1 Executive Summary

SAP, a global leader in the delivery and support of enterprise resource management software, seeks to improve the way businesses, big and small, run their day-to-day activities in order to increase efficiency, and ultimately, profitability. Given the far-reaching scope and massive scale of their typical customers, their software is understandably complex with a steep learning curve. This has lead to the development of SAP’s Active Global Support, or AGS network, which provides 24/7 support to SAP customers regardless of time zone. SAP is on a mission to grow their user base to 1 billion end-users in the next 5 years. As their user base expands, their support network must also evolve to meet rising demand. The challenge posed to this year’s ME310 team is to look into this evolution and better define what key changes need to happen in order for SAP to support 1 billion users.

A team consisting of three students from Stanford University in Stanford, CA, USA and four students from Trinity College in Dublin, Ireland has come together to work toward a solution to this very big challenge. Our initial focus was empathy, first towards creating empathy for the user and then creating empathy for the support consultant. Simultaneously, we learned that SAP’s support website was quite complicated, where different databases of solutions existed with search systems that were difficult to use because keywords were not intuitive. We knew that most submitted tickets already had answers, but it was just difficult for customers to find them.

Through needfinding interviews of customers with varying SLA agreements, we learned two primary needs:

1. SAP needs a better way to self-solve problems.
2. Early human-to-human interaction led to a much faster resolution process.

We kept trying to work around “the ticket,” a mandatory step to contacting SAP and communicating your problem. This ticket was a barrier. Customers would simply get more frustrated writing or responding to tickets, and even more frustrated due to the lack of transparency after submitting it. We decided to take a step back to imagine the process without a ticket or implementing the ticket in a different way. We realized we needed to design a new process that would encourage an early human-to-human contact and eliminate the troublesome ticket on the customer end. What if there was no ticket? What if user’s could easily define their problems in their own words? What if, when they did need support from a person, they were connected to someone immediately? This led us to the evolution of SAP Engage - a solution path builder and side-by-side telepresence system for collaborative problem solving. As both a kiosk located in a customers office and a workstation for SAP support consultants, Engage is an environment which bridges the physical distance between customer and support, enabling each user to naturally communicate and efficiently solve technical problems.

When a customer first enters the kiosk, they will be able to choose either “search” or “call.” If the customer chooses “search”, they will enter the solution path builder. The Trinity team focused on this method, whereby customers could easily identify their problem and search for the information they needed using their own words, not necessarily SAP
jargon. We developed an interactive touch interface that allows users to input their own words, have related words appear, and interact with each word to weigh their relevancy to populate results. The prototype was created using Python on an interface platform called Kivy.

If the customer instead chooses to “call”, they will be immediately connected to a SAP dispatcher. The dispatcher’s role is to be a friendly face to the customer, gathering all the necessary information about the customer’s problem to either solve quick and easy problems, or send a ticket to the appropriate product support team. The customer and dispatcher can screenshare the customer’s problem on their personal laptops and share additional information on the system’s touchscreen monitor, communicating verbally and visually to gather information in context. In this way, both users are working together to solve the problem from the start, creating a much more efficient process.
With SAP Engage, we are able to put the dispatcher and customer virtually side-by-side. Creating a sense that SAP is “on your side” versus the more traditional face-to-face telepresence setup, the side-by-side telepresence is a system designed specifically for technical support. This simulates in-person support scenarios where both participants are focused on the problem in front of them, collaborating towards a solution. As a kiosk at every client’s office and as a quad workstation for support, our future vision is that SAP Engage will bring customer and support together to provide the ultimate experience in technical support.
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Glossary

ActiveEmbedded The second highest level of support or Service Level Agreement.

AGS Active Global Support - SAP’s internal customer support network.


B2C Business-to-Consumer - Commerce transactions between a business and a consumer.

Benchmarking Looking at past and present solutions to similar problems to help generate ideas and inspiration.

BI Business Intelligence - a set of theories and methodologies that transform raw data into useful information for business purposes.

Brainstorming A group activity where all members think of new ideas related to a problem.

CFP Critical Function Prototype - a prototype that demonstrates a function that is viewed as key to project progress.

CEP Critical Experience Prototype - a prototype that is designed to give a test and evaluate a user’s “experience” using a product.

Collaborator Refers to the other person the user is communicating and working with.

CRM Customer Relationship Management - a model for businesses to manage interactions with current and future customers.

DHP Dark Horse Prototype - a prototype that focuses on testing an idea seems infeasible. Meant to explore the edges of the design space.

Development Engineer SAP’s term for a software engineer.

Dispatcher Responsible for gathering all the customer’s information upfront using the Engage system and logging a ticket into the system.

Enterprise Referring to SAP’s Service Level Agreement of support. Most standard form of support. Also synonym for Business.

Escalation The “SWAT” team of AGS. Members are highly trained and are flown out to on-site locations where customers have issues with highest priorities.

ERP Enterprise Resource Planning - software designed to help large corporations run their day to day operations.

FTS Follow the Sun - support procedure that involves transferring issues from one location to another in different time zones to provide 24/7 support.

Functional Prototype A prototype that focuses on construction of materials, engineering, and testing of an integrated functional system that makes progress towards the vision for Spring.
**Funky Prototype** A prototype that to focus on certain technical issues that have not yet been considered or resolved by exploring a design’s proposed functionality.

**High Touch Customer** A customer who receives more dedicated support like on-site support. Generally customers with ActiveEmbedded or MaxAttention Service Level Agreements.

**HR** Human Resources - a set of individuals who make up the workforce of an organization. Or refers to the HR department within a company.

**KBA** Knowledge Base Articles - Provide a solution for an incident specific and explanation about system behavior, how to work a tool and how to set some specific customization to reach the desired behavior. A KBA is a new alternative to help customers find relevant information and to solve his doubts [2].

**Kiosk** Refers to the Customer side of SAP Engage

**Kivy** An online platform to create user interfaces using Python.

**Low Touch Customer** A customer who receives less dedicated support, through more common protocols such as the ticketing system and phone calls. Generally customers with Enterprise SLAs.

**MaxAttention** The highest level of support. On-site support refers to the type of support where users resolve their problems with the help of support consultants situated at the customer’s office.

**OSS Note System** OSS stands for Online Service System. A database where SAP clients can go to via the internet and search for solutions to their problems.

**Ping-pong Effect** A situation where a support ticket is bounced around to different people until it finds the right person to solve the issue or is bounced back and forth between the customer and support consultant.

**Processor** Another term for a support consultant, specifically one who deals with the resolution of tickets entering the ticket queue.

**Remote Support** Refers to the type of support where users resolve their problems by communicating with support remotely, either through email, phone, or video.

**Self-Service Support** Refers to the type of support where users can resolve their problems by searching existing solution databases.

**Short-Throw Projector** A projector that can project large images onto a screen from very short distances.

**Side-by-Side Telepresence** A telepresence system where users are projected in a configuration as if they are sitting next to each other.

**SLA Service Level Agreement** A contract between SAP and their customer that outlines the level of support that SAP will deliver.
**Solution Path Builder** A self-search system that allows users to input keywords, select related keywords, and interact with them to reach a list of possible results.

**Sound Dome** A speaker with a parabolic reflector that directs and concentrates audio waves down to the user’s ears.

**Styrene** refers to Acrylonitrile butadiene styrene, or ABS, an impact resistant plastic material that typically comes in sheets of 4’ by 8’ in 1/8” and 1/16” thicknesses.

**Support Consultant** The main point of contact between SAP and the customer when there is a product issue. Support consultants receive ticket messages and resolve them in the most timely manner to maintain customer satisfaction. Also referred to as “Support Engineer”.

**Technical Support** Assistance to users of technology products, including software, electronic, or mechanical products.

**Telepresence** Refers to ultra-realistic video conferencing systems. Typically used in remote corporate meetings.

**Ticket** An electronic message that documents a customers issue sent to AGS.

**TQM** Technical Quality Manager - SAP personnel who is on-site at the clients location for those customers with a “MaxAttention” SLA.

**User** Refers to the person using the system.

**Weighting** Refers to assigning keywords a level of importance or relevance when searching a database.

**Workstation** Refers to the support side of SAP Engage.
2 Context

2.1 Need Statement

SAP is one of the world’s largest business software companies. Numerous Fortune 500 companies use SAP’s software to run their businesses, and approximately 65% of the globe’s Gross Domestic Product (GDP) passes through an SAP system each year. Continually pushing the boundaries of innovation and growth, SAP now sets its goal to serve 1 billion users by 2015. How can a company successfully serve 1 billion users? It would not only require robust and usable products, but also challenge the company’s capability to provide services and support to this many users. As an enterprise software company, SAP’s products focus on features that are complex and highly customizable based on their customer’s unique needs. Thus, reaching the goal of 1 billion will be a difficult path, not only in terms of the quality of their software products, but also in terms of how SAP can offer high quality and responsive support critical to satisfying their customers’ needs and enabling them to run their businesses smoothly.

SAP’s Active Global Support, or AGS, department currently has about 2,200 support consultants offering support to more than 250,000 customers in over 188 different countries. As the number of users increases, the current support system must be evolved to handle an increasing amount of support needs and provide their customers a more satisfactory experience. AGS needs to undergo transformations and improvements to adequately serve the large number of customers seeking support. Without a more scalable and efficient support system, SAP will not be able to realize their goal of serving almost one-seventh of the world’s population.

2.2 Problem Statement

The Design Challenge is to define how SAP’s service and support should evolve to serve 1 billion users - in other words, an ever increasing number of users. As the number of users increases, it will be nearly impossible for AGS to expand proportionally to fit the support needs of its users. The AGS department must transform their model in a much more scalable way. Customers can be categorized as high touch or low touch. High touch customers, typically those with a MaxAttention Service Level Agreement, or SLA, receive onsite consultants who provide efficient and fast-response support. Low touch customers, typically those with an Enterprise SLA, do not receive this dedicated support service and receive support remotely through online resources and the ticketing system. Most of these customers are smaller business who will be the majority of SAP’s increasing user base, and will not be able to afford onsite support. Therefore, the team’s goal is to enhance the support experience for those customers by improving two key areas:

- Self-Service Support: This is going to be a key factor in significantly reducing the number of tickets received by AGS. Most tickets in the system are either already solved or simple “how-to” and “why” problems. If an effective self-service system is provided
to customers, they could solve a majority of issues by themselves without having to submit a ticket. Currently, customers have to navigate through a multi-branched, complicated website, reaching different searchable databases that are helpful only if they understand the problem as defined by SAP. Our problem then is, how can we provide a self-service support system where customers can easily identify their problem and access the information they need?

- Remote Support: If customers cannot solve their problem themselves, they must seek help from AGS directly. We know that the most efficient form of support is having a consultant onsite, which can effectively reduce average resolution times from 3 weeks to 3 days. However, this is not a scalable delivery of support. AGS will have to provide support remotely beyond the ticketing system to accommodate for a larger number of users.

Customer support is well-known for its frustrations and inefficiencies. To relieve this familiar viewpoint, the team will emphasize the important factor of empathy within each type of support to increase collaboration within the process. Customers and support consultants both need to understand each other better to solve the problem together and have an enjoyable support experience.

### 2.3 Corporate Partner: SAP

SAP is the world leader in enterprise applications in terms of software and software-related service revenue. Based on market capitalization, they are the world’s third largest independent software manufacturer with more than 250,000 customers in 188 countries, more than 66,000 employees, an annual revenue of €16.82 billion, and locations in more than 130 countries [3]. They have a history of innovation and growth as a true industry leader. SAP’s 41-year history of success is defined by a few key themes:

- A belief that real-time data processing can help bring people closer to business intelligence.
- A dedication to innovation and an entrepreneurial spirit that enables SAP to continually push what is technically possible.
- An early commitment to collaboration and co-creating solutions with their customers.
- SAP is also a champion of Design Thinking, and SAP’s co-founder, Professor Hasso Plattner, has challenged the company to place design at the heart of everything they do.

### 2.3.1 Corporate Liaisons

#### 2.3.1.1 Katharina Rock

Katharina began her career in Germany as an implementation consultant working for an SAP Partner company, where she worked extensively on HR-related software products. Some time after, she moved to SAP in Toronto and eventually settled at SAP Labs in Palo Alto. She held multiple positions ranging from the development or engineering teams to quality assurance or engineering services. She currently works within Solution Validation where new products are thoroughly tested to ensure functionality.
2.3.1.2 Tony O’Donnell

Dr. Tony O’Donnell is a Chartered Engineer and experienced software development manager in the analytics space. He holds a PhD in Computer Science and a bachelor’s degree in Engineering from Trinity College Dublin.

His current role is within SAP’s Business Intelligence, or BI, organization where his team works on the Design Studio application. He has previously managed teams and projects in the applied research and innovation department of SAP, again with a focus on data integration and analytics.

Tony is also part of SAP’s senior leadership team for Ireland - one of the company’s top 10 largest operations with 1,400 staff. He represents the company externally on a number of industry panels, and has also appeared before the Irish parliament on SAP’s behalf. In addition to strong technical knowledge on BI, semantics, data integration, graph theory and cloud computing, Dr. O’Donnell also has a particular interest in Intellectual Property, patents, and tax.

Outside of his day to day work, Tony is also involved in the community and voluntary
sector. He sits as a member of Kildare County Council representing the 50,000 residents of the Kildare Electoral Area. Tony is also a director of his local LEADER company, a Rural Development Program part-funded by the European Union.

Dr. O’Donnell is also an active member of the Engineers Ireland Computing Division, serving as vice-chair for 2013-2014 and in 2013 was invited to join the Advisory Board for Trinity’s School of Engineering.

### 2.4 The Design Team

Team SAP consists of three students from Stanford University in Stanford, CA, USA and four students from Trinity College in Dublin, Ireland. We bring a diverse skill set from varied backgrounds and are ready to tackle SAP’s design challenge.

#### Vinh Bui
Status: Stanford Mechanical Engineering Masters Candidate
Contact: vbui22@stanford.edu
Skills: Basic mechatronics and machining (mill, lathe). Sheet metal forming and laserCAMM Computing: SolidWorks, MATLAB, Python, C++

Born and raised in Northern California, the Silicon Valley culture of innovation has influenced me a lot, leading me to an interest in engineering, particularly in the automotive field. I came to Stanford in 2008 for my undergraduate degree, majoring in Mechanical Engineering with a minor in Management Science and Engineering. I have worked at Akebono Brake in manufacturing design and NovaTorque in electric motor development and testing. I also enjoy hip-hop dance, swimming, gloving, and electronic dance music.

#### Kevin Burke
Status: Trinity Manufacturing Engineering and Management Degree Candidate
Contact: burkek4@tcd.ie
Skills: CAD, Prototyping, Design Thinking, MATLAB, Microsoft Excel

I’m a 4th year Engineering with Management student at Trinity College, Dublin. My interest in pursuing an engineering degree stems from a strength and passion for
mathematics at secondary level education. I was advised to choose an engineering degree based on the practical applications of mathematics and physics within the field. Although this has constituted a lot of the course, the wide range of topics within the course is challenging, but the vast areas of study is both interesting and highly engaging.

One of the most enjoyable parts of this course is the group dynamics that emerge from the large amount of group/team orientated work that we undertake. The class, for the past three years, has been comprised of seven very unique and independent guys. This year, we have been joined by five Brazilian students on the Science Without Borders program. Because of the close confines of the class, we’ve all worked with each other at some point. Because of this, I wish to pursue a career where I will work in a group, be in close contact with people and that offers creative and innovative input.

Outside of academics, my main passion is golf. I love the both the science of the game, but also the art. There is a huge engineering input in the modern game, from the precise mechanics of every part of the body during the swing, to the extensive and complex chemical engineering that goes into the manufacture and design of golf balls, and the evolution of carbon-fibres, steels and titanium for clubs.

Yongbin Han
Status: Stanford Mechanical Engineering Masters Candidate
Contact: ybhan@stanford.edu
Skills: Chinese Language, Basic Machining Computing: SolidWorks, Python, C++

I am originally from Xi’an, China. I came to the United States four years ago and got my Bachelor’s degree in Mechanical Engineering with a minor in Management at the University of Minnesota. I graduated with Latin Honors and wrote a honors thesis on using CNT-PDMS Material as Force/Pressure Sensor. Now I am a first year ME master student at Stanford University focusing on Design Methodology. I am interested in using the mechanical engineering knowledge to design new products or redesign the existing products in order to make them better.
CHAPTER 2. CONTEXT

Mike McHugh
Status: Trinity Manufacturing Engineering and Management Degree Candidate
Contact: mchughmp@tcd.ie
Skills: Design, Prototyping, Metal and Woodworking, Project Management
Computing: MATLAB, CREO, HTML + CSS

I am working towards a bachelor's degree in manufacturing engineering and management from Trinity College, Dublin, Ireland in June 2014 and will then pursue my masters in the same discipline the following year. I have worked as an intern in Trinity under Professor Kevin Kelly for the past two summers in the Mechanical Engineering Department. My work involved helping to develop and run a Summer School to encourage secondary school girls to choose engineering when they enter college. It was very interesting and satisfying work. Within that Summer School we ran some classes based upon Design Thinking processes. Outside of the Summer School I did research on education, team dynamics, personality profiling, and some work on omnidirectional catadioptric optics for use in robotics, website development, and manufacturing processes. I would like to become more involved with empathic design; my passions are innovation, creativity and team-driven achievement and excellence. I am motivated by people or projects that try to bring about real and positive benefits to others. Outside of college I enjoy song-writing, and I have fantasized about being the lead singer/guitarist in a band with Bob Dylan on bass, Lou Reed on piano and Leonard Cohen on drums.

Robyn Nariyoshi
Status: Stanford Mechanical Engineering Masters Candidate
Contact: rnariyoshi@stanford.edu
Skills: CAD (SolidWorks, AutoCAD 3D); Heat Transfer Analysis (Thermal Desktop, SINDA/FLUINT); media editing (Final Cut Pro); Sewing and Ironing.

Born and raised in Honolulu, HI, I moved to the beautiful land of California to attend college at University of the Pacific. At Pacific, I received my B.S. in Mechanical Engineering as well as interned at NUMMI and Lockheed Martin. After working for a few years in the narrow field of thermal propellant gauging for satellites, I returned to school for a change in career. My interests in human-centered product design and design methodology. I love the way things move and come together for a bigger purpose. Outside of engineering, I am a professional hip-hop dancer and choreographer.
I’m a Brazilian Production Engineering Undergraduate, and currently studying Integrated Engineering with Management at Trinity College Dublin, with a government scholarship for one year. I have been working for the past two years at a Brazilian company called Vale, the world’s biggest iron ore miner; I was an intern at Procurement dealing with acquisition of services and contracts management. There I attended three entirely different projects, where I gained much of the practical experience I have today, one improving efficiency/reducing costs of Maintenance, other doing an Spend Assessment and the last one creating an application/database for Procurement Categories Management. Academically my knowledge is mostly oriented to management tools and business strategies. In my spare time I enjoy eating a lot, playing some video game and reading all kind of books.

Barbara Silva
Status: Trinity Undergraduate Integrated Engineering with Management (1 year at TCD) + Manufacturing Engineering (5 years at UFS- Brazil)
Contact: silvab@tcd.ie
Skills: Teamwork, Adaptable, Creativity, Time Management
Computing: MATLAB, MS Project, MS Excel Advanced

I’m a Brazilian undergraduate student studying at Trinity College Dublin for the current academic year. This opportunity is due to a scholarship provided by the Brazilian government as part of an initiative called Science Without Borders. In Brazil I’m in my final year in a Manufacturing Engineering course, which is a mix of engineering modules and management. The modules I’ve chosen in my final year are aligned more to business and management versus engineering as I have a great interest in innovation, product design, project management and in the ways communication and staff relations can enhance productivity.

I have past experience as an intern with Shower Industry in Brazil, where I worked on the factory floor on quality control. Within this experience I had the opportunity
to work with different personalities and gain a clear sense of what really happens in a manufacturing environment and in business. Much of the time I spent there I was working towards implementing a Six Sigma standard within the quality control area; the vision was to make the environment a better place for the operators to work by providing the right tools in the right places, thereby enhancing productivity and quality of their work and reducing operation time.

Outside of University I took a MS Project course and a Six Sigma course, both of which were I found useful towards having a good comprehension of how to structure a project, how to communicate, and how to allocate resources; two main focuses being the decision-making process and time management.

In my free time I enjoy hanging out with friends, reading blogs, books and magazines related or not to management and engineering. I love to run and work out, I find them a great stress relief. Eating is a big passion, and an occasion to have a good chat with friends. Finally I really like to travel, to get to know new people and to learn about new cultures.

2.4.1 Coach

2.4.1.1 Vinod Baya

Vinod Baya is the Director of the Center of Technology and Innovation at Pricewaterhouse-Cooper, a company that specializes in assurance, tax and advisory services. He is a ME310 alumnus and holds a doctorate from Stanford. Having been a technology strategist and futurist for over 15 years at PwC, he has been valuable coach in the 310 curriculum.

Figure 2.3: Vinod Baya, Team Coach
3 Design Requirements

Introduction

SAP Engage is a centralized location for technical support that must enhance the customers support experience and make the support consultant’s role more efficient. Our design attempts to solve this on two fronts:

- Solution Path Builder: A self-search system that enables customers to define their issue and acquire the related information intuitively and quickly. It aims to reduce frustration and introduce a feeling that the system is working with you to define the problem.
- Side-by-Side Telepresence: A telepresence system that emulates real in-person support scenarios. The configuration allows users to naturally communicate and share information so that customers can efficiently solve their problem.
### 3.1 Functional Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Metrics</th>
<th>Rationale</th>
</tr>
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<tbody>
<tr>
<td>User is able to discard and add individual words during the same search.</td>
<td>System response to user control has to be immediate.</td>
<td>We want this system to empower the user to be able to refine their search as they see fit.</td>
</tr>
<tr>
<td>User is able to control weighting of word in search algorithm.</td>
<td>Word size should be exactly the same as the one settled by the user touch control and system has to work on the backend giving appropriate weighting proportional to word size.</td>
<td>We want this system to empower the user to be able to refine their search as they see fit.</td>
</tr>
<tr>
<td>Easy to see display of search results with quick preview option.</td>
<td>Quick preview has to instantly be displayed after user selection.</td>
<td>Ease of finding a solution.</td>
</tr>
<tr>
<td>Able to understand synonyms and suggest alternate words.</td>
<td>Algorithm matches words to related words in database.</td>
<td>Enhances depth of system.</td>
</tr>
<tr>
<td>Response time is fast.</td>
<td>Words should be displayed inside the circle within 10ms.</td>
<td>The system has to analyse quickly user input in order to give an accurate feedback.</td>
</tr>
<tr>
<td>Filters out conjunctions, pronouns, and punctuation marks.</td>
<td>Algorithm understands unimportant terms.</td>
<td>Focuses user search on keywords.</td>
</tr>
<tr>
<td>Must show clearly all the words in the blue circle without one being hidden by another.</td>
<td>All relevant (excluding conjunctions and pronouns) words said by the user have to appear spread inside the circle within 0.1 mm distance from the circle border.</td>
<td>Users can clearly see what words are being used for the search query.</td>
</tr>
<tr>
<td>Must be voice controlled.</td>
<td>Voice matched to words represented in database.</td>
<td>Voice control is a more natural way to communicate.</td>
</tr>
</tbody>
</table>

Table 3.1: Functional Requirements for Solution Path Builder
<table>
<thead>
<tr>
<th>Requirement</th>
<th>Metrics</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display life-size projection of person.</td>
<td>Projected image size of person equals size of actual person.</td>
<td>To create a realistic feeling of the person being there next to you.</td>
</tr>
<tr>
<td>Relay clear video feed of support and customer.</td>
<td>Minimum download/upload speed to support a video call 128kbps/128kbps.</td>
<td>To ensure clear communication, we must have an adequate Internet connection to avoid any issues with lag or losing connection.</td>
</tr>
<tr>
<td>Simple initiation of video call.</td>
<td>Video call will be initiated in 3 steps or less.</td>
<td>Make this system easy-to-use so that anyone can use it.</td>
</tr>
<tr>
<td>Desk projection matches.</td>
<td>Projection of desk matches edge of real desk.</td>
<td>To create the sense of a shared workspace.</td>
</tr>
<tr>
<td>Microphone must relay clear audio.</td>
<td>Microphone should pick up sounds within a 5ft radius and reduce external noise.</td>
<td>To allow the voice of each user to be heard clearly.</td>
</tr>
<tr>
<td>Speaker system/sound dome must provide clear audio.</td>
<td>Direct sound waves to ears from a height of 2m to a person sitting below.</td>
<td>The concentration of the soundwaves will reduce the need for a high audio volume. It will direct the sound straight to the user and be more discrete (less distracting to those around the system) and eliminate the need for headphones.</td>
</tr>
<tr>
<td>Sound must be isolated to each individual workstation.</td>
<td>The volume of the audio system should reduce 70% outside the working space.</td>
<td>Users should be able to work within an office environment without disturbing or being disturbed by sound coming from the Engage workstation.</td>
</tr>
<tr>
<td>User can easily screen-share with another system using touchscreen monitor.</td>
<td>User should be able to enter a screenshare session in less than one minute.</td>
<td>To quickly and easily share additional information between users.</td>
</tr>
</tbody>
</table>

Table 3.2: Functional Requirements for Side-by-Side Telepresence
3.1.1 Functional Constraints

- The solution path builder cannot use solutions outside of SAP support databases.
- The telepresence cannot create a disturbance in the work environment.

3.1.2 Functional Opportunities

- Users can teach the system how words may be linked, so that the search algorithm can iterate and learn.
- The solution path builder can be accessed on any platform (laptop, tablet, smartphone).
- AGS employees can use Engage to collaborate internally.
- Engage can be used with traditional or small-scale video chat systems.

3.2 Physical Requirements

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Metric</th>
<th>Rationale</th>
<th>Requirements met?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image must be at a reasonable height.</td>
<td>Eye level of image equals eye level of person using system.</td>
<td>This will create a feeling of eye-contact and thus builds on the connection between support and customer.</td>
<td>Yes. Eye level of image is approximately around the eye level of the user.</td>
</tr>
<tr>
<td>User must be able to comfortably see collaborator in their peripheral vision.</td>
<td>Collaborator’s projected image is within a 120 degree field of vision from the user’s line of sight.</td>
<td>This will allow users to easily receive visual cues from the person on the other end of the system.</td>
<td>Yes. Customer is within field of vision.</td>
</tr>
<tr>
<td>Sound must be enclosed in each working space.</td>
<td>The volume of the audio system should reduce 70% outside the working space.</td>
<td>Each Engage circle can provide four independent Engage in maximum. Users should be able to work simultaneously and should not be disturbed by the sound coming from other engage.</td>
<td>Yes. Logitech headset relays audio clearly without feedback.</td>
</tr>
</tbody>
</table>

continued on next page
CHAPTER 3. DESIGN REQUIREMENTS

continued from previous page

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Metric</th>
<th>Rationale</th>
<th>Requirements met?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor must be easy to reach and</td>
<td>The monitor should be able to move left and right, extend at least 6</td>
<td>To switch easily between using the touchscreen monitor and the user’s personal laptop.</td>
<td>Yes. Ergotron arm allows great freedom of movement.</td>
</tr>
<tr>
<td>maneuver.</td>
<td>inches, and have a change in height of 13 inches.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engage must be ergonomic.</td>
<td>Dispatcher should feel comfortable to work at Engage for 8 hours and</td>
<td>Engage will be used as the workspace for dispatchers in AGS. They must be able to work in</td>
<td>Yes. System is currently set based on average human</td>
</tr>
<tr>
<td></td>
<td>customer should feel comfortable to quickly use Engage kiosk.</td>
<td>a comfortable environment.</td>
<td>measurements. In the ideal installment of SAP Engage,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>perhaps certain features can move according to the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>user (i.e. camera, table height, etc.)</td>
</tr>
</tbody>
</table>

Table 3.3: Physical Requirements for Side-by-Side Telepresence

3.2.1 Physical Constraints

- Since office buildings have limited space, Engage cannot take up too much space.
- The telepresence system has to adapt to the lighting of the surrounding area.
- The system is designed for one user.
- The projector is set at specific height to match the table and project a life-size image, but can be a hazard for the user’s head if not careful.

3.2.2 Physical Opportunities

- Engage can be placed anywhere in the office since the sound should be isolated.
- Users can push the touchscreen monitor out of the way and use the entire table space.
- The shape of the Engage kiosk allows it to be set in the corner of the room.
- Engage has a smaller footprint (5ft x 5ft) than a standard cubicle size (6ft x 6ft), and can therefore potentially fit more workstations in an office.
### 3.3 Business Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Metrics</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Must adapt to most customer office environments.</td>
<td>Look and feel must not disturb customers.</td>
<td>To seamlessly integrate into customer work environments.</td>
</tr>
<tr>
<td>Must not pose a disturbance to customer work flow.</td>
<td>Audio and video does not disturb users.</td>
<td>To maintain customer’s work efficiency.</td>
</tr>
<tr>
<td>Provided services must be defined within SAPs contractual service agreements with customer.</td>
<td>Aligns with Customer SLA</td>
<td>To align system with current support infrastructure.</td>
</tr>
<tr>
<td>Information must be passed through the system securely.</td>
<td>Information sent on a secure connection.</td>
<td>To maintain reliability and loyalty to customer.</td>
</tr>
<tr>
<td>Must not significantly increase support costs.</td>
<td>Engage system should cost less than $2,000 to implement.</td>
<td>To persuade customers and AGS alike to adopt the system.</td>
</tr>
</tbody>
</table>

Table 3.4: *Business Requirements*
4 Design Development

4.1 Benchmarking

In Fall Quarter, the team benchmarked different types of support, summarized below:

- Phone support is one of the oldest methods of remote support for large customer bases. Users call in to large support centers wherein they verbally describe their problem to a service representative. This is fairly easy to implement as phones are easily accessible by most customers, but is largely not scalable to extremely large user bases and can be both inefficient and frustrating to both customers and service representatives.

- Message-based support has become increasingly more common in today’s web based society and can be implemented through email, chat, or some other messaging client. Users type a written description of their problem and send it off to a service representative. The service representative then researches the problem and responds to the customer with a solution. There is zero idle waiting time for either party, as they respond at their convenience, but can increase response times and leave the customer with a sense of ambiguity as to the state of their situation.

- Many companies now implement in-person support through storefronts or mobile service technicians. In-person support is very effective because it allows users to clearly describe the problem and for support representatives to easily understand the problem, as all forms of human communication are available (verbal, gestures, body language). Users can also “show” the problem to the service representative in many cases, which makes developing a full understanding of the situation much easier.

- More recently, many companies have been turning to online support via user forums and searchable databases. This is really an interactive extension of a more traditional user manual, as it provides explanations of key functions and solutions to the most common problems. Forums create a community that allows others in a similar situation to work together to understand and solve problems.

Equipped with this information, the team moved towards technologies that could enable remote support. Specifically, the team researched different telepresence technologies and remote collaboration tools to understand what existed and what elements could be incorporated into our development.

In early January, the team had a video conference between SAP Dublin and SAP Palo Alto using the Cisco TelePresence system. The video screens were set as if the remote individuals were sitting across the meeting table, creating a relatively real experience. The system used high definition screens and a dedicated conference room for audio quality control. However, we noticed that eye contact was off when looking directly at each other.

TelePresence Tech, a company in Texas, provides 3D telepresence systems that account for eye contact. Instead of being mounted above the screen as in most systems, the camera is mounted behind a beamsplitter screen at eye level, producing a much more “real presence.”
We also looked into remote desktop software as collaboration tools. TeamViewer allows remote parties to connect, view, and control each other's screens. It also allows multiple users to be able to view a single screen and users can adjust control preferences. Syncpad is a remote whiteboard application which allows users to draw on a white screen and share with participants in real-time. In essence, it simulates working on a white board together.

Using a 2008 study done at the University of Cambridge, the team also looked into remote technologies comparing collaboration between co-located individuals and remote individuals, and different technologies to bring co-located elements remotely [5]. A summary
of the major findings is listed below:

Spatial Partitioning: Personal vs. Group Territory

- In physical meeting spaces, participants usually have their own personal space to write their own notes, use their laptop, etc.
- There is also a common space where participants can share their notes or work together on something, and this is usually located in the center of the table.

Gestures:

- Point: Indicates focus on a particular thing.
- Spatial: Indicates size, distance, or relative location.
- Kinetic: Indicates action.
- Other: Indicates things such as emphasis, call to attention, etc.

Workspace Awareness:

- Consequential Communication: Describes the movement of an individuals body as a consequence of their actions in the workspace. These cues are perceived as participants watch each other work, either peripherally or intentionally.
- Feedthrough: Describes the visual and auditory cues arising from manipulation of a task artifact.
- Intentional Communication: Conversation and gesture.

As gestures are an important component of communication, the study looked into using remote technologies to portray them. Using a camera mounted looking down and a projector, an over display of the remote persons arm appeared in the projection. In this way, the participants on each end could see the shadow of the other persons arm as if they were working on the same table. The ability to do this remotely increased the effectiveness of communication. We will be utilizing these characteristics in our final design.
4.2 Needfinding

The team interviewed a number of people during the quarter to better understand the process of SAP support from the ticketing process to onsite support. We were able to define different problem areas within the support system and receive customer perspectives into how things could be improved.

4.2.1 Mike Murray, Customer Experience at SAP

Mike is part of the Customer Experience team, which analyzes information and data from customers and utilize their findings to improve the support process by doing such things as developing a list of best practices for ticket processing managers to distribute to their teams. He gave us a breakdown of the ticket solving process as described in Figure 4.5.

From our earlier interviews, we found that the number one customer complaint was that it took too long for problems to be resolved. Therefore, we inquired him about the major causes to long resolution times. He stated there were five main reasons:

1. Missing details and customer system information requires additional messaging.
2. Lack of communication between the customer and the ticket processor (support consultant) means the ticket must be reviewed again after a break in communication, adding time.
3. Problems with connections prevent the processor from determining a root cause analysis, adding time.
4. Ping-ponging with the customer prevents the ticket from moving forward.
5. Phone calls are not made to quickly clarify misunderstandings or acquire needed information, often resulting in ping-ponging.

A ticket can even be ping-ponged within SAP, where it is rerouted until it finds the right processor to solve the problem. In these cases, it takes additional time for each person to understand the problem. Factors that add to this time are how long it has already been in the process, how many processors have worked on the problem, and how well the previous processor summarized the problem. On average, tickets can be ping-ponged anywhere
from 3 to 5 times, where tickets with 3 or less being the ones with the highest marks of satisfaction.

![Current Process Diagram]

**Figure 4.5: Current Ticketing Process Flow Chart**

4.2.2 Ronald Grabyan, Southern California Edison (SCE)

Ronald is a Data Warehousing Manager at SCE, a utilities company in southern California. SCE is an Enterprise level customer using Business Warehouse (BW) on SAP’s HANA database. He gave us valuable insight into his experience as a low touch customer and what elements of the process could be improved. As with most customers, his first complaint was having to wait for days to receive a reply after submitting a ticket. Sometimes he received a phone call within an hour, but only if it was a serious “production down” problem. He also noted the issue of time transfer, when a problem reaches the queue at the end of a shift, in which it is transferred to the next available location in the world for processing, which increases processing time.

![Ronald Grabyan]

**Figure 4.6: Ronald Grabyan, Data Warehousing Manager at SCE**
To self-solve their problems, SCE would look up solutions on the OSS Note system, which is a database of past tickets that have been solved. However, he emphasized that the search system was difficult to use because the language was very specific to SAP. He wanted “a better tool that’s a lot more intuitive.” Overall he wants the whole process to be more friendly, efficient, and intuitive. He thinks there should be a better communication vehicle than just the ticket, and as a potential solution, he thinks video conferencing would be good because it can connect customer and support in a different way.

4.2.3 Klaus Krug, Warner Brothers (WB)

Klaus is a Project Manager at Warner Bros. He is apart of a project to replace WB’s legacy system for Intellectual Property Management (IPM) with SAP’s CRM-IPM system on their HANA database. This would allow WB to run queries on IP data much faster than with their old system. Interestingly, WB used to have an Enterprise level SLA, but upgraded to MaxAttention, so Klaus was able to provide us with insight from both perspectives.

He stated that during implementation of the software, the normal support protocols were not working for what they needed with such a large implementation. Response times were too slow and WB needed more dedicated support as opposed to the more abstract commitment of support through the ticketing system. Once they switched to MaxAttention, problems that generally took 3 weeks to get resolved took just 3 days. With an average of 10 people onsite, Klaus described 5 key elements that made support much more efficient:

1. Deeper conversation into each problem.
2. Additional topics could be brought up quickly.
3. Support visibly saw the problem being fixed.
4. Support could understand more of the context.
5. Instant feedback from onsite support.

From his experience with both types of service, Klaus believed sharing an initial level setting was critical to improving the support process. To this end, emails can be very lengthy, so a more visual and real time method of communication would be the most
beneficial. “Early human to human interaction” would easily clarify information and orient support and customer effectively so that messages are not sent back and forth for weeks.

4.3 User Persona

From these needfinding interviews, we developed a clearer understanding of our potential user. As we are developing a solution for SAP’s customers, we had to define who within a given company would be interacting with AGS. It turns out that there is a range of users, from business users to more technically-minded IT users. Because SAP is looking for a solution that will scale to 1 billion, our design must encompass the majority of these users. Thus, we created our persona, Somdev, to represent the business and IT users of SAP software.

![Somdev](image)

Figure 4.8: Somdev

Somdev is an IT technician in his early 40’s who works with specific SAP software products. He has worked with different systems for the past 15 years, and is primarily responsible for integrating updates to new systems and maintaining existing ones. When faced with a problem, he usually searches through Google and occasionally the SAP support portal. When he cannot solve a problem himself, he communicates to support through ticket messages and phone, which frustrates him because it takes days to weeks to receive a reply. He uses chat, phone, and video conferencing to communicate with his coworkers on a regular basis, but exclusively communicates with AGS using messages. He wishes there could be a better communication vehicle to AGS so that he could get his work done more efficiently and not have to spend lots of time waiting on replies to progress in his work.
4.4 Winter Quarter Prototypes

4.4.1 Trinity Dark Horse Prototype: Support Robot Artificial Intelligence

The design space was explored by working towards the milestone prototypes. Each prototype allowed a certain level of free will; they permitted the team to not worry about certain infeasibilities of implementation and to focus solely on key functionalities and characteristics of what the team wanted to create.

The theme for our dark horse prototype was addressing the issues of user frustration and support empathy. From our need finding and CEP activities, we’ve identified frustration and empathy as the major communicative weaknesses in the current SAP support community. With this in mind, we set about mapping the journey through an automated support robot that caters to individual personalities, technical abilities, time constraints and preferred support engagement. The ideal result for the dark horse is a uniform content user platform, where information and solutions are delivered in a clear, concise and user-preferred manner.

Our support robot appears when the user encounters a problem and pushes a button to seek support. The robot first engages with the user by detecting their body language to identify their current mood. The robot functions by processing various inputs from the user and outputting an algorithm that distributes user-based solutions. The robot detects both visual and aural inputs from the user. Certain facial characteristics can be related to user personalities, understanding and attention levels. Gazing, leaning, eyebrow movements and smiling etc can be parameterized with vocal tone, speed of speech, response times and language proficiency to build a cognitive profile of each user. In time, a more sophisticated interaction between robot and human can exists, and the robot learns more about individual habits and abilities of each user.

![Figure 4.9: Trinity Dark Horse Prototype](image)

4.4.2 Trinity Funky Prototype: Word Cloud

As the team entered February, we had learned that users would feel less frustrated if they had help in defining their problem. Utilizing the learnings from the dark horse prototype, we built our funky prototype to give user and support a more intuitive interaction with the system. It allowed the user to state their problem simply, as keyword widgets are given display size depending on their priority to the problem. Users have the ability to pick and
choose words that they feel are applicable to their problem, and swipe away things they feel are unrelated to the problem.

For example, you’re hungry and only have 15 minutes to spare; you check the fridge and you have three eggs, a full uncooked cloned chicken, a couple of dodgy peppers, a pack of rooster potatoes from Mammy, and your housemates tasty, tasty ham. Pressure cookers, kettles and grills won’t suffice for time restrictions, but a microwave or frying pan might be useful. The user may process their solution to something like the image below.

![Figure 4.10: Trinity Funky Prototype](image)

Eggs and ham are given preference, and hence size, due to their time convenience in preparation (and their tasty tastiness). Peppers are useful too, but are a bit dodgy, and so its visual size decreases. Chicken and potatoes are impractical due to their preparation time/hormone content, and therefore are very small visually and can be swiped away by the user. That leaves eggs, ham and peppers. Fancy an omelette?

The funky prototype echoes the perils of defining problem parameters for current SAP users. We used this prototype as a platform for designing the functional prototype, updating from Powerpoint text widgets to the Kivy system as defined in the next section.

### 4.4.3 Trinity Functional Prototype: Interactive Search

Currently, SAP runs a ticketing system for their users when they encounter a problem and seek support. These tickets are given different levels of priority, depending on the magnitude of the problem. Customers are also served in line with their support package, ranging from Enterprise to Max Attention support. While Max Attention support customers enjoy the benefit of instant and on-site support, other support packages rely on this ticketing system.

From our needfinding exercises, we found that many SAP users become frustrated when seeking help from SAP, as there is little empathy from support for their problem. We also found that the root of many problems for support is the difficulty users have in defining their problem. As support agents are given a foggy explanation of the users dilemma, adequately finding solutions within the vast collection of KBAs, forums and wikis becomes tricky and tedious. For this reason, ticketing problems bounce from one support technician to the other, further frustrating the customer.

The core function of our prototype is to aid users in defining their problem. As we’re designing this system for mass volume use, artificial intelligence is utilised to service users. After the user inputs their ambiguous problem definition through voice recognition, the system will remove stop words, keep relative words, and throw out additional keywords as suggestions to the user. These relative and added keywords will become widgets in a word-
cloud for the user to interact with. Interaction occurs by swiping words away and making relative/key word widgets bigger and smaller, depending on their relevance to the problem. The system iterates until a solution is found, with suggested KBAs/forums/wikis being displayed to the side throughout. This was done using Kivy, a free download application that embeds Python code to create a user interface.

In addition to aiding users define their problem, users get the feeling that the system is working with them to not only state the issue, but to find the answer too. This idea is a direct implementation from the dark horse prototype, where the central theme was support empathy. As users encountered problems, an avatar became available to talk through the solution with them. The funky prototype focused on the intuition of rotating and resizing word widgets, and how users interacted with this interface. Both milestone prototypes had themes user frustration/support empathy themes that became deep-seated in the functional prototype.

4.4.4 Stanford Dark Horse Prototype: Support Kiosk

Before coming up with the Kiosk, we initially went towards a direction to increase empathy within the support process by tracking the customer’s and support consultant’s emotion and communicating that to each other. In order to grasp the capabilities of current technologies, we looked at a few consumer products already on the market.

NeuroSky Mindwave: A headset “mind reader.” Contained EEG sensors that tracked brain activity in two areas. (1) Focus: how well you can focus on one thing and (2) Meditation: how calm and relaxed your thoughts are. We concluded that this technology while relatively accurate when recording brain activity, was not an adequate indicator for capturing the emotions we wanted to convey.

Figure 4.11: NeuroSky Mindwave
HeartRate Monitor: Tracks your pulse. In most social settings, especially meetings and business activities and such, users remained calm and at a stable heart rate. Only in extreme cases would the monitor be able to distinguish excitement, and thus it would not be a suitable indicator for our situation.

Using these two devices, we set up a test with 3 trials. The purpose of these trials were to see what were the effects of sharing emotion in a support scenario. The three trials were as follows:

- Trial 1: Support receives client emotion in text form.
- Trial 2: Support receives client emotion in visual form.
- Trial 3: Client receives support emotion in text form.

From this test, we discovered that sharing emotions of the customer to support was helpful. The support consultant would take the customers emotion into consideration in their reply and tailor their response to make the customer feel better. On the other hand, consultants were overwhelmed over time due to constant frustrated feedback and were likely to become frustrated themselves and just ignore the customers emotion completely. While sharing of the customers emotions was somewhat helpful sharing emotions of the support consultant was not. It made customers feel uneasy if a support consultant was frustrated or unclear on the situation. These findings led us to re-evaluate our efforts and pick a new direction.
4.4.4.1 Motivation

As we rethought our design efforts, we realized that while empathy was important, we were unsure of where we could take those ideas, and considered instead how else we could create an environment for empathy. What we ended up coming to was a previous idea we had last quarter - a Support Kiosk. The Kiosk was a collaborative workspace where users could have a telepresence video call with a support consultant to visually solve their problem.

![Support Kiosk](image)

Figure 4.14: Support Kiosk

The Kiosk was a central location for help, situated in a customer’s office building or in a common area among multiple businesses. It has a touchscreen computer with full access to SAP support resources, including KBAs, notes, tutorials, etc. It is also a facility for quick and easy communication to support via message, phone, or video. The benefits of the Kiosk were meant to be:

- For the customer, it provides a vital resource in maintaining their systems and receiving efficient and centralized support.
- For SAP, it provides a presence of SAP in the customers office, demonstrating a dedication to service and support to their clients.
- It gives the customer a face from SAP to connect and relate to.

4.4.4.2 Design

In order to bring our Kiosk to life, we used two projectors, a wide angle lens webcam, and two large screens. The set up is demonstrated in the following pictures.
CHAPTER 4. DESIGN DEVELOPMENT

Figure 4.15: Webcam and Microscot Kinect set-up

Figure 4.16: Pico projector to display screen for Kinect touch system
CHAPTER 4. DESIGN DEVELOPMENT

Figure 4.17: Main projector for telepresence projection of support consultant

Figure 4.18: Overall setup
4.4.4.3 Results

From our user testing, we discovered that the size of the support consultant’s projection was quite important. If the projection was too big, the user felt uncomfortable and intimidated by such a large image. Successfully, however, the Kiosk did accomplish our original goal of being able to change the users environment to make them feel more prepared to tackle their problem by placing him in an open communication setting. Although users did report a better support experience as opposed to just using their own laptop, the distance to the Kiosk in how much they would have to travel to use one, was an issue of concern. This led us to the direction of creating a portable system which would travel to the customer.

4.4.5 Stanford Funky Prototype: Support Robox

4.4.5.1 Motivation

Our goal in building the Support Kiosk was to create a more engaging support environment for the customer. Essentially, we wanted to bring a high touch experience to the low touch user. Through the user testing, we found that users were more engaged and focused, but still preferred to work at their own desk and did not want to have to walk too far to use the Kiosk. Thus, we wanted to develop something that could bring the same features and experience of the kiosk to the customer’s desk.

4.4.5.2 Design

In order to bring support to the customer’s desk, we developed a device that could provide quick and easy communication with SAP with a simple UI to support resources. The device had to be both small, due to the limits of a customer’s desk, and still be able to create and engaging support environment as the Kiosk did. To this end, we imagined a small SAP robot assistant appearing at the customer’s desk whenever they needed help.

The idea of the Robox was selected. Robox is named by combining two words - Robot and Box, which indicates the design’s compact box shape for storage and portability and the robot shape and function when being used to conduct video call with a support consultant. The original design sketch is seen in Figure 4.19.

The Robox has two working modes and two screens. In the Sal mode (self-search function), the body screen displays SAP support information and resources, guided by an SAP avatar displayed on the head screen. In the Support mode (video call with support consultant), the head screen shows the camera feed of support consultant and the body screen shows any additional information the support consultant may share to the customer. In addition, a detachable keyboard is also provided for ease of typing and can be stored into the body of Robox. The system diagram is seen in Figure 4.20.

The body of the Robox was rapidly prototyped using foam core. A 7” Andriod tablet was used as the head screen and a 10” Windows 8 tablet was used as the body screen. The complete Robox is shown below:
Figure 4.19: Robox Design Sketch

Figure 4.20: Robox System Diagram
Figure 4.21: Robox Final Design
4.4.5.3 Results

Our primary objective was to compare the experience of the Robox to that of the Kiosk, and so we test the Robox with the same users that tested the Kiosk before. We found that:

- The touch interface must be more appealing to use than the keyboard, otherwise our user would be more inclined to use their own computer.
- Users liked the convenience of working at their own desk so that they can work in an environment they are familiar with and have easy access to what they need.
- The small size of the screen is difficult for more involved interactions, especially if it is a touch screen.
- Users were easily distracted by their surroundings and the experience was less engaging than that of the Kiosk.

Figure 4.22: Sal Mode

Figure 4.23: Support Mode
4.4.6 Stanford Functional Prototype: Support Booth

4.4.6.1 Motivation

After the previous two prototypes, we took a step back to define what users truly wanted when they contacted support, determining that the nature of support simply is - help. We realized that most telepresence and video conferencing systems put people in a face-to-face configuration. This likens itself to more of a meeting or instruction scenario when people are talking at each other to give commands or share a conversation. However, in most help scenarios such as tutoring, people are generally sitting side-by-side on the same level. In this configuration the focus is on the object of help; in the case of tutoring it is a textbook or homework. Similarly, if an onsite support consultant was sent to the customer, they would be sitting next to them focusing on the problem on the computer screen. They would be working together on the same side of the screen, looking in the same direction not opposing each other as most systems do.

![Face-to-Face](image1)

**Figure 4.24: Face-to-Face**

![Side-by-Side](image2)

**Figure 4.25: Side-by-Side**

This revelation led us to our Functional Prototype, which we call the Support Booth. Our idea here was to bring the support consultant right to the users side to simulate a
more helpful, shared experience. The user would feel as if the consultant was fighting their problem alongside them, engaged in more of a partnership as opposed to a separated collaboration with the face-to-face configuration. In this way, we hoped to provide a more realistic environment that also conveyed more empathy to the user.

4.4.6.2 Design

To create a side-by-side support experience, we designed a booth using a front table and side wall fabricated from plywood and 2x4’s. On the front table was a keyboard, mouse, and computer monitor using TeamViewer for remote desktop capability.

Embedded inside the wall was a 24” television, wide angle lens webcam and keyboard, all connected to a laptop running Windows 7. The wall was 5 ft x 5 ft, using 4 vertical bars and 3 horizontal bars.

![Front Table](image)

Triangle supports were fabricated on each side to maintain stability of the wall. Within the two middle bars, a space of 22.5” x 14” was made using two horizontal 2x4’s and plywood to create a frame for the television.

To use the system, the user entered the booth and accessed the video call system by inputting their ticket number as the code. Once logged in, the support consultant called the user using Skype, whereby the user answered the call by pushing shortcut keys on the keyboard (Ctrl+0 to answer, Ctrl+1 to end). Once in the call, the support consultant appeared in the television as if they were looking in the direction of the front table. Essen-
Figure 4.27: Side wall with TV, webcam, and keyboard

Figure 4.28: Triangle Support

Initially, the consultants profile was shown to simulate their presence to the side as opposed to in front. Both participants used the remote desktop on the front computer to screenshare.
4.4.6.3 Results

In testing, our objective was to test the critical experience of having a side video call. The objectives are described below:

- Determine usability of video call system.
- Determine if the user feels comfortable having a side-by-side video call.
- Determine if the user can realize attention cues through their peripheral vision of the side screen.
- Determine if the support booth is overall an effective way to communicate.

We wanted to test the booth first as a communication tool using a sharing and conversational scenario as opposed to a support scenario. Therefore, users were asked to share with the support consultant any websites or products they liked using the remote desktop. With success, users did feel the experience to be more realistic and the system was easy to use. They enjoyed the separation of the video call screen from their primary computer screen. Because of this separation, both participants could tell whether the other was looking at their computer or the other person. This is different in a face-to-face call because users look in the same direction whether they are focused on their computer screen or the other person. Whereas some felt this separation was productive by limiting inattention, others felt more obligated to look at the other person when being spoken to. We noticed that users tended to look back at the other person primarily to acknowledge or receive confirmation for something just stated. Moreover, the limiting of inattention would prove much more efficient in a support scenario so that both participants can visibly see where the other person is focused.

Figure 4.29: Booth User Testing

Users did provide useful feedback for future iterations. If the television screen was set too far back or directly to the side, users would either have to scoot their chair back or
turn their head a full 90 degrees to face the other person, which they thought was a hassle. Instead they preferred the screen set more forward and at an inward angle so that facing the other person required less effort. While looking forward, users could see the other persons movements through their peripheral vision, but could not specifically see what was the type of movement, whether it was a hand wave or a head turning. This meant that users could not register any cues to grab their attention, which is an important aspect in normal communication that we would want to emulate with the design.

4.5 Spring Quarter Prototypes

4.5.1 Early Concept Designs

4.5.1.1 Motivation

With the support booth in mind, we generated several design concepts to realize our ideas. Based on the feedback we received from previous prototype, we focused on creating a comfortable side-by-side video call system, which could deliver clear visual cues to the user in without them having to turn their head a significant amount.

4.5.1.2 Design

As a kiosk in a customer office building, we thought Engage should be comfortable enough to work in for a short period of time. After a number of designs, four different designs were chosen for comparison.

![Engage Comfort](image)

Figure 4.30: Engage Comfort

Engage Comfort was designed to create a comfortable environment for users. With a wide and reclinable chair within a semi-enclosed environment, the user can come to a relaxing station for a support in a private area. Engage Comfort was designed with inspiration from business class seats in commercial airplanes.
The modern and futuristic appearance of Engage High-Tech was designed to cater to those SAP customers who are in technology-related businesses. The side door slides open and the user sits inside facing monitors mounted on a circular ring.

Figure 4.31: Engage High-Tech

Engage Relax is designed as a bar type working environment in order to make users feel relaxed as if they are drinking a cocktail or in a quick in-and-out session with a support consultant at a round bar table.

Figure 4.32: Engage Relax
Engage Sci-Fi is inspired by a ring-like couch we saw inside the Dublin SAP office. However, those couches were rarely used, and so we tried to utilize that design to incorporate it as a support device.

4.5.1.3 Results

After discussing and receiving feedback from the teaching team, we concluded that Engage Relax was the best idea that we would investigate further. Our primary objective is to have the feeling of someone sitting next to you, and that concept provides that feeling best. The other concepts focus on other aspects that are not significant to our design requirements.

4.5.2 Part X: Design Iteration Towards Engage

4.5.2.1 Monitor vs. Projector

When choosing a method of display, we had to decide between a monitor or a projector. A monitor would be easier to embed into a side wall, but would be more difficult to create eye contact because the camera would have to be placed outside the frame of the monitor, which is not at the eye level of the user. Using a projection brings the challenge of placing the projector in a stable position, but eye contact can be achieved by making a tiny hole in the projection screen and putting the camera behind the hole. Using a short throw projector solves the placement issue of the projector and therefore we chose to go with a projector.

4.5.2.2 Camera Positioning Prototype 1

Engage Relax concept was chosen to be the design direction for SAP Engage. We then developed a rapid prototype of the concept to test how well it would work. We used a PVC rod and Cardboard screen on a round table set at a 45 degree to the user.
When we placed the camera at different positions and angles, we found that at a certain angle and location, the table projected in the screen can match the edge of the actual table, which made the user feel the table was extended in the screen, as if the projection were the real thing. This feature greatly improved the feeling that the user was sitting next to the person in the screen at the same table.
The continuous table then became a key feature of the design for SAP Engage. Because of this, finding the correct camera angle and location became a critical factor in how realistic we could make the side-by-side video call.

4.5.2.3 Camera Positioning Prototype 2

In order to match the table and get an accurately sized projection of the person, we had to determine a good location and angle of the camera, in addition to the location of the projector, table, and person relative to the table.

We constructed a rigid frame out of wood studs to hang the projector and used cardboard sheets for the round table and projector screen. After placing the camera and adjusting the angle countless times, we were able to find the best location and angle for the camera and therefore were able to dimension the whole design.
Figure 4.36: Camera Positioning Prototype 2
Figure 4.37: System Dimensions
4.6 Final Design: Engage Solution Path Builder

4.6.1 Motivation

This prototype is the birth child of the previous functional prototype with its results already implemented. The catalyst to develop the user interface was the desire for a very clean, clear and intuitive way of displaying words and changing problem parameter weighting according to what was presented by the system. No manual is needed to interact SAP Engage works on intuition. Users experience minimal frustration and stress, with gentle prompts and guidance.

4.6.2 Design

The solution path builder is a prototype that enables users of SAP support to define their issue and acquire the related information intuitively and quickly. It aims to reduce frustration and introduce a feeling that the system is working with you to define the problem. Empathy and understanding are evident in the methodology and delivery of the solution.

The functionality of the envisaged final prototype focuses on delivering improved capability to the user when they are attempting to solve a problem themselves through the SAP support site, especially the types of problems that are related to system setup, how-to’s, or that require further information such as tutorials vs those caused by bugs (which only form about 8% of issues). Currently the information available is located through a somewhat labyrinthine multi-branched system requiring many click-throughs, uncertainties of choices to make or directions to go and a search functionality that is primarily only useful if you know your problem as defined by SAP. We have found that users post tickets to support asking for direct technician help to solve many issues that are already have documented solutions within the present support network. We see this prototype as providing a means of obtaining the information the users want in manner that is emphatic with their needs, efficient regarding defining and solving their issues, and that they will come to use it for most of their support needs vs. going through the ticket system and using up manual resources.

In order to have a more interactive support portal, our vision is to introduce technology such as the touchscreen to provide the user with tools that enables them to have some control over the search procedure by giving more information to the system. The differential from search web portals is that the user can give priorities to one or more words when they change sizes. The system understands which information is more relevant and gives quick, iterative feedback, like showing related words, synonyms, and displaying possible solutions on the other half of the screen.
Figure 4.38: Solution Path Builder User Interface
4.7 Final Design: Engage Side-by-Side Telepresence

4.7.1 Motivation

Going forward from our functional prototype, we decided to take it to the next level. We wanted to do more than simply place a screen next to a user. We wanted to create an ultra-realistic feeling that the person is physically there next to you. In this way, our system would bridge the physical gap between support and client and enable natural communication to better solve technical problems.

4.7.2 Design

![Figure 4.39: Layout of final prototype](image)

In order for us to create this ultra-realistic feeling while also maintaining the practicality of such a system, the final design for Engage consisted of the following key components:

- Side-by-Side Setup
- Real-Life Projection
- Eye-Contact
- Shared Workspace
- Personal Workspace
- Isolated Audio
4.7.2.1 Side-by-Side Setup

In this side-by-side setup, based off our functional prototype, the two users are orientated as such if they were working together in the same workspace on a shared round table. The difference between this setup and our Functional is that the user’s collaborator appears on a projection screen slightly angled from their side and on a round table, versus the wall that was parallel to the users orientation with a straight-edged table. The reason for this change is that we could move the collaborator into the user’s 120 degree field of vision. This way we eliminated the need for attention cues as the user could see any change in movement from their peripheral vision.

![Support and customer are at each other’s side](image)

Figure 4.40: Support and customer are at each other’s side

4.7.2.2 Real-life projection

Using a short-throw projector, we were able to display a life-size image of the collaborator next to the user. Having a life-size projection was critical to the realistic experience. Through our user testing, we discovered that while a smaller image didn’t quite have any negative effects, it just didn’t convey the realism that we needed. The system would still feel like a typical video call. We also discovered that if the image was too big, it became intimidating and caused the user to feel uncomfortable.

4.7.2.3 Eye-Contact

In real-life, talking to someone who’s constantly looking down causes feelings that the other person is insecure, untruthful, or has a lack of confidence. These are feelings that one does not want to feel from someone who is supposed to be helping them. For this reason, eye-contact is a critical design feature. Eye-contact between two collaborators initiate connection, understanding, and confidence. It is a clear indicator that two people are paying attention to one another. This feature distinctly separates our prototype from other personal web conferencing systems that place the camera above the screen creating
a downward angle view and shows the collaborator constantly looking down. By placing a camera in the projection area at the average user’s eye-level, we were able to capture a feeling of eye contact. One of the disadvantages of this design was that the camera lens became a dark spot in the projection image. Fortunately, from user testing, users found that the feeling of eye-contact was much more valuable and about 50% of them only noticed the dark spot when we pointed it out.

4.7.2.4 Shared Workspace

In order to complete the realistic feeling of working together with someone, it was necessary to create a shared workspace, or the feeling of being in the same space. In order to create
this feeling, we aligned the table image in the projection with the physical table and had a shared monitor where both users saw the same information. Aligning the projected table image with the physical table made it appear that the physical table continued on into the screen. While at first, this was simply a “cool” feature, we discovered from user testing that this was a critical detail in creating this feeling.

Figure 4.43: Projected image of collaborator’s table aligns with the physical desk on the user’s end

Another way to create the shared workspace feeling was having a shared screen. This monitor would show the same content between the two users so that they could be looking at the same content. By aligning the inside edge of the projected image with the edge of the monitor, it appeared as if the collaborator was reaching out to the user’s screen when the collaborator extended their arms to touch their own screen.

4.7.2.5 Personal Workspace

As support and client are working together, we wanted to provide a space where each user could have a place to put their own personal laptop. For this reason, users may push the shared screen up and place their personal laptop below. In the event that the shared screen will be the main one they are interacting with, we created an extension from the round-table on the opposite side of the projected image.
Figure 4.44: *Extended arm of collaborator appears as if its reaching out to user’s monitor*

Figure 4.45: *User has space to work with personal laptop*
4.7.2.6 Isolated Audio

In order to encourage users of this system to speak naturally, we needed a way to isolate the audio to the user’s workstation or kiosk so that they didn’t feel they were interrupting others around them. In order to accomplish this, we utilized a sound dome that used a parabolic reflector to focus the sound waves directly to the user so others outside the range of the dome would not be disturbed by the conversation.

However, only the sound from the speaker could be isolated and this feature is not able to isolate the sound waves from the user’s voice. Further investigation is required to implement a way of also isolating the user’s voice.

Figure 4.46: Sound Dome above directs sound directly to the user and isolates noise from surroundings
4.7.3 Vision

To create a full solution for SAP, we re-imagined a new support process to compliment our prototype. In looking at the current process, we found a number of inefficiencies and pinpointed three problem areas that our prototype could help resolve (see Figure 4.47). First, customer’s currently have to individually describe their problem through text in the form of the online support ticket. This can be difficult to do for complex problems where words may not be the best way to communicate a problem. Moreover, for customers who are unsure of what their problem is or are unfamiliar with the software, a written description might be difficult to formulate.

Our solution to this is the development of a new support role, called the dispatcher. The dispatcher’s role is to gather all necessary information about the customer’s problem and log a ticket into the system. Instead of the customer having to individually decipher their problem through text, the customer and dispatcher can engage in a collaborative definition of the problem through verbal and visual communication. In this way, the dispatcher can best define the customer’s problem with details in context and send the ticket to the right product team to solve the issue, reducing instances of ping-ponging and unnecessary cycles of messaging between customer and support to clarify or gather additional information (see Figure 4.48). By clearing these inefficiencies present in the current process, this would effectively reduce the long response times that customers currently face, resulting in a faster resolution for the customer and a more efficient process for SAP.

We imagine that the dispatcher role could be a rotational role for mid-level and entry-level support consultants. The position could be a training experience for entry-level consultants to be exposed to a variety of issues and learn where to send them. Mid-level consultants, with their experience, can provide the training to these entry-level consul-
tants. Consultants in general can rotate within their team to be a dispatcher or processor for a period of time.

Our ultimate vision for Engage is to become the future workstation for AGS employees. Beyond using it to dispatch between customer and support, we see the system being particularly useful for internal collaboration between product teams and departments. Since most teams are scattered throughout the globe, having an accessible method of communication to share information and work together can greatly increase productivity. As for the customer, Engage could begin as a kiosk in a customer’s office. However, it could also become a new type of workstation for those customers that work with SAP exclusively.

Figure 4.48: New Support Process with Engage
5 Design Description

5.1 Design Description

Our ideal vision of Engage is a quad workstation for AGS and a single kiosk for the customer. The workstation design is essentially a roundtable split into four quadrants, where each is an individual workstation. Our prototype emulates this quad design, but features only two functional quadrants to demonstrate a customer kiosk and support workstation. The other two quadrants were utilized for EXPE demonstration purposes. In clockwise fashion, quadrant 1 and 4 were used for EXPE and quadrant 2 and 3 were the customer kiosk and support workstation, respectively.

Figure 5.1: Engage: AGS Workstation
Figure 5.2: Engage: Customer Kiosk
5.2 Specifications

5.2.1 Solution Path Builder

Figure 5.3: Solution Path Builder System Diagram
5.2.2 Frame

The frame consists of four wooden walls bolted together to a center post. The center post is a 6 foot 3.5’ x 3.5” aluminum square tube and the walls are fabricated using 2x4’s.

![Center Post](image)

Each wall is 5 feet long and 6 feet tall, with two 60” horizontal studs and seven 69” vertical studs.

![Wall Frame](image)

To fasten the studs together, we use 3” gold drywall screws and angle framing anchors for more stability.

Each wall is fastened to the center post by four 1/2” x 11” hex screws, which go through the double stud of one wall, the center post, and through the double stud of the wall on the other side. Four 1/2” holes were drilled through the center post 16 inches apart, with
the first hole of one side starting 8” from the bottom of the post and the first hole of the adjacent side starting 16” from the bottom so that the bolts are evenly distributed across the center post. 3/4” holes were drilled through the double studs to fit the bolts through with one washer and are fastened on the other side using a washer, lock washer, and nut.

5.2.3 Table

The table for Engage was cut out of 3/4” thick maple plywood. It is a quartered section of a circle with a 30” radius and has a straight-edged extension on the right side 15” wide and 18” long. The table is placed so that the height at the top of the table is 32”.

Figure 5.7: CAD drawing of Table and specifications
The 30” radius allows enough space for the monitor to fit in the system while keeping it an ergonomic distance. The user is able to reach out comfortably and touch the screen in both the lower and upper positions of the monitor.

The 32” height of the top of the table allows more tolerance for users of different heights. Users of smaller stature could simply raise the chair so that they may sit at a comfortable level while users of taller stature could sit comfortably as is.

The extension gives the user extra room to put personal items and their laptop when they are not using it.

5.2.4 Monitor

For the touchscreen monitor, we selected the Acer FT220HQL. The 21.5” screen size provides users enough screen space to interact with our search system, which takes advantage of the screens 10-point touch capability, ensuring the best user experience when using the search function.

![Acer FT220HQL](image1)

Figure 5.8: *Acer FT220HQL*

Each monitor is mounted on an Ergotron LX Wall Mount LCD Arm.

![Ergotron LX Wall Mount LCD Arm](image2)

Figure 5.9: *Ergotron LX Wall Mount LCD Arm*

Each monitor arm is attached to a monitor mount fabricated out of 1/16” thick steel sheet metal. The sheet metal was first cut into two pieces with dimensions shown in
Figure 5.10. The first piece was bent to a 45-degree angle, and then the second piece was welded together with the first, also at an angle of 45 degrees. The mount was then fixed in the corner by twelve 1/4" hex bolts and locknuts.

Figure 5.10: Monitor Mount Dimensions

Figure 5.11: Monitor Mount CAD
5.2.5 Projector

The projector installed in our prototype is a short-throw projector model NEC U300X. Using a short-throw projector mounted above, we were able to project a life-size image while keeping the projector out of the user’s workspace. In order to hold the projector in this position, we designed a mount consisting of a metal plate and two closet brackets.

The plate was 1/4” thick steel that was cut 21” x 12”. We drilled four mounting holes with a 5/16” diameter in the plate to match the pre-made mounting holes of the projector. We also drilled three holes on each side with 3/4” diameters to match the mounting holes on the heavy duty closet brackets. The heavy duty closet brackets were designed to support up to 1000 lbs in weight.

The projector is fastened at a height of 37” above the tabletop with the inside edge, 30.75” away from the center of the system and 1” away from the projection surface. This
gave us a life-size image of the person and their workspace displayed over an area 40” wide by 22.5” tall.

The image of the user is reversed to display the user in the correct orientation.

5.2.6 Camera

The camera used in the final prototype is Microsoft LifeCam Studio. In order to make the image shown in the screen more realistic, we selected a camera with a 50mm focal length, which is similar to the focal length of the human eye. In this way, what the person sees in the screen is close to what that person would see with their naked eye.

The camera position and angle is crucial in our design, and thus it is required that the camera should be stably held and fixed behind the screen hole. Based on these requirements, we designed a camera mount that was flexible to vary the camera’s x-y-z positions, yet could be made stable enough when the correct position was found. Thus we developed a design, which was 3D printed on the ProJet and attached it to a Joby Gorilla Pod. Also, in order to minimize the size of the camera hole and keep it less obvious, we removed the front housing. This includes the outer glass, the shield, and the front plastic housing. This way the smallest hole was required for the camera to capture video from.
Figure 5.15: Microsoft Lifecam Studio

Figure 5.16: Camera Mount
5.2.7 Audio

Ideally for the customer kiosk, we want to use a sound dome for directed sound so that it would be easy for a customer to just walk into the system and use it without the hassle of putting on a headset, in addition to having the sound isolated. To this end, we purchased the sound dome along with a mounting arm from sounddomes.com.

![Sound Dome with Mounting Arm](image1.png)

Figure 5.17: Sound Dome with Mounting Arm

To configure the sound dome in stereo, we also purchased a 2 x 10W amplifier from parts-express.com and soldered the left and right speaker leads to the board.

![2 x 10W Amplifier](image2.png)

Figure 5.18: 2 x 10W Amplifier

To mount the sound dome, we fabricated a mounting plate out of a 1/8” x 16” x 16” steel plate and 6” x 4”, 3/8” x 4” L bracket. 1/4” x 1” hex bolts are used to fasten the L bracket to the plate and the mounting arm to the L bracket. The plate is fastened to the top of the frame using 1-1/2” coarse drywall screws.

However, for purposes of EXPE where the noise level would make hearing difficult, we used two Logitech H800 headsets. Each had a USB receiver which we plugged into our laptops.
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Figure 5.19: Sound Dome Mounting Plate

Figure 5.20: Sound Dome L Bracket
5.2.8 Wall Coverings

Projection Screen
The projection screen consists of 1/8” thick sheet of styrene cut 60” wide by 32.5” high. Styrene was chosen due to its matte surface allowing light to be reflected without a harsh glare. The styrene material also produced a brighter image than other comparable sturdy matte white surfaces. The 1/8” thickness was necessary for the sheet to hold its form and stay flat against the wall. We mounted the screen using low-profile heavy duty velcro that allowed for easier assembly and disassembly.

The projection surface has a hole for the camera drilled at an angle located 39” away from the center of the system and 19” high from the tabletop.

Aesthetic Wall Coverings
Opposite the projection screen, we covered the wall in a frosted clear 1/8” thick acrylic panel cut to 60” wide by 40” high. We painted the smooth surface of the acrylic with white spray paint and mounted it with the frosted side facing out. These additional wall coverings are not a critical part of the design and could be substituted with other materials. They are only meant to cover up the frame structure and give the system a finished look. The only critical element is that support and client systems should both have the same material to enhance the shared workspace feeling.

The bottom panels consisted of 1/8” thick particle board with a white finish cut 60” wide by 40” high. They were then upholstered with a bright SAP blue canvas. These bottom panels are also not critical to the design and could be substituted with other materials. The mounting holes for the table were drilled through after the panels were mounted.
5.2.9 Cabling

The cables making up the system consist of the list below:

1. Projector power cable (2)
2. Projector HDMI cable (2)
3. 6ft HDMI extension cable (2)
4. Mini DisplayPort to HDMI adapter (2)
5. Camera USB cable (2)
6. 6ft USB extension cable (2)
7. Monitor power cable (2)
8. Monitor VGA cable (2)
9. Monitor USB cable (2)
10. 3ft USB extension cable (2)
11. Ethernet cable (2)
12. Laptop power cable (2)
13. Sound dome cable (1)
14. Sound dome power cable (1)
15. 3.5mm audio cable (1)

All power, ethernet cables, and the sound dome cable are routed to quadrant 1 where the power strip is located. All other cables are routed through the walls to the corner under the table in their respective quadrant where the laptops are located.

5.2.10 Software Setup

We are using two Lenovo ThinkPad T530’s running Windows 8. The laptops are set to extend displays on the touchscreen monitor and projector, with the monitor being the main display. Both monitor and projector displays are set to a maximum resolution of 1920x1080. The projector image is reversed to mirror the image of the collaborator and to match the desk. Each quadrant is setup the same way.

Our user interface for the customer is a webpage consisting of one working button which begins a Skype call to the support quadrant. The webpage is written in HTML using a Skype API to display a call button on the page that is connected to a specific user ID. To work, both users must be logged into their Skype desktop client. Using the scripting language Auto-It, we also developed a simple script to automatically make the Skype window fullscreen when a video call is initiated. See Appendix for code.
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Figure 5.22: Lenovo ThinkPad T530

Figure 5.23: Engage User Interface
## 5.3 Bill of Materials

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<th>Component</th>
<th>Vendor</th>
<th>Quantity</th>
<th>Price</th>
<th>Sales Tax</th>
<th>Shipping</th>
<th>Subtotal</th>
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<td>Alan Steel</td>
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<td>9.00%</td>
<td>$0.00</td>
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<td>McMaster-Carr</td>
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<td>$0.79</td>
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<td>$0.20</td>
<td>8.75%</td>
<td>$0.00</td>
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<tr>
<td>1/2&quot; Hex Nut</td>
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<td>$0.00</td>
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**Total Bill of Materials:** $202.95
## CHAPTER 5. DESIGN DESCRIPTION

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6 Planning

6.1 Deliverables and Milestones

- 10/18/2013: Corporate Project Team Formation
- 11/7/2013: Benchmarking Review
- 12/3/2013: Critical Function Prototype
- 12/11/2013: Fall Presentation
- 12/12/2013: Fall Documentation
- 1/1/2014: Yongbin and Vinh in Ireland
- 1/30/2014: Dark Horse Prototype
- 2/13/2014: Funky Prototype
- 2/20/2014: Side-by-Side Idea Discovered
- 3/6/2014: Functional Prototype
- 3/13/2014: Winter Presentation
- 3/18/2014: Winter Documentation
- 3/15/2014: Robyn in Ireland
- 4/9/2014: Continuous Table Feature Added
- 4/15/2014: Part X
- 5/13/2014: Penultimate Review
- 5/30/2014: EXPE Brochure and Poster
- 6/5/2014: EXPE Presentation
- 6/10/2014: Final Documentation

Key Turning Points

2/20/2014: Side-by-Side Idea Discovered

After the SGM on 2/20/2014, the team sat together to brainstorm a pivot from our previous idea of a remotely collaborative table. During the discussion, the side-by-side video call concept was brought up as an effort to emulate in-person support scenarios. We thought it was a more natural, comfortable, and empathetic configuration for telepresence. It was from this point forward that we developed into our final design direction.

4/9/2014: Continuous Table Feature Added

As the team was measuring out dimensions for our Part X and adjusting the angle of the camera, we were able to match the edge of the round table in the screen to the edge of the actual round table. We felt that this feature was quite compelling to creating an extension of the roundtable, making the side-by-side telepresence system seem much more real.

6.2 Distributed Team Management

With a global team, maintaining organization is one of the most important aspects of our project. To ensure that everyone has easy access to information flow, we used communi-
cation channels that all of us readily use. We consistently use email to communicate big ideas and Google Drive to share documents, notes, assignments, and presentations. We use a Google Calendar to share each team’s upcoming due dates and assignments. We also created Facebook group to act as a blog and medium to share causal information and quick links to interesting information. We have a Google Hangout with each other regularly to share updates on the previous weeks, discuss upcoming assignments, and future work. Additionally, we have formal TelePresence calls between SAP Ireland and SAP Palo Alto with the both teams and our liaisons scheduled every month in average to update everyone involved on our progress.

6.3 Project Budget

The overall budget status of the Stanford team is shown in Figure 6.1. The total expense on SAP Engage is $4,364.22 and the total expense for Spring Quarter is $4,937.89. The total expense for this project over the course of the year is $6,779.80.

![Quarterly Expenses](image)

Figure 6.1: Quarterly Expenses

6.4 Reflections and Goals

6.4.1 Vinh Bui

Through the course of the year, I’ve been challenged in many different ways. The team and I were all very unsure about the project brief, and what direction we could possibly take the project. Lots of ambiguity and a unique problem that lent itself to more about process and software than hardware really kept us frustrated. Moreover, the loss of a teammate was unfortunate to our work as a team. However, these challenges and more really made my ME310 experience. Now that we’re at the end of the year, I can surely say that my team and I have overcome a lot of the obstacles that we imagined at the beginning of the year. We were able to pull through with 3 members and build a functional prototype that demonstrated a novel idea. More than that, our idea turned out to be something quite compelling and practical for many business users. We received great feedback and praise from people at SAP and other industry individuals at EXPE. Although it took A LOT of work and so much time, I never have wanted to put this much effort into a class. The work that I put in was well worth it, and I had a fun time doing it. Designing and building was such a great challenge, and having it culminate during EXPE felt phenomenal. The day EXPE arrived was almost surreal. I’m proud of my team for being able to pull everything off, despite our doubts earlier this year. We were able to develop something pretty cool and showcase it well. I don’t know if SAP will take on the idea for sure, but it does seem like...
they see promise in it and that is good enough for me. What I am taking out of this class beyond the technical skills - in the project management, organization, and people skills, is so valuable that I feel much more ready to tackle the real world. I feel so elated to have completed this year, and to know that I have learned so many vital things in this course.

6.4.2 Kevin Burke

I found there was underlying ambiguity from the brief as to who the end user and benefiter of the design was going to be. We quickly found out that ME310 is rooted physical product design, and that enabling 1 billion people to contact support without focusing on software would be the ultimate test of the project. Coupled with our inexperience with software design as mechanical engineers, the task seemed exceedingly daunting. Project challenges were tough and layered from initiation, and observing other teams without these challenges sometimes irritated me. These early challenges were frustrating, as I was surrounded by a teaching team and student team of free-thinkers, and that an early limitation created a sometimes suffocating constraint on the project. I felt it didn’t let us, as designers and innovators, the flexibility or power to bounce ideas freely. However, although we encountered new problems and complications as the project progressed, I enjoyed how the team overcame these. The introduction to design methodology was incredibly enjoyable. Each stage of prototyping was fulfilling, as the team got to see the fruits of our labour. It was brilliant to experience an idea transform from a piece of paper to its functional being. I enjoyed not only making a product easy to use, but explaining and demonstrating the functionality, innovation and potential of Engage during presentations, and to onlookers and observers.

6.4.3 Yongbin Han

The past spring quarter is my busiest quarter ever. Going back home at midnight became routine. At the EXPE day, all of the effort was paid off. Looking back to the past year, I feel I learned so much. What I learned is totally different from those I could learn in a regular class. And the most valuable thing is how to get things done in a team, which is totally different from getting thing done individually. The experience from 310 this year will for sure help my future career. Finally, finally, finally, it is over.

6.4.4 Mike McHugh

I learned more about teamwork, taking responsibility, dealing with problems, liaising with people, the reality of big company politics and environments, and also about myself, on this project than I have in any other task I have taken on, in college or out in the real world. It has been great. Our team was a very passionate and strong one, and I really enjoyed the way we all fought for what we believed was right at every step; I think it made our final result much better. And the project was set within a design orientated, innovation focused environment which I love. We were given excellent guidance but also the freedom to make and stand by our own decisions along the way, both from our teaching staff and from our sponsors. All of this means that I could not recommend this experience highly enough to anyone who wants to see what they are really capable of within a team dynamic, where the
onus is on you and your team to work well together and produce. To anyone looking for a real, exciting, useful and revealing challenge while they are still in college I would say jump at this.

6.4.5 Robyn Nariyoshi

This project initially got off on a rough start. During the first quarter, we struggled with need-finding and connection the problem statement to something that Mechanical Engineers could do as we all felt like it was a software related problem. This led to a lot of frustration from our team and by the end of the Fall, we had lost a teammate. Winter quarter was a little better. We actually started to build physical things. I feel that the numerous required prototypes, while they felt rushed and incomplete, helped us progress with lessons being learned from each one. We really were forced to keep moving and simply learned how to make decisions and go for them. There really was no “right” or “wrong” answer. I’m sure that our product would have turned out equally well had we started going in a different direction. The fact is that we kept moving and kept prototyping and kept progressing that we were able to create something valuable by the end.

This final spring quarter went by so quickly. It was actually really difficult to simplify our project to the features it has now. We had envisioned this beautiful, modern-looking capsule that would create a new environment for the user. However, with a lot of debate and discussion we stripped that down to the essentials. What did we REALLY want to accomplish? We really wanted to accomplish the support feeling, or someone being there for you. Creating something fancy was not going to accomplish that. I’m glad we ended up with what we did. However, we were so immune to our own ingenuity that we did not realize how much our simple set-up changed everything.

During EXPE, we had received amazing reviews. A person that worked with Ferrari was asking if they could purchase these systems. A psychology PhD candidate came up to me and said that he was writing his thesis on remote communication and that we nailed all the critical elements that made remote communication feel real. One of our liaisons wanted to send us to Germany to implement this system so he can work with his employees there rather than traveling. All employees that worked in large global companies really understood the problem that we were tackling and loved our prototype. I’m disappointed that we did not think of patenting our idea before EXPE. I wish we had believed in our idea more but we were struggling as Engineers and it seemed like such a simple non-ingenuitive system. However, it is a lesson learned that will not be forgotten the next time I develop a product.

All in all, this course was definitely a memorable experience. I think my biggest takeaway is to just keep going. Whether you feel ready or not, you just have to do it. Do something. Sitting on your butt, thinking and analyzing will not get you anywhere. Real-life is not a math problem. There might be some mistakes but there’s no wrong answer. As long as you learn and move-on you’ll be fine.

6.4.6 Vinicius Serra

Now that we are in the last week of the project, I reflect on how the stages of the project and see how great it was. I learned a lot about programming, as I wouldn’t have in any
other way. I gained a lot of experience about working within a group dynamic. I especially
learned a lot about design that was never in the scope of my course in Brazil, and enjoyed it
to the point that I am strongly considering product design as a career. Working on a project
like this was extremely challenging and gave me extensive knowledge and experience. For
me, it was a unique chance to study at a college as prestigious as Trinity College, and also
be part of a Stanford module. This has always been a dream of mine, which made it all the
more satisfying. All team members were important, both for the solution and to teach me
something, as did the teaching team and the corporate liaisons. The challenge now is to
be able to unite on one scenario for EXPE in a way that the user can experience how our
solution improves the current state of technical support, not only SAP, but all in general
support situations. I think we are doing very well in this last phase and that all the pieces
are coming together more harmoniously. I look forward to the day of the final presentation
and to find out what the reaction and opinions are.

6.4.7 Barbara Silva

At this point of the project, I'm fully confident that SAP team has come to the perfect final
solution. After diverging a lot and multiple shifts of end user, we drew the conclusion that
in order to reach 1 Billion users and still satisfy SAP Max Attention customers, the support
service must process repetitive and ticket-congesting problems through automation, while
retaining a highly personalized one-to-one upper level. For this reason, the integration of
a self-search system and the support booth is ideal, as it bridges the gaps that we have
been trying to fulfill since the beginning of the project. Since the functional prototype,
the team has made strong advances, and has drawn fresh, deeper insights. Presenting
these during the TP meetings with SAP liaisons boosted the team’s confidence to continue
improving the prototypes for the final presentation. The escalation process through the
SAP support service can now begin with a simple interaction to redefine the problem for
SAP wiki calibration, granting the need of more complex problems to be serviced personally
and remotely. For the preparation to the 5th of June the focus is mainly on the way that
the solution will be presented by showing all its strengths and opportunities. The idea is
innovative and can change the way support is provided not only relating to SAP but in
other generic situations.
7 Resources

7.1 Corporate Liaisons

Katharina Rock
SVP Solution Validation, SAP Labs Palo Alto
Email: katharina.rock@sap.com

Tony O’Donnell
Business Intelligence, SAP Dublin
Email: tony.o-donnell@sap.com

7.2 Other SAP Employees

Alan Fahey
Support Team Manager, SAP Dublin
Email: alan.fahey@sap.com

Janaki Kumar
Design and Co-Innovation Center, SAP Labs Palo Alto
Email: janaki.kumar@sap.com

Judi Marr
Senior Manager Technical Support, Sybase
Email: judi.marr@sap.com

Kimberly Meek
Vice President of AGS Primary Support, SAP Labs Palo Alto
Email: kimberly.meek@sap.com

Mike Murray
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Bibliography


A Appendices

A.1 Fall Benchmarking

A.1.1 User Benchmarking and Needfinding

After brainstorming, we wanted to get a better understanding of what different “support” systems and organizations were like. We talked with a number of different individuals involved in different support networks to discover key aspects that defined that support.

A.1.1.1 Wanjin Park and JeongSoo Sim, Korean Military Personnel

The military, in general, is a rather extreme instance of support - they deal with life and death situations everyday. The soldiers on the front line need access to mission critical information and supplies at a moments notice, which puts added stress on supporting entities. Talking with soldiers from the Korean Army, we discovered that personal problems are usually ignored in order to focus on team issues. Also, each soldier has a “battle buddy”, or someone there to help in supporting individuals with smaller problems, while more serious issues can be escalated to higher ranked individuals or counselors. They mentioned that their main pain point is relating to the hierarchical management system, where small changes up top result in significant hassle for lower ranking soldiers.

![Wanjin Park and JeongSoo Sim of the Korean Military.](image)

Figure A.1: Wanjin Park and JeongSoo Sim of the Korean Military.

A.1.1.2 Deepak, QA Manager, SAP

Deepak is tasked with quality control for SAP product releases, and has certain expectations and definitions of support within his organization. His focus was largely on how SAP can effectively support its customers. First, he mentioned that users need a consistent, structured way to receive support 24/7. This way, when scaled to large user bases, every user is familiar with SAP operations. Much like manufacturing, when looking at how to effectively scale, standardization is key. SAP currently implements a ticketing system, wherein users submit a “ticket” to SAP support representatives that contains all information relevant to the problem. This ticket enters into AGS (Active Global Support), which provides 24/7 support to all SAP customers, regardless of time zone. The level of action required by SAP is dictated by the SLA (Service Level Agreement) between SAP and
its client. As issues are processed and resolved, tickets may escalate from primary to secondary support, and eventually back to development engineering. This standardization makes some aspects of support easier because all issues are documented in the same way, but in somewhat inefficient and slow from the customer point of view. It is also difficult to scale this type of support structure to 1 billion users.

![Example of a SAP support ticket](image)

Figure A.2: Example of a SAP support ticket

A.1.1.3 Alan Fahey, Support Team Manager, SAP

Alan Fahey talked with the Trinity College team regarding SAP’s current support business model. He pointed out that 55% of SAP’s revenue is through support - and this support is 96% profitable. He also mentioned some of the biggest complaints regarding SAP support, which is most commonly that “it takes too long”. It takes around 5-6 days for SAP Ireland to solve a customer problem. He feels that moving toward more KBAs (knowledge base articles) will help to improve the systems efficiency. He also pointed out that most companies, including SAP, are moving toward cloud support. The business model is slightly different for cloud support, where more users will pay a smaller fee, but will have less data to maintain. Making system changes from the cloud much easier, but “the hardest part is to get customer to do what we tell them”.

A.1.1.4 HK Ueda, Sr. Product Launch Manager, Tesla Motors

HK focused on the importance of adaptability of large corporations in order to meet the needs of startups and growing companies. This will apply to SAP as they aim to support one billion people. Each person will not have the same needs, so solutions and support systems need to be more adaptable to meet the needs of many. In his experience, large corporations like SAP tend to deal with huge contracts and lack the startup focus, when these start-ups may become their next big contract. Existing implementation strategies and infrastructure may not be able to adapt to a new, fast moving company. Tesla ended up developing Tesla “Warp Drive” to replace traditional ERP software in order to tailor the
software to Tesla’s needs. Differing business models simply need different ERP software, as startups need a “flexible platform that can adapt quickly to fast moving companies”.

Figure A.3: *HK Ueda from Tesla Motors*

A.1.1.5 Rongwei Ma, Oracle Software User

As an end user, Rongwei focused on the software’s usability. She said that the user interface is not intuitive and is a bit intimidating at first, even though the software is really pretty easy to use after a short learning period. She suggested simplifying the procedure to do simple tasks, which sometimes requires more work than really necessary. She also noted that slow network connections significantly decreases operator efficiency, and while this is not purely a software issue, it still brings a bad image to the software developer.

Figure A.4: *Rongwei Ma, a Oracle software user*

A.1.1.6 Mark Schar, Proctor and Gamble, Intuit

Mark’s company had gone through the switch to SAP software at one point, and he mentioned that they experienced significant frustration during the switch. End users who could not see the end benefit of the new software were angry and frustrated. While the software did increase functionality in the end, the transition was not near as smooth as it should have been. He also suggested that we look into TurboTax, as they support 24 million people in a three month period - a high volume and high stress scenario that could be analogous to SAP supporting 1 billion users.

A.1.1.7 Kimberly Meek, Vice President, AGS Primary Support, SAP

Kimberly focused on SAP’s need to move away from the ticketing system. They understand the system’s shortcomings, and have a grand vision for “support without messages,” but have no method to achieve this yet. She said that SAP needs to humanize the customer/support representative interaction by actively encouraging phone support vs.
email/messaging support. Part of this is improving their remote support and diagnosis capability and being more proactive in avoiding problems by moving product support from “fix it” to “prevent it.” It also will involve encouraging more interdepartmental collaboration within SAP and within AGS. SAP’s efforts towards these goals to date include improved remote infrastructure and more “message deflection” through online forums and KBAs.

A.1.2 Business Benchmarking

We thought it was important to outline the business features and structures of SAP before fully embarking on the design challenge. We focused on major areas of the business to outline exactly what made SAP’s business a competitive figure in the market so that our eventual design will fall in line with the company’s overall goals and mission statement.

Key Activities: SAP strives to help businesses run better using their systems to “operate profitably, adapt continuously, and grow sustainably.” [1] Some major activities are enterprise software development and sales and software implementation and support.

Value Propositions: SAP’s products are a huge value proposition for many businesses, providing organized and streamlined methods for business management and customer relation management. Their software helps to standardize processes, provide analytics, improve resource planning, and reduce costs while minimizing risks.

Customer Segments: Primarily medium to large enterprises, but small businesses as well.

Cost Structure: SAP’s cost structure is definitely value driven. Costs are calculated through research and development, sales and management, general and accounting, and new company acquisitions.

Revenue Streams: 45% of SAP revenue is from software sales and 55% is from support and services. However, software sales are less than 10% profitable, whereas support is 96% profitable. When purchasing a software package, companies choose a SLA to determine the level of support they require. The support cost is a percentage of the price of the software package. The vast majority of companies choose the Enterprise SLA option. Below are the different SLA options and take rates.

- Standard: 17%
- Enterprise: 22%
- MaxAttention: 22-25%
- ActiveEmbedded: <25%

Key Partners: SAP has many different partners who play an important role in helping other organizations identify, purchase, and implement solutions to address their unique
business needs. Partners help with resale of software products, partner-developed solutions, consultation and implementation services, support, and more. Some example partners are IBM, HP, and Accenture [4].

**Channels**: SAP’s channels to customers are primarily through consultants, sales teams, and partners. Brand awareness through other major enterprises is a key factor as well.

**Key Resources**: Software engineers, consultants, partners, computing resources (servers, databases, cloud).

**Customer Relationships**: SAP not only has over 250,000 customers, but also reaches these customers through third party consultants. They maintain these relationships with their partners through both their sales team and support organization. Depending on the SLA, there are sometimes on-site TQMs available for the customer.

### A.1.3 Technology Benchmarking

After developing a solid understanding of the design challenge given by SAP, we decided that supporting large user bases was the essence of the problem and began investigating different means for support. There are very few companies that directly support one billion end users, such as Microsoft, Google, and Facebook, and most of these companies develop very simple and intuitive software that has very little need for support. Given the inherent complexity of SAP software, the support model of companies such as Facebook is not likely to be directly relevant to SAP support, and thus we decided that investigating different means of support more generally would be beneficial in further defining the problem. Five main avenues for customer support were identified, and are outlined below.

#### A.1.3.1 Phone Support

Phone support is one of the oldest methods of remote support for large customer bases. Users call in to large support centers wherein they verbally describe their problem to a service representative. This is fairly easy to implement as phones are easily accessible by most customers, but is largely not scalable to extremely large user bases and can be both inefficient and frustrating to both customers and service representatives. Long waiting times, which waste customers’ time, are typically associated with phone support, but some companies, such as Amazon, are beginning to solve this problem by scheduling support calls in advance. In this scenario, the service representative calls the customer when he is free. Phone support also does not provide service representatives any time to research the problem, and essentially puts them “on the spot”, where the customer is waiting for an answer. Some customers also find it difficult to explain a problem verbally in an articulate manner, and there is sometimes significant misunderstandings by both parties due to language barriers, poor connections, and many other factors. The team has found that sometimes problem identification is one of the most difficult aspects of customer support, and phone support provide no means to “show” the support representative the problem, which can lead to further misunderstanding.

#### A.1.3.2 Email/Message Based Support

Message-based support has become increasingly more common in today’s web based society and can be implemented through email, chat, or some other messaging client. Users type a
written description of their problem and send it off to a service representative. The service representative then researches the problem and responds to the customer with a solution. There is zero idle waiting time for either party, as they respond at their convenience. Users have a full record of all correspondence and can refer back to previous conversations to clarify new issues. This allows sufficient time for both the user and the support representative to form a good understanding of the situation, but can also increase response times and leave the customer with a sense of ambiguity as to the state of their situation. Many newer support services also allow attachments, wherein a user can attach a screenshot of the problem or some other alternate method for “showing” the support representative the real problem. We also saw many situations where either the customer or the support representative did not adequately explain their situation, leading to miscommunication and misunderstanding. For text support to be viable, both the customer and the support representative must form a cohesive message that succinctly and fully explains the problem or solution, which is not always possible. Message-based support is also very indirect, as it provides no personal interaction and promotes a perceived lack of responsibility from both parties. By allowing users to simply ignore messages or redirect questions, message based support can be ineffective. Sometimes long chains of emails form, and correspondence continues without any real problem solving.

A.1.3.3 In-Person Support

Many companies now implement in-person support through storefronts or mobile service technicians. In-person support is very effective because it allows users to clearly describe
the problem and for support representatives to easily understand the problem, as all forms of human communication are available (verbal, gestures, body language). Users can also “show” the problem to the service representative in many cases, which makes developing a full understanding of the situation much easier. Being able to show the problem to others is possibly more suited to hardware issues, but is also beneficial in solving software problems. This also provides instant response (aside from waiting in line at storefronts), as it is a real-time human interaction, but is also largely not scalable due to cost limitations. Mobile technicians are also a very effective problem solving method (albeit expensive), as they can come at the customer’s convenience and see the problem for themselves, which makes understanding the situation much easier. While effective, cost and scalability largely limits the practical implementation of such a service network.

A.1.3.4 Online Support

More recently, many companies have been turning to online support via user forums and searchable databases. This is really an interactive extension of a more traditional user manual, as it provides explanations of key functions and solutions to the most common problems. Forums create a community that allows others in a similar situation to work together to understand and solve problems. This is very good for the business model of most companies, as it decreases running costs by effectively leveraging other users to solve problems that the company would typically have to solve themselves. While this can be very effective at solving problems and is very scalable, the company is somewhat losing control over their support network. They must rely on third parties to help customers solve problems, but can moderate forums themselves and help to control support situations. Online support can also allow for support representatives to take control of a users device to fix problems, which makes it easy to understand the problem, but does pose some security concerns with more sensitive data.

A.1.3.5 Physical Support Devices

Some industries employ physical devices designed for solving specific problems to help users. This is typically found more in large corporations and industry, but some technology is coming down to the consumer level. One example of such a device is the OBD (on-board diagnosis) systems in modern automobiles. Vehicles now log many parameters and error codes, and historically this data was only available to service technicians at a dealer. With modern advancements in technology, consumers can now purchase OBDII scanners for as little as $20, and can read trouble codes and inform users of the real problem. The electronics in the car can identify problems, forgoing manual diagnosis methods to allow for more accurate and efficient problem solving. Another example of a physical support device is the UPS Diad V. This handheld device connect UPS drivers to the corporate network and gives them access to any data they need to support their daily tasks. Using these physical support devices, the end user is connected to a large support network by means of a personal device.
A.2  Fall Critical Function and Critical Experience Prototypes (CFP/CEP)

A.2.1  CFP: Sliding Monitor

After benchmarking and user needfinding, we distilled our problem down to a few things. At the center of the AGS system is where the Support Engineer sits. He or she must be able to communicate and collaborate clearly and effectively. This means providing him or her with the right tools and workspace. These tools must do the following:

- Allow clear communication between customers and support.
- Enable customers to better identify their problems through technology.
- Encourage collaboration amongst engineers to more effectively provide a solution.

In essence, how can we innovate on the tools and technologies present in SAP workspaces to improve the efficiency of communication between support and the customer? In this way, we can evolve SAP’s support organization to readily meet the needs of 1 billion users.

Based on our interviews with AGS managers, the design team decided that improving local collaboration would be worthwhile to explore for our CFP. We identified certain issues involving communication and collaboration amongst SAP support engineers. In particular, these engineers tend to “hide” behind their large desktop monitors in high-walled cubicles as seen in Figure A.7.

![Cubicle office of Support Engineer at Sybase](image-url)
This essentially acts as a wall, blocking users off from others around them, and enveloping them in their own world of work, which can inhibit collaboration, and ultimately lowers worker productivity. The office space is generally too quiet, which inhibits users from picking up the phone to more quickly solve a customer issue. Moreover, ticket issues fall to the notorious “ping-pong” effect where issues get bounced around to different engineers until they reach the right person to solve them. In view of these pain points, we re-examined the prompt and were able to use the task of improving next generation workspaces to increase collaboration and open communication channels as a viable option to help in supporting 1 billion users.

By taking a large touchscreen monitor and creating a mount that allows it to convert from flush-mounted in a desk (essentially becoming part of the desk) to a traditional upright monitor, users can change from an open, collaborative environment to a traditional, more personal workspace at the touch of a button (or anywhere in-between).

Figure A.8: CFP sliding monitor in upright configuration
Figure A.9: CFP sliding monitor transitioning from the upright to the flush mount configuration

Figure A.10: CFP sliding monitor in flush mount configuration
User feedback showed that this prototype does open up the space for more efficient communication and collaboration, see Figure A.11. They enjoyed the transition of the workspace and the flexibility of multiple modes. Users were also asked to focus on their preferred method to interact with the transitional mechanism. Users preferred either tapping the screen, pressing a button, or using a gesture to control the screen. Some people mentioned that they would like a physical slider to adjust screen position. Users also enjoyed the action of sliding out a keyboard to actuate the screen, but didn’t like voice or foot control.

Figure A.11: Example collaboration setting of CFP
A.2.2 CEP: Support to Customer Interaction

We based our CEP around communication between a customer and a support technician by creating a process and environment to simulate some of the main themes we have seen from our observations and through our interviews: problem definition and difficulties in communication of an issue. We also wanted to get insight from both groups, customer and support, about their experience, and we wanted to see how accurate the “experience” we built was to our expectations.

We created a MATLAB file that played a piece of speech from an audio file that had been sped up and reversed, making it unintelligible. This MATLAB file was presented to the “customer” and they were asked to contact a “support representative” via an Internet chat client to help them fix the sound file, and then solve a further problem we had set in the speech.

The speech within the audio file said “Please translate this Latin phrase: Ubi est tabella spiculæria” which translates as “Where is the dart board?” This was partly to see the difficulties encountered if the customer had translate through different mediums; from Latin to phonetic English into text which the support technician would then have to deal with.

We then created a tutorial for MATLAB that had examples of how to process audio, with many differing production techniques in it, two of which were how to adjust the speed, and how to reverse the sound. We called this file ’audio processing’ and placed this tutorial in a folder with many other documents to simulate the search a support tech would need to undergo to find the right information to use to identify and help the customer solve the problem. We also gave the support technician access to the Internet if they wanted to use it.

Here are the guidelines we gave the customer:

Please describe to support as best you can what you hear when you run this file, and get them to help you to “fix/solve” it. Your only allowed avenue of communication is through an internet text chat client. You may only operate within the chatbox, editor or command window of MATLAB. i.e. only use support chat for help; no Google or MATLAB help for you. Don’t forget the prize for quickest solving of complete problem is a free meal!

And here are the initial guidelines we gave the support technician:

In this simulation, you are a support technician attempting to help solve a users problem. Your only allowed avenue of communication is text chat within the Inter-net chat client window. They have no access to the web, help files, anything bar you. You have access to knowledge base articles within this folder, marked KBAs; perhaps one of them has applicable information to the problem. You may also use Google, or any other net based resource you think might be useful. Remember there is a prize of a free meal for the quickest full solution to the problem!

To which we added over time: They are using MATLAB. They have a music file being played in MATLAB, and there are some effects on it that need to be reversed to make the speech comprehensible. There is then a message within the speech to be answered. This was to see how much better the support got as we gave them better information.

We then found sets of volunteers to act as a customer or support technician and documented how they got on. We set a time limit to achieve the solution within fifteen minutes.

Overall we noted a lot of miscommunication, bad assumptions made by both sides, lack of clarity in messages sent, and misreading of messages received. They could not
communicate effectively, and the overall overriding experience of all who took part was one of frustration.

To provide the positive experience we would have the enduser in the same situation as before, but whereas before they could only receive help through communication over an internet chat client, with a support who didn’t know the nature of the problem, nor how to solve it immediately, now we will have a person in the room beside the user, who knows the nature of the problem, and will step in when it most suitable to do so to help the user achieve what they want to do, but in a way that also helps to educate the user gain knowledge about the process want to apply. This is a user experience we imagine people would like if they had the need for some support.

So how can we evolve the current negative support experience to our ideal positive? And how can SAP move towards enabling such a process to it’s customers? It is not practical to have a support technician alongside the user. But is it possible to build software and support into a more integrated package that gives people useful, intelligent guidance that mirrors this experience to help them solve their issues? What ways can we provide and support the knowledge and feeling of empathy to do this on a 1 billion user scale? Here, as an example, using what we have seen inside SAP AGS already, is an idea of what the current procedure could evolve to towards generating this user experience:

2. Customer accesses a bright, picture based support platform.
3. Product predictive software to find the problem and its solution.
4. They enter a search for their problems (keywords, etc).
5. Support database spits back related tutorial videos (SAP Connect, SAP YouTube-like Channel) and related, simply written KBAs, ranked by relevance.
6. Peer support forums.
7. If problem persists, customer accesses message solvers.
A.3 Fall Quarter SGM Handouts

A.3.1 Benchmarking Summary Handout

**SAP Benchmarking**
Vinh Bui, Yongbin Han, Darrick Hunting, Robyn Nariyoshi

Goal: Define service & support structures and devices for large user bases. Define key features of each support structure and device.

**Phone Support**
- Traditional method for solving problems remotely.
- Implemented by most major companies, but sometimes highly inefficient due to long wait times and dropped calls.
- Some companies, like Amazon, now have an option for pre-scheduled call times.

**Email/Messaging Support**
- Most companies now implement some form of text support, either via email, chat or other messaging service.
- There is no holding, and a specific question can be directly asked, so it is efficient for both the customer and service representative.
- Very indirect - no personal interaction and a perceived lack of responsibility.

**In-Person Support**
- Accessed through storefronts such as Apple, Microsoft, and Verizon.
  - Immediate in-person response - very personal and enables easy and direct communication.
  - Sometimes large volumes of customers result in long wait times.
- Technician
  - Someone that comes to your home/office to diagnose the problem.
  - Usually deals with hardware issues.

**Online Support**
- Forums and online blogs where users post questions and experts can answer.
- Automated Solutions
  - Windows Fix It Now
- Remote electronic control and support
- FAQ Databases

**OBDII Scanners and OBDII Bluetooth Dongles**
- In years past, auto mechanics and dealer service centers have had sophisticated diagnosis equipment that can read trouble codes from a vehicle’s OBD (On-Board Diagnosis) computer.
- This is now starting to appear in the consumer market, with consumer handheld scanners available for ~$20-$200.
- This is essentially bringing support designed for corporations and large dealer networks to the individual DIYer in his garage.
- Now OBDII bluetooth dongles are available that connect your car to your phone or laptop and you can not only read and clear trouble codes for diagnosis, but you can also see vital vehicle parameters in real-time.
- Some vehicles (such as Tesla) are now connected to the manufacturer via 3G and can be remotely updated and diagnosed in the field.
- This new connectivity is opening up new areas for app developers to explore.
Users Manuals

- All cars come with users manuals that are designed so end users can understand functionality designed by the manufacturer and can troubleshoot common issues.
- This can be in a more typical paper format or in digital format.
- Companies like Chiltons or Haynes make maintenance manuals that describe, in detail, most all major maintenance procedures specific to your vehicle.
- Some manufacturers also release fixes to common problems to help support users. For example, Ford releases TSBs (Technical Service Bulletins).
- Audi is now rolling out an augmented reality user manual application where "looking" around a car with your device's camera allows the app to ID different buttons or functions and explain more about them.

Mobile Devices

- Cell Phones/Tablets
  - Barcode reading applications
  - Can access websites, text information, product information etc.
  - Urgent 24/7 Care Medical Help
    - Directs you to a registered nurse who escalates you to a doctor if necessary.
  - Touch Scan OBD Diagnostics
    - Mobile app version of OBD scanner
  - Mint/Banking Apps
    - Analyze spending data, find best fit solutions for your personal habits.
  - Team Viewer
    - Allows remote connection of smart phones.

- Portable Data Terminals (PDTs):
  - An electronic device used to enter and retrieve data on a database from a remote location via wireless transmission used in large stores, warehouses, or in the field.
  - With increased processing and transmission speeds via WiFi and Bluetooth, users can quickly access data and resources to better perform their jobs.
  - UPS DIAD V, FedEx PowerPad, Rugged Computers

Navigational Support

- Maps are one of the original service/support devices to help people get around.
  - When people are lost or looking for a specific building, they can use local landmarks on the map to find the direction to their location.
  - Huge user base - maps are applicable to nearly everyone.
- GPS is a modern and enhanced version of maps
  - Storing the building/route information into the device creates a searchable database for the user and offers an easier way navigate.
  - Location data organized by "point of interest" so that users can quickly find places.
  - Allows for turn-by-turn directions, or "active support", to guide users to their destination.
A.3.2 Needfinding Summary Handout

Team SAP Needfinding Interviews
Vinh Bui, Yongbin Han, Darrick Hunting, Robyn Nariyoshi

1. Wanjin Park & JeongSo Sim, Korean Military (CFC & KATUSA)
   - Personal issues and problems are usually ignored if not urgent enough. More difficult in Korean Army (mandatory) vs. US Army (occupation).
   - Support usually comes from battle buddies, but problems can be reported to one rank up, counselors, or an online feedback system.
   - Pain point: Hierarchal system means decisions affect many, small changes up top result in much hassle for those below.

2. Deepak, QA Manager, SAP
   - Users need a consistent, structured way to receive support 24/7.
   - SAP uses a “ticketing” system, wherein any issue is documented on a ticket that goes into the Active Global Support (AGS) network.
   - These tickets are standardized, and any support agent that helps toward a solution documents their actions on the ticket.
   - AGS has locations strategically placed throughout the world to continue support 24/7 through all timezones for uninterrupted support.
   - Individual level of support dictated by Service Level Agreement (SLA) in SAP contact -- sometimes the contract even provides for financial liability for lost revenue due to system down situations.
   - As issues are processed and resolved, tickets may escalate from primary to secondary support, and eventually back to development engineering.
   - Takeaways: Need consistent process for all users with standardized documentation and 24/7 support; this may not be as efficient, but it is very scalable as it is so structured.

3. Alan Fahey, Support Team Manager, SAP
   - User 1: SAP Support
     - 55% of SAP’s revenue comes from support with ~90% profitability.
     - It takes 5-6 days for SAP Ireland to solve a customer problem.
     - Biggest complaints are that it “takes too long.”
     - SAP support website: Knowledge Based Articles (KBAs) written by support staff for redeemable points, forum-based community.
   - User 2: Businesses
     - Most companies, including SAP heading towards Cloud support.
     - Smaller fee per user, smaller amount of users to maintain.
     - “The hardest part is to get customers to do what we tell them to do.”
     - Changing systems from the Cloud is much less of a hassle.
4. HK, Sr. Product Launch Manager, Tesla Motors
   ● Startups and growing companies need a “flexible platform that can adapt quickly to fast moving companies.”
   ● Large corporations like SAP who typically deal with huge contracts need to focus on startups – Existing implementation strategies and infrastructure cannot adapt to a new, fast moving company.
   ● Idea: Smaller, autonomous business units could break off and focus on growing startups – this way every account matters and a product can be developed for a company, not simply adapting enterprise level products
   ● Ended up developing Tesla “Warp Drive” to replace SAP software in order to tailor the software to Tesla’s needs.
   ● Differing business models need different ERP software.

5. Oracle - Kyle
   ● When an error is detected, the ticket is created in company’s system and is assigned to the technical staff within the company to resolve. If issue cannot be resolved, it will be reported to Oracle support.
   ● The user interface of software is not intuitive and user friendly. People feels “scared” when see it at the first time even though it turns out to be easy to use after a short period of learning.
   ● Using the Oracle software to create tickets for error is easy to learn even for a non-IT background person.
   ● Simplify the procedure to perform a specific task.
   ● The application is connected to the internal network of the company. Becomes inefficient when the network gets slow or has some problem.

6. Mark Schar, Proctor & Gamble, Intuit
   ● Experienced a lot of frustration when switching systems to SAP.
     ○ People were angry and frustrated because they did not see the end benefit
     ○ “It’s amazing they are as big as they are”
   ● Asked the question “Who are a lot of people that do this?”
     ○ Turbo Tax (24 million people)
       1. A consumer application for a complicated system.
     ○ Salesforce.com

7. Kimberly Meek, Vice President, AGS Primary Support, SAP
   ● Currently using a ticketing/messaging system to support customer incidents
   ● Need to support customers without messages
   ● Humanize the customer/support rep interaction
     ○ Actively encourage phone support vs. email and messaging
   ● Improve remote support and diagnosis
   ● Need to proactively avoid problems by moving product support from “fix it” to “prevent it”
   ● Message deflection is a bit part of this goal
A.3.3 CFP/CEP Handout

Trinity Critical Experience Prototype

**Problem Statement:** Define the evolution of SAP services and support to meet the needs of 1 billion end users.

We based our C.E.P. around communication between a customer and a support technician by creating a process and environment to simulate some of the main themes we have seen from our observations and through our interviews; problem definition and difficulties in communication of an issue.

We also wanted to get insight from both groups, customer and support, about their experience, and we wanted to see how accurate the “experience” we built was to our expectations.

**Insight:** Overall we noted a lot of miscommunication, bad assumptions made by both sides, lack of clarity in messages sent, and misreading of messages received. They could not communicate effectively, and the overall overriding experience of all who took part was one of frustration. Full transcripts are available of their conversions.

**Solution Experience:** To provide the positive experience we have the enduser in the same situation as before, but whereas before they could only receive help through communication over an internet chat client, with a support who didn’t know the nature of the problem, nor how to solve it immediately, now we will have a person in the room beside the user, who knows the nature of the problem, and will step in when it most suitable to do so to help the user achieve what they want to do, but in a way that also helps to educate the user gain knowledge about the process want to apply. This is a user experience we imagine people would like if they had the need for some support.

So how can we evolve the current negative support experience to our ideal positive? And how can SAP move towards enabling such a process to it’s customers? It is not practical to have a support technician alongside the user. But is it possible to build software and support into a more integrated package that gives people useful, intelligent guidance that mirrors this experience to help them solve their issues? What ways can we provide and support the knowledge and feeling of empathy to do this on a 1 billion user scale?

Here, as an example, using what we have seen inside SAP AGS already, is an idea of what the current procedure could evolve to towards generating this user experience:

1) Customer encounters a problem/error
2) Customer accesses an bright, picture based support platform
3) Product user predictive software to find the problem and its solution
4) They enter a search for their problems (keywords etc)
5) The support database spits back related tutorial videos (SAP Connect, SAP Youtube channel-like) and related, simply-written KBAs, ranked by relevance
6) Peer support forums
7) If problem persists, customer accesses message solvers
Trinity Critical Experience Prototype

Stanford CFP

After talking with SAP, we have identified certain issues involving communication and collaboration between SAP service engineers and support representatives (The end user here is the SAP support personnel). The prompt also mentioned that improving next generation workspaces to increase collaboration and open communication channels would be a viable option to help in supporting 1 billion users.

We have seen that many people “hide” behind their large desktop monitor. This essentially acts as a wall blocking users off from others around them, enveloping them in their own world filled with their work which can inhibit collaboration, and ultimately lowers worker productivity.

By taking a large touchscreen monitor and creating a mount that allows it to convert from flush-mounted in a desk (essentially becoming part of the desk) to a traditional upright no , users can change from an open, collaborative environment to a traditional, more personal workspace at the touch of a button (or anywhere inbetween).

Scenarios for Screen Up vs. Screen Down

<table>
<thead>
<tr>
<th>Screen Up</th>
<th>Screen Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Private information: emails, etc.</td>
<td>● Sharing information</td>
</tr>
<tr>
<td>● Working alone</td>
<td>● Group meetings/discussions</td>
</tr>
<tr>
<td>● General keyboard task: typing documents, data entry, etc.</td>
<td>● Flat surface for writing/drawing/manual transfer of data</td>
</tr>
<tr>
<td></td>
<td>● Writing on the screen</td>
</tr>
<tr>
<td></td>
<td>● General tablet tasks: web browsing, data viewing, etc.</td>
</tr>
</tbody>
</table>

User feedback shows that this prototype does open up the space for more efficient communication and collaboration. Users were also asked to focus on their preferred method to interact with the transitional mechanism.

● Users prefer either tapping, a button to press or a hand waving gesture. Some people mentioned that they like an adjustable slider to adjust screen position.
● Users also liked integrating screen position with sliding out a keyboard.
● Users did not like voice control, or a foot pedal.
A.4 Winter Quarter SGM Handouts

A.4.1 Dark Horse Prototype Handouts

Design Review Agenda:
1. New Direction
2. Focus of the Dark Horse
3. Prototype Idea
4. Results
5. Next Steps

New Direction
As a result of our TelePresence meeting at SAP over the break, we have defined a new direction. Our user is now the customer and our new problem statement is to enhance the low-touch support experience for the customer. By low-touch, we mean support for the masses, as opposed to hi-touch support for the smaller number of customers that receive close monitoring and guidance.

Focus of the Dark Horse
To enhance the support experience, there are multiple factors that we can investigate, including:
- Customer frustration
- Miscommunication of the problem
- Long wait times
- Black hole feeling

However, the largest problems we have seen point to frustration and miscommunication. From this, we thought, what if support could truly understand and empathize with the customer? This could alleviate those key issues, but how do you convey empathy? How do let support see what they see and feel what they feel? With these thoughts in mind, we decided this was our “dark” realm, and for our Dark Horse we want to focus on being able to sense customer emotion and to convey that emotion to support.

Prototype Idea
Using the same support-customer scenario as in our CEP, where a customer has to solve a MATLAB audio file by receiving help only from support who can only access Google Search. In the support ticket, the customer also selects their level of frustration and current understanding of the issue. This information is then relayed back to support. Our objective with this test scenario is to determine how the customer feels sharing this information and whether knowing that information changes the way support handles a ticket. After learning how emotion may play a factor in this interaction, we hope to sense and convey emotion through different mediums.

Results
Trial 1: Support receives client emotion in text form.

Support:
- Would like positive reinforcement. Knowing that she actually helped the client’s situation.
- Knowing customer is anxious may reflect on support. Support engineer may rush, miss certain things and thus be less productive.
- Initially appreciated knowing the customer’s emotion. Will get tiresome if she sees “frustrated” a lot.

Client:
- Felt a little awkward answering the emotional questions. “What’s the point? You don’t think the support person really cares.”
- Appreciated “Clear/Confused” option. Liked that he could share his understanding of the problem.
- Wished it was a faster process.

Trial 2: Support received client emotion in visual form.

Support:
- Did not really notice the wristband color. Acknowledged it, but it didn’t really affect him.
- Was more affected with his performance when the client explicitly told him she was on a time crunch.
- Tried to remain as calm as possible as frustration would lead him to become less productive.

Client:
- “(Support) was not asking good questions”
- It felt good to communicate a sense of urgency through emotion.
- Wished it was a faster process.
- Felt impersonal. Wish he has explained what he was trying to do vs. just telling her what to do.

Trial 3: Client receives support emotion in text form.

Support:
- Would feel slight pressure to put “Calm” because he wants to keep customer calm and assure him that he will solve the problem
- Having some form of appreciation would help. “Like” button to show that his information was useful.

Client:
- It was interesting to see how support was feeling and if his message was getting through.
- Wished it was a faster process.
- When Support replied with “anxious” he felt worried that his problem was not going to get solved.
- Knowing Support’s emotion did not affect his behavior.

Next Steps

For the next steps, we plan to do more experiments with our prototype idea to gain more insight and feedback from the test scenario. We will also think about more improvements to our test.

Currently, the mediums through which we are conveying emotion are through a ticket answer through text, an LED wristband where a color matches a level of frustration, and an emoticon wristband display. We hope to develop more input and output options and test them using our scenario. On the input side, we will test different methods such as facial recognition software, a brainwave scanner, a heart rate monitor and a blood pressure monitor. We want to enable support to know the real-time emotion changes of the customer. For the output side, we will test different methods to convey emotion changes, such as temperature changes on a wristband or other kinds of physical indicators.

We also are planning visits to SAP customers and an interview with Neil Greathead, who is head of Customer Experience at SAP to gain more insight into customer issues.
Design Review Agenda:
1. NeuroSky MindWave & Heart rate monitor
2. DHP Version 2
3. Trinity DHP
4. Next steps

NeuroSky MindWave & Heart rate monitor
From our previous DHP, a customer deliberately sharing their emotion did have an affect on the support engineer. We thought that we could take this experience up a notch where we could read the user’s brainwaves and heart rate to automatically determine their emotion.

- Procedure: Have subject wear brain sensor and heart rate monitor during meeting and visually observe to match emotions.
- Results: Brain sensor technology was not sensitive enough for moderate emotions. Data did not show any trend with emotion.
- Conclusion: Decided to re-evaluate whether this was the right direction in the first place due to CEP results.

DHP Version 2
Motivation:
- Our primary goal was to develop a way for support to empathize with the customer, and so we tried to answer the question: How can we make support feel as the customer feels? To do so, we thought of running a scenario where both individuals are in a partnership, where they have shared experiences.
- We also wanted to try to make the experience of support more fun, and added elements to convey that.

Procedure:
Again, we are using the scenario where a customer must solve a MATLAB script by reversing and slowing down an audio clip by receiving help through email communication with support who only has access to Google Search.

Both are told that they are given a time limit of 30 minutes and will be rewarded with a candy bar if they solve the problem. The time limit is to provide a sense of urgency and the candy bar is given as an incentive for them to perform the test. Adding in the shared aspect, where if progress is made (or not) to solve the problem, they are told that they will be given positive or negative consequences the same as their counterpart. This is to create a sense of partnership and shared experience between customer and support.
We will run 3 different scenarios:
1. Positive consequence given only
2. Negative consequence given only
3. Positive and negative consequences given

Positive consequences include:
- If the audio is slowed down, a party popper goes off to celebrate success and both are rewarded with a 1 minute chair massage.
- If the audio is reversed, a party popper goes off with colorful lights flashing to celebrate success.

Negative consequence include:
- If progress is not made through consecutive messages, a foam dart is shot at both of their heads.

With these tests, we are trying to answer these questions:
- Does having shared experiences induce empathy for the other?
- Does having shared experiences change behavior and make both parties more incentivized to work together?
- How do positive, negative, or both types of consequences affect behavior?

Trinity DHP: Mind Mapping

The idea of Mind Mapping is to solve mass volume support issues by linking customer actions on their computer to problems and frustrations. For example, repetitive clicking on a single button might indicate that an issue has occurred and the user cannot proceed to the next step. Here is a list of some possible parameters we can track:
- Speed of use
- Mouse pressure
- Mouse darting
- Changes in typing speed
- Excessive clicking
- Transfer from page to page

The common issues and frustration points can be detected and fixed by SAP support if the same behavior can be observed across a large number of users’ computers.

Next Steps

Our next steps are to actually run these tests in the next day or so and use the information to revise the scenario. We are also having a call with Neil Greathed Monday morning, who is head of Customer Experience at SAP to gain more insight into what customers say about SAP.
Design Review Agenda
1. Motivation
2. Vision
3. User Testing
4. Trinity DHP
5. Next steps

Motivation
In the previous DHP versions, we focused on emotion and shared experience as ways to convey empathy. However, we were unsure of where we could take those ideas, and took a step back to consider how else we could create an environment for empathy. What we ended up coming to was a previous idea we had last quarter - a support kiosk.

Vision
The support kiosk is a central location for help situated in the office building of an SAP customer or in a common area among multiple businesses. It has a touchscreen computer with full access to SAP support resources, including KBAs, notes, tutorials, etc. It is also a facility for quick and easy communication to support via message, phone, or video. The benefits of an SAP support kiosk may be:
- For the customer, it provides a vital resource in maintaining their systems and receiving efficient and centralized support.
- For SAP, it provides a presence of SAP in the customer’s office, demonstrating a dedication to service and support to their clients.

User Testing
User: Garrett, Tech Experience Level: Advanced
- Pros:
  - Didn’t have to explain as much because remote connection allowed support to see his problem.
  - “It was different and interesting”
  - Kiosk made him feel more prepared as it changed his environment.
- Deltas:
  - Would have liked view only and then allow support remote control only when
needed.
  ○ Knowledge that session could be terminated at anytime.
  ○ Support person was too large. A smaller projection would be preferred.

Next Steps
We are going to run some more tests with our current prototype to gain more insight into user experience with the kiosk and its facilities.
  ● What size projection of support would be comfortable for the customer?
  ● What procedure of control privileges would be comfortable?
  ● Improve “touch” interaction and test effect on customer.

The theme for our dark horse prototype is addressing the issues of user frustration and support empathy. From our need finding and CEP activities, we've identified frustration and empathy as the major communicative weaknesses in the current SAP support community. With this in mind, we set about mapping the journey through an automated support robot that caters to individual personalities, technical abilities, time constraints and preferred support engagement. The ideal result for the dark horse is a uniform content user platform, where information and solutions are delivered in a clear, concise and user-preferred manner.

We also have another simplified support robot idea, which is a small portable version of the kiosk. The idea of this robot is to bring SAP support to the customer's desk. The robot has two screens. One is on its head and for the video call, showing the camera feed on the support side. Another is on its body, showing some additional information that the support engineer wants the customer to see. The robot is connected to the customer's laptop and has the ability for remote connection and control.
A.4.2 Funky Prototype Handouts

**DHP User Testing**

**Test Scenario:**
We had each customer solve a problem and receive support first at their own laptop and then at the kiosk to compare their two experiences.

**Results:**
- Telepresence made experience more engaging and personal.
- One user liked that support video did not take up his screen space.
- User more focused in kiosk and thought support was more legitimate.
- Remote connection was very useful.
- Prefer no headset - kiosk should have a mic and speakers.
- Distance to kiosk a barrier to use.
- Prefer if something could bring the experience to them.

**Funky Prototype**

**Motivation:**
Our goal in building the support kiosk was to create a more engaging support environment for the customer. By setting up a telepresence-like workstation, we wanted to bring a high-touch experience to the low-touch user. Through the user testing, we found that users were more engaged, but most of them acknowledged that they preferred to work on their own desk, and the distance of the kiosk was a concern. Thus, we wanted to develop something that could bring the features and experience of the kiosk to the customer’s desk - in the form of a support robot.

**Vision:**
- Compact support “Ro-Box” for storage and portability.
- Two screens - Body screen and pull-up head screen.

**Meet Sal, Your SAP Pal!**
- **Sal Mode (no video call):**
  - Head screen displays robot AI.
  - Body screen displays SAP-only support information and resources.
- **Support Mode (video call with AGS):**
  - Head screen displays camera feed of support consultant.
  - Body screen displays additional information that support consultant may share to the customer.
- Detachable keyboard for body screen.
- A greeting hand to start/end video calls.
- Connection to the customer’s computer for remote connection.

**Steps to Version 2.0**

- Finish CAD model of Body over the weekend
- LaserCAMM Body in Room 36 on Monday
- Assemble and integrate components by Tuesday
- Perform user testing by Thursday
Team SAP Funky Prototype Version 2.0
Vinh Bui, Yongbin Han, Robyn Nariyoshi
Kevin Burke, Mike McHugh, Vinicius Serra, Barbara Silva

Problem Statement
An IT person who needs to efficiently collaborate with SAP Support to solve their problem at the convenience of their own desk.

Solution Statement
A tool for quick and easy communication with SAP that also provides a simple UI to support resources.

Why the Robox?
- How can we create an engaging support environment at the user’s desk?
- How do we want to achieve a seamless transition from self-searching mode to support mode?
- How can we simplify support to a “one button” concept?
- What software functions are necessary for support situations?
- How can we implement an AI into support?

Functions
- Pull-up head screen
  - Head screen stored in body and pulled up when needed.
- Pull-put keyboard
  - Keyboard stored in body and pulled out when needed.
- Video Support - Head screen
  - Head screen provides video chat support and AI (“Sal”) interface.
- Provide support resources - Body screen
  - Simplifies search of SAP support resources.
  - Provides remote viewing of Support Consultant’s computer

Features
- Portable
  - User can use it at any location.
- Engaging
  - Provides a support presence at the user’s workstation

Figure 1. Sal your SAP Support Pul...
User Testing
Our primary objective was to compare the experience of the Robox to the kiosk. Was the formfactor small enough for portability and convenience? Was it big enough to create an environment suitable for support? Were the screens useful for the support process?

One thing we learned so far is that the touch interface must be more appealing to use than the keyboard, otherwise our user would be more inclined to use their own computer. We are going to test our previous DHP users on a new scenario in receiving help to choose a restaurant for a meal.

The Road to Functional
Recent Benchmarking/Needfinding
- Problems arise because customers are doing something not considered “standard.”
  - complexity of implementation
  - customization
  - updates
  - customers get mad when “it isn’t SAP’s problem”
- Problems become more “how to” and less technical as things move into the cloud.
- Best Practices
- SAP Community Network (SCN) - Gamification
A.4.3 Functional Prototype Handouts

As we mentioned in our previous findings, the best support is one that’s right there with you. In order to realize this, we want to create a tangible interface for remote collaboration. This led us to the ideation of a portal-inspired telepresence system with a shared table-top interface.

**Features:**

- **Personal space vs. Group space**
  - A key element in physical meeting spaces is that every participant has their own personal space (for notes, laptop, etc.) with a common focal point (the central area of the table) which is the group space.
  - Participants will have their own personal space which they can physically perform “sharing” actions. (e.g. moving a document from personal space to group space.)

- **Real-time "white board" table**
  - Participants will all be able to share real-time handwritten notes and drawings like they would be able to in a physical meeting space. It would mimic the feeling of sharing a physical whiteboard together.

- **Eye Contact**
  - Using a telepresence system, users can make “eye contact” commanding attention and engaging each other in the conversation.

- **Additional portals**
  - In the event customer and multi-department communication is required, there are additional portals that users can enter.
Benchmarking
- Spatial Partitioning: personal territory vs. group territory
- Four types of gestures: Point, Spatial, Kinetic, and Other
- Workspace Awareness: Consequential, Feedthrough, and Intentional Communication

![Figure 1: Arm overdisplay](image1)

TelePresence Tech:
- Direct eye contact alignment-create a real sense of presence.

![Figure 2: 3D Eye Contact TelePresence System](image2)

Trinity Functional Prototype
A user interface and interactive search engine for solutions.

Many user issues already have documented solutions within the present support network. Primarily, current self-search functionality is only useful if you know your problem as defined by SAP. This prototype provides a means of obtaining the information users want in their own words.
- Enable users to define their issues and acquire the related information intuitively and quickly.
- Introduce the feeling that the system is working with you to define the problem.
- Emphasize empathy and understanding through the delivery of the solution.
Team SAP Functional Prototype Version 2.0
Vinh Bui, Yongbin Han, Robyn Nariyoshi
Kevin Burke, Mike McHugh, Vinicius Serra, Barbara Silva

Road to Functional Version 2.0
● Embracing the notion of help being right next to you.
● Relaxing environment separated from your workspace.

Vision - SAP Booth

Features/Functions:
● Side-by-side video call
  ○ A side screen for video support to create the “next to you” feeling.
  ○ Most of time both customer and support engineer will look at the front screen and they can turn towards each other for face-to-face conversation.
● Foldable table
  ○ A table can be pulled out from the wall for customer to use.
● Front computer for system access and remote connection
  ○ When video call is not conducted, the front computer is used as an interactive search engine for solutions.
  ○ During the video call, customer can connect their laptop to the screen so that both parts can see the issue.
● Multi-degree adjustable chair
  ○ The chair is able to recline for relaxation.
  ○ The user can slide the chair forward and backward for a comfortable position.
● Hand gesture overlay
  ○ Relays image of remote partner’s arm/hand location to provide visual cues when communicating information.
System Diagram

Figure 2: System Diagram

Next Steps
Benchmarking:
- Interview with Warner Bros. tomorrow
- Interview HelpSU
- Observe interactions with Meyer Tech Desk and CS tutoring.

Prototype:
- Mount TV and webcam
- Set up front table and computer
- Develop video call functionality
- Investigate gesture overlay
Team SAP Functional Prototype Version 3.0
Vinh Bui, Yongbin Han, Robyn Nariyoshi
Kevin Burke, Mike McHugh, Vinicius Serra, Barbara Silva

Vision - SAP Portal
Our goal is to provide AGS and the IT technicians of SAP’s client companies with an efficient communication vehicle.
- Provide a centralized support portal for the customer
- Increase transparency of ticket statuses
- Innovate a more intuitive method of independent problem definition
- Create a natural interaction experience between IT and AGS

Customer Interviews
- Klaus Krug, Project Manager at Warner Bros. (MaxAttention)
  - Average of 10 on-site SAP employees
  - 3 weeks reduced to 3 days
  - Early human to human interaction
- Ron Grabyan, Data Warehousing Manager at SCE (Enterprise)
  - Getting a phone call is half the battle
  - Need better way to search the OSS Note system
  - Need more transparency and timely updates

Scope:
- The scope of this project will entail enhancing the support experience for SAP’s customers. Our focus will be on the needs of the client company’s IT technicians and their wants from SAP’s support department. We will not be focusing on security or access issues commonly related in confidential customer data.
Our prototype provides the basic interface of this IT and AGS interaction. With this simple set-up alone, users have already found it to be much more natural and interactive versus the typical video-conferencing methods.

**Functions**
- Side by side video chat
- one-touch video call
- record button
- Ticket bulletin board
- screen sharing

**Lessons Learned**
- Could see motion but no cue beyond that.
- Left or right side did not matter.
- Preference to a screen more forward and at an angle.
- Users felt both obligated or not to look at the support consultant.
- Liked the separation of the screen (limits inattention).
- Execution of the physical interface (acoustics, positioning, etc.) will be extremely important.
- Felt more realistic.
### A.5 Winter Quarter Brochure

#### Purpose
How many times have you been put on hold, waited days to weeks for a reply, and endlessly rerouted by customer support?

**MISCOMMUNICATION - LONG RESPONSE TIMES - LACK OF UPDATES & TRANSPARENCY**

Whether it’s by phone or ticket messages, customer support has a tendency to increase customer frustration due obstacles in communication.

**How do we redesign the support experience?**

#### Background
SAP is one of the world’s largest software companies, providing enterprise software to help businesses manage operations and customer relations. SAP is looking to define how their support organization, Active Global Support (AGS), should evolve to serve an ever-increasing number of users. To this end, it will be essential to scalably provide an accessible and seamless communication tool between customer and support.

#### Vision
Provide the business and IT users of SAP’S customers with an accessible telepresence system tailored to convey an engaging and efficient support experience.

#### Requirements
- Improves efficiency of customer support communications
- Maintains or improves customer satisfaction
- Scalable to 1 billion users
- Provides a centralized support portal for the customer.
- Reassures customer that they are being helped.
- Empathizes with a customer by creating a personable interaction experience.

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#### Our Team
- **Kevin Burke**
- **Barbara Couto**
- **Michael McHugh**
- **Vinicius Serra**
- **Vinh Bui**
- **Yongbin Han**
- **Robyn Nariyoshi**

#### Corporate Liaisons
- **Katharina Rock**
- **Tony O’Donell**

---

#### Team Coach
- **Vinod Baya**
**The ultimate resource in customer support**

### Design Overview

- A customer can schedule an appointment with a support consultant to quickly diagnose and resolve the problem.
- Both users can interactively share a remote desktop using the touchscreen.

### Development

- A front-facing telepresence screen with a touchscreen computer to access SAP support resources.
- A portable version of the kiosk, with a pull-up screen for video calls to AGS.

### Lessons Learned

- Users tend to focus on the computer instead of the support person.
- Portability is convenient, but screen size too small for more involved interaction.
- The relative size of the person is an important consideration.
- Did not prevent distractions of outside environment.

### Strategy

- Develop an interactive search engine using a touch and voice interface.
- Investigate the required audio and visual components to simulate a real experience.
- Design a remote desktop interface where users can intuitively share pointer control.
- Prototype different screen positions and visual attention cues.

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SAP Engage: Support at your side

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Special thanks to the Stanford and Trinity teaching team and SAP for their continued support and advice. Contact us at 310-sap-global@lists.stanford.edu
A.6 Winter Quarter Presentation

![SAP ENGAGE](image1)

**TEAM SAP**

Vinh Bui | Yongbin Han | Robyn Nariyoshi

Michael McHugh | Kevin Burke | Vinicius Serra | Barbara Couto

Tony O’Donnell | Katharina Rock

![队员照片](image2)
- PROBLEM DEFINITION -
- MISCOMMUNICATION -
- LONG RESPONSE TIMES -
- LACK OF UPDATES & TRANSPARENCY -

How do we redesign the support experience?

Providing enterprise software to manage operations and customer relations

Active Global Support (AGS)
“Need a better method to define our problems”

“Early human to human interaction drastically speeds up the resolution process”

Ron Grabyan, SCE
Klaus Krug, WB

VISION

Self-Service Support
Remote Support
Remote Support

- Communication
- Clarity
- Information
- Personable
- Connection
- Gestures
- Body Language
- Attention

3 weeks
3 days
DESIGN JOURNEY

1st Stop: Support Kiosk

- Dedicated environment for SAP service and support
- A one-stop solution terminal with all SAP support resources

User Feedback:
- Environment increases engagement and focus
- Users don’t want to walk too far

DESIGN JOURNEY

2nd Stop: Robox Support Pal

- Portable version of the Support Kiosk
- Brings support to the user

User Feedback:
- Screen size matters
- Easy to be distracted

DESIGN JOURNEY

Support ➔ Help
DESIGN JOURNEY

Current Stop: Support Booth

- Support consultant is right next to you
- Creates a more natural help environment
- Change remote tech support to a side-by-side conversation

DESIGN JOURNEY

User Feedback

- More realistic for help
- Users prefer a screen more forward and at an angle
- Visual attention cues are necessary
Interactive Search
Side-by-Side Telepresence
Attention Cues
Pointer Control
A.7 Team SAP Briefing Packet

Team SAP Briefing Packet
Penultimate Review
May 13, 2014

Robyn Nariyoshi, Vinh Bui, Yonbin Han

Stanford University &
Trinity College
1. EXECUTIVE SUMMARY

SAP, a global leader in the delivery and support of enterprise resource management software, seeks to improve the way businesses, big and small, run their day-to-day activities in order to increase efficiency, and ultimately, profitability. Given the far-reaching scope and massive scale of their typical customers, their software is understandably complex with a steep learning curve. This has lead to the development of SAP’s Active Global Support, or AGS network, which provides 24/7 support to SAP customers regardless of time zone. SAP is on a mission to grow their user base to 1 billion end users by 2015. As their user base expands, their support network must also evolve to meet rising demand. The challenge posed to this year’s ME310 team is to look into this evolution and better define what key changes need to happen in order for SAP to support 1 billion users.

A team consisting of three students from Stanford University in Stanford, CA, USA and four students from Trinity College in Dublin, Ireland has come together to work toward a solution to this very big challenge. Our initial focus was empathy: first towards creating empathy for the user and then creating empathy for the support consultant. During this process, we kept trying to work around “the ticket,” a mandatory step to contacting SAP and communicating your problem. This ticket was a barrier. Customers would simply get more frustrated writing a ticket, and even more frustrated due to the lack of transparency after submitting it. We decided to take a step back to imagine the process without a ticket or implementing the ticket in a different way.

During our need finding and interviewing customers of different support levels (high priority to low priority), we learned that early human-to-human interaction led to a much faster resolution process. We realized we needed to design a new process that would encourage this early human-to-human contact while also eliminating the troublesome ticket on the customer end. What if there was no ticket and you could be connected to a real-life person immediately? This led us to the evolution of SAP Engage and a new AGS role called “The Dispatcher.”

The dispatcher’s role is to be a friendly face and the first point of contact for the customer. The dispatcher will extract all the necessary information from the customer and then if possible, solve the quick and easy problems, or instead send it to the appropriate product support group. With SAP Engage, we are
able to put the dispatcher and customer side-by-side. Creating a supportive “on your side” feeling versus the more confrontational yet traditional face-to-face set-up. We envision an SAP Engage at every client’s office or in common commercial spaces such as banks. This will ensure that an SAP dispatcher is easy to reach whenever the customer has a problem.
2. Guiding Questions

Q. What is Engage?
A. SAP Engage is a solution portal for SAP’s clients. Clients come to Engage to speak directly to an SAP dispatcher who is able to solve simpler problems and/or extract all the necessary information for AGS to solve more complicated problems.

SAP Engage is a side-by-side telepresence system that literally puts a support consultant at your side. This side-by-side set up facilitates more natural communication in a support scenario between customer and dispatcher by clearly differentiating focus points. The other person can tell when you are looking at the screen and when you are looking at them. It is much less confrontational than the traditional face-to-face set up, making people feel more at ease to use a video calling system with a stranger.

Q. How does Engage work?
A. Client employees will enter into Engage when they have an issue. They will be welcomed with a touch screen that has two options; Self-Search and AGS Video Call.
   a. Self-search:
      i. The self-search system will be an interactive and user-defined method for finding “how-to” solutions to SAP products.
   b. Video Call:
      i. The video call will directly connect the user to an AGS Dispatcher. These dispatcher’s are knowledgeable with basic troubleshooting methods but their real expertise is knowing exactly which problems go to which group and that AGS consultants have all the necessary information from the customer. Once the AGS Consultant receives the ticket, because they have all the information they need, they are able to provide approximate estimates of how long each problem will take to solve and provide that transparency to the customer.

Q. Who is Engage for?
A. Engage is for everyone! It will be easy-to-use for customers who’ve just learned how to use SAP products. It will also allow experienced users to quickly relay the information SAP needs and maintain transparency to ease the customer’s worries.

Q. How will Engage increase scalability? (1 billion users)
A. Engage increases scalability by eliminating time-consuming “ping-ponging” of tickets. By gathering all the correct and necessary information in the beginning, we can eliminate the ping-ponging of tickets between customer and support. Secondly, by training the dispatcher to be an expert on knowing which problems go to which product support group, we can eliminate ping-ponging between support consultants. This will significantly decrease the amount of time spent on each ticket.

Q. Does Engage eliminate the ticket altogether?
A. SAP Engage does not eliminate the ticket completely. The ticket is still essential for SAP to track and document product issues. It is however, a hassle on the customer’s end, making the solution process more frustrating than it needs to be. By eliminating the ticket on the customer end, the AGS Dispatcher will be able to write tickets in SAPs lingo ensuring clarity of the issue on the consultant’s end.

Q. What is the role of a dispatcher and why is their role necessary?
A. The role of the dispatcher is to quickly tackle the easy-to-solve problems and/or gather all the necessary information that AGS needs to solve their issue. This role is necessary because the ticket itself is a very complex process. New customers often have difficulty completing these tickets and either don’t fill in the necessary information or don’t send it to the correct product group. This causes “ping-ponging” the annoying back-and-forth passing off of a ticket. This can be from customer to consultant or consultants of different product groups passing it off to other groups because it’s not their problem area.

Q. How will the dispatcher know what information to take down if they’re not the one solving it?
A. AGS has a set list of requirements that is able to solve 90% of the problems.
  • Does SAP have access to the system?
  • Describe the problem
  • What is your issue and how do we recreate it?
  • What is your environment?
  • What products are you running?
  • What kind of data?
  • Etc.
3. Design Requirements

Introduction

The following design requirements were developed to address the requirements for the “real-life” feeling of the system and the ease-of-use for the customer.

3.1 Assumptions

- Customers will still prefer a human-to-human interaction in the future.
- SAP will continue to grow their customer base.
- SAP Engage will be located in an indoor environment.

3.2 Functional Requirements

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Metric</th>
<th>Rationale</th>
<th>Does system meet requirements?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video System</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide life-sized projection of person</td>
<td>Projected image size of person = to size of actual person</td>
<td>To create a realistic feeling of the person being there next to you.</td>
<td>Yes. Person size is equivalent to person in real-life.</td>
</tr>
<tr>
<td>Provide and relay clear video feed of</td>
<td>Minimum download/uploads speed to support a video call 128kbps/128kbps</td>
<td>To ensure clear communication, we must have an adequate connection to avoid lags, cutting in and out, and anything else that may contribute to miscommunication</td>
<td>Yes.</td>
</tr>
<tr>
<td>support consultant and customer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple initiation of video call</td>
<td>Video call will be initiated in 3 steps or less.</td>
<td>N/A Make this system fool-proof. ANYONE can use it.</td>
<td>Yes. Video call is initiated in three steps.</td>
</tr>
<tr>
<td>Audio System</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microphone must relay clear feedback</td>
<td>Microphone should pick up sounds within a 5ft radius and eliminate excess noise</td>
<td>This will allow the voice of the user to be heard clearly from the other end</td>
<td></td>
</tr>
<tr>
<td>Speaker system/sound dome must provide clear audio</td>
<td>Direct sound waves to ears from a height of 2m to a person sitting below.</td>
<td>The concentration of the soundwaves will reduce the need for a high audio volume. It will direct the sound straight to the user and be more discrete (less distracting to those around the system) and eliminate the need for headphones.</td>
<td>N/A Speaker not in yet.</td>
</tr>
</tbody>
</table>
### 3.3 Physical Requirements

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Physical Requirements</th>
<th>Rationale</th>
<th>Does system meet requirements?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound must be isolated to each working space</td>
<td>The volume of the audio system should reduce 70% outside the working space</td>
<td>Each Engage circle can provide four independent Engage in maximum. Users should be able to work simultaneously and should not be disturbed by the sound coming from other engage.</td>
<td>N/A. Speaker not in yet.</td>
</tr>
<tr>
<td>Overall System</td>
<td>Customer's issues should be gathered quickly and efficiently</td>
<td>Customers will be working in their offices. This system must not be a distraction to others that could be working nearby</td>
<td>N/A. AGS consultants will be coming in on Thursday to test.</td>
</tr>
<tr>
<td>Video System</td>
<td>Customer must be able to communicate entire problem in less than 15 minutes.</td>
<td>Engage is a solution terminal which customers come to for help. In order for this system to be justified over the traditional ticketing system, we must maximize the efficiency of the time in the booth.</td>
<td>N/A. AGS consultants will be coming in on Thursday to test.</td>
</tr>
<tr>
<td>Audio System</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall System</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3 Physical Requirements</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CAD Drawing of Engage with Basic Components
CAD Drawing of Camera Mount
1. “The Ticket” – Show the EXPE visitors the complicated ticket process of today.
2. “The Customer” – Show the customer side of SAP Engage. Have the EXPE visitors try out the interactive self-search system and initiate the video call.
3. “The Dispatcher” – Show the dispatcher side of SAP Engage. One of our team will be acting as dispatcher during the fair. Visitors will be able to come around and see the set-up of the other side.
4. “How it Works” – We’ll show the over-view of the re-designed support process, streamlined with the introduction of the new dispatcher role.
Dimensions for Projector in Reference to the Centerpost
Dimensions for Mounting Plate of Projector
- Sun 1
  - Prepare for presentations

- Mon 2
  - EXPE Rehearsal

- Tue 3
  - SUGAR EXPE 2014
  - 9:30 am - EXPE 100
  - 1 pm - EXPE Trade

- Wed 4

- Thu 5

- Fri 6

- Sat 7

- Sun 8

- Mon 9

- Tue 10

- Wed 11

- Thu 12

- Fri 13

- Sat 14

- Sun 15

- Mon 16

- Tue 17

- Wed 18

- Thu 19

- Fri 20

- Sat 21

- Sun 22

- Mon 23

- Tue 24

- Wed 25

- Thu 26

- Fri 27

- Sat 28

- Sun 29

- Mon 30

- Tue 1

- Wed 2

- Thu 3

- Fri 4

- Sat 5
A.8 Spring Quarter Brochure

SAP Engage is a solution path builder and side-by-side telepresence system for collaborative problem solving. As a kiosk located in a customer's office and a workstation for SAP support consultants, Engage is an environment which bridges the physical distance between customer and support, enabling each user to naturally communicate and efficiently solve technical problems.

- **10-point touch monitor** provides interface for user-refined problem definition or information sharing.
- **Side-by-side setup** mimics in-person support scenarios. Allows for distinction of user's focus.
- **Projector displays life-size image of collaborator.**
- **Camera at eye level** enables eye-contact between collaborators for realism.
- **Matched desk projection** to create feeling of shared workspace.
- **User's personal laptop** where technical problem needs to be solved.

DESIGN TEAM: Yongbin Han, Vinicius Serra, Vinh Bui, Robyn Nariyoshi, Michael McHugh, Kevin Burke, Barbara Couto
SAP is one of the world’s largest enterprise software companies, helping businesses manage their operations and customer relations. With their rapidly expanding customer base, SAP must evolve their support network to scalably provide accessible, seamless communication between customer and support.

Background

Current Process

Customer submits support request online. Request goes into queue for undefined period of time, leaving customer in the dark. Support receives request. Unclear requests get “ping-ponged” between departments or sent back to customer for clarification.

Solution

ONE: Solution Path Builder

A problem definition system that works together with the user to offer the best mix of solutions, freeing them from having to contact support.

TWO: Contact Support

One button touch to initiate video call with customer support.

THREE: Open Communication

Open channel of communication and collaboration between customer and support to quickly diagnose or resolve problems.

FOUR: Support Workstation

This will be the future workstation for SAP Dispatchers, who diagnose customer problems and route them to the correct product team for processing.

<<This impersonal system repeats, leading to inefficiencies and customer frustration. <<

CORPORATE LIASONS
Katharina Rock  Tony O’Donnell  TEAM COACH  Vinod Baya

Trinity College  Stanford University
A.9 Spring Quarter Poster

SAP Engage is a solution path builder and side-by-side telepresence system for collaborative problem solving. As both a kiosk located in a customer’s office and a workstation for SAP support consultants, Engage is an environment which bridges the physical distance between customer and support, enabling each user to naturally communicate and efficiently solve technical problems.

**The Ultimate Support Experience**

- **10-point touch monitor** provides interface for user-refined problem definition or information sharing.
- **Camera at eye level** enables eye-contact between collaborators for realism.
- **Matched desk projection** to create feeling of shared workspace.
- **User’s personal laptop** where technical problem needs to be solved.
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**DESIGN TEAM** Yongbin Han Vinicius Serra Vinh Bui Robyn Nariyoshi Michael McHugh Kevin Burke Barbara Couto

**CORPORATE LIASONS** Katharine Rock Tony O’Donnell **TEAM COACH** Vinod Baya

**Trinity College** **Stanford University**
A.10 Spring Quarter Presentation
I BILLION

- SCALABILITY -
- PROBLEM DEFINITION -
- LONG RESPONSE TIMES -
- LACK OF TRANSPARENCY -

How do we redesign the support experience?
APPENDIX A. APPENDICES

Support requests

- How to: 92%
- Fix: 8%

Solutions

- Available: 70%
- Undocumented: 30%
CUSTOMER EMAILS ARE NOT ARRIVING IN MY INBOX

CUSTOMER EMAILS ARE NOT ARRIVING IN MY INBOX
Symptom
ERMS workflow for inbound pull mails (agent inbox as IC mail provider) is not optimal the E-Mails are not found in the agent inbox by an IC agent.

Environment
CRM 2007 and above

Reproducing the issue
1. Set up ERMS workflow for inbound E-Mails
2. Send E-Mail to the agent inbox
3. The E-Mail should be in the inbox of the search result is not found.
APPENDIX A. APPENDICES

Current Process

- **Customer writes support ticket**
- **Processor searches for solution**
- **Solution Found**

- **Customer submits support ticket**
- **Processor requests more information**
- **Customer replies**
- **Ticket sent to wrong product team**

- **Processor requests more information**
- **Customer replies**
- **Ticket sent to wrong product team**

- **Cycles of inefficiency**
  - **or “ping-ponging”**

---

**ENGAGE PROCESS**

- **Customer calls Dispatcher using Engage**
- **Dispacher submits support ticket**
- **Ticket enters queue**
- **Processor searches for solution**
- **Solution Found**

**Dispacher ensures assignment to correct product team**

- **All information gathered upfront by Dispatcher**
- **Problem described collaboratively, verbally, and visually**

---

- **SCALABILITY**
- **PROBLEM DEFINITION**
- **LONG RESPONSE TIMES**
- **LACK OF TRANSPARENCY**
PROBLEM

70%
Solution Path Builder

30%
Side by Side Telepresence

SOLUTION
Thank You!
A.11 Engage User Interface Code

```html
<head>
  <script type="text/javascript" src="http://www.skypeassets.com/i/scom/js/skype-uri.js"></script>
  <script type="text/javascript" src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.min.js"></script>
  <style>
    body {
      text-align: center;
    }
    h2 {
      font-size: 36px;
    }
    .buttons {
      padding-left: 240px;
    }
    .buttons li {
      display: inline;
    }
    #search-button {
      color: white;
      background-color: gray;
      font-size: 20px;
      padding: 30px;
    }
    #call-support-button {
      color: white;
      background-color: gray;
      font-size: 20px;
      padding: 30px;
    }
    #SkypeButton_Call_vbui22_1 {
      display: inline-block;
      position: relative;
      top: 24px;
      left: -220px;
      opacity: 0;
    }
    p#SkypeButton_Call_vbui22_1_paraElement a img {
      width: 183px;
    }
  </style>
</head>
<body>
<table cellpadding="0" cellspacing="0" border="0" height="100%" width="100%">
<tr><td align="center" valign="middle">
  <img src="EngageTshirt.png" id="engage_logo" align="absmiddle">
  <ul class="buttons">
    <li>
      <button id="search-button">Search</button>
    </li>
    <li>
      <button id="call-support-button">Call Support</button>
    </li>
  </ul>
</td></tr>
</table>
<script type="text/javascript">
  Skype.ui(
    "name": "call",
    "element": "SkypeButton_Call_vbui22_1",
    "participants": ["vbui22"],
    "imageSize": 32,
  );
</script>
</body>
</html>
```
"video": "true"
});
</script>
</div>
</li>
</ul>
</td></tr>
</table>
</body>
APPENDIX A. APPENDICES

A.12 Skype Full Screen Code

While 1=1
Opt("WinTitleMatchMode", 1)
WinWaitActive("Skype™ - mikemchugh789", "SAP Support")
Send("!{ENTER}")
WEnd
A.13 Team Picture