Red Hat

Project Proposal

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BACKGROUND AND OVERVIEW

Introduction

Red Hat is a leader in providing open-source software solutions tailored for enterprises. Red Hat specifically offers software developer teams various tools and platforms within its Developer Tools Ecosystem. These tools enhance development workflows by providing developers with the necessary resources to build, test, deploy, and run their applications before releasing them for production. Their product goals are to increase collaboration among team members and maximize the development process. Our sponsors for the project are Beau Morley, a Red Hat UX Designer, and Emma Spero, a Red Hat Research Operations Lead.

After interviewing their staff, Red Hat found that their software development teams face a prevalent challenge in their everyday work tasks: the increasing demand for tasks beyond "writing code." Developers are now expected to understand and use a plethora of tools, environments, and technologies that are not related to their typical coding tasks. The simultaneously changing technology environment requires developers to constantly learn and incorporate new, unfamiliar tools into their workspace. The perpetual learning and adaptation process poses time constraints on developers, underlining the pressing issue within the organization of their workflow

Currently, Red Hat recognizes the potential of using Artificial Intelligence (AI) to help their developers navigate these complexities. Therefore, they are committed to identifying key points in the developer's journey where AI can enhance productivity. The overarching goal of this project is to pinpoint opportunities for integrating AI into the developer’s workflow.

Your View of the Challenge

Given the expanding landscape for AI technologies, Red Hat has tasked our team with exploring ways to integrate AI into their products to benefit developers. While Red Hat has limited prior experience incorporating AI, with the exception of data science tools, the company recognizes the increasing popularity and capabilities of AI within their product workspace. While the overarching goal is to identify opportunities to enhance their customer experience, our understanding of the problem is two-fold. We want to understand a software developer’s user journey and where AI can be leveraged for specific tasks. Additionally, we hope to learn how to harness AI so that users can trust it. As there is minimal documentation and guidelines on the usage of AI, our focus is on navigating this evolving space and providing insights to users who are unsure of how to effectively employ AI.

This process involves conducting a competitive analysis of what other companies are doing in the developer space and whether they are using AI. It also involves conducting interviews with software developers and students to understand their coding and workflow process and if or how they might use AI. Lastly, the process includes defining tasks developers

need to complete and how they would want to incorporate AI into their work. Moreover, it is crucial to address questions regarding the appropriate applications of AI, clarifying where it should not be used and where it can be most effective. Additionally, it is important to consider questions such as how we can move beyond the evaluative stage of AI, positioning its role beyond being merely a generative language tool. A key consideration lies in seamlessly integrating AI, not as a tool to replace the work of a human, but rather to enhance it.

In its current stage, our team's talks and interviews with Red Hat and computer science students have revolved around understanding a developer's workflow in the Red Hat ecosystem. This process can largely be summarized by two concepts: the inner loop and the outer loop. The inner loop is a holistic approach all developers take when writing and sending code to be processed and published. It is largely characterized by four distinct steps: Code → Build → Debug → Push. Individual software developers typically cycle through these general steps until their code is ready to be reviewed and sent to the outer loop. The outer loop is essentially a shared developer space where individual packets of code are reviewed and tested by a team of developers with the goal of eventually pushing the code into production. It follows a rigorous testing loop of six unique steps: Code Review → Build → Compliance → Security → Tests → Deployment. It is important to note that Red Hat's products primarily function within the outer loop space to test applications before releasing them for production. It is a supplementary tool to enhance workflows within the developer space.

With a newfound understanding of the developer workflow from our first round of interviews, our team intends to conduct a second round of discovery interviews to further probe and pinpoint key pain points within the developer journey. Given that we want to develop solutions for Red Hat specific products, the scope of our project will largely pertain to the outer loop. This entails interviewing individuals with first-hand experience using Red Hat products and assessing the potential for AI to enhance their overall user experience. Based on the results of the interviews, however, it's also worth exploring how AI can also be applied to the inner loop. Otherwise, broadly applied to an individual developer's workflow.

What's driving the sponsor to do this project?

As AI is an emerging field, there is a broad industry trend to incorporate AI into workspaces. This trend prompts all companies to ask the same, big question: How can we use AI to solve problems?

From a broad, business standpoint, integrating AI into company products becomes a strategic advantage, giving companies a competitive edge in the marketplace. By staying at the forefront of this new technology wave, Red Hat aims to position itself ahead of competitors, adding value to their products and reinforcing competitiveness in the marketplace. Red Hat, similar to many companies, is hoping to delve into this domain and leverage the benefits of AI.

Incorporating Artificial Intelligence into Red Hat products will address developer's pain points, improve their product services, and enhance their customer's experience. This research could impact several key products within Red Hat's Developer Tools Ecosystem, particularly in the Red Hat Developer Hub and their Openshift IDE platforms. Products such as Red Hat DevSpaces, Red Hat Developer Sandbox, and Podman Desktop could be influenced by the outcomes of this project. By delving into the realm of Artificial Intelligence applications, our sponsor hopes to use AI to address software developers' pain points in an innovative way and make their workflow more efficient.

Additional questions to consider for this section

We expect additional questions to come up while working on the project, especially in regard to later stages such as data synthesizing, ideation, and prototyping. Questions we may tackle towards the second half of our project include:

- How can we quantify user pain points using measures of frequency and severity?
- What do we need to consider when developing our ideation methodology?
- What level of fidelity makes sense for our prototype?

We will approach these questions after synthesizing our discovery research to ensure we have a comprehensive understanding of the problem and user pain points.

OBJECTIVES

- Identify opportunities where AI can be leveraged and areas where AI cannot be used in the software developer's journey.
- Understand how AI can address software developer's pain points and enhance their workflow.
- Design a wireframe prototype of a Red Hat Developer Tooling product that incorporates new AI components.

USER / AUDIENCE

Our main target users are software developers with a specific focus on developers using Red Hat's Openshift product. To better understand the needs of developers, we conducted discovery interviews throughout the developers' lifecycle, focusing on two specific types of developers – inner loop and outer loop developers.

Inner loop developers focus on individual tasks such as coding, building, debugging, and pushing code changes. In contrast, outer loop developers are responsible for taking the individual code changes created by inner loop developers and integrating them into the larger development

environment. They focus on testing, compliance, and ensuring smooth transitions to production. Their needs revolve around managing complex environments and ensuring seamless deployments.

To further refine our understanding of the target audience and narrow down specific areas of the developer's life cycle, we will create user personas for both inner and outer loop developers. These personas will encompass the specific needs, pain points, and preferences of each group, allowing us to tailor our AI solutions to meet their unique requirements. Throughout the project, we will interview, and send out surveys to computer science students and professional software developers, to gain insights into their workflows, challenges, and priorities.

ASSUMPTIONS

The project objective and goals were handed to us with the assumption that Artificial Intelligence (AI) is the solution to making software developer's workflow more efficient and productive. Given that AI is an emerging field, resulting in current industry trends to incorporate AI into workspaces, there is a strong inclination to assume that AI is the solution to making workflow more productive. However, we hope to challenge this assumption by completing our own research and coming to our own conclusions about AI use in developer's workspace. We will not only investigate areas where AI can be used but also areas where it should not be used. Lastly, we will not limit our solution to only AI and will be open to other potential solutions that could be more effective in enhancing developer's workflow.

APPROACH

In terms of our project approach, our team has mapped out a project timeline as shown below. The project will largely comprise five distinct phases: Discovery Research, Persona Development, Ideating & Defining a Solution, Prototyping, and User Testing. Given the research-centric nature of the project, much of the timeline revolves around effectively defining and understanding the problem space, understanding who our audience is, and where an opportunity for AI exists. Acting on this research, we plan on developing wireframes and prototypes outlining the integration of AI into the developer interface, with this phase occurring toward the project's conclusion.

This timeline represents a flexible framework that is subject to change given the evolving nature of the project. We intend to maintain active contact with our sponsors, Beau and Emma, to ensure that we stay on track with project deliverables, update them with relevant information, and respond to project feedback. Though not entirely finalized, our team intends on conducting a range of activities and tests throughout the research and ideation phases including rank tests (to compare the severity and frequency of specific pain points), qualitative and quantitative surveys

(gather information in mass about developer workflow experiences), as well as brainstorming techniques like the “How might we” line of questioning to determine specific and actionable outcomes.

PROJECT TITLE	Augmenting the Developer Experience with AI
PROJECT RESEARCHERS	Jessie Huang, Michael Yung, Caroline Yang, Ami Sao, Quinn Troung

WBS NUMBER	TASK TITLE	START DATE	DUE DATE	DURATION	PCT OF TASK COMPLETE
1	**Discovery Meeting & Team Logistics**	**1/18/24**	**2/15/24**		
1.1	Project Introduction + Team Selection	1/19/24	1/19/24	0	100%
1.2	Outreach Email to RedHat Team	1/26/24	1/28/24	0	100%
1.3	Discovery Meeting w/RedHat Team	1/29/24	2/1/24	2	100%
1.4	Short Project Proposal	1/29/24	2/1/24	2	100%
1.5	Digital Project Notebook	2/5/24	2/8/24	3	100%
1.6	Project Proposal	2/5/24	2/15/24	10	100%
1.7	Project Approach Presentation	2/5/24	2/15/24	10	N/A
2	**Discovery Research**	**2/1/24**	**2/25/24**		
2.1	Research: RedHat Developer Tools	2/1/24	2/25/24	24	100%
2.2	Competitive Analysis on AI Tools	2/1/24	2/25/24	24	50%
2.3	Discovery Research Results Documentation	2/1/24	2/25/24	24	0%
3	**Interviews & Persona Development**	**2/15/24**	**3/7/24**		
3.1	Preliminary Audience Research	2/15/24	2/22/24	7	50%
3.2	Software Developer Interviews + Documentation	2/22/24	2/29/24	7	50%
3.3	Persona Development	2/22/24	2/29/24	7	0%
3.4	Customer Journey Map/Flowchart (what tasks and where can AI be applied?)	2/29/24	3/7/24	7	0%
3.5	Discovery Report on: Interviews, Research, Exploration	2/29/24	3/7/24	7	0%
4	**Define/Ideate**	**3/7/24**	**3/16/24**		
4.1	Ideate AI Applications within RedHat Ecosystem	3/7/24	3/14/24	7	0%
4.2	Schedule Product Demos	3/7/24	3/14/24	7	0%
-	**SPRING BREAK**	**3/16/24**	**3/24/24**	**7**	0%
5	**Prototyping**	**3/7/24**	**4/4/24**		
5.1	Design Concepts/Wireframes/ Wireflows	3/7/24	3/28/24	21	0%
5.2	Prepare Usability Testing Material	3/28/24	4/4/24	6	0%
6	**Usability Testing**	**4/4/24**	**5/10/24**		
6.1	User Feedback Results Round #1	4/4/24	4/15/24	11	0%
6.2	Usability Test Script Revisions	4/15/24	4/18/24	3	0%
6.3	User Feedback Results Round #2	4/18/24	4/29/24	11	0%
6.4	Final Deliverables + Presentation	4/18/24	5/10/24	22	0%

THE TEAM

Quinn Truong, Project Manager

She is a junior studying HFE at Tufts. She's originally from Vietnam, but moved to Florida recently. She is interested in UX Research and project management. Additionally, she's a pre-law student and spent last summer interning at Greater Boston Legal Services.

Caroline Yang, Main Point of Contact & UXR lead

She is a senior at Tufts studying HFE and minoring in Engineering Management. Her interests lie in UX research and product/project management, but she has experience interning in UX design, UX research, product management, and marketing in both startups and large SaaS companies.

Ami Sao, Research Lead

She is a senior studying HFE at Tufts and minoring in Spanish and Entrepreneurship. She is experienced in UX design, product management, inbound marketing, and content creation through several B2B SaaS internships in the Boston area. She is from Sudbury Massachusetts and loves playing squash.

Jessie Huang, Product Design Lead

She is a senior at Tufts studying HFE and Studio Art. She has experience in product design, having interned as a UI/UX researcher and worked on several design projects with various teams. Originally from Taiwan, she moved to Lexington, MA during middle school.

Michael Yung, UI Lead & UXR

He is a senior studying HFE and minoring in Studio Art and Entrepreneurship. He has experience in UX design and 2D animation, having interned at a digital marketplace startup and currently working at a media production studio in Boston. He is local to Medford, Massachusetts.

RESPONSIBILITIES / INVOLVEMENT / DEPENDENCIES OF SPONSORS

Our objectives are consistent with the project's overarching goal: to identify areas where AI can enhance a developer's workflow. After talking with our sponsors, we decided to conduct our initial discovery research through interviews. We learned that the developer workflow comprises two prominent sections: the inner loop, where coders work individually, and the outer loop, where coders can merge and collaborate. We plan to interview both types of coders. Fortunately, our sponsors, Beau and Emma, offered to help source Red Hat employees for interviews if needed.

After the interview process has been completed, we plan to synthesize our research into user journey maps. From there, we will identify pain points to narrow the scope of our project.

Our process will evolve and adapt depending on the information we uncover in the discovery phase. Therefore, we will stay in communication with Beau and Emma about developing our methodology for ideation and prototyping after narrowing down our scope. We will look to Beau and Emma to provide, relying on them to give constant feedback on our

project, share insights, and connect us to necessary resources (providing access to experts, educational slides, articles, etc) to complete the project.

To facilitate effective communication, we've decided to have our weekly check-in meeting with Beau and Emma on Mondays at 12:15 am Eastern time. Additionally, we have created a Slack channel to promote regular back-and-forth, question-asking, and expectation-setting throughout the project. Lastly, we've decided to send out weekly emails to recap our week's achievements, highlight our current goals, and underline action items for the following week.

APPENDIX

Appendix A: Discovery Plan

Objective	**Methodology**	**# of Participants**
Conduct competitive analysis	Synthesize information on AI use cases in the software development world.	0
Identify user pain-points	1. Conduct individual verbal interviews to collect qualitative data on developer pain points within the inner loop and outer loop. 2. Send out online surveys to inner loop and outer loop coders to quantify these pain-points using metrics of frequency and severity.	1. > 15 2. > 20
Synthesize information	1. Develop user personas from data collected during the discovery phase to inform the ideation and prototyping stages. 2. Develop user journey maps from discovery research findings.	0