Team Love <3

“Because it’s all about heart.”

UI for 3D Cardiac Flow

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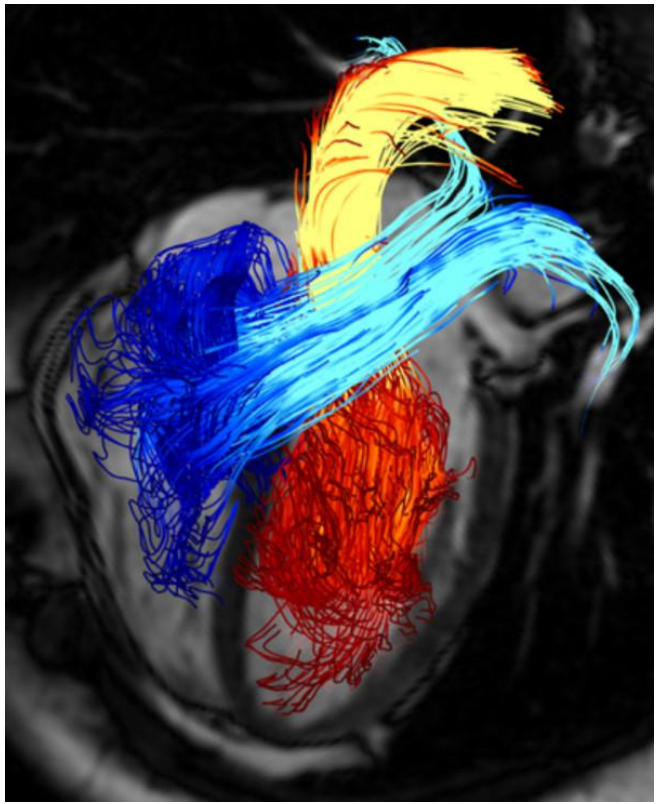
What are we doing?

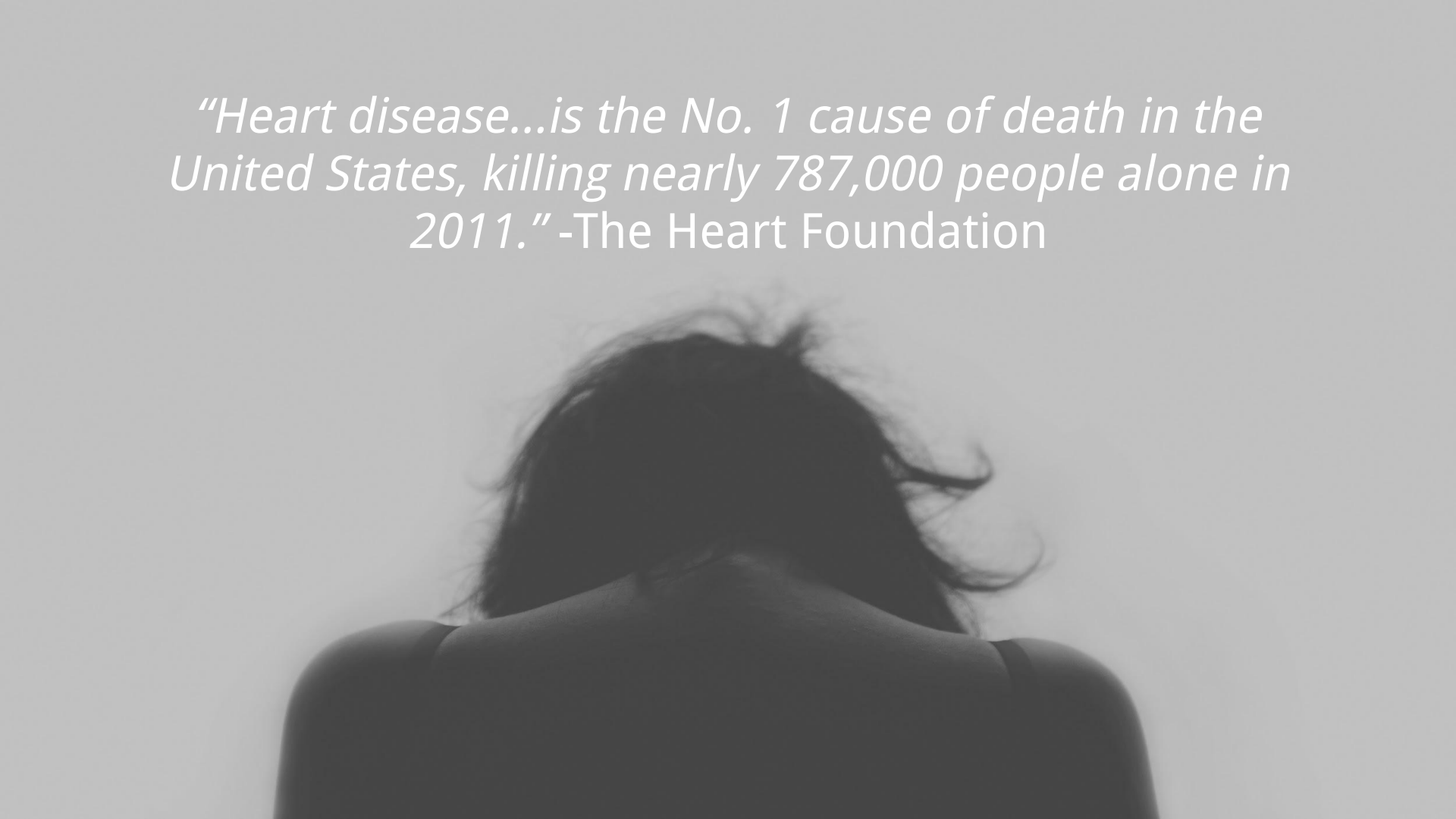


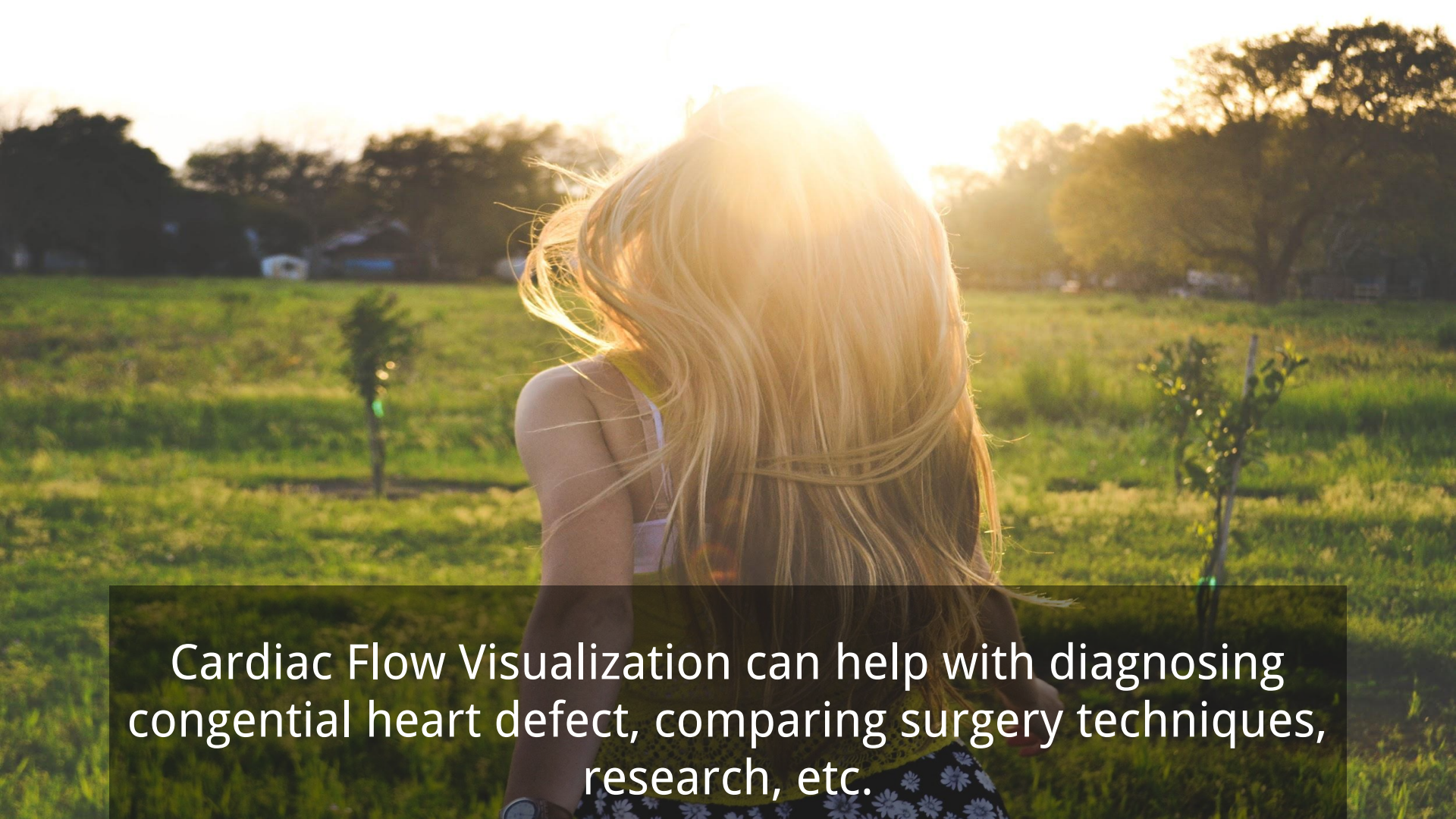
4 Modules

1. Loading 3D flow dataset
2. Image Pre/Processing
3. 3D Flow Visualization
4. Post Processing Data

Why?

“Heart disease…is the No. 1 cause of death in the United States, killing nearly 787,000 people alone in 2011.” -The Heart Foundation





Cardiac Flow Visualization can help with diagnosing congential heart defect, comparing surgery techniques, research, etc.

Current tools are hard to use for clinicians without technical background.

Team Love <3
To The Rescue

Design a more easier to use interface for clinicians and specialists

Users

Personas based on roles

Clinicians - Direct

1. Cardiologist - Tech level (2-3)
2. Radiologist - Tech level (2-4)

Indirect

3. Biomechanical Engineer (3-5)
4. Grad Students / Researchers (2-5)

Want to create a usable product for people with minimum tech level 2.

Personas based on needs and wants

1. I need
   a. to make a decision
      i. *“I need to make a decision whether or not to do surgery*
   b. more information."
      i. *“I need more information about my patient.”*
2. I want
   a. to explore
      i. *“I want to explore data for my research.”*
   b. to compare
      i. *“I want to compare two post-surgery patients.”*

GTFlow - Usability (60/100)*

- Simplify a complex program to one with a few core functions based on 4 modules - (80/20)
- Create a more usable layout

* As rated by the customer

Usability Problems - Module 1

Loading 3D flow dataset -

- Be able to load and save 2 different types of flow data...
  - MRI Data (Dicom, PAR/REC)
    - By patients
  - Ultrasound Data (Voldicom)
    - No current standard

Usability Problems - Module 2

Image Pre/Processing -

- Choose regions to exclude in visualization
- Choose regions of interest
- Select based on conditional values

Usability Problems - Module 3

Flow Visualization in 3D -

- Allow user to create and manipulate
  - Streamlines *
  - Isosurfaces *
  - Contours *
  - Pathlines *
  - Vectors

- Allow dynamic setting changes without having to reprocess the image

Usability Problems - Module 4

Post Processing -

- Easy to access tools that show/analyze for:
  - Shear Stress *
  - Helicity *
  - Reynolds Stress *

*Don’t put this on the test please professor, when we first heard this stuff, it went way over our heads.

HCI Methods

Phases

1. Defining the Problem / Requirements Gathering
2. Envision / Brainstorm
3. Design, Test, Repeat
4. Deliver

Defining the Problem / Requirements Gathering

- Interviews (~ 30 min)
  - Customer (2 interviews so far)
  - Introduced through customer:
    - Someone who has experience with flow visualization
    - Someone who has no experience but interest in flow visualization

- Cognitive Walkthrough
  - Creating user stories e.g.
    - **I want** a way to see helicity.
    - **As a** cardiologist.
    - **In order to** get more information about my patient.

Envision / Brainstorm

- Paper Prototyping
  - Paper-pencil

- Lo-Fi Wireframes
  - Using Balsamiq or a similar tool

- Heuristic Evaluation
  - Make wireframes slightly interactive with Invisionapp or PopApp tool
  - Nielsen heuristic evaluation by team members who did not design.

Design, Test, Repeat

- Redesign mockups based on Heuristic Evaluation
- Create fully interactive mockups (Invisionapp)
- User Testing
  - Tasks are based on modules and user stories e.g.
    - Please load patient 1’s MRI flow data (Data loading)
    - Please select a value range to exclude (Image pre-processing)
    - Please define a streamline (3D Flow visualization)
    - Please select the Helicity Tool and define a volume (Post process)

Deliver

- Final Redesign after User Testing

- (If time permits)
  - Create Style Guideline for consistent look and feel
  - Hi-Fi mockup examples (Photoshop or Sketch)

- Happy Customer = Ace the class*

*Also depends on grade on Final

*

Week #	To-Do:	Performed by:
Week 3	- Prepare initial presentations - Follow-up interview with Ahmad - Request contact with user	-Team Love
Week 4	- Initial Presentations - Interview with potential user (3-5) (Clinician/Specialist) - Finalize personas - Start user stories/cases - Start paper prototyping	-Team Love -Christelle, Nathaniel, Marissel -Khang, Erick
Week 5	- Finish user stories - Create initial mock ups (Lo-Fi)	-Khang , Erick
Week 6	- Heuristic Evaluations - Cognitive Walkthrough - Redesign	-Marissel , Christelle

*Tentative

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Week #	To-Do:	Performed by:
Week 7	- Redesign	-Nathaniel
Week 8	- Make mock-ups interactive - User Testing (5-8)	-Erick -Nathaniel
Week 9	- Prepare final presentation and report - Final redesign - Style guideline as deliverable	-Team Love
Week 10	- Final presentations	-Team Love

*Tentative