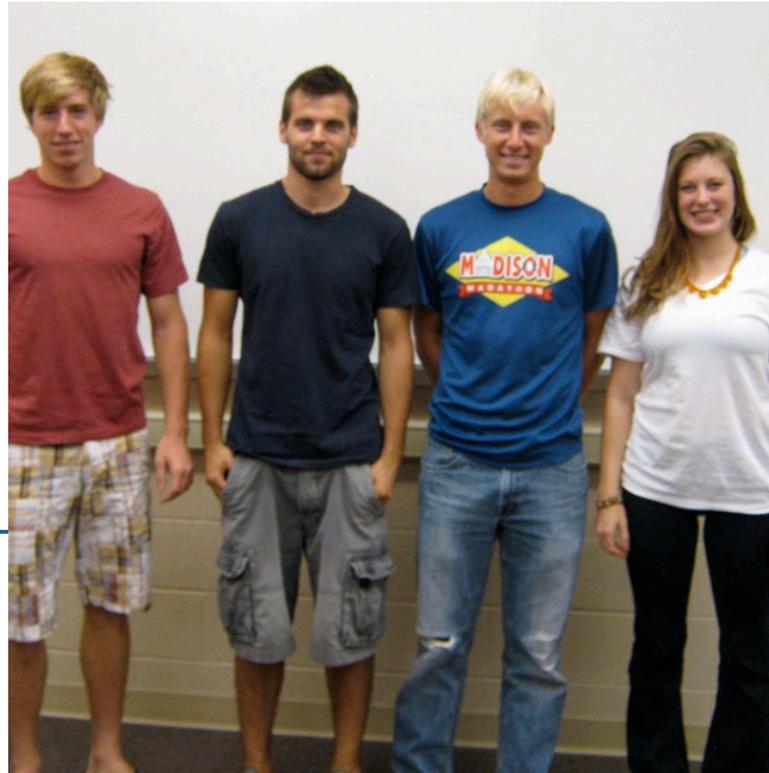


REACTION TIME MEASUREMENT DEVICE



Client:
Dr. Tom Yin

Advisor:
Pablo Irarrazaval
Mena

Team Members (Left to Right):
Darren Klaty-Communicator
Clayton Lepak-BWIG
Nathan Retzlaff-Leader
Hope Marshall-BSAC



Overview of the Presentation

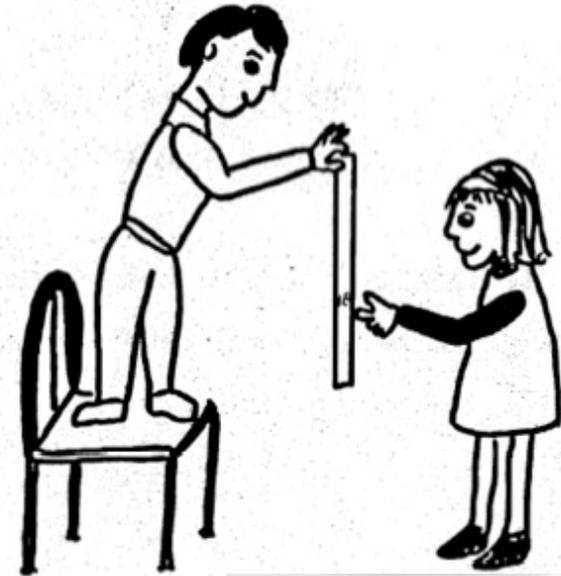
- Reaction Time Measurement
- Design Constraints
- 4 Design Alternatives
- Design Matrix
- Future Work

Reaction time is highly applicable in daily life.



Reaction time is stimulus dependent.

- Visual stimulus :
 - 190 milliseconds
- Auditory stimulus:
 - 160 milliseconds
- Difference due to:
 - Audio
 - Hair cells in a fluid
 - Mechanically gated ion channels
 - Visual
 - Chemical cascade
 - Signal amplification
 - Sensitivity vs. Speed tradeoff



A device is desired to demonstrate these reaction time differences in school settings.

- Outreach programs
- Grades 1-8 (ages 6-14)
- One device initially
 - Grant application



The design is very flexible.



< 20 kg

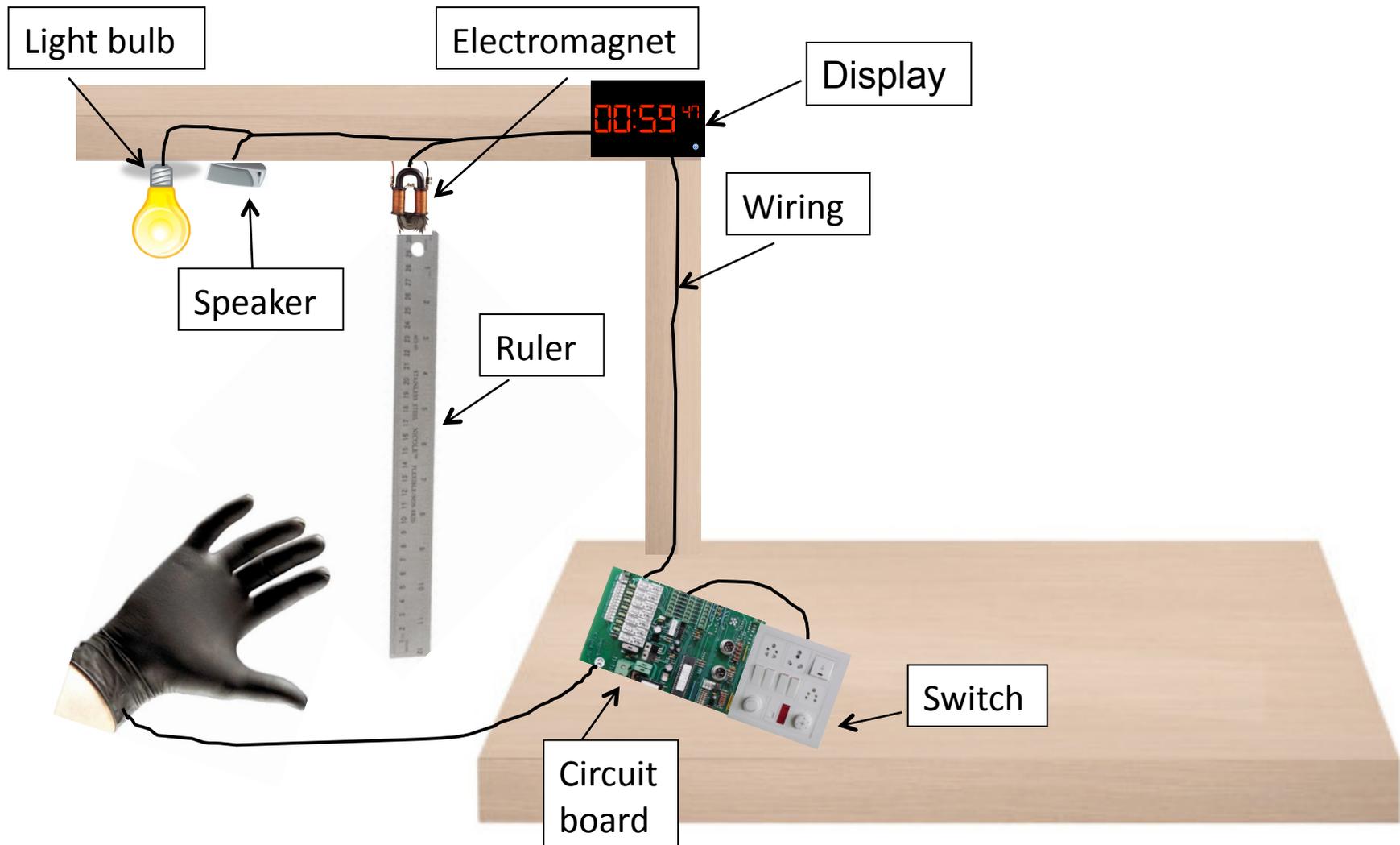


< \$200



Accuracy + Feedback

Ruler Design Alternative



The Ruler design has advantages and disadvantages

Pro:

- Direct physics correlation to reaction time
- Reliable-simple concept with falling ruler

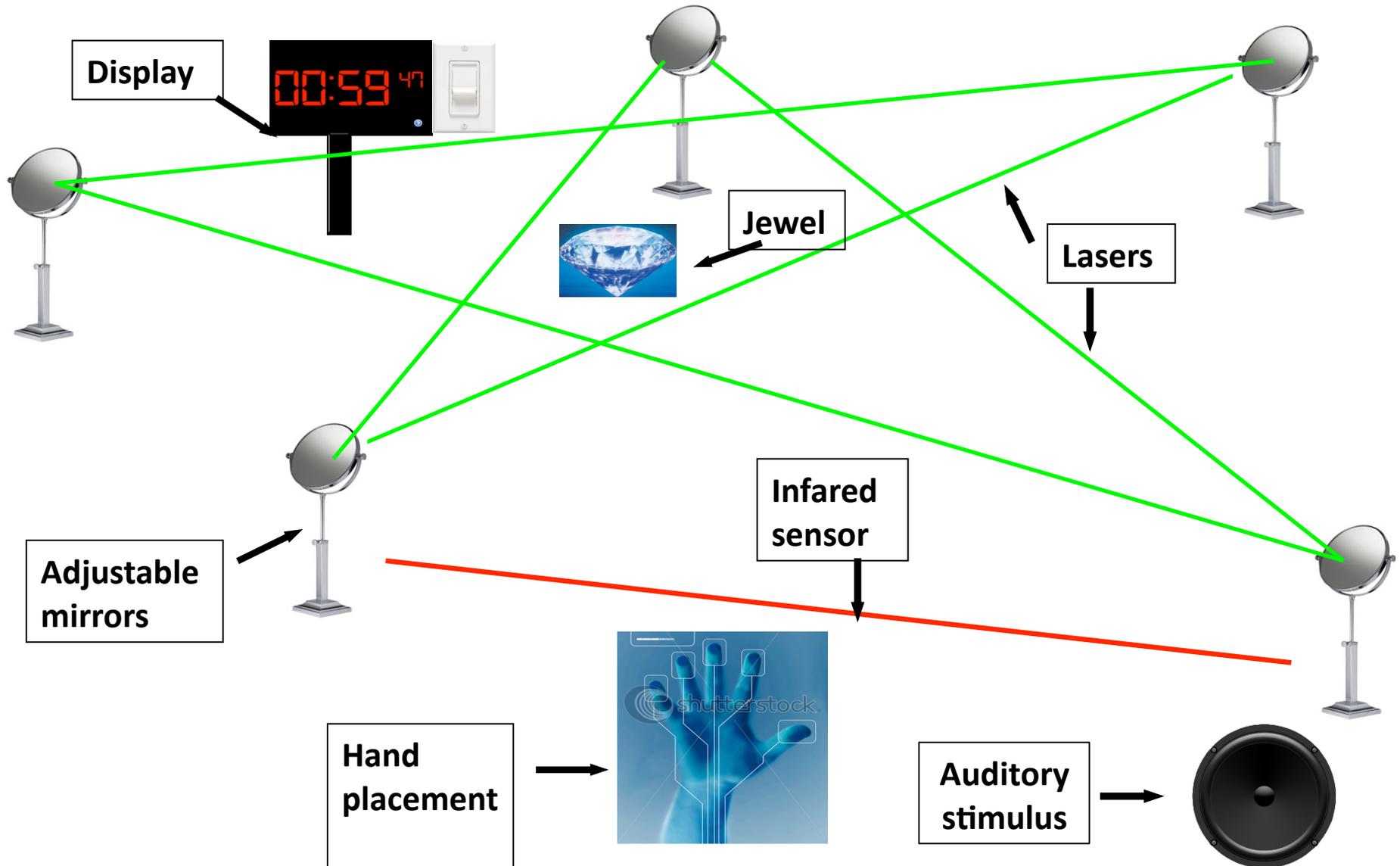


Con:

- Not appealing to kids
- Bulky structure



The Laser Design



The Laser design has pros and cons.

Pro:

- Visually appealing
- Fitting for a variety of age groups
- Game board size=easy transport



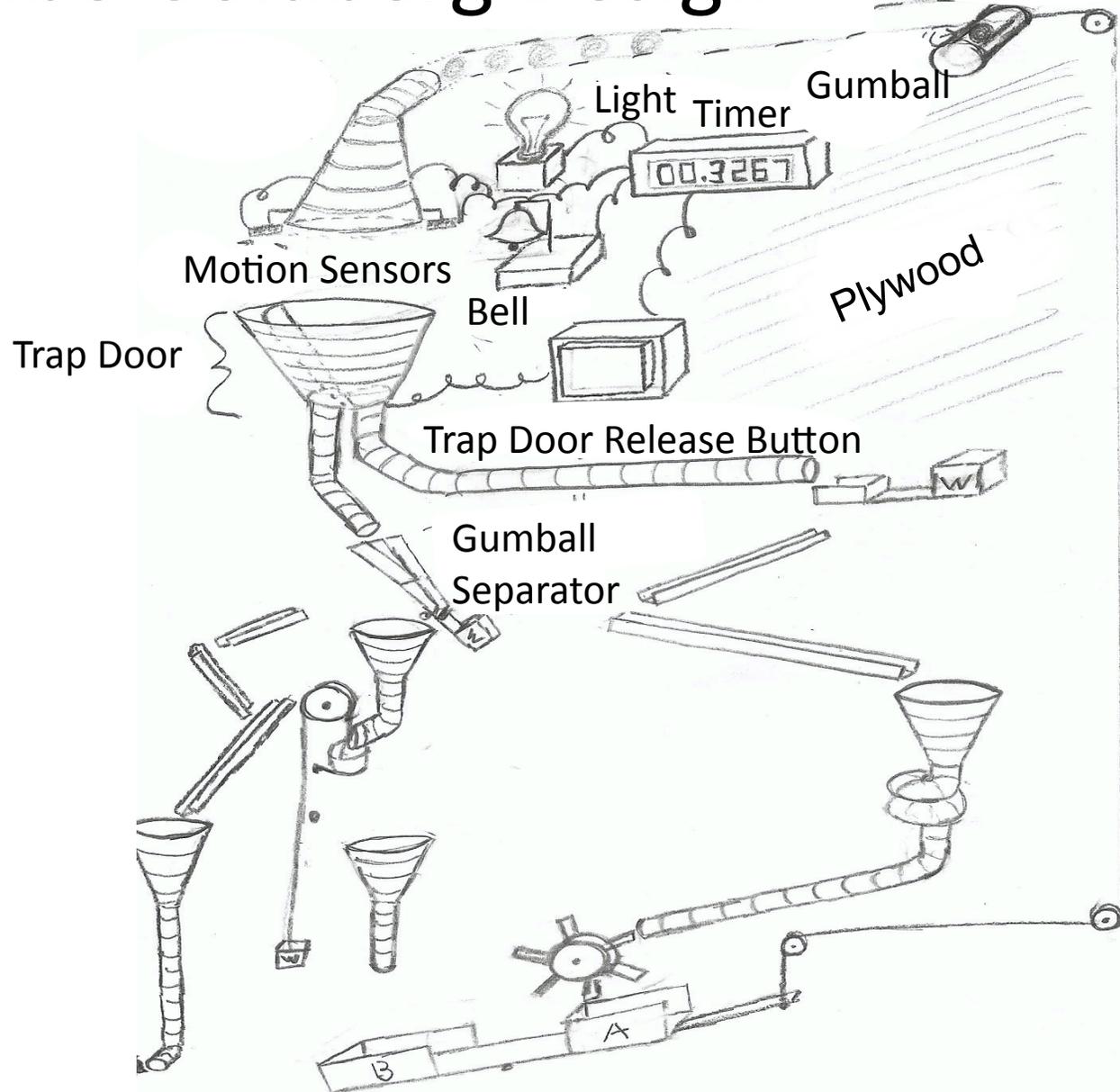
Cons:

- No direct physics correlation
- Negative moral message about theft
- Safety and cost concerns of lasers



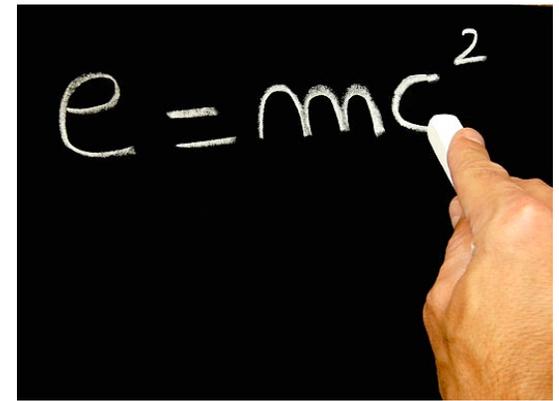
Rube Goldberg Design

Gumball Release Mechanism



The Rube Goldberg design is appealing as it...

- Visually appealing and child friendly product
- Strong physics correlation



However, it is unappealing as...

- Problems exist with its transportability
- Most expensive design
- Many separate components



Ambulance Design



Ambulance with Audio and Visual Stimuli

Initiating Switches



Handlebars with Brakes



Scoreboard Time Display

Auditory Reaction Time	Visual Reaction Time
0230	2680
Fastest Time	Audio & Visual Time
0230	0230

The strong parts of the ambulance design are:

- Its durability and ease of use
- Simple design

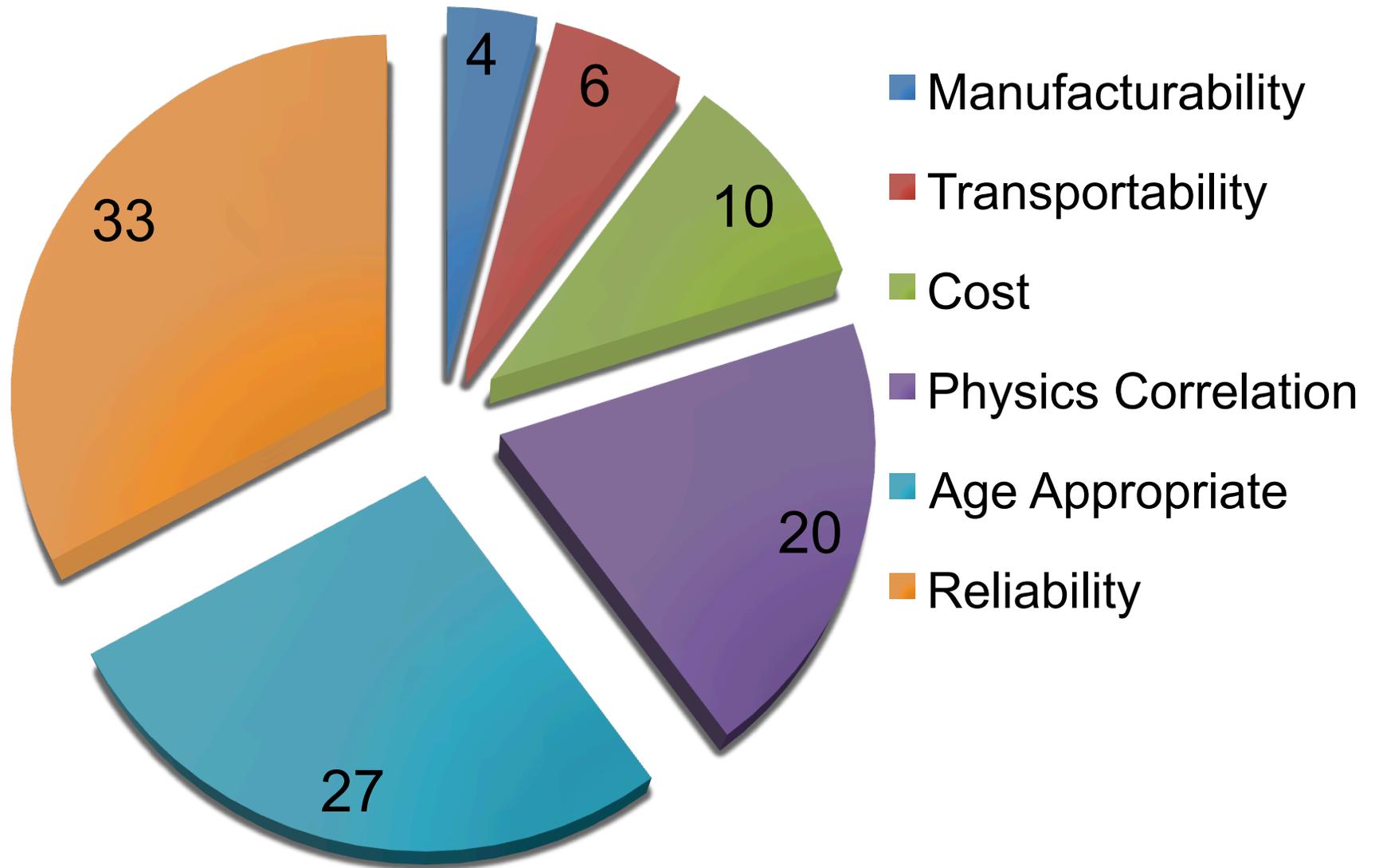


On the other hand...

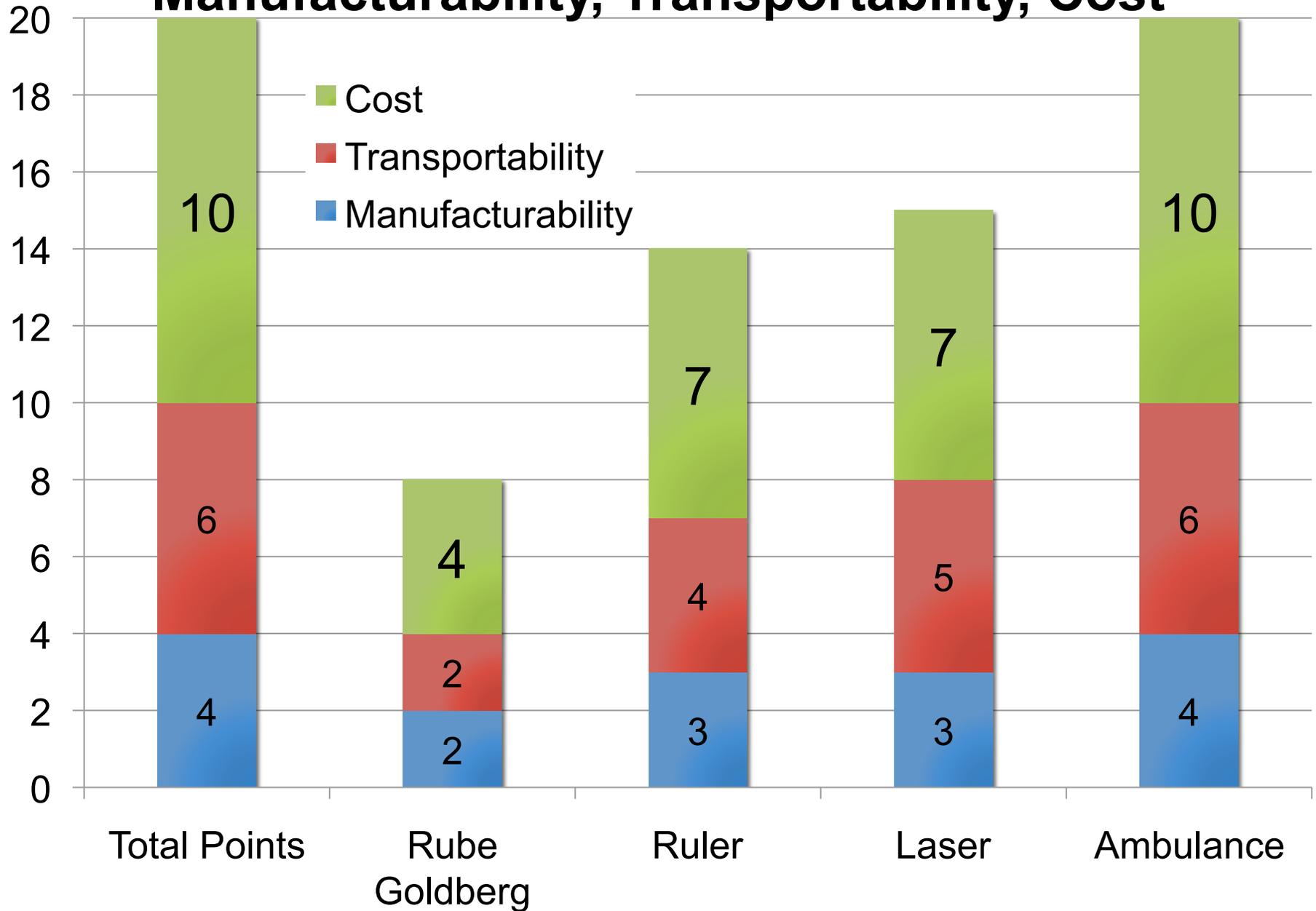
- It lacks any physics correlation
- It doesn't have much appeal



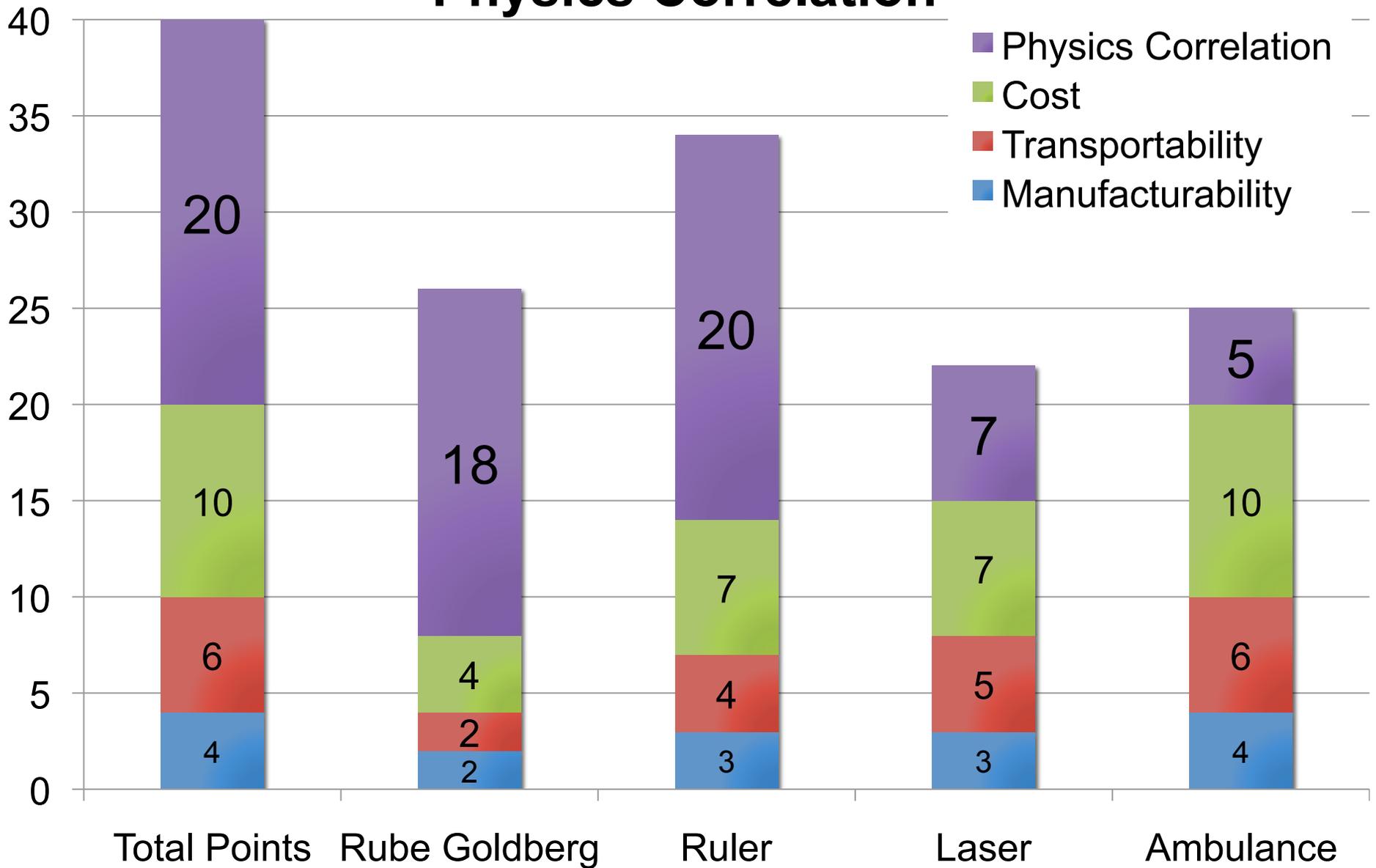
Design Matrix Point Breakdown



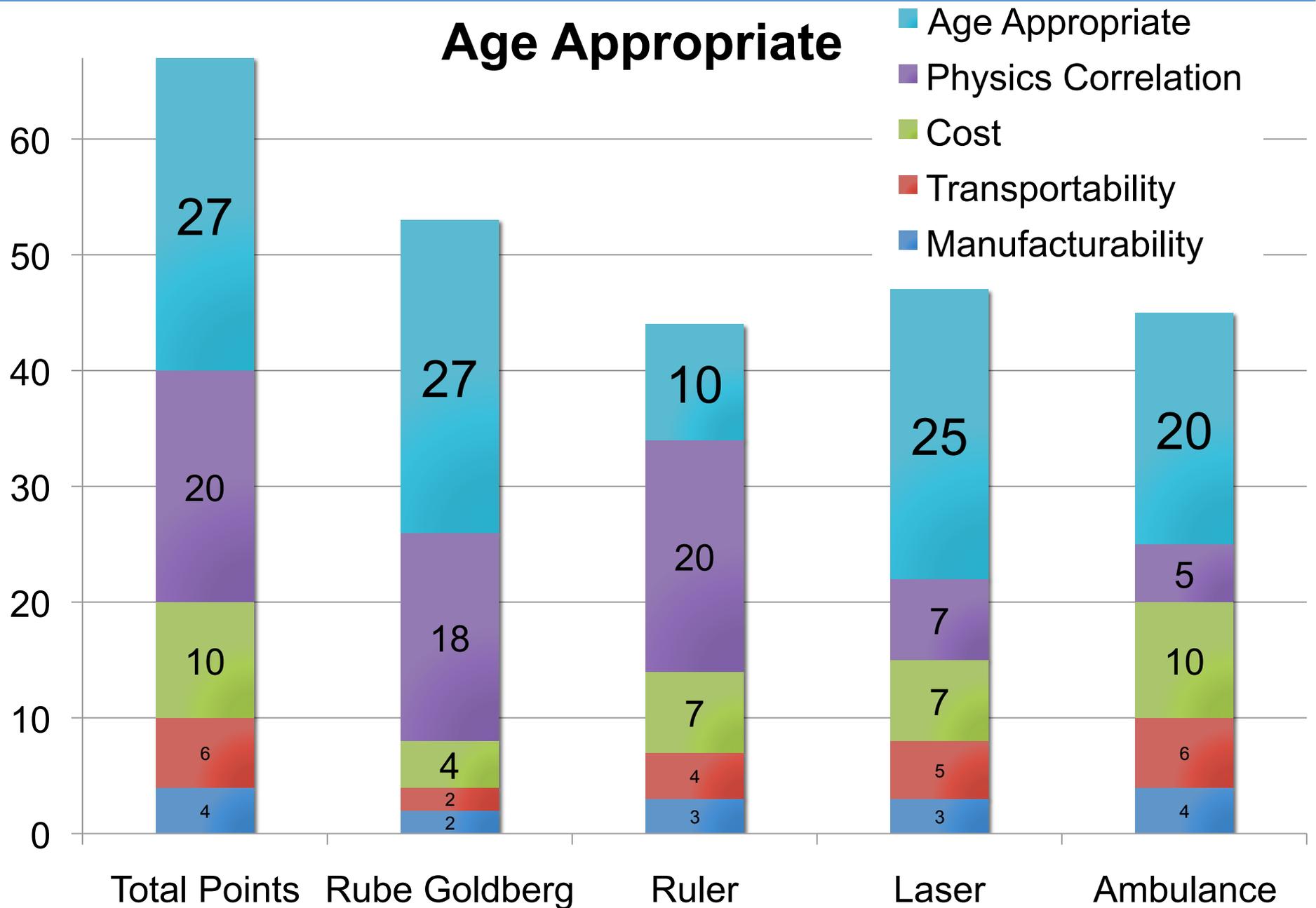
Manufacturability, Transportability, Cost



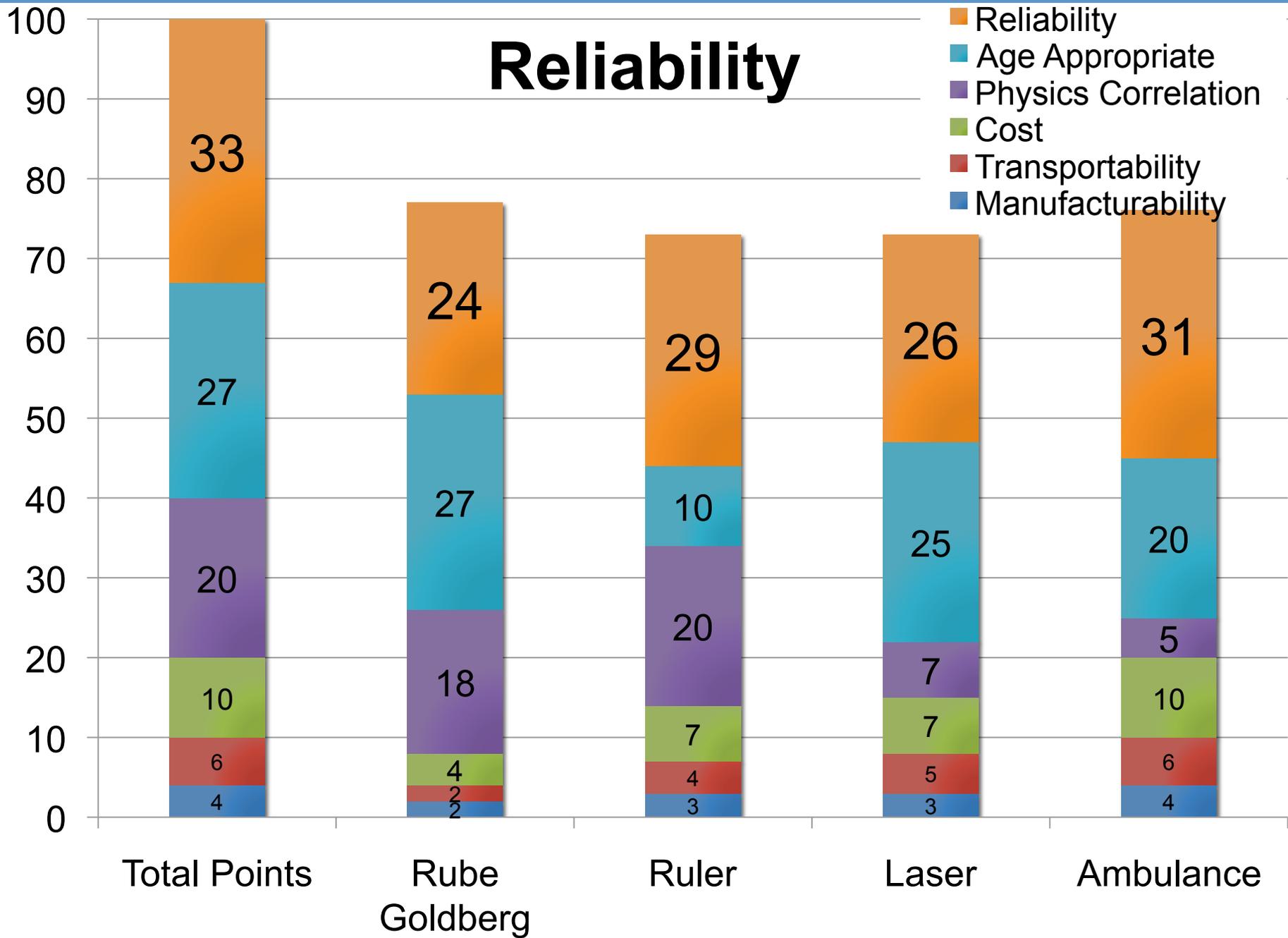
Physics Correlation



Age Appropriate

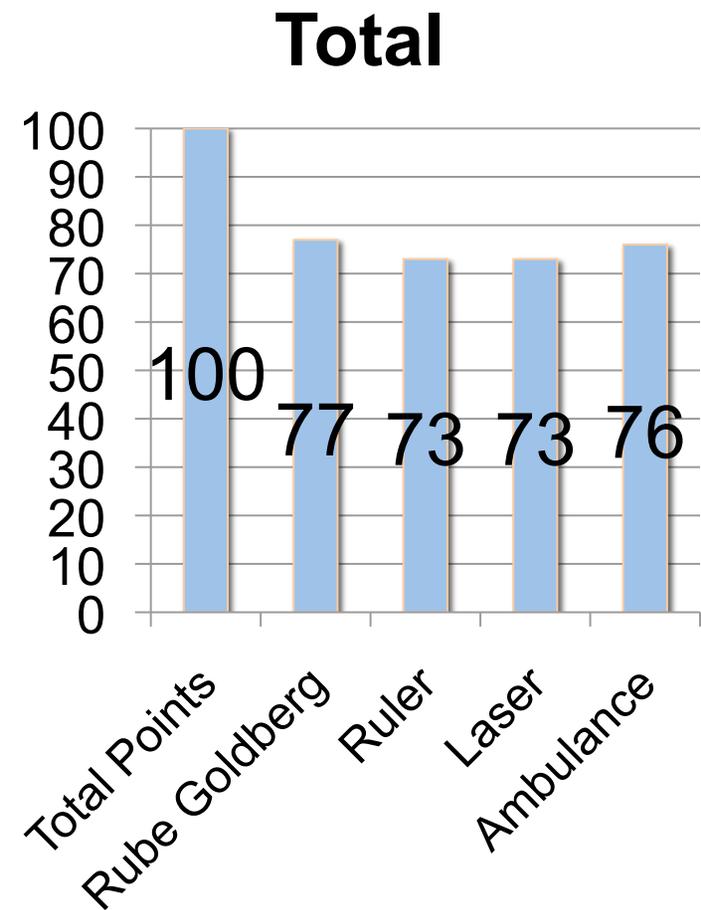


Reliability



Final Design: Rube Goldberg

- Very close evaluation
 - Illustrates unique project
 - Technically easy
 - Brainstorming is more important
- Choice affirmed
 - Original
 - Exciting



Future Work

- Finalize design
 - Work out rough spots
 - Releasing mechanism
 - Electronics
 - Trap door mechanism
 - Add dimensions
 - Energy, velocity, and time calculations
 - Material specs
- Order materials
- Build design
- Testing

