

# ***kAltchen: Cooking got Empowered***

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## **1. Statement of Work**

The project's initial focus is to bring an automated kitchen environment to the B2B market, specifically targeting institutions, healthcare facilities, and specialized service providers that assist physically challenged individuals. The overarching aim is to create an intelligent, adaptive kitchen space designed to support individuals with physical limitations in their daily tasks, promoting greater independence and improving quality of life.

To achieve this, the project will integrate both existing smart appliances and custom-built gadgets into a seamless system that supports a wide range of specialized interfaces. These interfaces will be tailored to meet the unique needs of different user groups, whether it be individuals with mobility impairments, visual or auditory challenges, or cognitive disabilities. The system will offer flexible control options through various input methods such as voice commands, touch interfaces, and gesture recognition, ensuring that users can interact with their environment in the way that suits them best.

A key technological feature will be the integration of a robust natural language processing (NLP) system, specifically trained on use cases relevant to kitchen interactions and accessibility challenges. This system will empower users to give commands in everyday language, making the kitchen more approachable and easier to use for individuals who may not be familiar with complex technology.

In addition to smart interfaces, the project aims to study common accessibility challenges faced by users in kitchen settings. Insights from this research will inform the design and functionality of the infrastructure, ensuring it is inclusive and adaptable. A central component of the automated environment that will be implemented later in the project will be an autonomous robot capable of performing various kitchen tasks, such as meal preparation, ingredient handling, and cleaning, further enhancing the user's independence by reducing the need for physical assistance.

This initiative seeks to break barriers in traditional kitchen setups and create a pioneering, user-centered solution that supports the well-being and autonomy of individuals with physical challenges.

## 2. Project Goals and Requirements

### Must-Haves:

1. Fully functional NLP system integrated with prototypes, enabling voice and text commands.
2. at least two smart kitchen gadgets working completely to demonstrate core functionalities.
3. Gesture-based and voice-based controls for gadgets to enhance accessibility.
4. A robust and secure software framework with clear API documentation.
5. At least five already existing kitchen gadgets integrated with our API
6. Comprehensive market research and accessibility study reports.
7. Usability testing results and feedback incorporated into final designs.

### Should-Haves:

1. Multi-lingual support for the NLP system, focusing on at least three major languages.
2. Energy-efficient hardware designs to align with sustainability goals.
3. Cloud storage integration for saving and syncing user preferences across devices.
4. An autonomous walking robot that can automatize part of the kitchen that cannot be automatized otherwise

### Could-Haves:

1. Smart recipe suggestions based on user inputs and available ingredients.
2. Integration with third-party health or diet apps to provide personalized suggestions.

### Won't-Haves:

1. Support for less common IoT standards during the initial launch (can be considered in future phases).
2. Advanced AI features for parts that don't concern the kitchen such as automatic grocery shopping or meal prep services.
3. Support for user wanting to use the kitchen even while not having any kind of disability
4. Support for the automation of other rooms of the house

### 3. Assumptions and constraints

#### Assumptions:

- Users of the kitchen have stable internet connection to use the cloud-based features.
- At least a few of the already existing companies producing smart kitchen gadgets will agree to collaborate with us and will share their APIs with us
- Governments are willing to give us money for our project
- People are able to understand the system functionalities given that they are already interacting with IoT and AI in their daily lives
- People of most countries are able to understand english, making our development easy to test with this specific language in the beginning

#### Constraints:

- The NLP must be successfully trained before starting the testing phase
- The budget must be used carefully and we might need to buy gadgets from outside instead of making them in house in the first phases of the project
- We must comply with the regulations of every country we want to reach with our project
- We might need to use really low power devices, and therefore we should use a technology which allows us to perform the computation off site.

#### Technical solution:

- We will need to use a client-server architecture which will make us perform most of the computations needed on our servers. This will complicate the architecture but will solve many issues regarding the low computational power of our gadgets

### 4. Business Objectives

- **Economic business objectives:**
  - a. **Expand Market Reach:** Target a niche market of physically challenged individuals by offering specialized, accessible kitchen solutions, filling a gap in the smart home industry.
  - b. **Product Customization for Different Needs:** Develop a modular product offering, where users can purchase only the gadgets and interfaces they need, increasing affordability and market adaptability.
  - c. **Partnership with Appliance Manufacturers:** Establish collaborations with smart appliance manufacturers to integrate the system with existing kitchen gadgets, reducing development costs and increasing brand visibility.

- d. **Revenue through Subscription Models:** Offer subscription services for regular software updates, advanced features, and premium support, creating a steady revenue stream.
- e. **Licensing of NLP Technology:** License the developed natural language processing (NLP) system for use in other assistive technologies, generating additional revenue from intellectual property.
- f. **Focus on Government and Health Sector Funding:** Explore opportunities for government grants and healthcare partnerships aimed at improving accessibility for disabled individuals, potentially lowering initial development costs.
- g. **After-Sales Support and Training Services:** Offer paid after-sales support, installation, and training services, creating a new revenue stream while ensuring customer satisfaction and reducing the likelihood of returns.
- **Social business objectives:**
  - a. **Enhance Accessibility for Disabled Individuals:** Provide innovative kitchen solutions that significantly improve the quality of life for people with physical disabilities, enabling greater independence and autonomy in their daily tasks.
  - b. **Promote Inclusivity in Smart Technology:** Design products that cater to a diverse range of abilities, ensuring that technology is inclusive and accessible to all, regardless of physical limitations.
  - c. **Raise Awareness of Assistive Technologies:** Increase public awareness of the importance and availability of assistive technologies for physically challenged individuals, advocating for more inclusive environments in both private and public spaces.
  - d. **Collaborate with Disability Advocacy Groups:** Partner with organizations that represent disabled communities to ensure that the products are tailored to real needs, and to create a feedback loop for continuous improvement.
  - e. **Promote Sustainable Living:** Incorporate eco-friendly materials and energy-efficient technology in the design of gadgets and interfaces, contributing to broader sustainability goals while improving accessibility

## 5. Summary of the Budget

### Expenses (In the first 2 year before launch):

**Total Estimated Budget: \$1,580,000**

**Budget Categories:**

- **Research & Development (R&D):** \$450,000  
(Includes smart gadgets, software, NLP, accessibility research and salaries of the researchers)
- **Manufacturing & Production:** \$300,000  
(Initial prototyping and production costs)
- **Marketing & Outreach:** \$120,000  
(Branding, marketing campaigns, and partnership development)
- **Operations:** \$610,000  
(Salaries, office space, equipment, and customer support)
- **Contingency & Miscellaneous:** \$150,000  
(Miscellaneous expenses and contingency fund)

#### **Additional Notes:**

- **Grants & Government Funding:** Part of the budget could be subsidized through government grants or healthcare funding aimed at improving accessibility for disabled individuals.
- **Potential Partnerships:** Collaborating with smart appliance manufacturers could reduce manufacturing costs.
- **Revenue Considerations:** Product sales, licensing of the NLP system, and potential subscription models for software updates can offset some of the operational and R&D expenses.
- **Salaries:** Were not specified in the different categories, we also include the salaries of people that we plan on hiring for specific purposes in small periods of time (*i.e*: someone performing a small marketing campaign for us)

#### **Expenses after the product launch (Yearly):**

**Total Estimated Budget:**  $\$1,000,000 + (200,000 * 20) = \$5,000,000$

#### **Budget Categories:**

- **Research & Development (R&D):** \$250,000  
(Includes smart gadgets, software, NLP, accessibility research, prototypes and salaries for the researchers)
- **Production:** \$200,000 (**per piece**)  
(production costs, **expected units sold:** 20)
- **Marketing & Outreach:** \$150,000  
(Branding, marketing campaigns, and partnership development)
- **Operations:** \$400,000  
(Salaries for the high roles in the company, office space, equipment, and customer support)
- **Contingency & Miscellaneous:** \$200,000  
(Miscellaneous expenses and contingency fund)

## Incomes (Yearly, after the product launches):

**Total gains: \$6,740,000**

**Product Sales: \$6,000,000**

Revenue generated from selling the automated kitchen systems to target customers (healthcare institutions, assisted living facilities etc.)

- **Expected Units Sold:** 20
- **Price per Unit:** \$300,000.
- **Total Sales Revenue:** \$6,000,000

**NLP System Licensing: \$500,000**

Income from licensing the customized natural language processing (NLP) system to third-party manufacturers and appliance companies interested in accessibility-enhanced products.

- **License Fee per Manufacturer:** \$100,000.
- **Expected Number of Licenses:** 5
- **Total Licensing Revenue:** \$500,000 annually.

**Subscription Model for Software Updates and Maintenance: \$240,000**

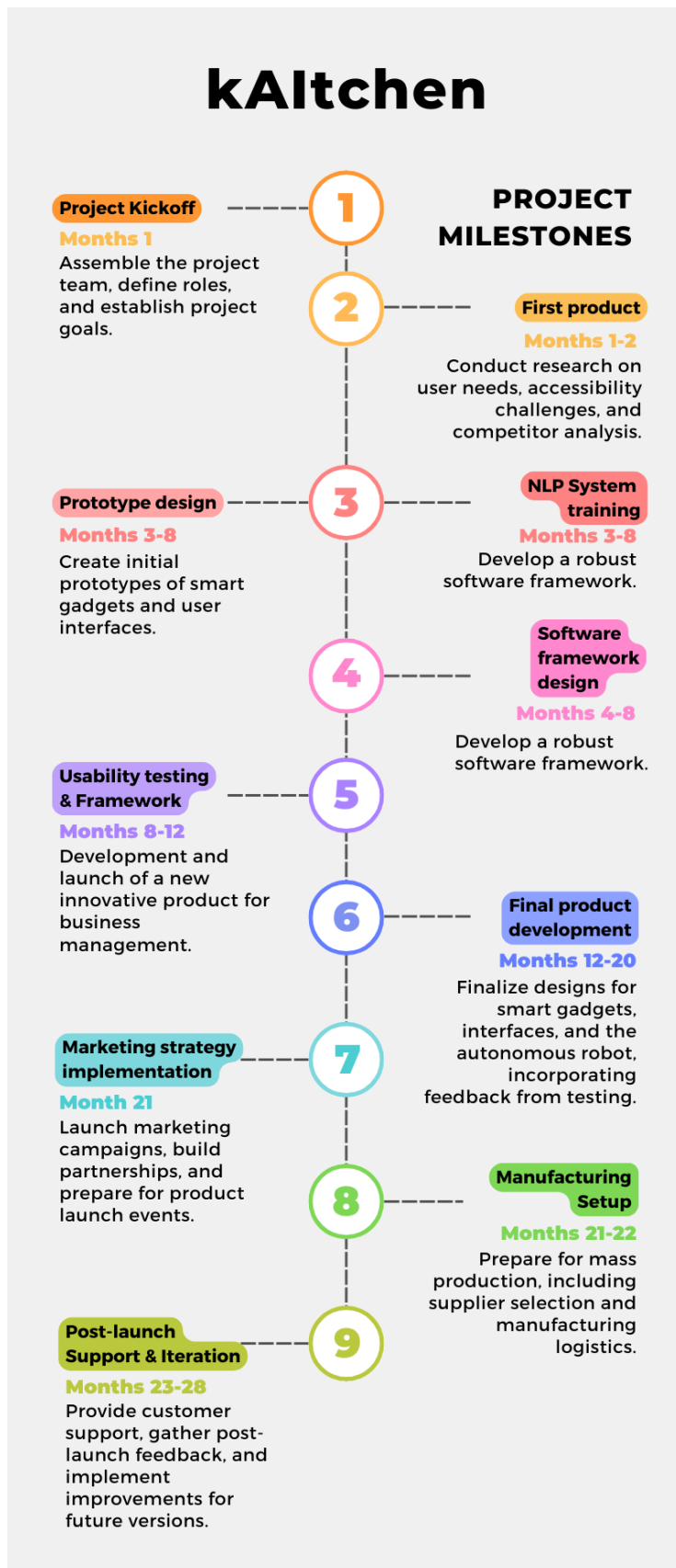
Recurring revenue generated from offering subscription services for software updates, new features, maintenance and continued NLP system improvements for end-users.

- **Monthly Subscription Fee:** \$1,000 per month per product sold
- **Total Subscription Revenue:**  $\$1,000 * 20 * 12 = 240,000$

The project pricing shown above is **based on competition** and by fixing the price. We checked how much the products similar to what we thought cost on the market and then we decided to offer the same cost but with many more features and functionalities.

Regarding the **expense profile** it's important to note that we plan producing the products only after having it ordered (and partially paid) by the customers, meaning that most of the expenses will be in the beginning of the production of the single product but they will be partially covered by incomes we already received.

## 6. Summary of the Project Milestones



### Project Kickoff

- **Timeline:** Month 1
- **Objective:** Assemble the project team, define roles, and establish project goals.

### Market Research & Accessibility Study

- **Timeline:** Months 1-2
- **Objective:** Conduct research on user needs, accessibility challenges, and competitor analysis.

### Prototype Development

- **Timeline:** Months 3-8
- **Objective:** Create initial prototypes of smart gadgets and user interfaces

### Natural Language Processing (NLP) System Training

- **Timeline:** Months 3-8
- **Objective:** Develop and train the NLP system to support various input methods for the kitchen environment.

### Software Framework Design

- **Timeline:** Months 4-8
- **Objective:** Develop a robust software framework.

### Usability Testing & Feedback

- **Timeline:** Months 8-12
- **Objective:** Conduct usability testing with target users, gather feedback, and

make necessary adjustments to prototypes.

## Final Product Development

- **Timeline:** Months 12-20
- **Objective:** Finalize designs for smart gadgets, interfaces, and the autonomous robot, incorporating feedback from testing.

## Manufacturing Setup

- **Timeline:** Months 21-22
- **Objective:** Prepare for mass production, including supplier selection and manufacturing logistics.

## Marketing Strategy Implementation

- **Timeline:** Months 1-21
- **Objective:** Launch marketing campaigns, build partnerships, and prepare for product launch events.

## Product Launch

- **Timeline:** Month 23
- **Objective:** Officially release the product to the market, accompanied by promotional events and demonstrations.

## Post-Launch Support & Iteration

- **Timeline:** Months 23-28
- **Objective:** Provide customer support, gather post-launch feedback, and implement improvements for future versions

# 7. Deliverables

N	Deliv ery Date	Title	Dissemination Level	Nature	Description
1	1	Project Kickoff Report	RE	R	A report detailing the assembled project team, defined roles, project goals, and initial timeline milestones.
2	2	Market Research & Accessibility Study Findings	CO	R	A comprehensive document analyzing user needs, accessibility challenges, and competitor insights to guide the project.
3	8	Smart Gadget Prototypes	CO	P	Initial prototypes of smart kitchen gadgets (e.g., smart



					cooking assistant, IoT-enabled appliances).
4	8	NLP System Training Outcomes Report and model	CO	R	A document summarizing the NLP system training results, including model performance metrics and supported input methods. As well as the model itself
5	8	Software Framework Architecture	RE	R	A technical document describing the software framework, including architecture design, APIs, and integration protocols.
6	12	Usability Testing Report	CO	R	A report presenting findings from usability testing, including feedback from target users and suggestions for improvement.
7	20	Final Product Design	CO	R	A comprehensive document detailing finalized designs for smart gadgets, interfaces, and the autonomous robot.
8	22	Manufacturing Readiness Report	RE	R	A report detailing manufacturing setup, including supplier selection, logistics planning, and readiness for production.
9	21	Marketing Strategy Documentation	RE	R	A detailed plan for marketing campaigns, partnerships, and preparations for product launch events.
10	23	Product Launch Event Materials	PU	P	Materials for product launch, including promotional content, demonstrations, and event coordination documentation.
11	28	Post-Launch Support & Feedback Report	PU	R	A document summarizing customer feedback, support insights, and recommendations for improvements in future versions.

## 8. Project Work Breakdown Structure

These are the main work packages in the project:

WP 0. Project Management (kAltchen)		
Start Date: M0	End Date: M28	Responsible: Project Manager,Product owner
Work Statement	this WP includes all activities related to managing the project	
Tasks	Project management plan, Risk management plan, Production of status report, Final project closure report	

WP 1. Market and accessibility study		
Start Date: M1	End Date: M2	Responsible: Market Research Analyst
Work statement	Conduct research on user needs, accessibility challenges, and competitor analysis.	
Tasks	Perform user interviews and surveys, analyze accessibility barriers, conduct competitor analysis	

WP 2. Prototype development		
Start Date: M3	End Date: M8	Responsible: Software Engineer, NLP Engineer, UI/UX Designer, Hardware Engineer
Work statement	Create initial prototypes of smart gadgets and user interfaces	
Tasks	Design prototypes for smart gadgets. Develop initial user interface designs. Test prototypes for functionality and usability.	

WP 3. NLP System training		
Start Date: M3	End Date: M8	Responsible: NLP Engineer,Hardware Engineer
Work statement	Develop and train an NLP model to support many different input methods	
Tasks	Collect data and train the NLP model. Integrate the NLP with the gadgets, test the NLP performance	

<b>WP 4. Software framework design</b>		
Start Date: M4	End Date: M8	Responsible: Software Engineer, Cybersecurity Specialist
Work statement	Develop a robust software framework to support all the system components	
Tasks	Define the software architectures, develop APIs for the many different kitchen gadgets, implement the data management and security protocols	

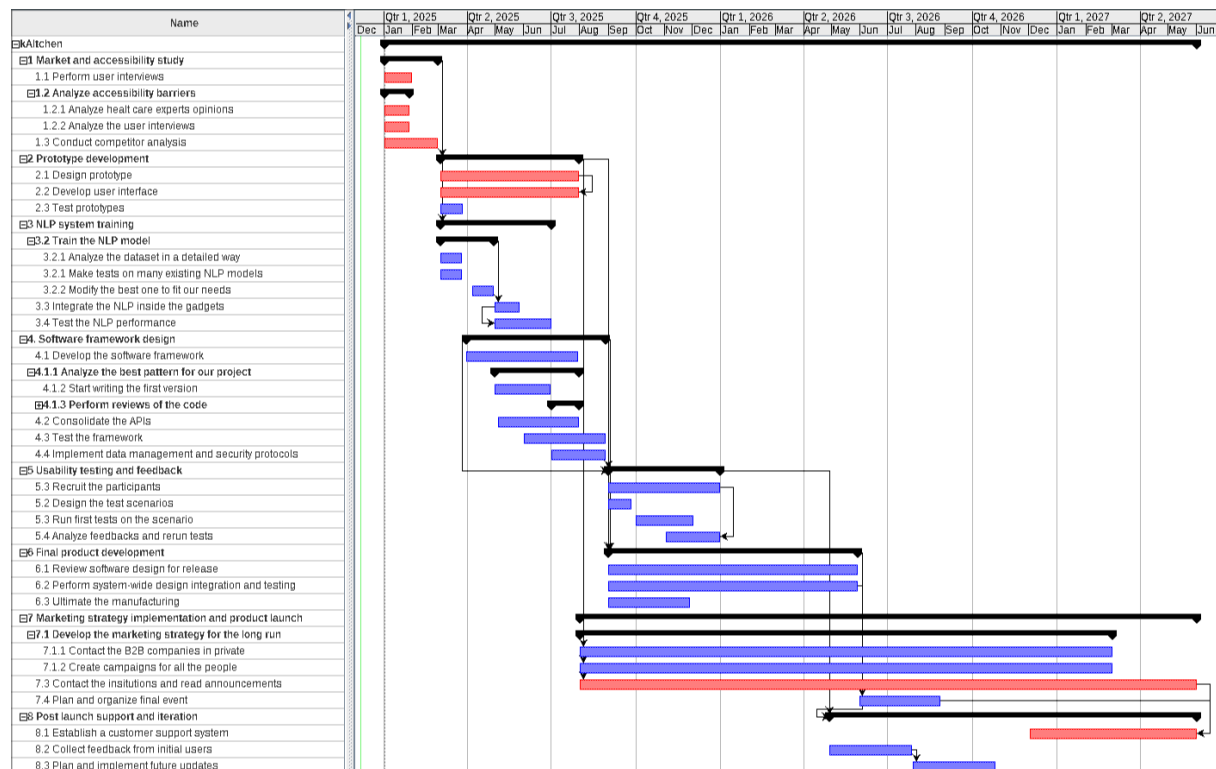
<b>WP 5. Usability testing &amp; feedback</b>		
Start Date: M8	End Date: M12	Responsible: Accessibility Specialist
Work statement	Conduct usability testing with the target users, gather the feedbacks and adjust the prototypes accordingly	
Tasks	Recruit the participants, design test scenarios for them and analyze their feedback. Iterate and refine the prototypes based on the feedback they gave, doing multiple iteration of the process.	

<b>WP 6. Final product development</b>		
Start Date:12	End Date: M20	Responsible: Hardware Engineer,Robotics Engineer, Industrial Designer
Work statement	Finalize the design for the smart gadgets and the autonomous robot	
Tasks	Review the software design for the release, perform system-wide integration and testing, prepare the manufacturing-ready designs.	

<b>WP 7. Marketing strategy implementation and product launch</b>		
Start Date: M1	End Date: M24	Responsible: Marketing Manager
Work statement	Launch the different marketing campaigns and prepare the launch events	
Tasks	Develop the marketing campaigns for the long run. Contact the B2B companies for the first campaigns aimed at them, contact the institutions, plan and organize launch events for all the customers to attend.	

WP 8. Post launch support and iteration		
Start Date: M23	End Date: M28	Responsible: Customer Relations Specialist, Field Engineer
Work statement	Provide customer support, gather post-launch feedback and implement the feedback in the software.	
Tasks	Establish a customer support system, collect feedback from initial users, plan and implement the future updates	

The following Gantt chart illustrates the structure of the project and the timing of the activities:



This Gantt chart contains all the work packages indicated above along with a view of the critical path highlighted in red. The start date is set on the first of January but it's just an hypothetical date that allows us to better calculate the duration of all the activities.

We can clearly see that the critical path is composed of tasks present in the first and second work packages and tasks from the seventh and eighth work packages. In particular we can see that it's crucial to finish the development of the prototypes so that we can start contacting the institutions and applying for contracts and announcements with something concrete. Other than that we must be fast in establishing our customer support system so that the clients that start buying our product once it's fully launched doesn't get into any trouble. If we aren't able to produce prototypes fast enough we won't have the money to go on with the project but since we plan on having a very expert team we don't think that will be an issue

All the activities have implicit padding in the times. In this case most of the activity times are determined by how fast the research team is able to perform the assigned tasks. In the best case scenario most of the activities in the second, third and fourth work package might finish a lot earlier, allowing us to be more concentrated on refining the little details and performing more tests.

Another thing to point out is also that most of the constraints present in the Gantt might be released if needed, only a few are crucial. This means that even if we end up taking more time than needed we should be able to still proceed with the work.

In the worst case scenario we might consider applying the **fast tracking** allowing the different teams to work on new features that are based on features that still need to be refined. This might seem risky but since the developers that we are going to hire are going to be experts they will definitely be able to coordinate.

In this case the Gantt extends all the way to the twenty-seventh month, after which we plan to conclude our project phase once the customer support system is up and running.

From this Gantt (created with the software Project Libre) it's also possible to identify the WBS by looking at the indentation of the different activities that compose the Gantt chart

## 9. Project Roster

Category	No	Role	Responsibilities	Contact	Status
Software Team	1	Project Manager	Oversee project execution, manage timelines, and coordinate cross-functional teams.	project.manager@kaitchen.com	Hired
	2	Product Owner	Define product vision, prioritize development goals, and ensure alignment with market needs.	product.owner@kaitchen.com	Hired
	3	Software Engineer	Develop and maintain the software framework, integrate	software.engineer@kaitchen.com	Hired

			interfaces, and ensure robust system performance.		
	4	<b>NLP Engineer</b>	Develop and train the NLP system to support voice, touch, and gesture commands.	nlp.engineer@kaitchen.com	Hired
	5	<b>UI/UX Designer</b>	Design user interfaces that ensure accessibility and usability across different user groups.	ui.ux.designer@kaitchen.com	Hired
	6	<b>QA Specialist</b>	Test software prototypes, interfaces, and NLP system for bugs and usability improvements.	qa.specialist@kaitchen.com	To Be Hired
	7	<b>Software Developers and Engineers</b>	Will be working with the software team.	software.team.i@kaitchen.com	To be Hired
<b>Hardware Team</b>	8	<b>Project Manager</b>	(Shared with Software Team)	project.manager@kaitchen.com	Hired
	9	<b>Product Owner</b>	(Shared with Software Team)	product.owner@kaitchen.com	Hired
	10	<b>Hardware Engineer</b>	Design and develop smart gadgets and integrate them into the kitchen environment.	hardware.engineer@kaitchen.com	Hired
	11	<b>Robotics Engineer</b>	Design and develop the autonomous robot capable of performing	robotics.engineer@kaitchen.com	To Be Hired

			kitchen tasks.		
	12	<b>Industrial Designer</b>	Create ergonomic and functional designs for smart gadgets and the autonomous robot.	<a href="mailto:industrial.designer@kaitchen.com">industrial.designer@kaitchen.com</a>	Hired
	13	<b>QA Specialist</b>	(Shared with Software Team, with additional focus on hardware testing and integration.)	qa.specialist@kaitchen.com	To Be Hired
	14	<b>Engineers</b>	Will be working with the hardware team	hardware.team.i@kaitchen.com	To be Hired
<b>Shared Roles</b>	15	<b>Accessibility Specialist</b>	Study user accessibility challenges to inform both software and hardware design.	accessibility.specialist@kaitchen.com	Hired
	16	<b>Market Research Analyst</b>	Perform user interviews and surveys, analyze accessibility barriers, conduct competitor analysis	market.analyst@kaitchen.com	Hired
	17	<b>Marketing Manager</b>	Develop and execute marketing strategies, including promotions for software and hardware features.	market.research@kaitchen.com	Hired
	18	<b>Supply Chain Manager</b>	Coordinate supplier selection and logistics for hardware manufacturing.	supply.chain@kaitchen.com	To Be Hired

	19	<b>Customer Relations Specialist</b>	Manage customer support, including hardware maintenance and software updates.	customer.relations@kaitchen.com	To Be Hired (Month 20)
Other	20	<b>Technical Writer</b>	Create user manuals, training guides, and product documentation for both software and hardware. *Final product launch phases	technical.writer@kaitchen.com	To be Hired (Months 12–23).
	21	<b>Cybersecurity Specialist</b>	Implement security measures for data privacy and system protection against breaches.	cybersecurity.specialist@kaitchen.com	Hired (Months 4–12).
	22	<b>Field Engineer</b>	Provide on-site technical support during product installation at client locations.	field.engineer@kaitchen.com	To be Hired (Months 23–28).
	23	<b>Other Roles</b>	Electrical Engineer, Embedded Systems Engineer etc.	.....@kaitchen.com	To be hired

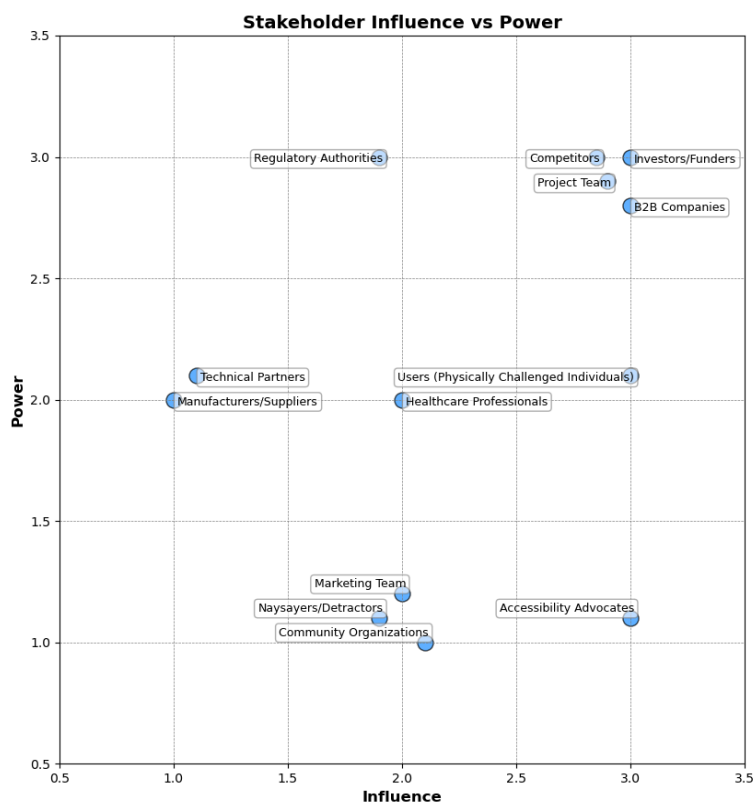
By looking at the COCOMO spreadsheet we can see that all the people indicated above are necessary because our project is really big and ambitious. In particular using the function points spreadsheet we can see we will have a total of around 2400 function points for a project that will involve both experts and junior developers in the developing part. The language we chose as the main development language for the backend part is C++, which is a very common language in critical systems.

In particular we will hire many junior developers both for the development of the framework and the development of the NLP, making them grow inside the company and learning how to use the technology that we have in house so that while the project goes on they are getting better at their work.

From the COCOMO spreadsheet we can also see that we will need around 50 people considering both seniors and juniors



# 10. Stakeholder Analysis



We are considering 3 tiers of **Power** and **Influence**:

- 1 = **low**
- 2 = **Medium**
- 3 = **High**

In the graph view we can also see a distinction between different stakeholders in the same tier.

Stakeholder	Role	Interest/Impact	Engagement Strategy	Power	Influence
Investors/Funders	Provide financial backing	Interested in the project's success and return on investment.	Regular financial reports and progress updates.	3	3
Project Team	Developers, designers, and project managers	Directly involved in execution and development of the project.	Regular meetings, updates, and collaborative tools.	3	3
Users (Physically Challenged Individuals)	End-users of the smart kitchen system	Primary beneficiaries; their needs and feedback shape the product.	User testing, surveys, and focus groups.	2	3

Regulatory Authorities	Ensure compliance with safety and accessibility standards	Interested in adherence to legal requirements.	Regular updates and submissions for compliance review.	3	2
Healthcare Professionals	Consultants and advisors	Can provide insights on accessibility and usability.	Workshops and consultation meetings.	2	2
Accessibility Advocates	Promote rights and needs of disabled individuals	Their feedback is crucial for ensuring usability and compliance.	Engaging in discussions and feedback sessions.	1	3
Community Organizations	Support groups for disabled individuals	Can help with outreach and feedback from target users.	Partnerships for testing and community engagement.	1	2
Marketing Team	Responsible for promotion and outreach	Interested in product features and market reception.	Collaborate on messaging and promotional strategies.	1	2
Manufacturers/Suppliers	Provide materials and production capabilities	Interested in contract opportunities and production timelines.	Regular communication and meetings to discuss progress.	2	1
Technical Partners	Collaborate on software and hardware integration	Concerned with technical compatibility and performance.	Joint development meetings and testing phases.	2	1

Competitors	Other companies in the smart kitchen market	May attempt to undermine project success or market position.	Monitor market trends and competitor strategies.	3	3
B2B Companies	Initial clients and end-users	Interested in the system's adaptability, efficiency, and benefits for end-users; key to early success.	Regular client meetings, product demonstrations, customized training sessions, and feedback loops.	3	3

## 11. Risks

### Technical Risks

- **Integration Complexity:** Coordinating various devices and technologies, including smart kitchen gadgets and NLP systems, may result in unexpected compatibility issues.
- **Data Security and Privacy:** Managing user data, especially for a vulnerable population, requires strict adherence to data privacy regulations (GDPR) and high security to prevent unauthorized access.
- **Reliability of NLP Systems:** NLP-based interfaces may struggle with varied speech patterns or accents, affecting user experience. We cannot afford the system to fail catastrophically in any case because we are working with people that are already at risk.

### Financial Risks

- **High Initial Investment:** Developing customized devices and advanced software frameworks demands significant upfront investment, which may strain budgets.
- **Limited Market Revenue:** The accessibility tech market, while growing, can be challenging for generating high revenue if initial adoption is limited. We will need governments and community organizations to start adopting our solutions very soon after the release of the project.
- **Funding Dependence:** Relying heavily on investors or grants increases financial risk if expected funds don't materialize.

### Market and Regulatory Risks

- **Regulatory Compliance:** Accessibility technology must comply with specific regulatory standards that may vary across regions. Changes in these regulations could impact development timelines.
- **Market Acceptance:** Some users may be reluctant to adopt smart kitchen technology due to cost, privacy concerns, or unfamiliarity with the tech. At first glance our project could scare people who are afraid that the time spent to

learn how to use our product won't make up for the gain they get in the long run.

- **Competitive Landscape:** The smart home industry is competitive, with new players frequently entering the market, which may reduce the project's market share. We must be able to make it clear that our solution is the only one that responds to the needs of disabled people.
- **Public Perception Risks:** Accessibility-focused technology is often subject to scrutiny from advocacy groups, and any perceived shortcomings could harm the project's reputation. We need to analyze in detail the legislation and clear any concern from the start.

## 12. Alternatives And Make or Buy Assessment

Some of the already existing alternatives are:

- **Moley Robotics** which claims to be the world's first fully automated robotic kitchen, combining robotics with AI to prepare a range of recipes. Their system offers residential and commercial kitchen models equipped with robotic arms that can replicate chef-quality cooking by following recipe libraries. Moley aims to provide convenient, healthy meals through automation, making fresh, home-cooked food accessible to everyone.
- **Voice assistants** like Alexa and Google home. They perform various tasks such as controlling smart home gadgets, providing information, setting reminders, playing music, and more. Both use natural language processing and AI to understand and respond to commands, with Alexa integrated deeply into Amazon's ecosystem and Google Home leveraging Google's extensive search and data capabilities. They also support integrations with third-party apps and smart devices for broader functionality.
- **Rev-A-Shelf:** Known for its accessible and customizable shelving systems, Rev-A-Shelf offers pull-out and adjustable shelves to make storage easier for people with mobility issues. Combined with smart technologies, these solutions can create an adaptable kitchen environment tailored to user needs.
- **IKEA's Inclusive Kitchen Range:** IKEA has developed kitchen models that incorporate accessible features, such as pull-down shelving and lowered countertops, designed to support various physical needs. Combining these with smart technologies provides an accessible yet high-tech solution.
- **Chefling:** Chefling is a virtual assistant designed to assist with kitchen tasks, offering recipe suggestions based on available ingredients, meal planning, and voice-guided cooking. Integrated with Alexa, it makes smart kitchens more user-friendly, especially for those who may benefit from guided cooking processes.
- **Bixi:** Bixi is a smart controller that uses gestures to control various devices without needing physical contact. This touch-free solution can be ideal for people with disabilities or limited dexterity, allowing them to control smart appliances, lights, and other devices through hand motions.

As will be discussed more in detail in the next section by looking at the score matrices, our product is able to beat all the existing alternatives for many different reasons. The main one is the fact that our product is the most complete, meaning that none of the alternatives could ever replace our product.

Taken that into account we plan on having two phases of the project

- **Phase 1:** contact many of the companies above, in particular IKEA and Amazon in order to get access to some fast solution both for the physical part and for the software for voice recognition and API to interact with many of the already existing smart gadgets. In this first phase we don't plan on selling our product yet, we just want to start contacting the B2B companies and show them our prototypes in action while we look for other companies (that might be smaller or new) to actually produce our physical components.  
Moley Robotics already has some of the functionalities that we plan on implementing so we don't plan on contacting them since we don't think the company will be willing to collaborate.  
Bixi won't be concocted because in the first phase we will make prototypes that only interact with the voice while we develop in-house software and hardware able to give different kind of controls,
- **Phase 2:** in this phase we will start to create new system gadgets that are able to communicate with the API that we chose to adopt. We will also start developing some other alternative ways of interacting with the gadgets. If contacting Amazon didn't go as planned we might consider looking for other solutions and switch to other APIs. Other than that in the second phase we plan on having a partnership with a manufacturing company that will allow some of our technicians to actually go into their factories and plan the production of our physical product.  
This means that the physical production won't ever be made in-house, while the gadgets will be made in-house but relying on already existing APIs

# 13. Evaluation

## SWOT:



### Strengths

- **Innovative Technology:** Utilizes cutting-edge technologies like NLP, smart gadgets, and robotics, making it a forward-thinking solution.
- **User-Centric Design:** Tailored interfaces based on user needs enhance usability and accessibility.
- **Independence for Users:** Empowers physically challenged individuals to perform daily tasks autonomously, improving their quality of life.
- **Market Demand:** Growing awareness and need for assistive technologies present significant opportunities for market penetration.

### Weaknesses

- **High Development Costs:** Creating custom-built gadgets and integrating various technologies can be expensive.
- **Complexity of Integration:** Ensuring seamless interaction between different devices and technologies may pose challenges.
- **User Training:** Users may require training to effectively utilize the new technologies and interfaces.
- **Dependence on new Technology:** Over-reliance on technology may lead to challenges if the system fails or malfunctions.

### Opportunities

- **Growing Aging Population:** An increasing number of elderly individuals may benefit from assistive kitchen technologies.

- **Partnerships:** Collaborations with healthcare organizations, tech companies, and research institutions could enhance development and outreach.
- **Grants and Funding:** Opportunities for funding from government and non-profit organizations focused on accessibility and disability support.
- **Expanding Market:** Potential to expand into other areas of the home or provide solutions for various disabilities.

## Threats

- **Technological Advancements:** The advancement in technology might not be fast enough in order to allow us to reach our goals.
- **Competition:** Existing companies may develop similar solutions, increasing competition in the market.
- **Regulatory Challenges:** Navigating regulations around assistive technologies and user safety can be complex.
- **User Acceptance:** Resistance to new technologies from users or caregivers could hinder adoption.

## Score matrices:

Factor	Description	Weight	Your Project	Total	Moley Robotics	Total	Voice Assistants	Total
Cost	The expense associated with the product development and deployment	3	5	15	6	18	9	27
Customization	The ability to tailor the product to individual user needs	3	10	30	6	18	5	15
Accessibility Features	Features specifically designed to support accessibility for physically challenged users	3	9	27	7	21	6	18
User Independence	The degree to which the product enables	2	10	20	8	16	5	10

	users to complete tasks independently							
Technical Support	Availability of ongoing support for users	1	7	7	6	6	8	8
Ease of Integration	How easily the product can be integrated with other systems	1	8	8	6	6	9	9
Ease of Use	How intuitive and user-friendly the product is	2	8	16	7	14	9	18
Number of Functions	The range of features and functionalities available	3	10	30	8	24	8	24
Expandability	The ability to add new features or integrate with additional tools	2	9	18	6	12	7	14
Stakeholders	The ease of managing stakeholders and meeting their requirements	-2	2	-4	4	-8	3	-6

## Financial method:

### Initial Investment (First 2 Years):



- **Total Pre-launch Expenses: \$1,580,000**

### **Post-launch Period (Years 3 and 4):**

- **Yearly Revenue: \$6,740,000**
- **Yearly Expenses: \$5,000,000**
- **Net Income (Per Year):**  $6,740,000 - 5,000,000 = 1,740,000$   
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### **Total Net Income Over 2 Years (Years 3 and 4):**

- **Net Income for 2 Years:**  $1,740,000 \times 2 = 3,480,000$   
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### **ROI Calculator:**

- **ROI** =  $((\text{Total Net Income} - \text{Initial Investment}) / \text{Initial Investment}) \times 100 =$   
 $((3,480,000 - 1,580,000) / 1,580,000) \times 100 = \mathbf{120,25\%}$

## **Conclusions:**

Our analysis of the alternatives in the automated kitchen environment space reveals that while several companies offer products that cater to specific functionalities, none provide the comprehensive set of features that our system aims to deliver. Although consumers can purchase various solutions from different vendors to achieve a similar outcome, the effectiveness and integration of these solutions will not match the quality and user experience that our all-inclusive system promises.

The score matrix we created clearly demonstrates that our project significantly outperforms competitors, including Moley Robotics, across several key factors. Our project excels in customization, accessibility features, user independence, and the number of functions offered. This competitive advantage positions us favorably to meet the needs of physically challenged individuals seeking enhanced independence in the kitchen.

With an ROI of approximately 120% over four years, our project demonstrates exceptional financial potential, indicating it is well-positioned in the market. Although the payback period is around 1.5 years (after the product launch), this relatively swift recovery reinforces the opportunity for ongoing development and scalability beyond the initial investment. The substantial net profit generated in the years following the launch provides a solid foundation for growth as we continue to expand our market presence and enhance our product offerings.

The high costs associated with our project stem from its strategic focus on the B2B sector, where delivering specialized solutions is essential for meeting the needs of businesses and institutions. This approach requires significant investment in

research, development, and tailored marketing to ensure our automated kitchen systems meet the rigorous standards of healthcare institutions and assisted living facilities. While these upfront expenses may seem substantial, they are vital for establishing a competitive edge and driving long-term value in the B2B market.

We also plan to reach out to the companies behind the alternatives we analyzed. Collaborating with these entities may enhance our framework by integrating their technologies and solutions, which could lead to mutual benefits. While we cannot predict their willingness to partner with us at this stage, we hope that none will directly compete with our innovative approach.

Since none of the alternatives are specifically designed to meet the unique needs of our target audience, we believe there is minimal risk of them pivoting their projects to directly challenge our initiative. Instead, their focus on niche markets may allow us to carve out a significant space for our comprehensive solution, catering specifically to the needs of physically challenged individuals and enhancing their independence in the kitchen environment.

In conclusion, our project stands out not only for its potential financial return but also for its commitment to providing an all-encompassing solution tailored to the accessibility needs of users. The favorable results from our score matrix further solidify our competitive advantages in the market. We remain optimistic about the opportunity to innovate and improve the quality of life for our target demographic while fostering collaborations that can further strengthen our offering.