



Future markets: rapid testing for COVID at schools and other population-dense, high-disease-vector locations

Management of New Product Development ACPA7006 - Assignment A
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Summary

- ▶ We've proved the **technical** viability of the new Chemical Detector Systems (CDS). This paper looks at the potential **market** viability for a COVID-detecting device, based on:
 - ▶ Aspects of our current business that will be useful in the new market
 - ▶ Competitor products and related products
 - ▶ Potential new markets
 - ▶ Recommended first market focus: virus detection devices for schools
 - ▶ The opportunities that this first market offers
 - ▶ An in-depth review of likely customer personas, their needs and how our product meets these needs
 - ▶ Final recommendations



The challenge

- ▶ The recent Knowledge Transfer Partnership and prototyping activities have proved that we can adapt our alcohol detection technologies to test for viral infections
- ▶ Other parts of the business are developing this into a physical product, delivering the internal components and physical appearance
- ▶ The challenge at hand is to identify and explore potential markets for the new product



What do we need to know about our new market?

- ▶ Virus Detect is a new class of product in the disease detection market
 - ▶ Other forms of detecting COVID and other viruses exist, but not in this format
 - ▶ Similar products exist in other markets, but for other purposes
- ▶ As there is no established market for virus detection using breath sensors. we need to incorporate both market research and market sensing approaches

What is	What could be
Market research captures information about the current market situation	Market sensing helps us understand the wider market context and interpret that to attempt to predict future trends

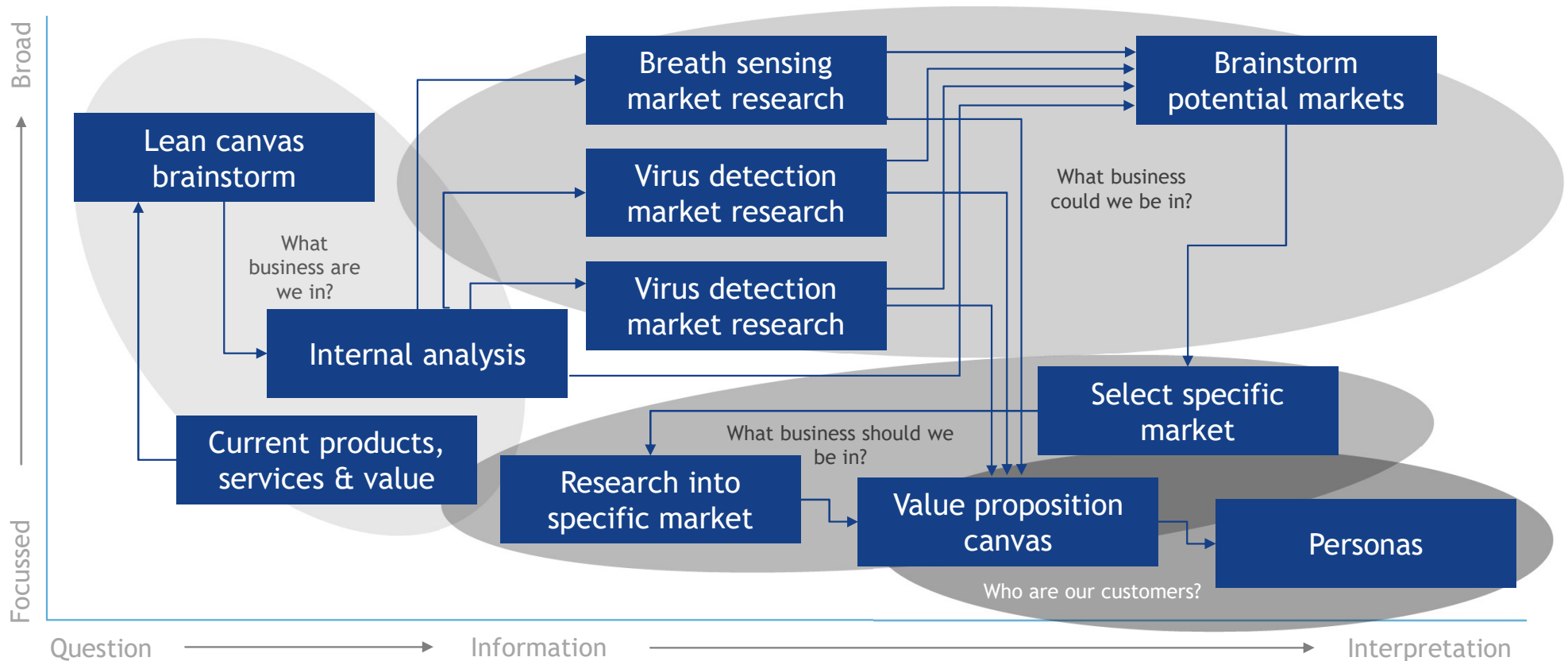
Information is available to anyone

Interpretation is our competitive advantage



(Bayighomog Likoum *et al.*, 2020; Piercy, 2017)

Our market research and sensing journey



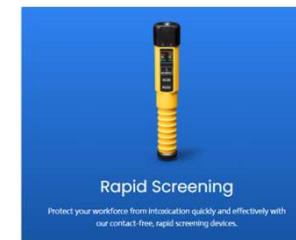
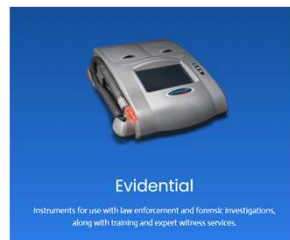
What makes Lion the Market Leader?

- ▶ Fully vertically integrated company: carry out all our own research, engineering product development, manufacturing and marketing
- ▶ Cutting edge: use and develop the latest technology, working with Universities and Technological partners
- ▶ Large market share: we supply nearly all the breath alcohol analysers (BAA) in use in the UK Police Force
- ▶ Able to meet stringent evidential standards: Stage Two Winners of PACTS MEBTI competition to produce “Roadside Evidential Breathalysers” to meet Home Office requirements
- ▶ Able to react to legislative or other demands: we’ve updated our products quickly each time new UK Legislation relating to alcohol in drivers has been introduced. These products have then been adopted by the UK Home Office as the “Standard equipment” to be used by the UK Police Force in their efforts to enforce the laws



Current products & value

- ▶ Our existing business is founded on trust and safety:
 - ▶ Police forces trust us to help them keep the roads safe from drunk drivers
 - ▶ Court systems trust us to provide alcohol testing that meets stringent evidential rules, to ensure that the guilty are prosecuted while protecting the innocent
 - ▶ Fleet operators trust us to enforce their obligations to keep the public safe
 - ▶ Industries such as construction, heavy industry and health trust us to keep their sites safe from alcohol-impaired operators



- ▶ We hold a market-leading position in part because we have a deep understanding of our customer's 'jobs to be done' and are proactive in delivering 'gain creators' and 'pain relievers' for them (Christensen, 2016; Stratgyzer, no date)

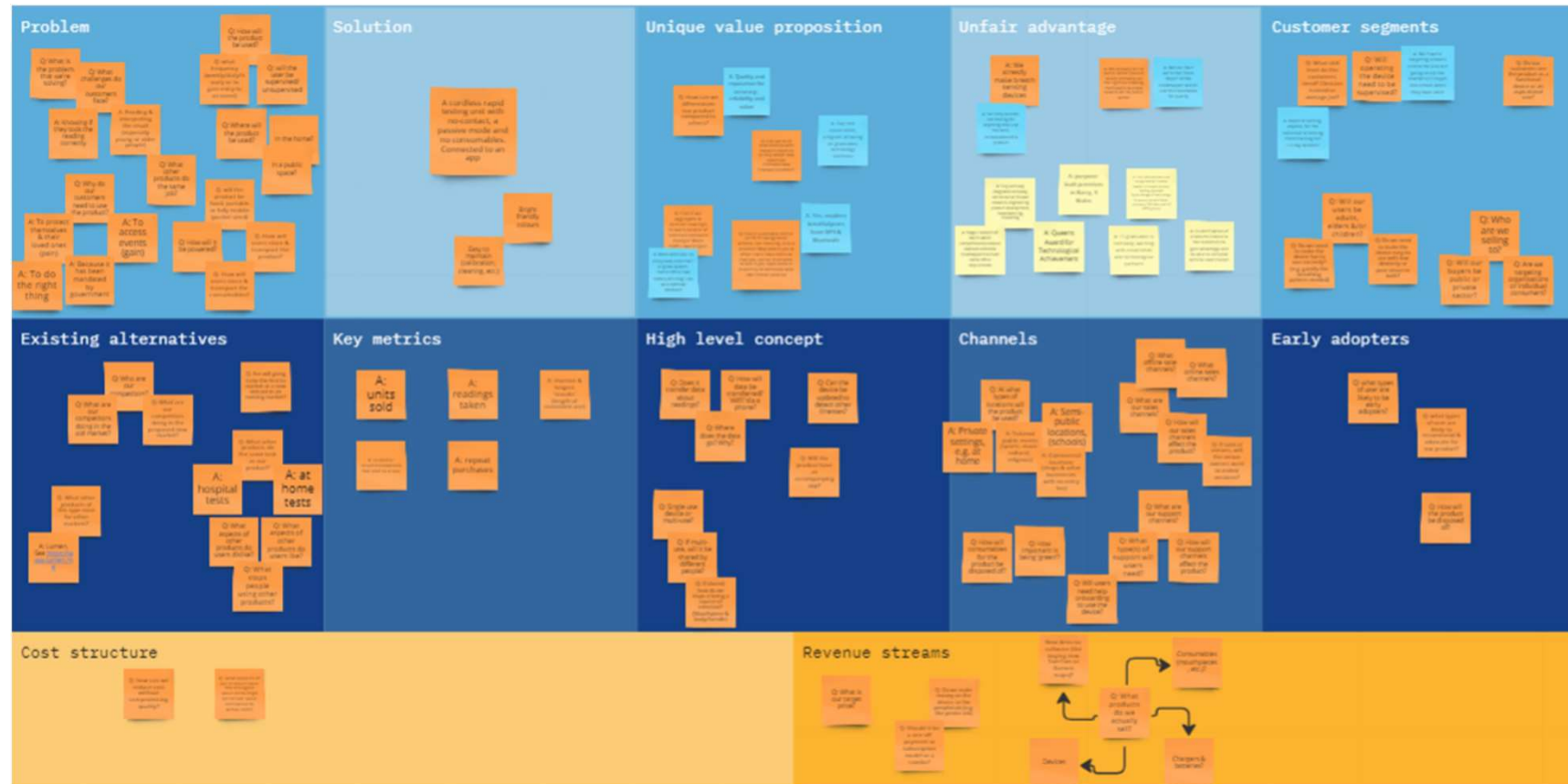


Moving into a new market

- ▶ The new Virus Detect product remains in line with our core values of trust and safety
- ▶ But the market will be different:
 - ▶ The new product will provide market opportunities beyond our historic core market of police forces, other parts of the judicial system, transport and heavy industry
 - ▶ The opportunities for Chemical Detector Systems (CDS) are so wide-ranging that there's a risk that we attempt to sell to too wide a market and dilute our impact
 - ▶ With forethought, we can create a strategy for a systematic move into adjacent markets once we are established in the primary market
 - ▶ Understanding the market for the new product will help us focus the development on features and benefits that matter to our customers and design our marketing to focus on our customers 'jobs to be done' (Christensen, 2016; Stratgyzer, no date)



CDS brainstorming using Lean Canvas



A larger version can be viewed in appendix or at: <https://miro.com/app/board/uXjVM7DTghU=>

(Maurya, 2019)

Internal analysis: our unfair advantages

Using the Lean Canvas as a guide, we identified our strengths in relation to the proposed new market of COVID breath analysers:

We are market leaders in breath-sensing devices for alcohol detection

It's a short pivot to produce breath-sensing devices for other purposes

We have a strong R&D focus, including close ties with universities and tech partners

Our culture and our connections position us to make this pivot quickly and effectively

We have experience in proving the effectiveness of breath testing devices

We can meet the testing & proof regime required to register Medical Devices for COVID

We have a well-established manufacturing partnerships and in-house assembly expertise

Our existing production approach is efficient and needs little adaption

We already have strong sales channels in public-sector and industry

We can go to market quicker in these sectors than others, for example, B2C sales

We already produce breathalysers that are Bluetooth, app and 5G enabled

We have experience in supporting technologies (not just the breathalyser) that people expect as standard



The virus detection market

- ▶ Antibody tests confirm whether a subject has previously had a condition (including via vaccine) whereas antigen tests look for whether the subject currently has the condition: our focus is on antigen testing
- ▶ Current publicly available virus detection methods use nasal and/or oral swabs that are uncomfortable and difficult to use, especially for younger children
- ▶ The short-lived Ellume at-home testing kit was Bluetooth-enabled (Woo, 2021)

Testing method	Pros	Cons
Lateral flow tests (lower standard)	Widely available; results within 15 minutes; at-home testing	Around £2 per test; moderate accuracy tests; not suitable for travel testing
Lateral flow tests (higher standard)	Results within 15 minutes; at-home testing; suitable for travel testing	Around £10-15 per test
Polymerase chain reaction (PCR)	Higher accuracy	Around £70-90 per test; samples analysed at laboratories & clinics; results within 3-7 days; some false positives

(Gov.uk, 2022; Money Supermarket, 2023)



The breath-sensing market

- ▶ There has been an expansion of devices used to detect different breath characteristics and conditions:
 - ▶ Hoh (2017), reporting on the research of Dr. N. Nasari, noted that “17 diseases [were] found to have clear biomarkers in human breath [including] diabetes, lung cancer, breast cancer, Parkinson's disease, asthma, schizophrenia, and kidney and liver failure”
 - ▶ Keto sensors that detect acetone or CO in the breath, including Keyto, Biosense, Ketonix and Lumen
 - ▶ Smoking cessation devices that test for CO, including devices from MD Diagnostics and Covita
 - ▶ Devices that test for methane and hydrogen to detect gastrointestinal disorders from Covita
 - ▶ Face masks that incorporate breathing and pollution sensors, including from AirPop
- ▶ Reviewing the various devices offers us insight into sensor market appeal, aesthetics, the challenges that customers might face using devices and how others have overcome them
 - ▶ Brew-Sam (2022) investigated user preferences for diabetes breath sensors among a pilot group of young people and their parents, and found a strong desire for the device to be accompanied by an app



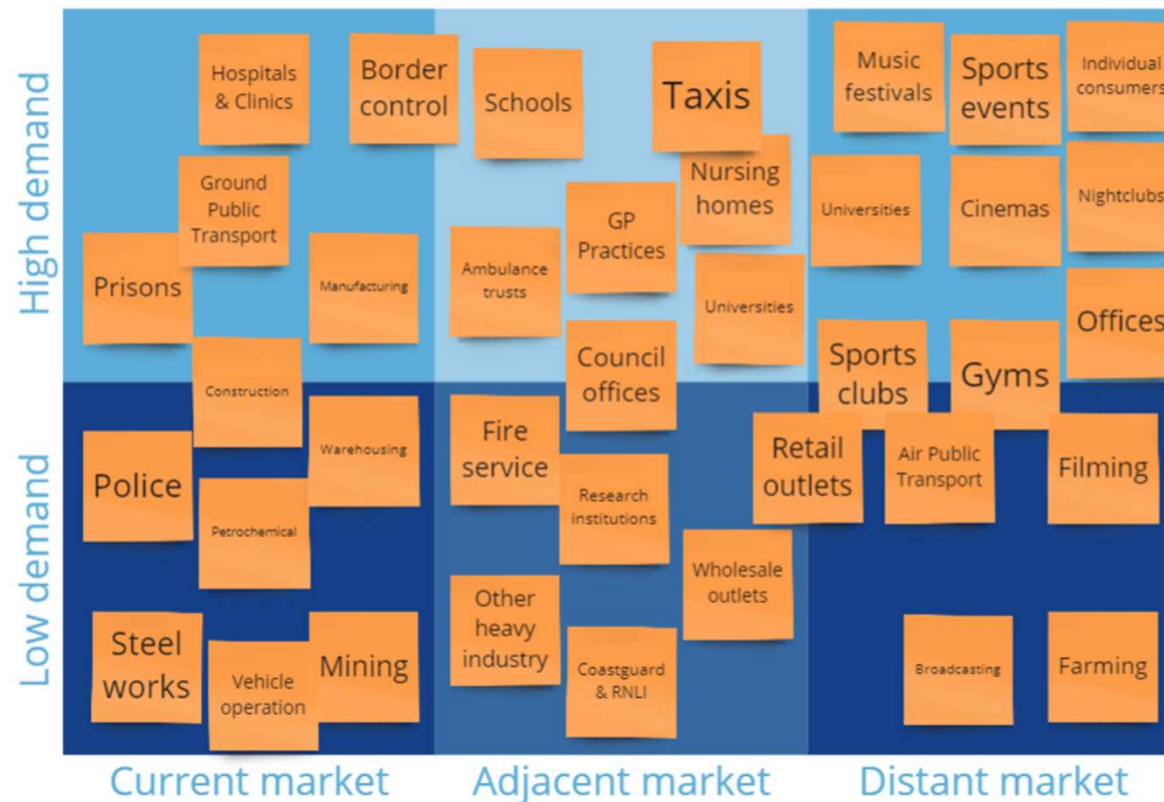
Breath sensing for virus detection

- ▶ Several early studies have proved the effectiveness of COVID breath detection
 - ▶ The reported accuracy of 93-95% (Kaloumenou, 2022; Grassin-Delyle *et al*, 2021; Nanyang Technological University, 2021) compares well to at-home lateral flow testing, which has an accuracy in the region of 90% (Giovannini, 2021)
 - ▶ However, studies are still in early stages, testing against comparatively small cohorts for most devices between 40 in the study by Grassin-Delyle *et al* (2021), 140 participants in the study by Shan (2020) and 1,400 for the TracieX study (Nanyang Technological University, 2021)
- ▶ Two devices have been granted provisional authorisation in Singapore (HSA, 2021)
 - ▶ The Breathonix BreFence™ Go COVID-19 Breath Test System is a floor-standing model designed for clinical locations that has also been approved for use in Malaysia and the EU (Breathonix, 2023)
 - ▶ TracieX uses a handheld disposable breathalyser that is read by a separate portable reading device (Nanyang Technological University, 2021)
 - ▶ Both devices produce test results in approximately 2 minutes
- ▶ Once developed, devices will have to be approved by the relevant body for a jurisdiction. In the UK this is the Medicines and Healthcare products Regulatory Agency (MHRA) (Gov.UK, 2020)
- ▶ Special dispensations have been made for COVID: devices can be approved by the Secretary of State in England or their equivalent in devolved countries such as the First Minister in Wales



What business *could* we be in?

We brainstormed potential ideas for markets and then grouped them by adjacency to our current markets and the estimated comparative demand for COVID testing



A larger version can be viewed at: https://miro.com/app/board/uXjVM2WNBeA=



What business *should* we be in?

- ▶ We recommend that the initial focus is on schools and other education settings because:
 - ▶ It's a large market: 10m children in nearly 30,000 schools in England alone, representing 5m households (Gov.uk, 2022; ONS, 2021)
 - ▶ We already have an established reputation in the public sector in many countries, and we're familiar with public-sector procurement activities and frameworks
 - ▶ Testing can be supervised teachers, support staff, and parents which may give us opportunities to learn about and refine our product's use before we expand into other markets
 - ▶ The effect of schools on transmission is not well understood (WHO, 2020) but focusing on schools may help reduce the transmission rate among the general population by improving detection. Detection rates are low in children as they are often asymptomatic (ECDC, 2021)
 - ▶ Although no definitive figures exist, minimising infection in schools would also have a positive impact on global productivity: fewer parents needing to care for children who are sick or isolating

Schools are also a springboard to new markets

- ▶ Our devices will become well known by users, offering a path to other new markets:
 - ▶ From schools into colleges, universities and other education environments
 - ▶ Health & social care settings, including nursing homes, hospitals, ambulance trusts, GP practices
 - ▶ Into entertainment venues, through extracurricular activities, Student Union night clubs, children & young adults' sports clubs, and fetes and festivals
 - ▶ Direct to consumers, as children & parents become familiar with and who trust our brand
 - ▶ Commercial markets, especially those we don't yet operate in such as white-collar industries, through increased brand awareness with parents



COVblow: potential features

Based on
existing
AlcoBlow
Rapid Test

Calibrated
annually onsite:
no gaps in testing

Connected
device and app
with automated
notifications:
keep everyone
informed

Minor re-colour:
more 'friendly'

One-button
operation:
simple to use

Traffic light
school status:
focus on key
information

Evidential
standard not
required

Based on
existing
AlcoBlow
Rapid Test



No contact:
minimises virus
transmission

Rapid screening:
test a whole class
in a few minutes

'Passive' mode:
easier testing
for small
children



Who are our customers

Meet:

- ▶ Reg Singer, a 60-year-old headteacher
- ▶ Sarah Adams, a 34-year-old mum of one involved with her children's school PTA





Reg Singer

Male, 63

Primary persona

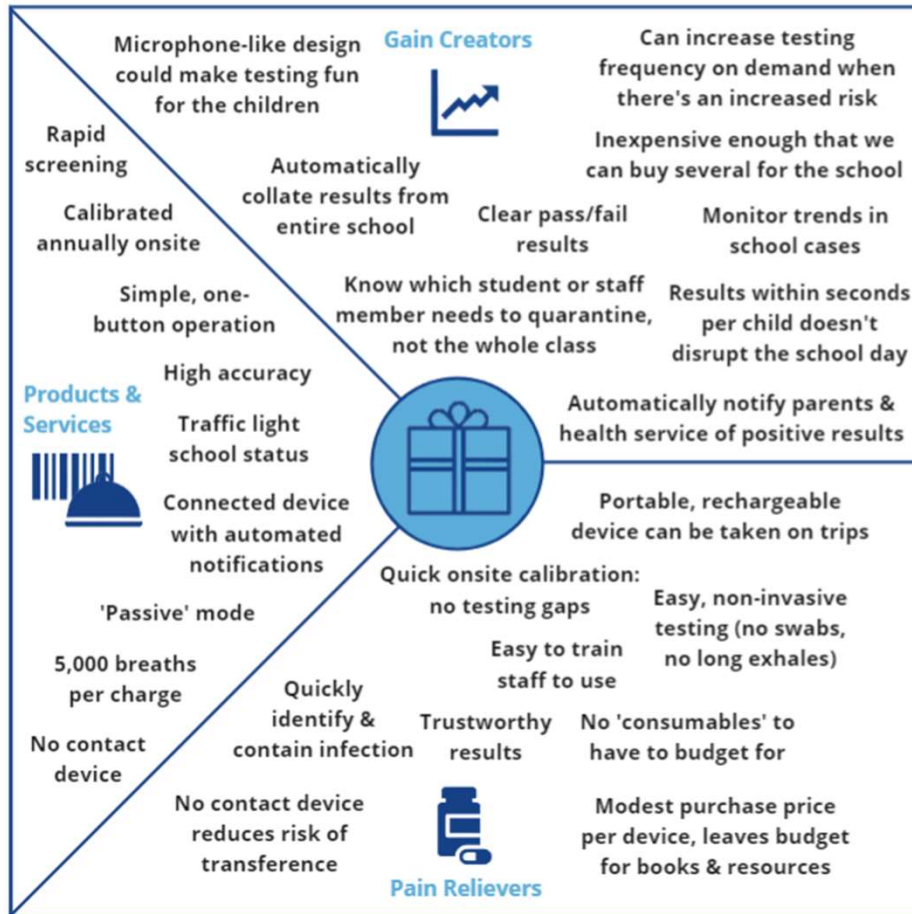
Headteacher

Decision role	Decision maker for school budget
Buying unit	Final decision-maker, but consults with school leadership team & stakeholders
Style	
Personal & home	Happily married for 36 years with two adult children and his first grandchild. Mother lives nearby in a care home.
Work	Career teacher who was promoted to Headteacher 18 years ago. Has been at the same school for 32 years. Enjoys seeing the children of former pupils join his school. Understands his professional responsibilities, including balancing budgets and achieving good Ofsted reports, but his first love is creating a safe environment for his students to blossom in their own unique way. Union member. Beloved by his staff, current and former students.

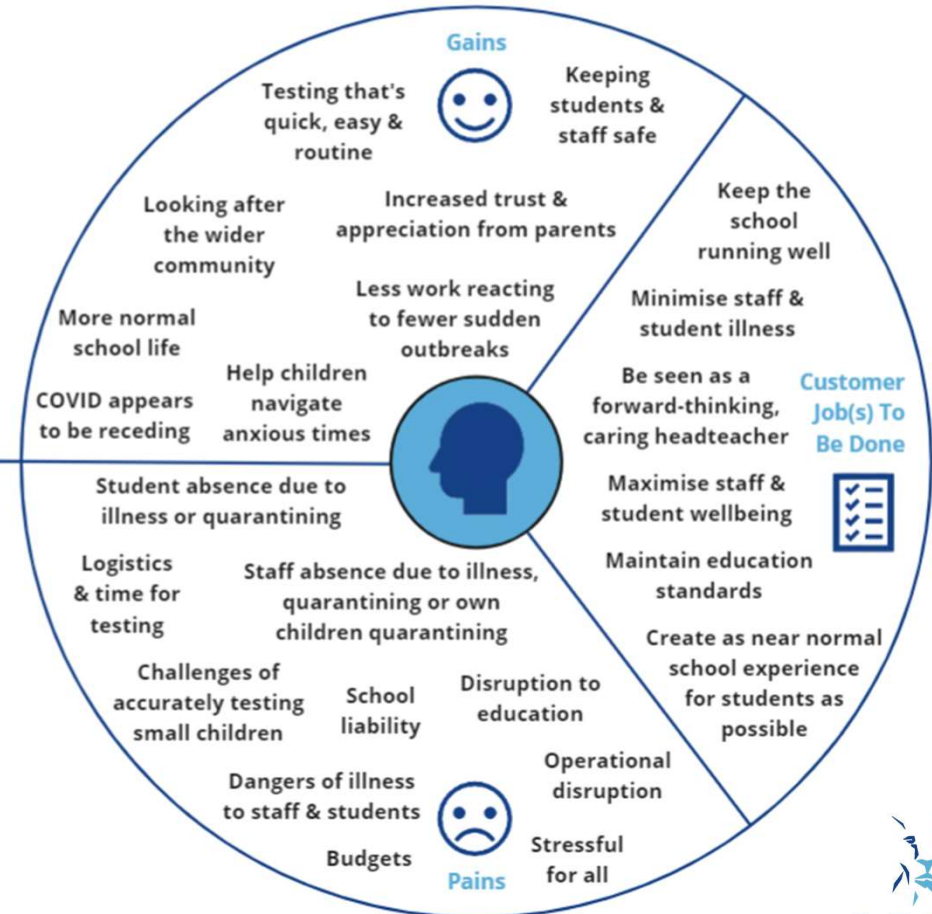
Goals & motivation	• Look after students, pastorally and educationally • Help the school function well for students & staff • Maintain and improve education standards • Balance budgets • Be seen to be proactive in the school district
Barriers & challenges	• Student & staff absences due to precautionary COVID quarantine • Comfortable with hosting small events but cautious about hosting larger events • Conflicting pressure from COVID-cautious and COVID-sceptic parents • Budgets
Key messages	• Students' health and education is the number one priority • We're not in a bubble: looking after students helps staff, parents and the wider community
Buying scenario	Willing to pay a modest amount for testing, but conscious that funds will be diverted from direct educational resources, such as books, or extra-curricular
Preferred media	Daily Telegraph, The Guardian and local newspapers, official channels (e.g. emails from Local Authority Education function, Department of Education, his union)
Social media use	Begrudgingly uses Facebook & Instagram professionally, mostly aided by his admin team. Doesn't use SM personally.
Devices	 Work desktop PC  Personal Android smartphone

Reg Singer: Value Proposition Canvas

Value Proposition: COVblow contact-free rapid COVID screening device



Customer Segment: School headteacher



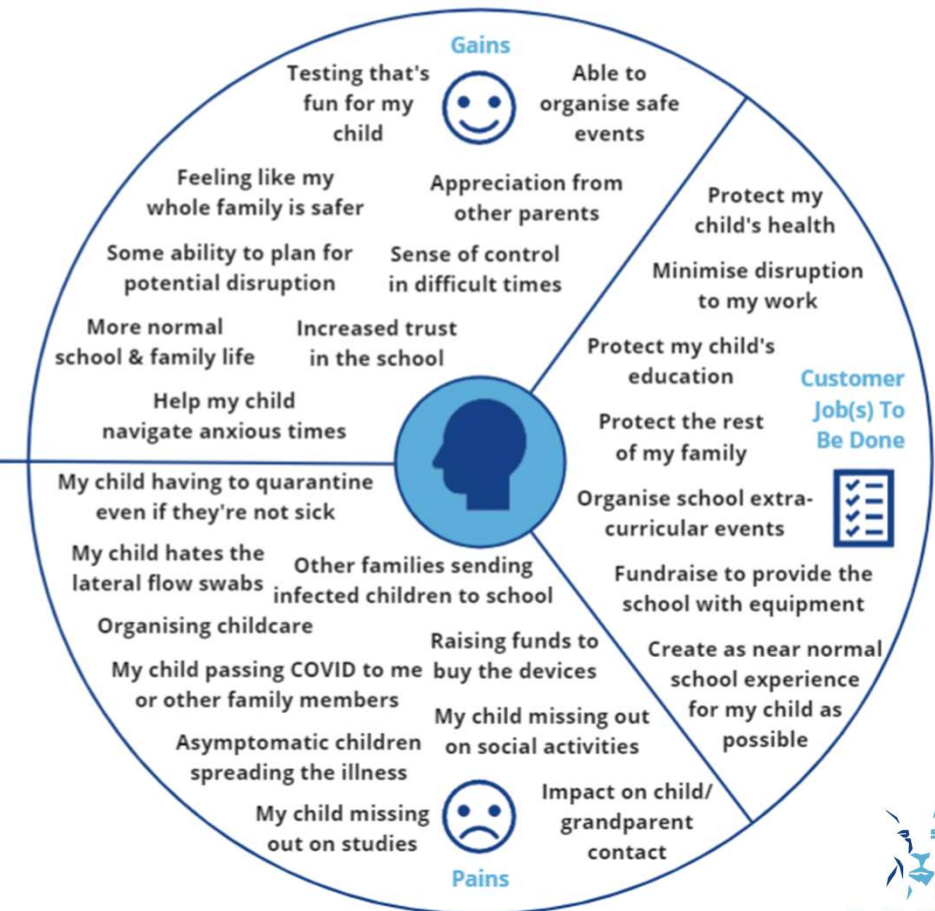
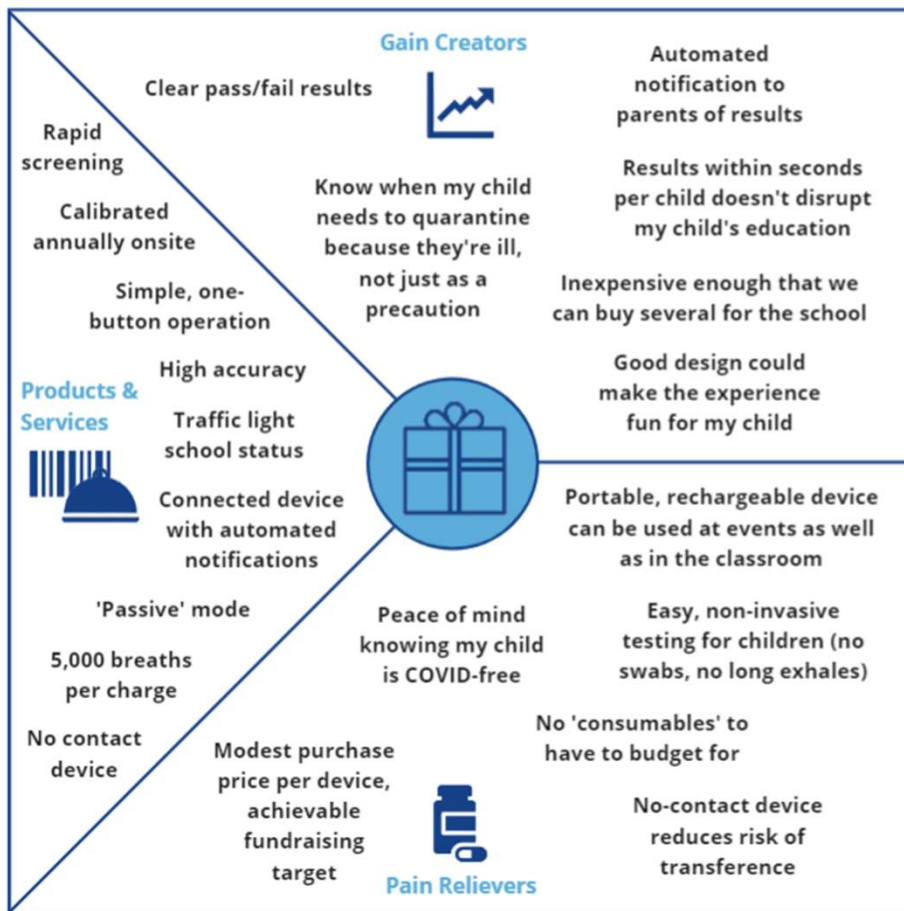
	
Sarah Adams	
Female, 34	
Primary persona	
Parent, member of the PTA	
Decision role	Influences the Parent Teacher Association expenditure for the school, both in terms of spending decisions and for fundraising
Buying unit	Consulted on decision-making; instrumental in fundraising for off-budget purchases
Style	
Personal & home	Married for 9 years with one child, who attends the local primary school. Involved with local community activities. Loves her kid, but also needs the fulfilment of her job. Shares many parenting responsibilities with her partner but is primary care-giver if her child is off school
Work	Working mum with a full-time mixed onsite & remote role. Can rearrange onsite meetings but it's trickier and more embarrassing when it has to be done at the last minute

Goals & motivation	• Protect her entire family, both her child and her vulnerable aged parents • Be a good employee • Help the school function well, particularly for students • Fundraise for the school for additional resources • Be seen to be helpful and proactive in the community • Keen for her child to have as near-normal a school experience as possible • Real and exaggerated virtue signalling builds her credibility among her peers
Barriers & challenges	• Having to rearrange work commitments at short notice because of frequent unexpected quarantining • Difficulties testing her child using lateral flow tests • Fundraising for yet another initiative
Key messages	• Protecting your kids protects you, your family, your job and your community • There's only one chance for them to enjoy their school life
Buying scenario	Highly motivated to purchase safety kit, but has to fundraise every penny in a fatigued environment already maxed out on bake sales, sponsored activities and other traditional initiatives
Preferred media	Local radio broadcasts, occasional mix of aspirational and guilty pleasure magazines & email newsletters (Country Living, OK, Mrs Hinch)
Social media use	Uses Facebook, Instagram and WhatsApp groups to keep abreast of local community updates. Occasional Mumsnet user
Devices	 Work laptop PC  Personal iPhone  Child-friendly iPad that she shares with her son

Sarah Adams: Value Proposition Canvas

Value Proposition: COVblow contact-free rapid COVID screening device

Customer Segment: Parent, PTA supporter



Recommendations

- ▶ While it is difficult to predict marketing outcomes, market research and market sensing activities have demonstrated that developing a rapid test device for COVID has merit. It seems to offer:
 - ▶ An effective way to test large volumes of children on a regular basis with minimal delay or discomfort
 - ▶ Welcome reassurance and service to teachers, parents, families and the wider community
 - ▶ At a price where schools, potentially with fundraising support from PTAs, could purchase multiple devices
 - ▶ A route to success in other markets
- ▶ However, any future prediction comes with caveats:
 - ▶ The decline in incidence and impact of COVID may reduce the market appetite
 - ▶ An increase in spread or danger posed may drive demand to higher than we can sustain, for example, if a new variant develops
- ▶ We therefore further recommend that we continually seek to develop the device to detect new variants, additional diseases (for example, to respond to fears about measles, as cited by Davis (2023)) and even consider recreational health measuring, like the keto monitors

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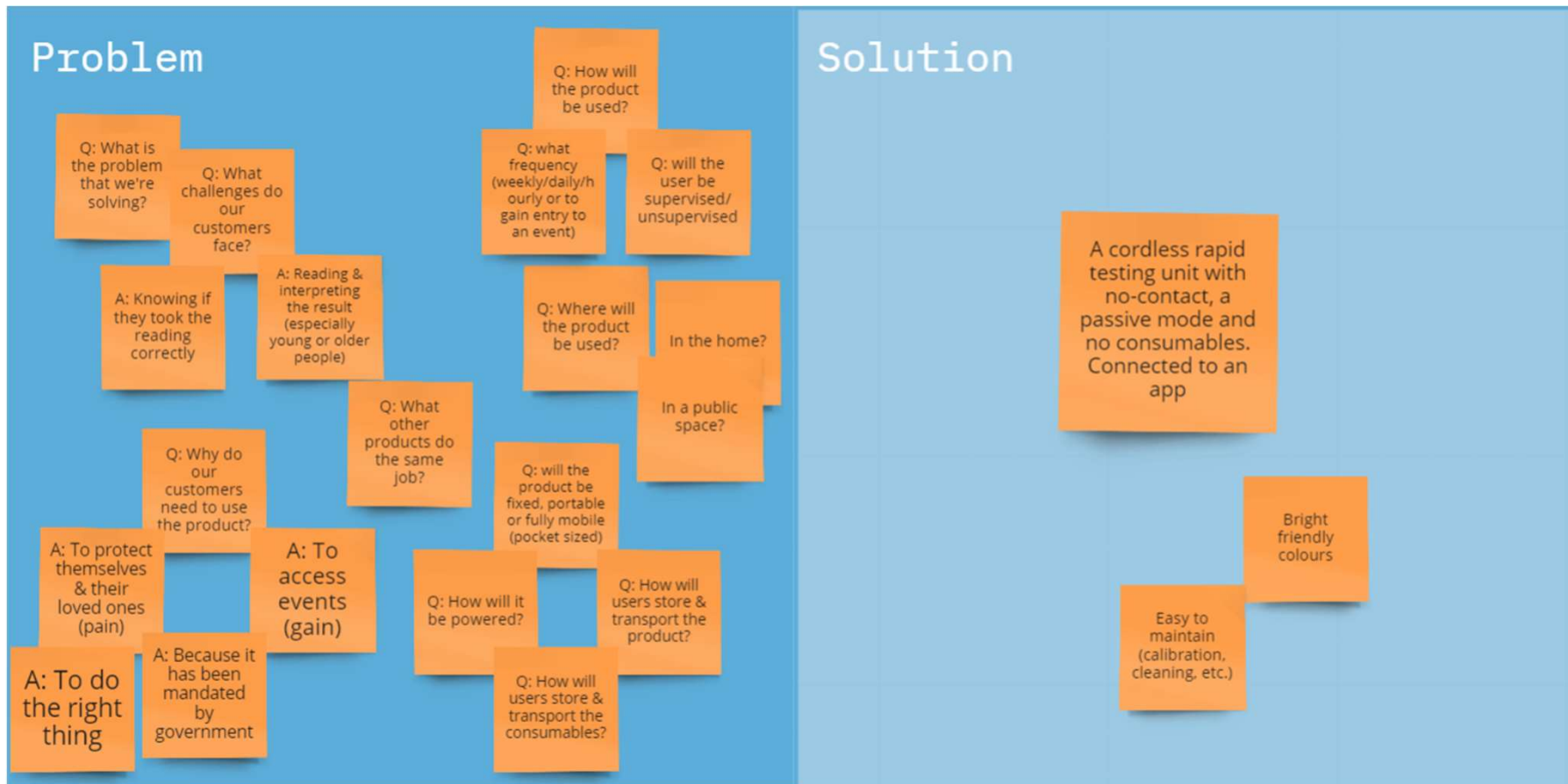
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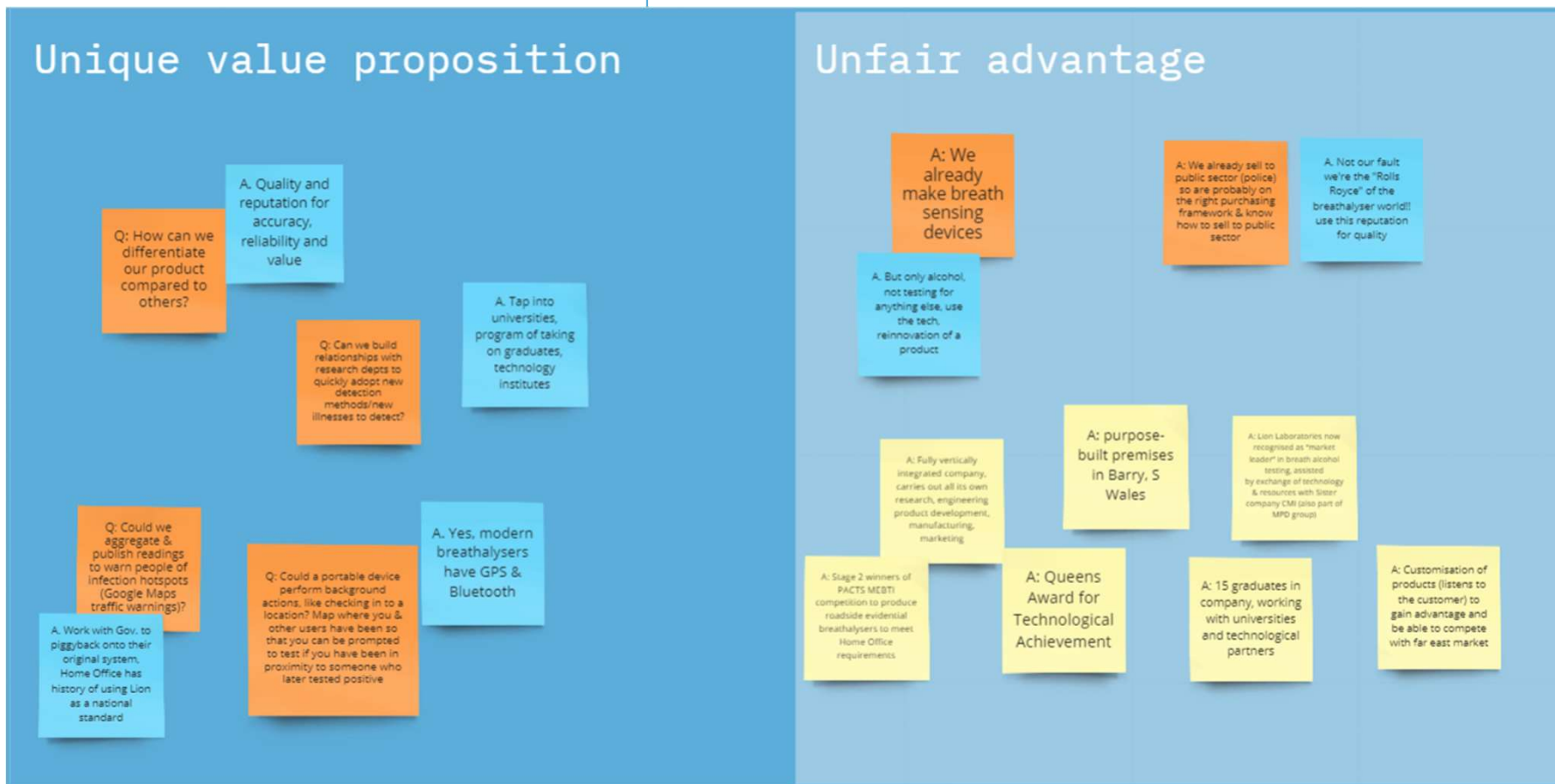
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Lean Canvas details

Lean Canvas detail - part 1



Lean Canvas detail - part 2



Lean Canvas detail - part 3

Customer segments

Q: What skill level do the customers need? Clinician trained or average Joe?

Q: Will operating the device need to be supervised?

A: No if we're targeting schools unless the kids are going to slip the teachers £5 to get into school when they have covid

Q: Do our customers see the product as a functional device or an aspirational one?

A: Rapid screening, anyone, for the individual screening more training but 1/2 day session?

Q: Will our users be adults, elders &/or children?

Q: Do we need to make the device fun to use correctly? (e.g. gamify the breathing pattern needed)

Q: Do we need to make the device easy to use with low dexterity or poor vision or both?

Q: Who are we selling to?

Q: Will our buyers be public or private sector?

Q: Are we targeting organisations or individual consumers?

Early adopters

Q: what types of user are likely to be early adopters?

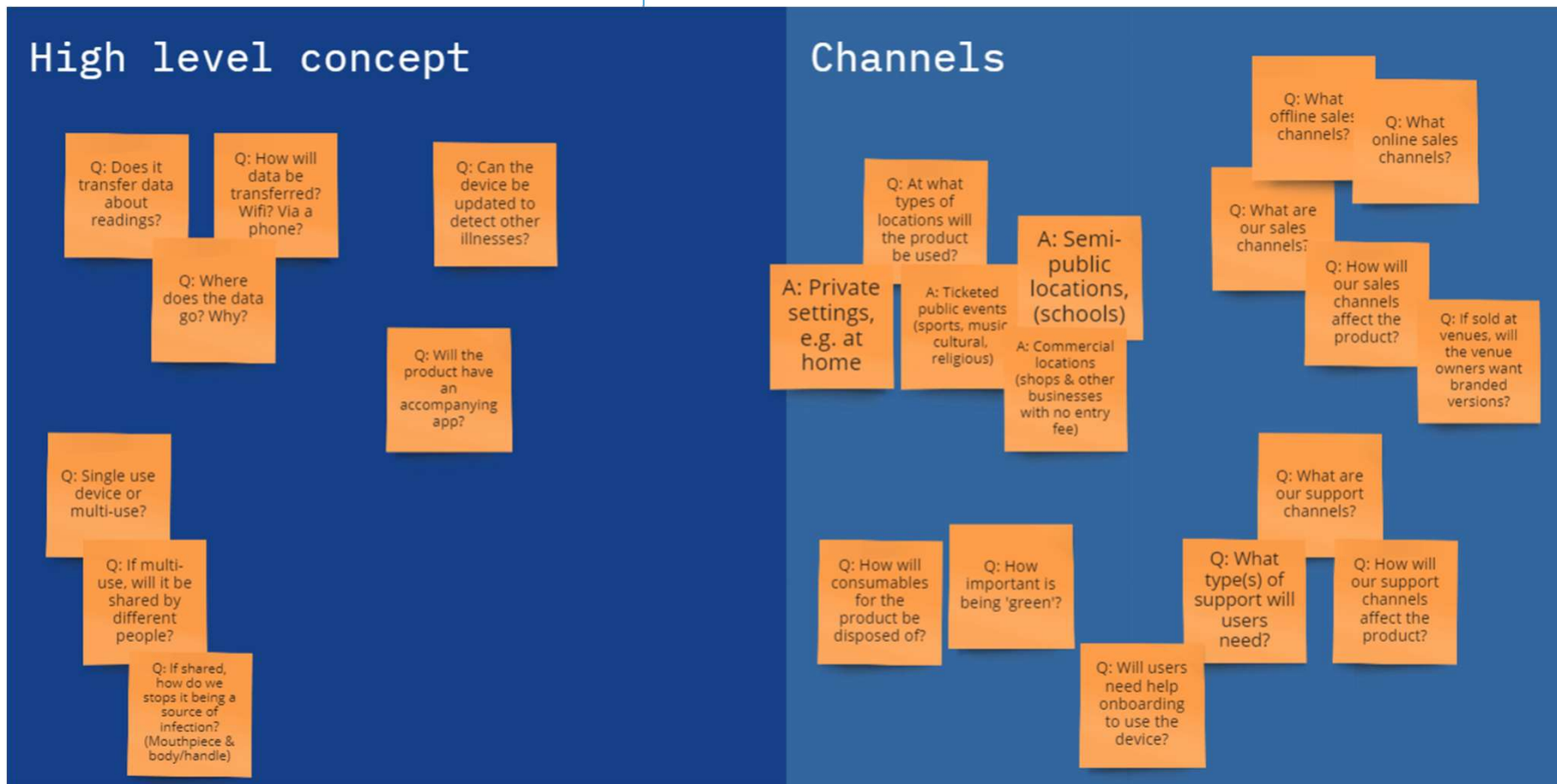
Q: what types of user are likely to recommend & advocate for our product?

Q: How will the product be disposed of?

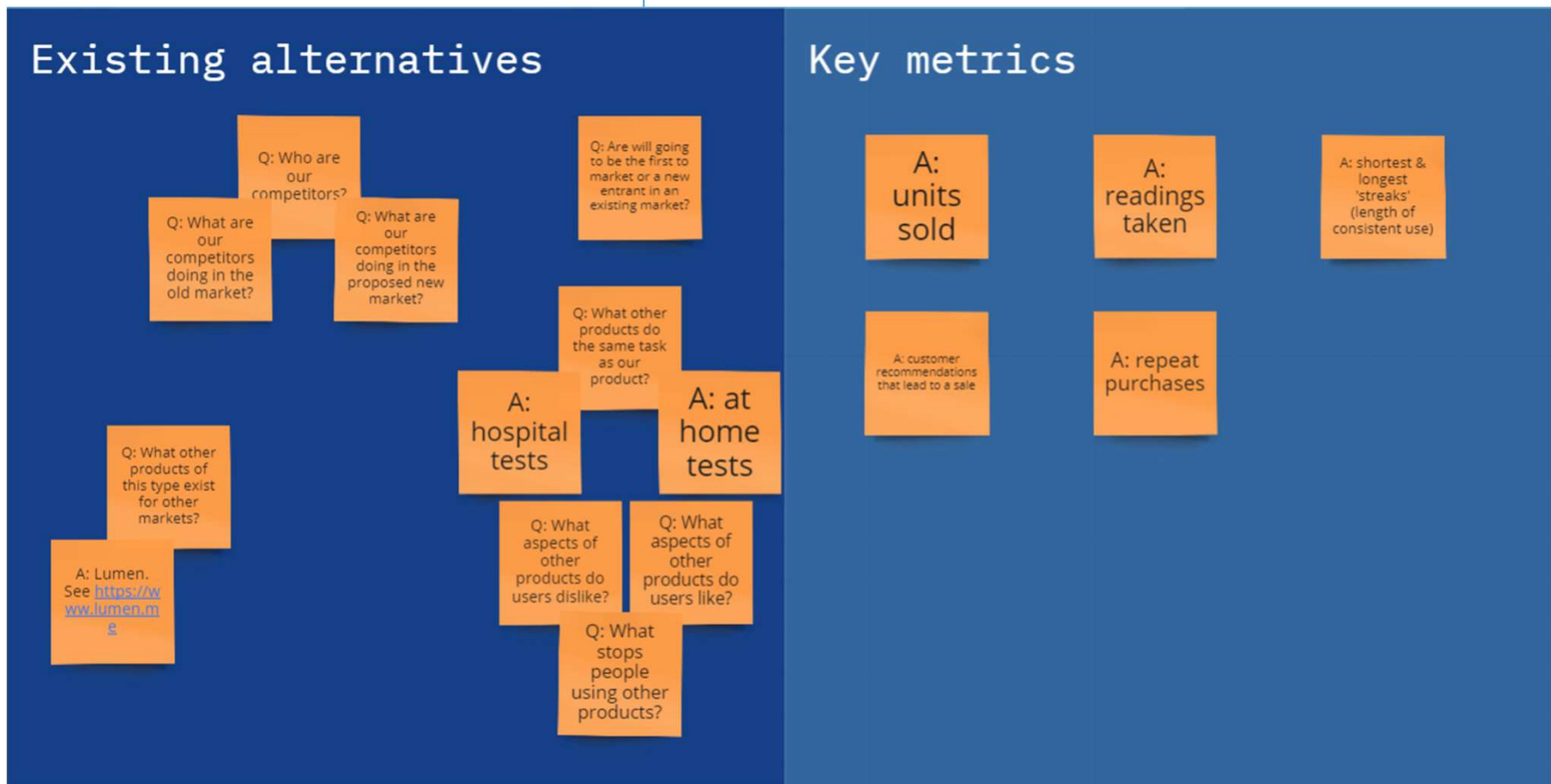


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Lean Canvas detail - part 4



Lean Canvas detail - part 5



Lean Canvas detail - part 6

Cost structure

Q: how can we reduce cost without compromising quality?

Q: what aspects of our product have the strongest value delta (high perceived value compared to actual cost)?

Revenue streams

Q: What is our target price?

Q: Should it be a one-off payment or subscription model or a combo?

Q: Do we make money on the device, or the peripherals (e.g. like printer ink)?

New detector software (like buying new TomTom or Garmin maps)?

Consumables (mouthpieces, etc.)?

Q: What products do we actually sell?

Devices

Chargers & batteries?