Supporting Interaction Designers through the Accomplishment Support Tool:

(Interaction Design Companion)

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1. **Abstract: Interaction Design Support**

This thesis paper addresses a problem of motivation that interaction designers experience when managing multiple design processes while keeping track of many design considerations. Once this issue is described at length, the paper focuses towards a possible solution in the form of a hybrid between creativity and productivity support tools: an accomplishment support tool. This tool is meant to support interaction designers in their experience with managing multiple processes.

This paper does not suggest that interaction design is the only profession that suffers from the motivation issue that is described, nor does it deny that other professions could benefit from the use of such a tool. The paper merely attempts to narrow the issue down to one profession so that it may be addressed within the limits of the thesis project.

The paper explores the need for such a tool by inspecting and analyzing current methods and digital applications used by interaction designers and mentions how this need is addressed with solutions based on relevant theories from diverse areas of interest. As defining qualities emerge from a combination of theoretical and practical research, case studies are described from a preparation perspective and then as experienced by workshop participants and interviewees.

The case studies (which include workshops and prototype modules) are then reflected upon and discussed in terms of their impact on the overall goals of the thesis project. A final prototype in the form of a web application, IxD Companion, is then described through scenarios of use and assessed in the conclusion. Suggestion to future work on accomplishment support tools such as IxD Companion, as well as others, is provided at the end.

2. **Introduction: The Research Question**

2.1 **Motivation: The Reason for Action**

Interaction designers are plagued by menial tasks of managing and organizing their thoughts, ideas, processes, skills, social networks, and goals with mediocre tools that function poorly for interaction designers and the stakeholders involved with their work. Löwgren and Stolterman (2004, p11) support this in their description of the anxiety and stress that is induced by the difficulties of keeping track of design considerations. In fact, there are times when interaction designers do not know where to begin when tasked with new projects (Saffer, 2006, p37).

One shouldn’t have to wear hats on one’s feet in order to walk on the street. In a similar manner, interaction designers should not be limited to using unrelated tools such as spreadsheet software (meant for accounting) like Microsoft Excel, in order to manage their design processes; the effort required is just phenomenal and counter-productive.

The lack of proper tools and the use of the above-mentioned types of tools can quite easily result in stagnation and lack of motivation for interaction designers that may lead to the inability to complete or even begin certain projects.
"Projects generally begin for one of two reasons: something is broken or something doesn't exist." (Saffer, 2006, p37)

In the case of this thesis project, something to support interaction designers in dealing with the above-mentioned issues is missing. Shneiderman (2007) writes about how many researchers, scientists, and new media artists use specialized digital tools (for their computing power) and powerful development environments, which through the strength of information visualization enable these professionals to extend their abilities (such as discovery, expression, and innovation).

With the proper support, it is plausible that interaction designers could be motivated to complete the projects that they have difficulty with. However, at the time of this writing, there are no digital support tools that are tailored to interaction designers in their management of interaction design processes.

The lack of specialized tools leaves interaction designers with either poor or fragmented alternatives to work with (i.e. tools that only support small parts of process management), some of which are ignored altogether by the interaction design community. The poor alternatives, which will be discussed at length in Section 4 of this paper, were designed with other goals in mind than those of interaction designers (such as strictly profit and business management, rather than creativity and innovation). The alternatives, which provide only fragments of support, were also developed for a broader target group than interaction designers alone. As such, these alternative tools can only scratch the surface of supporting interaction designers in managing their design processes.

2.2 Problem Formulation: A Critical Position

"The current and forthcoming generations of programming, simulation, information visualization, and other tools are empowering engineers and scientists just as animation and music composition tools have invigorated filmmakers and musicians." (Shneiderman 2007)

If Shneiderman’s above quote holds true, then by the same logic could a support tool for managing interaction design processes could be developed to empower interaction designers in addressing their possible lack of motivation. It would certainly be worth doing so, as it could increase the chance for more projects (than currently) to be completed.

"[P]roductivity support tools ... reduced manufacturing costs, tightened supply chains, ... strengthened financial management...[and] were designed to meet clear requirements such as improving insurance claim processing, reducing costs for airline reservations, or simplifying order entry. These tools were conveniently evaluated by standard measure such as time per task, cost per transaction, and errors per order. " (Shneiderman, 2007)

"Creativity support tools extend users’ capability to make discoveries or inventions from early stages of gathering information, hypothesis generation, and initial production, through the later stages of refinement, validation, and dissemination " (Shneiderman, 2007)
Knowing the definitions of support tool types as described above, and the vital need for interaction designers to be engaged in their processes skillfully and creatively (Löwgren and Stolterman, 2004, p11), it can be said that the tool that is aimed for in this thesis project should **support and encourage the accomplishment of interaction design goals** (that would otherwise never be reached from the lack of motivation to overcome challenges and impairing effects of existing management tools).

Due to their involvement with people, things, situations, contradictions, dilemmas, and conflicts, interaction design processes force creativity (Löwgren and Stolterman, 2004, p11). Interaction design projects then can be described as being creativity based, which in turn indicative of the beneficial aspect of basing any **accomplishment support tools** for interaction design on many of the beneficial qualities of creativity support tools.

Productivity support also stands to influence accomplishment in the sense that there is a strife for reaching an end product or goal.

The above indicates that a support tool must be designed as a hybrid between a productivity support tool and a creativity support tool. It is not fully a productivity support tool because it does not aim for efficiency, nor is it a fully a creativity tool in the sense of directly inspiring the discovery of new ideas.

The **research question** that this project aims to answer is then formulated as: **In the case where interaction designers need to manage multiple projects and deadlines, what kind of tool can be designed to make interactions with process management more engaging and supportive towards the accomplishment of projects than what is currently available?**

### 2.3 Context: The Role of Interaction Design

"**The types of problems that interaction designers often deal with have been called ‘wicked problems’, a term coined in the 1960’s by design theorist H.J. Rittel. Wicked problems aren’t fully understood and have fuzzy boundaries, they have lots of people (stakeholders) with a say in them, they have lots of constraints, and have no clear solution. ... these are the sorts of issues that designers, especially interaction designers, tackle all the time.**" (Saffer, 2006, p.39)

The target domain for this thesis project is interaction design specifically because of the situation provided by its relative role to other professions.

"**Interaction design is the art of facilitating interactions between humans through products and services.**" (Saffer, 2006, p.17)

Interaction design is a way of thinking; a methodology that opens the mind to consider the details of things from a new perspective. It is a systemic, big-picture, view that focuses on improving human life by addressing issues on the level of interactions.

"**Interaction designers change the world, a little at a time, through the products and services they create.**" (Saffer, 2006, p.36)
The most common outcome of interaction design processes is the creation of enhanced artifacts that make for better interactions. Generally, these artifacts are digitally enhanced by some form of technology. However, it is the option of the experienced interaction designer to break away from this rule where it becomes necessary to do so.

"It's a new discipline, even though humans have been using interaction design since before recorded history." (Saffer, 2006, p.10)

As the above quote suggests, interaction design is a philosophy that is adoptable (through specialized discipline and training) by people of any profession. For example, an architect can become an interaction designer, as can an engineer or a car salesman. Each of these people can address issues in their specific domains by dealing with interactions.

- The architect may choose to address the lack of social interaction in transitional spaces, such as hallways and underpasses, using an interaction design methodology.
- The engineer may look to interaction design as a means of developing an internet platform for sharing scarce resources between engineers on a global scale.
- The car salesman may choose to address a lack trust between potential customers and the brand of vehicle being sold by designing a smart-phone application that enables dialogues to occur between vehicle brand experts, past customers, and potential customers.

All of the three examples indicate possible applications of interaction design.

Interaction designers are trained to function in multi-disciplinary teams that are capable of addressing issues such as the ones exemplified above. Because of this multi-disciplinary training that interaction designers receive, they often work in teams containing professionals with other specializations. Interaction designers are trained to have at least basic skills in other domains in order to be able to properly collaborate with their team-mates and other stakeholders.

Due to the diverse nature of the work that interaction designers do, they are brought into contact with a multitude of diverse design processes and methodologies (several of which will be discussed at length in the following section).
3. Theoretical Frameworks:

By breaking down the research question introduced in Section 2.2 into its key components, what remains are two qualities of an accomplishment support tool for interaction designers that must be taken to a higher level than currently existing support tools offer; these are engagement and support.

To understand how these qualities can be achieved through a design solution, two frameworks need to be defined:

- one framework for analyzing creativity support tools that are currently available and translating this to an accomplishment support tool,
- and another for determining the design approach to be taken towards the development of the accomplishment support tool.

3.1 Analytical Framework for Creativity Support Tools:

“Within the creative community, researchers and practitioners have developed and studied various support tools and environments. It is important to learn from these tools and environments, identifying requirements for improving the future of creativity in design.” (Warr et al, 2007)

Previously (in Section 2.2), the purpose of creativity support tools was briefly described as tools that can empower designers along the entirety of their design processes. As Warr et al. suggest in the quote above, a deeper understanding of creativity support tools is required in order to enable improvement of creativity support. To the end of developing an accomplishment support tool, a deep understanding of the theories, that current creativity support tools base themselves on, will be covered in detail below.

3.1.1 Collaboration

“Design is a process that produces a new or refined product. Design is often collaborative, bringing together groups of stakeholders from diverse backgrounds to work together throughout the design process.” (Warr et al., 2007)

While not all creativity support tools extend their focus in social domains such as teamwork, collaboration between peers is at the heart of what creativity support tools should enable (Shneiderman, 2007, p27).

Much like creativity support tools, accomplishment support tools stand to gain effectiveness from the qualities that enable collaboration. To understand how to enable collaboration, the qualities of social discovery, boundary objects, and design-games will be explicated below.
3.1.1.1 Qualities of Social Discovery

Before collaboration can occur, people need to be connected by some means; this is known as social discovery.

Social discovery is act of finding of people and incorporating them as part of a social network for a specific or general means. Social discovery can occur through the use of networking platforms on the internet (such as Facebook, or LinkedIn), or through traditional means such as newspaper advertisements, conventions, exhibitions, as well as other social events. For the purposes of this thesis, social discovery will be specific to the act of finding collaborators as resources with which to realize projects.

Research into frameworks for social discovery done by Ben Shneiderman (2011) at the University of Maryland, USA, who proposed the Social Discovery Framework (SDF) as a means of identifying what tools would support collaboration between designers. Shneiderman’s description of the SDF is as follows:

“The implications of the Social Discovery Framework are that improved social tools to build capacity, initiate requests, and support dialog would accelerate the discovery process as much as the more visible tools for individuals seeking solutions.” (Shneiderman, 2011)

The Social Discover Framework as described by Shneiderman (2011) also suggests that, people making requests for work should be able to collaboratively (with active contributors to the framework) establish the terms under which the works should be done and the what the reward for doing such work should be. For this to occur, it must be established that both parties (those who request and those who contribute in collaborations) are valued at an equal level of importance.

Social discovery, in the framework proposed by Shneiderman, bases itself on information gathering that leads to breakthrough discoveries (Shneiderman, 2011). For these breakthrough discoveries to be realized, the design solution, which will be developed as part of this thesis project, cannot ignore the importance of social discovery and must adhere to the qualities that Shneiderman proposes above.

3.1.1.2 Qualities of Boundary Objects

In their description of what boundary objects are and how they are useful towards collaboration in the getting together of stakeholders to perform predefined tasks that inform the design solution (or workshops), Andrew Warr and Eamonn O’Neill (2007) at the University of Bath called for “support for generating and interacting with external representations to facilitate shared understanding and common ground amongst stakeholders.”

One method for enabling collaboration is the use of artifacts that are understood by all stakeholders in a design project and used as a common reference point for discussion, reflection, and the exchange of information. These artifacts usually exist externally of specific frames of understanding (such as disciplines, professions, or organizational hierarchy) and are known as boundary objects. (Fischer, 2004, 2005; Warr and O’Neil, 2007; Phelps and Reddy 2009; Zhu, 2011)
A concept that supports the use of enabling collaboration in this way is **embodied interaction**. The goal of embodied interaction, as described by Paul Dourish (2001, p.126) in his book "Where the Action Is", is the creation, manipulation, and sharing of meaning through engaged interaction with artifacts.

"If creativity support tools and environments are effectively to support design, they should support the creation, dissemination and refinement of boundary objects" (Warr et al. 2007, partially quoting Fisher 1999). Because accomplishment support tools should effectively support design as well, they need to adhere to the above quote.

### 3.1.1.3 Qualities of Design-games

Design-games are similar to boundary objects in that they are used as creativity support tools to enable discussion and collaboration in participatory workshop settings (See section 3.2.1 on User-Centered Design). Through their organizational structure, design-games enable the creative exploration of specific situations in a methodical yet open way. The qualities of design games, as will be discussed below, are potentially transferrable to an accomplishment support tool.

In an academic paper on facilitating collaboration through **design-games**, Jörn Messeter and Eva Brandt (2004) discuss how by framing collaborative design activities in a game format, design-games serve to facilitate user-centric design processes for design teams that are cross-disciplinary. Much like boundary objects, in the context of workshops, design-games help to break down "power relations and other factors that might hamper idea generation" (Brandt and Messeter, 2004) by "shifting focus to the game [aspect of things]" (Brandt and Messeter, 2004).

Brandt (2006) describes **design-games**, in an academic paper on designing exploratory design-games, as being the evolved form of **language-games**. In the same paper, she discusses how philosopher Ludwig Wittgenstein (1953) defined language-games as tools which serve to shape language and practice through the intertwined voices of different people being expressed as one voice, as opposed to several individual voices each expressing exact statements.

Brandt also mentions Pelle Ehn's work (1988), which takes language-games further as a "productive way of seeing participatory design" (Brandt, 2006). With the context presented, Brandt defines **exploratory design-games** "as a framework for organizing participation in participatory design projects" (Brandt, 2006).

Per Linde's description of design-games (2007), as found in his Phd. Thesis on Metamorphing, supports Brandt's description of design-games by suggesting that design-games are a playful exploratory means of collaboration in the field of interaction design. Linde goes on to mention that design-games set up situations that expose interaction-design issues to be viewable from multiple perspectives. This exposure, or openness, provides workshop participants with the ability to collaborate within a flexible design space. In this space, each participant's interpretation of the situation, though possible quite different from that of others (Linde, 2007), is valuable towards finding a design solution.
As the above-mentioned research would suggest, design-games are laden with useful qualities for enabling collaboration. However, while the purpose of design-games has, until now, simply been recognized as supporting collaboration and creativity within participatory workshops, design-games have the potential to be used outside of workshops in the context of daily use. Such use would perhaps be as part of an accomplishment support tool for interaction designers, who would benefit from the collaboration and creativity enabling qualities that design-games have to offer.

3.1.2 Engagement in Usability and Understanding from Creativity Support

Ideal creativity support tools are engaging and serve to motivate designers throughout their design processes. However, fully comprehend how an accomplishment support tool can be used to enable motivation in the same manner as creativity support tools, motivation itself must first be understood.

Denis and Jouvelot (2005) define motivation as the description of why actions happen. They also mention the quality of motivation in activating long-term memory functions such as the monitoring, elaboration, and organization of information. These long-term memory functions should be enabled by an accomplishment support tool for interaction designers.

However, to understand how to enable motivation in any context, the concept of flow can be applied. Flow, as Denis and Jouvelot (2005) quote Csikszentmihalyi (1975), is “the holistic sensation that people feel when they act with total involvement.” By this definition, interaction designers are motivated when they are in flow. Thus reaching a state of flow is the requirement for interaction designers to be motivated.

It is clear that for an accomplishment support tool to be effective, flow must be enabled or controlled, but how?

Csikszentmihalyi (1990) mentions that flow can be controlled by segmenting our interactions into manageable, yet challenging, goals.

Although the means described above by Csikszentmihalyi cannot be reproduced and can only occur naturally and spontaneously, several methods have been defined for keeping interaction designers engaged and as close to flow as possible throughout their use of creativity support tools. For example, in a paper on creativity support tools, Ben Shneiderman (2007) proposes that ideal creativity support tools as should provide a gradual level of sophistication that increases with user experience. This method ensures that users of creativity support tools are not too challenged initially, nor would the tool become too easy to use once they acquired significant experience with the tool. Such flexibility in the level of sophistication is also possible with accomplishment support tools.

However, there are also challenges that must be met in order to sustain flow and engagement. For example, Bederson (2004) mentions that users of creativity support tools will not be able to concentrate on tasks if there is a struggle with unstable features that they have to put effort into understanding these features time and time again.
To ensure that an accomplishment support tool can benefit from qualities that enable flow using methods such as that proposed by Shneiderman, and to avoid issues such as previously described by Benderson, an understanding of the elements that govern creativity support tools (and indeed accomplishment support tools).

Creativity support tools base themselves on providing their users with information that can be looked at from various perspectives and then applied as knowledge towards a design solution. Understanding how to manipulate this information is the key in discovering how it can be applied to accomplishment support tools. Information visualization, described below, provides the necessary framework for how to provide interaction designers with information in such a way that it enables flow.

3.1.2.1 Information Visualization

“…design… practitioners…‘think visually’ and constantly visualize their thoughts” (Goldschmidt, 2008)

"The principal task of information visualization is to allow information to be derived from data." (Spence, 2001, p.5)

As the above quotes suggest, information visualization can support users of creativity support tools by ensuring that they perceive what they see as directly useable information rather than data that must be deciphered or analyzed into information.

Spence (2001) breaks down information visualization into:

- **representation** as "the manner in which data is encoded, usually in visual form" (Spence, pp14, 2001) as can be seen in Figure 3.1.2 below.

![Figure 3.1.2 – Visual Representation of Data](image)

- **presentation** as "the way in which suitably encoded data is laid out within available display area and time" (Spence, 2001, p14) as can be seen in Figure 3.1.2 i.
interaction as "the actions undertaken by a user to move from one view of data to another" (Spence, 2001, p14)

Spence (2001, p19) also mentions the term overview, which "implies a qualitative awareness of one aspect of some data, preferable acquired rapidly and, even better, pre-attentively: that is, without cognitive effort." In Figure 3.1.2 i, it can be observed that the visual presentation of encoded data provides an overview of when a (fictitious) person eats, works, and plays during the week.

To establish the purpose of, and need for, information visualization, Spence (2001, p.6) quotes Simon (1996) as saying "solving a problem simply means representing it so as to make the solution transparent."

Spence's above descriptions of how to visualize information indicate that it is possible to use information visualization in the design of accomplishment support tools. However, to understand the way in which this is to be done, a few key concepts, relevant to the handling of information in relation to interaction design, must be named;

Paul Dourish (2001) mentions several concepts that focus on how information affects interactions through the analysis of the psychology behind these interactions.

Of these concepts, coupling is mentioned as dealing with "the way that we can build up and break down relationships between entities, putting them together or taking them apart for the purpose of incorporating them into our action." (Dourish, 2001, p.138)

Dourish's definition of intentionality gives us more insight on coupling:

"Intentionality concerns the relationship between what is done and what is meant, coupling is concerned with how that relationship is maintained." (Dourish, 2007, p.138)

The concepts described by Dourish provide a valuable framework for maintaining engagement and usability with creativity support tools that rely on information visualization through understanding the relationship between visual elements and that which they represent.
Furthermore, John Berger (1972) mentions that the way, in which people perceive things, is based directly on their knowledge and/or beliefs;

“*The relation between what we see and what we know is never settled. Each evening we see the sun set. We know that the earth is turning away from it. Yet the knowledge, the explanation, never quite fits the sight.*” (Berger, 1972)

In addition to visual understanding basing itself on existing knowledge and beliefs, Berger (1972) also mentions that human sight is constantly shifting in search for visual elements that support this understanding:

“*We never look at just one thing; we are always looking at the relation between things and ourselves. Our vision is continually active, continually moving, continually holding things in a circle around itself, constituting what is present to us as we are.*” (Berger, 1972)

Berger (1972) also mentions that people only see what they choose to look at. Given this circumstance, a deeper understanding of what makes visual elements desirable to be viewed would benefit the development of accomplishment support tools.

Dr. Sheelagh Carpendale’s paper (2003) and presentation (2002) on visual variables provides insights on how one can use attributes such as position, size, shape, value, orientation, colour, texture, and motion to make visual elements communicate information. Carpendale (2002, 2003) breaks up each of the previously mentioned attributes into the characteristics that they can be possibly used to represent: selective, associative, quantitative, order, and length. Closer inspection reveals that Carpendale bases her research on Jacques Bertin’s work (1967, 1983) on the semiology of graphics (of which the abstract describes it as an in-depth study of graphics that lays out the ground rules for information visualization and design). Carpendale’s research translates Bertin’s visual variables from the field of cartography to that of computational information visualization (Carpendale, 2003).

Given the knowledge gained from the above research, an accomplishment support tool for interaction design can be developed to be engaging and effective by paying attention to visual elements and the information that they communicate about design processes.

### 3.1.3 Time Management

Because interaction design processes occur over time, the management of time provides support to processes well. This makes the qualities of time management tools a requirement of accomplishment support tools for interaction design. Of these tools, to-do lists, calendars, and low-fidelity tools using pen and paper (as well as whiteboards) will be discussed below.
3.1.3.1 To-Do Lists

Due to the simple nature of traditional to-do lists, people using to-do lists can quickly create organizational structures to the tasks that they need to do towards some end.

Yolanda Gil and Varun Ratnakar as part of the USC Information Sciences Institute in California, USA, chose to focus their work in 2008 on intelligent to-do lists. While this is an interesting direction, it will not be that of this thesis paper. Yet, the studies of Gil and Ratnakar still offer some valuable insights on to-do lists in general;

- For example, they identify that to-do lists are the most popularly used personal management tools when compared to calendars, contact lists, etc. (Gil and Ratnakar, 2008).
- They also identify that to-do lists enhance memory through the augmentation of human memory through constant reminders of what needs to be done. (Gil and Ratnakar, 2008)
- Furthermore, they describe that to-do lists are used as points of entry into processes by suggesting (through information such as deadlines and importance level) that the tasks needing completion should be engaged with. (Gil and Ratnakar, 2008).

The above-mentioned insights expose the qualities of to-do lists, however it remains unclear how exactly to use these qualities towards accomplishment support. Clarity to this situation can be found through Csikszentmihalyi’s (1990) description of how to control flow through setting challenging tasks that are neither too simple nor too difficult. Thus the qualities of to-do lists to organize tasks that are manageable within the skillset of interaction designers can be used towards the development of accomplishment support tools.

3.1.3.3 Calendars

Calendars are generally paper based tools that are used to manage processes and random events over large periods of time by allowing users to visually keep record of information pertaining to these processes (in a similar manner to to-do lists).

Computationally driven calendar tools (some of which will be covered below in Section 4) provide an even higher retention of information than their paper counterparts.

For example, Tullio, Goecks, Mynatt, and Nguyen (2002) write about groupware calendar systems (GCSs) as calendar that are capable of being shared on networks (such as the internet) in order to facilitate shared use across co-workers in professional settings. The purpose of shared use is to facilitate more informed work practices. Tullio, Goecks, Mynatt, and Nguyen also mention that GCSs have actually been amongst the first tools to be shared across networks in this manner. This indicates the need for groupware calendar systems as a means of supporting working practices.
It is also interesting to note that Tullio, Goecks, Mynatt, and Nguyen maintain that such calendar systems are often integrated with other scheduling tools such as to-do lists and address books. This type of integration would provide a high degree of support that can be applied to the accomplishment of interaction design projects.

3.1.3.3 Pen and Paper/Whiteboards

“...despite the proliferation of potent digital visualization means and their willing adaptation by design practitioners, freehand sketching continues to be practiced by almost all designers throughout the design process.” (Goldschmidt, 2008)

Pen and paper offer an almost unrivaled amount of flexibility (such as colour, position and size which are exemplified by sticky note paper) with which interaction designers can record and visualize their ideas, yet no computing power to support this flexibility. The implications of using pen and paper are that it takes an extraordinary amount of paper, space, and time in order to go manage processes. The more sophisticated the processes, the more such tools fail to accommodate the needs of the interaction designer.

The use of whiteboards is more accommodating than paper, in that there is more space to use and that it allows for a lot of interaction with what is drawn (due to the rapidity of erasing and re-drawing of content). However, standard whiteboards also do not offer computing power, allowing them only to temporarily be used to manage parts of a process.

While accomplishment support tools are to be digital, in order to truly be effective they cannot ignore the above-mentioned qualities that pen and paper/whiteboards offer to interaction designers. An ideal accomplishment support tool would try to uphold the flexibility and openness that writing upon a simple surface affords.

3.2 Practical Framework

Once existing creativity support tools (that focus on process management) have been studied at length (in section 4, below) using the analytical framework described in the previous section, it will become necessary to understand how to proceed towards designing an accomplishment support tool that answers the research question.

Much like in the case of attempting to understand existing creativity support tools, a theoretical framework for assessing the means through which research and production will be conducted is necessary.
3.2.1 Existing Design Approaches

Because interaction design challenges a variety of complex issues (as described above in Section 2.3), each with its own diverse nature, several design approaches have emerged address these issues.

In his book, “Designing for Interaction”, Dan Saffer describes the existence of four approaches to interaction design;

- **User Centered Design (UCD)**; an approach that focuses the gathering of research data from user wants and needs (Saffer, 2006, pp.46-47). In order to assess whether a solution has the potential to address a particular issue, designers consult users at the beginning of projects and present them with artifacts (for holding discussions around) such as visual models that represent the various aspects and factors related to the project. Designers continue using user data as the determining factor for all design decisions; in principle, participation from users occurs at every stage of User Centered Design processes (Saffer, 2006, pp.46-47).

  In UCD, the knowledge of users is held above that of the designer because this approach assumes that only the users truly know what their needs, goals, and preferences are (Saffer, 2006, pp.46-47). This implies that as outsiders, designers cannot hope to have the same kind of understanding as the users. It is also understood that designers simply use their skills to discover the goals and meet the demands of users in this design approach (Saffer, 2006, pp.46-47).

  UCD, as a method, is in line with the rigorous research methods which Shneiderman (2007) calls for in the development of creativity support tools. Insights on various social environments where creativity support tools would be applicable can only be gained from a close linkage between researchers (or in this case designers/design-researchers) and users (Shneiderman, 2007, p.29).

  However, UCD is not without its drawbacks; because of User Centered Design’s reliance on users for every design insight, the resulting product or service is at risk of being focused too narrowly (Saffer, 2006, pp.46-47).

- **Activity-Centered Design**; An approach similar to UCD in the sense that it relies on research to inform design insights and decisions, although this is done by observing and cataloging user behavior instead of trying to meet the users’ goals (Saffer, 2006, pp.48-50).

  Activity-centered design is an approach that focuses on activities, as a cluster of actions and decisions done for a purpose, rather than on user goals and preferences to drive the design process (Saffer, 2006, pp.48-50). The actions and decisions that activities are comprised of are regarded by designers as tasks which vary in sophistication (Saffer, 2006, pp.48-50); “Tasks can be as discrete as pushing a button or as complicated as performing all the steps necessary to launch a nuclear missile. The purpose of tasks is to engage in (and possibly complete) an activity. Each task is a moment in the life of the activity.” (Saffer, 2006, p.49)
The ideal use of activity-centered design is best described by Saffer;

“Many products we use today were designed using activity-centered design, especially functional tools like appliances and cars. Activity-centered design allows designers to tightly **focus on the work at hand and create support for the activity itself instead of more distant goals. Thus it’s well-suited for complicated actions.**" (Saffer, 2006, p.48)

However, Saffer cautions designers to be careful in their handling of user input;

“**Designers should be especially careful in choosing the tasks they automate; it is very easy to de-skill users, to remove tasks that may be tedious or difficult to learn, but are also pleasurable to perform.**" (Saffer, 2006, p.50)

Saffer (2006, pp.48-50) also mentions that while activity-centered design allows users to focus narrowly on the task at hand and design supportive products and services for these tasks, activity-centered design can also lead to a form of tunnel vision in regards to the problem at hand. This tunnel vision occurs mainly because designers who practice activity-centered design focus on helping users accomplish specific tasks within activities rather than achieving an overall goal (Saffer, 2006, pp.48-50). In this case, designers become unable to see problems in their entirety, which tends to result in problematic design solutions; “**They won’t see the forest for the trees**” (Saffer, 2006, p.50).

- **Systems Design**: an analytical approach to design that leads to the creation of design solutions (such as products and services) through an established arrangement of components (or entities) that act upon each other (Saffer, 2006, pp.51-56).

Saffer (2006, pp.54-56) quotes Hugh Dubberly (from an interview by Thomas Hobbs) for saying that UCD can be combined with systems design because the understanding of user goals is at the core of both methods; “A **systems approach looks at users in relation to a context and in terms of their interaction with devices, with each other, and with themselves.**”

The purpose of this approach is to design stable systems that act as a means of achieving a specific goal (Saffer, 2006, pp.54-56). For example, Saffer (2006, p.22) mentions the invention of the telegraph, where the entire system of sender, receiver, wire, language (Morse code), operator, training of operator in the new language, etc., all had to be thought of to make the system function as a long-distance communication service.

The greatest strength of systems design is that it focuses on maintaining a systemic view of projects as part of a big picture perspective. It achieves this holistic view of projects by accounting for anything and everything that may arise in any given situation through an assortment of responses known as **requisite variety** (Saffer, 2006, p.53). As Saffer puts it;
“No product or service exists in a vacuum, after all, and systems design forces designers to take into account the environment that the product or service inhabits. By focusing on the broad context of use and the interplay of the components, designers gain a better understanding of the circumstances surrounding a product or service.” (Saffer, 2006, p.54)

From the same interview, to best describe the ideal use of systems design, Hugh Dubberly is quoted by Saffer (2006, p.56);

“A systems approach to design is most appropriate for projects involving large systems or systems of systems. Such projects typically involve many people, from many disciplines, working together over an extended period of time. They need tools to cope with their project’s complexity: to define goals, facilitate communications, and manage processes. Solo designers working on small projects may find the same tools a bit cumbersome for their needs.”

- **Genius Design**; an approach that bases design insights, decisions, and judgment of what users want, almost completely on the knowledge, experience, and wisdom of designers towards the production of design solutions (Saffer, 2006, pp.57-58). In genius design, the only time that users are actually involved is during the final testing phase of design solutions, simply as a measure of assessing whether products or services work exactly as was intended by the designers (Saffer, 2006, pp.57-58).

While the genius design approach to design may seem inconsiderate to users at first glance, it actually focuses very much on user needs and expectations through the perception of what the designer’s experience and intuition (and that of organizations that the designer may be working for) would suggest (Saffer, 2006, pp.57-58).

The benefits of genius design are the ability to progress along a design process when not having the resources or inclination to involve users, and also the time gained by not having to deal with users directly (Saffer, 2006).

Saffer (2006, p.58) best describes these benefits;

“It’s a fast and personal way to work, and the final design, perhaps more than the other three approaches, reflects the designer’s own sensibilities. It is also the most flexible approach, allowing designers to focus their efforts where they see fit. By following their own muses, designers may be able to think more broadly and innovate more freely.”

Saffer (2006, pp.57-58) cautions the use of the genius design approach for inexperienced designers who may not have the repertoire necessary for providing well-thought out and informed products and services. Saffer (2006, pp.57-58) suggests that the genius design approach is tempting for inexperienced designers to use because “it is, frankly, easier than the other three. It requires a lot less effort to noodle on a whiteboard than it does to research users or artfully assemble the components of a system.” (Saffer, 2006, p.58)
Ideally, genius design is used by designers with extensive experience from encounters with various issues and stakeholders, who can make use of their repertoire of products and services from past projects towards finding new design solutions (Saffer, 2006, pp.57-58).

“It probably also works best when the designer is one of the potential users, although this status can be a serious trap as well.” (Saffer, 2006, p.57)

However, it is not only the inexperienced designer who must be cautious in their practice of the genius design approach. Saffer (2006, pp.57-58) also suggests that if designers are also the users, then they must keep in mind that their knowledge of the functionality of the design solutions that they create is not shared by all of the other users (as they did not participate in the production of these design solutions themselves).

Picking a specific design approach is not only dependent on the project at hand, but also on the requirements that design processes may lead to, as well as the preferences of the designer which Saffer best describes:

“Most designers feel more comfortable with one design approach than others, although most designers mix approaches as they work. A designer’s temperament, personal philosophy, and view of work and of a project’s users will help determine which approach the designer prefers. But the best designers are those who can move between different approaches as the situation warrants, so it’s good to know them all.” (Saffer, 2006, p.59)

Given the above knowledge, the development of an accomplishment support tool will require the use of several design approaches.

3.2.2 Team Design Processes

The design approaches mentioned above hold another dimension to them, that is; designing in a team context will have a profound influence on how design approaches are used. This is best described by Günther, Frankenberger, and Auer (1996):

“…designers are collaborating more and more in teams crossing department and even company borders. … Working together in a group gives another dimension to the use of a designer’s abilities. The way in which a group discusses, solves conflicts, and makes decisions may increase or decrease the performance of its members. Thus the prerequisites of the group are of great influence on the process and its result.”

Because group design processes consist of the simultaneous actions of the designers in said group, Günther, Frankenberger, and Auer (1996) also recognize the need for design teams to keep track of their technical and social processes as part of a record-keeping procedure.
The first category, technical processes, that they mention, consists of reflections on the structure of the overall design process, specific attributes that design solutions should have (informed by research), and the various solution ideas and iterations that are come up with by the design team.

According Günther, Frankenberger, and Auer (1996), the second category of processes that must be kept track of is social processes. This category consists of the recording the details pertaining to the origin or suggestions and ideas, interaction in the group such as teamwork and self-organization, and finally when and by whom decisions are made.

By keeping in mind the requirements mentioned above, accomplishment support tools can be useful for not only individual interaction designer, but also for interaction design teams.

### 3.2.3 Reflective Methods and Techniques

In order to manage approaches such as the ones mentioned above, several guidelines have been developed to incorporate the best practices of interaction design practice. This entails being reflecting while practicing interaction design, through a method known as *reflection-in-action* (Schön, 1987, p.44).

Reflection-in-action is used in interaction design when designers almost inevitably find themselves perplexed and requiring order when faced with complex situations, regardless of the hierarchy of task priority, medium used, preference in style, and context of design process in those situations (Schön, 1987, p.65).

Complex situations, as mentioned above, are generally situations where the interaction designer’s existing working process becomes unclear, confusing, or seems to come to an abrupt end.

Interaction design practitioners can make use of reflection-in-action in these situations through the engagement in conversations with the situations that they aim to shape through their processes (Schön, 1987, p.65). During such conversations with their work, interaction designers will encounter unexpected meanings in their which they should then address through the act of reflection (Schön, 1987, p.65).

Reflection-in-action serves to address the recognition of the implications of unexpected meanings, to explore how to involve these meanings into the overall design process, and then to commit to the best means of doing so (Schön, 1987, p.65).

Taking reflection-in-action further, Jonas Löwgren and Erik Stolterman (2007, pp.63-100) have broken up reflection in action into five sections and appropriated them to design process as a whole (indicating that there is confusion and a lack of clarity at the beginning of design processes in general);
• **Inquiry:** is a phase that involves the inspection of existing elements that provide context to a design situation in order to establish an understanding of the situation as it exists and of how it could exist once a design solution is found. (Löwgren and Stolterman, 2007, p.65). Contextual inquiry is also mentioned as being the mixture of information derived from observing future users of a design solution and information provided directly from interviews with these future users (Löwgren and Stolterman, 2007, p.66).

• **Exploration:** is the phase where interaction designers examine the spaces where possible solutions, relative to the possible outcomes that are identified in the inquiry phase, could exist (Löwgren and Stolterman, 2007, p.65).

• **Composition:** is the phase where methods and techniques are appropriated towards narrowing down the overall design process in a comprehensive direction (based on the areas which were contemplated previously in the exploration phase) (Löwgren and Stolterman, 2007, p.65).

• **Assessment:** is the phase of critically inspecting design considerations such as ideas, concepts, specifications, prototypes, and artifacts which will arise through the appropriation of methods and theories in the composition phase (Löwgren and Stolterman, 2007, p.65).

  Denef et al. (2008) mention how through the analysis of the outcomes of prototype evaluation are helpful in further idea generation and providing rich material for reflection on the designs being evaluated (through which design researchers may even answer questions that they had not previously even considered).

• **Coordination:** is an overarching phase that occurs concurrently with the other phases as a means of ensuring that all parties involved (stakeholders) are brought into the design process through methods and techniques appropriately (Löwgren and Stolterman, 2007, p.65).
The above research (Section 3.2) indicates that interaction design processes are iterative and cyclical in nature. Because of this, the five phases, mentioned above, may occur concurrently with the iterations that exist within design processes [Fig. 3.2.3].

4. Context:

Now that frameworks for assessing accomplishment support tools and interaction design processes have been established in Section 3, they can be used in the assessment of relevant support tools in order to establish an overview of what currently exists.

As mentioned previously in Section 2, while there are no tools that are specifically tailored to the needs of interaction designers, there are poor and fragmented alternatives. Poor alternatives are generally process/project management tools that have been designed with productivity in mind rather than creativity. Fragmented alternatives are those that offer only a piece of the puzzle towards creativity support, and are not designed specifically for interaction design either.

The specific tools that this section covers have been selected through the following means;

- An internet search of existing project and time management tools.
• Feedback from interaction designers of what tools they currently use to manage their processes/projects.

• In cases where professional interaction designers were unavailable for interview and workshop purposes, tools were selected from interaction design job listing requirements.

The tools discovered by the above means can be used when comparing and contrasting the qualities with those of ideal creativity support tools. The qualities identified through this comparison will be incorporated in the development of an accomplishment support tool for interaction designers.

4.1 Project/Process Management Tools:

This section discusses tools that have been designed for the purpose of project/process management in several professional fields.

4.1.1 Scrum tools

The Scrum methodology, which bases itself on iterations of software focusing on the importance of teamwork (Ramsin and Paige, 2008), has been used in software development since the late 1980’s (Ramsin and Paige, 2008). There are various tools which support the Scrum methodology, such as Version One, Agilebuddy, and ScrumDesk, (to name a few) which focus on the agile development of software.

These tools were made for software developers and project managers of software development companies who are already familiar with the Scrum methodology. In fact, for anyone to understand the terminology and full functions of these tools, they must be trained in the Scrum methodology. After graduating from extensive training sessions, people are called Scrum Masters. Scrum support tools are made for Scrum Masters. For example, “ScrumDesk is a guidance [tool] for Scrum Masters that helps to manage impediments, support team self-organization and coach teams with the help of Scrum Coach rules.” (ScrumDesk, 2008-2012)

While these tools generally overlap in features, they also offer their own unique features, which make transitions between various scrum support tools an exhausting experience (should the need arise, i.e. the employing company decides to change their software, or the Scrum Master is hired by a company that uses a different tool.)

This means that software developers do not receive Scrum training as part of their education. In the ideal situation for interaction designers, support tools should not require any additional training to be used.

As such, scrum tools are not ideal for interaction designers to use in their management of design processes. However, while Scrum tools do so in inconvenient ways to interaction designers, they target certain important qualities that if used correctly can be incorporated in an accomplishment tool for interaction design;
• A tight record of project tasks, milestones, and deadlines across time
• Collaboration between users
• Visualizations of various information

4.1.2 Microsoft Project

Microsoft Project is a complex platform that hosts a variety of project management tools with a productivity perspective. It offers scheduling and collaboration tools that are supported by time-lines and other visualizations, which are just a few steps short of supporting creativity (as will be explained below).

The canvas area consists of a Gantt chart visualization [Fig. 4.1.2 – 4] that can be managed either by entering individual tasks (and their details) in a spreadsheet on the left [Fig. 4.1.2 – 3], or by visually creating items via the calendar on the right. An overall time-line also exists above the main canvas area. Spence’s (2001) definition of what an overview should be is not quite met by these visualizations, as they require quite of bit of cognitive effort to extract any information from. This situation may also be the case because there are simply too many visual elements present, and as Berger (1972) mentioned; people are constantly looking around trying to understand what they see within their environment.

When interacting with the visualization on the calendar side of the canvas, users are able to connect tasks via arrow-headed lines that indicate a linear relationship between the tasks [Fig. 4.1.2 i – 2]. In the same space, users can manipulate attributes such as duration of a particular task by clicking and dragging the endpoints.
of each bar displayed on the time-line. When selecting tasks on the calendar, the

task is also highlighted on the spreadsheet on the left side of the canvas [Fig. 4.1.2 i
– 1].

There is also an overall time-line of the tasks being plotted, that appears on above
the Gantt chart [Fig. 4.1.2 – 2]. However, this time-line is not as responsive as the
Gantt chart. For everything but the range of dates that the tasks span across, it
requires manual input regardless of what content is plotted in the Gantt chart.

Unfortunately for interaction designers, the above mentioned elements and
visualizations offer poor interactive qualities according to Spence’s (2011) definition
of the interaction needed in towards coming to accomplishments about a process.

The tool-bars on top of the interface [Fig. 4.1.2 – 1] change depending on what area
of the canvas you are working on [Fig. 4.1.2 ii – 1], accommodating the various
modes of interaction that are available.

Because of so many modes of interaction with Microsoft Project exist, it takes a great
deal of cognitive effort and willpower to fully understand, to use, and to continue
using this tool, leaving interaction designers without a clear means of managing an
overview of their projects and processes.

4.1.3 Microsoft Visio

Visio is a visualization platform featuring various diagramming tools [Fig. 4.1.3] that
is currently in demand for interaction designers to be familiar with in the industry,
(based on job requirements from several listings). However, the numerous
visualization types, that Visio provides infrastructure for, indicate that the software is
meant to reach a broad user group that reaches well beyond interaction designers
[Fig. 4.1.3].
Flowcharts consisting of predefined boxes (connected by lines) are the most common output of this software [Fig 4.1.3 i - 3], and are exported in a static image file format. Because the exported copies of the content are static, only users of this software are able to interact and edit the content, which must be saved in one of the Visio file formats in order to remain editable. This is a serious issue with Visio, as the interactivity with information visualization that Spence (2001) indicates is required.
The entire interaction of creating a visualization occurs on a grid-covered canvas area and the tools-bars surrounding it [Fig. 4.1.3 i – 3].

In order for users to create boxes, users must drag and drop icons from the toolbar on the left [Fig. 4.1.3 i - 2]. To label boxes, users have to click on boxes and enter text that then stays inside each box [Fig. 4.1.3 i - 3]. Users may also choose from which of the four sides of a box that the connecting lines should emerge from. The software also allows users to move the nodes around on the canvas without breaking the connecting lines.

Users of Microsoft Visio are able to group, separate, and organize content in terms of predefined areas described as “swim-lanes”, which give a linear structure to the visualization [Fig. 4.1.3 i - 4].

The software does not provide any structure, save for the grid and the “swim-lanes”, for mapping items out. This situation suggests that the items are to be perceived relative to each other for both users and viewers to understand the models created in Microsoft Visio.
Users are provided with a fair level of customization in terms of the visual style of the lines and boxes [Fig. 4.1.3 ii].

Overall, it can be observed that creativity support for interaction designers is almost possible with Visio, but the features required are lost in an overwhelming array of irrelevant ones and fail to provide real-time interactivity.

4.2 Time Management Tools: Calendars

4.2.1 Google Calendar

Google calendar provides a useful, but limited framework for managing processes. It has to used properly in order to prove useful, however many of interactions require too much effort to input information about a project constantly [Fig. 4.2.1].

Google Calendar was also not designed for interaction design project / process management specifically and as such does not provide the proper framework for doing so. It has very limited information visualization and the data it requires is too specific (hourly, location, with whom, etc.) [Fig.4.2.1 i].
Figure 4.2.1 – Google Calendar

Figure 4.2.1 – Google Calendar – Adding Tasks
4.3 Time Management Tools: To-Do Lists

4.3.1 Remember The Milk

Is a great tool for managing tasks, and as a to-do list application it is state-of-the-art. It has a clean and simple interface, the input required is limited and produces results quickly, and it provides key information such as when tasks are overdue and the importance level of specific tasks.

Remember the Milk does not however have any hierarchy to the tasks (such as sub-tasks). It also does not offer any visualization of these tasks across time [Fig. 4.3.1].

A framework for accomplishment support tool could be established by integrating the qualities of Remember the Milk with a calendar and visualizing processes on top of the calendar.

4.4 Other Process Management Tools:

There are many tools that can be used for project/process management, as can be observed from those previously mentioned. However, these tools are not always found in the professional domain of design. By looking to other areas where processes are managed, the qualities that other tools can offer to interaction design process management tools may be discovered.
4.4.1 Questhelper

Questhelper is an add-on for mass multi-player online game World of Warcraft (WoW) that organizes the in-game tasks (that belong to in-game goals known as quests) by proximity in a to-do list fashion [Fig. 4.4.1 - 2]. The tasks are also mapped out visually as points on a map connected in terms of proximity by dotted lines [Fig. 4.4.1 -1].

Users of Questhelper are able to change the order in which these points are connected, effectively enabling them to make informed decisions about their task-completing processes.

The need for Questhelper arises within WoW when players have quests that are scattered around the virtual geography that the game presents. Players experience a lack of motivation to complete such quests due to the distance (and in effect travel time required) between the tasks that the quests comprise of. In addition, the quests themselves also suffer from the same situation, and are often located far from each other.

The impact that Questhelper has is not on shortening the time that it takes to complete quests, nor make the process more efficient, but rather to support WoW players in completing quests by keeping them engaged. It shifts the goal of players from trying to complete each individual quest before moving on to the next one to completing an area or grouping of tasks that were within close proximity of each other.

The Questhelper add-on takes advantage of the fact that the tasks of different quests are at times close together, and it illustrates this proximity for players. This serves to keep players engaged even when doing quests that require a multitude of tasks to
be completed. In essence, it provides more achievable artificial goals that are met more quickly, in effect providing players with a more frequent sense of accomplishment.

In addition to its support to individual players, Questhelper also takes advantage of the fact that World of Warcraft is a multi-player game, and supports groups of players that are working on completing quests (or questing) together. The data collected by Questhelper from each group member is provided to the other members in their quest list and map visualizations, in effect improving collaboration between players. Questhelper’s multiplayer support offers a compelling array of qualities for collaboration that can be adapted for interaction designers in a professional setting.

Questhelper is an example of what an accomplishment support tool could be, and has the potential to benefit many people if its qualities were translated into a professional domain such as interaction design.

5. Reflective Design Process:

This section will explicate how the theoretical framework (mentioned in Section 3) has be applied within the practical framework (also mentioned in Section 3) as part of the overall process (which described below in Section 6). This application of the theoretical framework within the practical framework will serve to describe the overall methodological framework that guided the design of an accomplishment support tool for interaction designers.

The overall design process will be discussed from a reflective point of view that is based on Löwgren and Stolterman’s (2007, pp.63-100) five phases of reflective design processes (Section 3.2.3) [Fig.3.2.3].
5.1 Inquiry

As part of the overall design process, precedents have been examined for their qualities that are relevant to creativity support as a means of identifying which of these qualities are suitable for an accomplishment support tool for interaction design. Previously (Section 4), the analysis and reflection of the qualities behind these tools was covered.

Further inquiries have been made throughout the design process, namely in the workshop and interview sessions. Iteratively, workshops have been held where theory from Section 3 was tested out through workshops testing prototypes and discussing with future users of an accomplishment support tool.

The rigorous research methods, that Ben Shneiderman calls for in his paper (2007, p.29), come into play during the workshop sessions that are be described in more detail in section 5.2.2 of this paper. A close linkage, as Shneiderman proposes, between designer and the workshop participants was established in order to ensure that a more complete (than otherwise) understanding of the support that interaction designers need when managing multiple design processes.

Contextual inquiry is performed by appropriating a mix between user-centered and activity-centered approaches throughout several workshop sessions with various participants.

5.2 Exploration

5.2.1 Workshops

The field of participatory design has been using workshops as the basis for hands-on research that involves multidisciplinary user groups. This suggests that workshops are intertwined with prototyping in their evaluative capacity and provide unique exploratory environments where design-games may also be applied.

5.2.2 Workshop Planning

In between the production of prototype iterations, at least one workshop was held in order to observe participant engagement and interaction.

The workshop sessions served as explorative areas for applying both the research
mentioned in Section 3, qualities of the examples mentioned in Section 4, and insights gained from analyzing workshop results.

By varying the amount of participants for each workshop, both qualitative and quantitative results have had a chance to emerge.

5.2.3 Exploring Engagement

For the purposes of exploring engagement, the gradual level of sophistication, that Shneiderman (2008) also suggests be taken into consideration for ideal creativity support tools, was applied during the final phases of digital prototype development. This was done as a means of teaching the interface to new users and rewarding these users when they become more familiar with the accomplishment support tool and its functions.

The interactive qualities of information visualization also came into play throughout the overall design process as an engagement-exploring factor.

The exploration of the qualities of design-games resonate throughout the interaction with the final prototype, which also proved to demonstrate qualities of engagement.

5.2.4 Exploring Collaboration

As another recommendation by Shneiderman (2008), collaboration between peers was enabled in the digital prototypes that were programmed with database support for storing data from multiple user input.

5.2.4.1 Exploring the Qualities of Social Discovery

Several prototypes, which will be discussed in the next section, have been focused on social discovery as a means of identifying the effects of social discovery within the context of accomplishment support tools for interaction designers.

5.2.4.2 Exploring the Qualities of Boundary Objects

The visualizations that the prototypes afforded have, in some of the workshops, been able to function as boundary objects around which ideas for improving the prototypes were discussed.

5.2.4.3 Exploring the Engaging Qualities of Design-games

The qualities of design-games were explored in the final prototype. This point in the overall design process was chosen because a satisfactory level of having represented every necessary piece of data, and having presented it as useful information towards managing multiple interaction design processes, was reached.
This procedure was meant to instill the insightful and engaging qualities of design-games into the prototype's team-use scenario.

The qualities of design-games serve to enforce the interaction properties of information visualization, as defined by Spence (2001), at an engaging level.

5.2.5 Exploring Time Management

The relevant qualities of time management tools mentioned in Section 3.1.3 have been applied to various prototypes throughout the design process.

5.3 Composition

As part of detailed shaping of how an accomplishment support tool should function, scenarios using both real people and fictional characters were used early in the design process.

Prototype modules were developed using qualities of creativity support tools and of what accomplishment support tools may offer in the future.

Prototyping as a means of asserting the viability of a product by first building and testing a low-fidelity version of all or of parts of the final product, has been a method used by most if not all forms of design;

“...the development process for ... systems involves the generation of successive prototypes where each successor is closer to the user requirement” (Blum and Houghton, 1982)

To understand how to design an accomplishment support tool for interaction design, it is required to understand how it should appropriate all of the qualities mentioned previously in the theory section. To this end, case studies for the appropriation of these qualities were conducted. These case studies involved the composition of modules which aimed to prototype the qualities in question. Several of these prototype modules were iterated several times before yielding the desired results. The reasoning behind the modularization of the overall prototype was to isolate each quality that an accomplishment tool for interaction design should hold before testing it out.

5.3.1 Prototype Development

As mentioned above, prototypes have been used as engaging artifacts for the purpose of collecting data pertaining to future user interaction within workshop environments.

For gathering a range of different research data and information types, prototypes of varying fidelity were used as part of a larger iterative process;

- **Low-fidelity prototypes** (generally made of paper) served to help identify
what information was necessary for obtaining specific results related to the management of multiple interaction design processes.

- **Mid-fidelity prototypes** served to properly identify what data was being visualized as information and what information was still missing or required too much cognitive effort to obtain.

- **High-fidelity prototypes** served to test out the interactive qualities of the accomplishment support tool for interaction design, featuring visualizations that were informed from the low and mid-fidelity prototypes.

### 5.3.1.1 Applying Information Visualization

Throughout prototype development, and for the purpose of evaluating workshop results, research on information visualization was applied as a perspective for reasoning and justification of all visual content.

The application of embodied interaction, coupling, and intentionality took place during every stage of the overall thesis process where there was a need to present and represent data visually. When an icon or a button was made, it was filtered through the previously listed concepts in order to ensure that it upheld their qualities.

The reasoning behind this approach was that by minimizing the difference between the significance of each graphical element, and the significance that is pre-cognitively perceived by users, an intuitive and engaging experience would result for these users.

### 5.4 Assessment

Frameworks for assessment of research and of practice have been defined in Section 3 of this paper as a means of reflecting on the exploratory workshops and prototypes.

Section 7 of this paper covers in-depth reflection on the design process revolving around workshops and prototypes.

**5.4.1 Workshop Results & Reflection**

Basic reflection has been done at the end of every workshop and interview session throughout the design process.

To evaluate group workshop sessions, recordings have been made and analyzed. Prior to the analysis, the results were filtered by:

- identifying what is a common result amongst participants
- identifying where interactions are successful and where they break down

Qualitative results were required when dealing with details and fine-tuning, whereas quantitative results served to identify more general qualities.
5.5 Coordination

As mentioned previously, a partially user-centric approach was appropriated to the majority of the overall design process as a means of understanding the goals and needs of interaction designers as future users of accomplishment support tools.

6. Research & Development: Prototypes + Workshops

In an effort to inform the development of an interaction design process support tool, while taking into consideration the theory described in the previous section of this paper, various workshops were held using prepared material (such as prototypes).

6.1 Prototype 1 – Paper

6.1.1 Preparation + Workshop (Spring 2011)

The purpose of this workshop was two-fold;

- to identify what resources interaction designers depend on, as a basis for understanding what things need tracking in process management, when working on a variety of projects

- and to identify how interaction designers currently keep track of these resources visually (as a means of establishing a basis to be designed upon)

In order to get a somewhat diverse range of possible resources, the workshop participant would have to have access to both academic and professional resources.

After the workshop, a brief interview would be held with the participant in order to gain some qualitative insight into the choices made throughout the workshop.

The person chosen as the workshop participant was Tony Olsson, who is a teacher of physical computing as part of the interaction design program at Malmö University, and a business partner in a local design company.

Tony was provided with an A3 sheet of paper, a pen, and a block of sticky note papers and the set of instructions of mapping out his professional and academic resources.
6.1.2 Workshop Results

![Figure 6.1.2 – Tony’s Model – Paper Prototype](image)

The workshop resulted in Tony identifying the resources that he most commonly interacted with:

- the university where he teaches
- students (current and former) at this university
- academic organizations (related to the university)
- local design companies

Tony wrote the names of these resources onto the sticky notes and placed next to each-other so that they overlapped [Fig 6.1.2].

No lines or graphics were drawn, and when asked why, the Tony responded that lines would not be necessary for this particular visualization because most of the relationships between the resources overlapped.

Towards the end of the workshop Tony stated that he did not have a mental model that included all of these resources prior to creating this model. This indicated that there was room for information visualization to bring forth accomplishments with the introduction of more information in future iterations of the prototype.

What can be observed from Tony’s model [Fig 6.1.2] is that the chosen resources all hold a social layer. To further this point, it is interesting to note that Tony did not choose to include store, shops, websites, forums, etc. as resources even though he had access to them.

The previously mentioned social layer was rich in possible information that could be visualized towards helping interaction designers manage their various processes, and set the premise for a follow-up interview that happened a few days later.
6.1.3 Interview Preparation

The interview was split into two phases:

- Phase I: Questions related to social networking
- Phase II: Questions based on resource sharing scenarios

6.1.4 Interview Results

Phase I: Social Networking

Q: I asked Tony how he would find information about your personal resources, for example stakeholders in Tony’s various projects (such as potential clients or business partners).

A: Tony stated that he relied on word of mouth for potential clients and business partners and that for additional information on them he would check social networking sites.

Q: “What social networking platform do you use, and do you use these platforms to keep track of or to find people that you want to work with?”

A: After answering: “I tried this, tried that”, Tony mentioned that current social networking platforms currently only offer static information and that this type of information was insufficient to truly be able to judge whether or not he wished to work with/for the people whose details were displayed.

Q: “What do you try to learn about the people you read about on your social network?”

A: “A lot of time that I spend on these networks is learning what other people know.”

Q: “From a professional standpoint, why is someone’s knowledge more important than a money-making idea?”

A: “If they have done good work, then these people are valuable. A high level of knowledge around similar interests as me gives us an equal footing for conversation. Also, don’t think money first. Knowledge is more valuable, because it can be transformed into cash later. Anyone can have a good idea, but it could be a fluke.” Tony also mentioned that if a person has deep knowledge and understanding of how they came to an idea, then they are valuable because they are able to come to other informed ideas in the future.

Q: “What if the social network did not provide enough information; would you still
consider collaborating with someone?”

A: “Only if they are introduced to me with a recommendation.”

Phase II: Scenarios

From the initial phase of this interview, it was determined that Tony had taken on the role of a gatekeeper of knowledge and resources for his contacts. To gain deeper understanding of the subject, the scenario questions were adapted to this insight.

Q: “What is your role as a gatekeeper?”

A: “As a gatekeeper I am an evaluator, but I am not accessible all the time.”

Q: “If you become unavailable or inaccessible to students for help, is there a sort of backup system in place where students can still receive help in that situation?”

A: Tony answered that it is the proximity between him and his assistants that he counts on in times when he is unavailable. Tony’s assistants can pass on the knowledge and experience that they have gained from working with Tony. That relationship with his assistants allows the system to function; “if the structure isn’t there, it all falls apart.”

Q: “As a designer and a teacher, you must have an extensive social network, how do you decide whether to turn down or to accept project proposals from your contacts?”

A: Tony responded that it depended on what resources they had at hand. However, “the bad side of a network being too big is that sometimes you think you have the resources for projects, and you enter fields that you know nothing about.” Tony maintained that when accepting to work on projects that are different in nature than one is used to, could lead to the stagnation of these projects.

Q: “As a teacher, you are approached by a student seeking resources for a project, what do you do?”

A: Tony replied that he would try to find out what the student’s current proficiencies were and “test their knowledge level”. If the student seeking help had no idea what they were doing, Tony would “rotate existing knowledge” and have someone whom he had already imparted basic training and knowledge to, such as a senior student, to lend a hand.

“Sometimes”, Tony mentioned, “I even have to filter people out” if they are clearly not interested in help but are actually trying to abuse Tony’s knowledge and experience in order to have their work done for them.
Q: “If one of your contacts approaches you with a project proposal and asks if you know anybody that would be interested in collaborating with them, what do you do?”

A: “I try to find the contacts from my social network that have the most similar ideas, and get them in touch.”

This interview led to the development of a more detailed prototype that incorporated the qualities of the answers from this interview. These qualities were chiefly social discovery and knowledge rotation.

6.2 Prototype 2 - Paper

6.2.1 Preparation + Workshop (Spring 2011)

The purpose behind the second workshop was to identify what details/data were important in visualizations of the social layer of an interaction designer’s academic and professional resources.

Figure 6.2.1 – Scenario Cards

A set of cards was provided, illustrating a set of fictitious people (personas), which would then be used as example contacts from the interaction design industry as well as from academic circles involving interaction design. These personas would serve to establish a scenario for Tony Olsson, the workshop participant. To further add complexity to the scenario, a set of situations involving these personas was given to Tony, to use while identifying the details mentioned above in the description of this workshop’s purpose.
These personas and their related situations were:

- A student seeking help with specialized programming skills on a project
- A business professional seeking a collaborator on a project
- A teacher seeking a professional designer to give a lecture to his/her class

Tony was tasked with identifying what details he needed to know about each of the personas in order to know how to deal with their specific situations.

### 6.2.2 Workshop Results

As a teacher, Tony would need to share information with his students. When a student would become proficient in a certain skill or knowledge, he would be referred to when the next student has the same or similar assistance request of skill or knowledge.

As a professional interaction designer, Tony would often mediate interactions between interaction design students and professionals, providing both parties with valuable resources.

The most important pieces of information that would allow Tony to make judgment calls on which people to associate for mutual benefit were the **ideas that these people communicate** and the **level of aptitude** (in terms of skills and knowledge) that these ideas communicated.

For example, if a student's ideas were generic or not very thought through, Tony would not waste the time of a business professional or senior student who would expect to work with more significantly interesting and genuine ideas. A visualization where the student's ideas showcased their aptitude would provide Tony with a quick overview allowing him to make informed decisions as a gatekeeper.
6.2.3 Follow-up

To prepare a framework for a digital prototype, an information model was drafted based on the results of the previously described workshop. The model included generic users rather than the personas of the workshop in order to put emphasis on the relationship between user types. The model was then used as a conversation piece in a follow-up interview with Tony, and incorporated new knowledge and insights from Tony [Fig 6.2.3].

One of the updates to the model was the inclusion of idea judges. This came forth in the interview when Tony mentioned that, as a gatekeeper, he would at times run his student's ideas by his colleagues for a second opinion before passing an idea on to possible collaborators for the student(s).

The interview discussion also produced a more simplified model [Fig 6.2.3 i], which identifies people that require resources for their projects as "seekers", in relevance to the previously mentioned gatekeepers that have access to these resources. In this model, seekers would illustrate their ideas as design processes. These ideas would exist in privatized areas labeled "idea pools", to which Gatekeepers and their contacts would have access. The ideas inside the pools would be judged, by anyone with access to the respective idea pool, and connections between seekers and resources would be provided based on interest shown by a gatekeeper's contacts. This model also allows for seekers to become gatekeepers, and vice versa. In fact, this model displays the possibility of any user to take on any role once they are introduced to the system. The reasoning for this is that there is a complex nature in the variety of personal connections that such a system would allow. For example, a seeker of resources for one project could be the judge of another idea or the resource for another seeker.
In this social network model, interaction design processes would be the primary means of communicating ideas, thus placing a focus on design process illustration. This system allows for interaction design processes to be managed socially, as the people of this network could provide each other with feedback on any individual part of their processes.

The framework for developing a digital prototype would then have to support the illustration of design processes so that they could be managed and accessed by people belonging to a social network in the manner described above.

6.3 Prototype 3 - Digital

6.3.1 Preparation + Workshop (Spring 2011)

The purpose of this initial digital prototype was twofold:

- To identify what modes of interaction should exist in a digital interaction design support tool where relationships between people and projects could be mapped out as nodes connected by lines in terms of ideas using media such as video, imagery, and text.

- To assert the viability of producing an interactive visualization with web technologies such as Hyper-Text Markup Language (HTML), Cascading Style-Sheets (CSS), and the jQuery simplified javascript framework, or whether it was necessary to identify another means of producing the prototype (i.e. Adobe Flash).
The features of Prototype 3 were:

- An empty canvas onto which nodes could be plotted anywhere by clicking
- Placed nodes could be dragged and dropped, providing versatility of location
- Nodes could take on several categories once placed:
  - Image (support) – this would accept an image URL
  - Video (example) – this would accept a URL to an MP4 file
  - Text (description) – this would accept a short amount of text
  - Contact (person) – this would accept an email address
- Nodes would become visually distinct when selected
- Newly created nodes would be connected via curves to the selected nodes
6.3.2 Workshop Results

The interaction of clicking on the canvas to create a node proved to be too simple, as the participant (Tony) was tempted to keep creating nodes arbitrarily without giving meaning to them by attempting to map a process. Tony seemed reluctant to want to enter content into the nodes once they were created due to the sheer number that then existed in the canvas area.

The behavior of creating large amounts of arbitrarily-positioned empty nodes revealed the following:

- That in order for nodes not to be created continuously without purpose, the cognitive step of entering content into a node must be made prior to the creation of that node.
- That the arbitrary positioning of the nodes was due to a lack of structure onto which the idea nodes could be mapped.
- That mapping ideas in the manner that the digital prototype allowed would not suffice to aide interaction designers in managing projects and processes.

In order to address the above-mentioned points, a shift of focus would be required; design processes themselves would have to be mapped instead of ideas. Ideas themselves are too abstract and distant from, if not just a small part of, design processes (as the required cognitive effort that Tony was unwilling to put in to visualizing processes in terms of ideas would suggest).

(Because there is already a huge amount of research, effort, and attention going in the way of social discovery, as will be explained in Section 7, it will be assumed that an appropriate system for social discovery will be developed externally, and thus a complete shift of focus made towards the system of communicating ideas is justified here.)

6.4 Prototype 4 - Paper

6.4.1 Preparation + Workshop + Interview (Autumn 2011)

A workshop followed by an interview session were held in Copenhagen with graphic designer (and former Interaction Design bachelor student at Malmö University) Christian Wind Skaarup.

The purpose of this workshop was to identify a framework for mapping design processes and to see whether mapping out a design processes could lead to the discovery of insights about the process (from gaining a new perspective.)

In preparation for the workshop, a framework based on workshop material from an older project in service design (Figure 6.4.1) was established.

- In the service design project previously mentioned, various people living in the Western Harbour region of Malmö were interviewed on what means of transportation they used and asked to indicate their most frequent travel
routes on a map using felt markers. The colours used would denote the various means of transportation, making apparent which means of transportation were used for what purpose and in what location. These results were not only informative to the design team at that time, but they also brought out accomplishments in the interviewees who previously did not have mental models about their daily routes. It was for this reason that this framework for mapping was chosen as an inspiration for this workshop with Christian.

Christian was provided with the same set of markers used in the above example, an A4 piece of paper, an example model (Fig. 6.4.1 i) and was given the task to map out his most common design process in his experience as a designer.
6.4.2 Workshop + Interview Results

Initially Christian hesitated at the thought of having to map out his most common design process and stated that there was no typical process for his design due to the complex and flexible nature of his work. However, Christian was able to proceed with the mapping after being reassured that this exercise did not require him to map an accurate design process but rather to visualize his mental model of a typical design process.

Using the framework provided (Fig. 6.4.1 i), Christian illustrated an approximate model of his current design process as a designer (Fig. 6.4.1 ii).

After Christian had modeled his design process, he was shown Figure 6.4.1 and given the details as to why it was used as inspiration for the framework he had used for making his model. Christian reflected that his model did not seem particularly informative and that:

“The issue is that there is no natural relation between the representational elements in the model (Fig.6.4.1 ii) in contrast to the transportation model (Fig.6.4.1) that you described.

That one had a real-life connotation to the data inside the model;

- the paths relate to actual locations and physical/visual properties of the data,

- comparative scales between the different paths have a direct relationship with real-world data,

- and you can make some kind of informed accomplishment based on those data.

In this model (Fig.6.4.1 ii), you have very diverse elements represented by the same colour/legend.
Even if you map out a huge flowchart, it is difficult to make some kind of informed insight based on it because there is a lack of planned out framework for interpreting the data behind it."

From this response, it became clear that a framework for interpreting the design process visualizations would be required for the next iteration of the prototype. This framework would also need to enable the management of processes in order to support multiple design processes.

The framework existing in Figure 6.4.1 bases itself on a map, which visualizes the constant of area that exists between all of the mapped transportation routes. This allows for the informed accomplishments that Christian mentioned. To find a similar framework for mapping design processes, it must clearly be identified what constant exists between all processes. While geographical space is a constant, it would make for a poor framework for managing design processes. What remains is the concept of time, for which visual management tools already exist.

Looking at precedents, to-do lists are amongst the most basic time management tools. However, lists themselves offer little structure for the process visualization. It is for this reason that to-do lists must be combined with a more visual time management tool that has an existing structure that enabled information visualization. Calendars offer just that type of visual infrastructure, and enable the tracking of processes over any given time.

To understand how the combination of calendars and to-do lists could successfully be combined to support interaction design process management, further interviews and workshops would have to be held.

6.5 Prototype 5 - Paper

6.5.1 Preparation + Workshop (Spring 2012)

The goal of this workshop was identify what other interaction designers thought about calendars, to-do lists, and how/if they were currently using them.

For the workshop with this prototype, the laboratory assistants of Tony Olsson (previously a participant in the first 3 workshops) in the physical computing laboratory were chosen. These lab assistants were also bachelor students in interaction design.

Before the workshop, some printouts were prepared of a calendar spanning across roughly two months with a blank to-do list to the right of it. Here the workshop participants would be asked to present the tasks that they would do in the time frame of approximately one month.

The tasks were presented to the participants on another sheet (see Annex 1). The workshop participants were presented with a choice in order for me to determine whether they were more comfortable with starting out with to-do lists or calendars when planning. This result was meant to reveal the qualities of the effect of one tool on the other; would it be easier for them to list things out then plot the listed things on a calendar, or plot things on a calendar and then translate them over to the list. With
the data collected from this experiment, an accomplishment support tool for interaction designers could be developed to better support the interactions required between calendars and to-do lists.

The second task involved another choice given to the workshop participants between first grouping their tasks on the calendar (and then on the to-do-list) or first on the to-do list and (then on the calendar). The reasoning behind this task was to discover what the workshop participants considered a grouping, what elements they would use to make these groupings visual, and whether the method of grouping would differ between calendars and to-do lists. Another consideration was to discover whether the method of grouping was more intuitively drawn from the calendar or from the to-do list. This would determine how the interaction for a digital prototype would be designed in order to reduce unnecessary ways of grouping. Another reason for this task was to identify whether or not the grouping of calendar items would naturally take the form of process visualizations. If this were the case, it would make the progression of the prototype towards providing support for managing design processes much easier.

The third task involved the answering of several questions (Appendix 1) that were meant to offer insights regarding the thought processes that the participants were having while performing the previous two tasks. Also, insights could be gained on what data or information the workshop participants felt was necessary and what they felt was not. These insights would be informative of the degree of impact that design choices regarding the use of to-do lists and calendars were making.

The fourth and final task was to hold a 10 minute discussion (as a group) where general feedback would be received and it was identified whether or not any of the participants would be interested in a second workshop where the next iteration of the prototype would be tested.

The timing of workshop tasks was determined by the maximum allotted time for the workshop that was agreed upon by the group of participants.

6.5.2 Workshop Results

The results of the workshop, involving the paper prototype of a calendar and to-do list combination, were diverse in nature. Some of the participants felt that the to-do list was not necessary, others felt that the calendar grid was unnecessary, while others felt that grouping things on the to-do list was unnecessary.

However, several participants identified the need for input from multiple people in order to visualize their tasks in relevance to those of others.

It was suggested by one participant that in order to for an interaction design support tool to be useful to interaction designers; it would have to specifically support interaction design processes and methodologies rather than processes in general.
6.6 Prototype 6 - Digital

6.6.1 Preparation + Interview (Spring 2012)

The goal of this interview was to take the first step towards identifying what interaction design process specific information is required in the management of multiple interaction design processes.

The prototype was built using some of the logic from the previous prototype, however it was completely restructured to have a calendar on the left and a set of to-do lists on the right.

The prototype featured the ability to create to-do lists and associate a colour to each list. Once a list would be created, users could add items to the list either through the list or on the calendar itself. Either method would produce a node on the calendar. These nodes would be connected by lines in order of date. Each list would have its nodes and lines displayed in the initially chosen list colour in order to visually distinguish each list's visualization.

All of the inputted data was stored in a MySQL database, allowing users to access their lists and visualizations at any time. Because the prototype was designed to function on mobile devices such as iPads, drag-and-drop features were removed due to current limitations in mobile java frameworks such as jQuery Mobile.

An interview was held with Johannes Nilsson, one of the Adruino lab assistants at Malmö University. He is currently also an interaction design bachelor student and has experience with several types of interaction design processes. The digital prototype was inspected and discussed around what information it would show if it were to support Johannes’ current projects.
6.6.2 Interview Results

Johannes identified that he was dependent on **updates to his team-mates' progress** when managing his own design process. This requirement indicates that the support tool must also be tailored to **keeping track of tasks already completed by team-mates** as well tasks that will be done in the future.

It was also identified where the locus of interaction should be and the way in which data could be inputted into the prototype. Johannes suggested that it would not be helpful if the tool had too many types of input, as it would add too many steps to the interaction. He preferred to input data in a general field that could take in any information that he deemed necessary. In this manner, the tool would only keep track of information that was relevant to each process type. In effect, this would lead to a very personalized experience.
6.7 Prototype 7 - Digital Mockup

6.7.1 Preparation + Workshop (Spring 2012)

The goal of this workshop was to track the use of a digital mockup [Fig. 6.7.1] over the course of a week. In this mockup, feedback from previous workshops was incorporated.

This workshop involved me as the participant in order to see how the prototype could influence me to make improvements to it over the course of the week.

The prototype existed within Adobe Illustrator, allowing me to make changes as I was updating the content each day.

My research blog was used as a space for me to post and reflect on the exported images of the prototype mockup.

6.7.2 Workshop Results

Throughout the week I updated the mockup every morning and evening [Fig. 6.7.2], writing a reflection in my research blog each time (Annex 2).
Several issues regarding visualization, positioning, and interactivity arose and insights were gained from my attempts to resolve those issues in each version of the prototype mockup.

One such issue was the handling of completed tasks, where I created visual distinction between complete and incomplete tasks by inverting their colours.

Concisely put, the other issues that arose were:

- Whether to keep projects in visual clusters or to mixture the tasks of all projects together, and how groups of tasks should be represented
- Whether there should be a limit on how many tasks could be set for each day
- How to distinguish relationship priority and task duration
- The significance of the order in which tasks were visualized
- The handling of unfinished tasks, in terms of notification / placement
- Navigation between time-frames (days, weeks, months, etc.)
- **Progress notification, both binary and quantitative in to-do list and calendar**
- The need to plan ahead versus just keeping track of daily tasks, in order to give context
- The significance of how many times a task has been left unfinished
The insights gained from the week-long workshop with myself were:

- Seeing progress on a task served to engage me in working on that task.
- Progress on recurring tasks allowed for comparison in accomplishment between the days where these tasks occurred, offering engaging qualities when more was accomplished.
- Breaking complex or lengthy tasks down into more accomplishable sub-tasks proved more engaging and informative of the overall process.
- Recurring tasks would need to be visually distinguished, perhaps in task categories such as research, ideation, prototyping, production, testing and evaluation.

6.8 Prototype 8 - Whiteboard

6.8.1 Preparation + Workshop + Interview (Spring 2012)

The purpose of the workshop was to gain further insight on how interaction designers use currently existing tools and how the good qualities of this experience could be carried through to the final prototype.

A whiteboard was used as the canvas area for the prototype, and several whiteboard pens were used.

As an example for the ideal experience of that the prototype should provide for interaction designers, Questhelper (Section 4) was suggested as the equivalent of an accomplishment support tool in the gaming world.

6.8.2 Workshop Results

Figure 6.8.2 – (Low-fidelity - Mockup) Prototype 8
The participants, Peter and Marcus, used the example given to them to discuss how the quality of time should be used more extensively in the prototype.

They made a parallel comparison between deadlines in interaction design projects and quests in World of Warcraft [Fig. 6.8.2 – 1].

Various suggestions were made on how to visualize time [Fig. 6.8.2 – 2,3,4]. Along with some engaging iconography for indicating deadlines, the week view that Peter and Marcus suggested [Fig. 6.8.2 - 4] used fewer nodes to display tasks, but rather used one node per day to suggest the presence of a process in that day, and a segmented background to indicate the amount of hours of tasks pertaining to that project that were assigned to that day. The day view would be a close-up of a selected day, showed a similar hourly breakup of the day as each day in the week-view, however it was suggested that this view be somewhat more detailed in terms of individual tasks [Fig. 6.8.2 – 3]. The month view that was suggested was meant to provide a greater overview of processes [Fig. 6.8.2 – 2] through a similar means as the Prototype 6 had previously done.

Peter and Marcus suggested that in order to make this tool interaction design specific, there should be a selection menu (when entering a new project) that would set up a skeleton process based on the user’s choice of interaction design methodologies to be used for that particular project [Fig. 6.8.2 – 5]. The skeleton process could then be re-structured and assigned relevant information to the project in question (such as dates, and other specifics).

7. Discussion: A Progression of Knowledge

7.1 Assessment of the 1st Phase

7.1.1 Preparation + Knowledge Level
In the initial phase, the motivation for the thesis project influenced which steps would be taken in the following phases to build upon existing knowledge of the situation (regarding the thesis question). This influence, while opening the thesis study to a vast amount of possibilities, was in itself quite limited due to its specificity. It based itself on the hypothesis that an answer to the research question would be reached by breaking down the motivation behind the project into several key components and then answering them. Despite the bias that this influence produces, a deeper understanding of the motivation is in-fact reached by the end of the project, yet it stands to reason that there are perhaps facets of the issue (in the research question) that have been overlooked and have yet to be explored outside of this project.

7.2 Assessment of the 2nd Phase

7.2.1 Inquiry + Exploration
The inquiries conducted in the second phase of the design process yielded a deeper understanding of what resources interaction designers require towards completing their projects. User needs were identified and analyzed through the theoretical framework described in section 3 (this also holds true for the next two phases).
As a result, it was possible to shift the focus of the design process in the third phase towards understanding how to design a manageable overview of the opportunity to use the resources discovered in the second phase.

7.3 Assessment of the 3rd Phase

7.3.1 Inquiry + Exploration
The inquiries conducted in the third phase of the design process yielded a somewhat vague understanding of how to visualize the opportunity for interaction designers to utilize their resources. This however is not a problem, as it merely implied that in order to gain a deeper understanding of how to present these opportunities, a framework for visualizing tasks would need to be established first. What this implies is that the topics of knowing what tasks are possible in an interaction design process, and knowing what opportunities exist to use resources, are co-dependent.

This co-dependency in-turn indicates that they can be visualized in one common framework where each informs the other.

7.4 Assessment of the 4th Phase

7.4.1 Inquiry + Exploration
The inquiries conducted in the fourth phase revealed insights on how to establish a manageable overview of tasks and opportunities to make use resources.

Amongst these insights was knowledge of the situations within interaction design processes where such overviews would be needed, which in-turn revealed exactly what data was necessary in this overview.

At this stage, it was no longer required to focus on parts of the overall issue, and as such all design insights could now be combined and used towards a final prototype.

Through a combination of the insights from across all of the previous phases, an answer to the research question was reached:

*Through an interaction design methodologically guiding framework that is linked socially, a digital accomplishment support tool for intuitively visualizing, analyzing, and recording interaction design processes over adjustable segments of time could make project management for interaction designers and interaction design teams more engaging, supportive, and effortless than currently available tools.*

7.5 Assessment of the 5th Phase

7.5.1 Final Composition
The final prototype incorporated the design insights gained throughout the process
into one functional support tool for accomplishing interaction design projects. Because this phase marks the conclusion to the design process, for the purposes of this thesis project, it still requires further inquiry to ensure that all of the features function not only independently but as a coherent whole. In theory however, the accomplishment support tool (prototype) that is mentioned in the following section is capable of providing a new level of support to interaction designers.

The final prototype features an interaction-design method template for initially mapping out design projects. While this seems to force a rigid perspective of interaction design processes, it is only in existence to serve as an initial guide to such a complex tool. It is meant as a design-game where the user is rewarded for mapping out a tutorial by unlocking features for setting up personalized approaches for mapping and managing interaction design projects.

8 IxD Companion: An Accomplishment Support Tool

The manifestation of an accomplishment support tool that fits the parameters of the above answer to the research question is the Interaction Design Companion (or IxD Companion) [Fig. 8].

![IxD Companion Logo](image)

**Figure 8 – IxD Companion Logo**

IxD Companion has been designed with mobile device use in mind for the accessibility and interactivity that these devices afford. However, IxD Companion is not limited to mobile device use because it is a web application (web app) and can be accessed from any device with an internet browser.

The choice for which information to visually encode in each overview was decided based on where it made sense to present this information as not to overwhelm people by having an onslaught of details crammed into one view [Fig. 8i].
8.0.1 The User Interface

8.0.1.1 Introduction Tutorial

Upon first use of the tool, a step-by-step tutorial guides users in mapping out a fictional project. Upon completion, it is understood that users have figured out how the system works and so new features are unlocked that provide flexibility for users to input their own, personal, approaches to interaction design which they can then use to map and manage their projects.

8.0.1.2 Project View

In the project view, users can introduce new projects to the application, and can see a list of all previously introduced projects. Project settings and attributes (such as title and colour) can always be altered after projects are created by clicking the button with the coloured circle to the right of each project.

As projects are selected from the list on the left, users can add and view existing tasks on the right side. This view is intended to provide a simple manageable overview of projects and the various tasks that are involved therein. As such, users are able to set the priority level of tasks, their titles and also plan dates for performing these tasks. In essence, the task list is a to-do list that is specific to each project.

8.0.1.3 Social View

In the social view, interaction designers or design teams are able to search for and connect with social resources (people, companies, etc.) in order to seamlessly incorporate them into their design process as either team members or simply as stakeholders that can participate at the level permitted by the initial designer/team. Limitations of social resources that are added through the social view may be: comment on, help compose, manage, or simply to view design processes.
8.0.1.4 Track Changes

As IxD-Companion offers a high degree of flexibility, it provides a history of all changes made in every view of the tool in order to allow interaction designers to maintain an overview of how their processes (as well as their management of these processes) have evolved as they progress in their work.

8.0.1.5 The Rest of the Interface

Scenarios of use will be appropriated and illustrated (below) to explain how all the rest of the features come together in the practice of supporting the accomplishment of interaction design projects.

8.1 Scenarios of Use

8.1.1 Single User - Scenario

Joe is a freelance interaction designer, hired by the city to find a design solution to the growing issue of increased pedestrian traffic blocking the bicycle paths in a certain district of the city [Fig. 8.1.1].

Figure 8.1.1
Joe already is working on several other projects, so he has to figure out how he’s going to manage this one.

He sits down at his desk and pulls out his mobile device, on which he loads a web app for managing his design processes: “IxD Companion”. He taps “add new project” in the project page of the web app [Fig 8.1.1 i].

![Figure 8.1.1 i - Project List of IxD Companion](image)

A menu comes up, allowing Joe to define the title and pick a colour to represent the project [Fig. 8.1.1 ii].

![Figure 8.1.1 ii](image)

Joe taps after defining the project and choosing light blue to represent it. At this point, the menu guides Joe to choose between several established interaction design approaches, such as those defined by Saffer (2006).

Because the issue that Joe needs to address involves the needs and goals of many citizens around the activity of walking, he selects User-Centered Design from the menu [Figure 8.1.1 iii].
Joe is then presented with more specific design approaches that are relevant to both user and activity centered design, such as participatory design, and service design. From these, Joe selects both participatory and service design methods for his process [Fig. 8.1.1 iv].

The app then provides him with a basic framework for his project, including workshop sessions, stakeholder interviews, ecology mapping, etc.
Already, Joe has an overview of what may be involved, and a very rough estimate of how many work hours may be involved, based on the minimum time required for each of the tasks that are displayed [Fig. 8.1.1 vi].
Joe can fill in any additional information that he may have, such as which stakeholders he is going to interview, how long his workshops are going to be, whether or not he’s going to prepare a design-game, etc. Joe adds a few subtasks to the design-game preparation and sets an approximate time requirement for these subtasks [Fig. 8.1.1 vii].

He chooses to first check his workload in the upcoming weeks to see when he will have time for these new tasks, so he finishes the project setup by tapping done.
In the visualization pages of his app, Joe can quickly get an overview of when his workload will be most intense, and when he will have the time for this new project. [Fig. 8.1.1 viii].

Joe may also choose to postpone some of the less important tasks from other projects in favor of the important tasks that his new project requires.
Joe notices that he has several deadlines coming up in a few weeks, and he wants to check exactly how much work he has to do in that particular week of the deadlines. He taps on any of the days of that week to get the week overview [Fig. 8.1.1 ix].

Figure 8.1.1 ix – Week Overview
Because he sees that he only has to work for 5 hours and 45 minutes on Friday the 18th, Joe is taps this day to get the details for that day to see whether he can begin his new project on that day [Fig.8.1.1 x].

As the project progresses, Joe is able to use the recorded experience of his process so far in order to estimate how many future iterations of prototypes, workshops, and interviews he can hold before the deadline.
Upon completion of the project, IxD Companion added an extra button to the project setup menu with which add custom design approaches and methodologies [Figure 8.1.1 xi]. A few months later, based on his experience with the web app and knowledge gained from the pedestrian project and individual research, Joe defines a custom user-centered methodology for a similar project for another client.

Figure 8.1.1 xi – Custom Approach
8.1.2 Small Team – Organizational Scenario

Joe also has a part-time job at a local design firm along which consists of a total of five interaction designers.

The firm was hired by the local agricultural community to help them improve their interface with the growing group of fresh produce consumers, who know that they do not want junk food, but are new to the food that the agricultural community is producing and are still shy about buying certain produce [Fig 8.1.2].

In a meeting with the team, Joe connects his mobile device to the projector in the conference room, and loads IxD Companion [Fig. 8.1.2 i].
When the IxD Companion is loaded, Joe discusses what type of research method to use for this type of project. Jeremy, one of Joe’s co-workers, suggests that they use an activity-centered approach mixed in with a user-centered approach, as the issue focuses on a specific action and a specific type of people.

Leah, another of Joe’s co-workers, suggests that they also take a participatory-design approach to the projects in order to directly involve the stakeholders.

Over the course of the meeting, each member contributes to the decision making process and a methodology is defined.

Because Jeremy and Leah also have mobile devices, and have the IxD Companion application loaded, they are able to define a custom methodology instantly as the group makes the plan. Also, Leah is able to go into the social view of the application and search for and invite the appropriate stakeholders to the design process.

Because the whole team has mobile devices, they easily define the tasks for the project, split responsibilities, and set goals and deadlines. The invited stakeholders do not need to have mobile devices, they simply need a device with an internet connection to join in on the process and participate to the degree that the Joe’s team allows them to.

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A few weeks later, Joe and another team-mate are almost finished working on a
design-game to use in an upcoming workshop, however they are not sure how many stakeholders will make it to the workshop. They check IxD Companion and see that Jeremy, who was responsible for several stakeholder interviews, has indicated how many of those stakeholders would be present in the workshop. The stakeholders that were invited to the process by Leah are able to visually indicate whether or not they can make it to the meeting or not. Joe and the other team-mate can now make the appropriate amount of material to suit the needs of the workshop.

9. Conclusion: Assessment of the IxD Companion

The features of IxD Companion take into account the research of others, as well as research performed in workshops and interviews using prototypes of the application. Because this research has taken into account a broad range of interaction design needs, it supports interaction designers in both professional and academic capacities.

In the previous section, use-case scenarios with the final prototype of IxD Companion were used to exemplify the value of the contributions that the accomplishment support tool provides in various scenarios. Given these scenarios, it can be concluded that academic and practical interaction designers are supported both directly and indirectly by IxD Companion in the following manner;

- Directly, IxD Companion natively supports the management of both academic writing and practical processes in interaction design through its methodology framework.
- Indirectly, interaction design academics and practitioners can use the accomplishment support tool to evaluate and assess interaction design processes by taking advantage of the rich database of information that is recorded about each design process when interaction design practitioners use the tool.
- Also indirectly, academics and practitioners can use IxD Companion as an example of an accomplishment support tool that they can use to continue research and development of such support.

9.1 A New Direction Forward

Accomplishment support is a new direction in the domain of support tools and its long-term effects have yet to be studied. Now that accomplishment support tools have been initiated with this thesis project, academics and practitioners alike can explore the boundaries of what these tools can do.

As an accomplishment support tool, IxD Companion provides its services to interaction design specifically. Tools upholding the same core qualities can still be researched further and applied for other fields where they are needed.

The following section proposes how to proceed in the direction of developing accomplishment support tools.
10. **Future Development: Beyond This Project**

As a suggestion for future development of accomplishment support tools (including IxD Companion), several areas of focus have been identified:

- In order for accomplishment of support tools to be designed to their full potential, collaboration is required not only with external stakeholders such as future users as workshop participants, but also with internal stakeholders such as a skilled design team that can handle software development.

- For accomplishment support tools to go beyond their potential and have a chance to evolve into something more, knowledge and resources need to be shared with the whole world by making accomplishment support tools open source (at least in part).

- Accomplishment support tools would benefit from more in-depth research on personal time management as to allow the people being supported to be able to make informed judgment calls on whether or not they can reassign private time to professional tasks, and vice versa.

- In-depth research into related professions is suggested in order to better support tasks overlapping tasks from those domains, especially for interaction design because it can be applied in many domains (i.e. graphic design, industrial design, web design, architecture, etc.)

- Lastly, industry involvement needs occur throughout the development of accomplishment support tools, so that businesses learn from accomplishment support and do not exhaust their creative resources by blindly overemphasizing its demand on productivity.
11. References:


12. Annexes:

Annex 1 - Workshop Tasks for Prototype 5

First task:

- **Choice (5 minutes):**
  - On the calendar, plot out some of the things that you are planning to do, then write them on the to-do list.
  
  OR
  
  - On the to-do list, write some of the things that you are planning to do, then plot them on the calendar.

Second task:

- **Choice (10 minutes):**
  - Group the things (or tasks) on the calendar and then group them on the to-do list.
  
  OR
  
  - Group the tasks on the to-do list and then group the things on the calendar.

Third task:

- **Please answer the following questions (5 minutes):**
  - What data or information came to mind (was relevant to you) when you were thinking about what tasks:
    - to plot on the calendar?
    - to write in the to-do list?
  
  - What data / criteria was important to you when grouping these tasks:
    - on the calendar?
    - on the to-do list?
  
  - Would any other information or data have helped you?
    - If yes, what and how?
    - In no, why not?
  
  - Would it have been more helpful to have less information or data to work with?
    - If yes, what and how?
    - If no, why not?
Annex 2 – Workshop Reflection for Prototype 7

Reflection Day 1:
My main concerns while making today’s mockup were:

- Is the amount of space given for task names sufficiently large?
- Is a red outer glow appropriate as an indication of an incomplete task?
- What does the order of the tasks indicate?
- Should priority and task number have more informative correlation?
- Should tasks appear in the order that they are carried out, or sorted by project?
- If I carry missed tasks to the next day, is it important to know whether or not the task originated in the previous day or not?
- Should (and if so where, and how) the navigation between weeks of the month be displayed in another form than the scroll bar on the side of the days?

Morning Reflection Day 2:

- Ordering each project’s tasks by their individual priority seemed to make more sense than mixing them all together
- Initially, it seemed that it would be necessary to add additional tasks, however, after considering the amount of time the tasks would take, they would suffice for the day
  - Perhaps the interaction design process support tool (accomplishment support tool) should allow only a certain amount of tasks to be entered per day, based on the time each task would take
- Should the priority of tasks be based on the amount of time they take?
  - If so, what of highly important/crucial tasks that do not take a lot of time?

Evening Reflection Day 3:

- When partially completing tasks, I don't want to feel like I haven't done any of the work at all, I want to see my progress even if it is little
  - If the task requires a qualitative result, it is helpful to be able to enter the amount completed in order to keep track of progress
- While noticing incomplete tasks at the end of the day, I feel the need to start planning the next day's tasks ahead of time
  - Where would it be helpful to visualize tomorrow's content?
- On the left side, how could I visualize that I have completed part of a task by the end of the day?
  - A yellow glow seems insufficient, yet a red one gives the false indication that no progress has been made at all

Morning Reflection Day 4:
How do I represent a partially completed task in yesterday's section while carrying the task over to today?

- Leaving behind a low priority node in yesterday's section seems to work, but I will consider more informative alternatives if necessary.
- I am sensing a zig-zag pattern in the process of the thesis project, and am wondering if this is indicative of anything.
  - Is there a point in displaying so many nodes, or can completed tasks be represented by something else such as a progress bar?
  - Do completed tasks need to be represented differently from current and future tasks?

Evening Reflection Day 5:

- Perhaps completed posts are more indicative of their nature if styled differently. I shall invert the colours for the time being.
- Moving unfinished tasks to the end of the process visualization seems to more properly indicate that it will be carried forward the next day.

Morning Reflection Day 6:

- I began working on something before planning it out because I feel that I am falling behind on a task. Starting the day with part of a task completed before I entered it into the planner felt good.
- I was considering removing the amount of words written for the thesis project, in order to display any progress on a task with a complete marker rather than an incomplete one. However, I would lose the benefits of the informative quality of knowing how much was written.
  - Yesterday, even though I felt that I had not done much work on the thesis, I ended up writing 75 more words than the day before, which is actually an improvement (albeit a small one).
  - **There needs to be a better way to visualize recurring and accumulative tasks, and progress made to such tasks, especially when the progress is measured quantitatively.**

Evening Reflection Day 6:

- It will be interesting to see what the visualization will look like when a day is skipped in a process.
- Perhaps a visualization that breaks up highly important tasks into several, more easily accomplished, tasks may be necessary in cases such as the thesis paper writing.
  - Breaking the sections of the thesis paper down and listing the sections with their various words required would be more informative and motivating.

Reflection Day 7:

- No way to visualize recurring tasks yet...
Perhaps this will become more apparent with longer use of the prototype
Perhaps if attention was given to sub-processes such as:
- research
- ideation
- prototyping & production
- testing & evaluation
The above sub-processes could have their own unique way of being displayed, which could account for recurring tasks (assuming that recurring tasks are part of, or similar to, sub-processes)

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