

# Canvas LTI Student Climate Dashboard Mark II

**Team Number:** sdmay23-42

**Team Members:**

Joshua Harvey – Project Manager, Resonance, Persona, Journey Map

Colin Hasbrook – Database

Elias Simpson – Container Management

Howard Chi – UI

Hailee Leonard – CI/CD and UX

Jonathan Giblin – Security & Login Authentication

**Client:** Henry Duwe

**Advisor:** Nick Fila

**Date:** 12/6/2023

# Problem Statement | Solution

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## **Problem Statement:**

- Instructors and students lack tools that analyze student and course data to provide users with a better understanding of student experiences throughout the duration of a course.
- Manual journey map creation takes significant time and effort, preventing them from being adopted to map student experiences during a course, drive course design changes, and influence student performance.
- Mark I was not sufficient in delivering accurate journey maps and efficient UI. No student interface.

## **Solution:**

- Automate the journey map creation process and provide efficient and effective tools for creating and manipulating journey maps that provide course and student insights. Address deficiencies of Mark I.

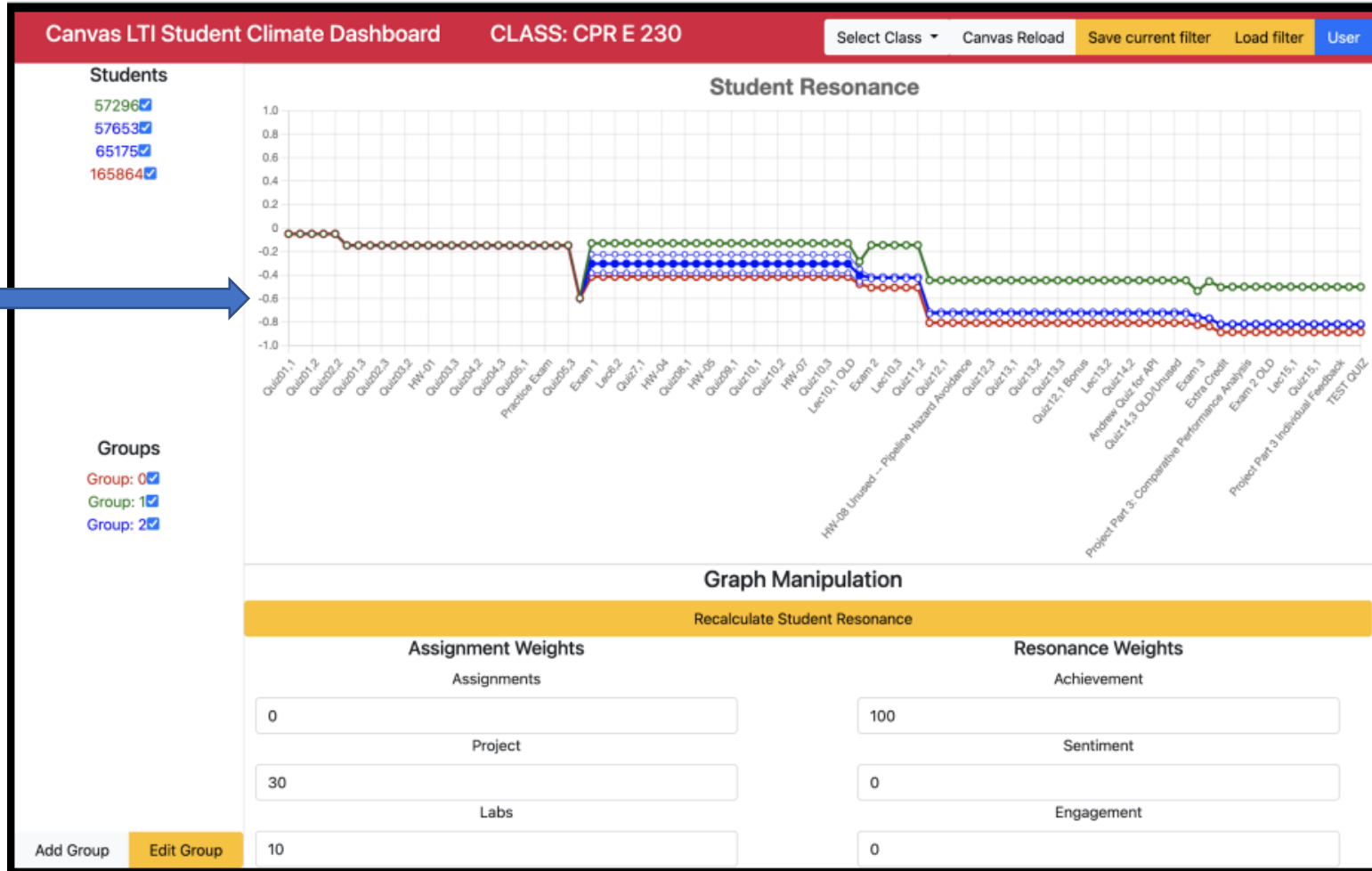
# Purpose

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- Instructors need a way to accurately understand students' experiences in their courses. Journey maps provide an interactive means for empathizing with students and improving student interactions through course design.
- Students need a tool that allows them to reflect on their class performance and use it as a basis for instructor communication.
- ISU ECpE Department paper found manual journey maps to be an exciting opportunity to improve course design, however the intensity of involvement and coordination required for effective journey maps significantly detracted from their optimal viability as a course design and student understanding tool.

# Terms & Example

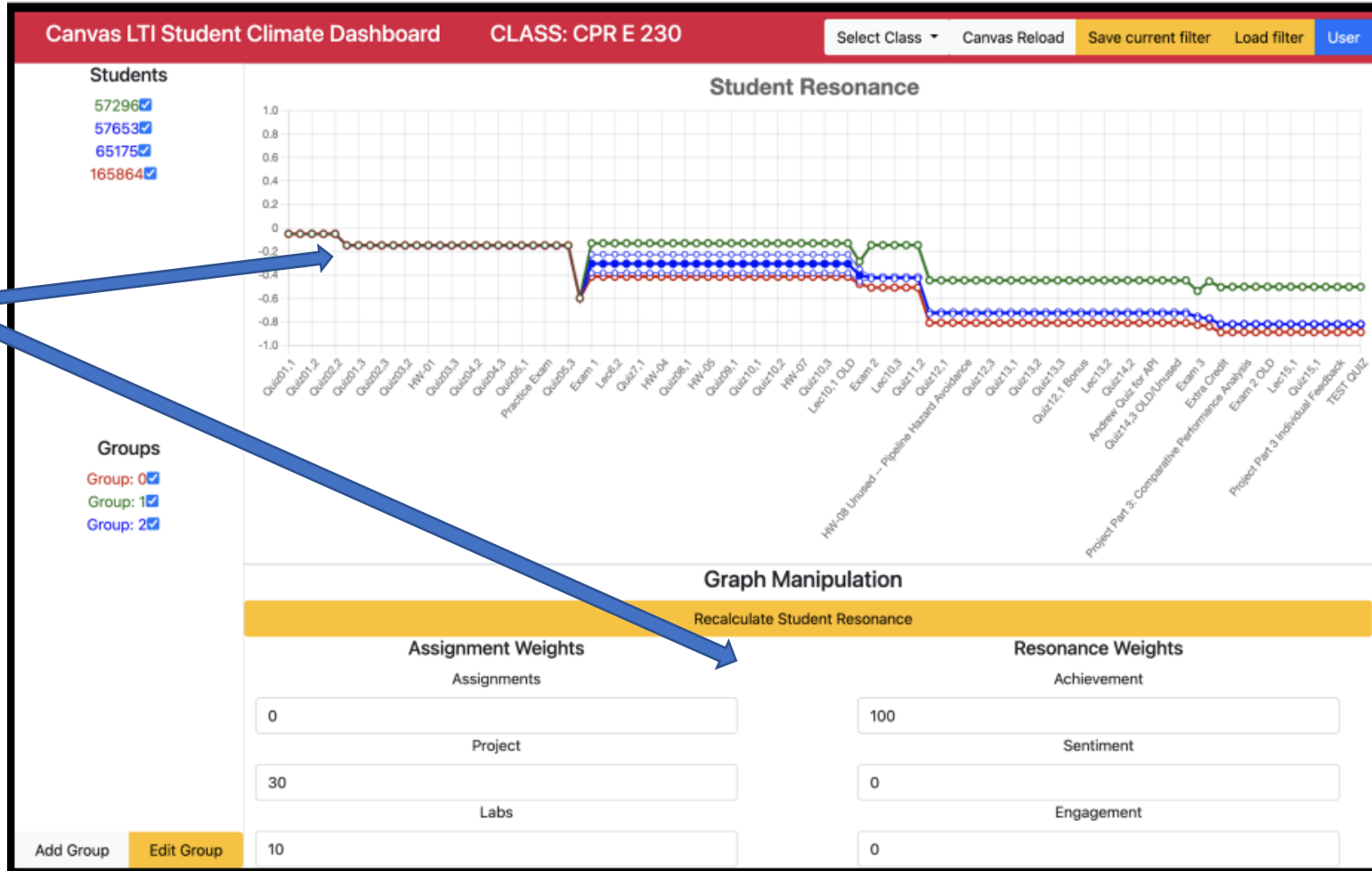
Journey Map



[https://sddec21-19.sd.ece.iastate.edu/docs/Senior\\_Design\\_Demo.mp4](https://sddec21-19.sd.ece.iastate.edu/docs/Senior_Design_Demo.mp4)

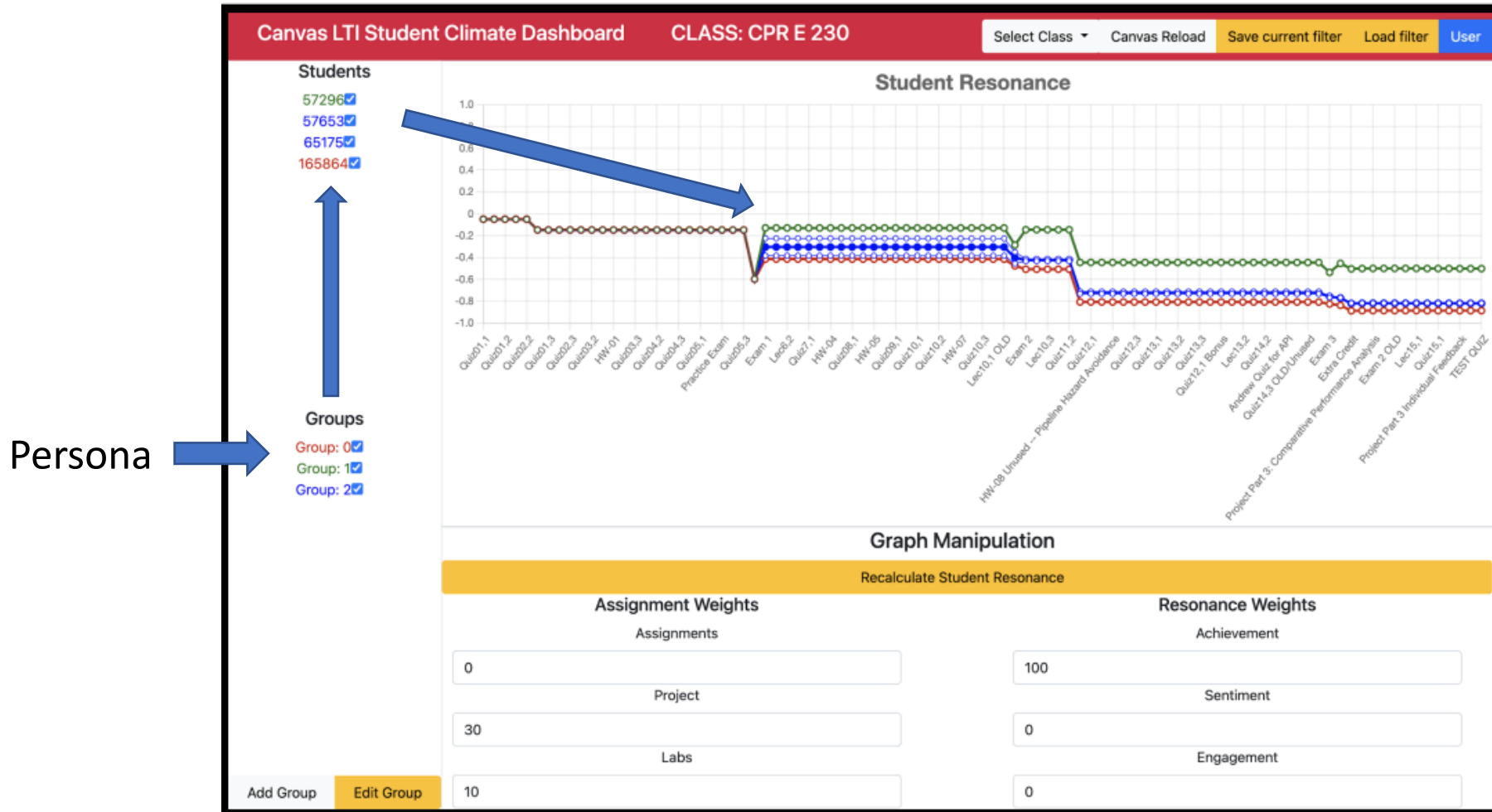
# Terms & Example

Resonance



[https://sddec21-19.sd.ece.iastate.edu/docs/Senior\\_Design\\_Demo.mp4](https://sddec21-19.sd.ece.iastate.edu/docs/Senior_Design_Demo.mp4)

# Terms & Example



[https://sddec21-19.sd.ece.iastate.edu/docs/Senior\\_Design\\_Demo.mp4](https://sddec21-19.sd.ece.iastate.edu/docs/Senior_Design_Demo.mp4)

# Functional Requirements

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1. Take user input to customize journey map
2. Journey map uses a sliding timescale for time window of data
3. Journey map uses a sliding magnitude of drop-off of older data
4. Journey map has the option to amplify data based on trend
5. Resonance and personas can be flexibly defined in app
6. Categorize personas based on user input (proximity, student-defined persona, best-performing category, sentiment, engagement)

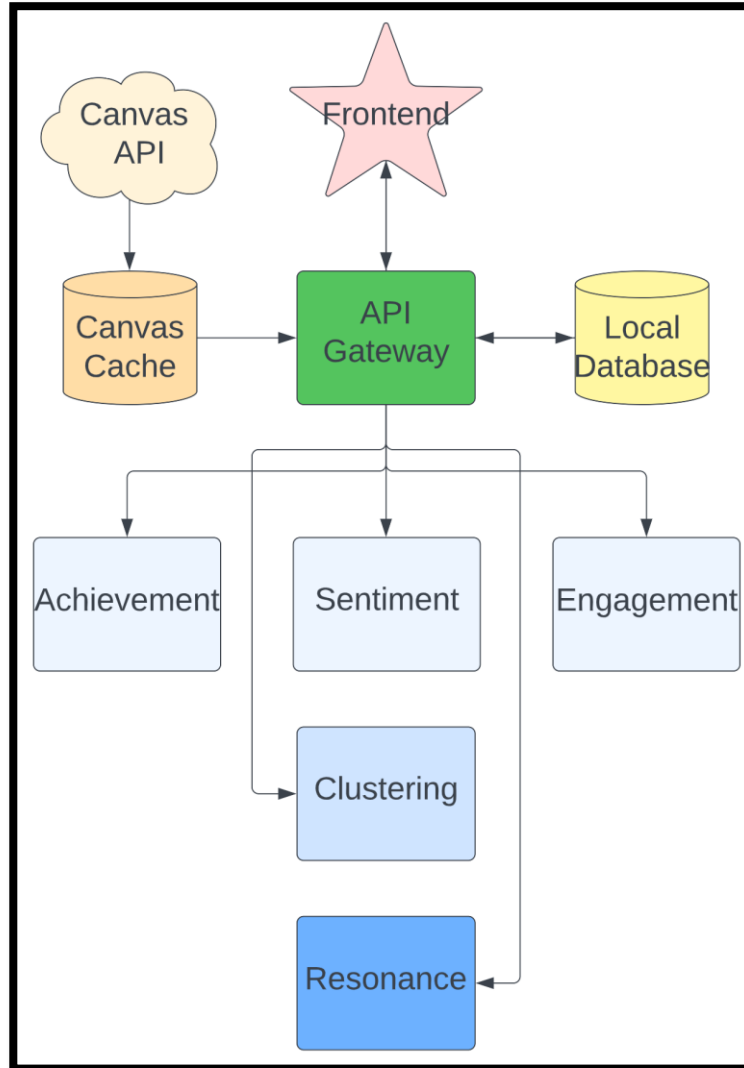
# Non-Functional Requirements

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1. Student data is private and should only be accessible to the professors and/or Tas and the individual student
2. Feature will not violate FERPA (data storage)
3. Any changes to the journey map including filters and etc. should update the journey map within 1.5 seconds
4. A fresh start to the journey map should be constructed within 60 seconds
5. User Interface communications needs to be efficient
6. UI layout needs to be simple and user friendly



# Application Overview



# Functional Decomposition

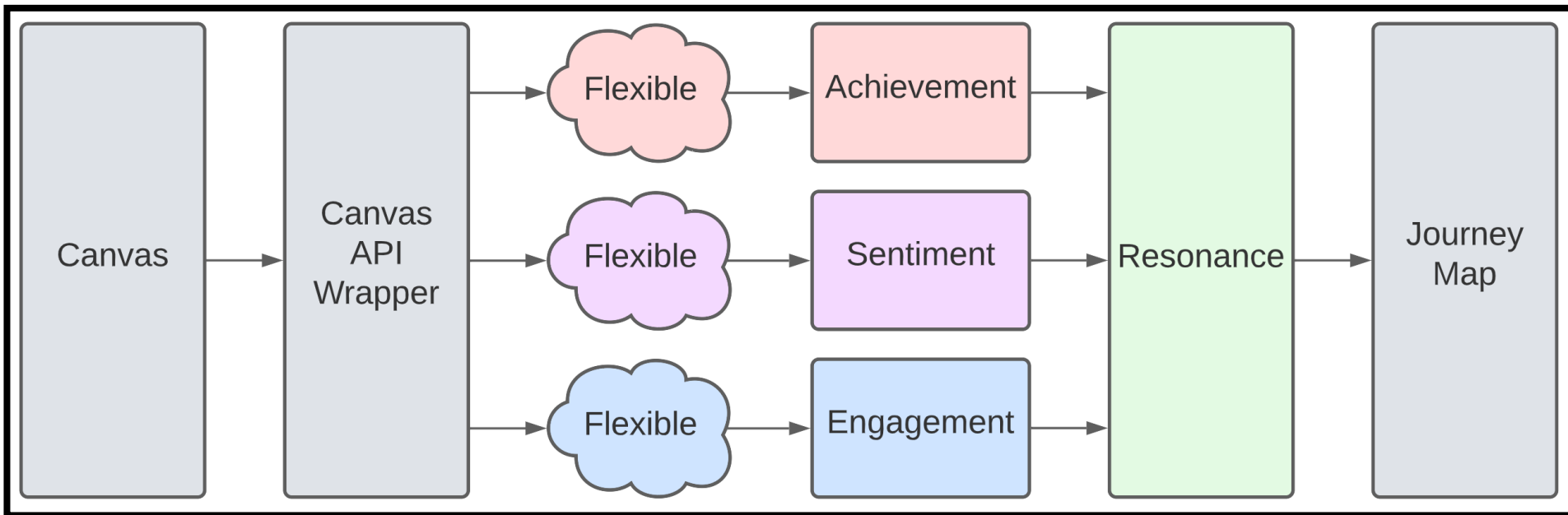
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- Frontend
  - Journey Map Controls
    - Time frame
    - Fade dynamic
    - Trend enhancer
    - Resonance and persona selection
    - Code input for resonance definition
  - Student interface
  - Full screen
  - Optimize space and time efficiency
- Backend
  - Proper communication between frontend and backend
  - Flexible resonance and persona definitions
  - Scripting definition of resonance
  - Resonance and persona accuracy testing
- Integrations
  - Simple course setup
  - Canvas API integration
  - Okta verification integration

# Resonance

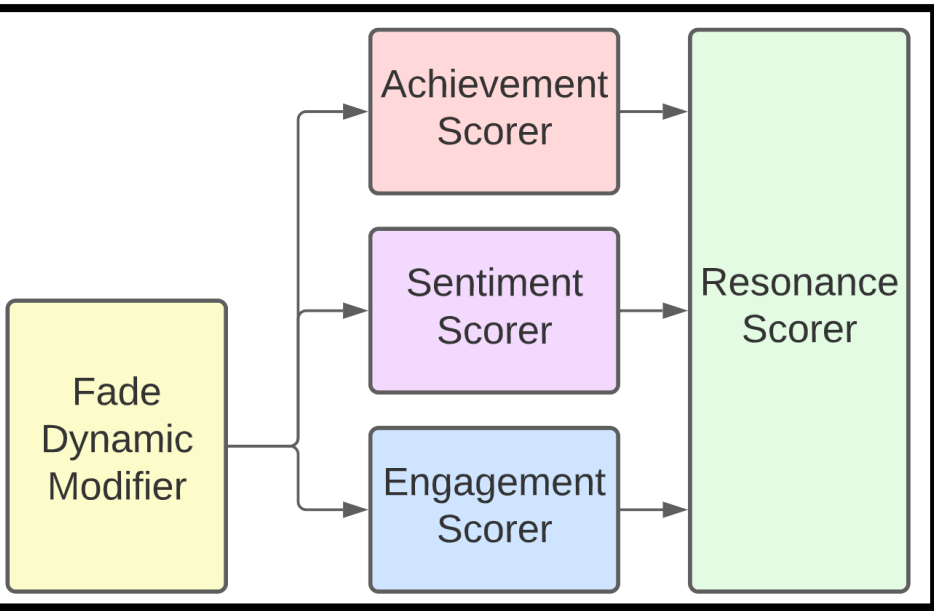
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## Flexible Definition

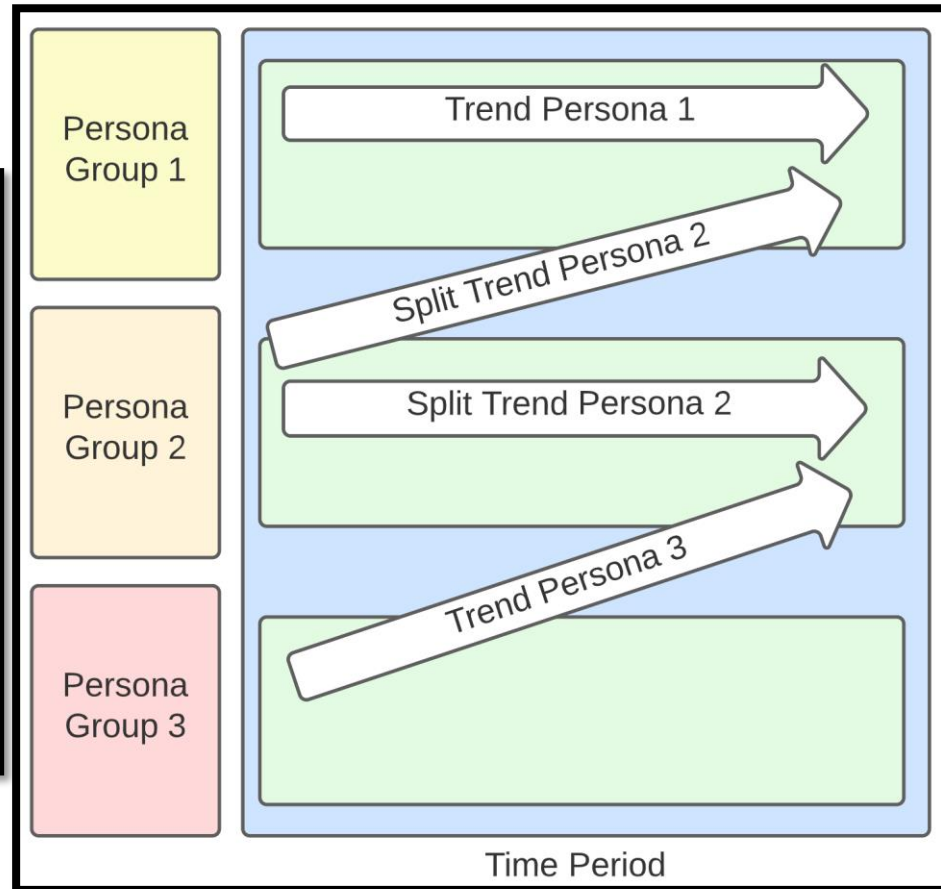


# Resonance

Fade Dynamic



Trend Enhancer

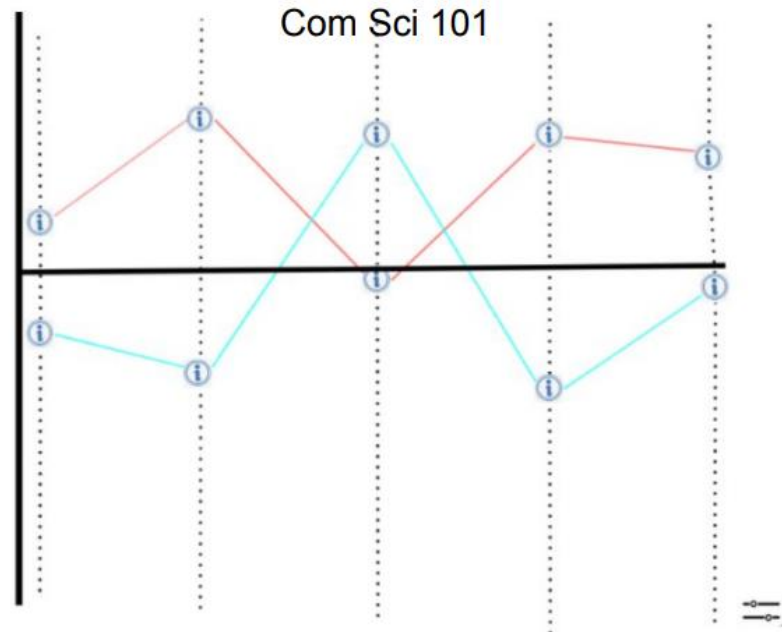
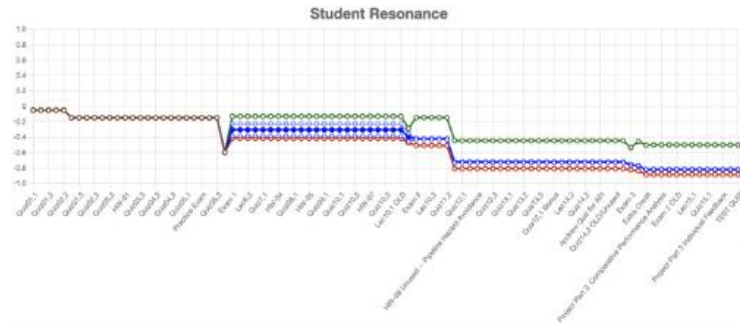
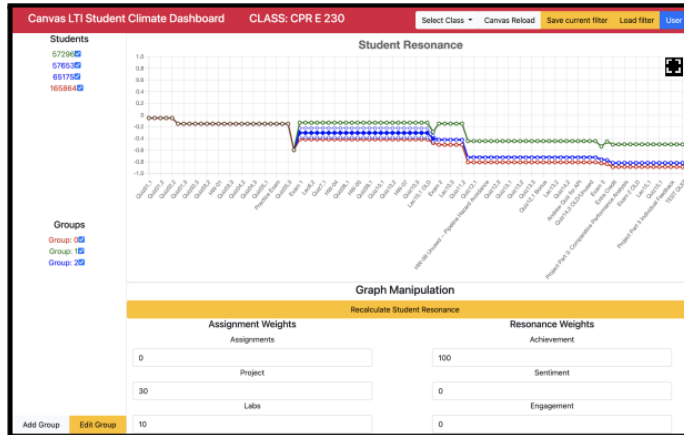


# User Interface Design Choices

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1. Fullscreen option for journey map
2. Interactive, allowing toggling and resizing
3. Professor
  - a) Display resonance customization features
  - b) Display mapping customization features
  - c) Display persona customization features
4. Student
  - a) Display Resonance over time
  - b) Compare Map with Persona groups and/or overall class

# Conceptual Sketch



[source](#)

▶ 😊 Student Groups			6 students	🔒
▶ Capybaras Student Groups			6 students	🔒
<a href="#">Project Charter</a>				
Assignments	5	5		📧
<b>Score Details</b>				<a href="#">Close</a>
Mean: 5	High: 5	Low: 5		📌
Median: 5	Upper Quartile: 5	Lower Quartile: 5		

source

# Technical Constraints/Considerations

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- Canvas API: throttling
- Complexity of hosting technologies: Kubernetes, Docker, containers
- Single VM: single node
- Microservice architecture: loose coupling, high cohesion



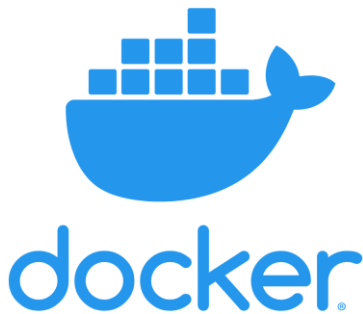
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# Server, Infrastructure Design

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- Currently, the virtual machine uses Kubernetes to deploy microservices:
  - External API service layer
  - Scoring and clustering
  - Frontend interface
- Docker can run the microservices and offer the endpoints without Kubernetes, so we plan improve maintainability by removing Kubernetes.



[Source](#)



**kubernetes**

[Source](#)

# Software and Engineering Practices

- Agile
- Automated testing
- CI/CD
- Python, SQL, JavaScript, YAML
- Microservice architecture



# Resource/Cost Estimate

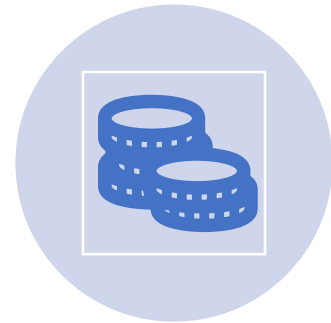
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RESOURCES ONLY INCLUDE  
ACCESS TO A SERVER



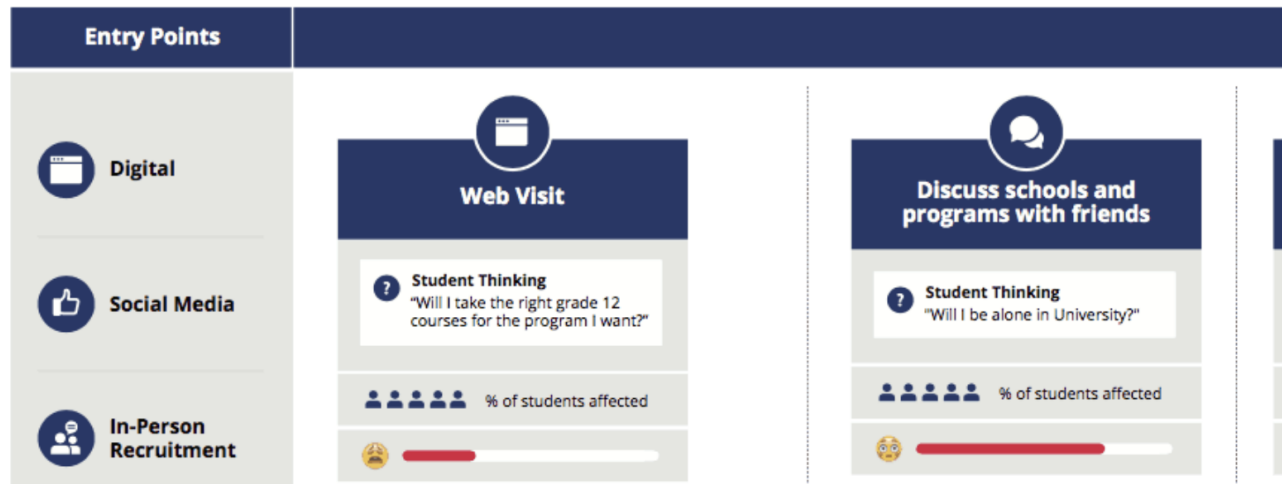
NO COSTS FOR THIS  
IMPLEMENTATION



ANY FUTURE COSTS WOULD BE  
SUBJECT TO ISU FINANCING

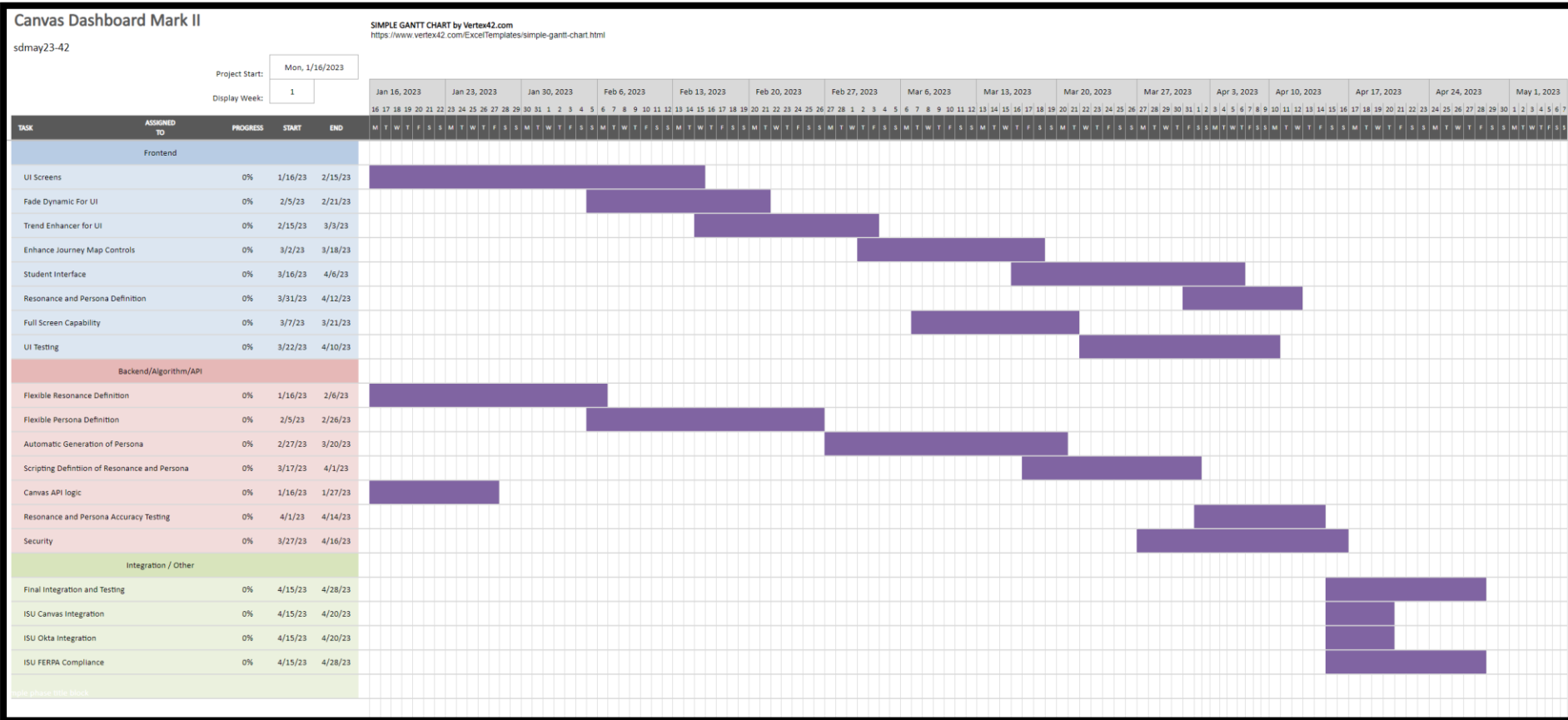
# Market Survey

- Journey maps originated as conceptual maps used for business planning
- Their application in education is limited to a "customer experience" perspective



[source](#)

# Project Schedule



# Potential Risks

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- Lose access to VM
- Compromised data
- Technology versions change or become incompatible
- Inaccurate computations



[source](#)

# FERPA

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- ISU FERPA Certification
- ISU Canvas Integration
- ISU Okta Integration
- ISU CELT Meeting



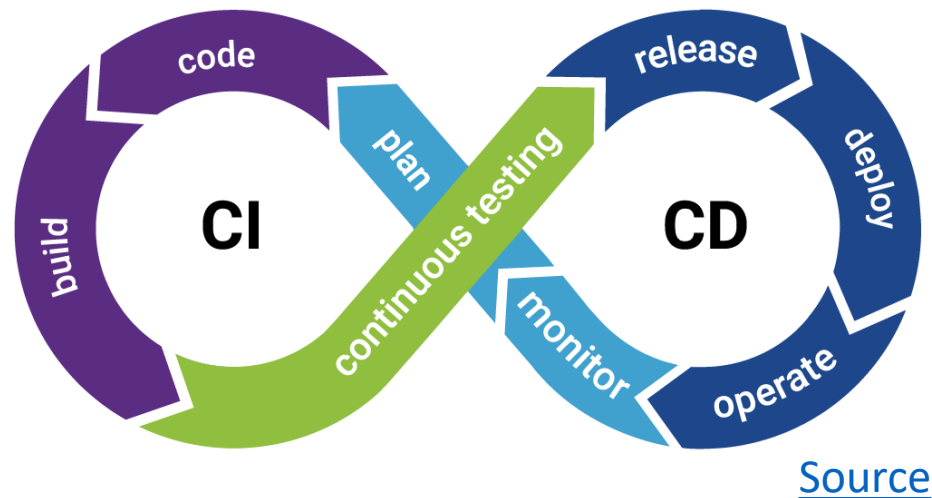
# FERPA

Family Educational  
Rights & Privacy Act

[Source](#)

# Testing and Patterns/Frameworks

- Unit testing: PyUnit for logic, algorithm, and basic service functionality
- Integration testing: Jenkins-Kubernetes-plugin for cross-service logic
- Acceptance testing: Conducted through demos with client, system administrators
- Security testing: OKTA integration testing for secure login
- Setup for regression testing: CI/CD used to automate regression testing in GitLab





# Current Status

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- Design Sketch
- Requirements identified
- Kubernetes setup
- Docker setup
- Server access
- OKTA account
- FERPA Training

# Future Plans

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Joshua Harvey – Project Manager, Resonance/Persona/Journey Map: Python, resonance changes, Canvas REST API, flexible resonance definition.

Colin Hasbrook – Database: FERPA Compliance, pulling data from backend to frontend

Elias Simpson – Container Management: Deployment, debugging, version compatibility, port and service setup. Simplify container startup and maintenance by removing Kubernetes infrastructure requirement.

Howard Chi – UI: Design new features and improve layout

Hailee Leonard – CI/CD, UX: Set up the CI/CD pipeline for automation and working with Howard to improve UX with the new UI

Jonathan Giblin – Security & Login Authentication

A photograph of the Iowa State University campus, featuring a large domed building on the left and a large tree in the foreground. The image is overlaid with a semi-transparent red filter. Two horizontal white lines are present: one above the text and one below it.

# IOWA STATE UNIVERSITY

**Software Engineering**

## References

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