 1☐ 2☐ 3☐ 4☐ 5☐ **Truly made for me**

Please answer these questions in your own words.

6. Now that you have the ***Point-Smart software on your computer,*** what do you expect you can do that you weren't able to do before?

_____
_____
_____
_____
_____

7. Do you have any observations or comments about the Point-Smart software at this time?

_____
_____
_____
_____

8. What problems did you have in up-loading and setting up Point-Smart?

_____
_____
_____
_____

9. What settings of Point-Smart did you set up?

☐ Larger mouse pointer

☐ Change the color of the mouse pointer

☐ Slow down the mouse pointer

☐ Speed up mouse pointer

☐ Put the mouse pointer on flash

☐ Use gravity function

☐ Use the wrap around feature

☐ Use the "invert" function

☐ Other

10. Please identify which features you think you will use:

_____
_____
_____
_____

PLEASE REVIEW YOUR QUESTIONNAIRE TO MAKE SURE

THAT YOU HAVE ANSWERED EACH QUESTION

AND MAIL IT TO US BY THE INDICATED ***DATE***

IN THE ENCLOSED STAMPED, SELF-ADDRESSED ENVELOPE.

7B7. Weekly Questionnaire for Consumer Home Trials: Point Smart Software

Weekly Assessment of Products transferred by T2RERC: Point Smart

For Office Use Only
Project #:
Participant #:

Participant's Name:_____

Response Form – Week [__]

Please complete this questionnaire on the evening of the day you start using the PointSmart software and mail it to us in the attached stamped envelope by [***DATE***_____ (End of week)]. If you have any questions, please do not hesitate to call ***Michelle Lockett*** at 716-836-0822 ext.112 between 8:30 a.m. and 5:00 p.m.

Thank you.

Weekly Assessment of Products transferred by T2RERC (Point Smart)

PART A – USAGE EXPERIENCE

1a. Did you work on the computer this week? ☐ Yes ☐ No

1b. Did you use Point-Smart this week? ☐ Yes ☐ No

If you said **No** to the questions, skip the remaining questions, and PLEASE RETURN Questionnaire in the enclosed envelope

If you said **Yes**, then continue with the following questions:

2. Which features of Point-Smart did you use this week?

_____

_____

3 (a) What adjustments did you make to the settings this week?

_____

_____

3 (b) Which of the settings did NOT work as expected?

_____

4. Which applications did you use Point-Smart with this week?

☐ Word Processing

☐ Spreadsheet

☐ Internet browsing

☐ Emailing

☐ Playing Games

☐ Drawing

☐ Publishing

☐ Other (Please identify the application) _____

Comments-

_____

_____

_____

5. What application if any was Point-Smart **NOT** able to work with this week?

6. Did any programs crash when using Point-Smart this week?? If not, please skip to Question 7.

☐ Yes ☐ No

7. (a) I had ____(enter number) crashes with Point-Smart this week.

(b) Please identify what application crashed and what you were doing:

☐ Microsoft Word

☐ Microsoft Excel

☐ Internet Browsing

☐ e-mail

☐ Other _____

Comments:_____
_____
_____

For the next two questions, please indicate your level of satisfaction on the given scale of **1 to 5,** where **1** represents that you are **least satisfied** and **5** represents that you are **most satisfied.** Mark the appropriate box with an x

8. Do you find yourself working on the computer longer when using Point-Smart?

Working less than before 1☐ 2☐ 3☐ 4☐ 5☐ Working **longer than before**

Comments – Explain why.

_____
_____
_____

9. How does the use of PointSmart affect your fatigue level?

I tire more easily than before 1☐ 2☐ 3☐ 4☐ 5☐ **I can go longer without tiring**

Weekly Assessment of Products transferred by T2RERC (Point Smart)

PART B

10. The following phrases describe what the Point-Smart is likely to be or do for you. Please rate **each** aspect of this device choosing a number between 1 and 5 which best describes your opinion. Then **mark** the corresponding box with an X. Remember, there are no right or wrong answers. We are only interested in your opinion.

The Point Smart mouse pointer is too difficult to set to my specifications	1☐ 2☐ 3☐ 4☐ 5☐	The mouse pointer is easy to set to my specifications
Point-Smart works with only specific applications/programs	1☐ 2☐ 3☐ 4☐ 5☐	Point-Smart is easy to use with all applications/programs
The mouse pointer is very difficult to control	1☐ 2☐ 3☐ 4☐ 5☐	The mouse pointer is very easy to control
Point-Smart Has no effect on my ability to perform related tasks on the computer	1☐ 2☐ 3☐ 4☐ 5☐	Point-Smart Improves my ability to perform related tasks on the computer
Point-Smart Interferes with the use of other devices on my computer	1☐ 2☐ 3☐ 4☐ 5☐	Point-Smart Is compatible with the other devices I use with the computer
Point-Smart Works very erratically	1☐ 2☐ 3☐ 4☐ 5☐	Works every time
Using Point Smart requires assistance of others	1☐ 2☐ 3☐ 4☐ 5☐	Can operate the computer using Point-Smart myself
It is too difficult to change settings	1☐ 2☐ 3☐ 4☐ 5☐	It is very easy to make changes to the settings
I feel ridiculous to use Point-Smart…	1☐ 2☐ 3☐ 4☐ 5☐	I enjoy using Point-Smart
The mouse pointer with Point-Smart is an unacceptable image	1☐ 2☐ 3☐ 4☐ 5☐	Is a very acceptable image
Point-Smart interferes with other programs	1☐ 2☐ 3☐ 4☐ 5☐	Point-Smart works well with other programs
The mouse pointer doesn't do	1☐ 2☐ 3☐ 4☐ 5☐	The mouse pointer works very

what I want it to do		well
Can't think of myself using Point Smart software	1 2 3 4 5	Point Smart software is made for me…
Point-Smart interferes with other people using this computer	1 2 3 4 5	Easy to switch to other users of the computer

11. Compared to your previous mouse pointer software, how much effort did it require to use Point-Smart?

More Less the same

12. Compared to your first use of the Point-Smart software, how was its use this week?

Much Easier

Just the Same

More Difficult

13. Please record any other observations, comments, or experiences about the ***Point-Smart*** this week. (Please write.)

_____

_____

14. If you would like to see Point Smart further *improved* in the way it works for you, what would it be?

_____

_____

PLEASE REVIEW YOUR QUESTIONNAIRE TO MAKE SURE

THAT YOU HAVE ANSWERED EACH QUESTION

AND MAIL IT TO US BY THE INDICATED ***DATE***

IN THE ENCLOSED STAMPED, SELF-ADDRESSED ENVELOPE.

7B8. Consumer Questionnaire at the end of Home Trial: Point Smart

End-Of-Trial Assessment of Products transferred by T2RERC (Point Smart)

For Office Use Only
Project #:
Participant ID:

Participant's Name:_____

Response Form – End of Trial Period

Please complete this questionnaire after ***DATE***] _____ and mail it to us by [***DATE]*** _____in the attached self-addressed stamped envelope. If you have any questions, please do not hesitate to call Michelle Lockett at 836-0822 ext 112

Thank you.

Sincerely,

End-of-Trial Assessment of Products transferred by T2RERC (Point Smart)

PART A - USAGE EXPERIENCE

You have now used Point-Smart for the past two months. Please describe your experience with this device by answering questions below. For each question, please mark your response by placing an "X" in the appropriate box.

How would you rate Point-Smart as compared to the alternatives you have used in the past and/or are currently using?

1. Controling the movement of the mouse pointer

[ ] Much less effective

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

2. Opening computer applications

[ ] Much less effective]

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

3. Composing and sending email

[ ] Much less effective

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

4. Working in a word processor

[ ] Much less effective

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

5. Browsing the internet

[ ] Much less effective

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

6. Using other applications

(a) Application 1: (Please write the name of the application)_____

[ ] Much less effective

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

(b) Application 2: (Please write the name of the application) _____

[ ] Much less effective

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

(c) Application 3: (Please write the name of the application)_____

[ ] Much less effective

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

Comments

_____
_____
_____

7. *As compared to* alternatives you have used (or currently using) to help control the mouse pointer, how much time does point-smart save you in a day while working on the computer?

[ ] none; it takes much longer

[ ] not much; it takes a little longer

[ ] no difference; it takes just as much time

[ ] saves some time

[ ] saves a lot of time

Comments:_____
_____

8. Considering your difficulty in controlling a mouse, how much overall effort does it take to operate the mouse pointer using point smart *as compared to* alternatives you have used (or currently using)?

[ ] A lot more effort - cannot use it.

[ ] Somewhat more effort

[ ] Just as much effort - no difference

[ ] Somewhat less effort

[ ] A lot less effort

Comments:_____
_____

9. Are both your hands equally functional?

If yes, skip to question 10.

If not, can point-smart be functional for you with one hand?

[ ] Always

[ ] Most of the time

[ ] Sometimes

[ ] Never

Comments:_____

_____

10. When compared to alternatives you used (or currently using) to control the mouse, how useful is Point-Smart software in operating with either hand (right or left)?

[ ] Takes a lot more effort

[ ] Takes somewhat more effort

[ ] Takes equal effort - no difference

[ ] Takes somewhat less effort

[ ] Takes a lot less effort

Comments:

_____

_____

11. Rate the overall comfort when using Point-Smart compared to alternatives you used (or currently using) to control the mouse pointer:

[ ] Very Uncomfortable

[ ] Uncomfortable

[ ] Equally Comfortable

[ ] Comfortable

[ ] Very Comfortable

Comments:_____

_____

_____

12. Compared to alternatives you used (or currently using) to control the mouse pointer, how do you find the use of the Point-Smart to be?

[ ] Very Frustrating

[ ] Frustrating

[ ] Not much different

[ ] Satisfying

[ ] Very Satisfying

Comments:_____
_____
_____

13. Compared to alternatives you used (or currently using) to control the mouse pointer, you found applications to crash while using Point-Smart to be:

[ ] A lot more likely

[ ] Somewhat more likely

[ ] Equally likely or unlikely

[ ] Somewhat less likely

[ ] A lot less likely -

Comments:_____
_____
_____

14. When compared to alternatives you used (or currently using) to control the mouse pointer, the chances of missing the icon with Point Smart is

[ ] A lot more likely

[ ] Somewhat more likely

[ ] Equally likely or unlikely

[ ] Somewhat less likely

[ ] A lot less likely - negligible

Comments:_____
_____
_____

15. The chances of crashing applications, when using Point-Smart, when compared to alternatives you used (or currently using) to control the mouse pointer is:

[ ] A lot more likely

[ ] Somewhat more likely

[ ] Equally likely or unlikely

[ ] Somewhat less likely

[ ] A lot less likely - negligible

Comments:_____
_____
_____

16. Point-Smart compared to your old software to control the mouse has been:

[ ] Less Reliable

[ ] Equally Reliable

[ ] More Reliable

Comments:_____
_____
_____

17. When compared to alternatives you used (or currently using) to control the mouse pointer, how consistent did you find Point-Smart?

[ ] Much worse - never worked consistently

[ ] Somewhat worse - was sometimes consistent

[ ] Somewhat better - worked consistently most of the time

[ ] Much better - worked consistently always

Comments:_____
_____
_____

18. Compared to my old method, Point-Smart allowed me to control the mouse pointer that I thought were not possible.

[ ] Strongly Disagree

[ ] Disagree

[ ] Can’t say

[ ] Agree

[ ] Strongly Agree

Comments:_____
_____
_____

19. Point-Smart has increased my ability to work on the computer independently.

[ ] Strongly Disagree

[ ] Disagree

[ ] Can't say

[ ] Agree

[ ] Strongly Agree

Comments:_____

_____

_____

PART B

1. The following phrases describe what Point-Smart is likely to be or do for you. Please rate **each** aspect of this device choosing a number between 1 and 5 which best describes your opinion. Then **mark** the corresponding box with an X. Remember, there are no right or wrong answers. We are only interested in your opinion.

While using the Point-Smart, I find that:

It is very difficult to move to different locations	1 2 3 4 5	It is very easy to move to different locations
Operations are restricted to specific locations	1 2 3 4 5	It is very easy to operate at different locations
It is very uncomfortable to use	1 2 3 4 5	It is very comfortable to use
It has no effect on my ability to perform related task	1 2 3 4 5	It improves my ability to perform related task
It interferes with the use of other devices on the computer	1 2 3 4 5	It is compatible with the use of other devices
It works very erratically	1 2 3 4 5	It works every time
Its controls are difficult to operate	1 2 3 4 5	Its controls are easy to operate
I require assistance of others	1 2 3 4 5	I can operate the mouse pointer myself
I can't think of myself using this software	1 2 3 4 5	This software is just for me…

2. Compared to your first use of this application, how was its use today?

Much more difficult	1 2 3 4 5	Much easier

3. Are there any changes you would like to see made in this software? (Please describe.)

   _____

4. What are two things you like **most** about this software?

   _____

   _____

5. What two things do you like **least** about this software?

   _____

   _____

6. If this software program were available in the market today, how much money would you be willing to pay for it?

   $_____

7. If this software were available at the price you suggest, how likely is it that you would buy it? (Please circle **one**)

   [ ] Definitely would not buy it

   [ ] Probably would not buy it

   [ ] Might or might not buy it

   [ ] Probably would buy it

   [ ] Definitely would buy it

PART C

1. To what degree does Point-Smart meet your needs?

[ ] Substantially below my needs

[ ] Slightly below my needs

[ ] Just meets my needs

[ ] Slightly above my needs

[ ] Substantially beyond my needs

2. How does Point-Smart compare with other softwares which perform a similar function?

[ ] Substantially Inferior

[ ] Slightly inferior

[ ] Same

[ ] Slightly superior

[ ] Substantially superior

3. What degree of importance would you attach to selecting a soft ware which performs the same function as Point-Smart?

[ ] Extremely important

[ ] Very important

[ ] Important

[ ] Somewhat important

[ ] Not so important

PART D

Imagine that your present software was destroyed and you had to pay yourself to replace it. How likely is it that you would buy your present software again? (Please circle one number.)

[ ] Definitely would not buy

[ ] Probably would not buy

[ ] Might or might not buy

[ ] Probably would buy

[ ] Definitely would buy

PLEASE REVIEW YOUR QUESTIONNAIRE TO MAKE SURE

THAT YOU HAVE ANSWERED EACH QUESTION

AND MAIL IT TO US ON THE INDICATED ***DATE***

IN THE ENCLOSED STAMPED, SELF-ADDRESSED ENVELOPE.

Thank you.

7C. Efficacy Assessment of Kelvin Thermostat

7C1. Observer Script for administering the Onsite trials: Kelvin Thermostat

Efficacy Assessment of Products transferred by T2RERC

[Focus: Kelvin Thermostat]

Observer Script for administering the Onsite trials

Introduction by observer: General Instructions

My name is…… and I will be instructing you about what you will be doing, following you as you are doing them and ask you for the feedback we need from you.

You will be trying out two Talking thermostats today, one after another. They are both used to provide the owner:

1. The day and time
2. The ambient room temperature
3. The thermostat setting
4. The ability to program weekdays and weekend temperatures through four different periods of the day.

One of them is the **Kelvin** thermostat and the other is the **VIP** thermostat. You will be first testing the _____ (Kelvin or VIP) thermostat then the (VIP or Kelvin) thermostat. First we will adjust the thermostat to the factory default settings and then you will be asked to perform a series of tasks with the thermostat.

You will be testing both the thermostat based on **five** different tasks:

1. Reading the room temperature
2. Raising or lowering the temperature setting
3. Setting the time
4. Setting the day
5. Setting the weekday and weekend temperature

I will first provide you a description of each thermostat and its parts. You will have the opportunity to feel the thermostat and push its buttons, as I explain to you what features and functions each thermostat has.

Then I will give you step-by-step instructions for each of the five tasks. Following instructions for each task, you will have the opportunity to try out the task yourselves. If needed, you can ask for help at that time. Please do not feel embarrassed or fearful to ask me to repeat the instructions. Remember that we are testing the device, and not you.

Once you are comfortable with the task, you will asked to perform the task in a specific way (example “Raising or lowering the temperature by 15 degrees and so on).

Finally, I will describe some features that are unique to each thermostat. You are not required to perform any tasks with those features.

Instructions for Kelvin

Description of the Kelvin Thermostat:

I will now describe to you the Kelvin thermostat and you will have this opportunity to feel the Kelvin, and push its buttons, as I explain to you what features and functions the Kelvin thermostat has.

Directions

The face of the Kelvin has an inner depressed circle, which is the speaker. On the left side of the speaker is a raised up arrow, while on the right side of the speaker is a raised down arrow. Pressing these arrows will make Kelvin announce the time and temperature. Pressing the appropriate arrow again will cause the temperature setting to raise/lower the spoken temperature respective to the direction of the arrow you press.

Go ahead and press the buttons to understand how the Kelvin works.

(After the person presses the buttons a couple of times, continue).

Along the bottom edge are 2 slide switches.

- The first slide switch on the left is the fan control. Slide this switch to the left and the fan will go to auto. Slide the switch to the right and the fan will turn on.
- The second switch is the cooling/heating slide switch. Sliding the switch to the extreme right will put the thermostat in heating mode while sliding the switch all the way to the left will place it in the cooling position. Sliding the switch into the middle position will disable the thermostat.

Below the speaker is the Door/panel that has the control buttons behind it. This panel is the entire width of the lower section of the Kelvin.

Opening the door will expose the buttons behind the door.

To open the door, place either a finger of your right hand and left hand on each side of the door:

And pull the door forward and down.

(Have the participant open the panel door and feel the buttons underneath)

Resume Directions:

Inside the panel door on the left side you will find two round buttons; placed vertically one above the other.

(Have the participant feel the two buttons on the left side)

The button on top is the voice control and has a small tactile dot in its center.

- Pressing the voice control button will either disable or enable the thermostat's voice. The round button on the bottom is the program button, feel free to press it and listen to what it says.
  (Have the participant press each button after you explained its purpose)

- In the center of the panel is two rows of buttons separated by a raised line. The top row consists of three round buttons, while the bottom row consists of four rectangular buttons.
- The first round button on the left end is the set time button.
- The center button which has a tactile dot in its middle is the set day button.
- The round button at the right end is the set temperature button.

Now let's look at the bottom row of rectangular buttons.

- The first rectangular button on the left end is set morning interval button.
- The second rectangular button going right is the set day interval button.
- The third rectangular button going right is the set evening interval button.
- The last rectangular button to the extreme right is the set night interval button.

And finally on the extreme right-hand side centered is a round button called the shift button. Please note that the shift button does not have any voice feedback.

Go ahead and press all the buttons you wish for the next couple of minutes before we continue.

==========

Now let us get to each of the five tasks you will be performing on the thermostat today.

Task 1: Reading the room temperature

This can be done in two ways

Manual Control

On the left side of the speaker is a raised up arrow, while on the right side of the speaker is a raised down arrow. Pressing these arrows will make Kelvin announce the time and temperature.

Now go ahead and try it yourself.

Hand-free by Voice commands

You can also initiate voice control by clapping twice. KELVIN will make a "tick" sound to let you know that your clap was heard. Say the keyword "thermostat". KELVIN will speak the current time, the current temperature and the current desired thermostat setting.

Now go ahead and try it yourself.

Test 1:

a) Please find out the room temperature for me using any technique you wish with the Kelvin.

b) Now please find out what temperature the Kelvin thermostat is set for?

Task 2: <u>Raising or lowering the temperature setting</u>

This can be done in three ways

1. Manual Activation

On the left side of the speaker is a raised up arrow, while on the right side of the speaker is a raised down arrow. Pressing these arrows will make Kelvin announce the time and temperature. Pressing the appropriate arrow again will cause the temperature setting to raise/lower the spoken temperature respective to the direction of the arrow you press.

Now go ahead and try it yourself.

2. Voice Commands and Manual Activation

You can initiate voice control by pressing the RAISE or LOWER buttons. KELVIN will tell you the time and temperature and await your command. You can then raise the temperature by one degree by saying, "raise" to raise the temperature and saying "lower" to lower the temperature by one degree.

You will have only seven seconds for Kelvin to be able to respond to your voice command.

Now go ahead and try it using your voice.

3. Hands-free Activation

You can also initiate voice control by clapping twice. KELVIN will make a "tick" sound to let you know that your clap was heard. Say the keyword "thermostat". KELVIN will speak the current time, the current temperature and the current desired thermostat setting.

If you say Raise, KELVIN will increase the current set temperature by one degree. You can then say Raise again and increase the temperature another degree. KELVIN will wait 15 seconds before it stops listening for your command. KELVIN responds to "lower" in the same manner, by decreasing the current set temperature by one degree.

Now go ahead and clap your hands and command Kelvin to raise and then lower.

Test 2: Using any method,

a) Now please set the Kelvin for ten degrees higher.

b) Now please set the thermostat 15 degrees lower.

<u>Task 3: Setting the time</u>

I will read to you first the directions and walk you through the process we want you to follow. After that I will ask you to do the same task but with different data that I will want you to set, read, or program. You will then do what I request and again if you have any trouble in repeating the task, do not feel embarrassed or fearful to ask me to repeat the instructions. We only want to get your impressions on what you are doing; we have no expectations of you being expert with this thermostat at this time.

Setting the Time

To set the time you:

- Press and hold in the round button, that is on the left side of the center round button with a small tactile marking in its middle. Hold this button in until Kelvin prompts you to "Set the time".
- To change the hour use up and down buttons located at the left and right of the center speaker. Holding the button in will result in a continuous count up or down. The time will change by one for each pressing.
- After the hour has been set, press the SET TIME button again (if the person can see) and the minutes will begin to flash. Use the up and down buttons again to set the minutes. Holding in the button will result in the minutes being counted up or down continuously.
- To complete setting the time press in the time set button once again.
- Hint: if you disable the voice prompts by pressing the VOICE button, it will enable you to scroll through the hours more quickly.

Go ahead and try it.

Test 3:

a) Now I would like you to set the time to 10:30 PM

Task 4- Kelvin Thermostat: Setting the Day

- To set the day, press the center round button with the tactile marking. By pressing the SET DAY button the thermostat will advance one day for each press of the SET DAY button. Keep pressing the button until the correct day is reached.

Go ahead and try it.

Test 4:

a) Now I want you to set the day to Wednesday.

Task 5- Programming the Weekday/weekend temperatures

You have the options of programming the thermostat for each day or in series by weekdays and weekend.

For programming individual days

A. Press the center Set Day button (the one with the tactile dot in the middle), until you hear the day. The days progress as you press the Set Day button each time. Move to a particular day that you would like to program

B. Then hit the "Morning Interval Button" (first rectangular button on left.

C. Then hit the "Set time" round button left of the center round button.

D. Hit either up/down arrow at the side of the speaker to set the desired hour.

E. Then push the “Set time “button. You CAN HOLD IN TO CHANGE TIME RAPIDLY

F. Then hit either up/down arrow to the desire minute(s).

G. Push “Set Time” button again.

H. Then Push the Set temperature “button right of the Center button to begin programming the desire temperature.

I. Then push either up/down arrow to the desire temperature.

J. Push the “Set temperature” button to set the temperature. One degree at a time, with each push.

K. Then push the program button, the round button to the far lower left, to hear “The Program is Active”.

Go ahead and repeat the task yourself:

Repeat steps A through K for each of the day interval buttons, going from right to left. (Morning-day-evening-night intervals).

For programming Weekdays as a whole.

Press the Set Day button to Monday.

Then hit any of the bottom buttons (Morning, Evening, Night).

Then hit set button again.

You will hear all the weekdays in series.

Repeat the above steps from A to K to program the weekdays.

For programming Weekend as a whole

Press the Set Day button to Saturday or Sunday.

Then press of the bottom buttons (Morning, Evening, Night).

Then hit set button again.

You will hear the weekend: Saturday and Sunday

Repeat the above steps from A to K to program the weekend.

Test 5:

a) First set the day to Friday

b) Now please set the morning interval to 5 AM at 55 degrees.

c) Now can you set the day interval to noon at 70 degrees?

d) Please now set the evening interval to a 8 PM with a temperature of 80 degrees.

e) Please set the night interval to 1 AM with a temperature of 72 degrees.

f) Now that we have finished programming the Kelvin thermostat, I would like you to do the following:

Additional features of Kelvin

Now we will just take a few moments to familiarize you with four more features of the Kelvin thermostat. These four features are:

1. Voice command on/off

1. First I will walk you through the voice control commands

To turn on voice commands press and hold the SHIFT button in. While still holding down the SHIFT button (?), press the VOICE button. You will hear voice on, and the READY icon on the display screen will go on.

To turn off voice recognition repeats the same procedure. You will then hear voice on and the READY icon will go out.

Clapper On/Off

If you do not want to use the clapper feature, it can be disabled, by Pressing and holding in the SHIFT button and pressing in the evening interval button in. You will hear nothing doing this and that will let you know that the clapper feature has been disabled.

If you wish to active the clapper feature Press in the shift button while pressing in the evening interval button, you will then hear a "tick" sound letting you know that the clapper feature has been activated.

Now go ahead and press the buttons to activate/de-activate the clapper.

2. Temperature swing control

This control allows you to adjust the furnace's recycling time. This means that the thermostat will continue to heat or cool to within one degree of the set temperature. This enables your heating or cooling system to work more efficiently minimizing its cycling time. This setting can be adjusted from the factory setting of 2 by pressing and holding the SHIFT button. While still holding down the SHIFT button, press the SET TIME button. The adjustable settings are 2, 4 and 6 degrees. Go ahead and try pressing down the shift and the set time button, repeatedly until you hear the degree ranges of 1, 2, 4, and 6 degrees.

3. Air conditioning delay

The Kelvin also has a feature that allows you to set your Air conditioning delay. This refers to a compressor delay for your AC system. The compressor delay protects your AC system from short cycling. If your AC is turned off and then immediately turned back on again, it could potential damage your AC system. To avoid this, KELVIN waits 3 minutes before it turns the

AC on again. This option can be disabled, but be careful. Consult your owner's manual for your AC system, as this can cause potential damage.

To disable the AC delay, press and hold the SHIFT button. While still holding down the SHIFT button, press the SET DAY button, you will hear Kelvin say either O (pronounce oh) and 3. Please press the Shift and set day buttons repetitively to hear the different options.

4. Celsius-Fahrenheit setting

You have the option to have the Kelvin thermostat provide you the temperature and thermostat settings in either Celsius or Fahrenheit, In order to adjust the appropriate temperature scale you first press in the shift button, while pressing in the shift button then press in the set the temperature button. You will hear Kelvin say either "Celsius or Fahrenheit". Now go ahead and press the shift button and the set temperature button repetitively and listen to Kelvin toggle between the two temperature scales.

5. Raising or lowering the volume for the voice output

To adjust the volume of the Kelvin, press down the Shift button and the Program button at the same time. When you press both these buttons together each time, you will hear beeps with varying loudness. The louder the beep the louder the voice output will be. To run through the different settings maintain holding the shift button in while pressing the program button, until you hear the beep that corresponds to the volume you wish.

Thank you, now I have a questionnaire here I would like you to fill out. Once you are done with that questionnaire we will go over to the other side of the room and conduct some tasks with another thermostat.

7C2. Observer Script for administering the Onsite trials: the competing Thermostat

Efficacy Assessment of Products transferred by T2RERC: *Alternative Thermostat*

Observer Script for administering the Onsite trials

Description of the Thermostat

I am now going to review the functions and features on the thermostat if front of you. We will begin with an overview of controls and layout of those controls. As you look at the thermostat there is a small round button at the upper left called the "Help" button. (Provides you the name of the programmed service vendor and their phone number).

If you drop your hand straight down, there is a raised speaker in the middle and to the lower left corner you will find another round button, the Report button. (Pressing this button will let you know the day, the time, the indoor (ambient) temperature and the temperature that the thermostat is set at). Take your fingers back to the help button.

Heading right from the "Help" button is a flat smooth surface, which is the digital display screen.

At the upper right hand corner, right of the digital display screen, are two half-circle buttons, with a split between them. The upper button is the up button, while the lower button is the down button. (These buttons will be used when changing the Days, time, and temperature).

GO AHEAD AND PRESS THE BUTTONS TO UNDERSTAND HOW THE Device WORKS.

To the right of these buttons is a small round button called the light button. Pressing this button will light the digital display.

Bringing your hand down from the up/down buttons you will feel an elevated finger slot that opens the door/panel to the function buttons inside.

Within the panel there are 7 round push buttons, 2 sliding buttons and one small reset button.

Placing your finger on the finger slot, push out and down to open the door/panel.

Starting from the left across the top of the inside panel are three buttons.

- The left button is the Program on/off button.
- The center button is the weekend button and
- The right button is the yes button.

Below the row of three buttons is a row of four buttons.

- The first round button on the left is the Day/Time change Button.
- Heading right the second button is the run button, followed by the third button which is the Weekday button and then the fourth one in is the No button at the right end.

- Therefore the Yes button is above the No button; the Weekend button is above the Weekday button; the ON/Off button is above the Run button and the Day/Time button the last one on the left in the bottom row has no button above it.
- To the extreme left is a very small button called the "Re-set Button".

Inside the panel, in the upper right corner are two up/down slide switches.

- The switch on the right side is the Heating/cooling control. Pushing the switch to the extreme upward position will set the thermostat to heat. While pushing the switch all the way down will turn the thermostat to the cooling position. Pushing the switch to the center position will disable the thermostat.
- The switch on the left is the fan switch. Pushing the switch up will turn the fan to Automatic – coming on as needed, while pushing the switch down will turn the fan On.

Task 1: Reading the temperature and thermostat

Press the Report button on the lower left corner of the thermostat (outside of the door panel). Go ahead and try it.

Test 1:

a) Please find out the room (ambient) temperature for me.

b) Now please find out what temperature the thermostat is set for

Task 2: Raising or lowering the temperature

Press the half circle UP button on the upper right corner of the thermostat (outside of the door panel) to raise the temperature and press the half circle Down button below that to lower the temperature.

Now go ahead and try it yourself if you need to.

Test 2:

a) Now please set the thermostat for 10 degrees higher.

b) Now please set the thermostat 5 degrees lower.

Task 3: Setting Day and Time

- Pull down the curved panel door and press the DAY/TIME button (on the left bottom row).
- Press the YES button (right upper row) when asked if you wish to change the day or time settings.
- Press the YES button again when asked if you wish voice instructions.
- Press the UP or DOWN buttons (next to the display screen outside of the door panel) to make changes to minutes, and then press the run button.
- Press the up or down button to set the hour followed by pressing the run button.
- Then press the up/down button to set the day followed by pressing the run button, you will know the day/time is set when the Thermostat says "Program Completed"

Now go ahead and try changing the day and time yourself.

Test 3:

a) Now I would like you to set the time to 10:30 PM on a Wednesday

Task 4: Setting the Weekday and Weekend temperature

- Press the WEEKDAY button (second from left on the lower row) to program Monday through Friday.
- Press the YES button when asked if you wish to change the program.
- Press the YES button when asked if you want voice instructions. Follow the voice instructions to set the time and temperature.
- The thermostat will then ask you to set the WAKE time by pressing the half-circle up or down buttons (outside of the door panel)). Pressing the buttons up/down will change the minutes by 10-minute intervals.
- Once you get the minute interval you want, press the run button.
- You then will be asked to set the hour of the day. Press the half-circle up or down button (outside of the door panel) for the hour of the day you desire. Once you get the desired hour then press the run button.
- The thermostat will then ask you to set the temperature. Then press the half-circle up or down button (outside of the door panel) to set the temperature you desire for the wake time. Then press the run button.
- The thermostat will then change automatically to the Day temperature setting. The procedure that was just stated will be repeated for the Daytime minutes, hour and temperature setting. Again the thermostat will automatically guide the same procedure for the evening and sleep time temperatures as well.
- Once the thermostat has guided you through the four periods of the day you will get the message "The program is completed".
- To program the weekend settings, press the WEEKEND button (second from right on upper row) to program Saturday and Sunday and repeat the above steps
- Now go ahead and try to program the thermostat yourself. Please remember feel free to have me read the instructions to you again whenever you wish.

Test 4:

Set the Weekday program

1. Change the wake time to 6.30 AM and set temperature to 70 F

2. Change day time to 9 AM and set temperature to 65 F

3. Change evening time to 5. 30 PM and set temperature to 75 F

4. Change sleep time to 10 PM and set temperature to 60 F

Additional features of the thermostat

Now we will just take a few moments to familiarize you with several more features of this thermostat. These four features are:

1. Voice on/off

To turn on the voice press and hold the ON button for 8 seconds To turn off voice press and hold the OFF button for 8 seconds.

2. Temperature swing control

This control allows you to adjust the furnace's recycling time. This means that the thermostat will continue to heat or cool to within a selected number of degrees of the set temperature. You can select 1, 2 or 3 degrees. This enables your heating or cooling system to work more efficiently minimizing its cycling time. This setting can be adjusted from the factory setting by pressing and holding both the UP and DOWN buttons together until the temperature flashes. Release and press them together again till the display reads CR1 for 1 degree, CR2 for 2 degrees and CR3 for 3 degrees from the set temperature

3. Air conditioning delay

The thermostat has a built in Air conditioning delay. This refers to a compressor delay for your AC system. The compressor delay protects your AC system from short cycling. If your AC is turned off and then immediately turned back on again, it could potentially damage your AC system. To avoid this, the VIP waits several minutes before it turns the AC on again.

4. Celsius-Fahrenheit setting

You have the option to have the thermostat provide you the temperature and thermostat settings in either Celsius or Fahrenheit, In order to adjust the appropriate temperature scale you press in both the Yes and NO buttons together and hold. You can check if the temperature scale has changed by pressing Report.

5. Raising or lowering the volume for the voice output

The volume of the thermostat voice is adjusted by removing the unit from the wall and turning the volume screw.

Thank you, now I have a questionnaire here I would like you to fill out. Once you are done with that questionnaire we will go over to the other side of the room and conduct some tasks with another thermostat.

7C3. Observer Questionnaire for Onsite trials: Kelvin Thermostat

Efficacy Assessment of Products transferred by T2RERC

[Focus: Kelvin Thermostat]

Participant Name:_____[Optional]

Participant ID:_____

Lab Trial Observer Questionnaire: *Kelvin thermostat*

(To be filled out by Observer closely following Consumer during Onsite trials, as Consumer completes each task- e.g., reading and setting the thermostat. To be filled out separately for each thermostat.)

Date: _____

Observer Name: _____

Talking Thermostat Name: _____

1a. Was the consumer able to read the room temperature?

Yes _____ No_____

1b. If yes, time taken_____

2a. Was the consumer able to read the set temperature on the thermostat?

Yes _____ No _____

2b. If yes, time taken_____

3a. Was the consumer able to set the thermostat exactly 10 degrees higher?

Yes _____ No _____

3b. If yes, time taken_____

4a. Was the consumer able to set the thermostat exactly 15 degrees lower?

Yes _____ No _____

4b. If yes, time taken_____

5a. Was the consumer able to set the **day** on the thermostat?

Yes _____ No _____

5b. If yes, time taken_____

5c. Was the consumer able to set the **time** on the thermostat?

Yes _____ No _____

5d. If yes, time taken_____

6a. Was the consumer able to program the Week day temperature?

Yes _____ No _____

6b. If yes, time taken _____

Overall

7a. Did the consumer need cues or instructions in the use of the device?

Yes_____ No ____

7b. If so, describe: ___

_____

_____

8a. Was the consumer able to hear and understand the voice output clearly?

Yes____ No_____

8b. Comments:

_____
_____
_____

IF APPLICABLE

9a. Was the consumer able to read the numbers off the thermostat without assistance?

Yes _____ No_____

9b. Comments: _____

_____

_____

10. Was the consumer able to interact with the Kelvin Thermostat in the following ways?

[ ] Manually using buttons_

[ ] Voice Input (after manual activation using buttons)

[ ] Voice Input (after activation of voice by clapping) _____

[ ] Combination of the above methods_____

11. Other Comments:

_____
_____
_____
_____

7C4. Consumer Questionnaire at Onsite trials: Kelvin Thermostat

Efficacy Assessment of Products transferred by T2RERC: *Kelvin Thermostats*

Participant Name:_____[Optional]

Participant ID:_____

Consumer Questionnaire: *Kelvin Thermostat*

(To be filled out by the consumer at the onsite trial –immediately following trial of device)

Date: _____

A. Please answer the questions below using a scale of **1 to 5**, where **1** represents the **least satisfaction** on your part and **5** represents the **most satisfaction**. **_____**

	Question	**Your Rating**							
1	How well did you succeed in raising/lowering the volume of the thermostat?	*Not effective –could not raise/lower the volume at all*	NA	1	2	3	4	5	*Very effective – first time*
2	How easy was it to get the thermostat to read to you the thermostat's setting?	*Very difficult-could not get the thermostat to read the setting*	NA	1	2	3	4	5	*Very easy*
3	How well did the thermostat raise/lower the setting?	*Not effective-temperature setting did not change*	NA	1	2	3	4	5	*Very effective-setting changed easily*
4	How easy was it to program the weekly temperature?	*Very difficult – could not do it*	NA	1	2	3	4	5	*Very easy*
5	How easy was it to program the day and time?	*Very difficult could not do it*	NA	1	2	3	4	5	*Very Easy*
6	How well were you able to understand the voice of the thermostat?	*Could not understand the voice of the thermostat*	NA	1	2	3	4	5	*Very easy to understand the voice*
7	How well did the voice output guide you through the	*Feedback was not at all helpful*	NA	1	2	3	4	5	*Feedback very timely*

	operation of the thermostat?								*and clear*
8	How easy was it for you to read the visual numbers/words off the thermostat's display?	*Very difficult-could not read the numbers/words off the thermostat*	NA	1	2	3	4	5	*Very easy to read the numbers/words off the thermostat*
9	How well did the visual display help you through the operation of the thermostat?	*Display not at all helpful*	NA	1	2	3	4	5	*Display was very helpful*

B. Please give your **overall impression** of the thermostat and its performance, on the following aspects. Use the same rating scale as before, **1** for least satisfaction and **5** for most satisfaction.

	Question	**Your Rating**							
1	How much effort do you feel is needed to set up and use the device?	*Too much effort*	NA	1	2	3	4	5	*Very little effort*
2	Without instructions, how easily could you figure out how to use the device?	*Not well at all – need instructions to figure out its operation*	NA	1	2	3	4	5	*Very well – can very easily figure out its operation*
3	How easy was it for you to use the device and all its features?	*Very difficult-could not operate*	NA	1	2	3	4	5	*Very easy*
4	What level of effort does it take to use the device, overall?	*Too high*	NA	1	2	3	4	5	*Very low-quite comfortable*
5	Overall, how did you like using the device?	*Very frustrating*	NA	1	2	3	4	5	*Very comfortable*
6	How much frustration/discomfort did you feel in using the device?	*Severe frustration/ discomfort*	NA	1	2	3	4	5	*No frustration/ discomfort*
7	How safe would you feel in using the device?	*Not at all safe*	NA	1	2	3	4	5	*Very safe*

8	How reliable you think the device might be in maintaining your desired temperature?	*Very unreliable; might not maintain temperature*	NA	1	2	3	4	5	*Very reliable*
9	Do you like the way the device looks?	*Not at all*	NA	1	2	3	4	5	*Very much*
10	Is the size of the device acceptable to you?	*Not acceptable at all*	NA	1	2	3	4	5	*Very acceptable*
11	Would maintaining and cleaning the device be acceptable to you?	*Not at all – too tedious to clean and maintain*	NA	1	2	3	4	5	*Very easy to clean and maintain*
12	Do you think this device might make you more independent in living comfortably in your home??	*Not at all*	NA	1	2	3	4	5	*Very much*
13	My overall rating for the device is	*Very low*	NA	1	2	3	4	5	*Very high*
14	How acceptable is this thermostat to you compared to the one at home?	*Very Unacceptable*	NA	1	2	3	4	5	*Very Acceptable*

C. Please add any additional or explanatory **Comments** you might wish to make in relation to the two thermostats you tried out.

_____

_____

_____

_____

7C5. Observer Questionnaire at Onsite trials: the Competing Thermostat

[See 7C2. Substitute Alternative Thermostat for Kelvin Thermostat]

7C6. <u>Consumer Questionnaire at Onsite trials: the Competing Thermostat</u>

[See 7C3. Substitute Alternative Thermostat for Kelvin Thermostat]

7C7. Consumer Exit Interview at Onsite trials: Kelvin Vs. the Competing Thermostat

Efficacy Assessment of Products transferred by T2RERC

[Focus: Talking Thermostats]

Consumer Interview Outline

Date: _____

Participant ID: _____

Participant Name (optional)_____

Interviewer: _____

Question 1: You have just tried out the two Talking Thermostats– the Kelvin Thermostat and the other Talking thermostat. Consider their overall performance and appeal.

How do they compare with each other in terms of promoting an independent life style? Explain.

Probing Questions

How many of the tasks (reading, setting, and programming) were you able to perform using the Kelvin Thermostat?

How many of the tasks (reading, setting programming) were you able to perform using the other talking thermostat?

1. Which one of these devices will improve your capability in living independently? And Why? _____
2. Which one of these devices would you find more dependable in daily life? And Why? _____
3. Which one of these devices would you believe will function longer without wear and tear based on your use? And Why? _____
4. Which one of these devices would you think is safer to use? And Why? _____
5. Which one of these devices would you think is easy to use? And Why? _____
6. Which one of these devices has easier to use controls? And why? _____ _____

7. Which one of these devices would you think is quicker to use? And Why?
   _____
8. Which one of these devices gives you better feedback? And why?
   _____
9. Which one of these devices did you find comfortable to use? And why?
   _____
10. Which one of these devices would you prefer to use in your own home? And Why?
    _____
    _____

Question 2:

What do you think the Kelvin is worth in terms of a buying price?
_____

What do you think the other Talking Thermostat is worth in terms of a buying price?
_____

Which one would you buy? _____

How much would you be willing to pay for it? _____

7C8. Consumer Questionnaire for Day One of Home trials: Kelvin Thermostat

Efficacy Assessment of Products transferred by T2RERC

For Office Use Only
Project #:
Participant ID:

Participant's Name:_____

Response Form – Day 1

Please complete this questionnaire on the evening of the day that the thermostat is installed and after you have programmed it. Please mail it to us in the attached stamped envelope by [***DATE_____*****].** If you have any questions, please do not hesitate to call ***Kate Wagner*** at ***834-0822 ext. 112*** between 8:30 a.m. and 5:00 p.m.

Thank you.

[Name]

Day One Home Assessment of Products transferred by T2RERC: Kelvin Thermostat

A. 1. Please indicate, choosing from the options below, how you use your current thermostat. Please put an X within the brackets provided at the left of the option.

[ ] a. Set your thermostat without assistance

[ ] b. Get assistance from others

[ ] c. Use a particular method of my own;
Explain_____
_____
_____

2. Please give the brand name of the thermostat that you currently use.

_____

3. When did you obtain the present device? (Please write.) 19____

4. How frequently do you use your present device? (Please mark with an X within the brackets provided at the left of the option).

[ ] a. 1 to 2 times a day

[ ] b 1 to 2 times a week

[ ] c 1 to 2 times a month

[ ] d 1 to 2 times a season

B. Answer the following questions choosing from options given and placing an X within the brackets provided at the left of the option

1. After the Kelvin Thermostat was installed, did you program it

[ ] a. independently,

[ ] b. with assistance from someone,

[ ] c. did not program it

2. In programming the Kelvin Thermostat, did you use the following?

[ ] a. the factory default settings

[ ] b. the day by day programming

[ ] c. the weekday/weekend programming

3. Did you set the volume of the Kelvin thermostat?

[ ] Yes

[ ] No

4. Did you set the thermostat for Celsius or Fahrenheit reading?

[ ] Celsius

[ ] Fahrenheit

5. Did you set the thermostat for the temperature swing?

[ ] Yes

[ ] No

If yes, what did you set it for?

[ ] a. one degree

[ ] b. two degrees

[ ] c. four degrees

[ ] d. six degrees

6. Did you set the thermostat for the AC delay?

[ ] Yes

[ ] No

If yes, what did you set it for?

[ ] a. zero min.

[ ] b. 3 min.

7. How did you set the voice prompts of the thermostat?

[ ] a. turned them on

[ ] b. turned them off

C. Please indicate your level of satisfaction on the given scale of **1 to 5,** where **1** represents that you are **least satisfied** and **5** represents that you are **most satisfied.** Choose the appropriate box along the scale and mark it with an x

1. The instructions to operate the ***Kelvin talking thermostat*** were:

Very Difficult to Follow 1☐ 2☐ 3☐ 4☐ 5☐ **Very Simple to Follow**

2. The appearance of the ***Kelvin talking thermostat*** is:

Very Unattractive 1☐ 2☐ 3☐ 4☐ 5☐ **Very Attractive**

3. Operation of the ***Kelvin talking thermostat*** requires:

Assistance from Others 1☐ 2☐ 3☐ 4☐ 5☐ **No Assistance from others**

If you needed assistance, describe what type-_____

_____

_____

4. The ***Kelvin talking thermostat*** is:

Very Difficult to Operate 1☐ 2☐ 3 ☐ 4 ☐ 5 ☐ **Very Easy to Operate**

5. The Kelvin talking thermostat takes up….

Too much space on the wall1☐ 2☐ 3 ☐ 4 ☐ 5 ☐ **Just the Right Space**

6. I believe that the ***Kelvin talking thermostat*** is…

Not at all a Device for me 1☐ 2☐ 3 ☐ 4 ☐ 5 ☐ **Truly a Device for me**

Please answer the following questions in your own words.

7. Now that you have the ***Kelvin Talking Thermostat,*** what do you expect you can do that you weren't able to do before?

_____
_____
_____
_____

8. Do you have any observations or comments about the ***Kelvin Talking Thermostat*** at this time?

_____
_____
_____

PLEASE REVIEW YOUR QUESTIONNAIRE TO MAKE SURE

THAT YOU HAVE ANSWERED EACH QUESTION

AND MAIL IT TO US ON [***DATE]***

IN THE ENCLOSED STAMPED, SELF-ADDRESSED ENVELOPE.

7C9. Weekly Questionnaire for Consumer Home trials: Kelvin Thermostat

Weekly Assessment of Products transferred by T2RERC (Kelvin)

For Office Use Only
Project #:
Participant #:

Participant's Name:_____

Response Form – Week [__]

Please complete this questionnaire at the end of the _____ week after receiving the device and mail it to us in the attached stamped envelope by [***DATE***_____ (End of week)]. If you have any questions, please do not hesitate to call ***Kate Wagner*** at 836-0822 ext 112

Thank you.

[Name]

Weekly Assessment of Products transferred by T2RERC: (Kelvin Thermostat)

PART A – USAGE EXPERIENCE

1a. Did you read the ambient temperature of the room this week? ☐ Yes ☐ No

1b. Did you set the temperature this week? ☐ Yes ☐ No

If you said **No** to the questions, skip the remaining questions, and PLEASE RETURN Questionnaire in the enclosed envelope

If you said **Yes**, then continue with the following questions:

2. (a) How many times did you read the ambient room temperature this week?_____

(b) Did you program, re-program or adjust the talking thermostat for any of the following?

☐ Weekday/Weekend setting

☐ Individual day settings

☐ Morning, day, evening and night settings

☐ Temporary comfort to warm up the room?

☐ Temporary comfort to cool off the room?

3. Mark with an X the way you used the thermostat.

(a) Reading the thermostat

[ ] Pressing the voice button and manual command

[ ] Pressing the voice button and clapping

[ ] Pressing the voice button and giving voice input

[ ] By reading visual display

(b) Setting the thermostat for desired temperature

[ ] Pressing the voice button and manual command

[ ] Pressing the voice button and clapping

[ ] Pressing the voice button and giving voice input

[ ] By reading visual display

(c) Programming the thermostat

[ ] Used buttons guided by voice output

[ ] Used the buttons guided by my sight to read setting

[ ] Had assistance from a friend/family

Comments-

_____
_____
_____

4. What problems, if any, did you have with the thermostat this week?

_____
_____
_____

5. Did you experience any discomfort in the warming/cooling of your house attributed to the thermostat?

If not, please skip to Question 7.

[ ] No

[ ] Yes

6. (a) we had ____(enter number) of issues with the thermostat this week.

(b) Please identify the type of issue you had with the thermostat:

☐ the thermostat did not maintain the time

☐ the voice output did not work

☐ the thermostat did not respond to my voice commands

☐ the temperature did not raise according to my setting it manually

☐ the temperature did not lower according to my setting manually

☐ the programming did not hold

☐ Other (please explain)

Comments:

_____
_____
_____

Weekly Assessment of Products transferred by T2RERC: Kelvin

PART B

7. The following phrases describe what the Kelvin Talking thermostat is likely to be or do for you. Please rate **each** aspect of this device choosing a number between 1 and 5 which best describes your opinion. Then **mark** the corresponding box with an X. Remember, there are no right or wrong answers. We are only interested in your opinion.

KELVIN TALKING THERMOSTAT

Its very difficult to understand its voice	1 2 3 4 5	Its Very easy to understand its voice
Its very difficult to operate without sight	1 2 3 4 5	Is very easy to operate without sight
It is very difficult to program	1 2 3 4 5	It is very easy to program
Decreased my ability to live independently	1 2 3 4 5	Improves my ability to live independently
Interferes with my ability to control my house temperature	1 2 3 4 5	Improves my ability to control the house's temperature
Works very erratically	1 2 3 4 5	Works every time
Controls are difficult to operate	1 2 3 4 5	Controls are easy to operate
Use requires assistance of others	1 2 3 4 5	Can operate device myself
Maintenance is very difficult	1 2 3 4 5	Maintenance is very easy
Is unsafe to operate …	1 2 3 4 5	Is perfectly safe to operate
Is very unattractive	1 2 3 4 5	Is very attractive
Will only last for a short time	1 2 3 4 5	Will continue to operate for a long time
Takes a lot of wall space	1 2 3 4 5	Just the right size
Can't think of myself using this device	1 2 3 4 5	A device for me…

8. Did the device require the use of sight?

Yes [ ] No [ ]

8a. Can the device be used with either with or without sight?

Not at all 1 2 3 4 5 **Very easily**

9. Compared to your first use of ***Kelvin thermostat***, how was its use this week?

[ ] Much easier

[ ] Just the Same

[ ] More difficult

10. Rate the performance of the following features of the Kelvin thermostat on a scale of 1 to 5, where 1 shows extreme dissatisfaction and 5 shows extreme satisfaction on your part. Circle the appropriate number.

(a) Display screen	NA	1	2	3	4	5
(b) Getting the time, temperature and thermostat setting	NA	1	2	3	4	5
(c) Accessibility (location and size) of buttons	NA	1	2	3	4	5
(d) Seven day programming	NA	1	2	3	4	5
(e) Weekday/Weekend programming	NA	1	2	3	4	5
(f) Voice enable/disable	NA	1	2	3	4	5
(g) Celsius/Fahrenheit setting	NA	1	2	3	4	5
(h) AC delay setting	NA	1	2	3	4	5
(i) Temperature swing setting	NA	1	2	3	4	5
(j) Voice commands	NA	1	2	3	4	5

11. Please record any other observations, comments, or experiences about the ***Kelvin thermostat*** today. (Please write.)

_____
_____
_____
_____
_____

PLEASE REVIEW YOUR QUESTIONNAIRE TO MAKE SURE

THAT YOU HAVE ANSWERED EACH QUESTION

AND MAIL IT TO US ON ***DATE***

IN THE ENCLOSED STAMPED, SELF-ADDRESSED ENVELOPE.

7C10. Consumer Questionnaire for End of Home trials: Kelvin Thermostat

End of Trial Assessment of Products transferred by T2RERC: *(Kelvin Thermostat)*

For Office Use Only
Project #:
Participant ID:

Participant's Name:_____

Response Form – End of Trial Period

Please complete this questionnaire after ----------[***DATE***] and mail it to us by ----------[***DATE]*** in the attached self-addressed stamped envelope. If you have any questions, please do not hesitate to call **Kate Wagner** at 836-0822 ext 112

Thank you.

Sincerely,

[Name]

End-of-Trial Assessment of Products transferred by T2RERC: Kelvin thermostat

PART A - USAGE EXPERIENCE

You have now used the ***Kelvin thermostat*** for the past two months. Please describe your experience with this device by answering questions below. For each question, please mark your answers putting an X within the brackets at the left of the option that best represent your answer.

A. How would you rate the Kelvin thermostat's performance as compared to the alternatives you have used in the past, regarding the tasks below?

1. Reading the ambient temperature on Kelvin is:

[ ] Much less effective

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

2. Setting the Kelvin thermostat is:

[ ] Much less effective]

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

3 Programming the Kelvin thermostat is:

[ ] Much less effective

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

4. Reading the time on Kelvin is:

[ ] Much less effective

[ ] Somewhat less effective

[ ] Just as effective - no difference

[ ] Somewhat more effective

[ ] Much more effective

Please write your comments here:

5. ***As compared to*** alternatives you have used (or were currently using) to regulate the temperature in your home, how often did you adjust the Kelvin thermostat?

[ ] Much more frequently

[ ] frequently

[ ] about the same - no difference

[ ] not as much

[ ] not at all

Please write your comments here:

6. Considering your limited vision, how much effort did it take to operate Kelvin as ***compared to*** alternatives you have used to regulate the temperature in your home?

[ ] A lot more effort - cannot use it.

[ ] Somewhat more effort

[ ] Just as much effort - no difference

[ ] Somewhat less effort

[ ] A lot less effort

Please write your comments here:

7. Are you totally blind?

If no, skip to question 8.

If yes, can the Kelvin be operated totally without any sight?

[ ] Always

[ ] Most of the time

[ ] Sometimes

[ ] Never

Please write your comments here:

Now, proceed to Q.9.

8. When compared to alternatives you used (or currently using) to regulate the household temperature, how useful is the Kelvin device to use with some vision)?

[ ] Takes a lot more effort

[ ] Takes somewhat more effort

[ ] Takes equal effort - no difference

[ ] Takes somewhat less effort

[ ] Takes a lot less effort

Please write your comments:

9. Rate the overall comfort when using the Kelvin compared to alternatives you used (or currently using) to regulate the household temperature:

[ ] Very Uncomfortable

[ ] Uncomfortable

[ ] Equally Comfortable

[ ] Comfortable

[ ] Very Comfortable

Please write your comments:

10. Compared to alternatives you used (or currently using) to regulate the household temperature, how do you find your experience with the Kelvin to be?

[ ] Very Frustrating

[ ] Frustrating

[ ] Not much different

[ ] Satisfying

[ ] Very Satisfying

Please write your comments:

11. Compared to alternatives you used (or currently using) to regulate the household temperature, how did you find the use of Kelvin buttons?

[ ] unable to use-could not see/feel them

[ ] Not much different

[ ] easier to use, could feel/see them

Please write your comments:

12. When compared to alternatives you used (or currently using) to regulate the household temperature, the chances of the household temperature being set comfortably without constant manual adjustments are:

[ ] A lot more likely

[ ] Somewhat more likely

[ ] Equally likely or unlikely

[ ] Somewhat less likely

[ ] A lot less likely - negligible

Please write your comments:

13. When compared to alternatives you used (or currently using) to regulate the household temperature, the chances of not being able to determine the actual ambient temperature is:

[ ] A lot more likely

[ ] Somewhat more likely

[ ] Equally likely or unlikely

[ ] Somewhat less likely

[ ] A lot less likely - negligible

Please write your comments:

14. When compared to alternatives you used (or currently using) to regulate the household temperature, the chances of any maladjustments to the Kelvin thermostat are:

[ ] A lot more likely

[ ] Somewhat more likely

[ ] Equally likely or unlikely

[ ] Somewhat less likely

[ ] A lot less likely - negligible

Please write your comments:

15. In comparison with the alternatives you used (or currently using) to regulate the household temperature, how much energy do you expect to save?

[ ] Very much energy (Kelvin reduces wild swings in household temperatures).

[ ] Some energy. I still have to make corrections in household temperatures

[ ] Not much energy, I still have to make quite a few adjustments.

Please write your comments:

16. The Kelvin takes up:

[ ] Too much wall space

[ ] Some wall space

[ ] No extra wall space

Please write your comments:

17. When compared to alternatives you used (or currently using) to regulate the household temperature, cleaning the Kelvin is:

[ ] Much more tedious

[ ] Somewhat more tedious

[ ] Not much different

[ ] Easier

[ ] Much easier

Please write your comments:

18. The Kelvin compared to your old device has been:

[ ] Less Durable

[ ] Equally Durable

[ ] More Durable

Please write your comments:

19. When compared to alternatives you used (or currently using) to regulate the household temperature, how consistent did you find the Kelvin?

[ ] Much worse - never worked consistently

[ ] Somewhat worse - was sometimes consistent

[ ] Somewhat better - worked consistently most of the time

[ ] Much better - worked consistently always

Please write your comments:

20. Compared to my old method/device, the Kelvin allowed me to regulate and/or program the household temperature that I thought was beyond my ability due to my vision loss.

[ ] Strongly Disagree

[ ] Disagree

[ ] Can’t say

[ ] Agree

[ ] Strongly Agree

Please write your comments:

21. The Kelvin has increased my ability to live more comfortably in my home.

[ ] Strongly Disagree

[ ] Disagree

[ ] Can’t say

[ ] Agree

[ ] Strongly Agree

Please write your comments:

End-of-trial Assessment of Products transferred by T2RERC: *Kelvin Thermostat*

PART B

1. The following phrases describe what the Kelvin Talking thermostat is likely to be or do for you. Please rate **each** aspect of this device choosing a number on the scale of 1 and 5 which best describes your opinion. Then mark your answer by writing the number corresponding to your rating. Remember, there is no right or wrong answers. We are only interested in your opinion.

    a. In terms of wall space, how much room does Kelvin take up?

    Note that One means a lot of space and 5 means just the right amount of space;

    Your answer:

    b. How dependent on a person's sightedness did you find Kelvin to be?

    One means that "Operations are restricted to having good sight"; 5 means "it is very easy to operate without sight"

    Your answer:

    c. How comfortable was Kelvin to use?

    One means it is very uncomfortable and 5 means very comfortable;

    Your answer:

    d. How does Kelvin affect your ability to maintain a comfortable ambient temperature?

    One means no effect and 5 means improves your ability

    Your answer:

    e. How able are you to use Kelvin with or without your assistive technology?

    One means unable to use and 5 means you can perform all functions

    Your answer:

    f. How consistently does Kelvin work?

    One means very erratically and 5 means works every time.

    Your answer:

    g. How did you find the controls on Kelvin to operate?

    One means difficult to operate and 5 means easy to operate.

    Your answer:

h. How independently can you operate Kelvin?

One means its Use requires assistance of others and 5 means you can operate it yourself

i. How easy is Kelvin to maintain?

One means very difficult and 5 means very easy.

Your answer:

j. How safe is Kelvin to operate?

One means unsafe and 5 means perfectly safe.

Your answer:

k. How did you find the appearance of Kelvin?

One means very unattractive and 5 means very attractive.

Your answer:

l. What do you think of the durability of Kelvin?

One means you think it will last only for a short time and 5 means you think it will continue to operate for a long time.

Your answer:

m. How did you find the voice of Kelvin to be?

One means “not understandable” and 5 means “clear and crisp -just right”.

Your answer:

n. Do you think the Kelvin is a device for you?

One means you can’t think of yourself using this device and 5 means it is a device for you;

Your answer:

2. Compared to your first use of the Kelvin, how was its use today? Rate it on a scale of 1 to 5, where one means “Much more difficult” and 5 means “Much easier”.

Your answer:

3. Are there any changes you would like to see made in this device? (Please describe.)

4. What are two things you like most about this device?

5. What two things do you like least about this device?

6. If this device were available in the market today, how much money would you be willing to pay for it? Please write here. $_____

7. If this device were available at the price you suggest, how likely is it that you would buy it? Please choose from the options below and put an X within the brackets at the left of the option you choose.

    [ ] Definitely would not buy it

    [ ] Probably would not buy it

    [ ] Might or might not buy it

    [ ] Probably would buy it

    [ ] Definitely would buy it

PART C

1. How important are the following features of the Kelvin thermostat to your needs? Choose a number on a scale of 1 to 5, where 1 represents extremely LOW importance and 5 represents extremely HIGH importance. Write the number in the space provided for your answer. Write NA if the question does not apply to your case.

(a) Display screen

Your answer:

(b) Getting the time, temperature and thermostat setting

Your answer:

(c) Accessibility (location and size) of buttons

Your answer:

(d) Seven day programming

Your answer:

(e) Weekday/Weekend programming

Your answer:

(f) Voice enable/disable

Your answer:

(g) Celsius/Fahrenheit setting

Your answer:

(h) AC delay setting

Your answer:

(i) Temperature swing setting

Your answer:

(j) Voice commands

Your answer:

Answer the following questions, choosing your answer from the given options and putting an X within the brackets of the option that you choose.

2. To what degree does the ***Kelvin thermostat*** meet your needs?

[ ] Substantially below my needs

[ ] Slightly below my needs

[ ] Just meets my needs

[ ] Slightly above my needs

[ ] Substantially beyond my needs

3. How does the Kelvin Talking thermostat compare with other devices which perform a similar function?

[ ] Substantially Inferior

[ ] Slightly inferior

[ ] Same

[ ] Slightly superior

[ ] Substantially superior

4. What degree of importance would you attach to selecting a device which performs the same function as the ***Kelvin thermostat?***

[ ] Extremely important

[ ] Very important

[ ] Important

[ ] Somewhat important

[ ] Not so important

5. Imagine that your present device became inoperable and you had to pay yourself to replace it. How likely is it that you would buy your present brand again?

[ ] Definitely would not buy

[ ] Probably would not buy

[ ] Might or might not buy

[ ] Probably would buy

[ ] Definitely would buy

PLEASE REVIEW YOUR QUESTIONNAIRE TO MAKE SURE

THAT YOU HAVE ANSWERED EACH QUESTION

AND MAIL IT TO US ON ***DATE***

IN THE ENCLOSED STAMPED, SELF-ADDRESSED ENVELOPE.

7D. Focus Group Script for Lids Off Prototype Assessment

Focus group facilitator guide

Step 1: Concept Definition
(Jar Opener)

1. Introduction: Purpose and process of the group

Introduce the paperwork and review
Human subject form
Release of information form
Non-disclosure form
Tell participants they are being audio and video taped.
Inform the participants' rules of the group
No debate of other's ideas
No barriers to what you have to say
No laughing at each other
Don't worry about costs
Have all participants introduce themselves.

2. Current Status:

What type of product do you buy that's in a jar of some type?
Why do you purchase a product that is in a jar that may also be found in a can or other packaging?
How often do you purchase something that is in a jar?
Who opens the jars in your home?
Work?
Other activity?
How many jars do you open in a day…a week?

What jars give you the most problems in opening them?

Why are these jars a problem to open?

What do you do, or what technique do you use to open up any jar?

What do you do to open up the problem jars?

What do you experience in opening jars?
Would you consider any of these situations problems? (make a list, and rate the problems from worst to least)

How often are you having these problems when you open jars?

How many times a day?

...a week?

...a month?

What devices do you use to open up jars?
How well are you satisfied with the method that you use in opening up jars?
What do you experience when you use your technique or method in opening up jars?
What are the positive aspects about your method?
What do you like about the way you open up a jar?
What are the concerns you have in opening up jars with your technique?
Do you have any safety issues with your technique?
Have you suffered any injuries or know of anyone who has when using your technique?
How often do you incur any injuries or have problems when using your technique?
Where do you open up these jars?
What rooms?
What part of the house?
...work
…home
...school
...play?
What are you doing when you need to open a jar?
What would you like your jar opener or technique do that it isn't doing?

3. Now we are going to design an ideal device that can open a jar for you. So if you had the ability to design a jar opener, what does the device need to have to be:

Effective
- Tell me the importance of why a jar opener is needed.
- What does the jar opener need to do?
- What task does the jar opener actually need to do?
- What type of jars should it be able to open?
- Should the device work with any other appliance?
- Other than opening jars should the device have any other purpose?
- Who would benefit from such a device?

Reliable
- What makes the opener reliable?
- What does the device need to do to make it dependable?
- What does the device need to do to be consistent?
- What can the device do to be predictable in its performance?

Portable
- Where does this device need to perform its tasks?
- What should the size of the device be?
- How much should the device weigh?
- In what way should this device need to be taken between locations of use?
- Who would be taking the device between locations of use?

How many assembled parts should be used to put this device together?

Durable

What would make this device durable?
What should the material be able to withstand?
What should the device be able to endure?
What is the frequency of use of the device – daily?
How long should the device last?

Securable

What needs to happen with securability to provide a level of safety?
Should there be anything done to prevent unwanted use?
...by children
...by any other person?
What needs to be done with the device to provide safe and maximize use of the device?
What are the situations that need to be addressed when using a jar opener?
What can be done to minimize these situations?
Should this device be attached to anything when in use?
Where should this device be when in use?
When not in use?

Learnable

Who should be able to use the device? (age group?)
What type of instructions should come with the device?
In what format should the directions of the device be in?
How long should it take for a user to use the device properly?

Comfortable and acceptable

What parts of the device need to be physically comfortable?
What should be seen easily?
What should be heard easily?
What needs to be (reached, touched,...) Easily?
What needs to be (grasped, held, ...) Easily?
What needs to be (pulled, pushed, lifted, turned, ...) Easily?
What material should the device be made of?

Operable

How would you like to operate this device?
What series of actions are needed to operate the device?
What if any feedback should be given to the consumer?
If so what should that feedback be?
What type of consumer involvement should the device have, when the device is performing its task? Intermittent, continuous assistance?
In what environment(s) will the device be operated?
How long should the device be operated continuously?

How should this device be powered?
Electric
Hydraulic
Manual
Battery
How many controls should be on the device?
What type of controls should there be?
How should the device interface with the jars?
What other device interfaces should this device have?

Maintainable and repairable

Should the device be a repairable or replaceable product?
Who should be able to repair the device?
What type of maintenance should the device have?
What should be used to clean the device?
How often should the device be cleaned?

Appearance (aesthetics)

What should the device look like?
Should the device blend into the decor when not in use?
What color should the device be?

Affordable

Should there be after sales service of the device by either the distributor or manufacturer?
What type of after sales service do you expect?
How much are you willing to pay for this service?

At the end of the discussion participants were given the following “Pricing Questionnaire”. This questionnaire provides the R&D team:
-Target Market Price (What participants would be willing to pay)
-Intent to Purchase (Participants intent to purchase at the stated or suggested price)
-Gifting (How many participants would prefer to receive the product as a gift rather than purchase it)
-Where the product should be sold
-Current competitive products

Script for <u>Beta Focus Group</u> for the Automatic Jar Opener

I. Ranking the Functions and Features using a pair-set comparison process review the ideal product functions and design features then rank the attributes of the Ideal product.

The ideal function of a jar opener is one that:

- Opens the lids of all jars without causing any damage to the lid or jar
- Breaks the seal
- Automatically fits (size) on various lids
- Removes the lid totally
- Opens the jar every time it is used
- Does not need any hand strength by the user
- Requires only the use of one hand to operate
- Is powered
- Activation should be accomplished by a on/off button
- Alerts user when the lid is loosened
- Is easy to use
- Possesses a comfortable, non-slip handle

The ideal design feature of the jar opener is one that;

- Does not have any sharp points
- Has shielding for safety
- Is portable in both weight and size.
- Has only 1 piece
- Is collapsible expandable for use on a variety of jars
- Is able to be stored
- Is made of hard plastic so that it would not break when dropped
- Should be: stain resistant, odor resistant, rust-free, and dishwasher safe
- Should have a safety lock or some protection for young children
- Unit should not wear out, or dry out
- Cleaning of the device should be accomplished easily.

II. Show the product operation CD, read description.

1. Power Point or flip chart presentation of the functional features will be brought up on the screen and all functional features according to ranking will be asked; how well does the prototype meet the requirements from the Ideal Product?
2. Does the prototype:
   Exceed the ideal product requirement?
   Is equal to the ideal product requirement?
   Doesn't meet the ideal product requirement?
   For those attributes that do not receive a majority of meets or exceeds requirements the participants will be probed to offer:
   Why doesn't it meet requirements?
   What needs to be done for it to meet requirements?

3. Pass out questionnaire that identifies: Price Point & Intent to Purchase
4. Models will now be evaluated. Model #1 will be presented. The feature description of Model #1 will be read to the participants, then Models 2 and 3.
5. Purchase Intent – Price point questionnaire on all three models.
6. A pair set comparison will be conducted with the three models.
7. Then an evaluation of the features will be conducted;
    a. button size
    b. button shape
    c. button location
    d. type of handle
    e. bottom jaws unlock activator
    f. overall shape of product
8. Purchase Intent – price point on device with their choice of buttons, handle etc.
9. The working prototype will be brought out and demonstrated. Each participant will get to use the device. One camera will be focused on the individual's face, a second camera on their hands to get the reaction and observe the physical process to the use of the prototype and the other 2 on the other participants to gauge reaction. At the end of the activity the following questions will be asked.

    What did you like about the prototype?

    What didn't you like about the prototype?

    Was there anything different about the operation of the prototype from what you were anticipating the device to do based on the video?

7E. Price Point Questionnaire: Lids Off Focus Group

Ideal Product Pricing Questionnaire #1

Participant Name: _____ Date: _____

Device Name: _____

Directions: Please answer the following questions based on your own opinion of the Ideal device you conceptualized in this session. Your answers will be kept completely confidential.

1. During the session we discussed a device to open jars. If such a product were available for purchase, how much would you be willing to pay for it? $ _____

2. Indicate your response by circling the appropriate number.

If the ideal device were available at the above price, how likely is it that you would:	Definitely Would	Probably Would	Probably Would Not	Definitely Would Not
a. Purchase it for yourself	4	3	2	1
b. Buy it as a gift for others?	4	3	2	1
c. Would like to receive as a gift from others?	4	3	2	1

3. Where would you expect to buy a device such as this? (Please list the names of outlets/stores)

_____

4. Please give the name of the device, or describe the current method you use, that performs a similar function to the ideal device conceptualized by the group.

_____

_____

5. If the ideal device were available for $ _____, would you …

A. Buy it for yourself Yes/No

B. Buy it as a gift for others Yes/NO

C. Would like to receive it as a gift? Yes/No

7F. Ideal Pricing Questionnaire: Kodak Home Imaging System

Home Imaging System

Ideal Pricing Questionnaire

Participant Name: _____ Date: _____

Device Name: Home Imaging System
_____

Directions: Please answer the following questions based on the discussion of the Ideal Home Imaging System that you conceptualized in this session. Your answers will be kept completely confidential.

2. If the Ideal Home Imaging System was available today how much would you expect it to cost?

$___

PLEASE CIRCLE YOUR ANSWER TO THE FOLLOWING QUESTION

2. If the Ideal Home imaging System was available today at the price that you just provided, you…

A. Definitely would purchase it for myself
B. Definitely purchase it as a gift for some else
C.. Would definitely want it as a gift
D. Would definitely not purchase it for myself
E. Would not purchase it as a gift for some one else
F. Would definitely not want it as a gift

3. Where would you expect to purchase the Ideal Home Imaging System?

_____

4. Where would you like to see the Ideal Home Imaging system sold?

_____

PLEASE CIRCLE YOUR ANSWER TO THE FOLLOWING QUESTIONS

5. How important is it for you to be able to print your own pictures?

A. Very important
B. Important
C. Not important at all
D. Don't want to print my own pictures

6. If you could access images the same way you can access music from the internet; You would

A. Purchase images frequently
B. Purchase images sometimes
C. Never purchase images

7. If the Ideal Home Imaging system was available at the price of $299 I …

A. Definitely would purchase it for myself
B. Definitely purchase it as a gift for some else
C. Would definitely want it as a gift
D. Would definitely not purchase it for myself
E. Would not purchase it as a gift for some one else
F. Would definitely not want it as a gift

7G. Participant Background Questionnaire: Kodak

Background Questionnaire

Name: _____

A. Which of the following statements best describes how you feel about taking pictures? (Please read all five options carefully before you answer. Please check only one option.)

___ 1. I rarely take pictures

___ 2. I don't take many pictures because it is too much of a bother, and I would rather spend my money on other things.

___ 3. Most of the pictures I take are limited to occasions like birthdays or vacations. I just need a basic, easy to use camera when I take pictures.

___ 4. Taking pictures is important to me. I take pictures on many different occasions to capture important memories.

___ 5. I like to take pictures, but I get a lot of enjoyment from editing my pictures on my personal computer.

B. Which of the following best describes how you feel about taking pictures? (Please read both options carefully before you answer. Please check only one option.)

___ 1. Taking pictures is not very important to me. Photography can be complicated and expensive.

___ 2. I get satisfaction from taking a great picture that I can share with my family and friends.

C. Which of the following best describes how you use your personal computer with your pictures? (Please read all three options carefully before you answer. Please check only one option.)

___ 1. My PC gives me control with my pictures. I can print my own pictures and control how many and which ones I print.

___ 2. Printing my own pictures at home is a bother. I'd would much rather have it done at a store or through an Internet service**.**

___ 3. I mainly use my PC to store my pictures and to e-mail them to my family and friends.

D. Which of the following best describes how you feel about your pictures? (Please read all five options carefully before you answer. Please check only one option.)

___ 1. I most enjoy sharing my pictures with close family and friends. I might scan or edit some pictures if it were easier to do.

___ 2. I share my pictures with all my family and friends. I would like to edit my pictures to make sure I have the very best to share.

___ 3. Getting my prints is what I enjoy most. I never get tired of looking at my old photographs.

___ 4. Photography is sometimes too complicated, but I still enjoy having pictures. The appearance and style of the camera is important to me.

___ 5. I only take pictures on special occasions.

7H. Focus Group Script for Kodak Home Imaging System

Script readout to participants:

The center point of tonight's focus group is the Home Imaging Center, or essentially what you do with digital pictures after you have taken them or what you would like to do with pictures after you have taken them. We are looking for you to think outside the box and blue sky for us. What would you like to see in this product area? In the first step of our process tonight, I will describe and demonstrate a Kodak product to give you an idea of what already exists in the marketplace in this particular product category.

What you see here in front of you is the Kodak Easy Share Printer Dock Plus. It uses a color print cartridge that is inserted in the side of the printer (show participant where the cartridge goes). When the color cartridge is low, the light on the front of the dock will blink slowly. When the color cartridge is empty, the light glows steadily. Typically, the color cartridges are sold in packs with photo paper, which can be loaded in the tray. The quantity of photo paper exactly matches the life of the color cartridge so that you get the same number of prints each time. (demonstrate how to load paper)

Once the picture is taken and the camera is placed onto the Printer Dock, you can scroll through the pictures stored on your camera or its memory card. After reaching the picture you'd like to print, you can do one of three things: (1) you can "auto-enhance" the picture before printing (auto-enhance automatically enhances over- or under-exposed pictures – can be used when printing directly from the camera); (2) you can opt to print more than one of the same picture per sheet (describe how to switch to a different number of pictures per sheet); (3) print one 4" x 6" picture.

You can also print pictures directly from your memory card by inserting it in the slot on the side of the printer dock (show participant where to insert card). The Printer Dock can also be

connected to your computer using a USB cable so that pictures can be transferred to your computer and edited before printing (show where the cable connects to). Pictures can be edited with Kodak's Easy Share software that is included with the Printer Dock.

The Printer Dock Plus can also recharge a camera's battery by simply placing the camera on the printer dock. The battery's progress is shown with these three lights. If there are no lights on, then the battery has no charge. If all three lights are on, then the battery is fully charged. The camera can be left in the Printer Dock to maintain its charge, if desired.

CHAPTER EIGHT

Some Useful Resources

Sajay Arthanat and Asha Subramaniam

For readers who might be interested in key literature on product evaluation, we provide below bibliographic references relevant to the T2RERC work on product evaluation discussed in this Resource Guide. For easy reference, we have organized them by meaningful categories under which they fall. Following it, we present a short annotated list of references compiled from the above listing, for an enhanced vision of some of the key references.

At the end we have provided links to literature review sections of some of our published studies, as a lead to a more expanded vision and in-depth understanding of this literature. While the review conducted at the T2RERC was especially relevant to the conceptualization of the Consumer Ideal Product (CIP) studies, device prototype evaluations and the product efficacy studies, interest in them might vary from reader to reader. It may interest consumers as it speaks to their needs and wants. It should be useful to product developers and manufacturers as it touches on theoretical evidence for success stories. Interested researchers may benefit from the review as contributors of further research and efficacy testing needed to fill the gap in the follow of accessible and usable products for consumers.

Section One: Key Bibliographic Sources relevant to the T2RERC Studies

Product Evaluation- Concepts, Issues, Methods

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7. Stone V.I. (2005, October). Assessing efficacy of assistive technology transfers: a validation of the T2RERC's Technology Transfer Model. *Annual Meeting of the American Evaluation Association*: Toronto, Ontario, Canada.

Product Design

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Section B: An Annotated Bibliography on Product Development and Evaluation

This section annotates a major part of the bibliography presented above for the benefit of interested readers, using original abstracts where available.

1. Akao, Y. (1990). *Quality Function Deployment: Integrating Customer Requirements into Product Design*. Cambridge, MA: Productivity Press.

   Quality Function Deployment (QFD) is a method for satisfying customers by translating their demands into design targets and quality assurance points. Yoji Akao who conceptualized QFD is one of the foremost leaders of the Japanese Total Quality Control movement. In this book he explains the concepts and methods of this remarkable systems engineering approach. It includes techniques to use the demanded quality deployment chart. It also includes using QFD at the pre-production stage and enlists its uses in the construction, service industry and for software development.

1. Babbar, S., Behara, R., & White, E. (2002). Mapping product usability. *International Journal of Operations and Product Management,* 22(10), 1071-1089

   It is not sufficient for firms to deliver products that have technical excellence. Products should be easy to use and fit in with the work practices, activities and context of the consumer. Product usability is now recognized as a critical dimension of product quality. Product usability is defined by product attributes that address the physical, cognitive and emotional needs of intended users. Based on a database of documented real-world customer experiences with manufactured products in use, this research maps the categories of product usability using an

affinity program. The resulting affinity diagram and the insights it provides can help managers design products that better meet the needs of their customers. Limitations of the study and the implications of its findings are also discussed.

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   Speech-impaired people need a powerful information-transfer technique. In an effort to meet that need, the author developed a concept key-board that, while it uses a limited number of images, has the capacity to define whole sentences in five or fewer keystrokes through a technique called semantic compaction. The system is commercially implemented with a speech-synthesis device to provide voice output.

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   The most important basis for evaluating an assistive device is whether it satisfies the needs of the disabled consumer. However, the factors that consumers consider in determining whether a device meets their needs are not well understood. This preliminary study applied a small focus group process to identify and prioritize factors used by long-term users--a panel of consumer experts with mobility impairments and a panel of consumer experts with sensory impairments. In total the panels identified and prioritized 17 general factors for 11 types of assistive technologies. This study constitutes an initial step toward the development of

design, engineering, and selection criteria based on the specific concerns of consumers.

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   Essentially, the expectation is that a power wheelchair must work every day in the way a person needs it and wants it. At the same time, there is a desire to enhance and advance the features of input devices and control systems. A focus group comprised of persons who use power wheelchairs and were asked to participate in a brainstorming session to determine priorities for the development and application of power mobility input devices and control concepts. The group consensus was that durability and reliability are the most important criteria. Many would say these changes constitute designing "smarter" power wheelchairs, such as systems that can independently detect obstacles and can provide users with more feedback. This paper presents the rationale behind forming this focus group and details of the results of a brainstorming session where ideas were generated and prioritized. The five most important issues as determined by the group are discussed in depth.

5. Center for Universal Design (2007). *About Universal Design*. Retrieved June 22, 2007 from College of Design, North Carolina State University Website: http://www.design.ncsu.edu/cud/about_ud/about_ud.htm

In this paper, usability is defined and a framework for identifying different aspects of usability is given. The main principles for creating usable designs are expounded, followed by practical advice as to how to design usable products. The book then tackles the issue of usability evaluation - a series of evaluation methods are described, followed by practical advice as to how to conduct the evaluation. The book draws on examples from software design and product design generally. This means whilst human-computer interaction (HCI) is a central issue in the book, other usability issues are also covered.

6. Ciciannteli, S. & Magdison, J. (1993). From experience: consumer idealized design: Involving consumers in the product development process. *Journal of Product Innovation Management,* 10, 341-347.

   A considerable portion of the growing body of literature devoted to the design process deals with the roles of internal marketing, production, and research and development teams and their interaction. Such design methodologies could be greatly enhanced by focusing more attention on understanding consumer needs and behavior, especially in the initial stages of product development. Susan Ciccantelli and Jason Magidson describe Consumer Idealized Design, a process for involving consumers in the actual design of a new manufactured good or service. They summarize three case studies involving the application of the process.

7. Cooper, R.A., Boninger, M. L. (2003) Use of the Independence 3000 IBOT Transporter at home and in the community. *Journal of Spinal Cord Medicine*; 26(1): 79-85.

The INDEPENDENCE™ 3000 IBOT™ Transporter (IBOT), as an electronically stabilized mobility device for people with disabilities. The purpose of this study was to gain experience with the IBOT™ at home and in the community using an expert wheelchair user, who used the device as his primary mobility device for 1 week. This case report is based upon observations by trained clinicians, and a diary recorded by the primary author a male manual wheelchair user with traumatic spinal cord injury at the T7/8 level. The subject was 41 years of age and 21 years post SCI at the time of the study. The participant was employed and lived in a ranch style accessible home. The subject used the devices to perform a variety of activities including holding eye-level discussions with colleagues and shopping by balancing on two wheels, going up and down steep ramps, traversing outdoor surfaces (e.g., grass, dirt trails) and climbing curbs. The balance and four-wheel drive functions were helpful and worked well. The IBOT was somewhat difficult to control in standard function. The seat height was too high for most tables and desks encountered, and transfers were notably more difficult than with other wheelchairs. It was difficult to use the IBOT in the bathroom, and the subject preferred to use his personal wheelchairs for transfers into the shower. The IBOT was a functional mobility device, its greatest strengths are outdoors and in circumstances where there is space to use balance function.

8. Design for all Foundation: Design for all: What is? Retrieved June 22, 2007 from http://www.designforall.org/en/downloads/dossier-DfA-Fd-ang.pdf

   Design for All is the intervention in environments, products and services with the aim that everybody including future generations, regardless of age, gender,

capacities or cultural background can enjoy participating in the construction of our society with equal opportunities and hence being able to participate in social, cultural, leisure and economic activities. Its objective is also for users to access, use and understand any part of the environment in an autonomous way.

9. Dumas, J.S., & Redish, J.C. (1994). *A Practical Guide to Usability Testing*. Norwood, NJ: Ablex

The authors begin by defining usability, advocating and explaining the methods of usability engineering and reviewing many techniques for assessing and assuring usability throughout the development process. They then follow all the steps in planning and conducting a usability test, analyzing data, and using the results to improve both products and processes. This book is simply written and filled with examples from many types of products and tests. It discusses the full range of testing options from quick studies with a few subjects to more formal tests with carefully designed controls. The authors discuss the place of usability laboratories in testing as well as the skills needed to conduct a test. Included are forms to use or modify to conduct a usability test, as well as layouts of existing labs that will help the reader build his or her own

10. Dzida, W. (1995). Standards for user-interfaces. *Computer Standards & Interfaces*, 17(1), 89-97.

Series of user-interface standards are currently developed. Designers and software testers may have problems in applying these standards because of their guideline like nature. This paper provides some help in reading software-ergonomic

standards and particularly in testing products for conformity. A methodology of conformance testing is introduced which is based on the criterion-oriented evaluation approach.

11. Eason, K.D. (1992). *The development of a user-centered design process: A case study in multi disciplinary research.* Inaugural lecture at HUSAT Research Institute, Loughborough University of Technology, Loughborough, UK

    This paper presents an analytical framework and an inter-disciplinary review of several selected approaches dealing with customer, consumer and user involvement in product development. It encompasses different kinds of formal methods and approaches for customer involvement in product design, the role of consumers in the different approaches in product development as well an in-depth analysis and comparison of the methods.

12. Green, P.E., & Tull, D.S. (1975). *Research for marketing decisions* (3rd Ed.). Englewood Cliffs, NJ: Prentice Hall, Inc.

    This books deals with Problem formulation and Marketing research-content and strategy. Marketing research is the value and cost of decision-making information. The tactics of marketing research include research design , Obtaining and organizing respondent data and gaining information from respondents. It then follows with Measurement and scaling in marketing research, Tabulation of survey data , Analyzing associative data through Multiple and partial regression and Experimental data-analysis of variance and covariance. The book also covers Advanced techniques in analyzing associative data and Other techniques for analyzing criterion-predictor

association like Factor analysis and clustering methods , Multidimensional scaling and conjoint analysis .it helps in Forecasting procedures in marketing research , Brand positioning and market segmentation

13. Green, W.S. (1999) and Jordan, P.W. Human Factors in Product Design London: Taylor and Francis.

    Human factors in product design have emerged as a major competitive issue in manufacturing. In many ways, manufacturers have hit a technology ceiling, meaning that it is increasingly difficult to get competitive on functionality, technical reliability or manufacturing costs. Design therefore has become a major battleground for manufacturers, and usability is recognized as its central tenet. This book explains current practice in human factors, identifying techniques that work under tight constraints and providing evidence of their effectiveness. Trends and the commercial implications of usability are also discussed. This book is essential for industrial designers and manufacturing executives.

14. Gutierrez B., Joffee, E., Gourgey, K. & Landau, S (1997) Evaluation of a prototype talking directory display system (TDDS) in an inter-modal transit facility. *Journal of Visual Impairment and Blindness.* 91(6). 590-593.

    The report describes a project that brought together technologies developed over the past several years and expertise gleaned from transit users with disabilities as well as those who teach mobility and transit use. The result is a display system that was piloted in one specifically designated, complex, inter-modal facility. The Talking Directory Display Systems (TDDS) offers information in several unique

combinations of accessible formats, such as: 1) A tactile/large-print map provides a schematic overview of the station; the map is connected to a computer-assisted system that speaks when points on the map are pressed by the user; 2) The system has an audio interface controlled by a touch tone telephone type keypad that offers the user a choice of voice mail type menu options from which information can be gleaned. The report documents the work and offers recommendations to transit facilities that may wish to consider their own TDDS.

15. Han, S.H., Yun, M.H., Kwahk, J., & Hong, S.W. (2001). Usability of consumer electronic products. *International Journal of Industrial Ergonomics*, 28 (3-4), 143-151.

The concept of usability has been applied to the design and evaluation of software user interfaces in which user performance was the major issue for improvement. Recently, it is being applied to consumer electronic products because companies consider it an important key to their success. However, there is a difference in the concept of usability between the two applications. Unlike the software user interfaces, the image/impression felt by the users are as important as the performance for a consumer electronic product to be successful. It is therefore necessary to redefine the concept. Although a variety of new concepts have been suggested, there is no widely acceptable one. This study provides a new definition of usability applicable to the consumer electronic products. It defines the usability as the degree to which the users are satisfied with the product with respect to both the performance and the image/impression. In addition, it classifies dimensions that can explain various and complex aspects of the usability. The results of this

study are expected to provide a framework for designing and evaluating the user interface of consumer electronic products.

16. He, W., Sengupta, M., Velkoff, V.A., & DeBarros, K.A. (2005). *65+ in the United States: 2005. US Census Bureau – Current Population Reports: Special Reports. Washington DC: US Government Printing Office*. Retrieved April 26, 2007 from http://www.census.gov/prod/2006pubs/p23-209.pdf.
17. International Standards Organization (1998). *Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs) - Part II Guidance on Usability* (ISO CD 9241-11). International Organization for Standardization, Geneva.

    This paper establishes the fundamental principles of ergonomics as basic guidelines for the design of work systems and defines relevant basic terms. It describes an integrated approach to the design of work systems, where ergonomists will cooperate with others involved in the design, with attention to the human, the social and the technical requirements in a balanced manner during the design process. While the principles are oriented to the design of work systems, they are applicable to any field of human activity such as design of products for domestic and leisure activities.

18. Jennings, L. (2006). Mason Professor Dubs Products for the Elderly "Nana" Technology- The Mason Gazette. Retrieved June 22, from http://gazette.gmu.edu/articles/8787/

    George Mason's Andrew Carle, assistant professor in the College of Health and Human Services and director of its assisted living program, has given a name to

the multibillion dollar industry serving the rapidly growing elderly population – what he refers to as “Nana” technology. This industry has exploded over the past few years with the aging of the baby boomers. Technology has allowed for a greater quality of life for the aging than ever before, and this a trend that promises to continue. Nana technology is defined as technology designed, intended or that can otherwise be used to improve quality of life for the elderly. This technology has the potential to serve the entire elderly population, whether living independently or in a community.

19. Jordan, P.W. (1998). *An Introduction to Usability*. London: Taylor and Francis

This work gives a broad introductory overview of the topic of usability. Firstly, usability is defined and a framework for identifying different aspects of usability is given. The main principles for creating usable designs are expounded, followed by practical advice as to how to design usable products. The book then tackles the issue of usability evaluation - a series of evaluation methods are described, followed by practical advice as to how to conduct the evaluation.; The book draws on examples from software design and product design generally. This means whilst human-computer interaction (HCI) is a central issue in the book; other usability issues are also covered.

20. Kaulio M. A. (1998). Customer, consumer and user involvement in product development: A framework and a review of selected methods. *Total Quality Management*, 9(1), 141-149.

Customer focus is a key component in a total quality management approach. This paper presents a review of seven different methods for customer involvement in product development, of which quality function deployment is one. Results from the review indicate that different methods support the involvement of customers at different phases of the design process, particularly in three phases: the specification phase, concept development and the prototyping. Moreover, different methods support the involvement of customers in different ways. Three types of involvement are identified: design for customers, design with customers and design by customers. The overall conclusion is that there exists a potential for improvements for practitioners who would like to further customer focus in the design process

21. Lane, J. P. (1999). Understanding technology transfer. *Assistive Technology*, 11(1), 5-19.

Technology transfer is a process for applying known technologies to new and novel applications. The term is widely recognized, but the process is not well understood. Technology transfer has significant value for developing industries, including the field of assistive technology. However, this value cannot be realized until the process is fully understood and properly implemented. This paper explains why technology transfer has value for assistive technology, presents a conceptual model of the process that describes the components and their relations, and discusses how intermediaries facilitate the process of transforming a technology into a new and novel product. The technology transfer process involves a series of activities that require cooperation between multiple

stakeholder groups over a period of time. Fully applying this process will advance technology transfer from an occasional coincidence to a structured methodology, with intermediaries facilitating stakeholder interaction where necessary.

22. Lane, J.P., Bauer, S.M., & Leahy, J.A. (2003). Accomplishing technology transfer: What works, what doesn't and why? *Assistive Technology,* 15 (1), 69-88.

    This paper presents lessons drawn from technology transfer case studies that address the persistent question: "What works, what does not, and why?" Each lesson highlights critical factors determining success or failure and is substantiated by case studies that exemplify the lesson. The case examples involve either the commercialization of prototype inventions (supply-push technology transfer) or the acquisition of desired technologies from other fields of application (demand-pull technology transfer). The cases present the chronology of events as they actually occurred, including supporting information from the other participants. Applying the lessons should help avoid common mistakes while increasing the likelihood of accomplishing the desired outcomes.

23. Lane JP, Usiak DJ, Stone VI, Scherer MJ. (1997)."The voice of the customer: consumers define the ideal battery charger", *Assistive Technology*: 9.2., 130-139.

    The Rehabilitation Engineering Research Center on Technology Evaluation and Transfer is exploring how the users of assistive technology devices define the ideal device. This work is called the Consumer Ideal Product program. The results show what device characteristics are most and least important, indicating where to place the priority on product features and functions from the consumer's perspective. The "voice of the customer" can be used (1) to define the ideal

characteristics of a product, (2) to make tradeoffs in product design and function improvements based on their relative importance to the consumer, (3) to compare the characteristics of existing products against the characteristics of the ideal product, or (4) to generate a product checklist for consumers to use when making a purchase decision. This paper presents the results of consumers' defining the ideal battery charger. Four focus groups generated the survey's content, then 100 experienced users rated 159 characteristics organized under 11 general evaluation criteria. The consumers placed the highest importance on characteristics from the general evaluation criteria of product reliability, effectiveness, and physical security/ safety. The findings should help manufacturers and vendors improve their products and services and help professionals and consumers make informed choices.

24. Leahy, J.A. (2003). Paths to market for supply push technology transfer. *Journal of Technology Transfer*, 28 (3/4), 30

    The Rehabilitation Engineering Research Center on Technology Transfer (T2RERC) advances the methods of technology transfer through research, transforms technologies into products through development, and facilitates the commercialization of new and improved assistive technology devices. This paper reviews the T2RERC's process and the three primary Paths to Market employed by the T2RERC for new products proceeding through its Supply Push program (Lane, 1999) in a case study format.

25. Leahy, J.A., Lane, J.P., Usiak, D.J. (2004). Improving accessibility of new mainstream consumer products through participatory development. *Proceedings from Annual*

Rehabilitation Engineering &Assistive Technology Society of North America Conference, Orlando, Florida.

This paper details the use of Participatory Development (PD) by the Rehabilitation Engineering Research Center on Technology Transfer (T^2RERC) in partnership with mainstream consumer product companies. We have implemented PD for the express purpose of integrating accessibility and usability features into new mainstream consumer products. Examples illustrate the enormous capabilities of Fortune 500 companies to rapidly and thoroughly distribute and market more accessible products at affordable prices.

26. Lenker, J. A., & Paquet, V.L. (2003). A review of conceptual models for assistive technology outcomes research and practice. *Assistive Technology,* 15 (1), 1-15.

Conceptual models provide a theoretical basis for advancing scientific knowledge and improving professional practice. Although numerous assistive technology-related models have appeared in the literature, there has been no systematic effort to assess them. Six conceptual models are reviewed here: Cook and Hussey's Human-Activity-Assistive Technology model; the World Health Organization's International Classification of Functioning, Disability, and Health; Scherer's Matching Person and Technology model; Gitlin's model of an AT user's "career"; social cognition decision-making theories; and Rogers' Perceived Attributes Theory. The models are reviewed in terms of six domains: background and goals; descriptive characteristics; indication of outcome measures; predictive characteristics; validation in the literature; and utility to assistive technology practitioners, developers, and consumers. The salient strengths and limitations are

highlighted for each. Application of the models to advance theory, research, and practice is discussed.

27. Phillips, B. & Hongxin, Z. (1993). Predictors of assistive technology abandonment. *Assistive Technology* 5, 36-45.

    Technology abandonment may have serious repercussions for individuals with disabilities and for society. The purpose of this study was to determine how technology users decide to accept or reject assistive devices. Two hundred twenty seven adults with various disabilities responded to a survey on device selection, acquisition, performance and use. Results showed that 29.3% of all devices were completely abandoned. Mobility aids were, more frequently abandoned than other categories of devices and abandonment rates were highest the first year and after 5 years of use. Four factors were significantly related to abandonment- lack of consideration of user opinion in selection, easy device procurement, poor device performance and change in user needs or priorities. These findings suggest that technology related policies and services need to emphasize consumer involvement and long term needs of consumers to reduce device abandonment and enhance consumer satisfaction.

28. Pirkl, J.J. (1991). Tran generational design: A design strategy whose time has arrived. *Design Management Journal,* 2(4):55-60.

    Trans- generational Design addresses this need by exploring product design that enhances the quality of life for users of all ages. This book offers a cross-disciplinary approach to product design that bridges gaps between designers and consumers, scientist and service professionals, young and old. Throughout, the

author focuses on practical solutions to design challenges, helping designers to avoid discrimination against both age and ability. Trans-generational Design sensitizes readers to the realities of aging by exploring changes in abilities that occur throughout one's lifetime. It explains how to make intelligent decisions during the design, production, marketing, promotion, and selection of consumer products used by an aging population with a wide range of abilities. Readers will gain the specialized knowledge they need to understand common functional limitations including sensory changes, balance and falling, dysmobility, memory and confusion, and how they inhibit independence; develop products that support and extend independence by accommodating human limitations in vision, hearing, touch, dexterity, and mobility; and create product "microenvironments" that enhance the overall quality of life for people of all ages and abilities. More than 140 full-color illustrations offer exemplary designs ranging from kitchen utensils to walking shoes to personal hygiene systems. High-quality photographs present a collection of trans-generational products used in living environments (including furniture and lighting), healthcare, cooking and eating, sports and recreation, leisure activities, transportation, personal care and hygiene, home maintenance, and information pressing and communication. All designs are described in terms of how well they accommodate human limitations.

29. Popovic, V. (1999) Product Evaluation Methods and their importance in designing interactive artifacts. In: Green and Jordan. (1999) *Human Factors in Product Design*. London: Taylor and Francis (p.27)

Manufacturers are becoming more aware of human factors in product design as a major competitive issue. In many product areas, manufacturers have reached a technology ceiling, which simply means that it is increasingly difficult to get ahead of the competition in terms of, for example, functionality, technical reliability or manufacturing costs. As a consequence, design has become a major battleground for manufacturers, and usability is recognized as being a central tenet of good design. This book provides a unique snapshot of current practice in human factors, identifying methods and techniques that work well under tight constraints and providing case study evidence of their effectiveness. The commercial implications of usability are discussed, and special attention is paid to two key trends: inclusive design and smart products. Inclusive design is about meeting the needs of all users with one design, which includes the elderly and the disabled. Smart products are multi-functional products with electronic interfaces containing a vast array of "helpful" functions. Industrial designers and manufacturing executives will find this text enlightening

30. Rich, C., Sidner, C., Lesh, N., Garland, A., Booth, S., & Chimani, M.(2005).*Diamond Help: A collaborative interface framework for networked home appliances*. Paper presented at the IEEE International Conference on Distributed Computing Systems Workshops, Columbus, OH.

    Ordinary people already have great difficulty using advanced features of digitally operated household devices, and the problem is getting worse as more customization and programming features are continually being added. This problem cannot be solved using only tiny displays and limited control buttons

typically found on home appliances. This paper describes how, using home networking to share a larger and more powerful display, one can provide home appliances with a new type of collaborative interface. This is called Diamond Help in which the appliance actively helps the user especially with the complex features that are occasionally used.

31. Rooden, M.J., Green, W.S. and Kanis, H. (1999). Difficulties in usage of a coffeemaker predicted on the basis of design models. Proceedings of the Human Factors and Ergonomic Society 43rd Annual Meeting.

An explorative empirical study was conducted on the possibilities and limitations of anticipating future usage of a consumer product. An existing product (a programmable coffeemaker) was chosen, and two design models were constructed. Practitioners in the field of ergonomics and design predicted operational difficulties by inspecting the design models, and by viewing video-tapes of users' trials carried out with the respective design models. The predictions were compared with actual operational difficulties, observed in usage of the real product. This paper discusses the predictions made for a selection of twenty events observed in usage of the real product. Reasons for not having predicted certain difficulties were investigated. Only in some cases characteristics of the design models appear to play a role in not being able to predict operational difficulties. Some events are not mentioned in the predictions, because the practitioners did not consider these events operational difficulties. Other difficulties were simply overlooked. In the paper recommendations are given on how to improve predictions of operational difficulties during design processes.

32. Rosenblad-Wallin, E. (1985) User-oriented product development applied to functional clothing, *Applied Ergonomics*, 16, 279- 287.

A method for user-oriented product development is presented. After a theoretical introduction the method is applied to the development of functional clothing. The characteristic of the method is its starting-point with the user in the use-situation. Important product demands are derived from use-analyses. Three case-studies are described where this method has been applied. They concern working clothes, clothes for the elderly and military clothing. The quality of this method is as an instrument for product development in the clothing area is evaluated by comparing, on the one hand, this method with those usually used in the clothing industry, and on the other hand the new products with those formerly used. The method for user-oriented product development has proved to be complementary to conventional methods. It should be applied to products whose functional properties are of great importance. The method can be generalized to all users and to products with close connection to human beings.

33. Rouse, W.B. (1991). *Design for Success*. NY: John Wiley and sons, Inc (P.3)

In the field of engineering like many others, foreign competitors are beating U.S. businesses to the punch in terms of bringing new products successfully to the marketplace. How can U.S. engineering companies compete? Simply by turning to this thought-provoking work which answers these and many other questions of successful design products and systems that are market driven and user oriented. Using a comprehensive methodological framework for human-centered design of

complex systems, it covers four phases: naturalist, marketing, engineering, sales and service. A wide variety of tools and techniques are discussed within this framework, with illustrated case histories introduced early and developed throughout the chapters. This thorough and consistent framework for design, in combination with numerous "how to" tips, provides the reader with a self-contained, applications-oriented plan with which to pursue design concepts.

34. Scriven M. (1973). The methodology of evaluation. In Worthen, B.R, & Sanders, J.R. (1973). *Educational evaluation: Theory and practice.* Belmont, CA: Wadsworth

    This is about evaluation in everyday sense in which it refers to the process of determining the merit, worth or value of things or to the result of that process. The field of evaluation includes many substantial and well recognized subareas such as product, program, personnel, policy and performance evaluation. The book contains substantial coverage of concepts and terminology of fields of evaluation already mentioned and other areas where evaluation is used such as crafts and physical disciplines.

35. Schulman, H. (2005). *Letter to Shareholders from CEO Harry Schulman*. Retrieved April 24, 2007 from http://www.applicainc.com/media/2005%20Letter%20to%20Shareholders.pdf

36. Scriven, M. (1991). *Evaluation Thesaurus* (4th Ed.). Newbury Park, CA: Sage.

    It is a dictionary, only more comprehensive, of terms and concepts, pertaining to evaluation as a discipline. Author presents definitions and descriptions with examples as necessary.

37. Stone, V.I., Bauer, S.M. and Leahy, J.A. (2003). “Ensuring effective technology transfer through evaluation.” RESNA 26th Annual Conference.

This paper presents partial findings from a research and development program that is ongoing at the University at Buffalo’s Center for Assistive Technology. The research component of this program validates an innovative approach to Technology Transfer as applied to the field of Assistive Technology. This paper focuses on the program’s development component and describes the role of evaluation in the methods used to transfer technologies and introduce products into the marketplace that address high priority needs of persons with disabilities.

38. Stone, V.I. (2003). Systematic Technology Transfer: A Case Study in Assistive Technology. *Journal of Technology Transfer*, Vol 28, 319-332

This paper presents the methodology and findings of a study at the Rehabilitation Engineering Research Center on Technology Transfer (T2 RERC). The program is federally funded to transfer needed technologies and products into the marketplace for persons with disabilities or Assistive Technology (A/T) marketplace. The study is a research effort to validate an innovative approach to technology transfer through its application to the field of A/T. It focuses on the feasibility, effectiveness and efficiency of the model processes as well as a description of how they work. Stakeholder involvement is fundamental to the model. The operating model is judged against the proposed model, rather than against an external model. Design validity is improved by providing a causal chain of Carriers that link intermediate outcomes to final outcome. Quantitative

and qualitative data generate case studies that report on the validated model version. Findings include outcomes (transferred technologies and devices), their time to success/failure and effort expended in the transfer at the current stage of the program. We also include examples of the Carriers used, the Barriers encountered and the Best Practices established

39. The Center for Universal Design. (2002). Evaluating the Universal Design Performance of Products, Raleigh: NC State University

The authors developed and tested two sets of Universal Design Performance Measures that reflect the Principles of Universal Design. One version is useful for product designers developing new products and the other version for individuals assessing products before purchase. The Measures were tested by a diverse group of 60 consumer households and 18 professional product designers using four common household products. This 6-page folding evaluation chart is designed to guide people who design products, as well as educators and students. The purpose of the Universal Design Performance Measures in this document is to provide a procedure for evaluating how well products satisfy the Principles of Universal Design and their guidelines, and therefore serve the needs of a diversity of potential users in a variety of circumstances.

40. University of Wisconsin-Madison, Madison: "Designing a More Usable World – for All" Trace Center Website: http://trace.wisc.edu/world/. Retrieved June 2, 2003

As persons with disability enter the mainstream of society, the range of engineering research has broadened to encompass medical technology,

technology for increased function, technology that interfaces between the individual and mainstream technology, and finally, public and systems technology.

Section Three*: *Some useful Links to Literature Review on Product Development and Evaluation

1. Stone V.I., Lockett, M., Usiak, D.J., and Arthanat, S. (2009, *in press*). Beyond Technology Transfer: Quality of Life Impacts from R and D Outcomes. *Journal of Assessment of Outcomes and Benefits.* Special Issue on Technology Transfer. Assistive Technology Industry Association.
2. Arthanat, S., Stone, V.I., and Usiak, D.J. "Enabling Products": Consumers with Limited Hand Functions Evaluate an Automatic Jar Opener. (article in review by *Technology and Disability*)
3. Center on Knowledge Translation for Technology Transfer (**KT4TT**) website: http://**kt4tt.buffalo.edu**. From the home go to the Knowledge Base; this is a repository of knowledge as related to the NTK (need-to-know) model developed by the Center. It includes information on reviews of new product development literature.