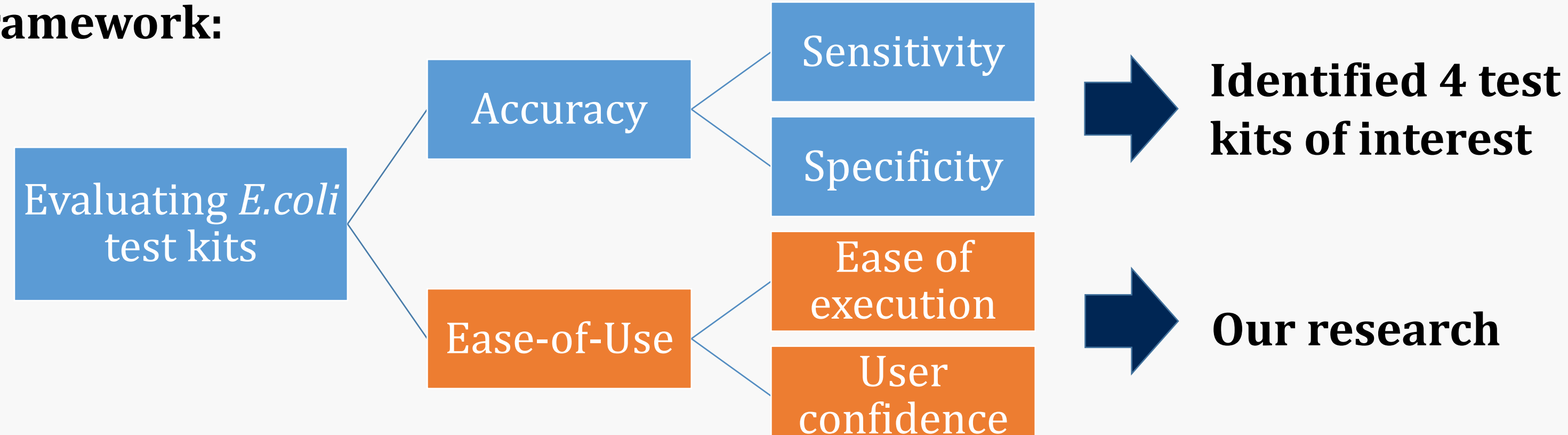


Introduction

- *E. coli* is a water contaminant that can indicate the presence of fecal matter
- *E. coli* is a significant health risk to over 3.3 million private well owners in North Carolina who must conduct water quality testing themselves^{1,2}
- There are *E. coli* test kits on the market, but getting affordable, accessible tests into the hands of Eastern North Carolinian private-well owners is a challenge
- To help local communities, testing kits must be a balance of low-cost, easy to use, and accurate

ECUIPP Lab

ECUIPP Lab: A collaborative effort to support North Carolina communities and reach environmental equity; recent focus on evaluating low-cost *E. coli* test kits



Research Goals

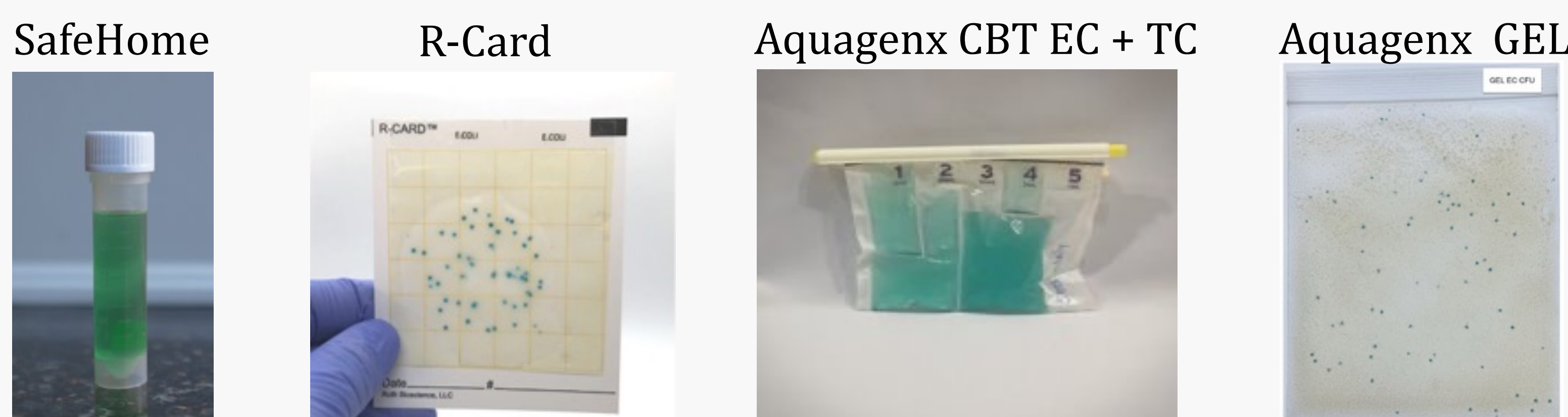
By developing methods to identify easy-to-use test kits, we hope to increase the accessibility of well-water testing, increase frequency of private well testing, and support local communities in monitoring water quality.

Methodology

Survey Design Process

- 1st Literature review • Determine methods for evaluating ease-of-use
- Initial survey development • Adapted System Usability Scale (SUS) survey³
• Custom Ease-of-Use (EoU) survey⁴
- Pilot study • Compare SUS survey and EoU survey
- 2nd Literature review • Determine methods for evaluating ease-of-use survey
- Cognitive interviews • Assess a consolidated EoU survey⁵
- Readability analysis • Measure readability of survey at all stages

Initial Test Kits



Figures 1-4. Positive *E. coli* test kits evaluated by participants

Results

Pilot Study

Procedure

- 10 UNC-CH students with little lab experience
- Participants individually completed 2 out of the 4 *E. coli* test kits
- Participants responded to the SUS survey, then the EoU survey

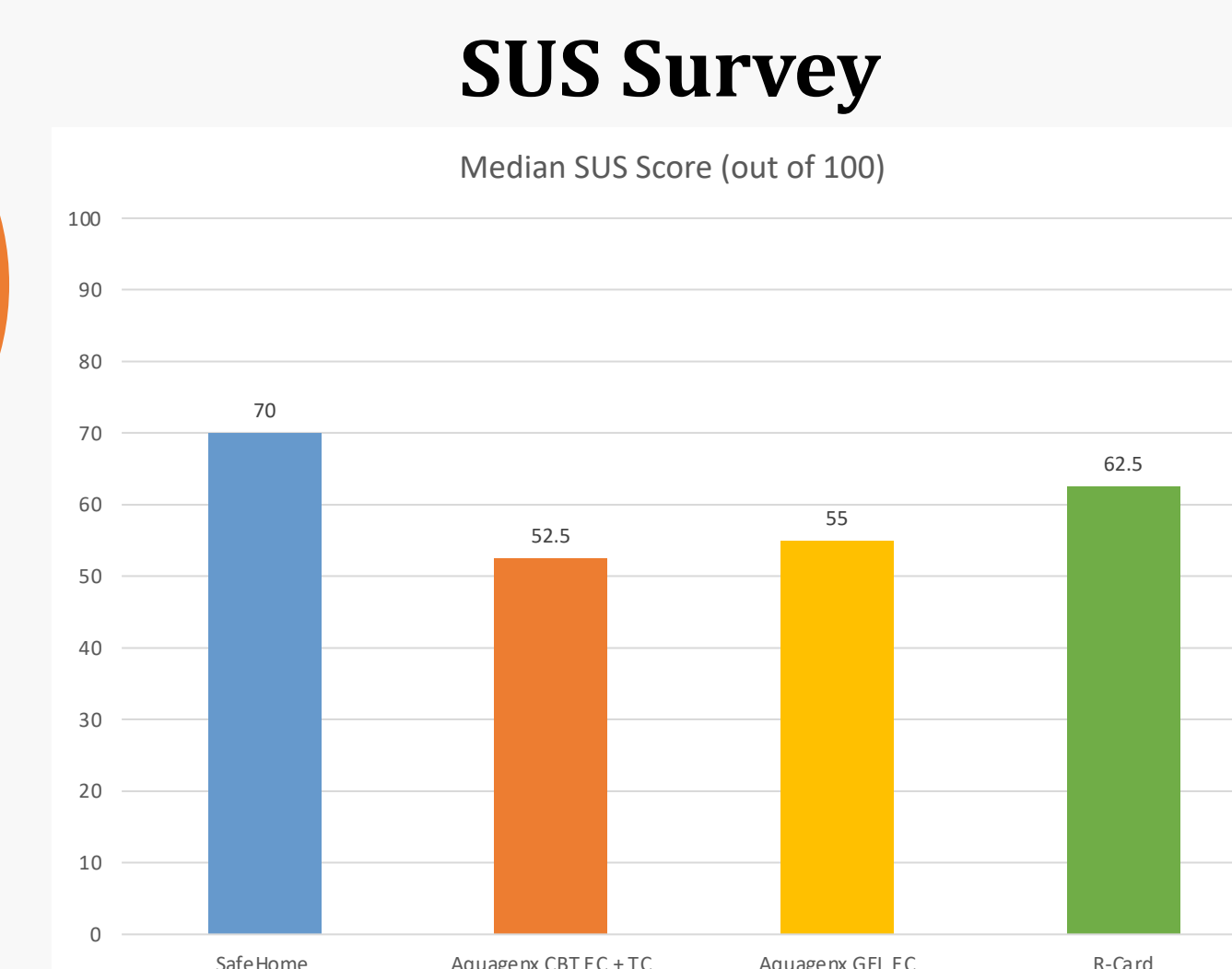


Figure 5. SUS results

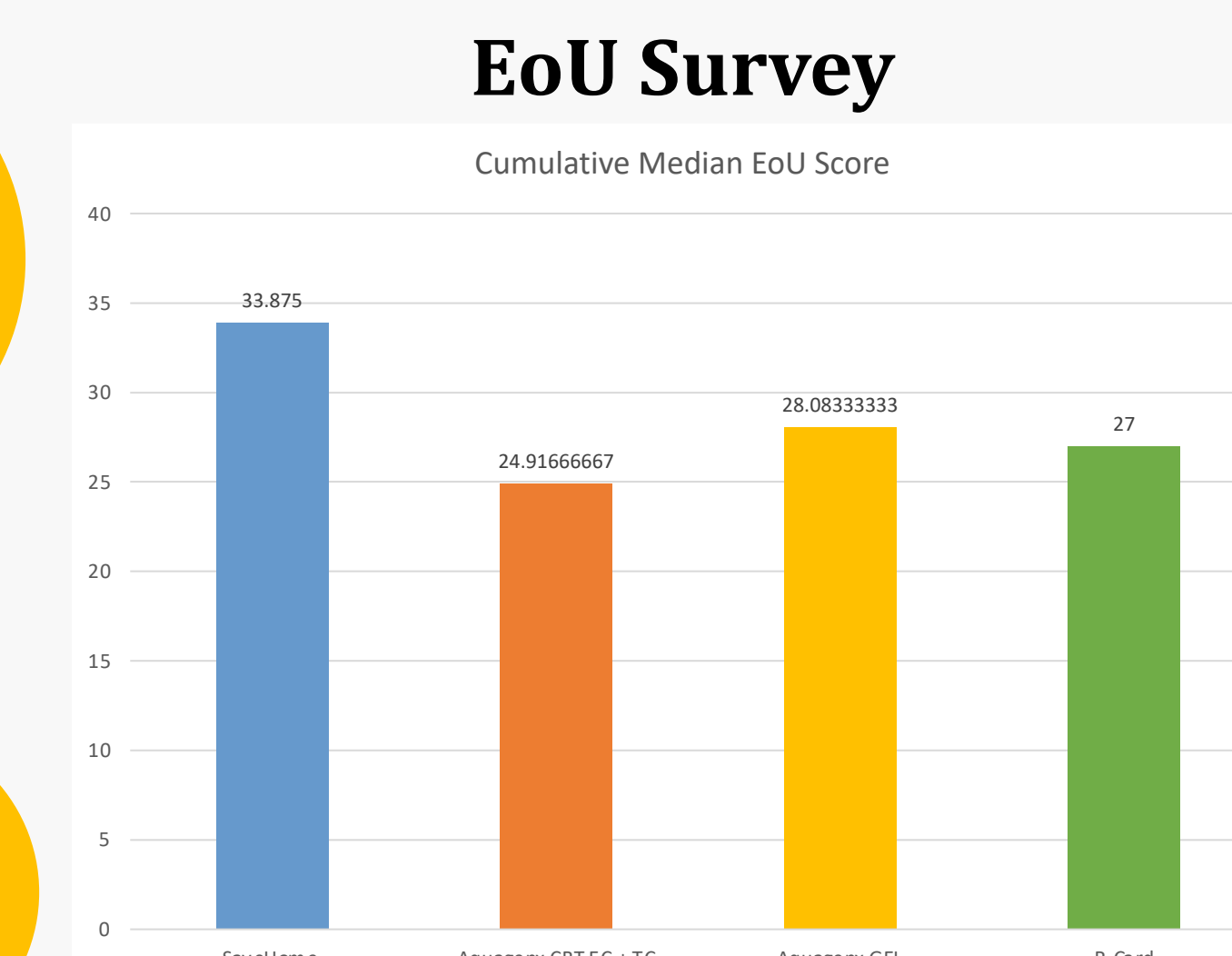


Figure 6. EoU results

Cognitive Interviews

- 20-item consolidated EoU survey edited for brevity
- Evaluated by 4 UNC-CH students after completing SafeHome

Findings: Survey accurately reflects respondent sentiments on test usability

Item 5: The test kit pieces did what they were meant to do

In one respondent's words: "The pieces of the test kit served their intended purposes"

Edits: Changes made based on feedback to eliminate any ambiguity

- 3. "using the directions" → "skills" → "ability"
- 4. "move around" → "use"
- 7. "were readable" → "were displayed well"
- 12. "skills" → "ability"
- 13. "do the test" → "complete the steps"

EoU Survey Readability Progression



Discussion

- Pilot results from the SUS and EoU surveys both suggest that the SafeHome test kit is the easiest to use, while the Aquagenx CBT EC+TC test kit is the most difficult to use
 - Slight differences in results demonstrate need for revisions to EoU survey
- Feedback indicated that the new EoU survey gives an accurate reflection of how respondents interact with at-home *E. coli* test kits
- According to readability analyses of EoU survey iterations, the EoU survey is now easy to read and should be accessible to respondents as young as 6 years old

Future Direction

- Evaluate the ease-of-use of at-home additional water quality test kits with the new EoU survey, specifically with the private well-owner and K-12 student populations in mind
 - Larger, more representative samples (Summer 2023 camp with community partners)
 - Make changes to test directions and instructional materials accordingly
- Use EoU questionnaire data to develop a usability matrix for lead, arsenic and manganese test kits being studied by the ECUIPP Lab
- Combine ease-of-use data with additional ECUIPP Lab research to create a recommendation guide for at-home water quality test kits to be implemented in local North Carolina counties

References



Scan for survey(s)



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- We appreciate Dr. Caroline Chandler's guidance

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