

Multi-Agent Startup Platform Proposal

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Problem Definition and Motivation

In today's entrepreneurial landscape, there exists a significant gap between the process of brainstorming an idea into deployment of actionable products. Many potentially viable business ideas never materialize due to lack of direction in navigating the structural barriers centered around planning:

- **Limited Access to Diverse Expertise:** Entrepreneurs, especially first-time founders lack access to the expertise necessary for comprehensive business planning. Consulting with experts across varying domains (executive, technical, financial, operational, etc.) is prohibitively expensive and time-consuming [1]. This expertise gap can result in incomplete or flawed business plans, which in turn reduces the likelihood of startup success.
- **Decision Paralysis:** Without structured guidance, entrepreneurs often struggle with information overload and uncertainty about the right first steps, leading to misdirected efforts or inaction [2].

To address this issue, our team proposes a generative AI multi-agent-based consultation platform that enables a comprehensive business planning ecosystem to be widely accessible to potential entrepreneurs or startups.

Background and Related Work

The integration of Large Language Models (LLMs) into multi-agent systems revolutionized how we tackle complex, interdependent tasks. Traditional single-agent frameworks struggle with limitations in perception, collaboration efficiency, and computational overhead, particularly in dynamic environments requiring domain-specific expertise [3]. Recent advancements demonstrate the strengths of multi-agent architectures enabling distributed problem-solving by simulating specialized roles, mirroring organizational structures in human teams. For instance, legal consultation systems like Chatlaw employ a Mixture-of-Experts (MoE) model with role-based agents to reduce hallucinations and improve accuracy in legal advice [4]. Similarly, financial stability applications leverage CrewAI and LangGraph frameworks to coordinate risk assessment, fraud detection, and investment analysis through inter-agent workflows [5]. These developments highlight multi-agent systems that excel in scenarios requiring modular expertise, iterative refinement, and context-aware reasoning.

System Design and Technical Approach

We will design a multi-agent Gen AI system where each of our agents plays a special role in a startup, i.e CEO, CTO, CFO and COO. Our system will bring together the agents in a roundtable meeting loop, and these agents will output a well-structured startup pitch deck with actionable insights such as Market Cap, competitors, pricing, etc. We will deploy our application as a web application using streamlit with a python backend that coordinates the agent's interaction and retrieves relevant information from external APIs when needed.

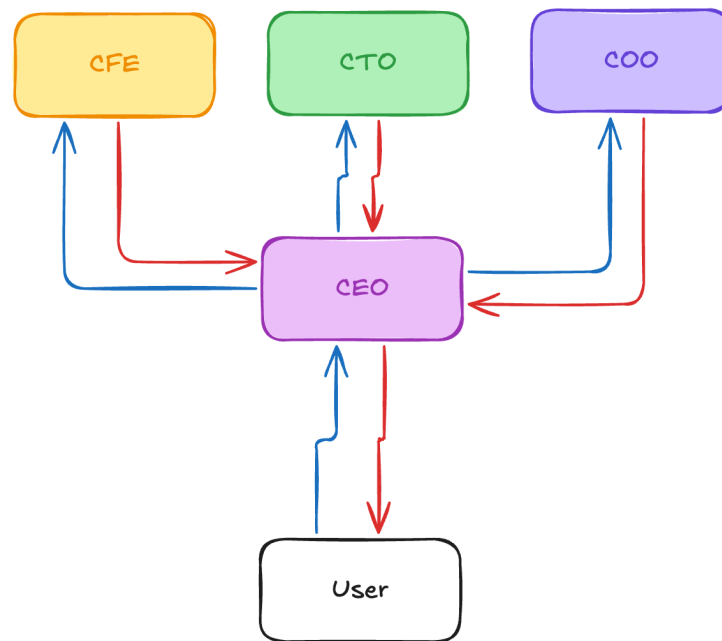


Figure 1: Showing agent communication structure

System Architecture

User Interface: Using streamlit, the frontend takes a startup idea from users as input. This is followed by a chat-style interface to show our agents discussions and the output section shows the final startup summary for the idea initially given by the user.

Multi-Agent Controller: We will be using either LangGraph or CrewAI to manage all LLM agents. This makes sure that our agents maintain memory and have good conversational flow. Also, Our agents will be able to critique or build on each other's responses, avoid hallucination and output a structured pitch deck/business proposal.

LLM Integration/External Tools: Through AWS Sagemaker, OpenAI's GPT-4o will be used as a base LLM for each agent due to its good performance in long-context reasoning and its ability to actually simulate different personalities. The LLM will be configured using role-specific prompts and we will be using the RAG pipeline for real-world data retrieval from APIs such as Google news, product hunt, crunchbase etc.

These are all APIs relevant to the startup ecosystem.

Deployment: We will be deploying on Streamlit Community Cloud.

Multi-Agent Workflow

- 1) **CEO Agent:** Our CEO agent takes care of Vision and strategy by interpreting the user prompt, proposing several possible directions the startup can go and then defining the vision for the company.
- 2) **CTO Agent:** the CTO agent takes care of the technical design by evaluating the technical feasibility of the proposed solution, recommending technologies, system architecture, MVP roadmap, and addressing potential technical challenges.
- 3) **CFO Agent:** The CFO agent designs strategies on monetization and revenue streams for the company. It estimates the possible funding sources and how much funding is needed. It also provides early stage financial projections such as burn rate etc.
- 4) **COO Agent:** The COO agent takes care of operations and executions by outlining an execution plan and timeline, for example, hiring, legal, etc. It also helps with setting up the structure of the team, roles, priorities, etc.

The agents use a collaborative approach where after reading the users prompt, each agent responds to previous agents by using their specific domain knowledge. They also either critique or build on other agent responses.

Experiment Plan

We plan on developing an interactive demo based on the Minimum Viable Product (MVP) architecture. For assessment, we will be conducting a peer-to-peer review on variations of prompts in various domains and use human evaluation for the actionability of the proposed business plan.

Feasibility and Team Planning

The project requires the implementation of the Minimum Viable Product (MVP) with suggested potential future works to be explored at a later time. Ideally we finish the implementation of the project by week 3 and use the remainder of the project duration on documentation and working out bugs.

Milestone:

To accomplish the implementation of the MVP, the following tasks/milestones need to be completed:

- Project Proposal
- Design system prompts

- Agent Role Definition
- Integrate OpenAI GPT-4 API
- Build multi-agent discussion pipeline
- Display agent conversation & summary pitch
- Final Report Documentation

Timeline:

The project duration will be roughly four weeks starting from week 10 until week 14.

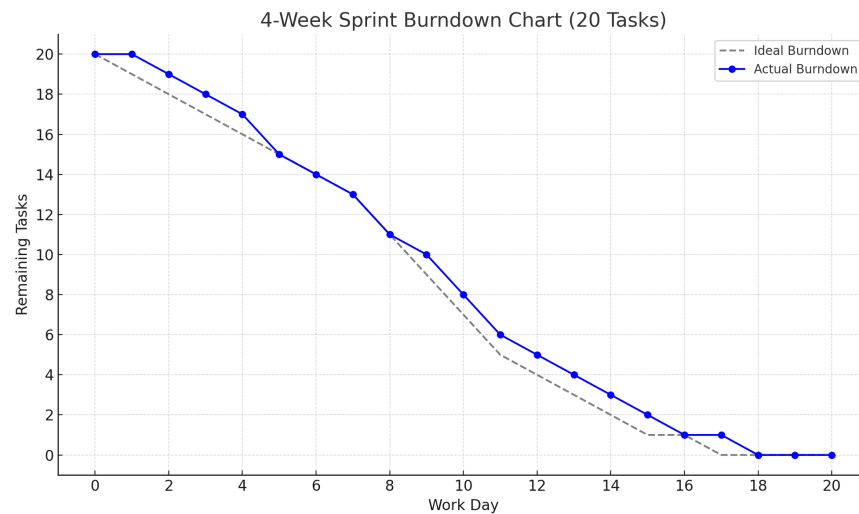


Figure 2: Showing ideal/possible Burndown Chart

- Week 1:
 - Finalize scope & tools
 - Design system prompts for CEO, CTO, CFO, COO agents
 - Create shared codebase (GitHub, Stream app structure)
 - Build multi-agent discussion pipeline
 - Integrate OpenAI GPT-4 API
- Week 2:
 - Test agent handoff logic and response formatting
 - Build input/output interface in Streamlit
 - Display agent conversation & summary pitch
- Week 3:
 - Implement remaining features
 - User Testing and system evaluation
 - Fix main bugs
 - Build evaluation rubric
 - Run user evaluations (colleagues, peers)
- Week 4:
 - Fix remaining bugs
 - Finalize report and presentation

Team Roles & Responsibilities:

Team members will share work with each other and have their own main responsibility. They can delegate work to others and is the first point of contact when it comes to their responsible topic. There are also tasks that don't fall to any one person but to the entire team, like prompt tuning and testing, which will be shared by everyone.

Each members responsibilities are:

- Amzar:
 - Build agent prompts and sequencing logic
 - Integrate LangChain/OpenAI API
 - Format and pass messages between agents
- Nathaniel:
 - Design evaluation plan, run feedback sessions
 - Analyze feedback & improve prompts
 - User Testing and System Evaluation
- Hannes:
 - Create Streamlit interface
 - Handle user input, display agent responses
 - Format startup summary output

References

- [1] Sarumi, O. O. (2024, November 25). *AI: Driving Entrepreneurship, Nurturing Innovation, and Fueling Startup Growth*. International Journal of Advances in Engineering and Management (IJAEM).
https://ijaem.net/issue_dcp/AI%20Driving%20Entrepreneurship,%20Nurturing%20Innovation,%20and%20Fueling%20Startup%20Growth.pdf
- [2] Han, Y. (2022, March 25). *Personality, Cognitive Bias and Entrepreneur Decision-making*. Atlantis Press. <https://www.atlantis-press.com/article/125975476.pdf>
- [3] Guo, T., Chen, X., Wang, Y., Chang, R., Pei, S., Chawla, N. V., Wiest, O., & Zhang, X. (2024, April 19). *Large language model based multi-agents: A survey of progress and challenges*. arXiv.org. <https://arxiv.org/abs/2402.01680>
- [4] Cui, J., Ning, M., Li, Z., Chen, B., Yao, Y., Li, H., Tian, Y., & Yuan, L. (2024, May 30). *Chatlaw: Open-source legal large language model with ...* arXiv.
<https://arxiv.org/pdf/2306.16092>
- [5] Joshi, S. (2025, February 28). *Advancing innovation in financial stability: A comprehensive review of ai agent frameworks, challenges and applications*. World Journal of Advanced Engineering Technology and Sciences.
<https://www.semanticscholar.org/paper/Advancing-innovation-in-financial-stability%3A-A-of-Joshi/0ad50aa8e57901e59e959e2f2c0b6d221a0cf8cd>