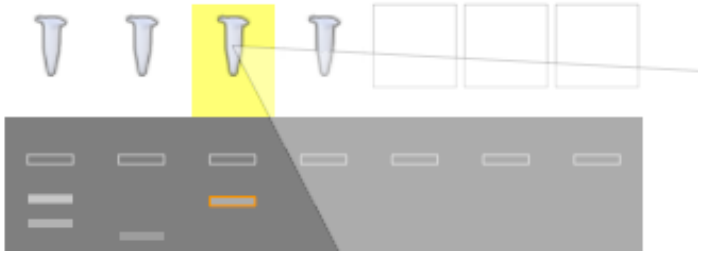
From: **Shawn Douglas** shawn.douglas@gmail.com
Subject: Re: Gelbox update
Date: January 20, 2018 at 2:57 PM
To: Chaim Gingold cg@levitylab.com

SD

Chaim,

Looks like great progress. Here are my notes for this build:

1. New samples get a slightly non-zero degradation value, which makes the gel bands spread out a bit. Can we just set this to **0** by default?
2. **Time slider**: Could we make the appearance consistent with the inspector sliders (i.e. no rectangular fill) and add a value label (h:mm), with the maximum runtime set to 3 hours.
3. **Gel sim:** Now the "1bp" size goes exactly to the bottom of the gel, but I preferred the more realistic behavior when the smallest bands would run off the edge of the gel. Let's note to revisit this when we calibrate against some real gel data.
4. **Degradation**: I felt the new icon it looks too structured, kind of like a Jenga tower. My earlier mockup was meant to transmit the idea that fragments break off in an unpredictable way. I'm attaching the source AI file — it didn't fit into a square aspect ratio so it may need to be re-done.
5. **Concentration**: My favorite mockup was Slider **b** from the study (the smaller black dots), can we try that? Also, the units should be **ng** (nanograms).
6. Selected tube: For some reason, I'm not so fond of the long selection box that peaks all the way past bottom of the gel. Can we try just highlighting the fill of the box surrounding the tube icon (and retain the light gray stroke)? Or wait, maybe a better option is to keep the elongated yellow selection region, but remove the gray boxes around the tubes.

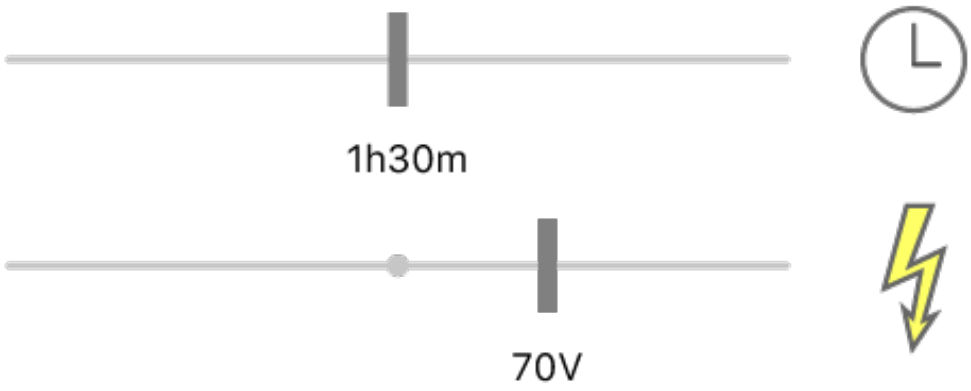


New feature ideas:

A. **Voltage slider**. I now think it will be worthwhile to scale gel-band mobility via separate time and voltage sliders. I hadn't emphasized voltage before since we normally don't use anything other than 70V for DNA origami, but it's hugely important and will give us some really nice options for demonstrating things that can go wrong:

- Setting V=0 and running the time slider will allow us to show the isolated diffusion effect (real-world mistake = forgetting to start the gel).
- Setting V<0 should make the gel bands run the wrong direction (real-world mistake = swapping the terminal wires).
- Setting V>>100 will produce distortion artifacts (real-world examples: 1 2)

I think it should work to make voltage a linear multiplier of time (with V=70 giving the current behavior).
I'm picturing clock and lighting bolt icons:




B. **Buffer add-ins:** I'm psyched about being able to add dyes. I thought about this more and realized that we need to allow for varying the concentrations of additional loading buffer components. A very common mistake that ruins gels is having differing salt concentrations between your gel and your sample. The bands get totally screwed up! Here's a nice example. For more funny effects you might check out this vendor page (it will nag you to specify the country).

I'd put priority for both of these features at 4/5.

Maybe in order to handle various dyes, salts, or other chemicals, we should extend the sample tube inspector to include a small drawer at the bottom that could expand to reveal "Loading buffer" options. We could list the common dyes, and a couple common buffer types (TAE, TBE), and Magnesium (which is required for DNA origami).

Thanks,
Shawn