Systems Thinking Applied to a Telecommunication Startup Company: The nexiwave Case

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Abstract

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Telecommunication technology has had a profound impact on our daily lives. It has enabled organizations to be more competitive by reducing the need for physical proximity and fostering collaboration. In recent years especially, data networks have been especially prominent, with the obvious example being the Internet. Work that was once conducted by phone and fax is now increasingly being done by VoIP, e-mail and IM. For years telecommunication companies had focused in making available communication between person-to-person as well as multi-person and mobile communication, but none had focused on the content of the voice communication.

This thesis presents a functioning product to address the needs of such users by applying a systems thinking approach to visualize and manage complexity through the whole process from the product idea generation to the business model. A detailed assessment of the users' needs and description of the product's user-centric design is provided. User experience design principles and legal constraints were considered throughout the development process.

We propose to add value and differentiate the product by providing users with options to manage the content of their calls. At the most basic level, we give free audio-to-text transcripts with built-in features that could users save time and be more productive.

nexiwave was built using principles promulgated in the System Design and Management Program classes.

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To my parents Carlos and Sara, for all their love, support and lessons during all my life.
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Para mi Mamaita en el cielo.

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1. Introduction

1.1Objectives

The first objective of this thesis is to discuss how design and development of innovative products can be done at a startup company in the telecommunications industry when applying holistic systems thinking methods. The case of PC-NG, which delivers its core product--nexiwave--for the management of user's conversations, will demonstrate the process and methods of product design and development and offer a roadmap to follow for startup companies in this field.

Another objective of this thesis is to explain the business model we used as a startup company when introducing nexiwave into the market. We show the assumptions, challenges and strategy, and demonstrate a business plan which takes into account many factors of the ecosystem environment. Furthermore, we analyze the monetization of recorded conversation content so that users can have a manageable, searchable text related to their conversations, meetings and recorded memos.

One last objective is to demonstrate the technology advancement curve and its impact on value capture: How the value chain changes as technological advancement of an industry proceeds. The nexiwave case is used to prove that a company should always focus on the tight integration point of an industry, where most value is being captured. Our goal is to apply system thinking in this industry strategy level.

1.2Motivation

Our motivation is based on the need to have thoughtful procedures in place when designing a new product in a startup company that is full of entrepreneurial spirit but lacking in formal procedures and resources. Systems thinking, in this context, has helped us in understanding the complexity of a startup with an innovative product.

We were also motivated by the fast advancement of the telecommunication industry in recent years; in particular, the widespread use of Voice over Internet Protocol. The merging of the internet world and traditional voice world has lowered the barrier-to-entry of the voice world dramatically. We believe a strategic decision to focus on next generation (3-5 years) customer needs is key to obtaining not only a strategic, but also a tactical advantage. The motivation of PC-NG Inc. (Personal Communication – the Next Generation), the parent company that owns nexiwave.com, is to obtain the high ground in the next generation of industry battle. The content focus of nexiwave is a direct result of this systems thinking.

2. Literature Review

2.1Product Development

Product Development is a process that is employed to conceive, design and deploy a product. According to Otto (Otto at al. 2000), the process can have three high level phases:

- Understand the opportunity to create something new or improve something in the market.
- Develop a concept of what the product will be like.
- Implement the concept.

Understanding the opportunity starts with a vision for a new product which does not exist and that does something that is needed. Then, the vision should be evaluated through market analysis to know whether it could be successfully realized and that it can generate profit (monetary value or social value). After the market analysis is done, the team must analyze the customer needs, and analyze competitive products--performing a complete competitive analysis.

Developing a concept starts by designing general market specifications and functionalities of the product and strategically deciding its positioning in the market. Then, the team needs to determine what specific functionality (input, outputs and transformations) the product should have in order to satisfy the users. Once the team knows the functionalities, an architecture should be produced in order to distinguish the interfaces among all the subset of components of the product with the goal to produce the already defined functionalities. After that, the team should come up with different concepts to solve the problem and choose one among all of them.

Implementing a concept starts by giving form to the concept and preparing specifications of the components; then modeling the components in their real context is necessary in order to attain optimal accuracy. The design is then progressed by using the metrics and specification developed previously, and by making sure that the product works properly and passes all the tests. At this stage, the prototype should work and meet the needs of the users.

The following graph depicts these phases:

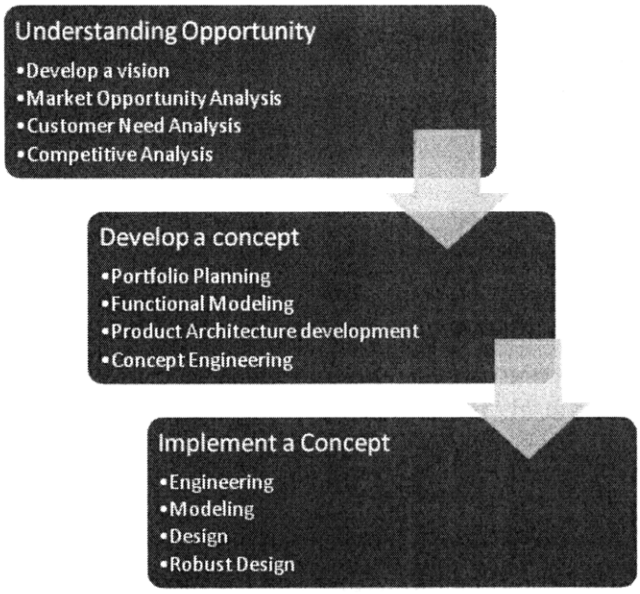


Figure 1 Product Design and Development Phases according to Otto

Eppinger and Ulrich (EPP at al. 2008) divide the product development process into six phases--which also go along with the three high level phases proposed by Otto.

Figure 2 Product Development Process as Eppinger and Ulrich

For any company, particularly for a start up company, it is very important to have a clear "vision statement" during the product development in order to direct the company's creative focus. The vision statement can guide the process with the goal of targeting the right user needs (Cusumano at al. 1988); thus, also helping companies focus and their positioning in the right market.

Eppinger & Ulrich (Eppinger at al. 2008) suggest that performance of the product development process should always be evaluated and the performance of the process can be measured by:

- **Product Quality:** determines if a product satisfies the customer needs, and if it is robust and reliable.
- **Product Cost:** determines the profitability of the product.
- **Development Time:** determines how responsive the company is to competitive forces and technology development.

- **Development Cost:** determines how much the company is spending to develop the product.
- **Development Capability:** determines if the development process of the company can allow future products.

2.2Assessing User Needs

Finding the right user needs to consider is the most important part of the design and development of an innovative product. In order to achieve a success need finding, there are some principles by Robert Becker and Dev Patnaik (Becker at al. 1999) that we followed in order to solve people's problems:

- **"Look for needs, not for solutions"** this keeps open all possible solutions without sticking to a specific solution that could be the wrong one for the need.
- **"Make research and design seamless"** the research is done based on the information needed for the product design, then design is done with the information gathered from research; both phases are done knowing the requirements from each other phase.
- **"Go to the customer's environment"** it is important to understand the needs by observing the user in his own context and also interviewing customers in their own environment.
- **"Look beyond the immediate, solvable problem"** this will allow you to plan for future issues that could be fixed later.
- **"Let the customers set the agenda"** allow users to guide the discussion and activities so some surprises can be discovered.
- **"Collect eclectic forms of data"** not only words should be collected from users; also pay attention to facial expression and body language--noting emotions and the customer's relationship with his work.
- **"Make findings tangible and prescriptive"** in order to do a better understanding of needs, you could do drawings, pictures, voice recording and/or video.
- **"Iterate to refine the findings"** this could be done many times in parallel with design in order to refine the product in each of the iterations.

Besides considering the needs of the users, we took into account the behavioural change needed when designing the innovative product. (Gourville 2006) creates a behavioural framework in order to understand the market potential of an innovative product. The framework involves:

- the new product or technology,
- the consumer who will adopt the new product,
- and the company which designs the product

As an innovation creates value for consumer, it also demands a behaviour change in the user. This generates a conflict, says Gourville: "companies create value through product change, but they capture that value best by minimizing behaviour change". This could be viewed in the following matrix (figure 3) that shows how an innovative product can succeed based on how much change in user behaviour is required versus the payoff of the product use.

- ***Easy sells:*** are products that bring few changes and that generate limited adjustments in behaviour.
- ***Sure Failure:*** are products that bring few new benefits but require a lot of behaviour change.
- ***Long Hauls:*** are products that generate a big value for users but also require a lot of behaviour change.
- ***Smash Hits:*** are products that generate large benefits with only a minimal behaviour changed.

Figure 3 Behavior Change - Payoff Matrix

Understanding the user behaviour change was very important and we kept in mind throughout the entire design. We tried to minimize the change in the user's behaviour (i.e. the way they arrange meetings or sign into web conferences) and to have a compatible behaviour of what the user currently has, this was done in order to avoid resistance to change and therefore get a better adoption rate of our product.

2.3Agile methodology as a framework

By 2001, a group of industry experts called The Agile Alliance met to outline principles and values of their philosophy in order to guide software teams as to how to work fast and respond and adapt to change--writing The Manifesto of the Agile Alliance (Martin 2003). From The Manifesto:

> *"We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:*
>
> - *Individuals and interactions over processes and tools*
> - *Working with software over comprehensive documentation*
> - *Customer collaboration over contract negotiation*
> - *Responding to change over following a plan*
>
> *That is, while there is a value in the items in the right, we value the items on the left more"*

This agile framework, with the priority of satisfying customer, recognizes that:

Individuals and interactions should be valued more over processes and tools: The project needs strong players who can work well with others and can build a team; even a good process cannot make a project succeed and, even worse, a bad process can render a very good player ineffective. The tools for development should be set by the team based on their needs.

Working with software over comprehensive documentation: given the rapid development, the project needs to maintain at least a short and structured documentation, with the main key points of the overall design and of the highest level structures in the system. This will also help to train other people and to communicate between teams.

Customer collaboration over contract negotiation: the project always needs customer feedback; one should not blindly follow a contract or a statement of work.

Responding to change over following a plan: the project plan needs to be flexible in order to adapt rapidly to changes that could happen in the business requirements or in the technology. A good strategy could be to detail a plan for two weeks into the future, and to prepare draft plans that go out for three months.

Some principles of the Agile Framework (Martin 2003):

These principles were followed during the implementation of the nexiwave product and were reflected in the project management:

- *Early and Continuous Software Delivery:* studies had revealed that earlier release of a low-functionality product version improves the quality of the final product and that continuous delivery increases the feedback from the customer (MacCormack 2001).
- Changing requirements are welcome throughout the project lifetime: for that reason the software should be flexible.
- Business people and developers should work together throughout the entire project
- Motivate, support and trust the project members.
- Face-to-face conversation is the best way to interact within the team
- The main measure of success is working software that meets customer needs.
- Agile teams pace themselves and reflect continuously in order to become more effective
- Good design is important in order to deliver clean and robust software

2.4Product Quality

During a product life cycle, the quality perception from the customer perspective differs and therefore the processes for product design and development should adapt and evolve as the product evolves. Grady (Grady 1992) suggests that there are three quality goals: minimize the schedule (delivery time), maximize the features, and minimize product defects. Moore (Moore 1991) complements this idea by showing the different phases of a product's lifecycle against the quality goals. The following table depicts how the customer's needs of quality changes over the product lifecycle.

Table 1 Interaction of Quality within Product Lifecycle (Rothman 2007)

Customer Desire for Quality	Product Introduction	Initial Product Acceptance	General product Acceptance	Near Obsolescence
Minimize Schedule Goal	High	High	Medium	Low
Maximize features Goal	Low	High	Medium	Low
Minimize Defects Goal	Medium	Medium	High	High

Table 1 shows that during introduction, the new product has to be in the customers hands fast enough to avoid another competitor being first. The first release should encompass some features: enough to satisfy some of the customer's current problems. After the product is in the

market and has some acceptance, adding more features becomes important to increasing market presence. When the product is established in the market, users became very sensitive to the number of defects and expect a very stable product by this stage. The minimization of error becomes a high priority.

2.5Achieving Innovation

Achieving innovation is not a straightforward process; it happens over time and it needs substantial interaction and feedback from institutional and organizational elements: from science and technology to market demand and policy, these elements form a whole dynamic "system of innovation" (Edquist, 1997). Also we should not that many factors and motivations influence and shape the innovation within a company.

Some dynamics that occur in the system of innovation can be extracted from (Galanakis et al. 2000).

"The generation of new concepts feeds the new product development process. After a screening process of these new concepts, which is based on the evaluation of the risk taking policy, the capital availability, the strategy of the firm and the technological capabilities, some concepts are selected and are developed to finished products. These may then be introduced into the market. The output of the creative factory is an index of successful new products that are launched into the market and indicates the level of innovative activity at the firm." (Galanakis et al. 2000)

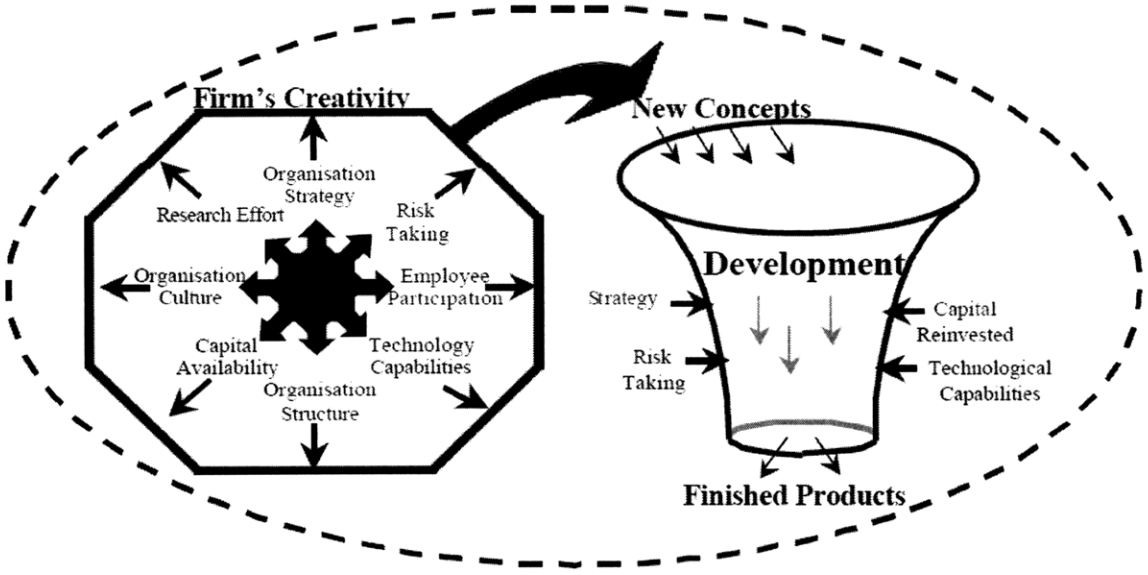


Figure 3. The Creative Factory Framework

Figure 4 Dynamics in System of Innovation

2.6Michael Porter Competitive 5 Forces

A company should always formulate a strategy based on an assessment of its environment. Porter (Porter 1985) states that there are five competitive forces which, when combined, can predict the potential of the industry in which the company intends to play. The goal of doing this analysis is determining the right positioning in the industry after obtaining knowledge of its strengths and weaknesses and the trends for opportunities and threats.

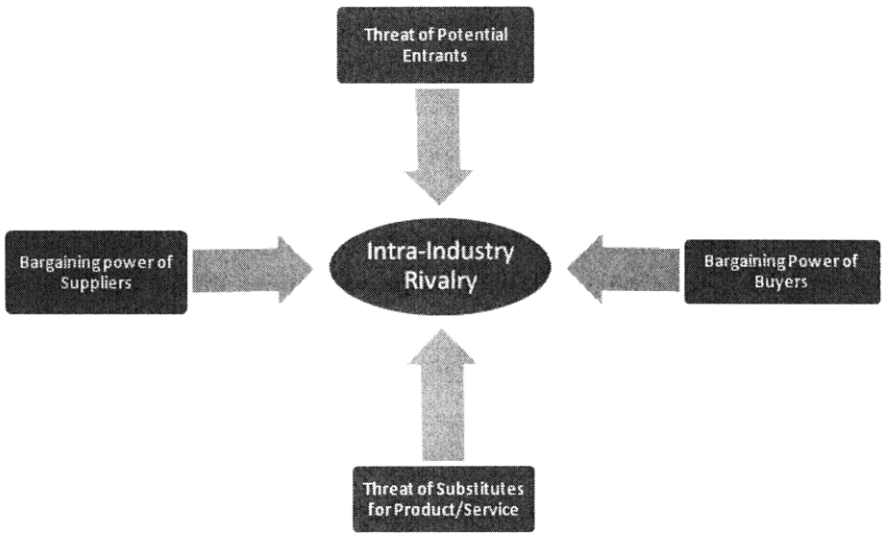


Figure 5 Porter Competitive Forces

In the following sections we detail the description of each force described by Porter in his book Competitive Strategy:

Threat of Entry

This threat is aligned with the barriers of entry and the competitor's reactions to a new entrant. There are many ways to barrier an entry:

- Using economies of scale: the cost of a product decreases as its volume increases.
- Using product differentiation: the differentiation causes customers to identify clearly with the brand and encourages loyalty.
- Capital requirements: the need to start with a large amount of money.
- Switching cost: it is the one-timer cost for the buyer to switch from one supplier to another.
- Access to distribution channels: competitors may have strong relationships with some distribution channels--making entry hard for a new company.

- Cost Disadvantages independent of scale: established firms in the industry may already have a cost advantage without being influenced by volume; this is possible because of Intellectual Property, access to raw materials, good locations and the learning experience curve

Intra-Industry Rivalry

Rivalry takes place through price competition, marketing battles, and new products in order to improve position in the industry. There are many states of competition:

- Numerous or balanced competitors: companies can make moves without competitors realizing it. This can also create stability when companies fight for resources.
- Slow Industry Growth: all companies fighting for market share since that is the only way to improve their sales.
- Lack of Differentiation or Switching Cost: the product or service is viewed as a commodity, so the only difference to competition is price or service.
- High Exit Barriers: sometimes even though companies are achieving low profit margins, there are strategic, economic or emotional reasons that cause them to stay in the industry.

Threats of Product/Services substitutes

Threats of Product/Services substitutes are interesting to analyze since these substitutes can limit the growth and the survival of the industry--because their price-performance is better.

Bargaining Power of Buyers

Buyers try to get lower prices when they have lots of information, or their purchase volume is high compared to the seller sales, or if their cost of purchase is high, or if the products they need to buy are not differentiated or have low switching costs.

Bargaining Power of Suppliers

Supplier threat to raise prices or reduce quality of good/services; this tends to happen when there are few suppliers, there are no substitutes, the industry being analyzed is not their main consumer, the suppliers are differentiated, or there is a high switching cost.

2.7Company Strategies

Some strategies that a company can follow are the ones suggested by Porter (Porter 1985):

- Leadership in Cost: focus on competing through costs by minimizing cost in all areas of the company, such as building efficient-scale facilities and controlling cost and overhead control. This focus defends companies against all five competition forces.
- Product/Service Differentiation: A unique product/service is released that would be difficult for other companies to copy. This difference could be in unique customer service, design or technology. This differentiation creates loyalty and causes customers to be less sensitive to prices.
- Focus on a particular buyer group, segment or product line: have in mind to serve effectively and efficiently a particular group.

The following graph depicts the different strategies as pointed out by Porter:

Table 2 Porter Strategies (Porter 1985)

	Uniqueness Perceived by Customer	Low Cost Position
Industry Wide	DIFFERENTIATION	OVERALL COST LEADERSHIP
Particular Segment Only	FOCUS	

Principles for strategic positioning

Positioning in an industry should be aligned with the strengths and weakness of the company and should be focused on following a strategy that could defend the company against competitive forces or that takes advantage of them. There are best practices that companies can follow, but most importantly, a company should follow an integral strategy that could take the company from an unknown start up to a successful company. Porter gives six principles when formulating a strategic positioning (Porter 2001):

- Have the right Goal: sustained profitability. Goals should not be in terms of volume or market share; but instead, in terms of the profit created by the cost of producing a product/service and the price that customer would pay for it.
- Deliver a unique value proposition that differentiates the company from competitors.
- Value chain should be aligned to value proposition and should be unique, and clearly differentiable from competitors.
- Willingness to accept trade-offs in the value chain or in the product.
- All activities in the company should be self-reinforcing, creating a fully integrated system.
- Strategy should have continuity in direction, so it can build employees skills, and strong branding with customers.

Companies have to be aware that if they succeed, many companies will want to copy, but if the strategy is unique and if the company has built a reinforcing culture, then they have a strong defence against competition.

2.8Innovation and its diffusion

According to Rogers in Diffusion of Innovations (Rogers 2003): "An Innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption." The "real time elapsed" does not matter much when determining the "newness" of a product for a user who just discovered the product or is using it for the first time. It all depends on how new it is perceived to be by the user.

Users perceive an innovation through some product characteristics that, the more noticeable they are, can affect its rate of adoption:

- **Relative Advantage:** if user appreciates the innovative product as better than former products in ways of costs, prestige, convenience or customer satisfaction, then the innovative product will likely be adopted faster.
- **Compatibility:** if the user believes that the innovative product is consistent with existing values, experiences and the user's current needs, it is more likely that it will be adopted more rapidly.
- **Complexity:** simple ideas are always easier to understand and faster to be adopted.
- **Trialability:** if an idea can be tried without commitment, then it could represent less uncertainty to the user, and therefore ultimately become adopted faster
- **Observability**: if users can see, in friends and neighbors, the results of an innovative product, then will adopt the product faster.

In order to inform potential adopters about an innovative product, some channels are needed to create awareness and knowledge. Mass media channels such as radio, TV and newspapers can

rapidly inform large audiences; but, interpersonal channels are often more effective in persuading users to adopt a new product.

The following graph shows the S-shaped diffusion curve over time of different innovations. It shows how the adoption of an innovative product takes off, which happen when mass adopter start using the innovative product.

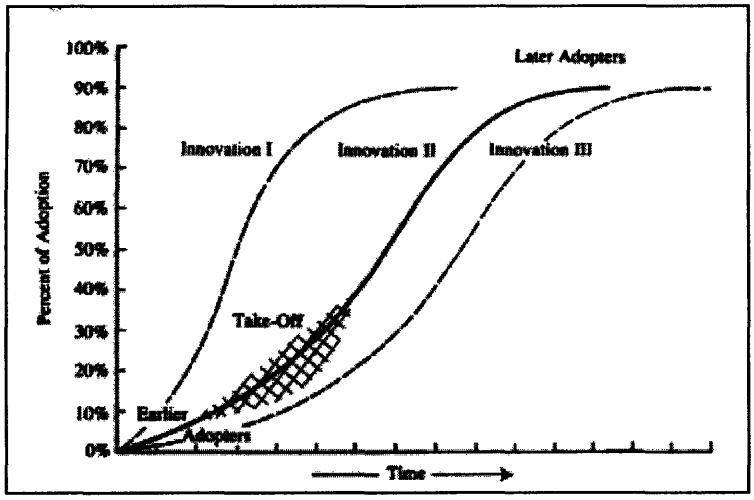


Figure 6 S-Shape diffusion curve (Rogers 2003)

3. Product Development Process in a Start Up Company Using a Systems Thinking Approach

3.1Holistic Factors that affected the product design and development process at innovative nexiwave

All the holistic factors that affect innovation mentioned in 2.5 have played a role in the product design and development processes at nexiwave, and it was important to be aware of them and take them into account. The following are the key points of each factor as experienced through experimentation at nexiwave:

- **Organization Strategy:** The organization is driven by the creation of customer-oriented products. Our main goal is to satisfy the customer by providing him a product that addresses his needs when making telephone calls or conducting meetings over telephone. This strategy was reflected in the process used to discover user needs and while gathering requirements.

- **Research Effort:** Our research was focused on doing benchmarking among different companies that provide the main components for our technology integration and the interfaces they provide--as well as focused on the future of speech engine adaptation in order to attain increased transcription feature accuracy.

- **Organization Culture:** the entrepreneurial spirit mixed with a priority of serving customer was embedded in the whole team while designing the product.

- **Capital Availability:** The team members started by putting time into the project and making a small initial monetary investment. The lack of more capital forced the team to work hard to invent ways to reach self-sustainability by delivering the product without all features incorporated. The product was able to economically sustain the research required to get a full-featured product to market. We were also looking for venture capital, which would allow us be more accurate in our voice-to-text tool, and which would let us push our product in foreign markets.

- **Organization Structure:** the flat structure and easy-to-adapt to changes structure used in nexiwave is believed to drive innovation and empower the team members. This also allowed free communication of ideas, therefore increasing the generation of innovative features at nexiwave.

- **Technology Capabilities:** This intangible asset of knowledge for nexiwave was very important. The product needed the right capabilities in order to do such integration of technology and provide the right service for the right customer. These capabilities, which range from business to software and user understanding, enabled the creation and delivery of nexiwave.

- **Employee Participation:** motivation was a key to success at nexiwave where all team members get recognition for the product's usability. Further, business plan competitions had the effect of encouraging the team to become very involved and even more eager to create an innovative product.

- **Risk Taking:** starting with the fact that we were a startup company, we were risk-prone but in order to avoid it, we always kept, as a high priority, the minimization of defects; Minimizing defects allowed nexiwave to release to the market a non-full-featured product conference tool and call-through tool as a trial (during trial there is more tolerance to defects). The risk increased with the ongoing economic crisis in the U.S., but that said, the crisis has also put nexiwave in a place of advantage. We are, after all, providing a tool which can help people do their jobs more efficient, make more sales, and be more productive; and for companies, nexiwave can help save on travel expenses by offering effective web conferencing tools with powerful features.

3.2Product Design and Development Process Goals

Taking into account all factors discussed above for the nexiwave, we needed to define doable and realistic goals for our product development strategy:

- The product delivered should be customer-focused.
- The effort spent on product design and development needed to be efficient in order to get a product to market as soon as possible.
- Release the products to users as soon as possible in order to get feedback the soonest. We decided to attain feedback by employing an incremental approach that allowed us to deliver a non-full-feature product that was ready to use.

With these goals in mind, we started our design and development phases as described in the following chapters.

3.3Understanding Opportunity Phase:

For the nexiwave technology-push product, we had started with a vision of technology integration that we believed it was very useful and we then tried to find a user match for this integration of technology and see the opportunity in the market.

3.3.1 Identification of Users and their needs

Nexiwave's target user group is "the business people who need to make important calls". Our own personal experience was a motivator in our selecting this group. This group also typically constitutes an "adopter of innovative products" when the product is useful to them. This user group is an adopter of innovative products because they are desperate for help and right now they lack a method to search information regarding their important calls.

In order to identify their needs, we conducted several one-on-one interviews with business people and salesmen (see Appendix 1). The following are excerpts from interviews. The interviewee was asked if they forget discussions with clients or peers held over the phone:

> *"often... if I could just remember that name that was mentioned on the call" (S. Kant, Business Owner)*
>
> *"I've even lost opportunities on few occasions because of this" (J. Proctor, Sales Lead),*
>
> *"We usually spend hours in conference calls, but then we cannot remember what was agreed to or the to-do list" (Graduate Student)*
>
> *"Sometimes one person is missing in the conference call, and then some of us need to update him about the meeting" (Graduate Student)*
>
> *"It's hard to go back to the notes... most times, I cannot find anything" (L. Harvey, Sales Lead).*

Some facts gathered about their needs are:

- Sales professionals and business people are always on the go and use the telephone extensively: typically making 20 to 50 phone calls per day.
- No cost-effective services are offered to efficiently and easily manage the content of these calls.
- Graduate students meet on conference calls at least twice a month.
- Usually, all users rely on low-tech solutions: pen/paper, recordings or, even more commonly, their memory to keep records of their phone or conference calls.

We also identified *lead users,* who are "ahead of the majority of users in their populations with respect to an important market trend and they expect to gain relatively high benefits from a solution to the needs they have encountered there" (Von Hippel 2005). These lead users for nexiwave are some business people and graduate students that we were able to examine and integrate into our innovative product. Their valuable input was taken into account seriously and they were made to feel like a part of nexiwave.

Some of the inputs from lead users were:

"Please add the web conference meeting schedule in my outlook calendar, a simple email or reminder will be just discarded since I have a very tight schedule " (AT Kearney consultant)

"While waiting for a conference call host to start a meeting, I can never be sure if it is the right meeting that I am waiting for" (Graduate student)

"I make frequent conference calls, please do not repeat the wrong number to me; just let me know that I made the mistake" (Consultant)

"I usually schedule weekly conference calls and I need a one-step schedule instead of multiple scheduling steps" (A T Kearney consultant)

"I need to send the invitation from my email account so I can send notes to the users regarding the meeting"

"Sometimes we need to pause a meeting, and we would not want to handle another invitation and meeting ID simply to restart in one hour; please keep it alive" (Graduate student)

Even though these lead users were not directly involved in the software development, we had many ways for them to be involved in the design and development of nexiwave. They gave us feedback on the website, or after a meeting, or in personal conversations. Usually, these users felt very satisfied after seeing that their request was incorporated into nexiwave just days after making the suggestion. They were also impressed at how closely we followed up on their inquiries.

We also spent entire days with salespeople to monitor details of their day to day work on the go and in the office. In designing the conference calls, we interviewed people who deal with conferencing tools, to understand their needs.

The following table shows the first market research done, in September of 2008, for the sales and business consumers:

Table 3 Market research done in October 2008

Segment	Segment #	Definitely 100%	Probably 75%	Might 50%	Probably not 25%	Definitely not 0%	Sample Size	Weighted Purchase Intention
		38%	35%	25%	13%	11%		
Tech Sales	1	2	3	2	1	1	9	28%
Sales (Except tech or retail)	2	0	1	1	0	0	2	30%
Real Estate	3	0	0	0	0	0	0	n/a
IT Consulting	4	0	0	1	1	0	2	19%
Management Consultant	5	0	1	1	0	0	2	30%
Legal/Lawyer	6	0	0	0	2	0	2	13%
SMB	7	0	0	0	0	1	1	11%

3.3.2 Market Analysis

Our market for tools over phone calls includes business people and salesmen in the U.S., while our market for web conference tools includes the same people with the addition of graduate students. In order to calculate the number business people potentially interested in our product, we broke down the market as follows:

Table 4 Market size for Nexicall

Technology Sales	400,000
Non-retail, non-tech Sales	3,000,000
Management Consultants	700,000
Real Estate Agents	220,000
Journalists	51,620
Total:	4.3 million users

Source: U.S. Dept of Labor, Bureau of Labor Statistics, 2007

For our conference call market we will begin by focusing on students in distance learning programs. There are about of 11,240 on-line programs, which make an approximate market of

1,124,000 users--allowing 100 students in average in each program (*Source: IES National Center for Education Statistics 2006-2007*).

Our marketing interviews show that nearly 30% of these students will try our service. We expect a medium to high retention rate (40%) out of users who try Nexiwave. In summary, our segmented market size is as follows:

Table 5 Market size for segmented products

	"Beyond Conferences"	**"NexiCall"**
Target market	SME (50+ employees)	Individual + company subsidized (Tech sales, consultants, real estate agents, Journalists)
Size	700,000 companies	4.3 million users
Market Cap	Total: $4.2B/yr	Total: $1B/yr
Penetration	10%	20%
Reachable Size	$420M/yr	$200M/yr

3.3.3 Competitive Analysis

It is clear we needed to understand the position of each of the competence companies in the market and define our position in order to give the user the best service possible. Our position will be to *"Give the user a way to easily find details within past conversations,"* and for that reason we are focused primarily on the content of the conversations and not in the way the conversations takes place--as other products are primarily focused.

To understand our competitive situation was also crucial to see our weaknesses and strengths and to identify how fast we can act when something new happens in other companies. This forced us to remain continuously updated and vigilant in observing the state of our competitors. It was very important to monitor their incorporation of features similar to those offered by nexiwave.

3.4Development of Concept Phase

Once we had the user match for our integration of technologies and found the right market to pursue, we developed the concept of the product--where the technology integration could be deployed.

The concept design evolved along the iterations done. In order to achieve a good concept design in the whole process, we defined the product intention: "Give the user a way to easily find details

within past conversations." This intention has allowed nexiwave to deliver the functionalities and features that it currently has, and that plans to offer in future generations.

3.4.1 Customers Pains

Typical sales and business people make 20 to 50 calls a day; some calls are long conversations and, after few days, details are forgotten. It is even worse when people take part in long conference calls and that after few days, many details, summaries or to-do list are not remembered and therefore lost.

Currently, these people take notes using pen and paper, and need later to transfer the notes to an electronic format, spending time and effort. Others have humans to transcribe all conversation, but such service is often too expensive.

3.4.2 Issues considered in the product concept

The product concept was created using the systemic thinking approach, and it took into account many aspects which otherwise may not have been:

- Legal issues
- Telecommunication Industry and Ecosystem
- Competence
- Portable Devices

3.4.2.1 Legal Issues

Recording a call is not simply a matter of personal preferences; the design of nexiwave had to be within what the law dictates. There are federal and state laws that regulate the use of electronic recording equipment. The statutes nexiwave had to adhere are (Source http://www.rcfp.org/taping/consent.html):

A. The U.S. Federal Law allows the recording of phone calls and other electronic communications with the consent of at least one party to the call (18 U.S.C. 119, Sec. 2511(2)(d)).

B. Even that most of the states are based on the Federal Law regarding wiretapping, every state is different from each other. Thirty-eight states and the District of Columbia have the **"one-party consent"** statutes which allow individuals to record conversations if the user is one of the parties in the conversation without the need to inform the other parties that the conversation is being tapped, in other words, as long as the subscriber is a party of the conversation, it is legal for him to record it. (Nevada also has a one-party consent statute, but the state Supreme Court has interpreted it as an all-party rule.)

C. Twelve states in the other hand require under most circumstances, the consent of all parties to a conversation. Those jurisdictions are California, Connecticut, Florida, Illinois, Maryland, Massachusetts, Michigan, Montana, Nevada, New Hampshire, Pennsylvania and Washington, where all people involved in the conversation must consent to the taping: **"all-parties-consent"**.
D. No matter which state, the conversation cannot be recorded if the user is not a party of the conversation.
E. In the case of an interstate call, it is safe to use the stricter rule.

The Accepted forms of consent defined by Federal Communications Commission FCC are (Source: http://www.fcc.gov/cgb/consumerfacts/recordcalls.html):

- Verbal or written consent given before the recording is made.
- Verbal notification before the recording is made. (This is the most common)
- An audible beep tone repeated at regular intervals during the course of the call.

Nexiwave in this matter achieves with complying all the laws by playing a notification before any conversation of conference starts.

3.4.2.2 Telecommunication Industry and Ecosystem Issues

In order to better understand this ecosystem, the graph in Figure 20 in chapter 6 shows all the current players related to this product concept. We needed to evaluate each of these players and understand how they affect us in order to succeed in our mission.

3.4.2.3 Competence Issues

As the competitive analysis was done, it helped us to understand our strategic position and to see that other companies were only focusing in the communication availability, but not in the content of the communications--as nexiwave focuses.

3.4.2.4 Devices

We analyzed the use of telephone devices and understood their functionality and the customer's use of them in order to integrate this knowledge into our product concept. Examples of this analysis are:

Cellular telephones currently offer a phonebook which people would typically not re-enter into a website. Doing this would have a high switch cost for users, which in turn, would cause users to avoid trying our product. Therefore, we will incorporate into our product the ability to synchronize the phonebook of cell phone devices with nexiwave.

3.4.3 System Level Design

We designed our architecture with the intention of satisfying the following initial stories; the stories show profiled users which helped us understand user needs and the user's interaction with the product:

1. Mario is a 40-year-old salesman that makes 40-50 business calls a day for his job. Often, he forgets details such as volume or prices that he agrees to, as they are all different. Most of the time he uses pen and paper but, sometimes he is on-the-go and cannot write.
2. Susan is a grad student in a distance learning program and needs to make many conference calls in order to work with her teams. She also has a full time job. As a result, she misses a conference and needs a way to know what happened.
3. Thomas, a management consultant, has long conversations over phone. He usually records his conversations with a tape recorder; however, he has trouble listening to them since they are over an hour long. He would like to have an easier way to find important things he said.
4. Susan and her team members always need to create a summary of the meeting and of what needs to be done next. She wants to have some way to make this task easier.
5. Thomas and his team members need to share documents and screen, in order to, follow what everyone has to say.

After a few iterations of the product, the stories became more detailed. Some of the detailed versions are:

- Susan has to manage her job in addition to taking classes. She works hard to stay alert at her class meetings and also needs a reminder of what occurred at the meetings.
- Thomas sometimes is the first one logged into a teleconference and he needs assurance of whether he is waiting in the right meeting number.
- Thomas needs to make a special note with the schedule for the meeting before sending invitations to other attendees.
- Thomas needs to schedule weekly meetings at the same time for two months.
- Mario needs to record his ideas while he walks to avoid forgetting important points.
- When preparing a meeting, Susan, needs to make a schedule of the points that need to be covered in the meeting so that her team will focus on these issues. She also needs to be aware of which point is forgotten while she is speaking.
- Mario has various telephone numbers from his cell phone, office phone, home phone that he needs to be recorded on one source.
- Susan is actively involved in social networks and blogs. She would like to post comments on the go by just calling and recording her voice.

The features, unique in nexiwave, that were agreed upon in order to meet the user needs are:

- **"Call and record"** We will provide a real Direct Inward Dialing (DID) number to each user. The user can dial into his/her DID number to call a contact and receive the recording and transcription of the call. The user can also receive calls through this provided number and receive the recording and transcription.
- **"Unify telephone numbers"** We will provide one DID number that will be used to integrate all telephone numbers the user uses, so all the calls received there will be recorded, when needed (based on user's profile setting).
- **"Profile setting":** The user can decide when to record. It could be in all the calls completed through the DID number, a call by call basis, or within a call.
- **"Audio Bookmarks"**: By simply pressing a key ("#" key, for example), a user can bookmark a point in the conversation and rapidly identify this part when browsing the conversation.
- **"Just-in-time Summary"**: Instead of transcribing everything, the user can also invoke the transcription function and notify the other participant(s). One example being, "let's re-cap the important points," or simply stay on the line after the other parties drop off. Additionally, they can record a summary, which will be later transcribed and can be sent to other participants.
- **"Record a Memo"**: User will be able to record voice memo through the web or telephone. The voice memo will then be transcribed into text that will also become searchable.
- **"Conversation Search"**: User will be able to search in his/her conversation history through our website.
- **"Outlook/Google/Lotus Integration"**: We plan to integrate with address books functions of Outlook, Google and Lotus Notes.
- **"Social Networks integration"**: We plan to integrate with Google, Facebook and MySpace. These existing players already have large user base, phonebook and contact functions that would need to come together.
- **"Beyond Conference Calls"**: we provide a way to schedule conference calls without behavioural changes having same features as "call and record". We also offer participants a way to collaborate with each other in the agenda building by document sharing, drawing whiteboard sharing, screen sharing, chatting privately or to other participants, and video sharing.
- **"Effortless Speaker Adaptation":** Given that we will have many users that are not registered, we will offer a continuous, effortless speaker adaptation where the users won't have to commit time to train the speech recognition system, but that it will adapt to his conversation.

The System architecture diagram reflects the high level system design that would work when solving all the stories and features described before.

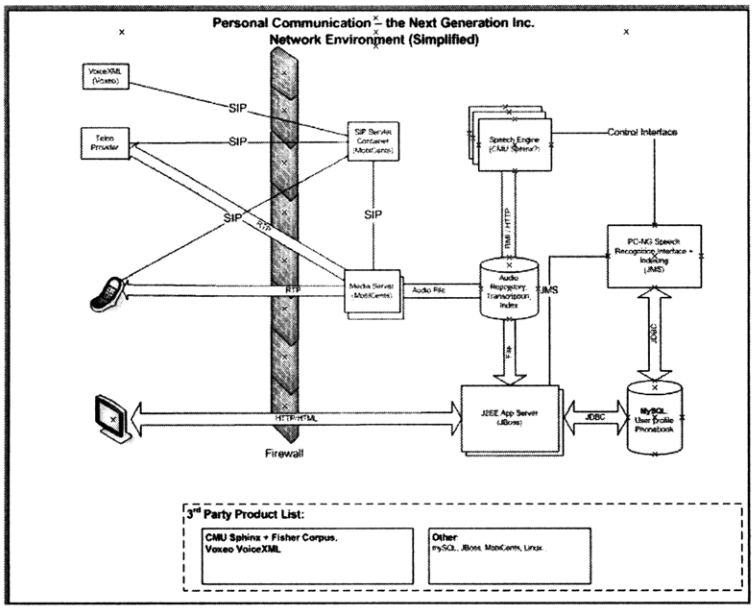


Figure 7 nexiwave Architecture

3.4.4 Design techniques used

We used many design techniques that are focused in building a user-centered design such as sketches, playing with scenarios and story boards.

- **Sketching**: It was a good and cheap way to brainstorm and generate ideas with just pen and pencil and also using the whiteboard. This helped us to visualize the ideas, accept them, improve them and critique them by thinking about the pros and cons. We also tried to make up some realistic data in order to make the sketches more understandable.
- **Scenarios:** this design technique was very important in the way that by creating fictitious profiles and stories, we could analyze and design for them. Also our agile methodology worked properly with scenarios. The scenarios were concrete and complete, and depicted a story in a specific context where an imaginary user has a goal or a need to satisfy.
- **Storyboards:** These helped to figure out the sequence within scenarios. It was very useful for organizing the structure of the telephone interaction and the sequence that could happen while joining conference calls.

3.4.5 Detailed Design

We have divided the design in Object Oriented Design (for class hierarchy in the programming), Database Design (for the entities and relationships in the database), File Structure Design (for storing the transcription and voice files), and user interface design (for the front-end applications in the website and telephone).

3.4.5.1 Object Oriented Design

In order to make a flexible application that could adapt to new request and ways of work, we used a Modular design based in Object Oriented concepts. This allowed us to expand our requirements and to work in a team. Inheritance was a key to scale code and be efficient.

We had broken the class diagram in three high level pieces in order to understand better how the whole system works, in the first one we detail the telephony system, in the second one we detail the business objects and in the last one we detail the web interface components.

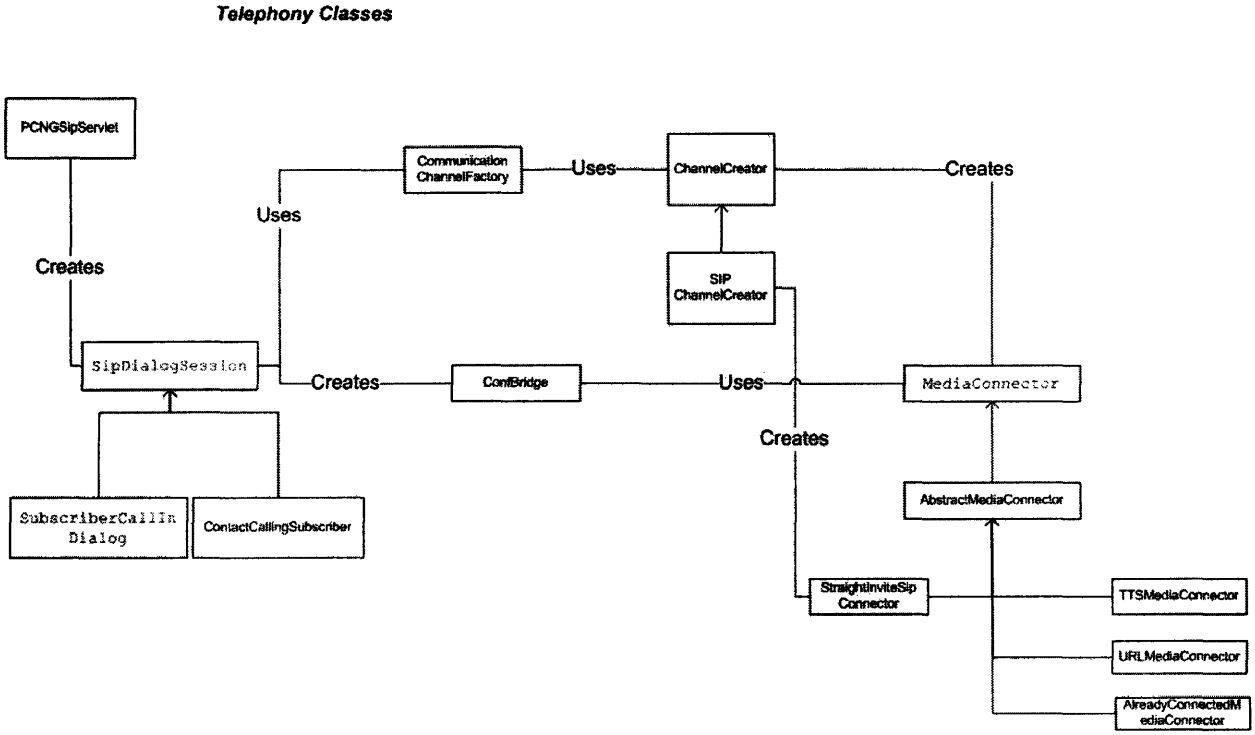


Figure 8 Telephone Classes interaction

3.4.5.2 Database Design

We also detailed the Database Model which handles all the data in the application. We had taken into account efficiency and replication of the data for security purposes. The following diagram is just a subset of important entities that hold data for nexiwave.

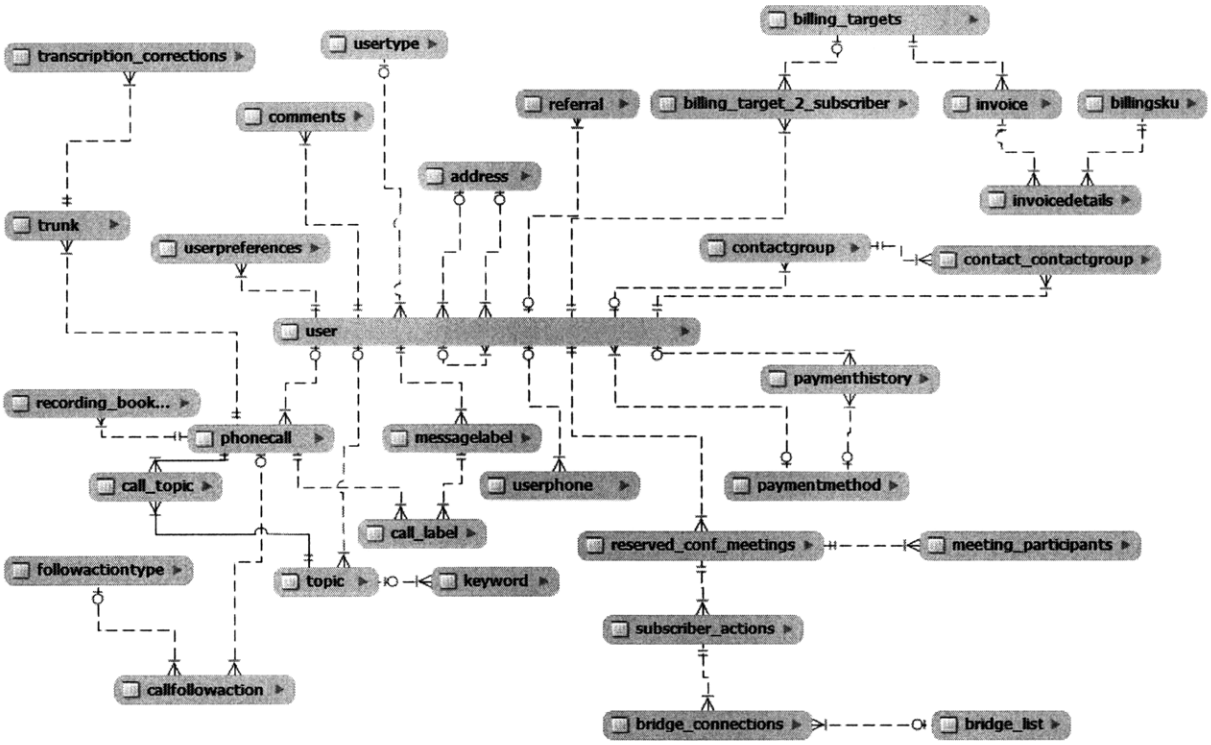


Figure 9 Database design

3.4.5.3 File Structure Design

In order to hold information of transcription, we needed to save information into separate files for their later access. Our main structure divides the files into audio files with its transcription files, and index files which support the search functionality.

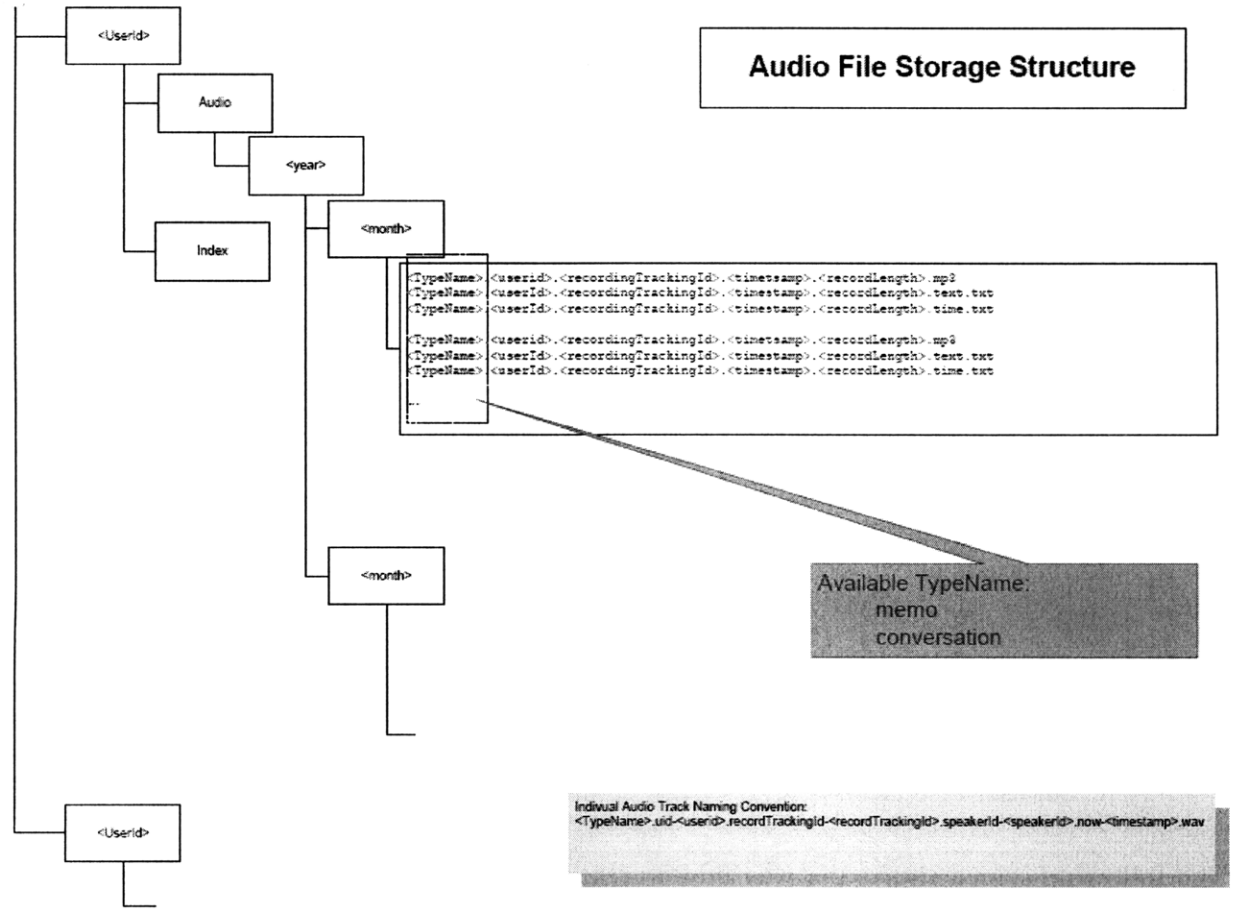


Figure 10 File Structure Design

3.4.5.4 User Interface Design

We had followed User Interface principal designs gathered from Product Design and Development class, User Interface Design and Development class, The Design of everyday things (Norman 2002), ISO 9241-11guidelines, and Design Interface (Tidwell 2005). All of these principles were used in order to create an interface that achieves the goals stated in the concept development and which harness the usability of the software.

The dimensions of usability (Nielsen 1993) and principles taken into account were:

a) Learnability:

We took in mind that there would be people accessing for the first time to a system like nexiwave, as well as users that did interact with similar systems before.

For those ones that would be novice: we had used very simple words, clear identification of sections. These once novice users will be frequent users, so we created a uniform and consistent appearance of the system for each of the functionalities, so the interface becomes familiar after few times of use.

For those expert users (previously used similar applications) we used interfaces that would not disrupt the way they perform now.

We had included guides and manuals but we believe these ones are not needed since the application had taken care of the learnability issue. Issues covered include:

- External consistency with features in other external products. For example, the way for selecting items from a known item list: using drag and drop, or using "<<" signs. This helps people in learning with a new product as nexiwave.
- Simple words
- Advanced features are hidden so, novice users only need to do simple steps. Extra information is only asked "on demand".
- Using "*" for mandatory fields.
- Using icons related with the real life like the green hand phone icon for making a call, this is what Norman (Norman 2002) refers as "affordances".
- We gave the right feedback messages when information was wrong or we needed to prevent user mistakes.

The following screen shows the way how to reserve a meeting taking into account learnability issues.

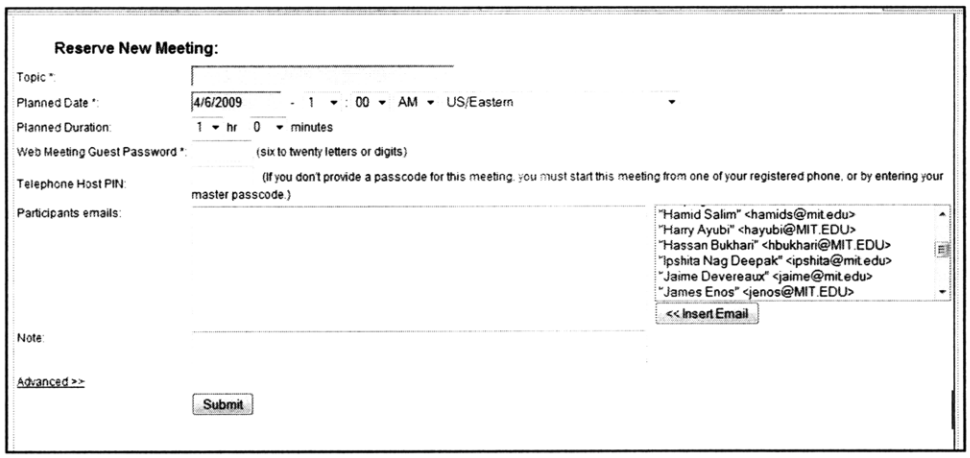


Figure 11 Screen for Reserving a meeting

Very important to learnability is also a clear set of entry points. Our home page makes easy to do usual tasks by giving the right amount and clear set of choices without extra navigation steps. The frequent tasks targeted in the home page are *join a meeting*, *log in*, *join a web meeting*, *register* and *learn how the search is done*.

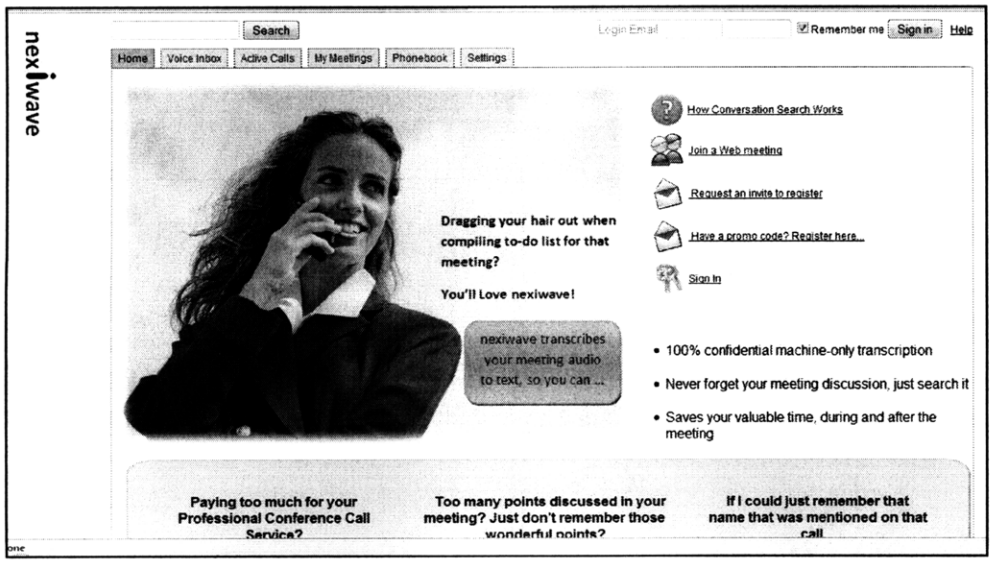


Figure 12 Nexiwave Home Page

b) Visibility:

Visibility issues handles the way we communication with the user. We had tried to have everything visible to the user, so he could have a sense of orientation and control.

- We included in each page a global area for navigation that helps user move from one section to another. The main sections are: Home, Voice Inbox, Active Calls, My Meetings, phonebook,

- We avoided modal dialog box which do not allow viewing what is behind, instead we have everything displayed in place.
- Feedback was also visible in red to make user be aware of it.
- We created logical areas to display set of items, as the past meetings that are displayed in the bottom part of the page, and the pending meetings at the top of the screen showing first the one that are next to start.
- The next screen shows how the top menu is kept in every single page:

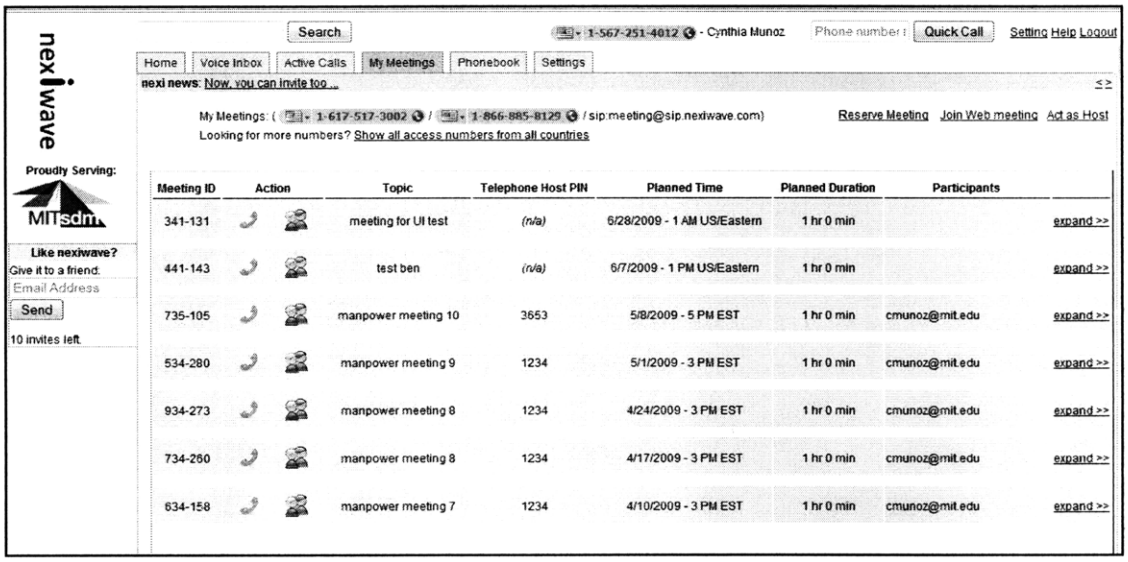


Figure 13 My Meetings screen

c) Efficiency

We tried to always perform queries and tasks with efficiency, so users won't get tire of waiting more than one second. In case it is necessary we show in the screen the remaining of the waiting time.

d) Memorability

The system remembers previous configurations to make the system more useful to users. Some examples are: it remembers last people invited for conference calls; it remembers the way that last conference call was made, so users do not have to remember again how is the best configuration for him.

e) Error handling

We had tried to prevent error in the whole application: web site and telephone application, some examples are:

- We prevent people from login into the wrong meeting by announcing the name of the meeting as well as the person that reserved it, in this way a person waiting for the host to connect, can be sure he is waiting in the right teleconference.
- We handle errors when people dials wrong meeting numbers or access codes, so they user can dial again immediately without having to hang up.
- In the website errors are reported if data is inconsistent, but most of the times, we prevent errors as in dates, we only allow calendar input.

f) Simplicity

Simplicity of the UI was wanted all the time in the development, but we had balance with all features we needed to show as well.

Website screens were designed with minimal text and we used colors and icons instead.

Our main page shows the few main options we have for a user.

The telephone interaction was designed carefully and it had many rounds of improvement, also taking into account feedback of users. An example of these rounds of improvement was that after a user dialing a wrong meeting number, we were speaking the wrong meeting number, but we had many users commenting that it was a "waste of time listening a wrong number", so now we only tell the user that he "entered a wrong meeting number, please enter again", giving them the opportunity of entering it again.

g) **Subjective satisfaction:**

It was very important to make the user feel satisfied while experiencing with the product. The next screenshot shows a real meeting taking place and the whiteboard allowing people miles away understand each other better by making simple diagrams and having everybody interact with them. This subjective satisfaction is a key issue in the word of mouth effect that our product relies on for viral marketing.

Also in order to increase satisfaction, we make sure we write back to all comments that users send. If a new feature needs to be developed because of user feedback, we acknowledge them about it.

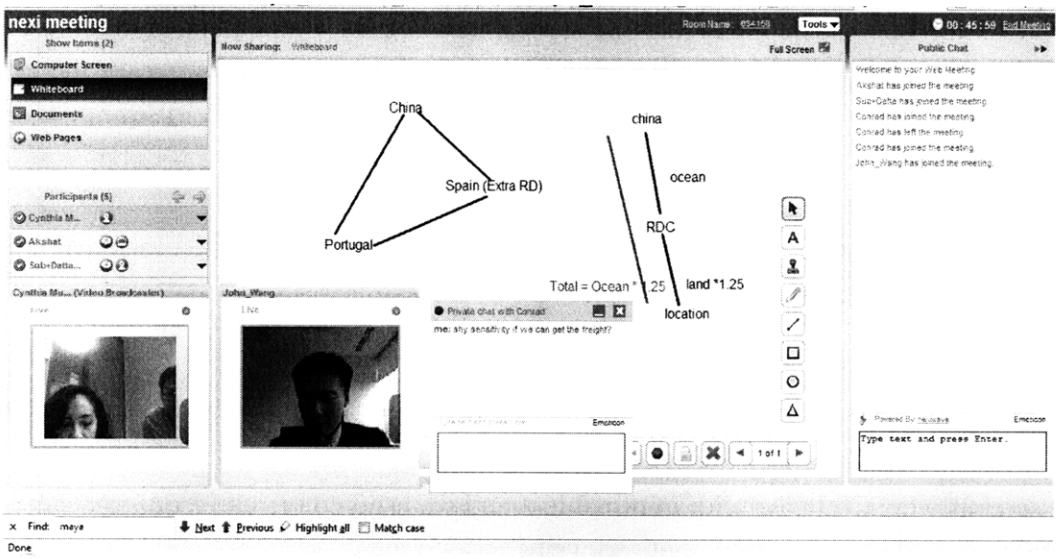


Figure 14 Web conference environment

3.4.6 Iterative prototyping and its effects

We had used prototyping along all the way of the product development. It was always cheaper to first build an idea on paper and then test it if work rather than go ahead and write code and then after some test, find out that it was not the right feature. All the feedback gathered about good and bad features of prototype were crucial to build the final product.

According to Jacob Nielsen (Nielsen 1993), there are vertical and horizontal prototyping. The vertical prototyping tests in-depth functionality for a selected number of features, using realistic data. The horizontal prototyping, in the other hand, test the whole full-featured interface but with no depth functionality, so no data is returned or so; the advantage is that a user can have a sense of the whole application and see its consistency. A scenario can test few features with few levels of functionalities; this scenario is good for testing the design. The following graph depicts Nielsen division:

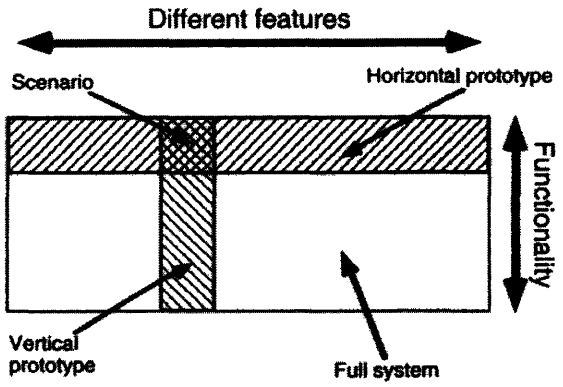
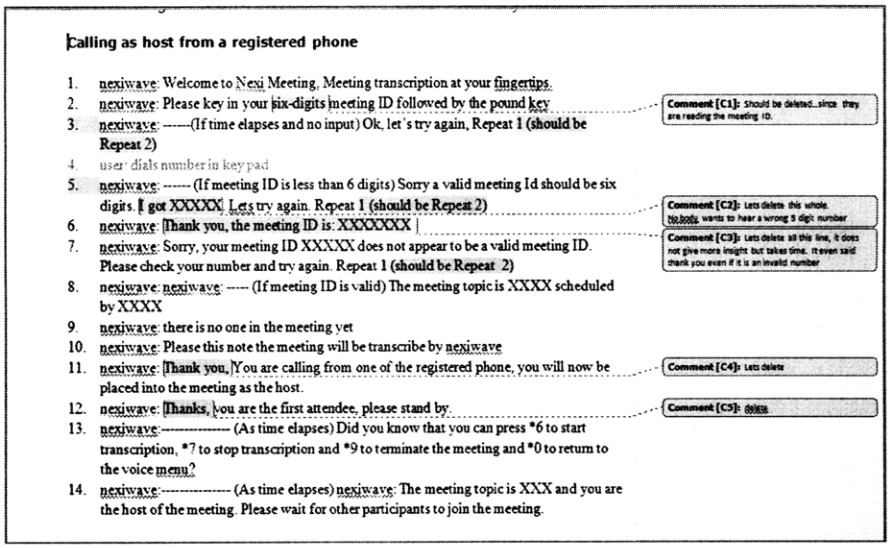


Figure 15 Nielsen Prototype in depth and Breadth

Some prototyping techniques were used in order to test horizontally and vertically depending of the risk we needed to mitigate. The used techniques were the following:

- **Paper prototyping:** all the screens were done first in paper, using post-it notes, and transparencies; even that these paper prototypes were not high fidelity of how they would look later, it was easy to appreciate how they would look and how they would be used. It was cheap and fast to change them when we had problems or when we needed to improve after user did not understand or a task was difficult to be done. Mostly this paper prototyping was used at the early stage of our product development.
- **Computer Prototype:** after doing our prototypes in paper, we had started doing the prototype in the computer, first having a breadth coverage (horizontal prototyping), and then we focused in some risky parts of application to develop them in depth (vertical prototyping) as the playing a conversation feature and the correction feature, where it was important to assess if it was useful and if user understands it without having to read a manual.
- **Wizard of Oz prototyping:** this technique, in which user interacts with computer but there is a human that responds as the interface, was very useful when designing the telephone interaction between the user and the application. It helped us discover what was important, and what was not, also helped figure us out the annoyance perceived by the user if so much or too little information was said and to figure out the time spent in the interaction. An important discovery of this early prototype was that users did not like advertisement played while waiting to be connected. The following screen shows some changes done after this prototyping:



Calling as host from a registered phone

1. nexiwave: Welcome to Nexi Meeting, Meeting transcription at your fingertips.
2. nexiwave: Please key in your six-digits meeting ID followed by the pound key
3. nexiwave: ------(If time elapses and no input) Ok, let's try again, Repeat 1 (should be Repeat 2)
4. user: dials number in key pad
5. nexiwave: ------ (If meeting ID is less than 6 digits) Sorry a valid meeting Id should be six digits. I got XXXXX. Lets try again. Repeat 1 (should be Repeat 2)
6. nexiwave: Thank you, the meeting ID is: XXXXXXX
7. nexiwave: Sorry, your meeting ID XXXXX does not appear to be a valid meeting ID. Please check your number and try again. Repeat 1 (should be Repeat 2)
8. nexiwave: nexiwave: ----- (If meeting ID is valid) The meeting topic is XXXX scheduled by XXXX
9. nexiwave: there is no one in the meeting yet
10. nexiwave: Please this note the meeting will be transcribe by nexiwave
11. nexiwave: Thank you, You are calling from one of the registered phone, you will now be placed into the meeting as the host.
12. nexiwave: Thanks, you are the first attendee, please stand by.
13. nexiwave:---------- (As time elapses) Did you know that you can press *6 to start transcription, *7 to stop transcription and *9 to terminate the meeting and *0 to return to the voice menu?
14. nexiwave:---------- (As time elapses) nexiwave: The meeting topic is XXX and you are the host of the meeting. Please wait for other participants to join the meeting.

Comment [C1]: Should be deleted...since they are reading the meeting ID.

Comment [C2]: Lets delete this whole. No body wants to hear a wrong 5 digit number

Comment [C3]: Lets delete all this line, it does not give more insight but takes time. It even said thank you even if it is an invalid number

Comment [C4]: Lets delete

Comment [C5]: delete

Figure 16 Wizard of Oz interaction for logging into a meeting

3.5Product Implementation

The implementation of the product was done using an agile methodology, object oriented approach and object oriented programming language as Java in the backend. Web interface was done in HTML, CSS, XML and JavaScript. More details on how the project was managed are in the following chapter.

3.6Product Testing

Our battery of tests, involving several cases over many rounds, was carried out with real users.

3.6.1 Test Cases Design

Our test cases are summarized in the following table, they cover various telephone and web conference interactions.

Table 6 shows which party made the first call, whether it was by registered/unregistered telephone, or by call back, and how the other guest got connected. Each time we changed the application we repeated these test scenarios to see if the application still performed well.

Table 6 Test Cases for Conference Calls

CALLS FIRST	HOW	OTHER GUESTS
Host	call back	guest connects with webconf
Host	call back	guest calls in
Host	call back	guest calls back
Host	your phone	guest connects with webconf
Host	your phone	guest calls in
Host	your phone	guest calls back
host	other phone	guest connects with webconf
host	other phone	guest calls in
host	other phone	guest calls back
Host	Web	guest connects with webconf
Host	Web	guest calls in
Host	Web	guest calls back
Guest	Phone	host calls in
guest	Phone	host connects webconf
Guest	Phone	host calls back
Guest	call back	host calls in
guest	call back	host connects webconf
Guest	call back	host calls back
Guest	webconf	host calls in
guest	webconf	host connects webconf
Guest	webconf	host calls back

3.6.2 Automatic testing

We devised automated testing routines in order to able to:

- deploy quickly
- isolate regressions
- stress test

The tools used for automatic testing were:

Apache JMeter: for load testing and profiling under varying amounts of load. This enabled us to *simulate* the performance of a large number of concurrent users.

MaxQ: for recording form-filling macros that we executed after introducing new features, in order to save time.

3.6.3 Stress Testing

We stress tested with both automated tools and with people. Since we needed users to be online for at least twenty minutes to verify the quality of the sound, we promoted participation by giving out $5 gift certificates for Amazon. Next we scheduled the test so that it would not interfere with existing customers.

The stress test allowed us to test background music (in order to assess the performance under continuous sound) and selective muting (so unruly users can not disrupt the conference) with many concurrent users.

3.6.4 Metrics associated with the product

In order to provide a pleasant user experience, we set ourselves certain goals:

- Account setting time: no more than one minute to set up an account.
- Scheduling a meeting: no more than one minute to set up a meeting with 4 attendees, it will take longer if more attendees need to be inserted.
- Searching former conversations: immediate, one second at most.
- Login into a phone conference call: 30 seconds if user does not make any error.
- Login into a web conference: automatically if following a link, or 30 seconds if there is no link to follow.
- Pages should be properly displayed in different browser and different platforms.

We verified that we reached these goals.

3.6.5 Risks and challenges associated with a new product

- IP protection: we filed four patent provisions. Even though we are now somewhat protected, we do not have the resources to challenge big companies, like Google and WebEx, should they imitate our product.
- The trade-off of a new product for any user, is that it needs to be trained to the individual user's voice in order to be more accurate, and this needs to happen in more than one time. The reduced accuracy at the initial, uncustomized state may be an obstacle to adoption.

- Trial period should be enough to test product and take advantage of the benefits without having people to abuse our product, so we created a trial package that allows at most 500 minutes of use or 10 conferences in total in a one-month period. We cannot reduce this time because we need users to feel the need to keep using nexiwave and to explore all the features we include; also, in order to feel the "search advantage", they need to have some number of messages.
- Sometimes, people assess products based on perceived value, relative to products they are already using for a long period. The problem is that, they would be very sensitive if something goes wrong or if something appears no to perform as they think it should with new product they are trying; this is because they are used to an old product that even that it does not have all features, it was used for a long period of time, so they are used to it. In order to mitigate this risk, we are doing lots of test before version releases.
- Some businesses may take into account the switching costs for using a new product and ignore further and more productive benefits. For this reason, we need to educate our business customers in order to appreciate the benefits in productivity for just a little switching cost. We plan to do this by showing some whitepapers and business cases.
- There are privacy concerns for meetings but we have the approach to handle that by using passwords, meeting keys and so on, so only the right people would hear and see a conference.
- There are legal issues related to recording conversation. In the US: 40 states only need one person to make consent of recording (for nexiwave: it is the subscriber), but in the rest of the states, the consent needs to be done by all parties. In order to comply this rule, nexiwave acknowledges when a user logs into a conference or when a person receives a call from nexiwave.
- Scalability factor is important in order to offer always a high performance product even if many users are using the product at same time.

3.6.6 User validation

We had introduced the beta product into the market for free in order to have the best real feedback from random users and to validate the product. Following are some of our findings:

- **Discoveries:** people were doing copy/paste in order to get their contacts, so we provided a way to store all the contacts from previous meetings and users from the same company and sort them by the frequency of previous invitations. We also discovery that some people dismiss the email and forget about the meeting, so we now send emails that integrate with calendars and reminders.
  Another important discovery is that most people just close their conference window without terminating their meeting participation, so we needed to terminate their session from the program after we identify the events.

- **User feedback:** this was very important to keep us improving. One simple feedback was that a person hosting a meeting needed to send by herself the meeting email because she needed to add more things to the email, so we changed the design of our meeting email and included the extra things a user may want to add in the top part of the email. In order for people to easily send us feedback, we had added an integrated interface for doing so in the right top corner. This is the screen that allows users insert any feedback:

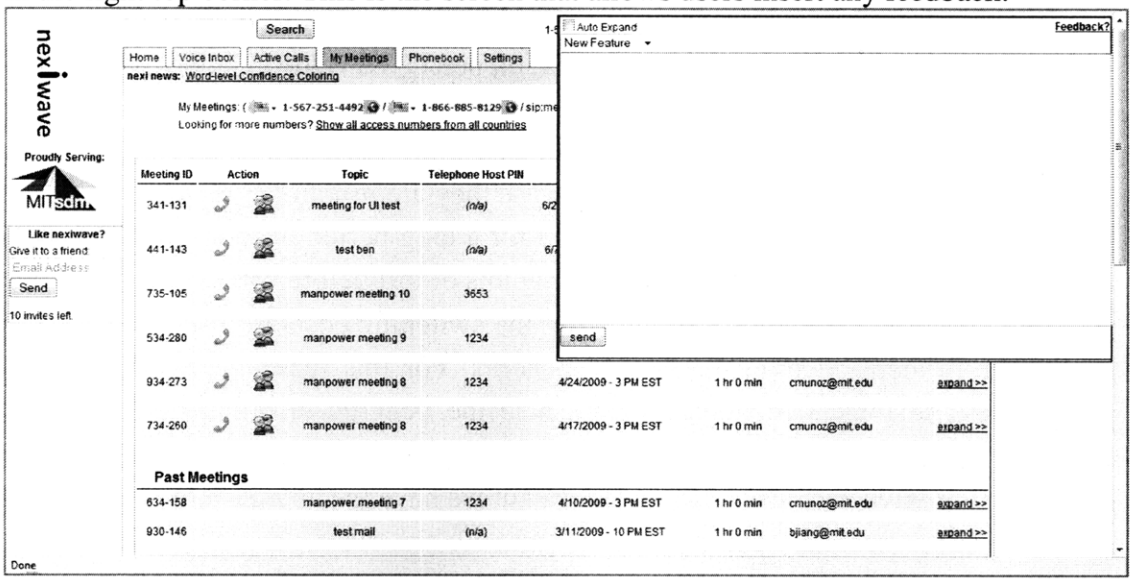


Figure 17 Feedback integration with application

- **User annoyance:** we found that people were annoyed by receiving lots of emails with reminders for the meeting, and even worse they did not see them on time; so instead, now we are sending the email with a calendar event insertion, so the calendar in each computer handles the reminders and integrates with the calendar option of the user. Also we found that some people were annoyed by how we interacted with them on the telephone, so we changed our interface to have less words and more specific output. The complete interaction file for the teleconference is in Appendix B.

- **User wow expressions:** it was gratifying to hear these "wow expressions" as when playing an audio, when finding certain conversation and when viewing the bookmarks after a one-hour-conversation.

We have gathered many comments of the usability of nexiwave, some of them are the following:

> "Nexiwave allows me to stay connected with my teams on the road - no matter where they are", John Wang, Management Consultant.
>
> "We could send the audio and the transcription to one of the team members that was not able to make the meeting", graduate student.
>
> "This tool could have saved me those lost sales", salesman

"Audio Bookmark is a killer"

"Our nexiwave transition was really smooth...", customer transitioning from other tool.

"Audio Bookmark is a time-saver"

"Compared to all the other videoconferencing systems that I have used in the past, nexiwave was the easiest and the fastest to set-up. In a few clicks and in less than a minute, I was sharing documents with a colleague in California as a first time user!", Mona Masghati.

3.7Product Deployment

A careful review of the possibilities of where to locate the product was taken into account when doing the deployment. The factors to choose one of them were based on the following:

- Proximity to the internet backbone and telephone carriers: we negotiated contracts to directly attach our server to telephone backbone carriers.
- Routing of the ISP
- Bandwidth required to support the users usage
- Service support
- Service reliability

Trade-offs were made in selection of connection speed, audio compress-ability and audio quality. Less compression results better audio quality and better speech recognition results. However, it also drives up requirement of fatter bandwidth. The decision was to choose G711U, instead of G729, for better audio quality. G729 offers better compress rate. However, the flexibility to dynamically switching the different codices was ensured in the system.

The hardware needed was calculated based in our projections of nexiwave usage for making calls, recording calls and doing the speech to text transcription.

4. System Project Management

We believed that the implementation of the product designed would also have a high impact on the product adoption. Owing to our limited resources as a startup, we decided to use an agile methodology for the software development in order to be flexible, to adapt to new requests and to release in shorter cycles.

The software project management required systems thinking in order to account for all the cause-effects that a system dynamic in the context of project management handle. Some key considerations are: minimizing error, writing documentation, adding new features, and testing procedures, quality control, accumulation of work. All these have to be addressed and in order to avoid later rework fixing bugs and consequently meeting project schedules delivering a quality product to all nexiwave customers. Having considered all learned in System Dynamics allowed us to balance between costs, schedule, scope and quality in order to achieve the results we wanted.

Ass the product evolved and the quality control evolved, the prioritization of tasks changed to reflect the evolution of customer quality needs as per Table 1.

4.1Holistic Factors that influenced the project management in nexiwave

Project management is not only following a schedule and a list of tasks to be accomplished. By having a systemic approach, it was easy to understand and deal with other hidden factors when doing project management which is also a continuous dynamic system itself (de Weck at al. 2006):

- **People**: team members were full of an entrepreneur enthusiasm, all members had previous experience and therefore their confidence was high. Given that the confidence was high, it was also necessary to set boundaries of the project and control each other in order to not go beyond the requirements we established since when spirit is high, it is very likely to go further in a project but that can deviate the direction of the entire project. A high motivator of people was also visibility, recognition and profitability.
- **Time**: as our goal was to deliver a product as soon as possible in order to get use feedback, time was always a key when planning and when optimizing tasks. We had done multiple tasks in parallel without burning ourselves; the time dedicated for each task was prioritized by importance.
- **Scarce budget**: this had made us take advantage of our machinery as much as we can and distribute them well enough for development, testing and for production.
- **Quality**: we wanted to have the highest quality possible, all the features needed to be tested before going into the release.
- **Corrective actions**: we had always shared new features within the team in order to have feedback and correct functionality or usability errors before users can detect it, since that would take longer time.
- **Technical difficulties:** this had to be treated with a non-restricted time in order to avoid losing confidence and be stressed about.

- **Pressure:** the pressure to the team is to get the best product the soonest possible, we did not have hard deadlines in order to not pressure our team, but instead, the compensation was that the feature could be tested and approved the soonest and users can give feedback if they are finished sooner.

This diagram by James Lyneis shows how variables relate in a dynamic project and that all have a cause-effect, so rework and burning out energy were key aspects in our project management that we avoided in order to be successful.

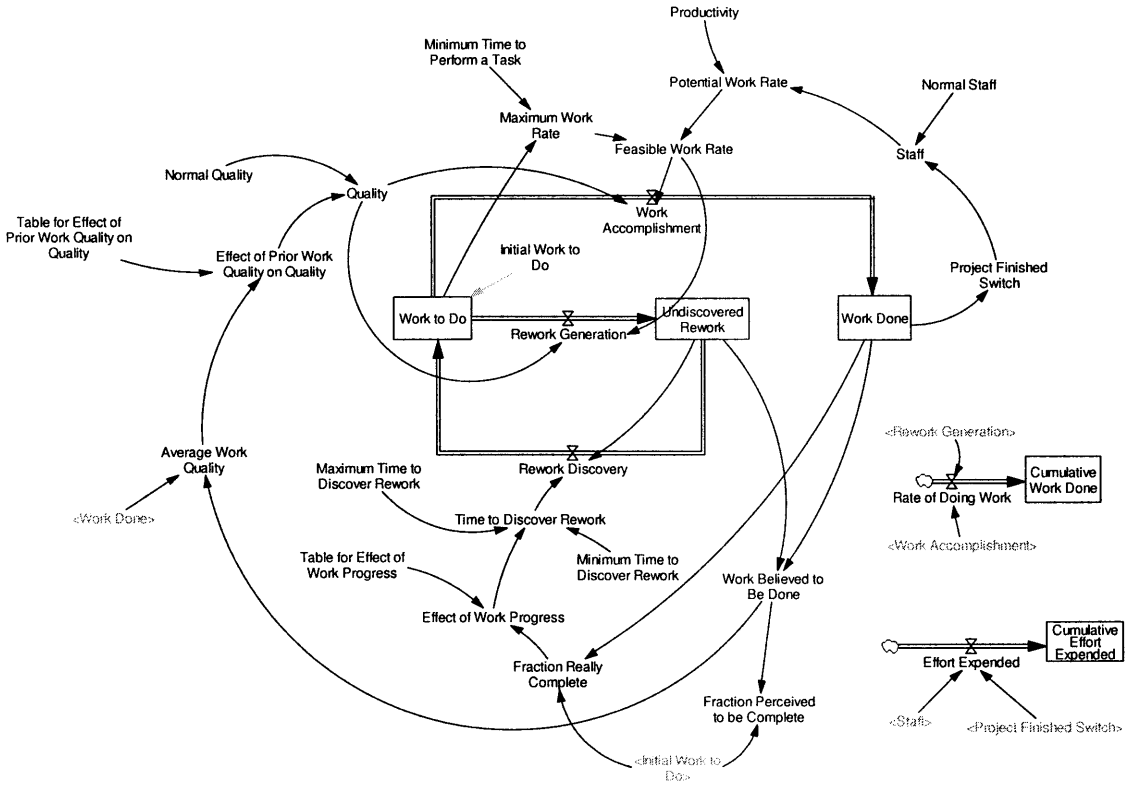


Figure 18 Systems Dynamic Model for Project Management

4.2Tools used in the Project Management for nexiwave

The tools used in the software project management were:

- svn for managing source code and synchronize coding and documents in the team.
- Google Code for task management and issue tracking.
- Documentation was not ignored, but reduced to essential as per an agile methodology applied where prototyping and early testing was the main concerns of the project. We kept main design diagrams updated in our common environment repository.
- For the database design, open source MySQL Workbench was used.

The following diagram describes the environment set up for the diverse roles: web developer, Interactive Voice Response (IVR) developer and speech developer. These environments were adapted as there were needed.

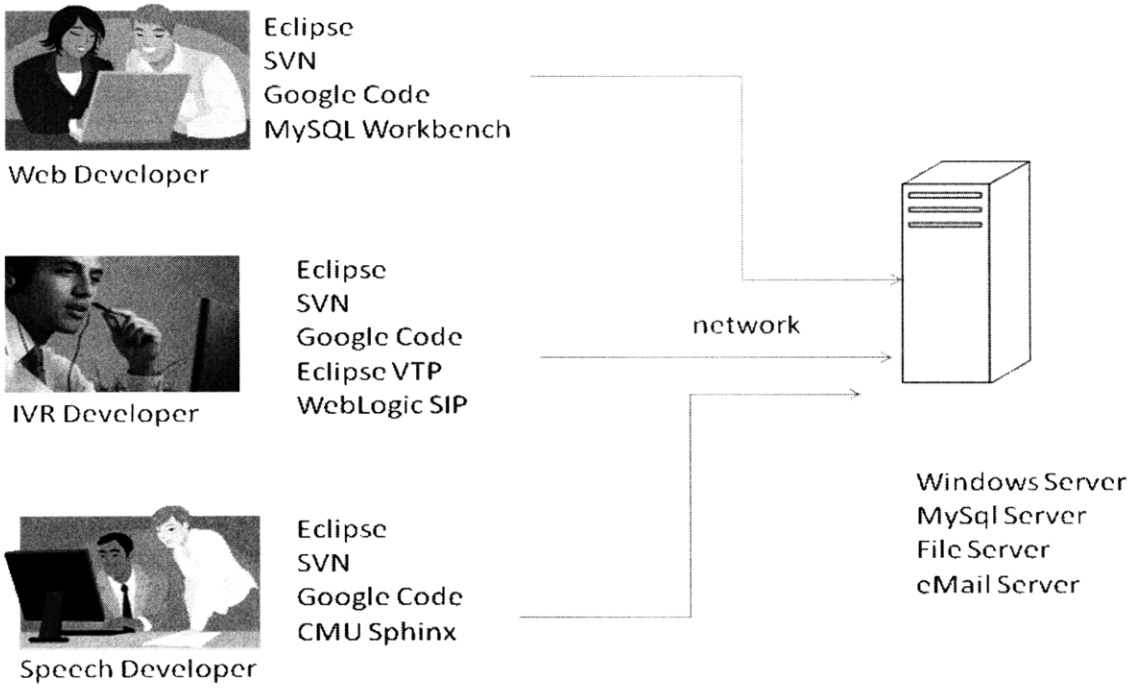


Figure 19 Environment setup for diverse roles

4.3Horizontal and Vertical Integration of nexiwave

The flexibility of nexiwave was considered from the early stages through the whole development process by using a modular design that can be easily adapted for changes and for integration with other applications. Therefore the design and development considered:

- Flexibility for easy integration with other products such as Facebook, Google Calendar, blogs, and others.
- Flexibility to integrate vertically with in other kinds of companies like restaurant delivery system, sales trade system, patients case systems, call management, customer support systems, project management support for companies, and others.
- Flexibility to change features to the application.
- Flexibility to collaborate within team members.

4.4 Feedback and Comments management

4.4.1 Strategy to get feedback

Feedback is very important for any Alfa, Beta or GA release. At first it proves the concept and then it helps improve the product as the time goes by. We had inserted a feedback in the following ways:

- Space in each of the website screens,
- We send emails to the host of a meeting after a meeting ends to ask for feedback of performance and usability.
- We had training sessions where we also took feedback and questions and answers to see what is more important for users.

4.4.2 Feedback Management

Every feedback email is answered by email as soon as possible. If we consider, we take the feedback and insert it as a task in Google Code with a respective priority for later implementation and follow up.

After we implement the improvement or error suggested by the feedback, we inform the user who reported the error, that the implementation was released. This had created a good sense in users since they feel they are heard and that nexiwave commitment is to help them as much as possible.

5. Product Extension Future work

We have many ideas for the growth of the product. These ideas are based on:

- **nexiwave as a collaboration tool,** we will add features that could help run a conference call better like sharing documents before meeting, sharing the meeting points schedule, and others.
- **Internationalization of nexiwave,** we have in mind the expansion of the product into Chinese and Spanish markets.
- **Nexibox:** We plan to prepare the nexiwave box for companies, this would let them set up their own environment and record and transcribe their conversation and conference calls.
- **nexiwave for Doctors:** we plan to have a customized version of nexiwave to help doctors in their patients cases.

6. Analysis of Current Status of Telecommunications Ecosystem

In order to do an effective assessment of the five competitive forces used in Porter's framework, we had started doing analysis of the state of the ecosystem industry.

One reason why speech was largely untapped was because content utilization and different services were not where the money was in the past. The telecommunication industry, which carries most speech content, used to be a highly integrated business. In the fixed-line space, this has largely changed since the introduction of internet and Voice over IP (VoIP), and therefore the cost to communicate has become less and less.

The mobile space, however, is still highly integrated business. Mobile communication still has not reached the good enough threshold to foster the growth at the sub-component level. The carrier, being the sole integrator, collects most of value of this industry.

However, with the steady improvement in the performance of Mobile Broadband, the mobile players are facing yet another disruption in losing their voice revenue to voice over mobile broadband.

We are predicting that VoIP will spread to mobile broadband within five years and the cost to communicate will decrease to a level that the services that are offered through the communication channel will become more important and profitable than the communication technology itself.

The intervening years before the wide-spread of mobile broadband will allow us to prepare our products/offerings to be in a position to take advantage of this revolution and go along with the change of needs of the users: needs that had changed in the last 25 years from just communication to a whole set of services.

6.1 Ecosystem

The current environment is composed by the Technology enablers, Infrastructure enablers, competence, ads content providers and demanding users. All of them play an important role since they provide technology and competition. The following graph shows the interaction in this ecosystem among all the players:

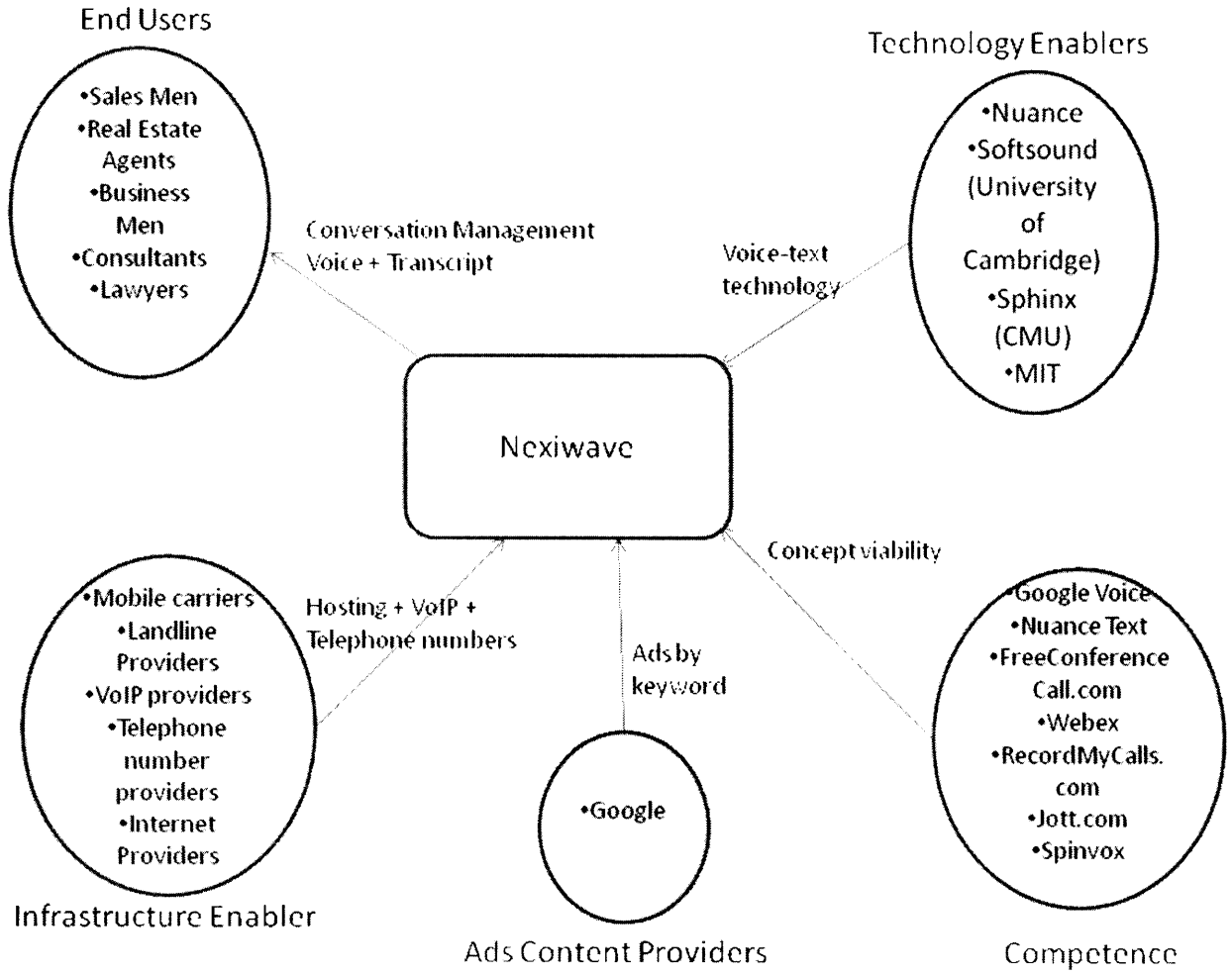


Figure 20 Ecosystem Diagram

6.1.1 Infrastructure Enablers

This group of participants are today's Cellular phone operators, such as AT&T, T-Mobile. There should be a mutually beneficial relationship between this group and us. Our service will encourage user demand for their businesses; nevertheless our product will be better placed if it is a service they offer to their client.

We need from this group:

- Unlimited data connection, so users can record memos, calls by phone or joins conferences anywhere they go.
- Voice quality will improve dramatically with better data connection, and therefore get better accuracy in our transcriptions.

We benefit this group as:

- We encourage increased demand for their service.

6.1.2 Mobile Industry Incumbents

This group includes the existing cell phone providers. They are the necessary enabler for our service. This will be a friend-or-foe relationship. On the one hand, they are the necessary enabler for our service and we will boost their air time. On the other hand, these carriers may also want to move into our area. Our strategy is to keep us off their radar screen, then deal with them.

We need from this group:

- Initially, we need their voice service to connect their users to our service.
- In order to avoid the minutes cost to our users, we will obtain a phone number from the major carriers and therefore enable free calling between our users and our service and encourage our subscribers to always connected to our service.

What we can leverage against them:

- Our user base and our fast innovation speed.
- The carriers have no legal reason to disconnect our service with our users.
- We avoid switching costs for users, by giving them a nexiwave number that can be used even after transition between carriers.

6.1.3 Speech Technology Enablers

This group includes all the companies that can provide us of technology for the voice recognition. Each company had developed their own technology and CMU Sphinx group had committed to open source their code.

PC-NG should invest heavily to obtain some of the core technologies to ensure its long term growth. Some of the core technologies are:

- Sphinx: Sphinx is an open source product from CMU.
- Nuance: Nuance is world leading provider in speech recognition.

- HTK / SoftSound: From Cambridge University. This is the technology behind SpinVox VMCS.
- vLingo.com: Vlingo is a speech recognition technology provider. Vlingo also has voice operated search engine

We need from this group:

- Provide speech recognition technology for proof of concept (it could be done with open source Sphinx)
- Provide high accuracy voice recognition for commercial transcriptions.

6.1.4 Ads Content Providers

This group includes the advertisement agencies and publishers, for example, Google, Amazon.com. For the first 2 years of operation, we plan to obtain most ad content from these players (instead of directly obtaining content from Ad content providers).

We need from this group:

- Ads content to be played before conference meetings or before telephone call in trial subscriptions.

6.1.5 Competence

In order to do a better assessment we divided our competence in the following groups:

- **Communication History Archievers:** These companies provide similar forms of service as PC-NG. However, the key differentiators are: our focus is to utilize the content and not the sole purpose of archiving it. For example, we provide voice-to-text function and the user can search within their recorded conversation, also we provide summary and bookmarking features to find important parts of conversations. This group includes: RecordMyCalls.com and CallRecorderCard.net
- **Voice – Text:** These companies can pose the greatest competition to PC-NG. They have existing voice recognition capability and they are consumer-facing. In this group, SpinVox and Jott are the estimated future greatest competitors. There also other competitors PhoneTag.com, CallWave.com (voice mail + gadget + HD web conf. schedule meetings from Microsoft), VoiceCloud.com, CallGraph.in, Atttel.com (note: Alltel is the fifth largest US mobile carrier. This is a deal with SpinVox.), Nuance Voicemail to Text (Nuance seem to have abandoned the direct consumer facing approach), and recently Google Voice offering transcription for integrated voice mail.
- **Voice transcription Providers:** These companies could be disrupted by our service. They use human operators to transcribe audio into text and charge a fee based for the

service. Some companies in this group are skylook.biz and transcriptionstar.com. The strength of these companies are the accuracy since done by humans and that can work in any domain; but nexiwave has lower costs (automated computer transcription is cheaper), offering privacy and speed since all transcription is done by computers instead of humans.

- **Meeting enablers:** These companies allow user to schedule web or teleconference meetings without having a physical presence in a room. Some of these companies are for free and some ones charge to the host by minute of use. Their strength right now is that some of them have already a market share but their weakness is that they do not have a differentiation among each other, other than by cost. Some of them are GotoMeeting.com, FreConferencecall.com and Webex.

We made a detail assessment of the competence below:

Table 7 Detailed Difference with Competence

Company, year headquarter	**Revenue Users**	**Service**	**Pricing**	**nexiwave advantages**
RecordMyCalls.com (New York 2004)	$1m-$10m 10,000 est. users	Record calls by calling a toll-free number. Access to calls are done through website	**Economy:** $4.95/mo + 20c/minute 500MB storage **Deluxe:** $9.95/mo + 15c/minute 1GB storage	-nexiwave is focused in the content of conversations, therefore providing features that help users deal with it. -nexiwave provides online searchable transcription for stored conversations. - nexiwave aims to capture both call-out and call-in conversations.
callrecordercard.net		Records calls in and out by providing a unique telephone number. Access to recordings through website and telephone.	pre-paid card: $99.99 (250 min) $179.99 (500 min) $19.99 (60	-nexiwave is focused in the content of conversations, therefore providing features that help users deal with it. -nexiwave provides online searchable transcription for stored conversations. - nexiwave provides a

			min for only outgoing calls)	record memo feature.
SpinVox.com (UK 2005)	Profit '06 $865,000 130,000 users	Converts voice mail to text by an automated + human system in English, Spanish, French and German. Sends transcript sms, blogs and email. Partner with Alltel, Skype	Under Cincinnati Bell $5.99/month unlimited voice mail. $0.25 per voice mail in Skype account	-nexiwave is focused in the content of conversations, therefore providing features that help users deal with it. -nexiwave provides online searchable transcription for stored conversations. -nexiwave aims to capture both call-out and call-in conversations.
Jott.com		Converts voice mail to text. personal assistant for notes and reminders by voice on the go for sales force personal.	**Jott VoiceMail** $9.95 for 40 voice mails. **JottAssistant** $3.95/mo (15 sec. recording) $12.95/mo (30 sec. recording) **Jott for Salesforce** $25 per month	-nexiwave is focused in the content of conversations, therefore providing features that help users deal with it. -nexiwave provides online searchable transcription for stored conversations. -nexiwave aims to capture both call-out and call-in conversations. -nexiwave allows record memos to be used later.
Callwave.com (1998)		Converts voice mail to text.	Pro $14.95 (40 msg) Exe $24.95 (80 msg) Bus $44.95 (200 msg) per month	-nexiwave is focused in the content of conversations, therefore providing features that help users deal with it. -nexiwave provides online searchable transcription for stored conversations. -nexiwave aims to capture both call-out and call-in

				conversations. -nexiwave allows record memos to be used later.
Google Voice(former GrandCentral) 2005		One number that can be attached to many telephone numbers and receive all voicemail. Transcription of voice mail. Allows conference calls.	Premium $15/month	-nexiwave is focused in the content of conversations, therefore providing features that help users deal with it. -nexiwave provides online searchable transcription for stored conversations. -nexiwave aims to capture both call-out and call-in conversations. -nexiwave allows record memos to be used later.
FreeConferenceCall.com (2001)	800,000 registrants	Free reservationless account (Instant dial in access by providing telephone and email). Free conference call recording	**Free Conf. call:** up to 99 callers to toll number. **Simple Toll free:** host gets charged x min of attendees. **Simple Flat rate:** 200 callers $99 **Simple Event:** 96 organizers & up to 1000 attendees (price varies)	-nexiwave is focused in the content of conversations, therefore providing features that help users deal with it. -nexiwave provides online searchable transcription for stored conversations. -nexiwave aims to capture both call-out and call-in conversations. -nexiwave allows record memos to be used later. -nexiwave allows participants to see recordings and transcriptions -nexiwave allows to keep history of conferences

7. Value Proposition of nexiwave as a Technology Integration Product

PC-NG started with a market research in the telecommunications field (detailed in section 3) and then built product nexiwave.com, which integrates the best of technology in order to support diverse current user needs when having a conversation over the phone.

This chapter describes the user-focused product as well the value proposition delivered to customers and our approach to mitigate the different technological risks by using a flexible architecture.

7.1 Customers Pains

Typical salesman and business people make 20 to 50 calls a day, some calls are long conversations and after few days, details are forgotten. It is even worse when people make long conference calls and many details and summary or to/do list are lost.

Currently, these people take notes using pen and paper, and later they need to write electronically the notes spending time and effort. Some other people make human transcribe all conversation, but the service is too expensive and not scalable when many hours of speech need to be transcribe.

7.2 Pre-Conversations Needs Found

- User needs to manage a phone book that should be integrated with other phone books.
- User needs to reserve and host conference meetings.
- User needs to reserve meetings in behalf of another user.
- User needs to remind users about coming meetings.
- User needs to have an agenda that can be shared about the meeting
- User needs to prepare document to be shared during meeting

7.3 In-Conversation Needs Found

- User needs to mark important parts of conversations, especially if they are long and important calls.
- User needs to indicate to transcribe some parts of conversation
- User needs to secure his meeting from other people to access it without permission
- User needs to dictate summary of a call
- User needs to mark points that had been covered in agenda

7.4 Post-Conversation Needs Found

- Search for some particular words in past conversations
- Play important part of conversations
- Get transcription of conversations
- User needs to send transcription and voice recording to a member that was not in conference call.
- User needs to review summary of a call.
- User needs to label some messages using some keywords.
- User needs to see how many times he had approached some client and what the important keys issues of each conversation were.

7.5 Value Proposition

nexiwave is a tool focused in the content of telephone conversations and meetings over the phone with the value proposition of:

- Nexiwave allows users concentrate in the call rather than taking notes.
- Nexiwave saves users valuable time by having all conversations saved on text format, this makes them more productive in their job.
- Nexiwave avoids users missing details of their conversations and conference calls since they are recorded and could be viewed even after months.
- Easy search and content highlights on all recorded calls
- No transcription cost
- No need to install any program

As an example, nexiwave can offer users who make a call of 60 minutes, an instant transcript that can save them about 12 minutes of capturing and typing notes. This transcript is then easily viewed and therefore searchable.

We believe no other company offers this value to users; and after a one-month-trial, users can understand and take advantage of all the benefits of using nexiwave.

7.6User benefits

Users will achieve many after using a tool like nexiwave; some of them are the following:

- Increase their concentration by allowing users to be more concentrated in what is being said in the call than in taking notes.
- Increase their productivity since they do not need to transcribe notes taking in a call.
- By using a nexiwave tool, users do not need to travel and attend a meeting physically, saving them time and money.
- Increase collaboration by all attendees of a meeting working in agenda, documents and whiteboards.
- For a company doing customer service, nexiwave can help them find easily previous calls from users, related topics or search for similar problems or complains.
- Very useful for recording memos or reminders when users are on the go and have no paper or computer.
- Very useful for doing training
- Very useful for practicing for interviews

7.7Innovation in Nexiwave

As per Rogers (Rogers 2003), we tried to introduce an innovative product with the following characteristics that were carefully analyzed in order to affect nexiwave adoption rate and therefore result in better sales.

- **Relative advantage:** the easiest way to differentiate our product and to be noticeable by customers is by cost, which in the times as current economic crisis, it is a key issue when choosing among alternatives. But cost is not our only differentiation point; our product differentiates mainly in our core product features that we need to make them visible by educating potential customers. We can educate users by playing a small video in the home website, and repeating features while waiting for a call, and designing a useful web interface. We believe all these differentiations would allow the product to be adopted faster.
- **Compatibility:** we tried to create a product that does not change the behavior of users, and it is compatible with what they use. Examples are integrating reminders with any calendar, and integrating phone book with the ones that customers use in cell phone or others. We believe all these compatibility integration would allow the product be adopted faster.
- **Complexity:** we avoided complex screens and complex words, in order to make a simple interface that could be understood better and therefore adopted faster.
- **Trialability:** we give trials to users and invite them through referrals since we believe the best way to have a customer buying our product is by trying it.
- **Observability**: we take advantage of this by contacting attendees of former conferences that are no current customers. After they use nexiwave and see the advantages of the

product, we send them the transcription of the conversation. We believe this will help to the network effect that the product will have.

8. Nexiwave strategy

We conducted an assessment of the five competitive forces in the industry before formulating a strategy. The analysis resulted in:

Threat of New Entrants: There are really few barriers of entry other than brand identification and loyalty to old brands like Webex, Nuance, freeconferencecall.com, gotomeeting.com, and others. This barrier puts us in a place where, in order to enter to this industry, we need to attack this force by building a brand that differentiates us with other companies. Also the law enforcing the authorization of all parties for the recording of a conversation raised the barrier of entry for this new idea into this industry, but we have a workaround for this.

Bargaining Power of Suppliers: Suppliers of telephone numbers that we need in order to give our solution are willing to be used and offer very good deals for volume usage, there are many of them, there is no switching cost for us to change suppliers other than doing testing before and making sure the codification used will be consistent with nexiwave; therefore suppliers have no power in the industry we want to enter.

Bargaining Power of Buyers: customers of services like nexiwave can easily switch tools with the only difficulty of learning again another tool and changing behaviour due to another interface. Another fact is that products like nexiwave, can improve buyers (companies) quality of service, so nexiwave could become a very important piece of improvement in some companies.

Intra Industry Rivalry: currently there are many players that compete by price and security/privacy features focusing in different segments of market. We consider that this industry has been growing slowly and that it gives chance to start ups with innovative focus and different business model to take a place into it.

Substitute Threat: for the automated kind of service that nexiwave provides with an average of 80% accuracy, the threat is using human transcription services which has an approximate of 100% accuracy but which cost, charged by minute, is really high. Other companies do not offer a free and integrated service of transcription.

With all the assessment done, nexiwave will have a strategic positioning offering a differentiated product that focuses in the content of the conversations and collaboration. This will allow them differentiate with the other competitors that are only focused on providing a way to make calls and/or give transcriptions; with this we expect to get a good position in the market. Some requirements in order to accomplish this differentiation are:

- Be very creative and search for more features in order to help users.
- Offer the transcription for free subsidized by the subscription as a different business model across competition.

- We will need to have a strong marketing team that should coordinate and collaborate with the product designers and developers in order to deliver a consistent and strategic product.
- Have a high accuracy rate in the speech recognition.
- Have a consistent and coherent growth. We should grow accordingly with our capacities. We cannot grow very fast at the beginning that we could not satisfy the number of users.
- Our first potential customers to approach would be the easy ones to access, so we can maintain financially the company and do not run out of cash while it grows.

9. Nexiwave Roadmap Launch

After the release of our beta, we went ahead looking for customers that could help testing our product, getting feedback and seeing the response of the market.

Having a holistic point of view, made us consider many issues like:

- It is important to build a diverse team that together could cover all the aspects of a business: entrepreneur spirit, technology, management, finance.
- We should not try to growth too fast at the beginning, so we don't have the risk of not being able to technologically support such a fast growth: the system could become slow if many users try to connect at same time and we don't have the adequate hardware to support it.
- We could start by reaching an easy access market, focus in their needs and through words of mouth and network effect make a brand that could be associated with good service and user-focus. An example is that we had started by getting contracts with schools that are easy to reach and that could have many users who need nexiwave features.
- It is important to be in higher stages of product development in order to get more attention from venture capitalists.

9.1 Horizontal and Vertical Integration with nexiwave

Nexiwave does not stand alone in a very complex and full of applications world, that is the reason why in the close future it needs to horizontally integrate with other products, as well as integrate vertical in many business areas that are potential markets.

An expected horizontally integration of nexiwave across other popular and current business covers:

- Blogs: some users may record a memo that should be sent to a blog. Facebook: some users will want to record something to post on the wall of some of their friends
- Phonebooks upload/download/integration: users are already integrating all their phonebook in one single place and nexiwave should be able to access that phonebook.
- Calendars: users need to have everything integrated with their calendars, from a meeting to a simple memo or event.

Some promising vertical integration support that nexiwave could add on top of features with the goal of satisfying other business needs are:

- Calls management for a company
- Customer service support for companies

- Patients cases systems.
- Project management support for companies.

9.2 Management of changes in technology

Technology changes rapidly representing a challenge for any start up company. We believe our components have to adapt at same rhythm; this is why the architecture is highly modular allowing us flexibility in adapting our current product to changes in technology.

The tendency in the mobile industry is a continuous growth with better bandwidth that would allow us better performance in the VoIP service delivering a smoother conversation communication.

We are looking continuously on how technology is emerging in the speech recognition field; we are prepared to use any package if such could give us better accuracy that the one developed. The accuracy is important in the value delivered to the users.

9.3 Planned growth

The following table makes a summary of the milestones that we have as a company:

Table 8 nexiwave company milestones

Stage	Observations	Milestone
First Business Plan	First business plan that has the overall picture of the service and the market. Helped us focusing and having a whole picture map	August 2008
Proof of Concept	We proved what could be created and that it was usable for users.	September 2008
Alpha Product	First version of product. It was entirely functional in most of the features. Test done within the team and close lead users.	November 2008
Closed Beta Product	All features implemented and users registered by invitation tried the product, team got lots of feedback about its usability. Potential customers looked at product and are willing to pay for it once released.	January 2009
General Availability (GA) Product	Release was done, and general public is able to use it. Commercialization of the product started. First customer with about	February/March 2009

	200 users sign first contract. Marketing of product takes place by sponsoring conferences, show in presentations, flyers, and have a Facebook profile.	
Repeatable sales Model	Sales people can repeat same methods and get an average number of deals closed.	Estimated June 2009
Profitability	Sales are aggressive, network effect and word of mouth spread.	Estimated January 2010
Phase II	Add other second phase features as artificial intelligence and others.	Estimated Mid 2010

It is important to have as much stages advanced in order to get the larger interest from investors who will look at the company at a lower risk if more stages are done.

10. Monetization of conversations

10.1 Subscription fees vs. advertisement supported

At first, we considered giving a free service to users who would hear advertisement and probably will follow in some sales; but after doing market research we found out that hearing advertisement would be very annoying for users who will use nexiwave for work.

Subscription is a way to generate income and give choices to the user by giving the bundles that adjust to their needs. Subscription was determined to be in a month by month basis, so users do not feel like they have to be attached to nexiwave by doing contracts for one or two years.

Service by minute was not considered since it is one of the ways to differentiate us from the competence and also we avoid the costs of small amounts of credit card payment.

Plans for business enterprise customers differ from individual customers, in the way that the total minutes are combined within all their users.

10.2 Bundling Options

We will offer bundles that are combinations of storage, air minutes, incoming/outgoing calls coverage.

A tiered pricing model will be used considering three plus trial packages for individual customers. We will target to be our most money from the executive package.

The trial package has as limitation of use, but enough to test the product and like it. We had set up maximums, so we can prevent users from using infinitely our product and carrying us costs.

For our business customer's contracts, we have different packages that can be adjusted to their needs, they are based on the number of users and the total minutes per month they would need. A minimum of 6 months will be required in order to sign the contracts, but we give them also a one-month-trial.

Table 9 "Beyond Conference Calls" bundles

Pricing for Business Beyond Conference Calls						
Package	**Num. of Users**	**Limited talk per call**	**Total minutes/month (out/in)**	**Storage**	**Extra minute domestic price *** See intl. chart price	**Price**
Bronze	<20	unlimited	8,000	1 month	$0.05	$450
Silver	<100	unlimited	40,000	1 month	$0.04	$1,900
Gold	<500	unlimited	100,000	6 months	$0.04	$3,000
Platinum	500+	unlimited	500,000	unlimited	$0.03	$8,000

Table 10 "NexiCall" bundles

Tiered Prices for Consumer Product: "NexiCall"							
Package	**Private Number**	**Search conversation**	**Limited talk per call**	**Total minutes/month (out/in)**	**Storage**	**Extra minute domestic price ***	**Price**
Free Trial (1 month)	No	Only outgoing calls	< 20 min	500	1 month	$0.00 (max. 10 conf calls total)	$0.00
Basic	Yes	Yes	unlimited	1000	1 month	$0.05 No international	$19.99
Executive	Yes	Yes	unlimited	3000	6 months	$0.04 See intl. chart price	$34.99
Premium	Yes	Yes	unlimited	5000	unlimited	$0.03 See intl. chart price	$54.99

10.3 Bundling economy: Transcription subsidizing

Our business model has an economy that subsidizes the cost of transcription, which in other companies it is charged by minute. We believe that by giving the transcription away, even with no 100% accuracy as human transcription is, we can get those customers that are already doing transcription (outsourcing human transcription) use our product.

Subsidizing transcription with subscription is better than giving cheap service for facilitating calls and conferences and then charging for a transcription. This is because users feel like they are not constrained on how long the transcription needs to be and because they feel like they would get a good value.

10.4 Cost/benefit analysis of services

For an individual who makes at least four long calls a day, he can save valuable time: approximate one hour a day of non-productive work by instead, using nexiwave and forget about transcribing again all notes and missing details.

One hour call	**used minutes**	**% of call**
Call	60	
transcribing summary	12	20.00%
looking for detail	3	5%

Number of calls per day	4
transcribing savings	48
Searching	12
total saved in a day	**60**

In total, a user can save 60 minutes in 4 hour of calls, by using nexiwave, given that he won't need to do manual transcriptions and that he could search in few seconds for something important after the conversation is done.

10.5 Ads and content providers and their integration with nexiwave

Ads and content providers can play an important role since the revenues generated from them are high, but it also has the drawback of annoying the users when being played. We think that could

introduce the ads in the trial versions, so in case the user gets annoyed, he can try a full feature package.
Later, ads can be given after analyzing the user context and after some semantic extraction, so ads could be relevant to user and have some benefit to them. We believe those ads could be related to keywords relevant to the user.

11. Marketing

As a new company and new product, the most important marketing program is to get the word out, through a combination of the following:

- Start with direct marketing for accessible potential customers as schools and salesmen. This will leverage our product and give us the reference customer we need to start going to mass media.
- Prepare whitepapers, business cases and presentations to demonstrate the product and show the usability, the saving and how we could solve companies' problems.
- "Reference a friend": our initial offering will be by-invite only. Recent history shows that this is an effective way to publicize one's service. Also this will help us manage feedback and manage the amount of users.
- Network effect: as more customers are satisfied with our product, our reputation will be increased and the word of mouth effect will generate a network effect by having more customers jumping into our product.
- Internet Social Marketing: this will include promoting our service on noticeable bloggers, Facebook, MySpace, etc.
- Public relations campaigns (press releases, announcements, etc)
- Sponsorship of events in institutions as sales conferences where invitation for the trials can be given away as well as the tool can be used to set up the event.

12. Business Plan and Funding

The business plan is considered a very important part of a start up, it gives a venture capitalist a way to understand the business and its product. The executive summary is our presentation card.

12.1 Business Plan

The business plan is in Appendix B and it was used to investors and so far, got us into 100K semi-finals.

12.2 Funding Plan

Our funding plan consists in being self funded at the beginning and then raising capital that could let us expand. In order to get the most interest possible we had advanced many phases of the product rollout

In order to show investors the potential of our product, we showed:

- First Revenue: second quarter in First year
- First Quarter of Profitability: first quarter in Second year.
- Cash Flow in the next Five Years: with an initial investment of $800,000, we don't run out of cash.
- A product roll out and product extension.

13. Conclusions and Recommendations

As a start-up company, and taking into account all that we have learned, we recommend the following to other companies in similar situations:

- Systemic thinking is the optimal way to envision complexity related to a product, from identifying users to the marketing and rollout of a product.
- Build a strong and diverse team where team members complement each other. The members should be passionate about the idea and willing to embrace risk.
- Creating a design that is user-oriented is the platform for a successful product.
- Start-ups with an innovative product and a unique business model can compete even with established companies in the industry.
- Intellectual property protects your ideas; but, it is not the whole solution to protecting your ideas.
- Build the product with quality and speed in order to get investors interested in the product and to compete in the industry.
- Users do not always know precisely what they need; it is often important to guide them when introducing a new product built to satisfy their needs.
- It is important to include users in the design of a product. Involve them in some way and acknowledge the importance of their feedback.
- An agile methodology is very useful for start-up companies. Team players need to build a product with a design, marketing and business completely aligned with the strategy of the company.
- Prototyping is a cheap way to discard or improve ideas without many resources; rather than spending a lot of resources for a no-useful-product.

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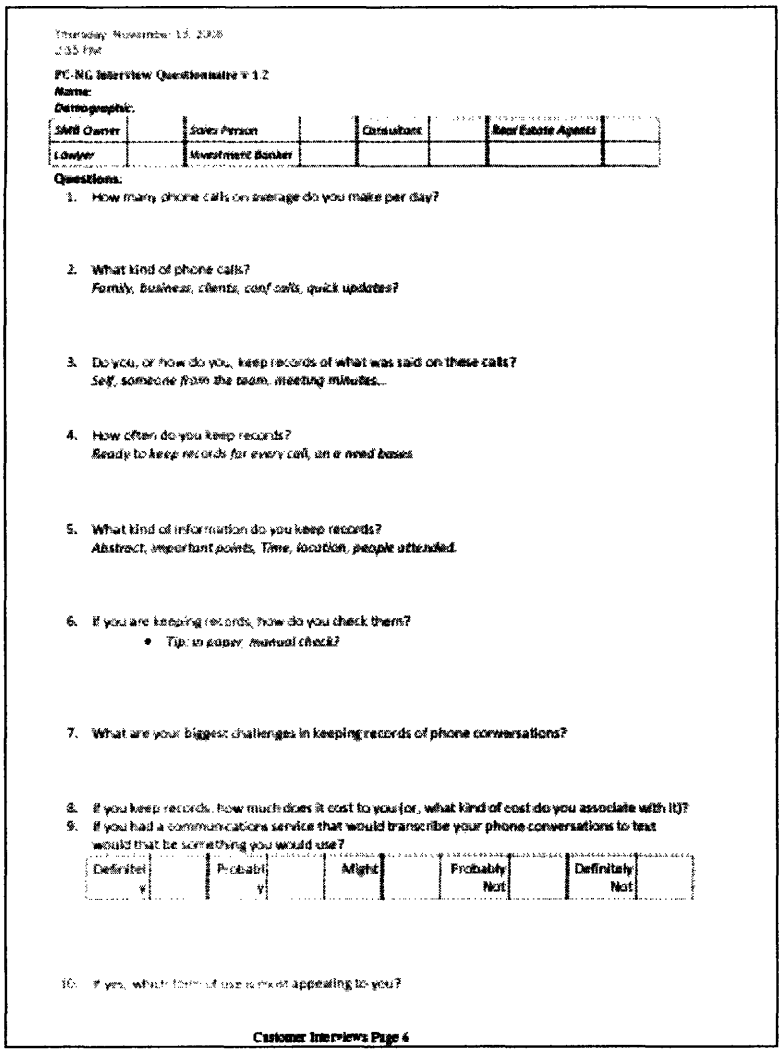
Appendix A

User interviews

Some user interviews are attached in order to see how the needs assessment was done. The next graph is the format used:



Thursday, November 13, 2008
1:35 PM

PC-NG Interview Questionnaire v 1.2
Name:
Demographic:

Skill Owner		*Sales Person*		*Consultant*		*Real Estate Agents*	
Lawyer		*Investment Banker*					

Questions:

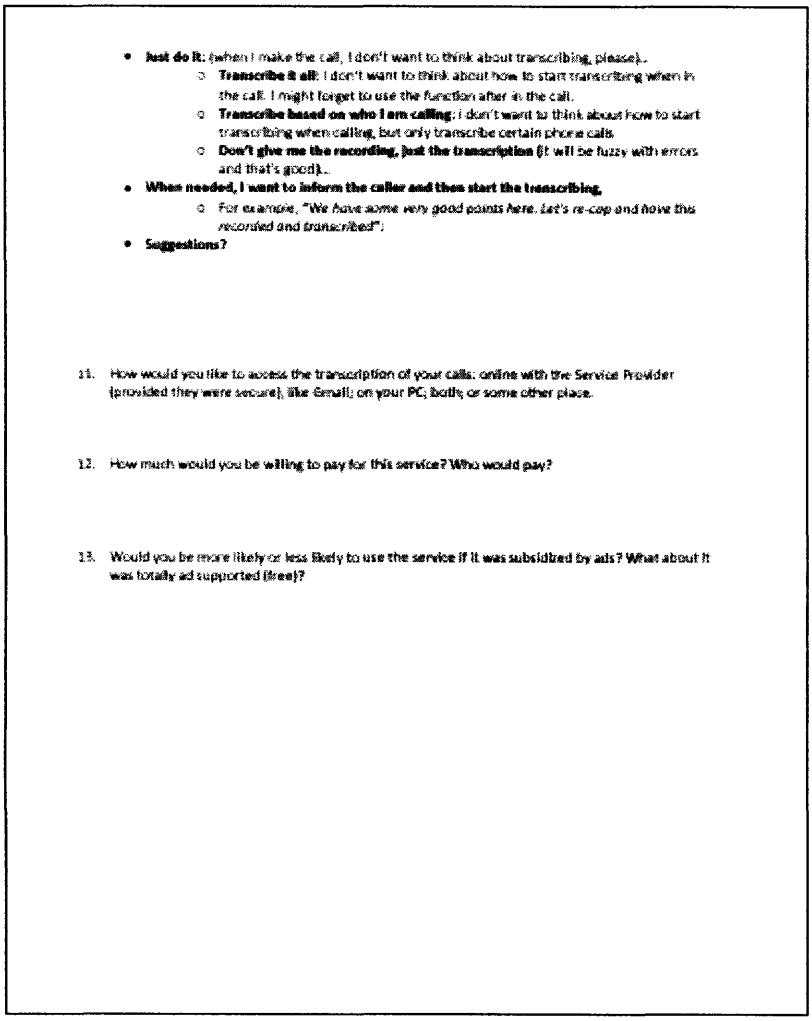
1. How many phone calls on average do you make per day?
2. What kind of phone calls?
   Family, business, clients, conf calls, quick updates?
3. Do you, or how do you, keep records of what was said on these calls?
   Self, someone from the team, meeting minutes...
4. How often do you keep records?
   Ready to keep records for every call, on a need bases
5. What kind of information do you keep records?
   Abstract, important points, Time, location, people attended.
6. If you are keeping records, how do you check them?
   - Tip: to paper *manual check?*
7. What are your biggest challenges in keeping records of phone conversations?
8. If you keep records, how much does it cost to you (or, what kind of cost do you associate with it)?
9. If you had a communications service that would transcribe your phone conversations to text would that be something you would use?

Definitely		Probably		Might		Probably Not		Definitely Not	

10. If yes, what [illegible] is most appealing to you?

Customer Interviews Page 6

Continuation of format:



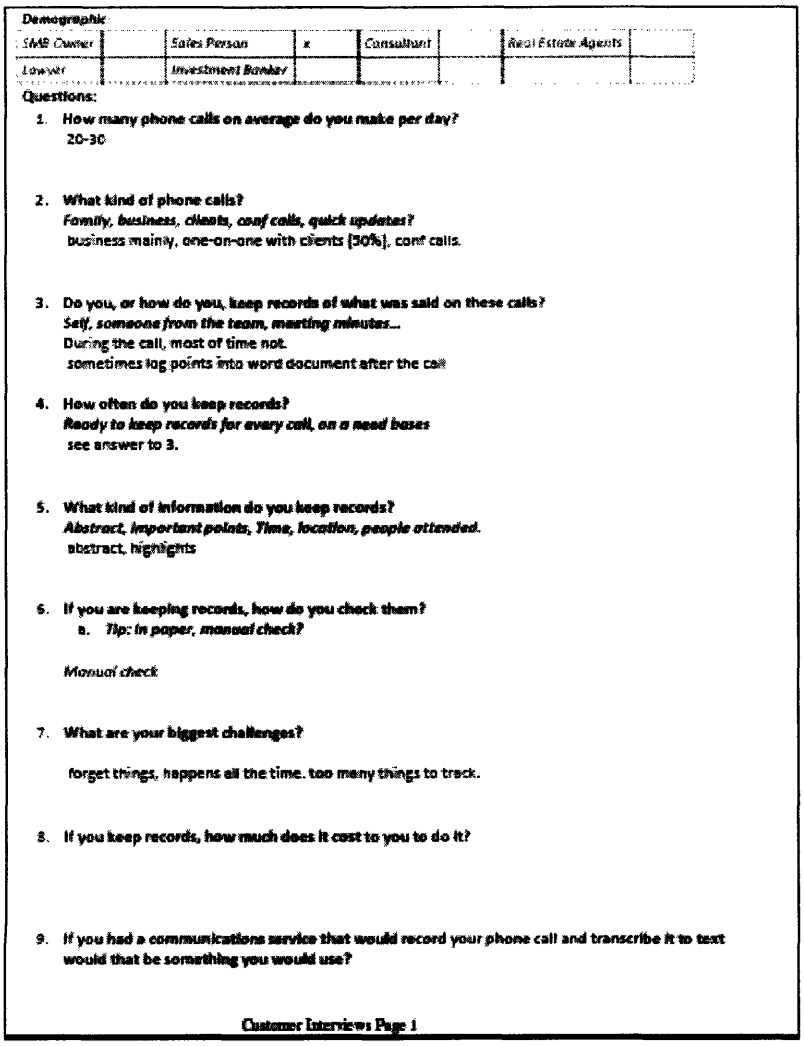
- **Just do it:** (when I make the call, I don't want to think about transcribing, please)...
  - **Transcribe it all:** I don't want to think about how to start transcribing when in the call. I might forget to use the function after in the call.
  - **Transcribe based on who I am calling:** I don't want to think about how to start transcribing when calling, but only transcribe certain phone calls.
  - **Don't give me the recording, just the transcription** (it will be fuzzy with errors and that's good)...
- **When needed, I want to inform the caller and then start the transcribing.**
  - For example, "*We have some very good points here. Let's re-cap and have this recorded and transcribed*".
- **Suggestions?**

11. How would you like to access the transcription of your calls: online with the Service Provider (provided they were secure), like Gmail; on your PC; both; or some other place.

12. How much would you be willing to pay for this service? Who would pay?

13. Would you be more likely or less likely to use the service if it was subsidized by ads? What about if was totally ad supported (free)?

An interview example, name was removed.



Demographic

SMB Owner		Sales Person	x	Consultant		Real Estate Agents	
Lawyer		Investment Banker					

Questions:

1. **How many phone calls on average do you make per day?**
   20-30

2. **What kind of phone calls?**
   Family, business, clients, conf calls, quick updates?
   business mainly, one-on-one with clients (30%), conf calls.

3. **Do you, or how do you, keep records of what was said on these calls?**
   Self, someone from the team, meeting minutes...
   During the call, most of time not.
   sometimes log points into word document after the call

4. **How often do you keep records?**
   Ready to keep records for every call, on a need bases
   see answer to 3.

5. **What kind of information do you keep records?**
   Abstract, important points, Time, location, people attended.
   abstract, highlights

6. **If you are keeping records, how do you check them?**
   a. ***Tip: in paper, manual check?***

   Manual check

7. **What are your biggest challenges?**

   forget things, happens all the time. too many things to track.

8. **If you keep records, how much does it cost to you to do it?**

9. **If you had a communications service that would record your phone call and transcribe it to text would that be something you would use?**

Customer Interviews Page 1

yes, would be very helpful. But with concerns: privacy, must be in control

Suggested features: let's re-cap our meeting and then start recording would be useful.

10. **If yes, would you want or need one side of the conversation or both sides? Does your job require you to record calls with clients? If so, how do you do it now? How do you store and index the call content?**

the ability to discard or keep recordings at the end of the call might be helpful.

11. **How would you like to store the transcription of your calls: online with the Service Provider (provided they were secure), like Gmail; on your PC; both; or some other place.**

online, must integrate with existing calendar and phonebook (in Lotus Notes).
Voice interface to access **abstracts** would be useful too.

12. **Would it be useful if the conversation is automatically grouped into topics?**

yes

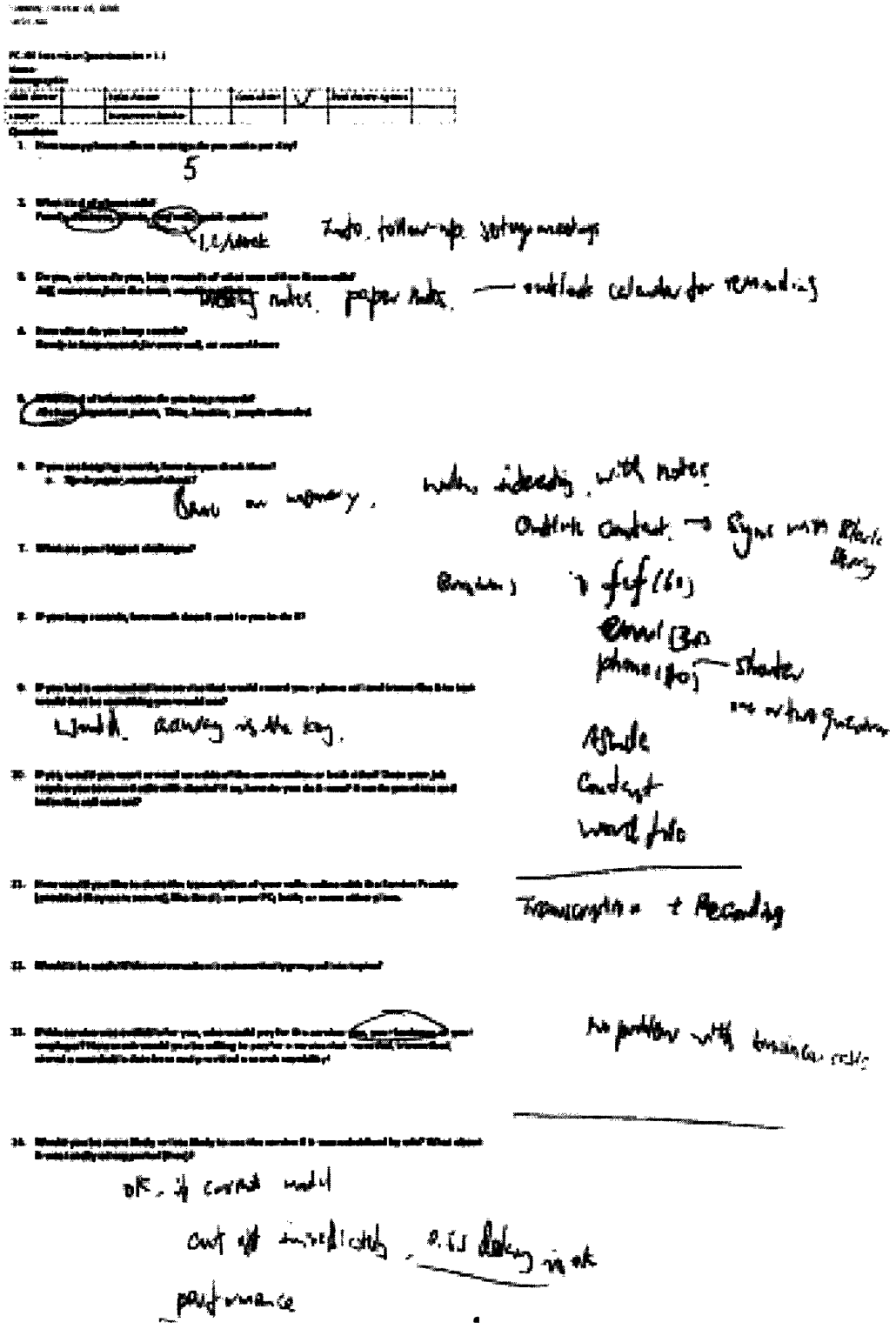
13. **If this service was available for you, who would pay for the service: you, your business, or your employer? How much would you be willing to pay for a service that recorded, transcribed, stored a searchable data base and provided a search capability?**

14. **Would you be more likely or less likely to use the service if it was subsidized by ads? What about it was totally ad supported (free)?**

Less likely.

Customer Interview Page 2

Another interview example, name was removed.



Customer Interviews Phase 3

Appendix B

Phone interaction for a teleconference

The followings are the interactions between machine and user in the IVR system:

A.Calling as host with a registered phone

1. nexiwave: Welcome to Nexi Meeting, Meeting transcription at your fingertips.
2. nexiwave: Please key in your meeting ID followed by the pound key
3. nexiwave: ------(If time elapses and no input) Ok, let's try again. (Repeat 2)
4. user: dials number in key pad
5. nexiwave: ------ (If meeting ID is less than 6 digits) Sorry a valid meeting Id should be six digits. Let's try again. (Repeat 2)
6. nexiwave: Sorry, your meeting ID XXXXX does not appear to be a valid meeting ID. Please check your number and try again. (Repeat 2)
7. nexiwave: ----- (If meeting ID is valid) The meeting topic is XXXX scheduled by XXXX
8. nexiwave: there is no one in the meeting yet
9. nexiwave: Please note this meeting will be transcribe by nexiwave
10. nexiwave: You are calling from one of the registered phone, you will now be placed into the meeting as the host.
11. nexiwave: You are the first attendee, please stand by.
12. nexiwave:---------- (As time elapses) Did you know that you can press *6 to start transcription, *7 to stop transcription and *9 to terminate the meeting and *0 to return to the voice menu?
13. nexiwave:---------- (As time elapses) nexiwave: The meeting topic is XXX and you are the host of the meeting. Please wait for other participants to join the meeting.

B.**Calling as host from an unregistered phone**

1. nexiwave: Welcome to Nexi Meeting, Meeting transcription at your fingertips.
2. nexiwave: Please key in your meeting ID followed by the pound key
3. nexiwave: ------(If time elapses and no input) Ok, let's try again. (Repeat 2)
4. user: dials number in key pad
5. nexiwave: ------ (If meeting ID is less than 6 digits) Sorry a valid meeting Id should be six digits. Let's try again. (Repeat 2)
6. nexiwave: Sorry, your meeting ID XXXXX does not appear to be a valid meeting ID. Please check your number and try again. (Repeat 2)
7. nexiwave: ----- (If meeting ID is valid) The meeting topic is XXXX scheduled by XXXX
8. nexiwave: there is no one in the meeting yet
9. nexiwave: If you are the host, please entry the host key
10. user: dials host key
11. nexiwave: Please note this meeting will be transcribe by nexiwave
12. nexiwave: You are calling from one of the registered phone, you will now be placed into the meeting as the host.
13. nexiwave: You are the first attendee, please stand by.
14. nexiwave:---------- (As time elapses) Did you know that you can press *6 to start transcription, *7 to stop transcription and *9 to terminate the meeting and *0 to return to the voice menu?
15. nexiwave:---------- (As time elapses) nexiwave: The meeting topic is XXX and you are the host of the meeting. Please wait for other participants to join the meeting.

Appendix B

nexiwave.com

a business plan for

the nexi wave of communication evolution

PC-NG Inc.

(Personal Communication – Next Generation Inc.)

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April, 2009

1. Executive Summary

Overview

nexiwave.com is a voice communication company, we focus on the content of communications by providing machine transcription to voice content in the telephone and conference call market.

Market Needs

Even though, speech-to-text has existed for long time, there are still strong market needs for affordable privacy-guaranteed transcription for voice conversations that could be searchable in easy to use.

We classified the markets into two categories: business conference calls and individual customers.

Following are examples of feedback gathered when asking professional salespeople: "*how often do you forget your discussions with your clients or peers?*"

- *"Often ... if I could just remember that name that was mentioned on that call".*
- *"I lost some sales opportunities because of this".*

Business meeting participants have almost the same problems as above (information loss):

- *"I don't remember what we have discussed after those long conference calls"*
- *"We usually spend hours on conference calls for team project, but then we cannot remember what was agreed or the to-do list".*
- *"Too many unproductive meetings ... because of no meeting agenda, and not follow-up action items".*

Our interview/survey shows, on average, professional salespeople make 20-50 phone calls every day, and company employees spend average 12 minutes after a one-hour conference call just to compile meeting minutes or to-do list. Usually, users rely on low-tech pen/paper or memory to keep records of voice communication. However, even people with good note keeping skills expressed frustrations: "*it's hard to go back to the notes... most times, I cannot find anything*".

We offer the following value to our users: 1) time saving: easily search within the calls, instead of having to remember; 2) productivity increase: focus on the conversation other than taking notes, and meeting minutes or to-do; 3) opportunity saving: will not lose an opportunity due to information loss; 4) new source of information: voice communication was not searchable before.

Products

We offer two lines of product:

Beyond Conference Calls: provides integrated conference call service with machine transcription to voice content.

NexiCall: enables user to call through, receive calls and voicemail. All content can be transcribed and searchable.

The two products are designed for different segments of users, but share main features:

- **"Conversation Search":** our key feature is the machine transcription capability. We provide search capability within voice transcriptions and user friendly view that lets user read the text and listen the audio.
- **"Audio Bookmarks":** innovative bookmarking capability in the audio stream while on the phone to mark important parts of conversation/conference.
- **"Just-in-time Summary":** enables user to dictate a summary note for a call by simply staying on the phone (while the memory is still fresh).

Technology

Our team possesses unique combination of deep talent in the three main areas: speech, telecom and web. In the speech domain, we have full ownership of the highly-extensible speech processing engine and introduced features such as offline (MLLR) and online (VTLN) speaker adaptation, discriminative parameter extraction (MLLT), unsupervised speaker clustering (SAT),

multi-pass multi-layer recognition, extended result representation with DAG or N-Best lists, word level scoring/timing, a unique language model specially trained for spoken language and speaker identification. Distributed architecture design provides infinite scalability of the speech processing speed.

In the web/telephony domain, we have features and algorithms that require full source code level ownership and deep understanding of all three domains: i.e. two-way synchronized audio + text play + audio bookmarks and conversation browsing. We also designed and patented algorithms to overcome the privacy concerns in the telephony domain. Our work has been carefully analyzed and well protected by four pending patents.

Customer Traction

We launched first prototype in September last year and entered GA in February 2009. The same month, we closed our first large-scale commercial contract with an MIT department; our second commercial contract was signed in March 2009. The third customer trial is in place now. We are also in close conversations with five more large customers and prospecting more. All customer activity has been secured without full time executive team and sales force.

Competition and Differentiation

While there are many voice transcription incumbents in the market, our service is unique on the market with clear differentiation:

- Content focus: there is no competitor that focuses on the search-ability and data mining in the voice content. No company is offering content focus value with browsing and searching capabilities.
- High accuracy: 100% machine based transcription. Under acceptable using situations, we offer very good accuracy and close to perfect accuracy after seamless speaker adaptation.
- Unique combination of features: our features are not offered by any other companies and are protected by patents as the "bookmarking".

Market Size

	"Beyond Conference Calls"	**"NexiCall"**
Target market	SME (50+ employees)	Individual + company subsidized (Tech sales, consultants, real estate agents, Journalists)
Size	700,000 companies	4.3 million users
Market Cap	Total: $4.2B/yr	Total: $1B/yr
Penetration	10%	20%
Reachable Size	$420M/yr	$200M/yr

Marketing Strategy

Conference Call is our target entry market, because 1) does not require any user behavior change; 2) more focused marketing/sales activity; these customers can be approached by direct channel via: cold calls, email marketing, referrals, advertisement.

In addition, we plan to prepare whitepapers and case studies as well as utilize the inherent network effect of conference calls: any conference participant is a potential easy-to-reach customer. We plan to leverage these known contact information from our database: each meeting participant will receive a post-meeting transcription-sharing email which will also contain brief features list and sign-up for free trial info.

We propose a one-month free trial period. This will effectively get people into the system and convert them into paying customers.

Management Team

Our team consists seasoned professionals from IT, telecom and speech fields. Our team has over 60 years of combined experience. nexiwave is a

solution to their own frustrations with the current services.

Benjamin Jiang (CTO /Interim CEO): over 10 years experience in the IT and telecom fields. Ben worked at IBM for seven years as System Architect, Team and Technical Lead in the telco, banking and IT industry bringing complete understanding of IT projects. Ben also contributed in fast growing tech start-up.

Cynthia Munoz (VP of Engineering): With over six years of experience in IT and MS in Computer Science, Cynthia worked in software development, knowledge management and algorithms. She is currently a Master Candidate at MIT.

Nickolay Shmyrev (VP of Development): Nick has worked in mathematics and speech for over 11 years. Nick obtained his MS in Mathematics and currently a PhD Candidate from Moscow State University. He is part of the Academy of Science Research Institute.

Eric Burger (Executive Advisor): Eric brings very rich telecom and IT experience to PC-NG. Eric was CTO at BEA Systems, CTO at Canata Technology (Brooktrout) and Snowshore Networks. Eric is the Chairman of the Board of the SIP Forum. Eric has a SBEE from MIT, MBA and PhD in Computer Science.

Status

Our product is already in GA with two paying customers. Our customers include highest education institution in the US and clear energy company. Our current annual revenue is already above five figures. The management team plans to fully commit in June 2009. We are looking to rise $1M initial funding for: marketing/sales, R&D and operating expenses.

1. Company and the Product

1.1 Company Overview

Personal Communication – Next Generation Inc. (PC-NG Inc.) is a privately held company started by two seasoned professionals from the IT industry who realized there are distinct needs in the telephone communications when after have had an effective telephone conversation with other peers and team mentor, some details were forgotten just after few days, and they wished to have recorded the conversation. Immediately, our experience and knowledge of user-innovated products identified the current problem as a need in the market that needed to be addressed and therefore being the mission of the company to solve user problems related to telephone conversations by focusing in the content of telephone conversation and collaboration between peers.

1.2 Product Overview

Our immediate nexiwave offering includes two lines of product: "Beyond Conference Calls" and "=Call-Thru/Receive Calls "NexiCall" which are aligned with the mission of the company:

A. **Beyond Conference Calls** (*market proven*): the user can organize conference calls through our service in few seconds and have same capabilities as a normal phone call. This product is oriented to the segment of SME where employees need to do business type meetings. The product already has two paying customers and another in trial for the web conference management with a total of near 300 users.

B. **NexiCall** (*market proven*): We provide a real Direct Inward Dialing (DID) number to each user. The user can dial into his/her DID number to call out a contact and receive calls in that number. This number can also integrate all different telephone numbers that user has. This product is focused in the segment of **independent/dependant** individual business people.

These two products, that share same platform solution, are focused on the content of telephone conversation and constitute our platform for more future offerings. Current features include:

- **"Audio Bookmarks"** (*market proven*)**:** by simply pressing the "#" key, a user can highlight a point in the conversation and rapidly identify this part when browsing the conversation later.
- **"Just-in-time Summary"** (*market proven*): instead of transcribing everything, the user can also invoke the transcription function and notify the other participant(s) such as "let's re-cap the important points", or simply stay on the line after the other parties drop off.
- **Record a Memo"** (*market proven*): Users are able to record voice memo, through the web or telephone. The voice memo will then be transcribed into text and also searchable.
- **Conversation Search** (*market proven*): user will be able to search in his/her conversation history through our website.
- **All conversations recorded and transcribed** (*market proven*)**:** User can decide in his/her profile to record and transcribe all telephone call or conference calls, or on a call to call basis.
- **Outlook/Google/Lotus Integration** (*to-be-implemented*): we plan to integrate with address books functions of Outlook, Google and Lotus Notes.

- **nexiwave in a box** (*to-be-implemented*): We plan to prepare the nexiwave box for companies , this would let them set up their own environment and record and transcribe their conversation and conference calls.
- **Horizontal integration** (*to-be-implemented*): to speed up the user acquisition process, we plan to integrate with Google, Facebook and MySpace. These existing players already have large user base and phonebook and contact functions.

Some key benefits for users using nexiwave are:

- Free high accuracy machine-transcription for all conversations (or conversations that user indicate)
- Nexiwave allows users concentrate on the call rather than taking notes.
- Nexiwave saves users valuable time by having all conversations saved on text format that could be easily searched, this makes them more productive in their job.
- Nexiwave avoids users missing details of their conversations and conference calls since they are recorded and could be viewed even after months.
- Nexiwave allows make bookmarks while the conversation takes place to indicate important parts if the conversation.

1.3 Product Roadmap

Our mid-term service will further extend the values delivered through our initial offering:

- **Intelligent Thread Conversation View**: This service is a natural extension to the "Topic-based Conversation View". It provides a more intelligent view of user conversations. Instead of a plain list of user's conversations in chronological order, items will be organized by topic; for example, sales lead with AT&T, birthday party for Bob. Features could be: Automatic grouping of communication history, and topic based user communication history.
- **Automated Summary**: semantic based text analysis which produce automated summary of long conversation.
- **More Features in the Voice Channel:** As described, voice channel is not an optimal channel for humans to intake information. New functions planned include: "Read My Email", reminder as: "Remember to pick up groceries after meet with John for Coffee at 3 at Cosi" (advanced reminder service)
- **Carrier integration:** nexiwave offered by carriers. NexiCall and related patented features can also be offered by carriers through licensing programs.
- **Horizontal integration with other conference call providers:** after we proved market adaptation, to pre-empt patent violation, we will offer licensing programs. This will allow the other conference call providers to offer our features in their services.

The following table makes a summary of the milestones that we have as a company:

Stage	Observations	Milestone
First Business Plan	First business plan that has the overall picture of the service and the market. Helped us focusing and having a whole picture map	August 2008
Proof of Concept	We proved what could be created and that it was usable for users.	September 2008
Alpha Product	First version of product. It was entirely functional in most of the features. Test done within the team and close lead users.	November 2008
Closed Beta Product	All features implemented and users registered by invitation tried the product, team got lots of feedback about its usability. Potential customers looked at product and are willing to pay for it once released.	January 2009
General Availability (GA) Product	Release was done, and general public is able to use it. Commercialization of the product started. First customer with about 200 users sign first contract. Marketing of product takes place by sponsoring conferences, show in presentations, flyers, and have a Facebook profile.	February/March 2009
Repeatable sales Model	Sales people can repeat same methods and get an average number of deals closed.	Estimated June 2009
Profitability	Sales are aggressive, network effect and word of mouth spread.	Estimated January 2010
Phase II	Add other second phase features as artificial intelligence and others.	Estimated Mid 2010

2. Marketing Analysis and Strategy

2.1 Market Needs

When people were asked "how often do you forget your discussion with your clients or peers?" Frequent answers were "often... if I could just remember that name that was mentioned on the call" (S. Kant, Business Owner). A more emphatic salesman replied "I even lost opportunities on few occasions because of this" (J. Proctor, Sales Lead). A graduate student responded "we usually spend hours in conference calls for team project, but then we cannot remember what was agreed or the to-do list".

Another even more interesting market is Business Conference Call market. When we surveyed over 50 business professionals regarding problems with business conference calls, they responded with answers like: "I don't remember what we discussed after those long calls", "meeting to-do items are not known". Our survey also shows, on average, 12 minutes were spent after a one-hour conference call to compile meeting minutes or to-do list.

Today's business and business people rely extensively on telephone and telephone conference: sales people typically make 20 to 50 phone calls per day; businesses conduct telephone conferences every day. With this amount of information flowing through telephone channel, however, no cost-effective services are offered to manage efficiently and easily the content of these phone calls.

Usually all users described above rely on low-tech pen/paper, recordings or, commonly their memory to keep records of their phone or conference calls. Even people with good note keeping skills expressed frustrations like "*it's hard to go back to the notes... most times, I cannot find anything*" (L. Harvey, Sales Lead).

Previous customer pains are the ones we address in nexiwave by recording the user calls and conferences and transcribing them, so then can later be searched, labeled and shared.

By not having to actively take notes during or after the call, our user: 1) saves valuable time, 2) can perform multi-tasks while on the call, 3) will not lose an opportunity because of information loss, 4) can obtain a summary transcript ready to share with other people.

2.2 Target market

Our targeted markets for our two products are the following segments:

2.2.1 Business Conference Calls

Our target companies for Business Conference Calls fit these criteria:

- Small to Medium-Large businesses: 20 - 5000 employees
- Annual sales $20,000 – $30,000,000
- Industry: Business Services, IT, Consulting, Trading, Legal, Financial Services, Media companies and academia.

They display these characteristics:

- Relative Tech savvy and has IT spending

- Outward facing business where client relations are important
- Company image is vital (will hesitate to stay as free service)
- Productivity and Cost saving are important

A preliminary search with leading Business Leads database shows 700,000 businesses matches our criteria.

We have very strong ties with high education institution. Our initial marketing activity will be through personal referencing through the higher education institutions.

2.2.2 Business Professionals

This group include sales persons, management consultants, real estate agents and journalists. This group of users have busy life schedule and many things to track. They most likely make a lot of phone calls with clients which they need to remember details. For example, before calling a client, they will need to review what was talked about on the previous calls. Currently, some of them use voice recording, but mostly just notes taking.

Technology Sales	400,000
Non-retail, non-tech Sales	3,000,000
Management Consultants	700,000
Real Estate Agents	220,000
Journalist	51,620
Total:	4.3 million users with avg. account $25 = $1260 Million per year

Source: U.S. Dept of Labor, Bureau of Labor Statistics, 2007

2.2.3 Distance learning students

This group contains students enrolled in distance learning programs. This group continuously needs to make conference calls in order to work in teams for class projects with a previous schedule, and usually need to send summary to other students who could not attend the conference, indicate important parts of a conference call and have following actions to be sent to the attendees.

Today there are about 11,240 on-line programs, which make an approximate market of 1,124,000 users (*Source: IES National Center for Education Statistics 2006-2007*).

2.3 Sales and distribution

As a new company and new product, the most important marketing program is to get the word out, through a combination of the following:

- Start with direct marketing for accessible potential customers as schools and salesman. This will leverage our product and give us customer references that we need to start going to mass media.
- Build whitepapers and case studies to show the model of our solution to prospective customers.
- "Reference a friend": our initial offering will be by-invite only. Recent history shows that this is an effective way to publicize one's service. Also this will help us manage feedback and manage the amount of users.
- Network effect: as more customers are satisfied with our product, our reputation will be increased and the word of mouth effect will generate a network effect by having more customers jumping into our product.
- Internet Social Marketing: this will include promoting our service on noticeable bloggers, Facebook, MySpace, etc.
- Public relations campaigns (press releases, announcements, etc)
- Sponsorship of events and institutions such as sales conferences where invitation for the trials can be given away as well as the tool can be used to set up the event. For example, we have sponsored MIT Sloan Sales Conference and had very good response rate.
- For second year, we plan to have aggressive sales by hiring professional salesman that could get more companies to use nexiwave Web Conferences.

2.4 Revenue and Pricing Strategy

For Phase 1, our revenue is based on the three bundling subscription for individuals and four bundles for contracts with companies which could be in case-by-case priced according to the bundles for conference calls.

Even that we will not get revenue from Trial users, we will offer them a trial for a month in order to allow them to see the usability of the product and engage them, so they can upgrade later to a better package.

- "Beyond Conference Calls"

This line of product is targeted our enterprise customers. We have different packages which adjust to their needs and also based on the value delivered, they also consider customer service support.

Pricing for Business Teleconference Calls						
Package	**Num. of Users**	**Limited talk per call**	**Total minutes/month (out/in)**	**Storage**	**Extra minute domestic price *** See intl. chart price	**Price**
Bronze	<20	unlimited	8,000	1 month	$0.05	$450

Silver	<100	unlimited	40,000	1 month	$0.04	$1,900
Gold	<500	unlimited	100,000	6 months	$0.04	$3,000
Platinum	500+	unlimited	500,000	unlimited	$0.03	$8,000

*The conference call minute is charged for all the other attendee's connection minutes.

- NexiCall

This line of product is targeted individuals or individuals sponsored by companies. A tiered pricing model will be used considers four packages that are based on the value they deliver based on the number of minutes, storage limit time, and extra minute charge. We will target to be our most money from the executive package.

Tiered Prices for Consumer Product: "NexiCall"							
Package	**Private Number**	**Search conversation**	**Limited talk per call**	**Total minutes/month (out/in)**	**Storage**	**Extra minute domestic price ***	**Price**
Free Trial (3 months)	No	Only outgoing calls	< 20 min	500	1 month	$0.00 (max. 10 conf calls total)	$0.00
Basic	Yes	Yes	unlimited	1000	1 month	$0.05 No international	$19.99
Executive	Yes	Yes	unlimited	3000	6 months	$0.04 See intl. chart price	$34.99
Premium	Yes	Yes	unlimited	5000	unlimited	$0.03 See intl. chart price	$54.99

2.5 Prototype and Product Launch

Our beta prototype was launched in September 2008 and our product was released into GA in February 2009. It was developed using Object Oriented programming that allows great flexibility and scaling. The product uses open source Java, MySql database and it was done using open source Eclipse environment.

2.6 Competition and Differentiation

Currently, there is no existing company that provides our short-term core offerings or our long term products. However, we expect to see imitators after the first year of initial product launch. The key differentiation points are:

- nexiwave's content focus and services are designed based on the understanding of the user and providing a well designed user interface;
- nexiwave's profile based worry-free conversation recording. This eliminates the hard-to-use and intrusive keypad operation to record the call after the call has started. You do not have to remember to record your call. Your profile setting decides what to record.
- Our product goes beyond capturing the conversations and offers a good combination of features that help users find important details within important parts, i.e. using the bookmarks in audio will allow user see where it was something important said and in-time summary.
- High accuracy: 100% machine based transcription. Under acceptable using situations, we offer very good accuracy and close to perfect accuracy after seamless speaker adaptation.
- Our user-centered-design allows users to provide feedback that could be implemented and tested.

We also have planned imitation deterrent by:

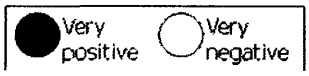
- Patent applications;
- New market opportunity: unless we demonstrate the success of our model, many companies will wait until the proof of our success. It might be in our beneficial to keep our company away from unwanted attention.

Among the companies that could compete with us, are the following groups.

- **Communication History Enablers:** These companies provide similar forms of service as PC-NG. However, the key differentiators are: our focus is to utilize the content and not the sole purpose of archiving it. For example, we provide voice-to-text function and the user can search within their recorded conversation, also we provide summary and bookmarking features to find important parts of conversations. This group includes: RecordMyCalls.com and CallRecorderCard.net
- **Voice – Text:** These companies can pose the greatest competition to PC-NG. They have existing voice recognition capability and they are consumer-facing. In this group, SpinVox and Jott are the estimated future greatest competitors. There also other competitors PhoneTag.com, CallWave.com (voice mail + gadget + HD web conf. schedule meetings from Microsoft), VoiceCloud.com, CallGraph.in, Atttel.com (*note: Alltel is the fifth largest US mobile carrier. This is a deal with SpinVox.*), Nuance Voicemail to Text (Nuance seem to have abandoned the direct consumer facing approach), and recently Google Voice offering transcription for integrated voice mail.

Competition Chart

Features	nexiwave	GoToMeeting	Free Conference	Record MyCalls	CallrecorderCard	SpinVox	Google Voice	Nuance	Jott
Record calls and conf calls	●	⊕	◑	◑	◑	⊕	⊕	⊕	⊕
Makes transcript of phone calls	●	⊕	⊕	◑	⊕	●	⊕	●	⊕
Has bookmarks in audio and text	●	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Voice mail transcript	●	⊕	⊕	⊕	⊕	●	●	⊕	●
Price for conference meetings	●	◑	◕	N/A	N/A	N/A	N/A	N/A	⊕
Price for recording/transcript	●	N/A	N/A	◑	◑	◑	●	⊕	◔
Web conference	●	●	⊕	⊕	⊕	⊕	⊕	⊕	●
Tele conference	●	●	●	⊕	⊕	⊕	●	⊕	●
Collaboration tools	●	●	⊕	⊕	⊕	⊕	⊕	⊕	●
Social blogs	●	⊕	⊕	⊕	⊕	●	⊕	⊕	●
Accuracy	◔	N/A	N/A	N/A	N/A	N/A	N/A	●	N/A



A complete detailed competitive analysis is available in separate competitive analysis files.

3. Operational

3.1 Daily Operations

All operations with our product are done on the website 24 hours a day, 7 days a week. Business accounts for conference calls have an administrator who controls the members and groups after nexiwave create the administrators accounts.

3.2 Technical Support

Our technical support can be accessed by email or by telephone. We provide quick response to all requests. For first year, technical support works from 9:00 am to 9:00 pm. For second year, customer support will be 24/7.

3.3 System Maintenance

Maintenance is done seamlessly. We have daily backups of data and we have backup servers that will start working if one crushes. We have done successful performance tests that could allow us grow to more customers without any difficulty.

3.4 Software releases

Software is released very often after a new feature is developed. New features come from planned releases or from feedback from users. Since it is a web application and user does not need to install a program, the user does not need to update anything.

4. Management Team

This unique and devoted team with a broad experience in telecommunications, voice recognition and web development is committed to work in the project even after graduation. The team is composed by:

The services that nexiwave provide are result of their own frustrations with the current services.

Benjamin Jiang (CTO /Interim CEO): over 10 years experience in the IT and telecom fields. Ben worked at IBM for seven years with roles in System Architect, Team Lead and Technical Lead. Ben consulted regularly with large telco, banking and IT firms. Prior IBM journey, Ben contributed in a fast growing tech start-up. Ben brings complete and proven-records understanding of IT projects and delivery process.

Cynthia Munoz (VP of Engineering): With over six years of experience in IT and MS in Computer Science, Cynthia worked in software development, knowledge management and algorithms. She is currently a Master Candidate at MIT.

Nickolay Shmyrev (VP of Development): Nick has worked in mathematics and speech for over 11 years. Nick obtained his Master degree in Mathematics from Moscow State University and holds advanced positions at the Academy of Science Research Institute. Nick is currently a PhD Candidate in Mathematics.

Eric Burger (Executive Advisor): Eric brings very rich telecom and IT experience to PC-NG. Eric was CTO at BEA Systems, CTO at Canata Technology (Brooktrout) and Snowshore Networks. Eric is the Chairman of the Board of the SIP Forum. Eric has a SBEE from MIT, an MBA and PhD in Computer Science.

Barlow Keener (Legal), has great passion to start-up and brings exceptional telecommunication legal directions to PC-NG. Barr has been specializing in communications law for over 15 years. He represents competing telecommunications providers in state and federal regulatory matters, negotiates interconnection agreements and handles issues, represents various Internet-related entities in regulatory matters and issues relating to rights management, privacy, and internet video. Barr practices law at Keener Law Group. Barr holds degrees from Emory University, JD, Univ. of the South, BA. Barr is the CEO & Founder of Brahma.com; Barr is also General Counsel for CSA, Inc. and General Attorney for AT&T (BellSouth); Barr has 2 patent applications.

Sales Manager (to be filled)

Sales Team (to be filled)

Board of Advisors:

Shashi Kant: Shashi is a successful entrepreneur and owner of Cognika Inc. Shashi brings important strategic advices and has strong personal ties to the founders' team.

5. Financials

5.1 Projected Profit and Loss

We have started generating revenue and we expect to break even in the first quarter of second year. Out Detailed financial projection is shown below:

	Source	Year 1		Year 2		Year 3		Year 4		Year 5	
Total Sales		**$ 694,351**	100%	**$ 4,282,793**	100%	**$9,235,487**	100%	**$ 21,017,224**	100%	**$37,624,215**	100%
COGS	P&L By Month	$426,984	61%	$1,809,782	42%	$3,097,871	34%	$6,152,320	29%	$10,592,991	28%
Gross Margin		**$ 267,367**	39%	**$2,473,011**	58%	**$6,137,616**	66%	**$14,864,904**	71%	**$27,031,224**	72%
Expenses											
Engineering	P&L By Month	$ 377,833	54%	$683,200	16%	$1,071,500	12%	$1,499,700	7%	$1,857,400	5%
Marketing	P&L By Month	$ 110,500	16%	$150,845	4%	$465,000	5%	$923,400	4%	$ 1,462,800	4%
Sales	P&L By Month	$ 59,948	9%	$428,346	10%	$520,705	6%	$633,721	3%	$812,491	2%
G&A	P&L By Month	$ 404,283	58%	$500,100	12%	$770,200	8%	$917,400	4%	$1,193,600	3%
Operating Exp.		**$ 952,565**	137%	**$1,762,491**	41%	**$2,827,405**	31%	**$3,974,221**	19%	**$5,326,291**	14%
Operating Profit		**$ (685,198)**	-99%	**$710,520**	17%	**$3,310,211**	36%	**$10,890,683**	52%	**$21,704,933**	58%

A complete Detailed financial sheets are available in separate excel files.

5.2 Current Funding

We are self funded with steady revenues. The founders have committed large amount from their personal wealth. We have secured two small seed funding through the first friend/family round.

5.3 Exit Strategy

This is a significant opportunity to build a high growth opportunity. The management is confident that the company will have a good size and continuous growth record. To grow nexiwave at a desired speed, extra large funding is required. Therefore, our exit strategies are:

We anticipate strong strategic interests in these types of companies, such as voice conference companies, customer relationship management software vendors. Cooperation among nexiwave.com and these companies will benefit nexiwave.com's customers and the industry as a whole.

6. Funding Opportunity

We are looking to rise funding for the remaining six month of first year and first half of second year's expenses. Majority of our current product plan is market proven and adopted by initial customers.

We are looking for seed funding of $1M for these following expenses:

- Sales and marketing($600K): sales base salary, marketing campaign, advertisement, conference sponsorship;
- Operating($400K): R&D, hardware, connectivity, hosting, office;

With this funding, we plan to achieve these milestones:

- Sales revenue
- number of customers acquired
- development milestones