

The background of the entire image is a dark field filled with a pattern of green hexagons of varying sizes. On the left side, a white line drawing of a woman's profile is shown, facing right. She has long, flowing hair and is reaching her right arm upwards towards a bright, glowing green light source. This light source is composed of many small, bright green dots and a larger, more intense yellow-green circular glow. The overall mood is futuristic and hopeful.

Bio Lumi

Imagine a future where
we *grew* our own *light*

1

The Goals:

Making safe and accessible lighting



Harnessing the same technology designed by nature...

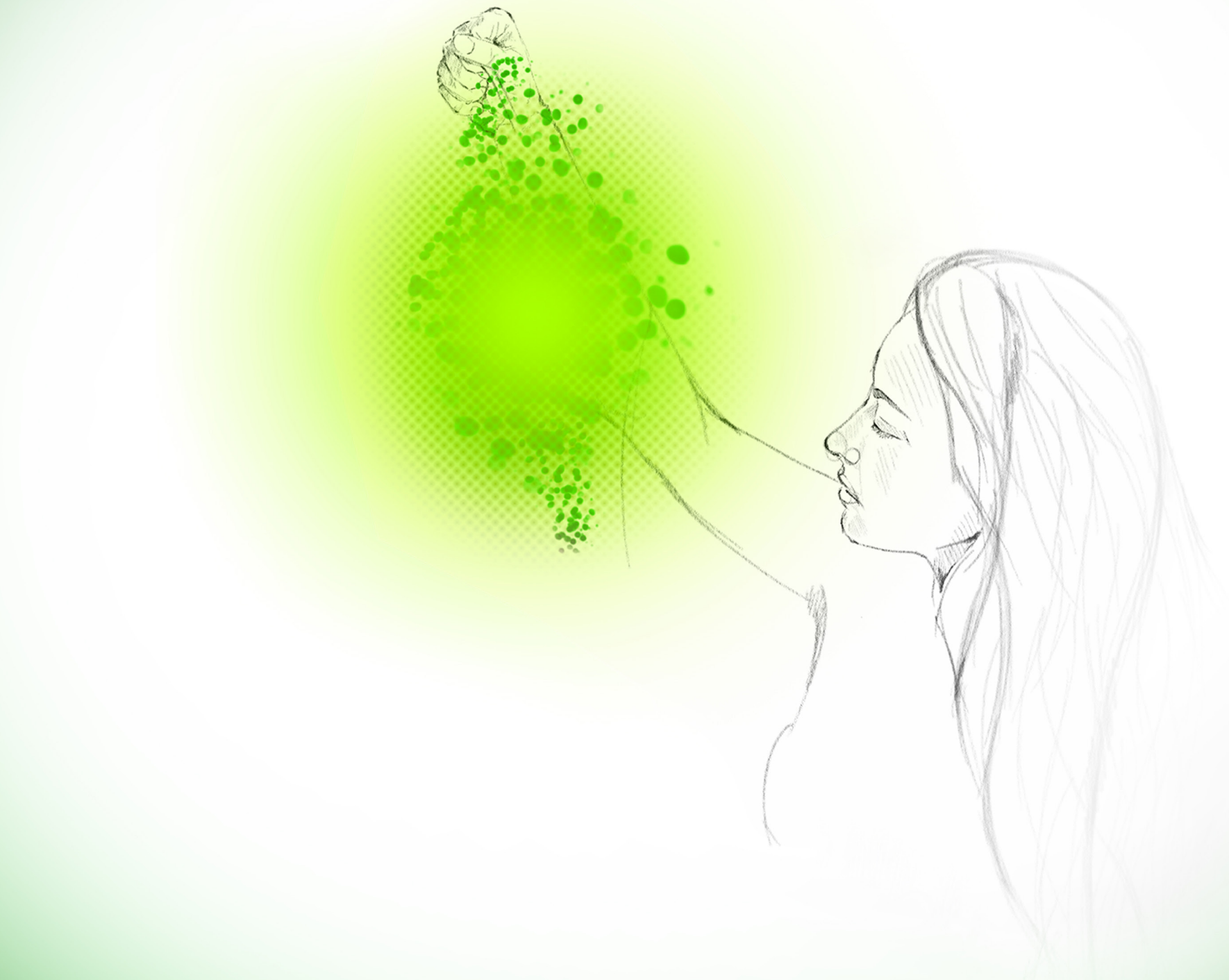


Putting it in the hands
of those that need it most



It's time to reframe the lighting paradigm.





"It is possible to call upon a group of people... who think and can see twenty years, thirty years ahead. It is possible to raise an idea and see it supported by a younger generation to become real."

-Álvaro Salas Chaves

End User:

Public Health, Relief & Disaster Aid Workers travelling to remote and off grid locations, without access to electricity and need lighting alternatives that function in a multitude of environments, climates and circumstances.



IFRC rescue teams searching for tourists missing in rivers and mountains, 24 April 2023. (Photo: Costa Rican Red Cross)

Discussion with a Scientist...

Key Takeaways on Bioluminescence

Luciferase is an enzyme that regulates biochemical reactions in living things.
Luciferase + luciferin substrate = chemical reaction that causes light.

Timeline for this reaction is 15-20 minutes to hits its peak, but can last for several hours. Lucifer and Luciferase are **non regenerating, non renewable**. The dosage can dictate longer durations, but there is a limit. **One reaction cannot be used for days on end.**

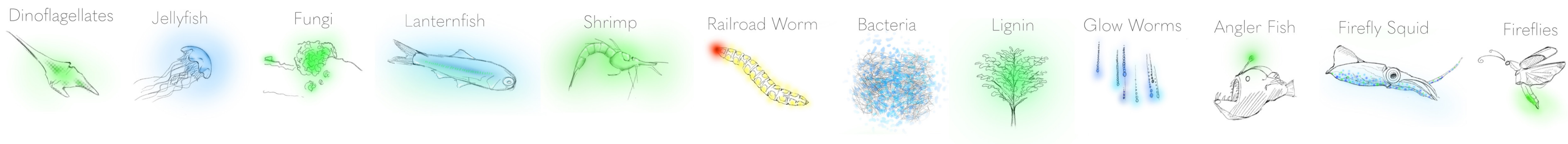
Several companies have synthesized this process and sell a synthetic version. Only one lab has been successful in naturally replicating fungal bioluminescence & grows biolum plants.

Toxicity level & PPE: Dr.H says there is **no inherent toxicity in luciferase and luciferin substrate**, nor with dinoflagellate plankton, another organism that produces bioluminescence. Working with them is not dangerous. Dinoflagellates should not be disposed of into waterways and streams.

The colour of the bioluminescence is alterable (different wavelengths) Chemistry can dictate colours.



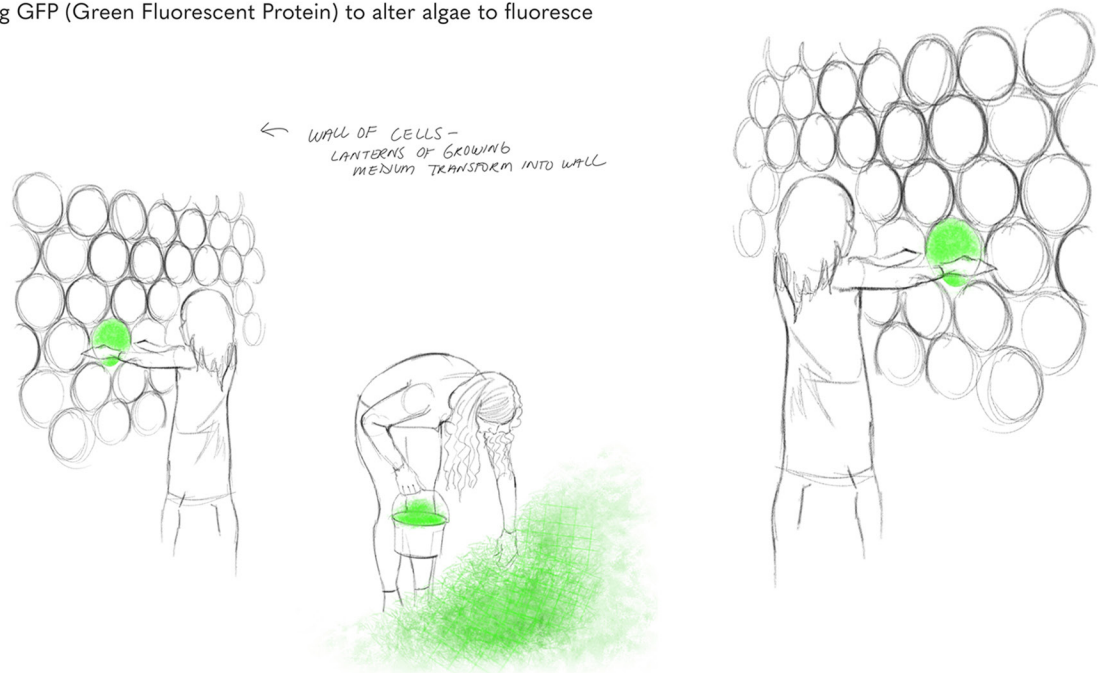
Dr. Ute
Hochgeschwender



Initial Concepts

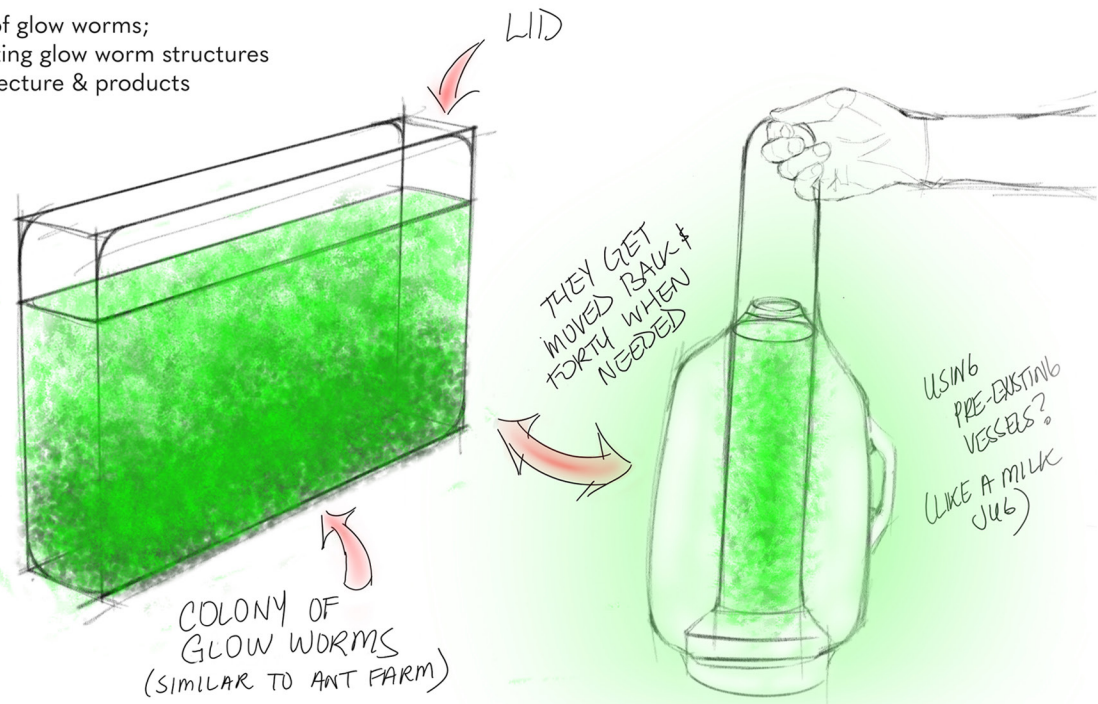
Concept 1

Utilizing GFP (Green Fluorescent Protein) to alter algae to fluoresce



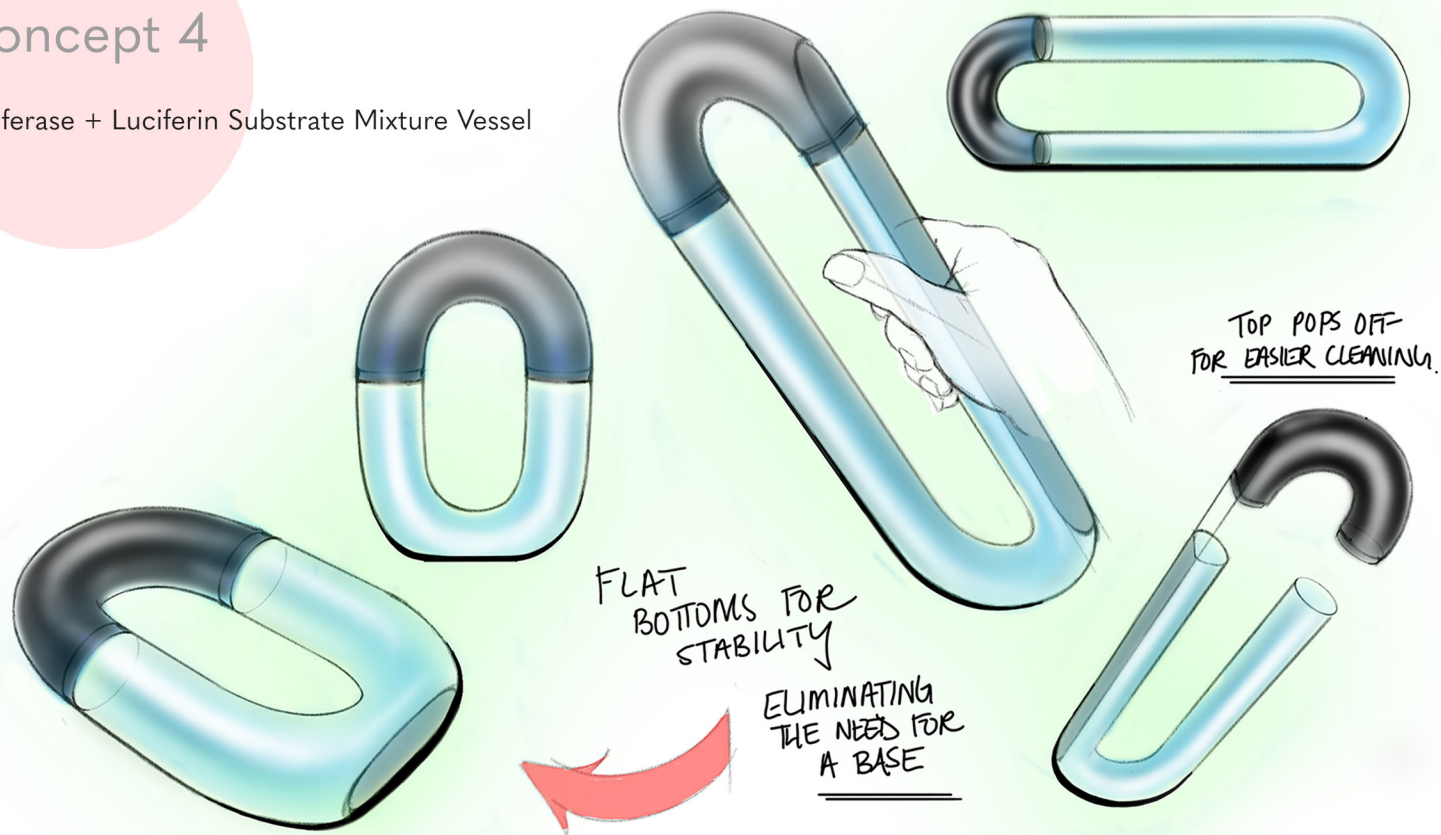
Concept 2

Colonies of glow worms; Implementing glow worm structures into architecture & products



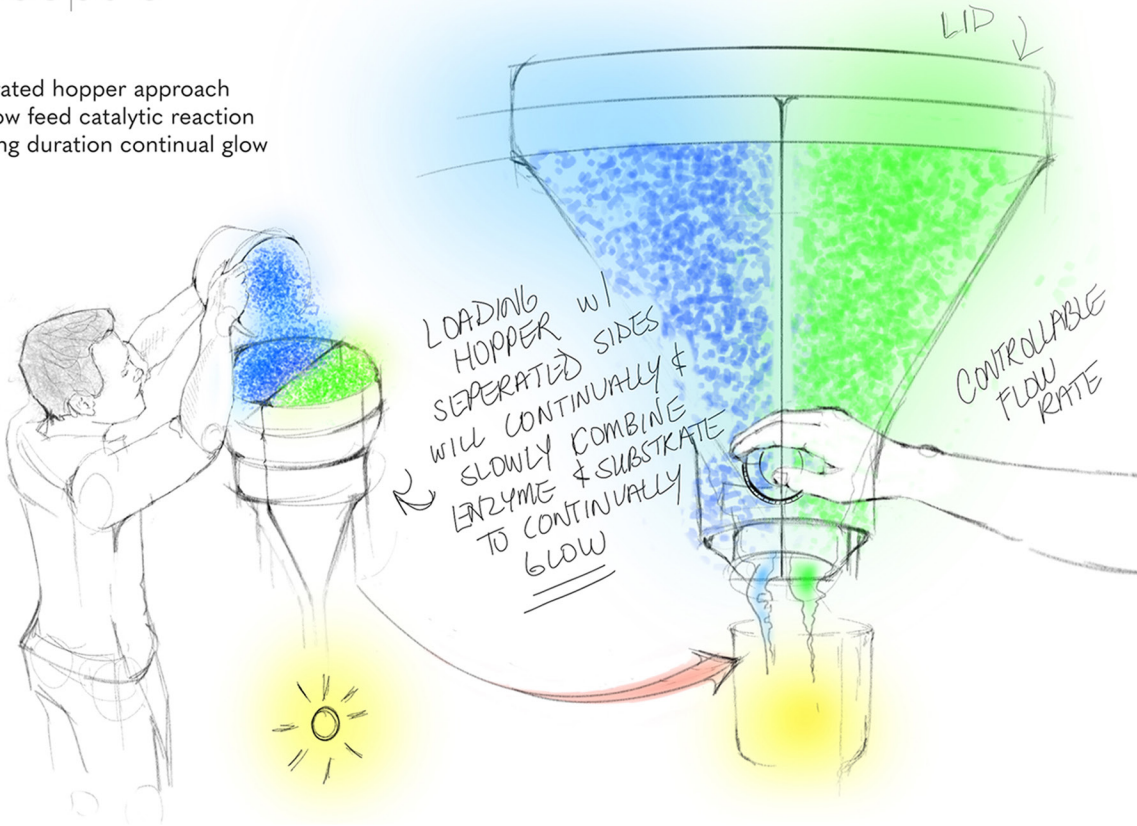
Concept 4

Luciferase + Luciferin Substrate Mixture Vessel



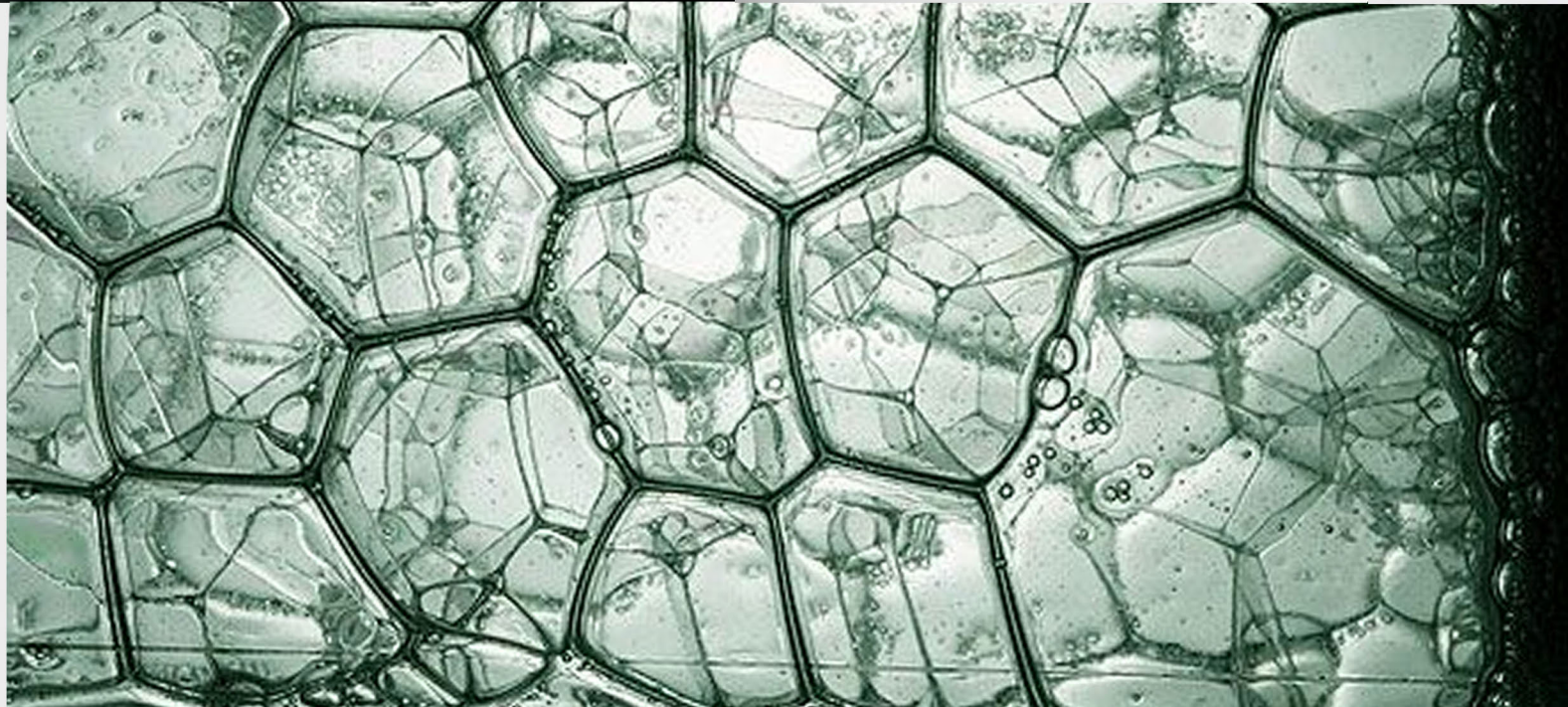
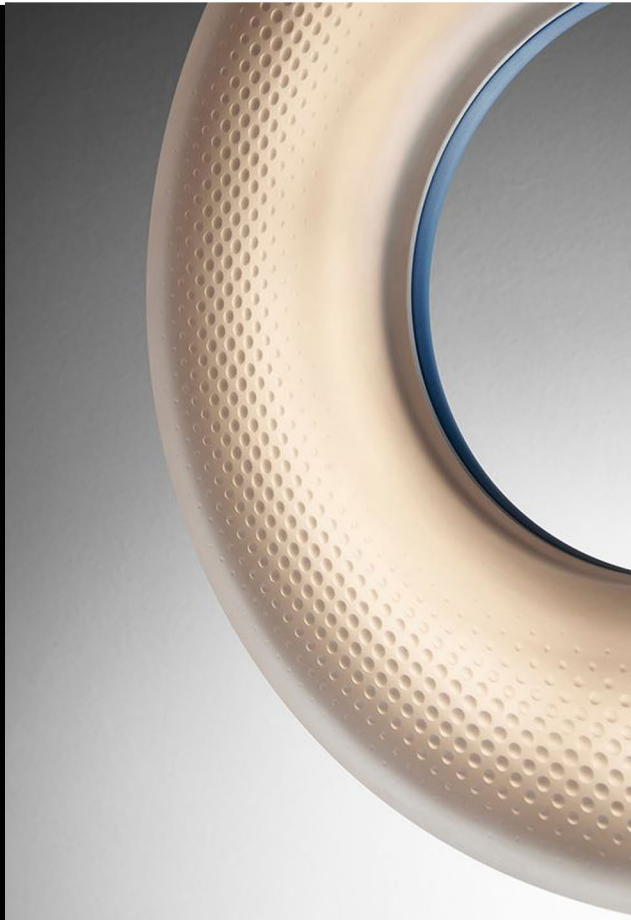
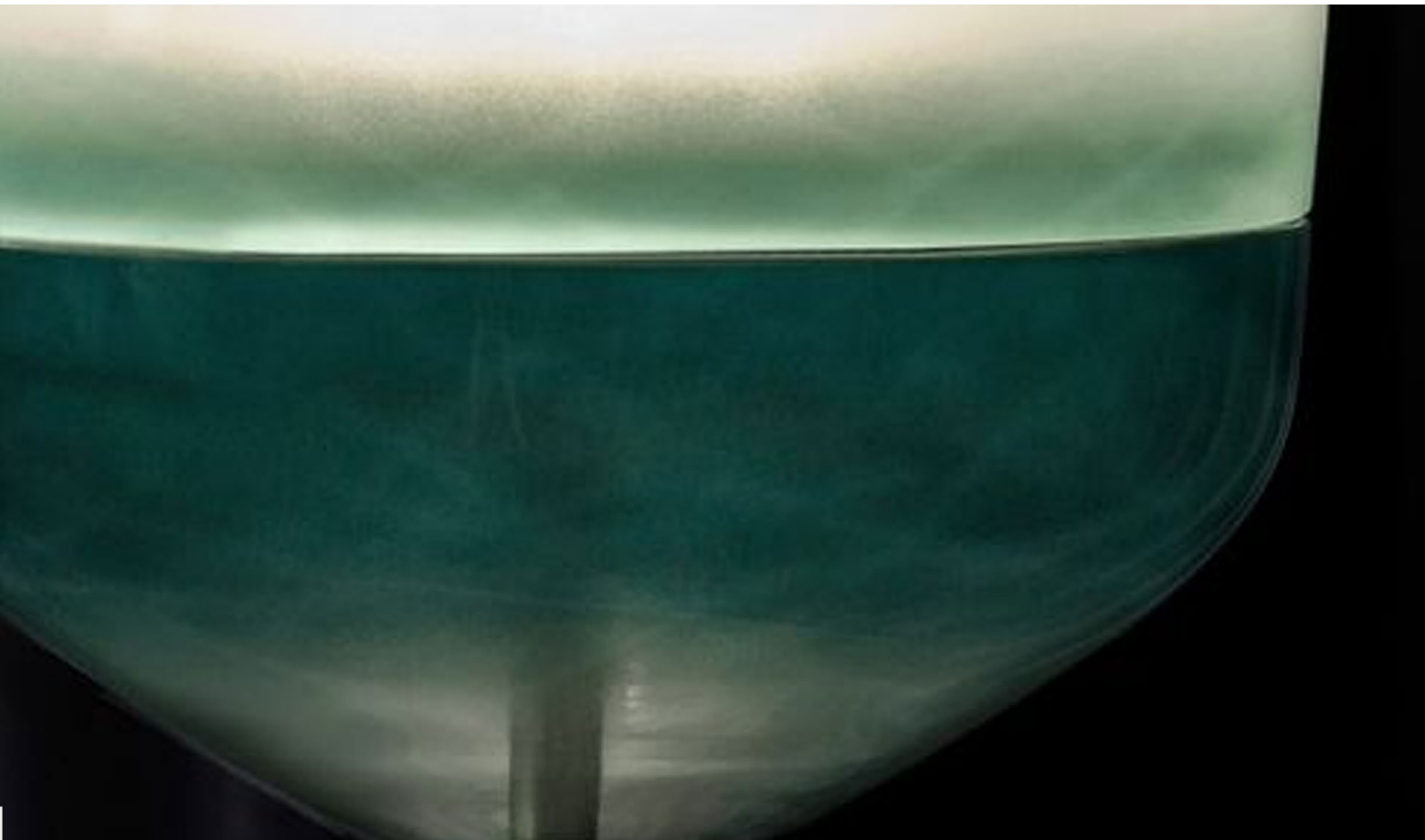
Concept 3

Separated hopper approach for slow feed catalytic reaction for long duration continual glow



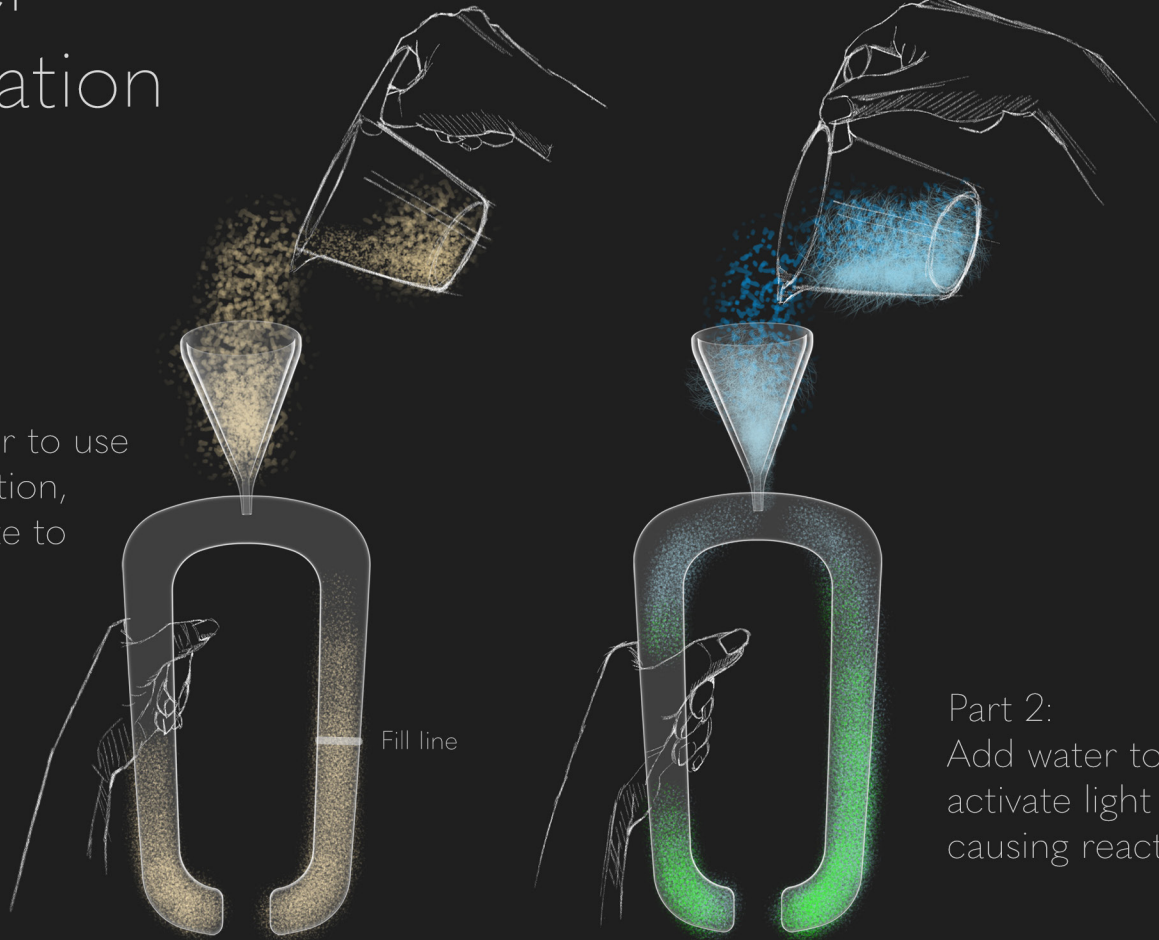
Ergonomic & Graphic Mood

Inspiration



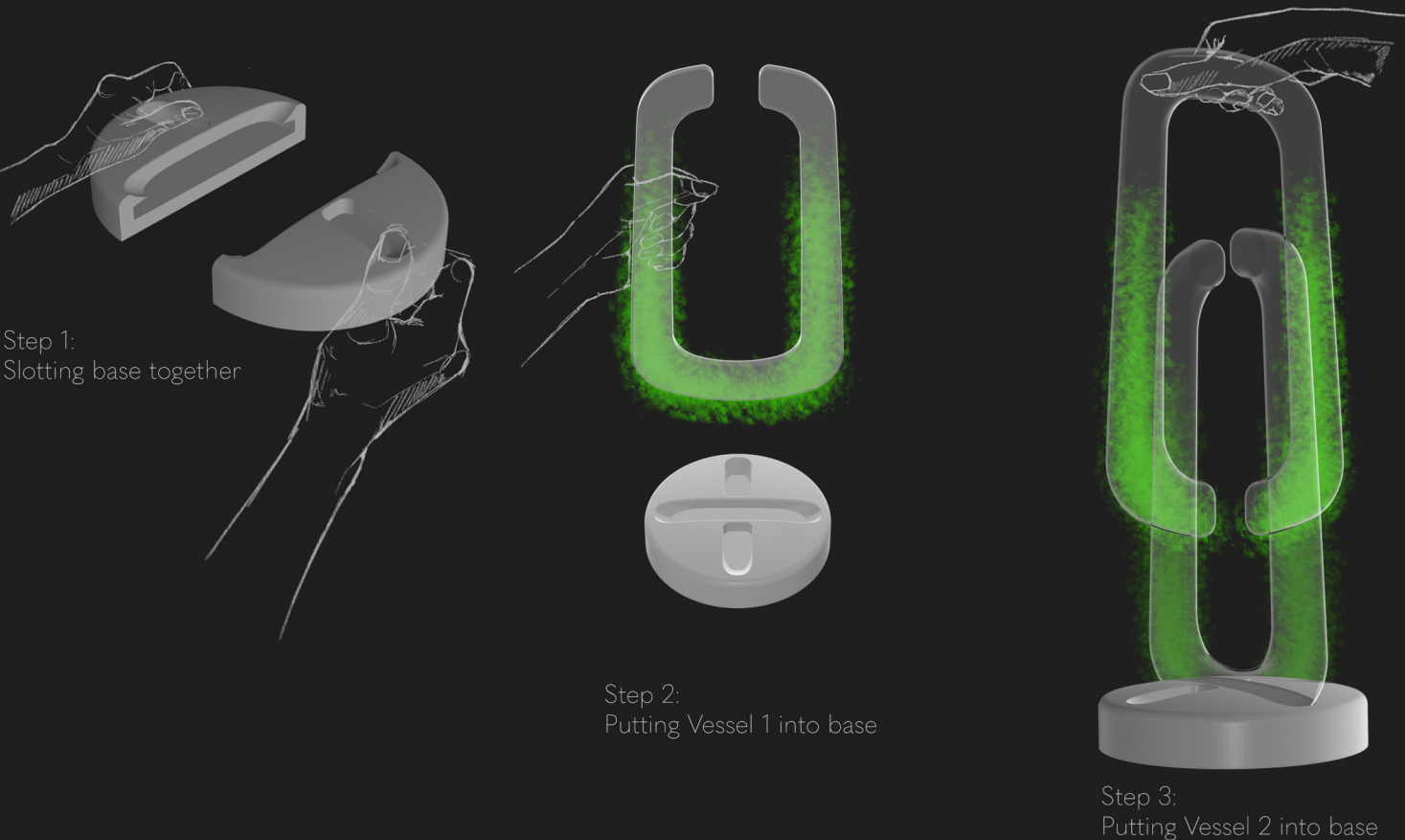
Further Exploration

Part 1:
Either prior to use
or on location,
fill substrate to
fill line

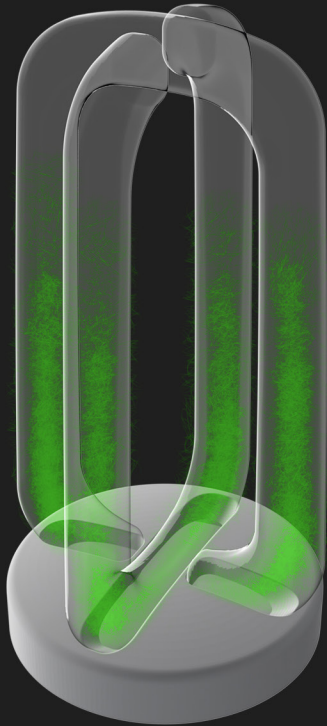


Part 2:
Add water to
activate light
causing reaction

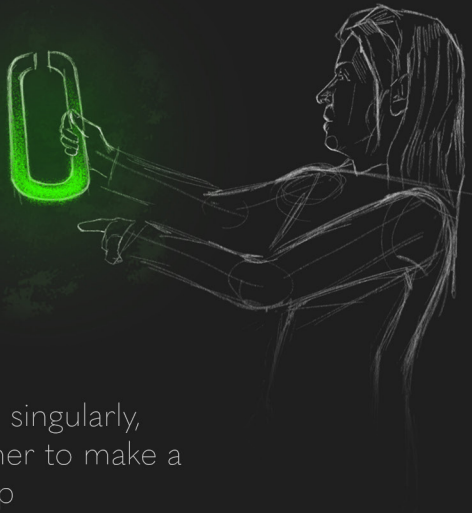
Assembly Steps



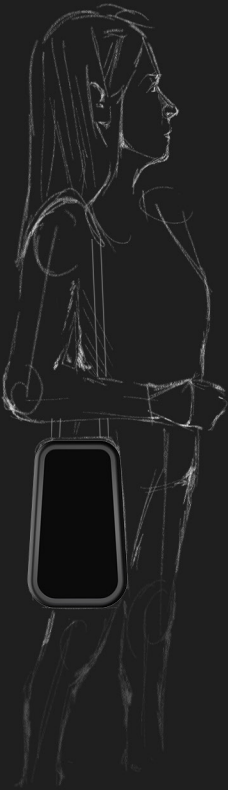
Assembled Light



Can be used singularly,
or put together to make a
standing lamp



Carrying Case



Case can be carried
as a sling bag, or,
fits into backpacks
& medical bags



NYOKA

A protein powder that is activated with water to generate light



dry powder (enzymes and fuel)

+



water

=



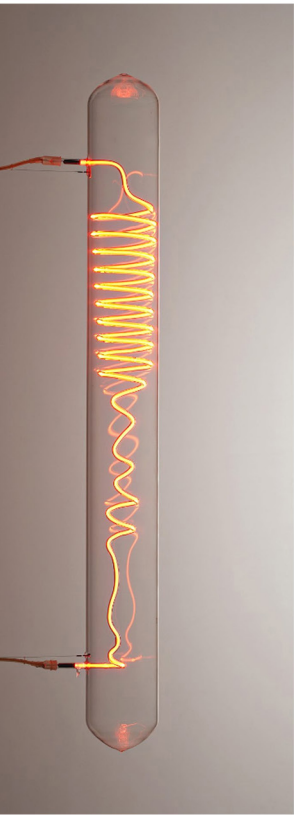
light

THE RESULT

A protein powder that is activated with water to generate light

“...Developed a breakthrough in the field of bioluminescence: [Nyoka] base formulas produce a steady [cold light reaction] for over **20 hours** and a **slow release for over 48 hours**... outperforming all chemiluminescence... all while being safe, sustainable and stable”

Minimal.
Simple.



TABLET DISSOLVES
TO CREATE REACTION

TABLETS =
POTENTIAL FOR
CONTINUAL GLOW!!

POP TOP

POTENTIAL
TABLET
CONTAINER

MOISTURE STOPPER
FOR CONTAINER

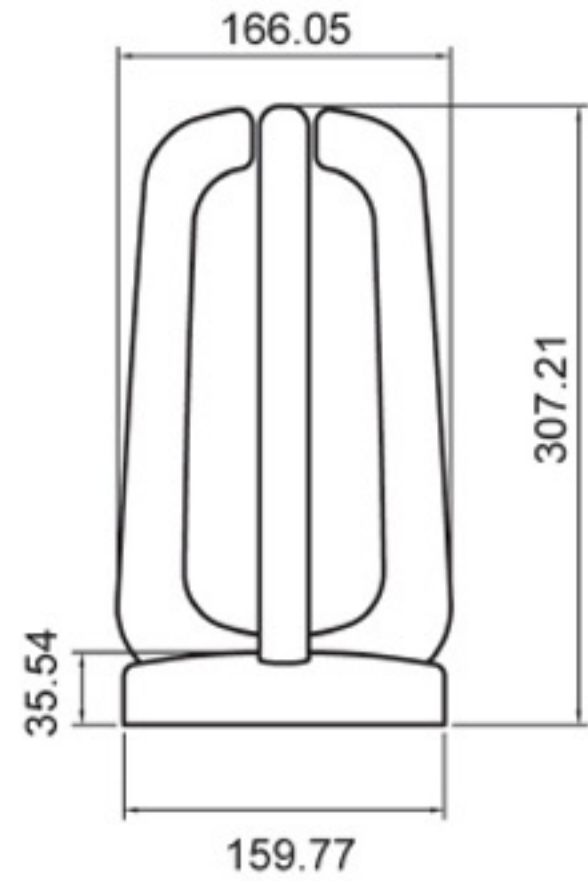
TABLETS COULD BE HELD
AT TOP OF
STRUCTURE
(LID)

BLISTER
PACKAGING IS
AN OPTION

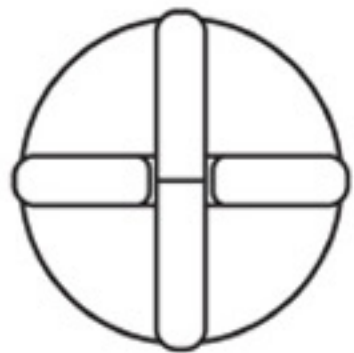
TURNING SUBSTRATE POWDER
INTO TABLETS FOR PORTABILITY

Initial Exploratory Modeling

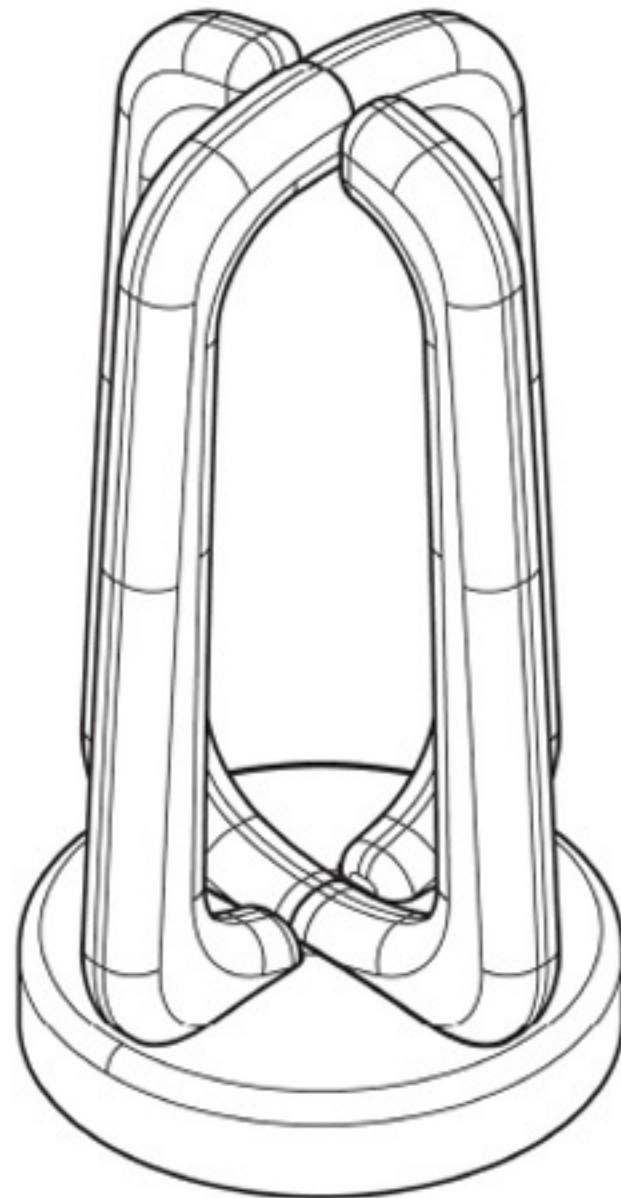
*Model Drafted in millimetres



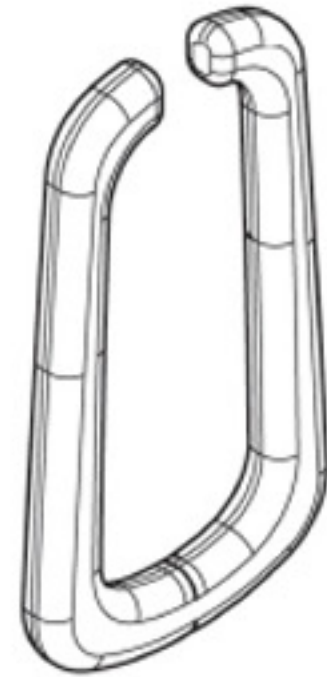
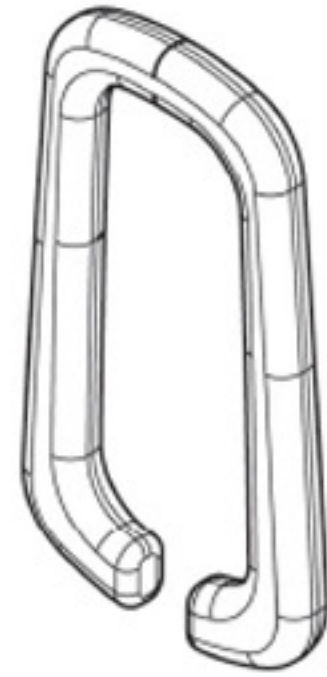
Front



Top



3/4



Initial Sketch Model



Pain Points with Form Study:



Needs to
Scale down
10%

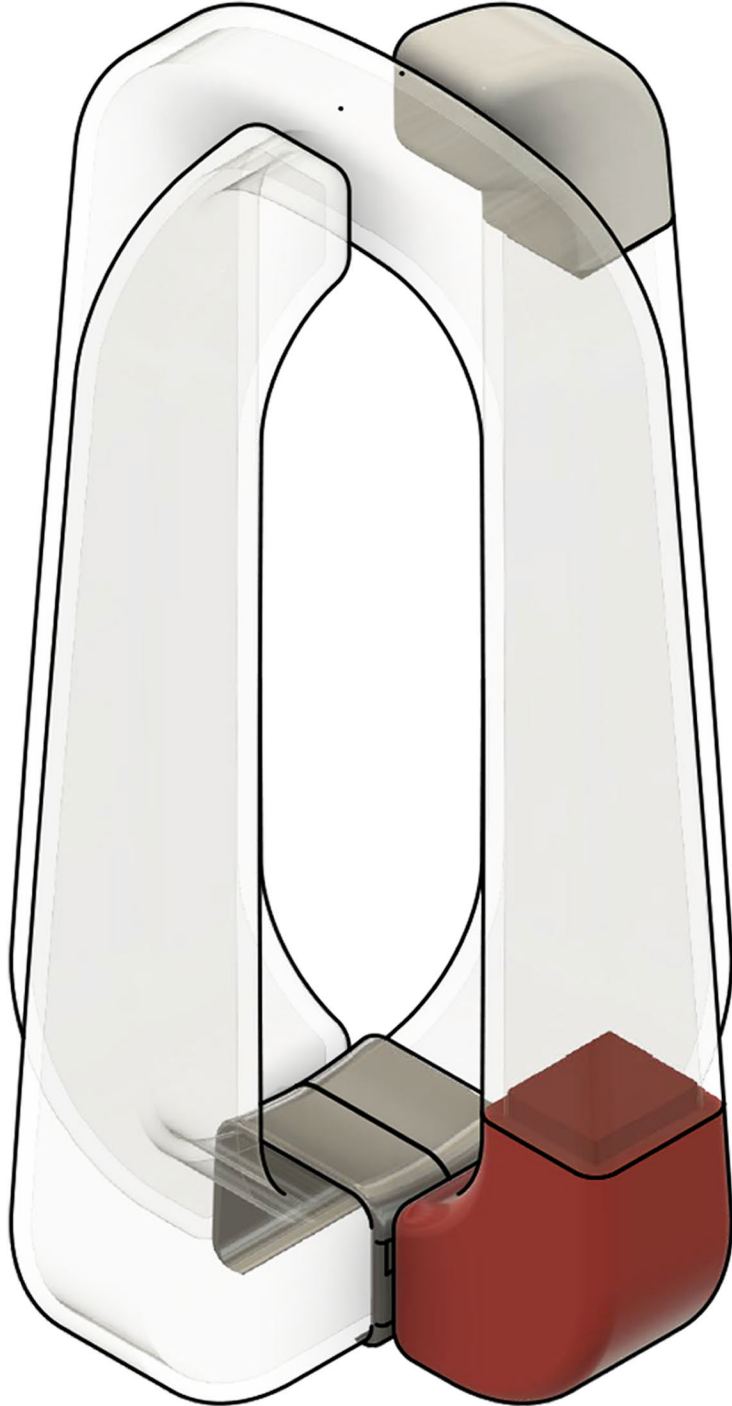
Too
Rectangular
in Hand



Fillets need
to double

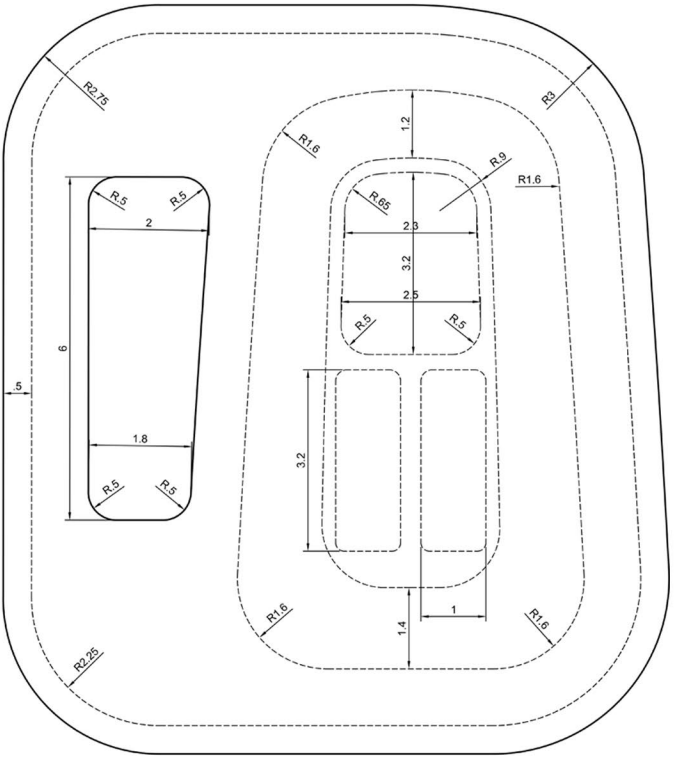
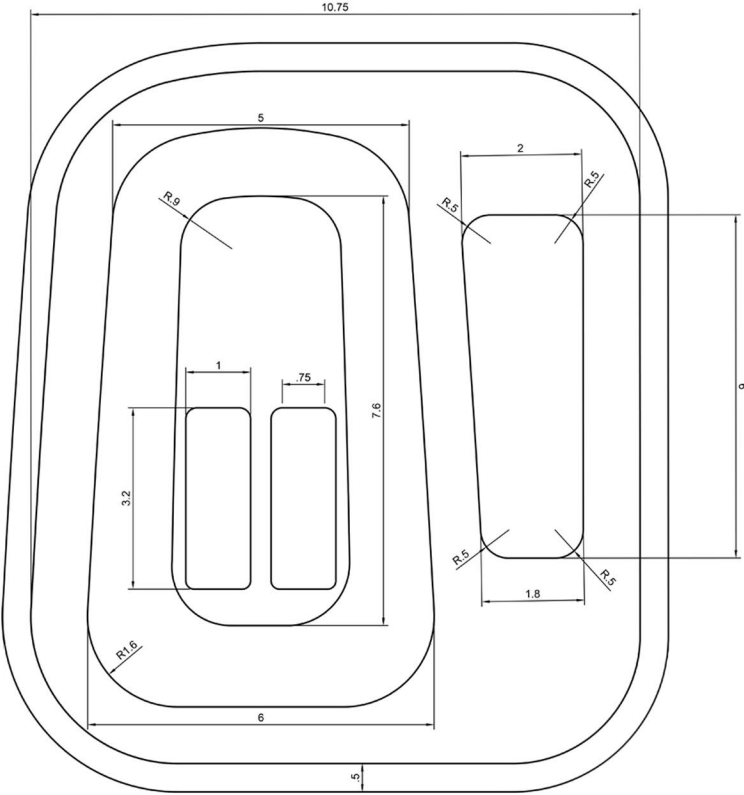
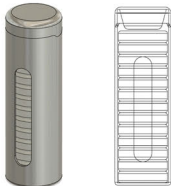


Final 3D Orthographics

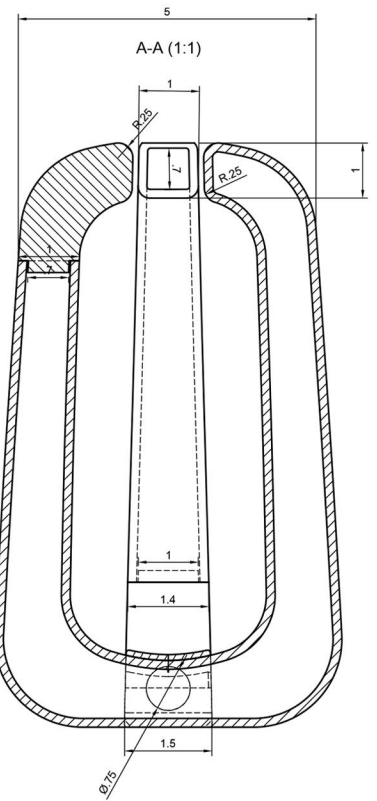
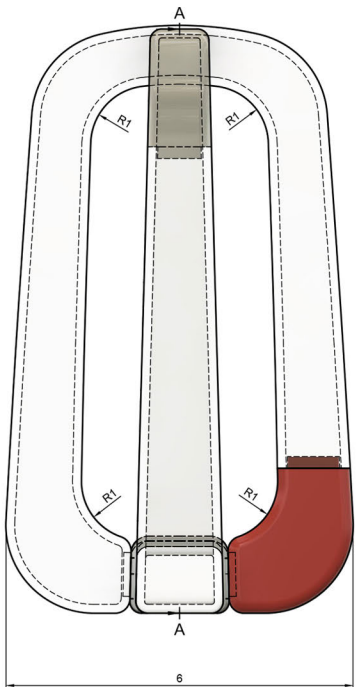
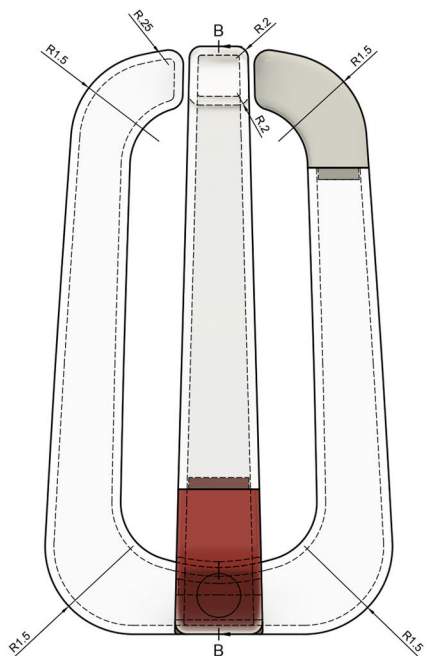
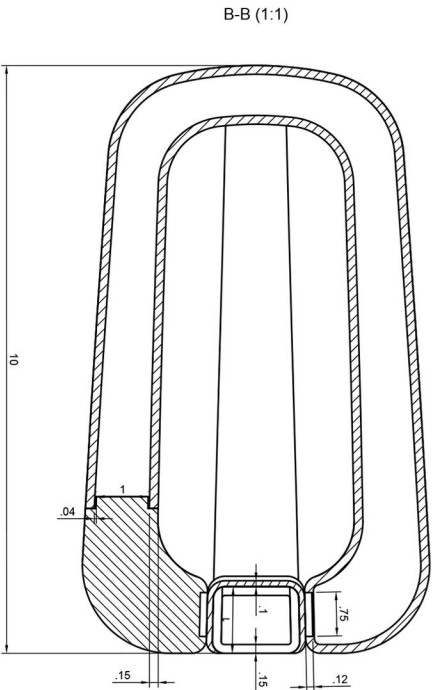
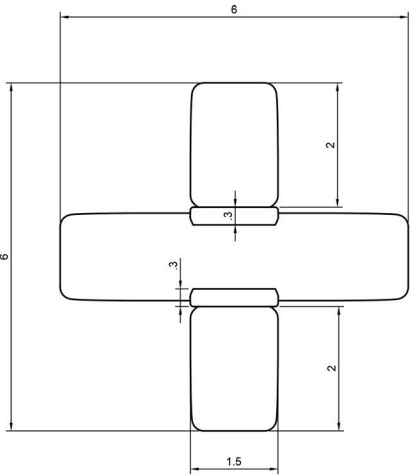


Light Vessel

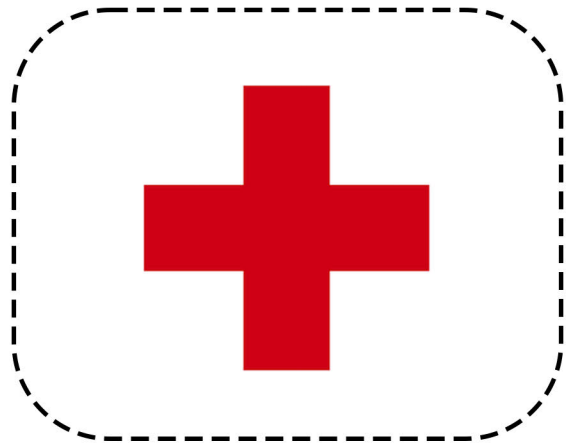
Substrate
Container



Case



Initial Colour Exploration & Research



"In 1863, Durant and four other individuals from Geneva established the International Committee of the Red Cross. In order to identify their medical workers while on the battlefield, the group created an emblem consisting of a red cross on a white background..."

White flags have long been associated with negotiation and surrender, making it an ideal backdrop for the red cross to sit on. Due to its association with blood, danger and urgency, red makes for a powerful colour choice for the cross itself ... The overall symbol is simple, graphic and easy to discern from afar.

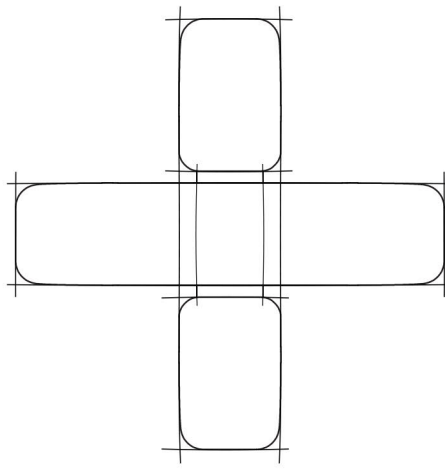
Since 1863 a red cross has come to symbolize many forms of medical aid, from an international humanitarian organization to the first aid kit found on a job site."

COLOUR STUDIES BOB HAMBLY

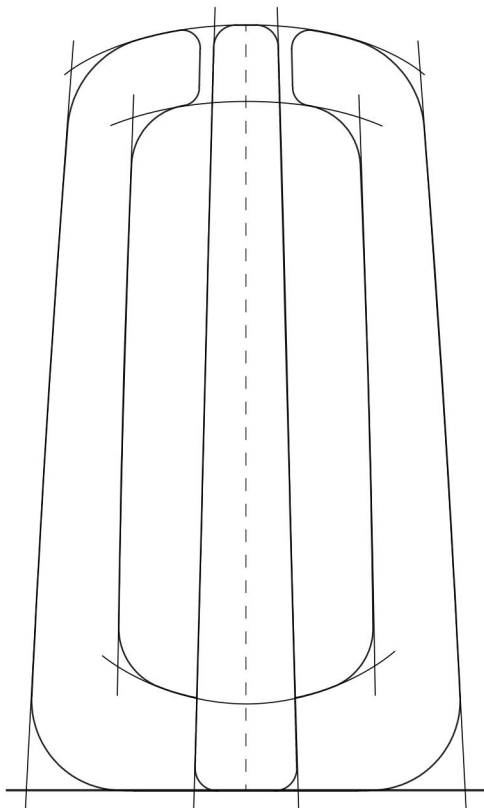


"In many Countries, prehospital emergency medical care is primarily provided by the red cross."

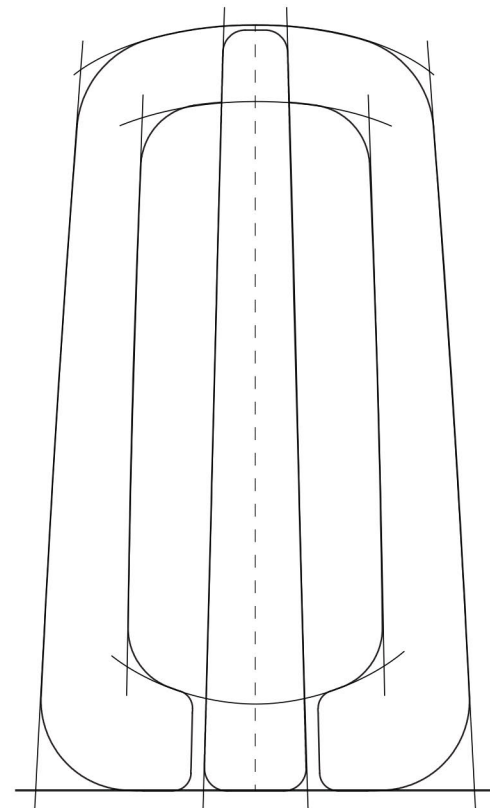
Bottom



The cross in top & bottom view symbolize the Red Cross Organization, the association to **peace and relief aid**. This cross also acts as a '**plus sign**'; the light is in addition to the user, it is adding to: **providing light & a reminder of positivity**.



Front

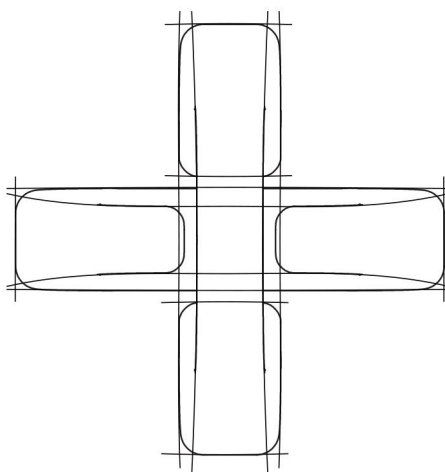


Side

The vessel arms **symbolize the universal on/off power symbol**. A reminder of Bio Lumi **embracing nature** and presenting an **alternative method** of generating light through **innovation & non-electric solutions**.



Top



The standing vessel reminds us of **the origin of light: fire**. The stronger base tapering at the top represents a flame and early usage of the **traditional lantern**; **nodding to progress & change**.

Final Physical Model : Form



Front



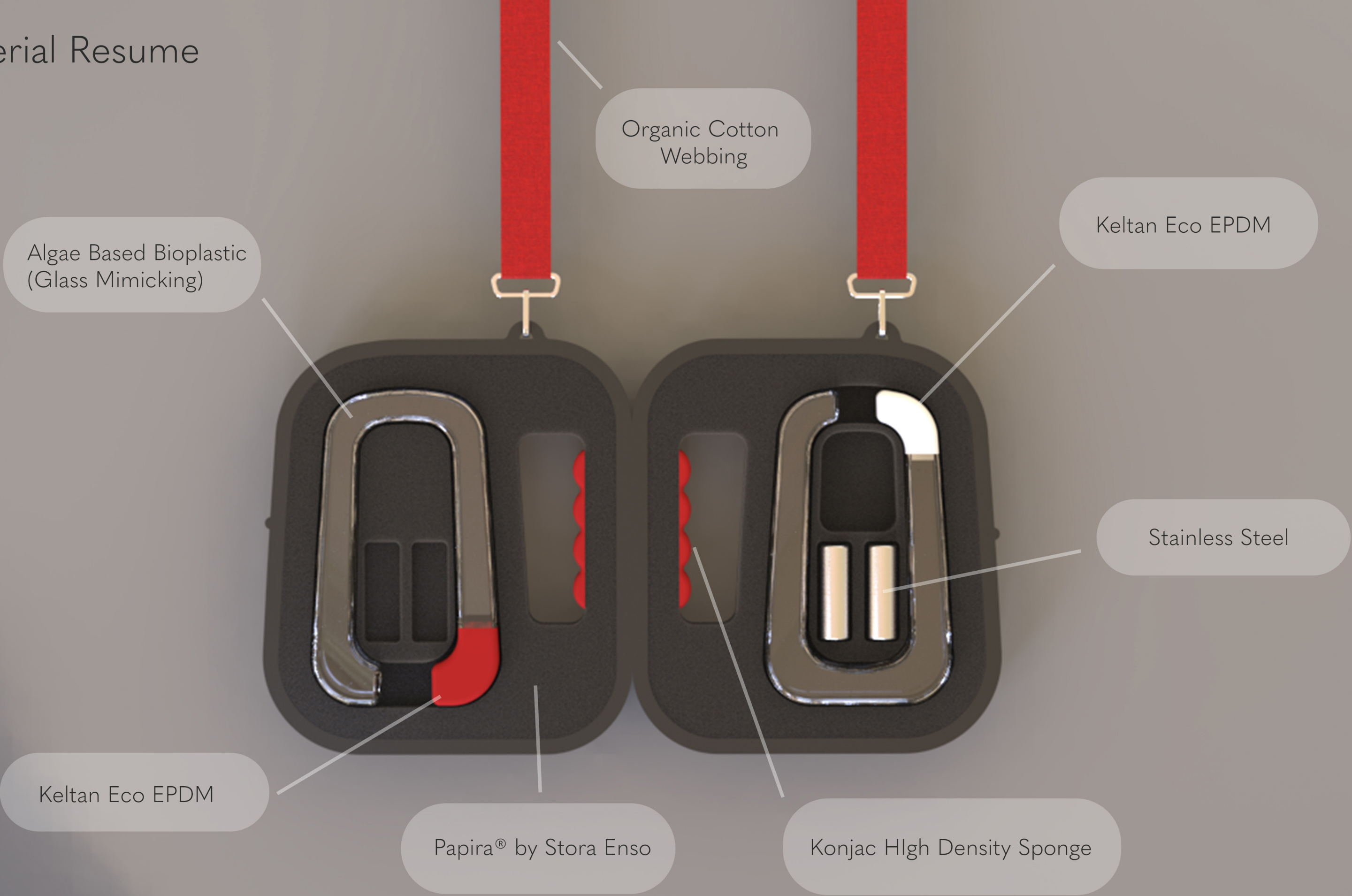
Top



Detailed View



Material Resume



Glow







Thank you

