Standard Metrics and Scenarios for Usable Authentication

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Our experience

- S. Ruoti, B. Roberts, and K. Seamons. *Authentication melee: A usability analysis of seven web authentication systems.* Proceedings of the 24th International Conference on World Wide Web. International World Wide Web Conferences Steering Committee, 2015.

- Reviewed numerous authentication papers

- Empirically evaluated seven web-authentication proposals

Problem

- Unclear whether any real progress is being made

- Steady stream of authentication proposals, but...
  - Most lack empirical analysis
  - Few are compared against existing password-based authentication
  - Fewer still are compared against competing proposals

- We need a more scientific approach to this research area

Head-to-head Comparisons

Direct Comparisons

- Evaluate whether new proposals are making tangible progress
  - As compared to passwords
  - As compared to alternative proposals

- Within subject or between subject
  - Within subject can be preferable

Standard Metrics

System Usability Scale (SUS)

- Simple and effective evaluation of usability
  - 10 questions
  - Single usability score from [0, 100]

- Reliable
  - Across studies
  - Across populations
  - More accurate than mean time-to-authenticate
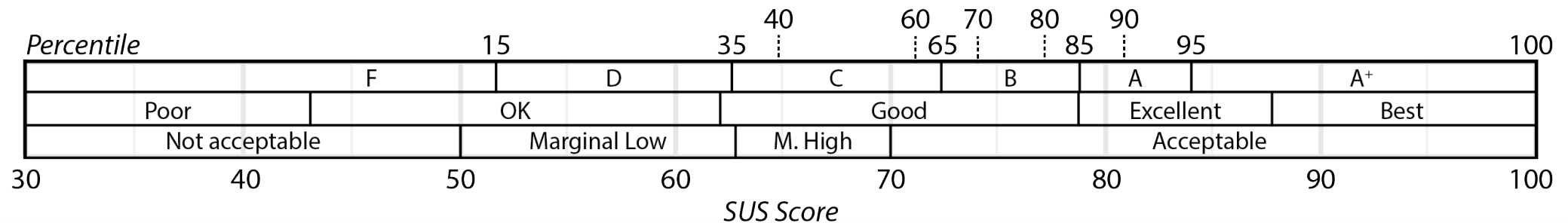
Other Potential Metrics

- J. Sauro and J. Lewis. *Quantifying the user experience: Practical statistics for user research*. Elsevier, 2012.
  - Post study questionnaire – PSSUQ
  - Post-task questionnaire – SMEQ, SEQ

- User Burden Scale (UBS)
  - New scale introduced at CHI 2016

- Mean time-to-authenticate
  - Less reliable than SUS

Standard Scenarios

Real-World Scenarios

- Allows for more rigorous comparisons
  - Systems evaluated against same criteria
  - Reduces confounding factors

- Real-world scenarios with relatable tasks
  - More accurately evaluates a proposal's usability

Example Scenarios

- Banking
  - High security environment
  - Occasional usage

- Discussion board
  - Lower security environment
  - High usage

- Available for download

Recommendations

Recommendations

- Direct Comparisons
  - Within subject or between subject
  - Measure against baseline

- Standard usability metrics
  - SUS

- Standard scenarios
  - Banking
  - Discussion board

Discussion

Discussion

- Standard usability metrics
  - Alternatives
  - Is SUS a good fit for usable security?

- Scenarios
  - Other compelling scenarios
  - Scenarios for emerging forms of authentication

SUS Questions

1. I think that I would like to use this system frequently.

2. I found the system unnecessarily complex.

3. I thought the system was easy to use.

4. I think that I would need the support of a technical person to be able to use this system.

5. I found the various functions in this system were well integrated.

6. I thought there was too much inconsistency in this system.

7. I would imagine that most people would learn to use this system very quickly.

8. I found the system very cumbersome to use.

9. I felt very confident using the system.

10. I needed to learn a lot of things before I could get going with this system.