P4
Process Book

Group 6

Jiapei Wang, Siyi Liu, Xinfei Cen, Ashima Saxena, Durga Krishnamoorthy, Melody Chu

Ideation

Jiapei (1-5)

Example & Capability	**Instructions**: - Add concepts to the Generative AI concept column. We recommend filling out the capability, domain, customer, and applications from your matchmaking worksheet. - Rate each concept across technical, financial, and desirability criteria (1 (low score) to 5 (high score)). - Add two NEW criteria and determine the 1-5 rating scale. These criteria should be relevant to your domain. - Review the summed scores for each concept. Try to remain objective, even if you have a favorite. What does this tell you?- Want to dive deeper? The score is just a sum of all criteria, however, you can create a more complex formula by turning this into a weighted average with different categories weighted differently (shown in the Weighted Score column)	Technology is readily available (1-Beyond State of the Art, 5-Off-the-shelf)	Data exists (1-No,5-Plentiful)	Data can be labeled (1-Hard, 5-Easy)	Model performance required (1-Very high, 5-Low)	Installation cost is low (1-Expensive,5-Cheap)	Data processing cost is low (1-Expensive,5-Cheap)	Customer would pay (1-Little,5-Lots)	Market Size (1-Low,5-Massive)	Privacy risk	Social performance risk	FATE risk	Environmental risk	Language Coverage and Diversity (1-Low,5-High)	User Trust and Dependency (1-Low,5-High)		
	NLP Concept	**Technical Feasibility**				**Financial Viability**				**Acceptance/Desire**				**Team Criteria**			**Weighted Score**
Example: Speech Recognition by ZOOM **Capability:** Transforming spoken language into machine-understandable format	**Title:** Voice-to-text input **Capability:** Transforming voice inputs to texts **Domain:** Communication services **Customer:** Phone companies / Smart Home Device developers **Application:** Speaking to the microphone to type in sentences without manually type words	5	5	5	1	4	3	3	5	3	3	5	5	5	3	47	18.6
	Title: Conference Transcriptor **Capability:** Record voice inputs, recognize information and construct documentations **Domain:** Meeting documentation **Customer:** Large companies with lots of meetings / Government departments **Application:** Record conference content and transcript into documents	5	5	5	2	2	2	4	5	3	3	2	5	5	4	43	17.5
	Title: Accessibility Tools **Capability:** Understanding voice commands and interact remotely. **Domain:** Accessibility **Customer:** Companies that develop accessibility devices **Application:** People who needs accessibility help can interact with devices with voice inputs	3	3	5	2	1	3	3	1	3	2	5	4	2	5	35	13.6
	Title: Language Learning Helpers **Capability:** Compare voice inputs with a standard input to see if the voice input is precise **Domain:** Language Learning **Customer:** Language learning apps (Duolingo) **Application:** User record their pronunciation and the app compares their input with a standard input recorded by native speakers	5	5	5	2	2	3	4	3	5	5	4	5	5	5	48	19.4
	Title: Voice assistants **Capability:** understand users' voice inputs and respond to their requirements and needs **Domain:** Virtual assistance, remote control **Customer:** Companies that develop voice assistants and smart home devices **Application:** users talk to voice assistants with their requirements, and receive response from the virtual assistant or they finish users' demands	5	5	5	3	2	3	4	5	1	2	3	5	4	3	43	16.5

Jiapei (6-10)

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Example: Autocorrect by Apple **Capability:** identify a misspelled word by cross-matching it to a set of relevant words in the language dictionary used as a training set.	**Title:** Code editors **Capability:** checking spelling mistakes in codes **Domain:** Coding / Computer Science **Customer:** Coding apps / software engineers **Application:** checking if the code has weird typos (variables, punctuations), highlight them to inform engineers of this possible typo so they don't need to run the whole program to find out these minor problems	5	5	5	5	4	5	1	1	4	4	5	5	3	3	49	18.3
	Title: Internet Search corrector **Capability:** understand the possible meaning of a misspelled word **Domain:** Internet Searching **Customer:** Search engines (Google) **Application:** Understand the misspelled word and the whole search input, return responses for the estimated input and inform users of their typo	5	5	5	5	5	5	1	1	2	3	3	5	1	3	45	16.4
	Title: Content Manager **Capability:** Scanning online content and detect misspelled words **Domain:** Content Management **Customer:** News agencies **Application:** Scanning articles or video subtitles to find out misspelled words and correct them, making sure the content published is free of typos.	5	5	5	2	3	5	3	2	4	2	3	4	3	3	43	17.4
	Title: Emoji/Meme input helper **Capability:** checking words input and match with possible emojis/memes **Domain:** word input / Communication / Messaging **Customer:** Chat apps / Messaging apps **Application:** when users type their inputs, their specific words can be matched with emojis or memes that they usually use/labeled/works well in these conditions	3	5	5	2	3	4	2	1	4	4	5	5	3	3	43	16.3
	Title: Better Autocorrect? **Capability:** checking possible misspelled words and cross check with a larger training set that contains trending phrases **Domain:** Communication / Messaging **Customer:** Chat apps / Messaging Apps **Application:** checking possibly misspelled words, cross checking in training set and compare the possibilty that this belongs to a trending phrase/abbreviation, and decide whether/how to autocorrect	5	5	5	2	3	3	3	4	3	2	4	5	3	3	44	17.1

Jiapei (11-15)

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		Technical Feasibility				Financial Viability				Acceptance/Desire				Team Criteria			
Example: Text summarization by ChatGPT **Capability:** summarize text by extracting the most important information.	**Title:** News/Content Reading helper **Capability:** Summarizing keywords in news and estimate reading time **Domain:** Internet Experience improvements **Customer:** News agencies, content creators, internet platforms **Application:** summarize keywords for news and articles, displaying them besides the main article, also displaying the reading progress to help the reading experience	5	5	5	3	4	3	3	4	5	4	4	5	2	3	50	19.5
	Title: Academic Reading helper **Capability:** Summarizing key content **Domain:** Academic research **Customer:** Acdemic researchers that need large amount knowledge input with high efficiency **Application:** Summarize key content for the content read and display a gist besides the article, also a quick link to the chapter that mentioned this idea to improve reading experience	5	4	4	2	3	3	4	3	3	2	4	4	3	4	41	16.5
	Title: Interactive summarization **Capability:** summarize content based on input requirement **Domain:** Summarization + sentiment analysis **Customer:** literature scholars **Application:** put in literature / content and interactively train models to summarize the content based on their requirements (e.g. understanding authors' implications in this certain paragraph)	5	5	5	2	2	3	4	5	3	3	3	4	2	3	44	17.2
	Title: Cross-Lingual summarization **Capability:** summarizing content in different languages **Domain:** Content Summarization / Global research **Customer:** Global/multinational business; researchers that need local information around the globe **Application:** summarizing documents/readings/resources that are in different languages to increase communication efficiency and research efficiency	5	5	4	2	3	4	4	4	2	2	4	5	5	3	44	17.5
	Title: Legal Document Summarization **Capability:** summarizing legal document **Domain:** content summarization / Law services **Customer:** Law firms **Application:** providing summaries of lengthy legal documents to their customers without mispresenting key information	5	5	4	1	2	3	3	3	1	2	1	4	2	4	34	13.3

Xinfei (1-5)

B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
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Example & Capability	**NLP Concept**	**Technical Feasibility**				**Financial Viability**				**Acceptance/Desire**				**Team Criteria**			**Weighted Score**
Example Chatgpt **Capability** Response Generation	**Title:** Peronalized Intelligent Tutoring System **Capability:** Adaptive feedback generation **Domain:** Education technology **Customer:** Students, educational institutions **Application:** Intelligent Tutoring System using NLP for real-time, personalized feedback and in-depth explanations, adapting to individual student needs and confusions.	5	5	5	3	4	4	5	5	5	4	5	5	4	3	55	22.1
	Title: Schedule Optimizer **Capability:** Intelligent Schedule Management and Advising **Domain:** Productivity **Customer:** Inividuals, industries **Application:** Manage and optimize personal and professional schedules. NLP is used to understand individual priorities, appointments, and the time of the day that's the most productive, then generates responsive scheduling advice. Or even rearrange tasks based on changing priorities or unforeseen events.	3	3	2	4	4	4	3	4	4	5	4	5	4	4	45	18.3
	Title: Virtual Health Advisor **Capability:** Personalized healthcare and wellness planning **Domain:** Healthcare and wellness **Customer:** Individuals, fitness coach, doctors **Application:** This virtual health advisor creating personalized healthcare plans using user health data, featuring tailored diet, exercise regimens, and support for medication adherence and appointment reminders.	5	4	4	3	5	4	3	3	4	4	4	5	4	3	48	19.1
	Title: Recipe Generator **Capability**: personalized recipe creation and nutritional guidance **Domain:** Culinary and nutrition **Customer:** Individuals, chef **Application:** An interactive guide that suggests recipes based on dietary preferences, nutritional needs, and available ingredients. It also provides nutritional information and cooking tips.	4	4	5	5	5	4	2	2	4	5	5	5	5	4	50	19.5
	Title: Traveling Planner **Capability:** Personalized Travel Itinerary Creation **Domain:** Tourism **Customer:** Individuals, traveling agencies **Application:** Travel planner that designs personalized itineraries based on individual traveling preferences, budget, and accompanies. It integrates real-time data on famous attractions, cultural events, weather, safety information, etc, to ensure consumers a seamless and enriching travel experience.	5	5	5	4	4	4	3	4	5	4	5	4	4	5	52	21.1

Xinfei (6-10)

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		Technical Feasibility				**Financial Viability**				**Acceptance/Desire**				**Team Criteria**			
Example Google Translate / DeepL **Capability** Language Translation & Interpretation	**Title:** Interactive Language Learning Assistant **Capability:** Communication and language teaching **Domain:** Education technology (language learning) **Customer:** Student, language learners, educational institutions **Application:** A language learning chatbot (text/audio) that offers interactive, conversational practice with instant feedback. It adapts to the user's proficiency level and learning style, incorporating cultural nuances.	5	5	4	4	4	3	5	5	4	5	5	5	3	4	54	21.1
	Title: AI Storyteller **Capability:** Story generation and language translation **Domain:** Entertainment and Education **Customer:** Parents, educators **Application:** Crafting engaging original children's stories and seamlessly translating beloved children's books between different languages, fostering global cultural exchange and young readers' imaginations.	5	5	5	5	3	3	2	2	5	3	4	5	3	3	47	18.1
	Title: Lyrics & Subtitle Translator **Capability:** Language translation for lyrics and subtitles **Domain:** Media and entertainment technology **Customer:** Media related industries **Application:** A powerful tool designed to bridge language barriers by translating song lyrics and subtitles, offering a global audience access to a world of music and entertainment.	5	5	5	3	5	3	3	3	4	4	5	5	3	4	50	19.6
	Title: User-generated content Insight **Capability:** User attitude trend analysis **Domain:** User-centered analytics **Customer:** Social Media Managers, content creators, businessman **Application:** Harnessing the prowess of NLP for seamless language translation, it anticipates evolving trends in user opinions and insights. This amplifies leaders' capacity to connect and resonate with a diverse global audience.	5	5	3	5	4	3	2	3	5	2	4	5	4	3	46	19.1
	Title: Mystical Oracle Interpreter **Capability:** Divination and oracle interpretation **Domain:** Entertainment **Customer:** Individuals **Application:** A profound tool designed to unlock the wisdom of oracles, offering seekers a path to inner enlightenment and self-awareness through the interpretation of mystical signs and symbols.	5	4	4	4	5	4	2	1	4	4	5	4	4	3	46	18.6

Xinfei (11-15)

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		Technical Feasibility				**Financial Viability**				**Acceptance/Desire**				**Team Criteria**			
Example **Capability** Information retrieve & clustering	**Title:** Academic Literature Meta-analysis **Capability:** Research synthesis **Domain:** Academic research and literature analysis **Customer:** Researchers, students **Application:** By automatically categorizing, and summarizing vast collections of academic papers, and identifying key trends across diverse research domains, it facilitates comprehensive literature reviews and meta-analyses, aiding scholars in generating insights, and identifying gaps, etc.	4	5	3	5	4	2	5	5	5	4	4	5	3	4	51	21.1
	Title: Retail Inventory Optimizer: **Capability:** Inventory management and optimization **Domain:** Supply chain management **Customer:** E-commerce businesses, retailers **Application:** Analyzing historical sales data, supplier information, and market trends, seasonality, customer preferences, helps retailers optimize their inventory levels, reduce carrying costs, and minimize stockouts. Allowing businesses to maximize profitability, and improve customer satisfaction.	4	5	4	4	4	5	3	3	3	4	4	5	4	5	48	19.6
	Title: Event Insight Engine **Capability:** Event detection, aggregation, and recommendation **Domain:** Media **Customer:** Event organizers, Individuals **Application:** Designed to streamline the process of monitoring and summarizing real-time events. It extracts relevant information from a multitude of sources, including news articles, social media posts, and live event feeds, to provide concise and comprehensive event summaries, and recommended to potential people and organizations who might be interested.	5	5	4	5	4	3	4	4	3	4	4	5	4	5	50	19.6
	Title: Personalized E-commerce recommendation **Capability:** Personalized product recommendation **Domain:** E-commerce **Customer:** E-commerce platforms, online retailers **Application:** Leverages cutting-edge recommendation algorithms and user profiling techniques to enhance the online shopping experience. Analyzes user behavior, preferences, and past interactions to provide tailored product recommendations, allows e-commerce businesses to deliver targeted promotions, improve customer engagement, and boost conversion rates.	5	5	4	4	4	3	4	4	3	4	5	5	4	4	50	19.6
	Title: AI-Driven Reading Clips Organizer **Capability:** Theme/content extraction and organization **Domain:** Education, Entertainment **Customer:** Individual **Application:** Instead of merely clustering content by authors or sources, this tool intelligently extracts and categorizes lines or passages based on their underlying themes, topics, or content. Thereby, content creators and researchers can easily find and organize quotes or excerpts that align with specific themes or ideas	4	4	3	4	5	3	2	2	4	5	4	5	4	4	45	18.6

Durga Krishnamoorthy (1-5)

Example NLP **Capability** Information retrieve & clustering	Title: Fraud Message Alert Capability: Natural Language Processing (NLP) Domain: Cybersecurity Customer: Individuals, Businesses Application: Implement an NLP-based system that analyzes incoming messages for potential fraud. The system identifies patterns and keywords indicative of fraudulent activity, promptly alerting users to exercise caution. This application enhances cybersecurity by providing real-time alerts, protecting individuals and businesses from phishing and scam attempts.	4	4	3	3	4	4	4	4	3	3	3	5	3	3	44	20.1
	Title: Job Application Scams **Capability:** Natural Language Processing (NLP) **Domain:** Employment Security **Customer:** Job Seekers, Hiring Platforms **Application:** Implement an advanced system that utilizes NLP to analyze messages related to job applications. The system detects patterns indicative of scams, such as fraudulent job offers or requests for sensitive information. Additionally, employ image recognition to verify job postings and accompanying documents, providing users with real-time alerts. This application safeguards job seekers from falling victim to job application scams, ensuring a secure and trustworthy job-seeking experience.	4	3	2	3	3	3	4	3	2	3	2	5	3	3	37	18.1
	Title: Statement Verification System **Capability:** Natural Language Processing (NLP), Image Recognition **Domain:** Financial Transactions **Customer:** Businesses, acount holders **Application:** Develop a comprehensive system for transction reporting verification that utilizes both NLP and Image Recognition. Users can submit images of statements from online transactions.	4	4	3	3	4	4	3	4	4	4	3	5	4	4	45	20.1
	Title: Invoice Verification System **Capability:** Natural Language Processing (NLP), Image Recognition **Domain:** E-commerce **Customer:** Businesses, Online Shoppers **Application:** Develop a comprehensive system for invoice verification that utilizes both NLP and Image Recognition. Users can submit images of invoices from online transactions.	4	3	3	3	4	4	3	3	4	4	3	5	4	4	43	19.6
	Title: NutriEval - Nutrition and Dietary Analysis **Capability:** Natural Language Processing (NLP) **Domain:** Health and Wellness / Nutrition **Customer:** Individuals seeking dietary guidance / Fitness apps / Healthcare providers **Application:** Utilize NLP to analyze food ingredients, providing personalized health ratings and dietary insights to users for informed decision-making and optimized nutritional choices.	4	5	3	5	4	2	5	5	5	4	4	4	3	4	50	21.1

Durga Krishnamoorthy (6-10)

Title: Product retrieval **Capability:** Natural Language Processing (NLP), chatgpt **Domain:** E-commerce **Customer:** Online shoppers **Application:** Develop a chatbot system to provide product inventory and helps in purchase decision based on real-time stock, reviews and availability status.	4	5	4	4	4	5	3	3	3	4	4	5	4	5	48	19.6
Title: Travel Assistant **Capability**: Identifying key locations and points of interest from travel blogs **Domain**: Travel and Tourism **Customer**: Travel agencies / Online travel platforms **Application**: Create personalized travel itineraries by extracting notable locations and attractions from travel-related texts.	3	3	2	4	4	4	3	4	4	5	4	5	4	4	43	32
Title: Personal Fund AI **Capability**: Advising on financial queries **Domain**: Personal Finance **Customer**: Banks / Financial advising apps **Application**: Offer financial advice and answer queries on personal finance management.	4	5	4	4	4	5	3	3	3	4	4	5	4	5	49	17
Title: Content Post manager **Capability:** Curate online content and detect trend analysis based on keywords **Domain:** Content Management **Customer:** News agencies, Social media analyst **Application:** Reads articles or video subtitles to find out tremdinh words and notifes us, making sure the content published is on or off trend	4	5	4	4	4	5	3	3	3	4	4	5	4	5	45	18
Title: Mindfulness Mentor **Capability:** NMindfulness and Relaxation Techniques **Domain:** Mental Health and Wellness **Customer:** Individuals seeking stress relief **Application:** Develop a chatbot system to guide users through mindfulness exercises, breathing techniques, and relaxation strategiesus.	4	3	3	3	4	4	3	3	4	4	3	5	4	4	43	19.6

Durga Krishnamoorthy (11-15)

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Example: Entity Recognition with NLP Systems Capability: Identifying and classifying named entities (people, places, organizations, etc.) in text	**Title**: Resume Screening Tool **Capability**: Extracting key information from resumes **Domain**: Human Resources **Customer**: Recruitment agencies / HR departments **Application**: Automate the process of scanning resumes for relevant experience, education, and skills.	4	4	3	3	4	4	4	4	3	3	3	5			44	20.1
	Title: Legal Document Analyzer **Capability**: Identifying key entities in legal documents **Domain**: Legal **Customer**: Law firms / Corporate legal departments **Application**: Streamline the review of legal documents by quickly identifying pertinent entities like parties involved, locations, and legal references.	4	3	2	3	3	3	4	3	2	3	2	5			37	18.1
	Title: News Content Categorizer **Capability**: Classifying news articles based on entities **Domain**: Media and Journalism **Customer**: News publishers / Content aggregators **Application**: Automatically categorize news content by extracting key entities, aiding in quicker content sorting and retrieval.	4	4	3	3	4	4	3	4	4	4	3	5			45	20.1
	Title: Research Paper Classifier **Capability**: Extracting topics and keywords from academic papers **Domain**: Academia and Research **Customer**: Academic journals / Universities **Application**: Assist in organizing and categorizing research papers based on key entities like methodologies, subjects, and institutions.	4	3	3	3	4	4	3	3	4	4	3	5			43	19.6
	Title: Travel Itinerary Planner **Capability**: Identifying key locations and points of interest from travel blogs **Domain**: Travel and Tourism **Customer**: Travel agencies / Online travel platforms **Application**: Create personalized travel itineraries by extracting notable locations and attractions from travel-related texts.	4	4	3	3	4	4	3	3	3	3	3	5			42	19.1

Ashima Saxena (1-5)

Example & Capability	**Instructions**: - Add concepts to the Generative AI concept column. We recommend filling out the capability, domain, customer, and applications from your matchmaking worksheet. - Rate each concept across technical, financial, and desirability criteria (1 (low score) to 5 (high score)). - Add two NEW criteria and determine the 1-5 rating scale. These criteria should be relevant to your domain. - Review the summed scores for each concept. Try to remain objective, even if you have a favorite. What does this tell you?- Want to dive deeper? The score is just a sum of all criteria, however, you can create a more complex formula by turning this into a weighted average with different categories weighted differently (shown in the Weighted Score column)	Technology is readily available (1-Beyond State of the Art, 5-Off-the-shelf)	Data exists (1-No,5-Plentiful)	Data can be labeled (1-Hard, 5-Easy)	Model performance required (1-Very high, 5-Low)	Installation cost is low (1-Expensive,5-Cheap)	Data processing cost is low (1-Expensive,5-Cheap)	Customer would pay (1-Little,5-Lots)	Market Size (1-Low,5-Massive)	Privacy risk	Social performance risk	FATE risk	Environmental risk	Language Coverage and Diversity (1-Low,5-High)	User Trust and Dependency (1-Low,5-High)		
	NLP Concept	**Technical Feasibility**				**Financial Viability**				**Acceptance/Desire**				**Team Criteria**			**Weighted Score**
Example: Sentiment Analysis Capability: Analyzing text to determine the sentiment (positive, negative, neutral).	**Title**: Customer Feedback Analyzer **Capability**: Identifying sentiment in customer feedback **Domain**: Customer Relationship Management **Customer**: Retail companies / E-commerce platforms **Application**: Analyze customer reviews and feedback for product improvements and customer service enhancement.	4	4	3	3	4	4	4	4	3	3	3	5			44	20.1
	Title: Social Media Trend Tracker **Capability**: Gauging public sentiment on social media **Domain**: Marketing and Public Relations **Customer**: Marketing agencies / Corporate PR departments **Application**: Monitor social media to understand public opinion trends on brands, products, or events.	4	4	3	3	4	4	3	4	3	3	3	5			43	19.6
	Title: Political Sentiment Meter **Capability**: Assessing public sentiment towards political topics **Domain**: Political Campaigns **Customer**: Political parties / Campaign managers **Application**: Gauge public sentiment on policies or candidates to shape campaign strategies.	4	3	2	3	3	3	3	3	2	2	2	5			35	17.6
	Title: Financial Market Predictor **Capability**: Predicting market trends based on news sentiment **Domain**: Finance and Trading **Customer**: Financial institutions / Individual traders **Application**: Analyze financial news to predict stock market movements or economic trends.	4	3	2	2	3	4	3	3	2	2	2	5			35	18.1
	Title: Mental Health Assistant **Capability**: Detecting emotional states in personal journals **Domain**: Health and Wellness **Customer**: Mental health apps / Therapists **Application**: Assist in monitoring users' emotional wellbeing through journal entries.	4	3	3	3	4	4	4	3	2	4	3	5			42	19.1

Ashima Saxena (6-10)

Example & Capability	- Add concepts to the Generative AI concept column. We recommend filling out the capability, domain, customer, and applications from your matchmaking worksheet. - Rate each concept across technical, financial, and desirability criteria (1 (low score) to 5 (high score)). - Add two NEW criteria and determine the 1-5 rating scale. These criteria should be relevant to your domain. - Review the summed scores for each concept. Try to remain objective, even if you have a favorite. What does this tell you?- Want to dive deeper? The score is just a sum of all criteria, however, you can create a more complex formula by turning this into a weighted average with different categories weighted differently (shown in the Weighted Score column)	Technology is readily available (1-Beyond State of the Art, 5-Off-the-shelf)	Data exists (1-No,5-Plentiful)	Data can be labeled (1-Hard, 5-Easy)	Model performance required (1-Very high, 5-Low)	Installation cost is low (1-Expensive,5-Cheap)	Data processing cost is low (1-Expensive,5-Cheap)	Customer would pay (1-Little,5-Lots)	Market Size (1-Low,5-Massive)	Privacy risk	Social performance risk	FATE risk	Environmental risk	Language Coverage and Diversity (1-Low,5-High)	User Trust and Dependency (1-Low,5-High)		
	NLP Concept	**Technical Feasibility**				**Financial Viability**				**Acceptance/Desire**				**Team Criteria**			**Weighted Score**
Example: Chatbot Technology Capability: Simulating conversation with humans	**Title**: Customer Service Bot **Capability**: Handling customer inquiries and support **Domain**: Customer Service **Customer**: Online retailers / Service providers **Application**: Automate responses to common customer queries, improving response time and efficiency.	5	4	3	3	4	4	4	5	3	3	3	5			46	20.6
	Title: Virtual Shopping Assistant **Capability**: Assisting in online shopping **Domain**: E-commerce **Customer**: E-commerce websites **Application**: Help users find products and provide recommendations based on queries.	5	4	3	3	4	4	4	4	3	3	3	5			45	20.1
	Title: Language Practice Companion **Capability**: Assisting in language learning **Domain**: Education **Customer**: Language learning apps / Educational institutions **Application**: Provide conversational practice in different languages to learners.	4	3	3	3	4	3	3	3	3	4	3	5			41	18.6
	Title: Personal Finance Advisor **Capability**: Advising on financial queries **Domain**: Personal Finance **Customer**: Banks / Financial advising apps **Application**: Offer financial advice and answer queries on personal finance management.	4	3	3	3	4	3	4	3	3	3	3	5			41	19.1
	Title: Health Consultation Guide **Capability**: Offering preliminary health consultations **Domain**: Healthcare **Customer**: Healthcare providers / Telemedicine services **Application**: Provide initial health consultations and guide patients to the right medical resources.	4	3	3	3	3	3	4	3	2	3	2	5			38	18.1

Ashima Saxena (11-15)

Example & Capability	- Add concepts to the Generative AI concept column. We recommend filling out the capability, domain, customer, and applications from your matchmaking worksheet. - Rate each concept across technical, financial, and desirability criteria (1 (low score) to 5 (high score)). - Add two NEW criteria and determine the 1-5 rating scale. These criteria should be relevant to your domain. - Review the summed scores for each concept. Try to remain objective, even if you have a favorite. What does this tell you?- Want to dive deeper? The score is just a sum of all criteria, however, you can create a more complex formula by turning this into a weighted average with different categories weighted differently (shown in the Weighted Score column)	Technology is readily available (1-Beyond State of the Art, 5-Off-the-shelf)	Data exists (1-No,5-Plentiful)	Data can be labeled (1-Hard, 5-Easy)	Model performance required (1-Very high, 5-Low)	Installation cost is low (1-Expensive,5-Cheap)	Data processing cost is low (1-Expensive,5-Cheap)	Customer would pay (1-Little,5-Lots)	Market Size (1-Low,5-Massive)	Privacy risk	Social performance risk	FATE risk	Environmental risk	Language Coverage and Diversity (1-Low,5-High)	User Trust and Dependency (1-Low,5-High)		
	NLP Concept	**Technical Feasibility**				**Financial Viability**				**Acceptance/Desire**				**Team Criteria**			**Weighted Score**
Example: Entity Recognition with NLP Systems Capability: Identifying and classifying named entities (people, places, organizations, etc.) in text	**Title**: Resume Screening Tool **Capability**: Extracting key information from resumes **Domain**: Human Resources **Customer**: Recruitment agencies / HR departments **Application**: Automate the process of scanning resumes for relevant experience, education, and skills.	4	4	3	3	4	4	4	4	3	3	3	5			44	20.1
	Title: Legal Document Analyzer **Capability**: Identifying key entities in legal documents **Domain**: Legal **Customer**: Law firms / Corporate legal departments **Application**: Streamline the review of legal documents by quickly identifying pertinent entities like parties involved, locations, and legal references.	4	3	2	3	3	3	4	3	2	3	2	5			37	18.1
	Title: News Content Categorizer **Capability**: Classifying news articles based on entities **Domain**: Media and Journalism **Customer**: News publishers / Content aggregators **Application**: Automatically categorize news content by extracting key entities, aiding in quicker content sorting and retrieval.	4	4	3	3	4	4	3	4	4	4	3	5			45	20.1
	Title: Research Paper Classifier **Capability**: Extracting topics and keywords from academic papers **Domain**: Academia and Research **Customer**: Academic journals / Universities **Application**: Assist in organizing and categorizing research papers based on key entities like methodologies, subjects, and institutions.	4	3	3	3	4	4	3	3	4	4	3	5			43	19.6
	Title: Travel Itinerary Planner **Capability**: Identifying key locations and points of interest from travel blogs **Domain**: Travel and Tourism **Customer**: Travel agencies / Online travel platforms **Application**: Create personalized travel itineraries by extracting notable locations and attractions from travel-related texts.	4	4	3	3	4	4	3	3	3	3	3	5			42	19.1

Melody Chu (1-5)

Example & Capability	applications from your matchmaking worksheet. - Rate each concept across technical, financial, and desirability criteria (1 (low score) to 5 (high score)). - Add two NEW criteria and determine the 1-5 rating scale. These criteria should be relevant to your domain. - Review the summed scores for each concept. Try to remain objective, even if you have a favorite. What does this tell you?- Want to dive deeper? The score is just a sum of all criteria, however, you can create a more complex formula by turning this into a weighted average with different categories weighted differently (shown in the Weighted Score column)	nology is readily available yond State of the Art, 5-Off-the-shelf) Data exists (1-No,5-Plentiful)	Data can be labeled (1-Hard, 5-Easy)	Model performance required (1-Very high, 5-Low)	Installation cost is low (1-Expensive,5-Cheap)	Data processing cost is low (1-Expensive,5-Cheap)	Customer would pay (1-Little,5-Lots)	Market Size (1-Low,5-Massive)	Privacy risk	Social performance risk	FATE risk	Environmental risk	Language Coverage and Diversity (1-Low,5-High)	User Trust and Dependency (1-Low,5-High)		
	NLP Concept	**Technical Feasibility**				**Financial Viability**				**Acceptance/Desire**			**Team Criteria**			**Weighted Score**
Example: customer service chatbots or chatgpt Capability: understanding prompts and generating human-like responses	**Title:** Language Learning Practice **Capability:** understanding prompts and responding to them (potentially translation) **Domain:** Language Learning **Customer:** People who want to learn languages **Application:** Practice speaking to a chatbot in a foreign language, maybe it can provide tips (in your native language?) on how to improve your messages	5	5	5	2	5	5	3	5	4	3	5	5	5	4	52	21.6
	Title: Conversation Practice **Capability:** understanding prompts and responding to them **Domain:** mental health/behavioral development **Customer:** People who want to improve their social skills (due to anxiety, other disorders, or otherwise) **Application:** Provide a "safe space" low pressure chat room where they can practice having conversations with the chatbot	5	5	5	2	5	5	3	2	4	3	5	5	5	4	49	20.1
	Title: Interview Prep **Capability:** understanding prompts and responding to them, retaining memory **Domain:** Professional Development **Customer:** Job or School Applicants (or employers who are interviewing applicants and want to practice interviewing other people) **Application:** Can generate more tailored practice interview prompts, questions, and responses based on what you said	5	5	5	5	5	5	5	4	5	3	5	5	5	3	57	22.6
	Title: Behavioral Interview **Capability:** understanding prompts and responding to them **Domain:** Professional/Recruiting **Customer:** Companies who are hiring **Application:** Use a chatbot to see how the applicant responds to different personalities of people or different situations (chatbot pretends to be different types of personalities)	5	5	5	5	5	5	3	3	4	2	2	5	3	4	49	20.6
	Title: Mock User/Stakeholder Research **Capability:** **Domain:** Design Research **Customer:** **Application:** have the chatbot assume the personality/position of a stakeholder and ask it questions (e.g. a car company could use the chatbot to ask what common problems a suburban truck driver will run into)	5	5	5	4	5	5	2	3	4	3	3	5	4	3	49	20.1

Melody Chu (6-10)

Example & Capability	applications from your matchmaking worksheet. - Rate each concept across technical, financial, and desirability criteria (1 (low score) to 5 (high score)). - Add two NEW criteria and determine the 1-5 rating scale. These criteria should be relevant to your domain. - Review the summed scores for each concept. Try to remain objective, even if you have a favorite. What does this tell you?- Want to dive deeper? The score is just a sum of all criteria, however, you can create a more complex formula by turning this into a weighted average with different categories weighted differently (shown in the Weighted Score column)	...nology is readily available ...yond State of the Art, 5-Off-the-shelf) Data axis (1-No,5-Plentiful)	Data can be labeled (1-Hard, 5-Easy)	Model performance required (1-Very high, 5-Low)	Installation cost is low (1-Expensive,5-Cheap)	Data processing cost is low (1-Expensive,5-Cheap)	Customer would pay (1-Little,5-Lots)	Market Size (1-Low,5-Massive)	Privacy risk	Social performance risk	FATE risk	Environmental risk	Language Coverage and Diversity (1-Low,5-High)	User Trust and Dependency (1-Low,5-High)		
	NLP Concept	**Technical Feasibility**				**Financial Viability**				**Acceptance/Desire**				**Team Criteria**			**Weighted Score**
Example: Voice Assistants (e.g. Alexa) Capability: Understanding Voice Prompts and Responding Out Loud	**Title:** Audio Workout Guide **Capability:** listen to prompts and reply (speak) **Domain:** fitness **Customer:** people who workout but dont want to pay for a trainer/classes **Application:** can provide realtime exercise instructions (you can tell it when you completed an exercise and how difficult it was, and it can respond with the next exercise and instructions for it), or for yoga and things like that, it can help with pacing too	5	5	5	4	5	5	3	4	5	3	5	5	4	4	54	21.6
	Title: Conversation Practice **Capability:** understanding voice prompts and responding to them **Domain:** mental health/behavioral development **Customer:** People who want to improve their social skills (due to anxiety, other disorders, or otherwise) **Application:** Provide a "safe space" low pressure chat where they can practice having conversations with the chatbot	5	5	5	2	5	5	2	3	1	2	5	5	5	3	45	18.6
	Title: Language Learning Practice **Capability:** understanding prompts and responding to them (potentially translation) **Domain:** Language Learning **Customer:** People who want to learn languages **Application:** Practice speaking to a voice assistant in a foreign language, maybe it can provide tips (in your native language?) on how to improve your messages	5	5	5	2	5	4	3	5	4	3	5	5	5	4	51	21.1
	Title: Practice Presentation with Feedback **Capability:** understanding speech, summary, responding to them **Domain:** Education/Business **Customer:** People who want to practice presenting or speaking **Application:** Practice presenting to the voice assistant, then it will respond with summary of what it understood, and feedback on delivery (e.g. if there are a lot of filler words)	5	5	5	4	5	3	2	4	5	3	5	5	4	4	51	20.1
	Title: AI Information Desks **Capability:** **Domain:** Info Desk **Customer:** Companies or Organizations or Events **Application:** Have an AI info desk to receive inquiries and provide responses (e.g. where's the bathroom, what fun things are there to do near me, etc)	5	5	5	5	3	3	3	2	5	3	5	5	4	4	49	18.6

Melody Chu (11-15)

Example & Capability	- Rate each concept across technical, financial, and desirability criteria (1 (low score) to 5 (high score)). - Add two NEW criteria and determine the 1-5 rating scale. These criteria should be relevant to your domain. - Review the summed scores for each concept. Try to remain objective, even if you have a favorite. What does this tell you?- Want to dive deeper? The score is just a sum of all criteria, however, you can create a more complex formula by turning this into a weighted average with different categories weighted differently (shown in the Weighted Score column)	…y is readily available (…State of the Art,5-Off-the-shelf)	Data exists (1-No,5-Plentiful)	Data can be labeled (1-Hard, 5-Easy)	Model performance required (1-Very high, 5-Low)	Installation cost is low (1-Expensive,5-Cheap)	Data processing cost is low (1-Expensive,5-Cheap)	Customer would pay (1-Little,5-Lots)	Market Size (1-Low,5-Massive)	Privacy risk	Social performance risk	FATE risk	Environmental risk	…nguage Coverage and Diversity (…Low,5-High)	User Trust and Dependency (1-Low,5-High)		
	NLP Concept	Technical Feasibility				Financial Viability				Acceptance/Desire				Team Criteria			Weighted Score
Voice-to-Text Transcription	**Title:** Meeting Notes **Capability:** Understand human speech and transcribe it into written text, summarizing **Domain:** Business **Customer:** Businesses **Application:** Have the program running during meeting and transcribe everything (take notes), then format the meeting notes with headings for different sections of the meeting, and include a summary of the meeting at the beginning	5	5	5	2	5	3	3	3	3	5	5	5	3	3	49	19.1
	Title: Control electronic devices for people with mobility issues **Capability:** understand human speech and transcribe it **Domain:** accessibility **Customer:** people with mobility issues **Application:** use voice prompts to control smart devices and electronics, type on their devices (e.g. smart light, TV, etc)	5	5	5	3	5	5	2	2	5	3	5	5	5	3	50	20.1
	Title: Interview Notes **Capability:** Understand human speech and transcribe it into written text, summarizing **Domain:** Business **Customer:** Businesses **Application:** Have the program running during applicant's interview and transcribe everything (take notes), then format the meeting notes with formatting for question vs answer, and include a summary of the interview and the interviewer's thoughts	5	5	5	3	5	5	3	3	5	3	5	5	5	5	52	21.1
	Title: Therapy/Advising/Counseling Notes **Capability:** Understand human speech and transcribe it into written text, summarizing **Domain:** Transcription **Customer:** Therapy/Advising/Counseling **Application:** Have the program running during applicant's interview and transcribe everything so the therapist/advisor/counselor can focus on the real-time personal connection, rather than worry about taking notes (and can review them later)	5	5	5	2	5	5	2	3	1	2	5	5	5	3	45	18.6
	Title: Mock Class **Capability:** understanding human speech and transcribe it and respond to it **Domain:** education **Customer:** people who want to become teachers **Application:** A potential teacher could teach a mock lecture to the AI, which could then summarize what it learned from the class and provide feedback on the teaching style.	4	3	3	3	5	3	3	3	5	5	3	5	4	4	45	20.1

Suzie Liu (1-5)

Example & Capability	Instructions: - Add concepts to the Generative AI concept column. We recommend filling out the capability, domain, customer, and applications from your matchmaking worksheet. - Rate each concept across technical, financial, and desirability criteria (1 (low score) to 5 (high score)). - Add two NEW criteria and determine the 1-5 rating scale. These criteria should be relevant to your domain. - Review the summed scores for each concept. Try to remain objective, even if you have a favorite. What does this tell you?- Want to dive deeper? The score is just a sum of all criteria, however, you can create a more complex formula by turning this into a weighted average with different categories weighted differently (shown in the Weighted Score column)	Technology is readily available (1-Beyond State of the Art, 5-Off-the-shelf)	Data exists (1-No,5-Plentiful)	Data can be labeled (1-Hard, 5-Easy)	Model performance required (1-Very high, 5-Low)	Installation cost is low (1-Expensive,5-Cheap)	Data processing cost is low (1-Expensive,5-Cheap)	Customer would pay (1-Little,5-Lots)	Market Size (1-Low,5-Massive)	Privacy risk	Social performance risk	FATE risk	Environmental risk	Language Coverage and Diversity (1-Low,5-High)	User Trust and Dependency (1-Low,5-High)		
	NLP Concept	**Technical Feasibility**				**Financial Viability**				**Acceptance/Desire**				**Team Criteria**			**Weighted Score**
eg. some text editor has reminder for informal language **language correction/polishing**	**Title:** interview response polishing **Capability:** asks users common interview questions, generates a more professional response based on users' simple answer **Domain:** employment **Customer:** job-seekers **Application:** interview preparation	5	4	4	4	3	4	3	4	4	3	3	5	4	3	46	19.6
	Title: Resume polishing **Capability:** generates a more professional version of resume text based on users' simple input **Domain:** employment **Customer:** job-seekers **Application:** interview preparation	5	5	4	2	3	4	4	4	4	3	3	5	4	3	46	20.1
	Title: Making your writing more native **Capability:** identify possibilities to use more native expressions in text **Domain:** writing, translation **Customer:** non-native speakers **Application:** Can be incorporated into existing platforms such as google translate	4	3	3	4	3	4	4	4	4	4	4	5	4	4	46	20.1
	Title: Customized chatbot talking like people of the same age as users **Capability:** chatbot that talks in a similar way as users, with age being the main factor **Domain:** personal care, mental health, entertainment **Customer:** people in isolation or tend to feel lonely **Application:** Elderlies who do not have many friends around or are in hospital can use the chatbot as an alternative way of social interaction and self-expression.	3	4	3	4	2	2	3	2	3	4	4	5	4	4	39	16.6
	Title: Academic writing polishing **Capability:** remove informal lauguage, replace with formal **Domain:** academia **Customer:** students, scholars **Application:** Students, especially non-native speakers, can polish their academic writing.	4	4	4	4	3	4	4	4	3	4	4	5	4	4	47	19.6

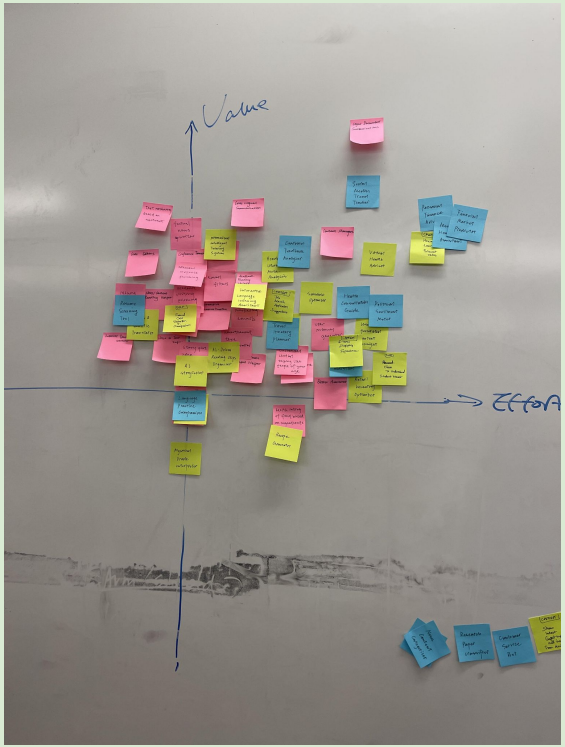
Suzie Liu (6-10)

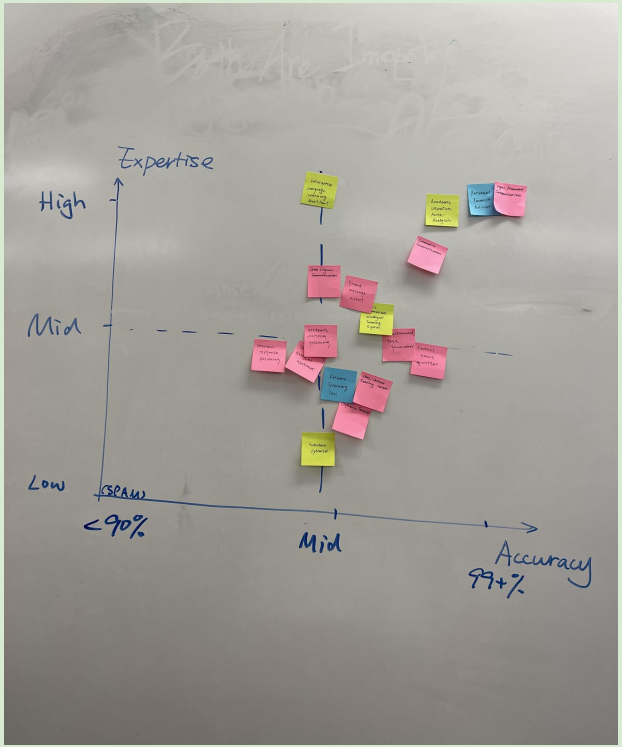
	Instructions:																
Example & Capability	- Add concepts to the Generative AI concept column. We recommend filling out the capability, domain, customer, and applications from your matchmaking worksheet. - Rate each concept across technical, financial, and desirability criteria (1 (low score) to 5 (high score)). - Add two NEW criteria and determine the 1-5 rating scale. These criteria should be relevant to your domain. - Review the summed scores for each concept. Try to remain objective, even if you have a favorite. What does this tell you?- Want to dive deeper? The score is just a sum of all criteria, however, you can create a more complex formula by turning this into a weighted average with different categories weighted differently (shown in the Weighted Score column)	Technology is readily available (1-Beyond State of the Art, 5-Off-the-shelf)	Data exists (1-No,5-Plentiful)	Data can be labeled (1-Hard, 5-Easy)	Model performance required (1-Very high, 5-Low)	Installation cost is low (1-Expensive,5-Cheap)	Data processing cost is low (1-Expensive,5-Cheap)	Customer would pay (1-Little,5-Lots)	Market Size (1-Low,5-Massive)	Privacy risk	Social performance risk	FATE risk	Environmental risk	Language Coverage and Diversity (1-Low,5-High)	User Trust and Dependency (1-Low,5-High)		
	NLP Concept	**Technical Feasibility**				**Financial Viability**				**Acceptance/Desire**				**Team Criteria**			**Weighted Score**
mass customization	**Title:** Factual news writer **Capability:** generates short article in news style based on keywords **Domain:** journalism, communication **Customer:** news writers **Application:** News writer can use this for simple, repetitive, factual news.	3	4	4	3	2	4	3	3	4	3	3	5	4	4	41	18.6
	Title: user manual generator **Capability:** generates the "redundant" text usually found in user manuals **Domain:** manufacture, product **Customer:** manufacturer, designer **Application:** a lot of electronic products are pretty homogenous and a first pass at their manuals can be generated this way	2	2	3	3	2	3	3	2	4	4	4	5	4	4	37	17.6
	Title: Advertisement text generator **Capability:** generates advertisements based on features of a product and the target audience **Domain:** marketing **Customer:** businesses, marketers **Application:** generating relevant ad copy for social media platforms, tailored to specific target audiences and marketing goals	3	3	4	4	3	4	4	4	4	4	4	5	4	4	46	20.1
	Title: marketing emails **Capability:** crafts marketing messages by analyzing product information, target demographics, and marketing trends **Domain:** marketing **Customer:** businesses, marketers **Application:** generating relevant ad copy for social media platforms, tailored to specific target audiences and marketing goals	3	3	4	4	3	3	4	4	4	4	4	5	4	4	45	19.6
	Title: story plot idea generator **Capability:** generates narrative concepts across genres, given characters, settings, and genre **Domain:** literature **Customer:** writers **Application:** writing large quantities of commercial novels that meets a particular taste	2	2	3	4	3	4	2	2	4	5	5	5	4	4	41	18.1

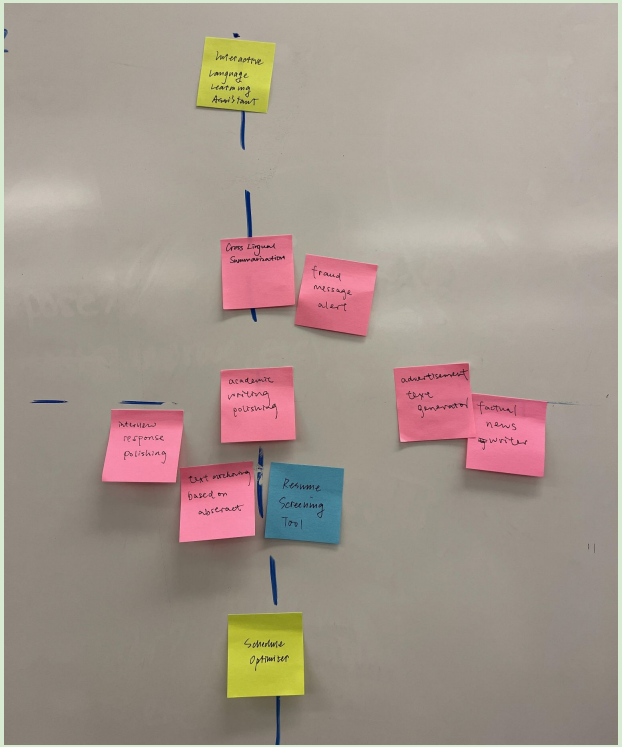
Suzie Liu (11-15)

	Instructions: - Add concepts to the Generative AI concept column. We recommend filling out the capability, domain, customer, and applications from your matchmaking worksheet. - Rate each concept across technical, financial, and desirability criteria (1 (low score) to 5 (high score)). - Add two NEW criteria and determine the 1-5 rating scale. These criteria should be relevant to your domain. - Review the summed scores for each concept. Try to remain objective, even if you have a favorite. What does this tell you?- Want to dive deeper? The score is just a sum of all criteria, however, you can create a more complex formula by turning this into a weighted average with different categories weighted differently (shown in the Weighted Score column)	Technology is readily available (1-Beyond State of the Art, 5-Off-the-shelf)	Data exists (1-No,5-Plentiful)	Data can be labeled (1-Hard, 5-Easy)	Model performance required (1-Very high, 5-Low)	Installation cost is low (1-Expensive,5-Cheap)	Data processing cost is low (1-Expensive,5-Cheap)	Customer would pay (1-Little,5-Lots)	Market Size (1-Low,5-Massive)	Privacy risk	Social performance risk	FATE risk	Environmental risk	Language Coverage and Diversity (1-Low,5-High)	User Trust and Dependency (1-Low,5-High)		
Example & Capability	**NLP Concept**	**Technical Feasibility**				**Financial Viability**				**Acceptance/Desire**				**Team Criteria**			**Weighted Score**
eg. deciding whether reviews are positive or negative **simple categorization**	**Title:** health rating of food based on ingredients **Capability:** utilizes nutritional analysis algorithms to assess the composition of food items **Domain:** health, food industry **Customer:** individuals, dietary apps and platforms, food companies **Application:** consumers can get health analysis by scanning product labels or inputting ingredients into apps	2	3	3	2	2	3	3	4	5	3	3	5	4	3	38	19.1
	Title: Text archiving based on abstract **Capability:** categorizes texts by analysing their abstract **Domain:** academic, business **Customer:** e-scholar platforms, library, large companies **Application:** large companies categorizing their documents	4	4	5	3	3	3	4	4	5	4	4	5	4	3	48	20.1
	Title: resume selection **Capability:** autonomously analyze and identify qualified candidates based on criteria specified by the recruiter or employer **Domain:** HR **Customer:** recruiters, HR teams, companies **Application:** identifying top candidates based on skills, experience, and job requirements for HR	4	4	4	3	3	3	4	4	4	2	2	5	4	3	42	19.6
	Title: email filters **Capability:** filters type of email based on user preference **Domain:** digital service **Customer:** gmail, etc **Application:** when users do not want to be disturbed by subscription emails, they can turn the filter off and on later	4	4	5	4	3	3	3	4	4	4	4	5	4	2	47	19.1
	Title: fraud message alert **Capability:** detect and promptly notify users of potentially fraudulent messages based on patterns, heuristics, and sender verification **Domain:** cybersecurity, messaging, fraud detection **Customer:** end-users, businesses, organizations **Application:** a mobile banking security feature that alerts users of potential phishing attempts or fraudulent messages related to their financial transactions	4	4	4	2	3	4	4	4	4	2	2	5	4	2	42	20.1

Ranking and Selection







Consequence Scanning & Critique

Consequence Scanning

Consequence scanning is a useful and important tool we practiced in this project. Essentially, it is a framework designed to help us address the negative consequences of our product and identify areas for improvement. This allows us to slow down the product ideation process and think about what drawbacks we have, and by fixing the shortcomings we're able to find more opportunities. We did a consequence scanning session after the in-class sprint. Each team member contributed to identifying the potential consequences of our product. This involved analyzing various aspects such as stakeholders, touchpoints, and data utilization. Then we created a 2x2 matrix of intended and unintended consequences, as well as positive and negative outcomes, to visualize how these consequences are affecting our product. We discovered that simply using NLP can't provide a useful training experience for different language learners, which is an unintended negative consequence, so we added the ability to detect users' language proficiency to create a more customizable user experience. Consequence scanning proved instrumental in navigating potential shortcomings in our product and steering it toward a more refined and user-centric direction.

Critique

Below are some key takeaways from the critique session:

1. **Financial Analysis**
   - **Clarification on Duolingo Partnership**: Emphasize that we are Duolingo, focusing on enhancing and refining an existing product.
   - **Cost vs. Revenue Calculation**: Improve financial slides by explicitly showing and calculating cost versus revenue.
   - **Subscription Fee Examination**: Take Duolingo Max's subscription fee ($30/month) into consideration for financial benchmarking.

1. **Technology Considerations**
   - **Technical Limitations of TTS**: TTS may not be sufficiently advanced for inaccurate pronunciation.
   - **Content vs. Pronunciation**: Emphasize the product's focus on the content of speech rather than pronunciation accuracy.

2. **User Experience**
   - **User Engagement with Ads**: Assess user receptiveness to an ad-supported model versus subscription.

3. **Other Considerations**
   - **Break-Even Analysis**: Determine the number of users needed to convert to subscriptions for profitability.
   - **Risk Management**: Clearly list the risks, explain why they are manageable, and propose mitigation strategies.

Final Solution

Duolingo Audio Chatbot

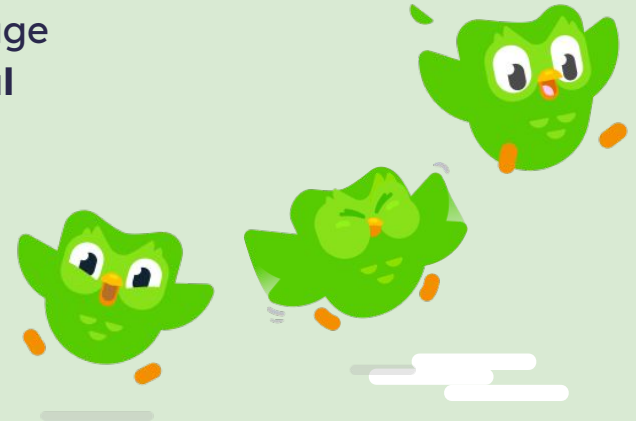
Group 6

Introduction

Our customer: Duolingo

Recently, Duolingo cooperated with GPT-4 and introduced the language learning chatbot.

We want to continue optimizing the potential of language learning with AI assistants by creating **smooth, natural conversations that fits users' proficiency level**.



User Desirability

Audio Based

Improve speaking first, prioritize spoken form over written form;

Talking faster than typing, higher efficiency

Natural Conversation

Allow errors in the learning process, avoid the teacher tone;

Mimic the way a real person talks

Personalized Proficiency

Analyze users' language proficiency from input;

Give responses that match or go slightly beyond users' proficiency level to push for improvement

Innovative Points

Talking > Writing	Respond to the growing market demand for native speaker trainers, encourage talking
Casual Expressions	Incorporate cultural references, idiomatic expressions, and situational language; prepare learners for everyday conversations
Stress-free	Allow users to talk about anything in any way, tolerate errors, prioritize the flow of the conversation

User Journey

What did you do last weekend?

Proficiency level: on an scale, not limited to three!

Beginner

I go to park. See trees and birds.

Intermediate

I went to the park over the weekend. It was really nice out there. I saw lots of birds and sat by the lake for a while. Even had a small picnic, just some sandwiches and juice.

Advanced

I visited the park last weekend. It was quite lovely, actually. The place was really lively - kids playing, people jogging. I did some birdwatching and enjoyed a small picnic near the lake. Just sitting there, soaking in the sun and the sounds of nature was pretty relaxing. It's nice to get out and just breathe in some fresh air, you know?

User Journey

Proficiency level: on an scale, not limited to three!

Beginner

Simple language
easy vocabulary

⬇️

Addresses students' language mistake to foster basic conversational skills.

Intermediate

Higher tolerant of mistakes

⬇️

Maintains a smooth conversation flow

Advanced

Cultural references and idiomatic expressions

⬇️

Teaches language nuances beyond textbook learning

Technology

Capability

- **Audio-Recognition Technology:** transforming Audio input into Text
- **NLP:** understanding users' input according to their proficiency, and provide proper feedback that matches their proficiency.
- **TTS:** transforming Text into Audio.

Domain:

- Education, Language Learning, Communication

Feasibility:

- Technology already exists (used by OpenAI, Google, Duolingo)
- Data already exists, and can be continuously generated by users
- Data can be labeled
- Although the performance needed is high, many companies have been using audio chatbots for communications.

How it works:

Voice input

Speech Recognition Technology transfers the voice input into text

NLP interaction

NLP technology understands your words and generates response based on your proficiency

Voice interaction

TTS reads the text aloud

Financials

Assuming 2.5% conversion rate of our 1 million active users, with the chatbot feature expected to boost premium subscriptions, and a 10% increase in user engagement.

Financials Category	DuoLingo Audio Chatbot	Details/Assumptions	Unit Cost	Quantity/Units	Total Estimates (Approx.)	Timeframe
Development Costs						
Technology Licensing	GPT-4 and other APIs/Platforms etc.	Licensing fees for NLP and TTS Tech	$200,000	Per Annum	$200,000	Yealy
R&D Investment	Chatbot development	Engineering, design, UX/UI	$500,000	Initial	$500,000	One-Time
Data Acquisition & Labeling	Dataset preparation	Data purchase, annotation, and curation	$150,000	Initial	$150,000	One-Time
Operational Costs						
Maintenance	Ongoing support	Regular updates, bug fixes, improvements	$75,000	Per Annum	$75,000	Yearly
Support Staff	Human oversight	Staff for monitoring and assistance	$120,000	Per Annum	$120,000	Yearly
Marketing and Promotion	User acquisition	Campaigns to promote the chatbot feature	$250,000	Per Annum	$250,000	Yearly
Total Costs					**$1295000**	

We can recoup our investments in < 3 months!

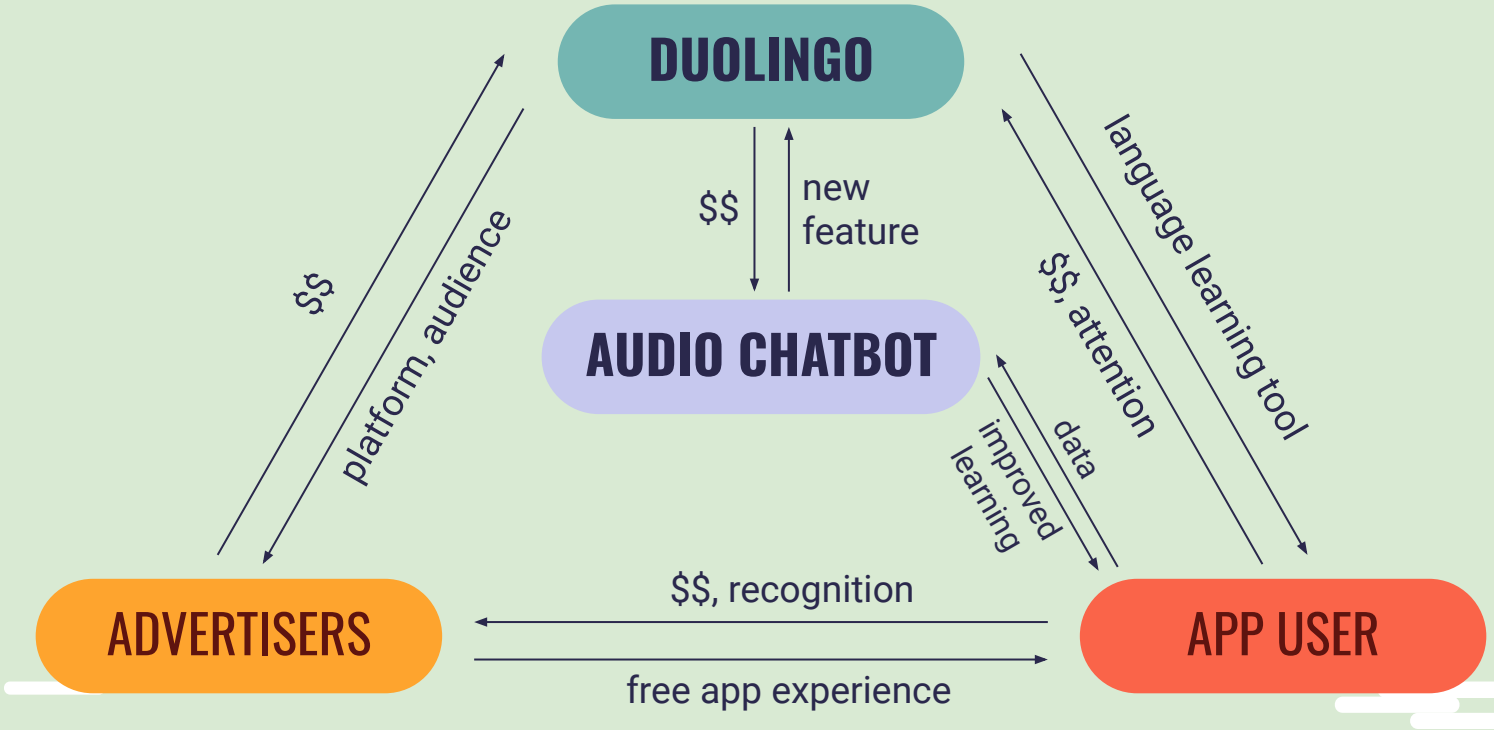
Revenue Stream	Conversion Rate (With base of 1M active users)	
Subscription Fees ($30)	Before Chatbot	After Chatbot
Premium Users	2% of 1 M = 20000	2.5% of 1 M = 25000
Subscription Revenue	$7,200,000	$9,000,000
Advertiser Revenue	$200,000	$300,000
Total Revenue	$7,400,000	$9,300,000

Growth Category	Growth Impact	Notes
User Engagement	+ 10%	Based on increased session times and interactivity.
Conversion Rate	+ 0.5%	Incremental conversions to premium subscriptions.
Retention Rate	+ 5%	Improved retention through enhanced learning experience.
Customer Acquisition	+ 15%	Attraction of new users looking for advanced learning tools.

Yearly Net Profit: Total Revenue - Total Costs = $9,300,000 - $1,295,000

= $8,005,000

Value Flow Model



Risks / Consequence Scanning

Privacy and Security (High)

- Voice **Data Breaches** and Misuse
- **Legal Issues** and Reputational Damage

Ensure Data protection & governing act (GDPR, CCPA) are intact

User Desirability (Low)

- **Accessibility Issues** & limited audience
- High Development and **Maintenance Costs**

Build features that cater to wider learning audience & plan upfront costs

Algorithmic and AI Challenges (High)

- **TTS inaccuracy** due to accents
- **Bias in NLP Algorithms** for accents, dialects

Train models on data from a variety of backgrounds, perform quality checks

Regulatory and Compliance (Medium)

- **Evolving** privacy and regulatory **laws**
- **Unintentional infringement** of Intellectual Property and Copyright

Ensure stringent protocol measures and fines, in case of non-adherence

Technical Feasibility in Detail

1. **Audio-Recognition Technology:**
   I.e. DeepSpeech, Kaldi, Flashlight
   - Automatic Speech Recognition (ASR):
     Converts spoken language into text with a focus on recognizing words and phrases accurately.
   - Machine Learning Models for Accented Speech Recognition (A Plus):
     Specialized in understanding various accents to improve recognition accuracy.

2. **Natural Language Processing:**
   I.e. Some top language models: GPT-4, BARD, LlaMA, Gemini!
   - Dialogue Management Systems:
     Manage the flow of the conversation and generate appropriate responses based on user inputs.
   - Sentiment Analysis (a plus):
     Determines the emotional content of the user's speech, which is useful for language learning that involves expressions.
   - Named Entity Recognition (NER):
     Classifies key information from speech into predefined categories to enhance language comprehension.

Technical Feasibility in Detail

- Language Modeling:
  Predicts subsequent words and aids in crafting grammatically correct sentences.
- Deep Learning Algorithms for Contextual Learning:
  Utilize neural networks to understand the context for better interaction.
- Language Detection Algorithms:
  Identify the language spoken by the user, essential in a multilingual learning platform.

3. **Text-to-Speech (TTS):**
   I.e. WaveNet, Tacotron, FastSpeech…
   - Speech Synthesis Markup Language (SSML): Allows for the customization of speech output to make the TTS more natural and engaging.

In addition, student data can be meticulously labeled through various methods. Human annotators, possibly augmented by crowdsourcing platforms, provide manual labeling for accuracy, while semi-supervised and active learning techniques optimize the use of unlabeled data. Furthermore, transfer learning leverages pre-trained models to improve generalization to new data, and multi-model approaches ensure comprehensive coverage of different language skills.

Financial Viability in Detail

Technology Licensing: Starting with GPT-4 licensing, we estimate a yearly cost of **$200,000**. This is based on a **projected 5 million user interactions annually**, with an **average token consumption rate of 500 tokens per interaction**. Given **OpenAI's pricing of $0.02 per 1,000 tokens**, this translates to $50,000 solely for token usage.

The remaining **$150,000 accounts for the additional computational and API usage**, ensuring we have the capacity for peak performance without bottlenecks. Taking all these factors into account, we have estimated a comprehensive licensing fee that ensures robust service delivery without interruption.

Operational Costs: We're looking at **$75,000** for maintenance—this includes server uptime, technical support, and iterative improvements to the chatbot. Support staff and customer service add another $120,000, essential for maintaining high user satisfaction and rapid issue resolution. For marketing, a budget of $250,000 will allow us to effectively reach a broader audience and convey the unique value of our chatbot

Financial Viability in Detail

Subscription Revenue Projections:
Our current user base is **1 million active users**, with a conservative premium **conversion rate of 2%**.
At our current premium NLP **subscription price of $30 per month**, the annual subscription revenue per user is $360.
We are projecting the chatbot would lead to a **2.5% conversion rate** increase from a base of 1 million active users:

Current Conversion Rate: 2% of 1 million = 20,000 premium users New Conversion Rate: 2.5% of 1 million = 25,000 premium users **Increase in Premium Users: 5,000 users** due to chatbot introduction	Revenue Before Chatbot: 20,000 users * $30/month * 12 months = $7,200,000 Revenue After Chatbot: 25,000 users * $30/month * 12 months = **$9,000,000** **Incremental Subscription Revenue from Chatbot: $1,800,000**

Advertiser Revenue is pegged at $300,000. With our enriched user engagement metrics, we can command premium ad slots. This figure is drawn from current ad spend trends and the increased time users are expected to spend interacting with the chatbot.

Total Revenue with Chatbot: $9,000,000 (Subscription) + $300,000 (Ads) = $9,300,000

Yearly Net Profit: Total Revenue - Total Costs = $9,300,000 - $1,295,000 = $8,005,000

User Desirability in Detail

Our version of Duolingo chatbot has 3 major upgrades from the existing one. We decided that these could be some features users desire, according to our research and interpretation on the current market of language learning.

1. Speaking-first approach

"An estimated 250,000 native English speakers work as English teachers abroad in more than 40,000 schools and language institutes around the world." This rapidly expanding market reflects **language learners' growing awareness of the importance of being able to talk like the way native speakers do**. Speaking is slowly becoming the priority of the learning a new language, whereas traditionally the priority has always been writing.

That's why the chatbot we have proposed is audio-based, which means the user and the bot talks back and forth. We do acknowledge that having to speak can limit the range of occasions the learning happens, but we think that in those cases other features of Duolingo would be suitable. It is beneficial to differentiate Duolingo's chatbot from its normal features and maximize that distinction.

User Desirability in Detail

2. Natural conversation

The high demand for native English speakers also indicates learner's preference of learning through natural conversations. Currently the Duolingo chatbot is somewhat "academic", as it tries to correct users on all the mistakes they make; the chat has no topic, other than the bot teaching users vocabulary and grammar, in the way conventional textbooks do. We are trying to move away from that. We encourage normal, everyday topics. We prioritize the flow of a conversation, and try not to correct users' errors immediately so as not to interrupt the flow. This mimics real-life situations of talking with native speakers and introduces casual, native expressions, which is oftentimes exactly the goal of language learners.

3. Personalize proficiency

We realize that users can feel overwhelmed by being thrown into a conversation. Our chatbot makes it an incremental process by inferring users' proficiency level from their input, and gives prompts and responses that match or go slightly beyond users' proficiency level to push for improvement.

Risk Analysis in Detail

Below are some approaches of how we will manage risks when there are deviations in AI's performance and ethics:

Audio Recognition:
- Regularly test and monitor models for accuracy and biases.
- Establish guidelines for responsible data sourcing to prevent biases.

Natural Language Processing:
- Update models to adapt to language shifts.
- Rigorous testing for biases and ethical considerations, especially in sentiment analysis.

Language Modeling and Deep Learning:
- Regularly update models to prevent biases.
- Implement interpretability tools and ethical guidelines.

Text-to-Speech (TTS):
- Assess and update TTS models for naturalness.
- Thorough testing across linguistic and cultural contexts.

Student Data Labeling:
- Annotators must obtain criminal clearance and complete relevant ethical training beforehand.
- All sensitive personal student information will be removed to maintain data confidentiality.

Reflection

Group reflection

In this project, we continued to practice our matchmaking and concept ranking skills. Initially, each team member generated 15 ideas based on three examples identified using NLP technology. During the concept selection phase, we developed multiple matrices to compare each idea's expertise requirements, necessary accuracy, generated value, and effort involved. Through this matrix analysis, we successfully eliminated most of the impractical ideas. Following the matrix evaluations, we conducted concept ranking and risk analysis to narrow down our options. After consulting with other teams and professors, we collectively decided to pursue the development of a language-learning chatbot. In the subsequent parallel refinements stage, our team split into three parts, each responsible for technology, financial aspects, and user experiments.

The consequence scanning session conducted outside class proved highly beneficial during parallel refinements. By listing the potential consequences of our data utilization and NLP technology, along with considering the concerns of different stakeholders, we gained valuable insights. It became apparent that we had overlooked the language proficiency levels of potential users and their lack of a natural practice environment. This oversight could lead to communication difficulties with the chatbot and reduced efficiency in learning the new language. Consequently, we incorporated audio technology and proficiency level detection, enhancing the customization and communicability of our product.

In summary, our team demonstrated effective dynamics in idea generation, thoughtful discussions on the strengths and weaknesses of our product, and refining our approach from diverse perspectives. The techniques employed in this project are expected to be beneficial for our teammates' future endeavors in AI technologies.

Jiapei - Shaping the Big Idea (Ideation & Consequence Scanning)

During the ideation part, I chose three examples that used NLP technology and came up with 5 different ideas for each of the examples. The first example is the speech recognition used by Zoom which transforms spoken language into a machine-understandable format; the second is autocorrect used by Apple, which identifies misspelled words by cross-matching them to a set of relevant words in the language dictionary used as a training set; and the third one is the text summarization used by ChatGPT, which summarizes text by extracting the most important information. These NLP applications utilized different capabilities and could also inspire other similar applications in different fields. For each of these examples, I used matchmaking to come up with different possible domains and applications for the capability. I discussed with teammates in class about the concept selection, and we used multiple methods to narrow down the concepts. It's really useful to use a combination of the value-effort matrix, cost-proficiency matrix, and the usual ranking system to eliminate unnecessary ideas. I discovered that many ideas we came up with were interesting and sounded attractive, but they may cost too much or require professional people to manipulate, which isn't ideal for a good AI product. Our team also used consequence scanning when we were picking up the final idea. We listed many touchpoints of users' interaction with the product and evaluated them from whether it's positive or negative as well as intended or unintended.

Jiapei - Critique & Overall Reflection

The consequence scanning method helped us clarify how we wanted to make the product. In this project, we were thinking about generating a chatbot that could help tutor kids, but after rounds of discussion and concept selection, we combined some ideas together and came up with a language-learning chatbot that could help people learn new languages faster and communicate in a more natural environment, without the need to live in a new country or to find native speakers. The consequence scanning helped us specify what we wanted to avoid, for example, unmatching proficiencies. After the discussion with the professor, we added the feature of matching the chatbot's language use with the users' proficiency level and set our role as part of Duolingo's product development team.
During the critiques, it was really useful to get feedback from our professor, which helped improve our project significantly. I was in charge of the technical feasibility, but I only listed some possible technologies and domains. This wasn't convincing enough so our professor suggested I use diagrams and a simple prototype to illustrate how the conversation is created using NLP and other technologies, which is a very straightforward way to illustrate our idea.
Overall I think this project is really useful for understanding NLP technology and its various applications. This technology is really crucial for better human-computer interactions and will benefit our lives in a significant way.

Xinfei - Shaping the Big Idea (Ideation & Consequence Scanning)

My initial ideation centered on three pivotal NLP capabilities: response generation, language translation and interpretation, and information retrieval and clustering. As I delved deeper into this ideation phase, I recognized that a significant portion of my ideation was entrenched in the field of learning science. This realization became more pronounced when my group mates and I put our ideas on the same table. It was evident that most of us had envisioned multiple applications of NLP in enhancing learning sciences, reinforcing the notion that this is a promising area for application.

Among the most, several were focused on integrating NLP technology into the development of educational technologies, aiming to personalize the learning experience. Current mainstream intelligent tutoring systems are predominantly based on expert systems. These systems typically operate by having a student perform an action, to which the system fires a predetermined feedback. However, the integration of NLP technology promises a much more tailored learning journey. This personalization is achieved by interpreting and responding to the unique inputs of each learner, thereby creating a more engaging and effective educational experience.

However, during consequence scanning, we also realized that it also poses challenges: There's a risk of diminishing crucial teacher-student interactions. Additionally, precision in interpreting diverse student inputs, providing accurate explanations in domain knowledge and ensuring data privacy are major concerns. Thus, while NLP promises to revolutionize educational practices, it requires a balanced approach considering its impact on students, educators, and the educational infrastructure.

Xinfei - Critique & Overall Reflection

This module provided me with the opportunity for a thorough and detailed exploration of the nuanced distinctions between NLP and closely related fields, such as speech analysis. This journey was initially sparked by our initial concept of creating a language-learning tutor aimed at helping foreigners achieve more native-like pronunciation. This ambitious goal necessitated the tutor's enhanced capabilities in accent manipulation. As we ventured deeper into this realm, our research expanded heavily into the field of speech analysis. This investigation unveiled the complexities and current limitations inherent in language technologies. A notable discovery was the intricate interplay between linguistic elements and their varied perception across different accents and dialects. Understanding these nuances was crucial for developing a system capable of guiding learners effectively in their pronunciation journey.

Redirecting our focus towards a more practical objective – a language learning tutor that facilitates more natural conversations – we encountered a saturated market of similar products. However, we observed that none were particularly distinguished, primarily due to the gap between their design ambitions and the current technological limitations. This realization led us to a critical reflection on the balance between innovative design and the pragmatic application of existing technological capabilities. It became clear that to make a meaningful impact in this space, our approach needed to not only leverage advanced NLP and speech analysis techniques but also address the practical challenges in language learning technology. This required a creative blend of technical prowess and an understanding of the learner's expectation and needs, aiming to bridge the gap between aspiration and reality in language learning tools.

Durga

Throughout the ideation phase, I focused on three pivotal NLP capabilities: speech recognition, autocorrect, and text summarization. Collaborating with my team, we brainstormed diverse ideas for each capability, exploring potential applications across different domains. The **value-effort matrix, cost-proficiency matrix, and a ranking system** played key roles in refining concepts, ensuring practicality for AI product development.

A recurring theme emerged, highlighting the significant potential of NLP in learning sciences. Our ideas were centered on enhancing educational technologies, particularly through personalized learning experiences. The integration of NLP promised tailored journeys for learners, addressing the limitations of current expert system-based tutoring.

During consequence scanning, we identified potential challenges. Personalization might risk **diminishing crucial teacher-student interactions,** and precision in interpreting diverse student inputs posed concerns. Balancing the transformative potential of NLP with ethical considerations became imperative, emphasizing the need for a nuanced approach in its application to education.

Consequence scanning shaped our project into a language-learning chatbot, prioritizing proficiency alignment. Professor feedback led to a clearer technical feasibility presentation with diagrams and a prototype. The project highlighted NLP's crucial role in **enhancing human-computer interactions**, foreseeing positive impacts on user learning and continuous improvement process.

Ashima - Shaping the Big Idea (Ideation & Consequence Scanning)

Reflecting on the ideation phase of the Duolingo Audio Chatbot, I was struck by the dynamic and multifaceted nature of brainstorming sessions that led to the 'big idea'. The process was a blend of creativity and structured thinking.

We explored numerous concepts, but it was the intersection of language learning needs and cutting-edge NLP technology where we found our focus. This convergence sparked the concept of an audio chatbot that could revolutionize language acquisition.

We deliberated on the potential implications, both positive and negative, the chatbot could have on user experience and business outcomes. This deep dive into the "what-ifs" taught me the importance of foresight in product development and the responsibility that comes with deploying new technologies.

Through this phase, I learned the value of cross-disciplinary collaboration, where diverse perspectives coalesce to shape an idea that is innovative, feasible, and socially responsible

Ashima - Critique & Overall Reflection

The critique phase was a robust and, at times, challenging part of the process. Receiving feedback on the Audio Chatbot's financial model put our assumptions under the microscope and forced us to rethink and refine our approach. I learned the power of constructive criticism in transforming a good idea into a great one.

The exercise has been enlightening, enhancing my skills in financial modeling, strategic planning, and effective communication.

I also took the ownership of the part which i always struggled with which is the financial structuring, and while i struggled with it initially, with the right feedback and understanding i was able to get into the details and enjoyed the process thoroughly.

The collective effort of each team member, with their unique strengths and insights, was instrumental in shaping the project's trajectory.

Melody - Shaping the Big Idea (Ideation & Consequence Scanning)

At the beginning of the project, a lot of my ideation tended to fall into the domains of language learning, professional development (interviews), and conversation practice (e.g. social skills development). I thought this was an interesting trend in my ideation process, as a lot of these use cases emphasize using AI interaction as a substitute for human interaction. Thus, two of the biggest concerns I found in my ideas were consequences of AI not being human-like enough, which may cause discomfort or negative psychological effects in the user, or being unable to respond to certain situations as fluidly as a human, particularly in situations like interviews. After we all individually ideated, we found that multiple group members independently came up with the highly-ranked language learning tool idea, indicating a good sign to move forward.

Our idea evaluation process in this project built off of our previous skillsets, such as ranking and risk evaluations. This time, we also incorporated consequence scanning, where we listed any possible consequences we could think of, to see if this idea would produce any effects that were too egregious. . This holistic approach let us consider not only the immediate positives of the idea but also its long-term impact on all stakeholders involved.

Melody - Critique & Overall Reflection

After confirming the base idea, we spent a lot of time refining the idea and its details, with emphasis on how it would fit within the market and developing the user flow. Doing this, I learned more about the capabilities of NLP, and some of the difficulties in implementation. For instance, with the language learning concept, one of the ideas we initially had was to have the audio chatbot correct people's pronunciations of words as well as providing conversation practice, but after speaking with the instructor, we learned that there are limitations to the current technology in effectively handling variations in pronunciations. So, we changed our focus to be on improving the user's actual word choice instead. We also found that a concern we got from critique was that it would be competing with the big established language learning app, Duolingo. In turn, instead of competing with Duolingo, we decided to shift our focus to be an additional feature. So, through this project, I feel that I practiced the process of understanding the current situation and adapting to it, both with the technical side (limitations of NLP) and the market/business aspects.

Suzie Liu

NLP is a growing AI technology in trend, and it is exciting to be able to work with it. Out of the four projects I was involved in this semester, this is **the first time I worked as a part of an existing company/product, and it is both easier and harder**. It is good that we have a base model and know what is operable/profitable in real life; at the same time, though, we need to spend extra effort differentiating our proposal and the existing model. I feel that the part I worked on for parallel refinement, user desirability, is key to making that distinction. I tried to demonstrate that our alternative version is beneficial in three aspects, redefining the experience of using a language learning chatbot. It is sort of also the point of this class: **to think about a range of applications of the same technology by framing it with different scales, markets, and features**.

Consequence scanning was a difficult part for me because of the limited real-life experience and understanding I have on the current market of AI technologies. I found it hard to foresee or brainstorm, especially the “unexpected positive” points. Now that I reflect on this, a way to approach it is to **question ourselves why existing technologies are not designed the way we are proposing**, since there are usually solid reasons — risks associated with them. Then we can start to take precautions.