UNIVERSITY OF CAMBRIDGE

Technology for The Poorest Billion

SMILE - Last mile remote vaccine delivery

Oliver, Hussain, Iain

Problem context; Need and application

WHO definition of “Hard to Reach” populations:

Hard-to-reach populations are those who face supply-side barriers to vaccination due to geography by distance or terrain, transient or nomadic movement, healthcare provider discrimination, lack of healthcare provider recommendations, inadequate vaccination systems, war and conflict, home births or other home-bound mobility limitations, or legal restrictions.

Problem context; Need and application

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MIT and unicef: Drones are a cost-effective solution to boost Nepal's Immunization efforts.

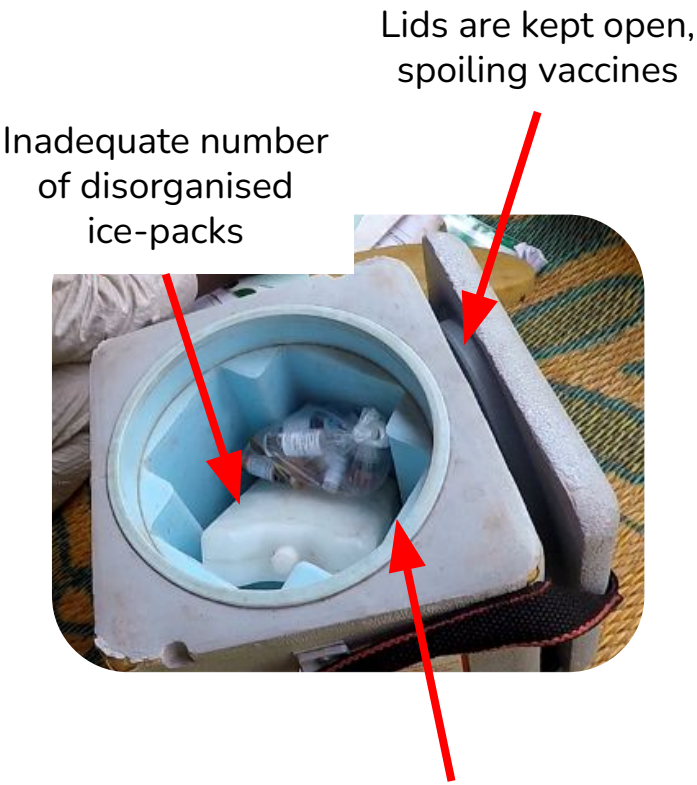
'With the advent of drone technologies, governments can leapfrog infrastructural and geographical barriers to ensure that the most remote and often underserved populations enjoy equitable access to vaccines and medicines.'

Problem context; Current technology

Ice Boxes are used to deliver vaccines for remote locations.

Current designs are poorly designed for real life use

Due to this a 12 hour design life is reduced to 4 in field conditions

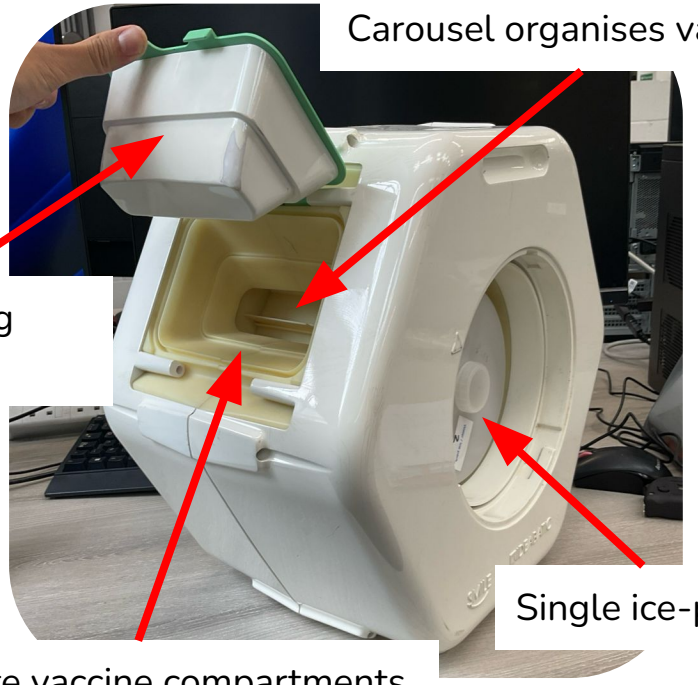


What SMILE currently is:

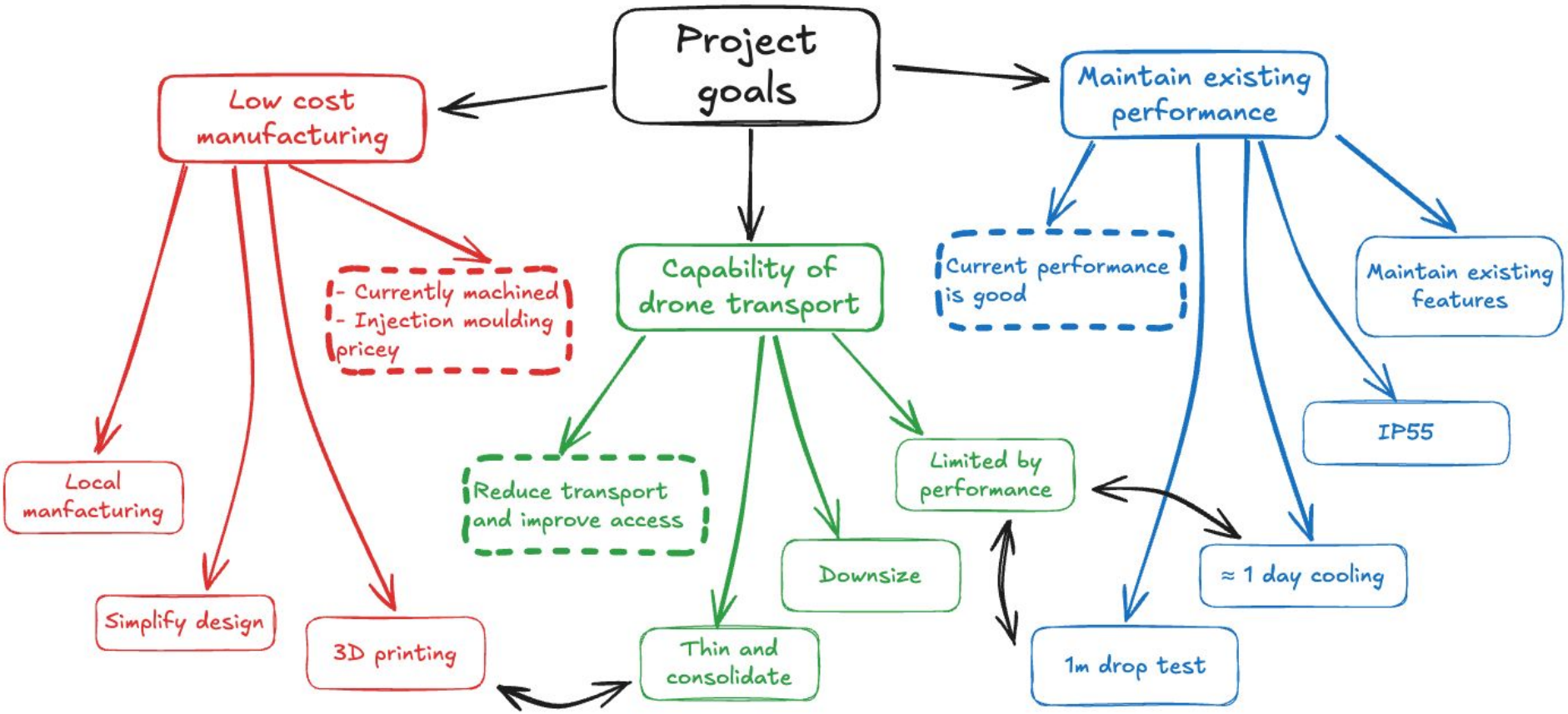
SMILE solves this with good design.

Provides 96 hour cooling life

However, currently very expensive to manufacture.



Goals and requirements



Value of our ideas in the context of the project

Lara's Slides		Our project proposal
1	Responsible and Responsive	• Recyclable materials . Widely accessible materials • Responds to end goal of making sure people are • Manufacturing techniques are not one sided • Assembly made simple
2	Inclusive innovation	
3	Adds significant value	• Potentially save 300k in upfront costs • Room for manufacturing changes and mass production
4	Accessible to end-users	• Made with the people carrying vaccines in mind • Affordable
5	Context appropriate	• This can be seen from our earlier goals

Team Member Strengths and Weaknesses

Oliver:

- Hobbyist + industry drone experience
- Practical 3D printing knowledge
- Collaborating on complex projects
- Find drone requirements, 3D printing

Hussain:

- SOLIDWORKS and materials
- Thermal modelling
- 3D printing and Git experience
- Thermal calculations and modelling

Iain:

- Mechanical design + CAD
- Practical maker experience
- Project management + software
- Mechanical design and testing

Project Gantt Chart

SMILE		0%	
▼ Presentation Preparation		0%	
Project Proposal Presentation			
Complete Proposal Presentation	Hussain, Ian, Oliver	0%	Hussain, Ian, Oliver William Griffiths
Complete Thermal simulation	Oliver William Griffiti	0%	Oliver William Griffiths
▼ Prototyping Phase		0%	
Interim Report			
CAD prototyping	Ian, Oliver William G	0%	Ian, Oliver William Griffiths
First 3D prints. Review Problems	Hussain, Oliver Willi	0%	Hussain, Oliver William Griffiths
Iterative Prototyping, address problems.	Hussain, Ian	0%	Hussain, Ian
Begin Presentation Prep	Hussain, Ian, Oliver	0%	Hussain, Ian, Oliver William Griffiths
▼ Final Product Development		0%	
Final Project Submission			
Final CAD design and BOM	Ian, Oliver William G	0%	Ian, Oliver William Griffiths
Final Report and Presentation	Hussain	0%	Hussain

Contingency plan

What if something goes wrong?

Reduce risk	Stepped goals	Built in contingency time
Small scale + software testing	Manufacture method + CAD	50% additional planning time
Procurement management	Simple prototype	
Risk assessment	Additional features	
	Validation of design	

Risk assessment

Dyson centre risk assessment:

Most activities will fall under the remit of this:

- Assembly
- Power tools and hand tools
- Soldering iron

Expanding foam risk assessment:

Additional risk from possibly use of expanding foam.

- Planning to use materials teaching lab fume cupboard
- Risk assessment is already being reviewed

Drop test risk assessment:

Possible risk assessment needed for a drop test of prototype

Costing and resources

Resources

No additional resources beside Dyson centre resources are needed

Oliver has a personal Bambu A1 mini (3D printer)

Material needed	Cost (£)	Source
PETG 3D printer filament	35	RS components
TPU 3D printer filament	22	RS components
Polyurethane expanding foam	15	RS components
Fasteners	20	CUED stores
Adhesives	10	CUED stores
Ice-pack bottle	20	RS components

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Thank you for listening.

Any questions?