

Continuous Glucose Monitoring for Neonatal Care



Jessica Collins

A Taste of Biomedical Device Design

Objectives:

- Understand how engineers design medical devices
- Appreciate how technology helps premature babies
- Learn some of the basics of design methodology

Babies Need Glucose Monitoring



< 28 Weeks and / or **< 1 kg**

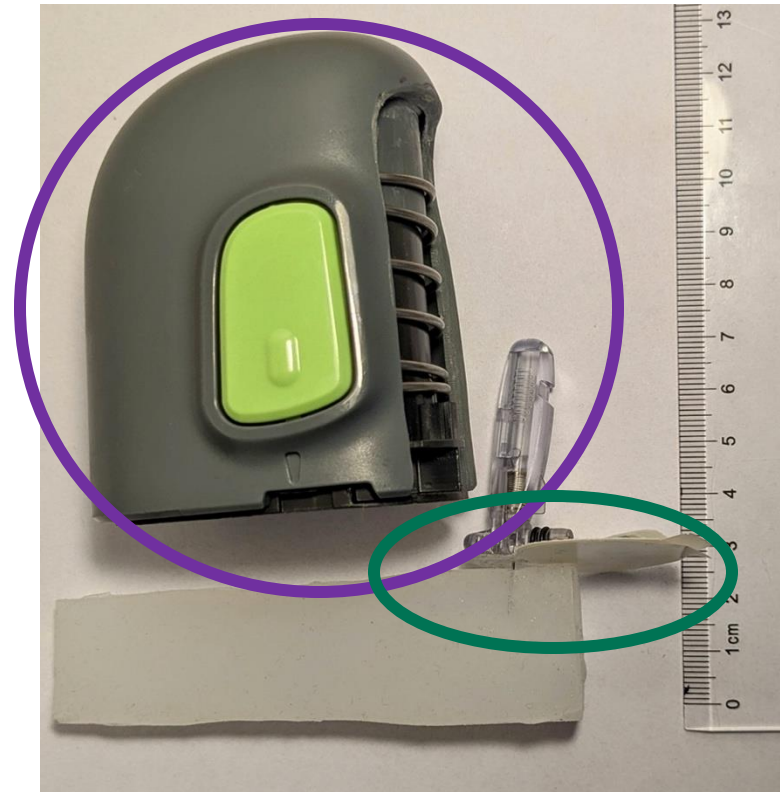
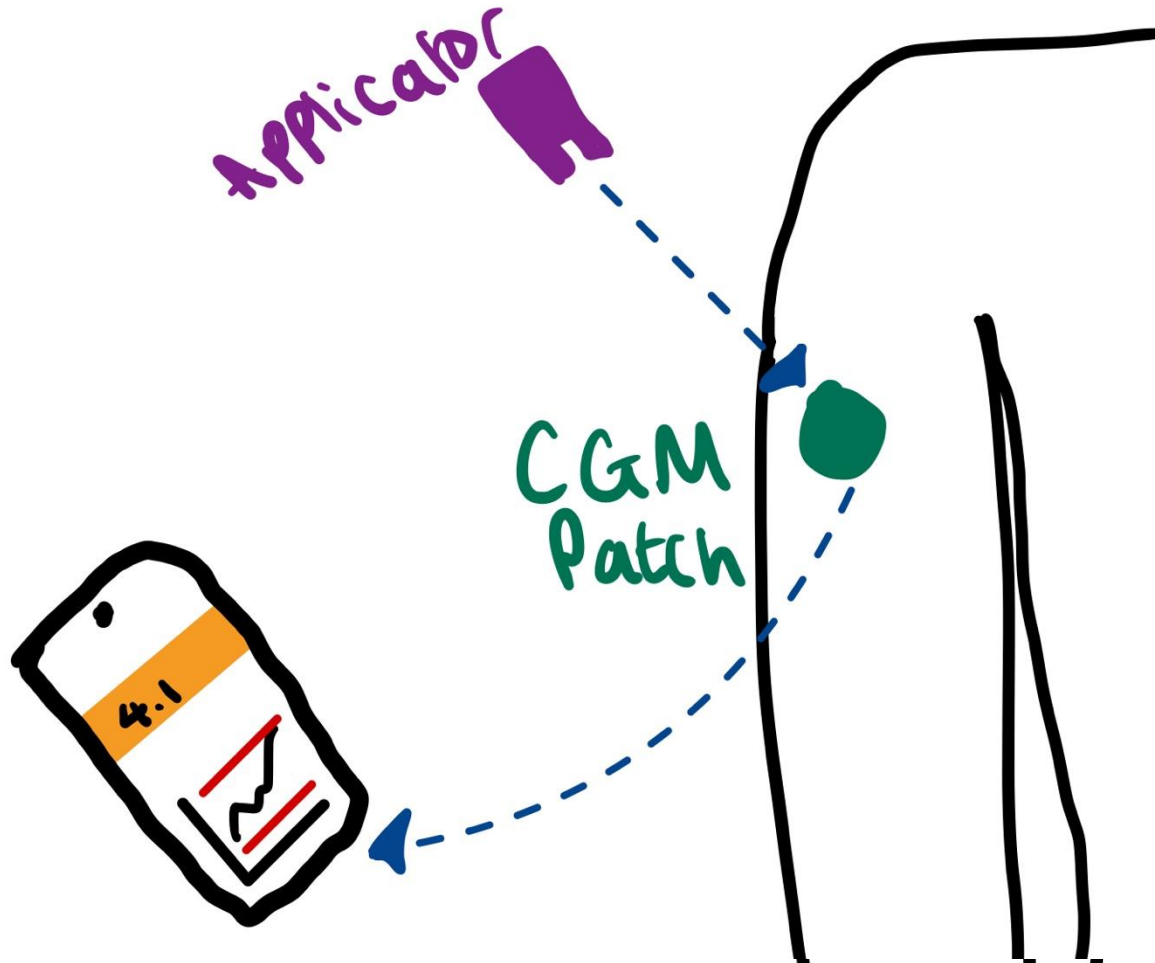
Very small

Current Monitoring Method:

☐ **Intermittent** heel pricks



Continuous Glucose Monitoring (CGM)



Design Requirements

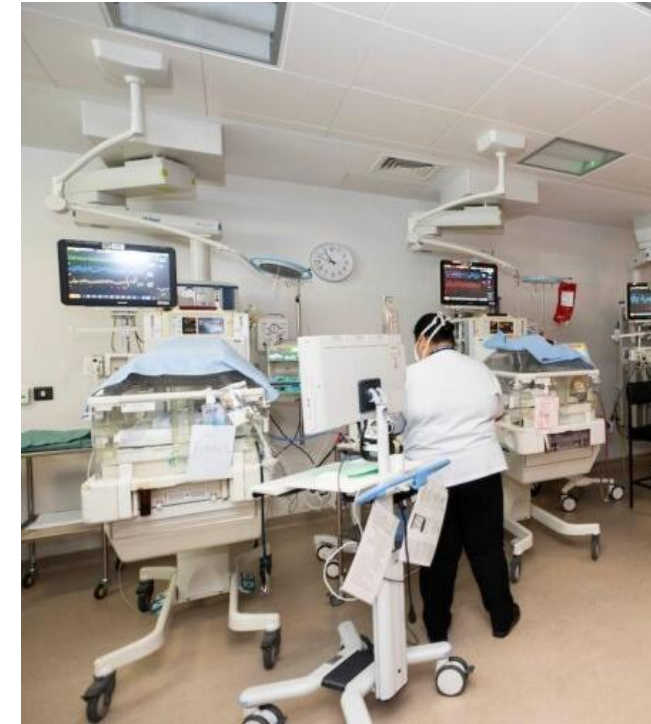


**Sensor
inserted
enough to
take
readings**

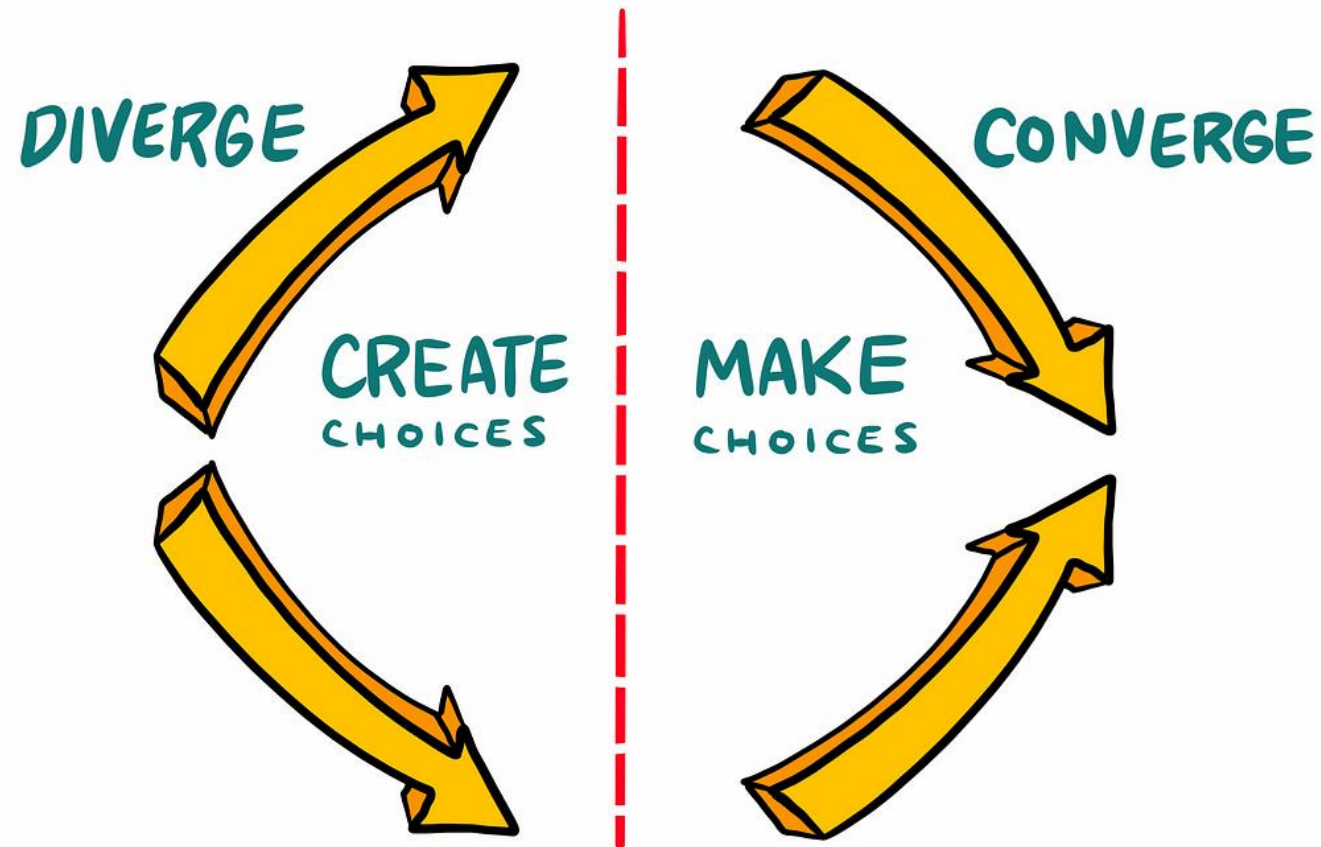
**Needle not
inserted
too deep
into leg**

**Very simple
and easy to
use**

**Suitable for
inside an
incubator**



Diverging and Converging



Step 1:

How could it feel to hold?

Why do you think it might be tricky to insert something like a needle into a baby?

What mechanisms could you use?

Come up with ideas for continuous glucose
monitor inserter designs for preterm babies

What materials could you use?

What might happen if it's done wrong?

SCAMMPERR

S - Substitute - components, materials, people

C - Combine - mix, combine with other assemblies or services, integrate

A - Adapt - alter, change function, use part of another element

M - Magnify - Make it enormous, longer, higher, overstated, added features

M - Modify - increase or reduce in scale, change shape, modify attributes (e.g. colour)

P - Put to another use

E - Eliminate - remove elements, simplify, reduce to core functionality

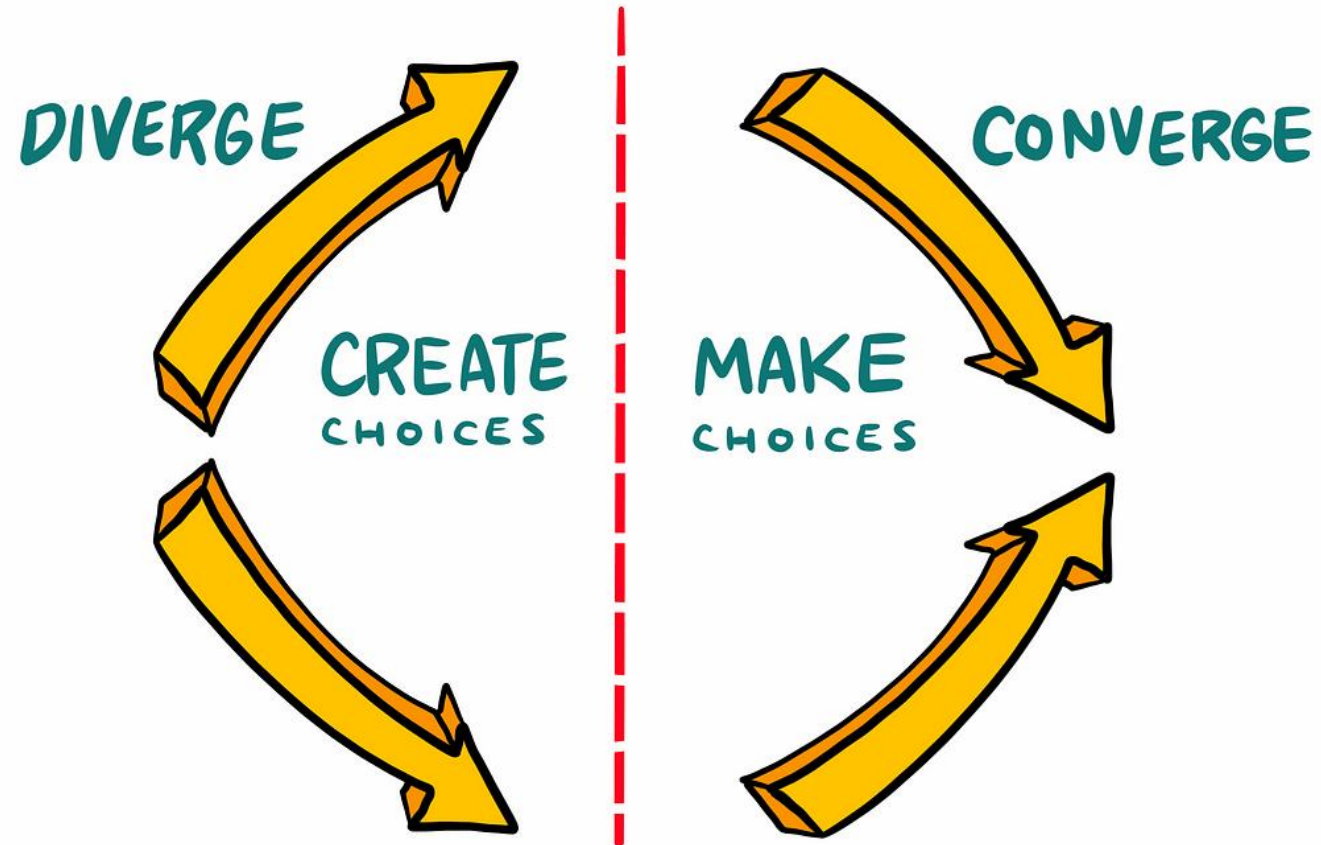
R - Rearrange - change the order, interchange components, change the speed or other pattern.

R - Reverse - turn inside out or upside down.

Morphological Chart

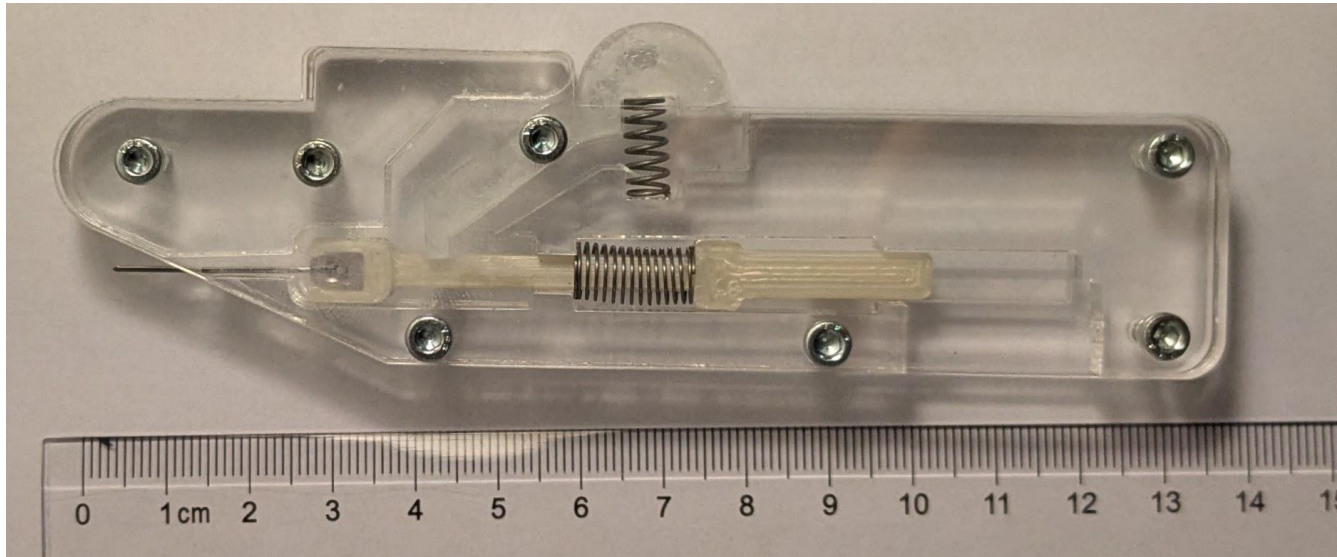
Functions	Option 1	Option 2	Option 3	Option 4
Insert Sensor				
Stick Patch On				
Remove Needle leaving sensor in place				
Attach transmitter				
Control Depth				
Control Sensor Length Inserted				

Diverging and Converging

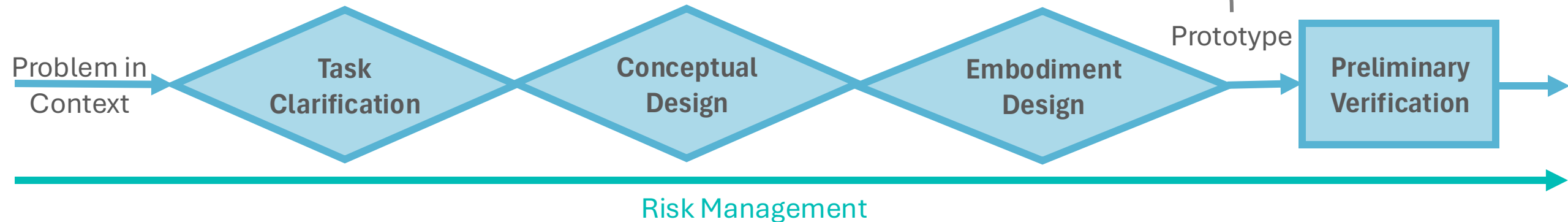


Which design do you think is the best and why?

My Design Choice



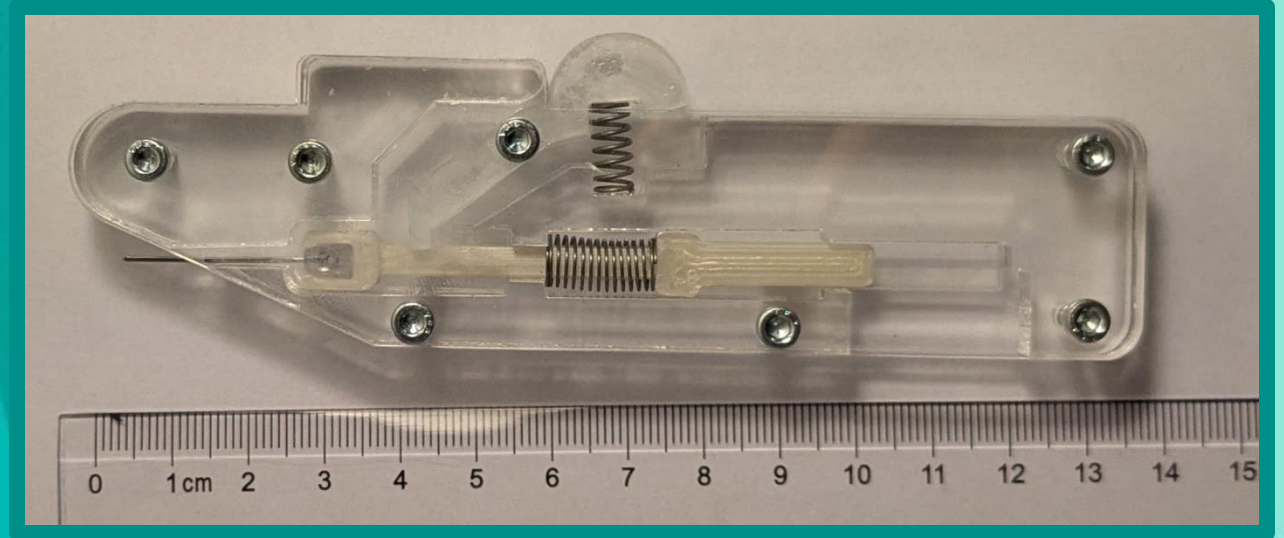
- Single Sensor
- Manual Insertion
- Spring-Powered Retraction



Learning Outcomes

- Understood some of the steps in design
- Learned 2 design methodology techniques
- Importance of continuous glucose monitoring for neonates

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