Prototyping

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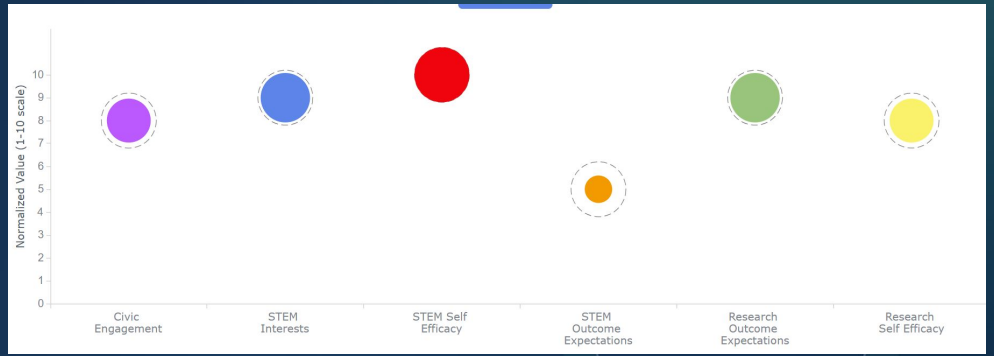
What is MySTEMGrowth?

- Web app survey measuring growth from undergraduate research
- Students complete it before and after their undergraduate research term
- Compare results to track improvement in:
  - Civic Engagement
  - STEM Interests
  - STEM Self-Efficacy
  - STEM Outcome Expectations
  - Research Outcome Expectation
  - Research Self Efficacy



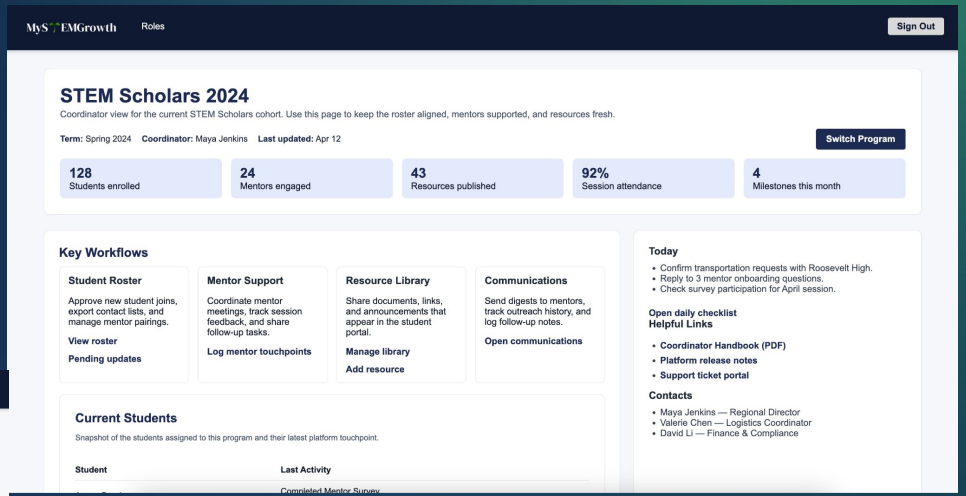
Prototyping Strategy Adopted

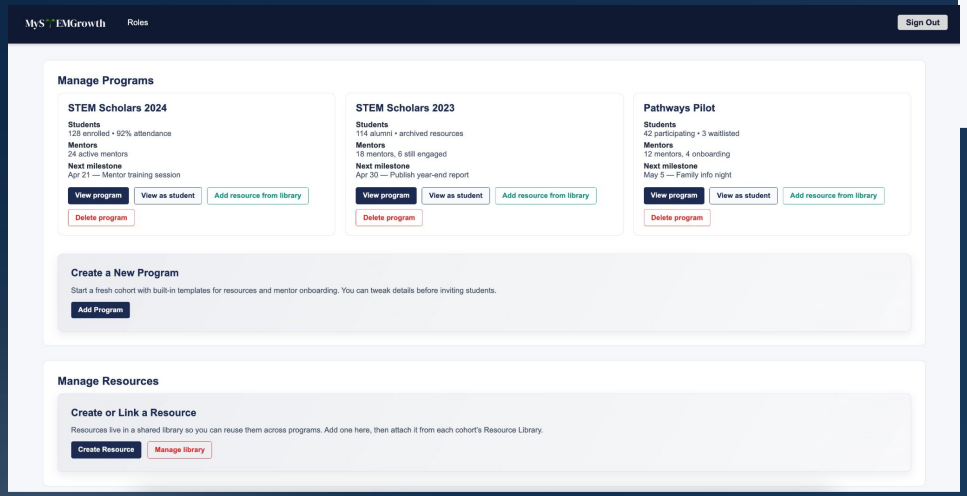
Isolating Subsystems

- What? → Created working versions of system(s)
  - Prototype of specific features
  - User Diagrams
- Why? → Focus on individual components
  - Inherited a ‘functional’ tool
    - Allows us to improve on certain components (based on client proposals)
- How? → Create a user interface
  - Demo UI

Prototyping Examples: Frontend Demo UI

Enables clients to view and test different roles in an interactive environment before implementing final decisions in the live app



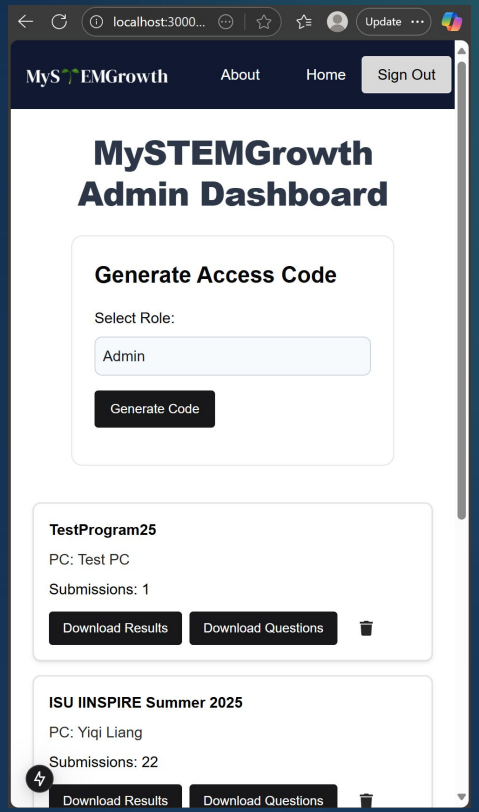


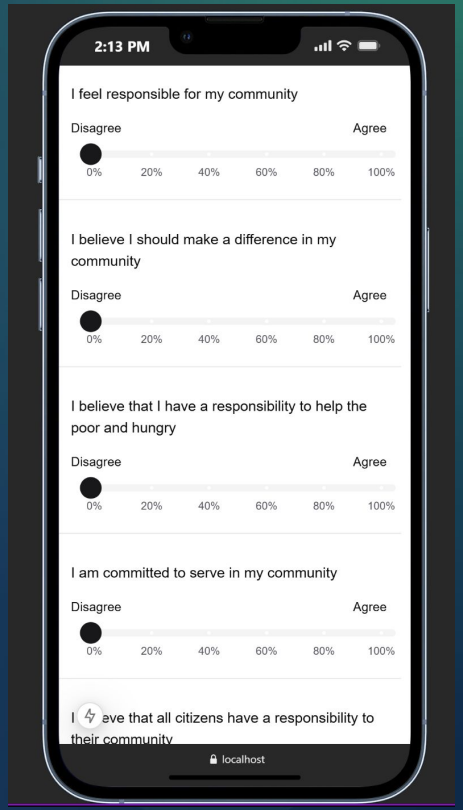
Streamlines client feedback by allowing early validation of UI layouts and feature flows in a lightweight prototype environment

Prototyping Examples: Small Screen View

Next.js will create a development server which communicates with the backend to show changes in the front end locally without affecting the published product

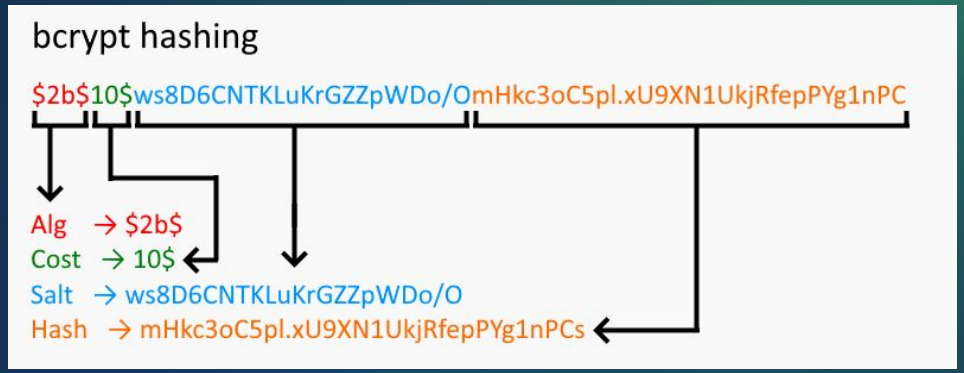
```
> iinspire-app@0.1.0 dev
> next dev

  ▲ Next.js 15.1.7
  - Local:        http://localhost:3000
  - Network:      http://192.168.20.91:3000
  - Environments: .env.local

 ✓ Starting...
 ✓ Ready in 3.4s
 ○ Compiling /admin-home ...
 ✓ Compiled /admin-home in 6.2s (2038 modules)
 GET /admin-home 200 in 7724ms
```





Prototyping Examples: Security Improvement

- bcrypt - tool that allows for secure password storing/comparing
  - plaintext password + salt → hash
  - Never stores or compares plaintext passwords
- Prototype - demonstrates register/login flow and how passwords will be hashed and stored
  - User (plaintext) → Frontend → Backend (bcrypt: salt + hash) → Database (hashed password stored)
  - Smooth transition from prototype to production with user data security as a priority




```
if (req.body.password) {
  const salt = await bcrypt.genSalt(10);
  user.password = await bcrypt.hash(req.body.password, salt);
}
```

"fullname":"gadelha","password":"$2b$10$DBU3aqcSrOcwWpdcmyOsEe4Rs7uPw3Uk9sERAOJv4Jh3kqr/m78ee"},

Prototyping Examples: Cloud Services

Weighted Decision Matrix

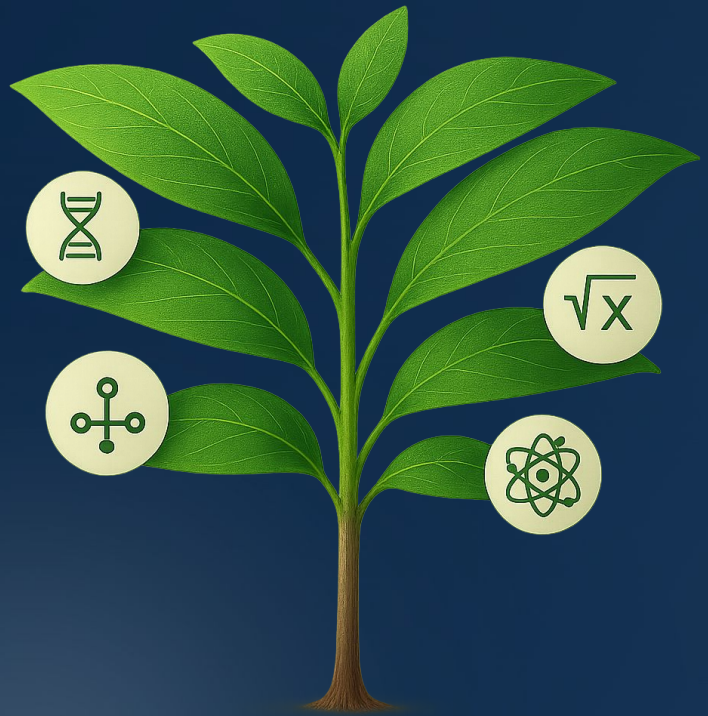
CRITERIA	WEIGHT	AWS	DIGITALOCEAN	GCP	AZURE	HEROKU/VERCEL
Cost	0.25	2	5	3	3	4
Ease of Setup	0.20	2	5	3	3	5
Integration w/ Stack	0.20	5	5	4	3	3
Security	0.20	5	4	5	5	3
Scalability	0.15	5	4	5	5	3
Weighted Score		3.7	4.7	4.2	4.0	3.8

Weights: Cost 25%, Ease 20%, Integration 20%, Security 20%, Scalability 15%. Weighted score = Σ(score × weight).

Outstanding (4–5) Competitive (3) Needs Work (1–2)

- Switched from AWS to DigitalOcean after evaluating performance, cost, and ease of setup
- Chose DigitalOcean for its streamlined deployment process and strong integration with our existing stack
- Now entering the beginning phases of cloud-based prototyping, testing backend workflows and scalability in the new environment

Thank you!



Questions?