Forecasting demand for Guide Dogs

15 years into the future

SKIM decision behavior experts

Guide Dogs

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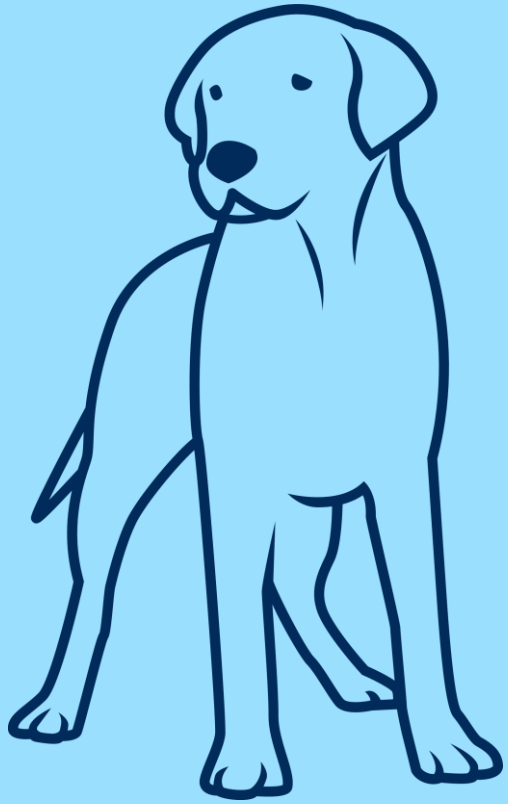
Stephen Scales

Guide Dogs

Aileen Bradley



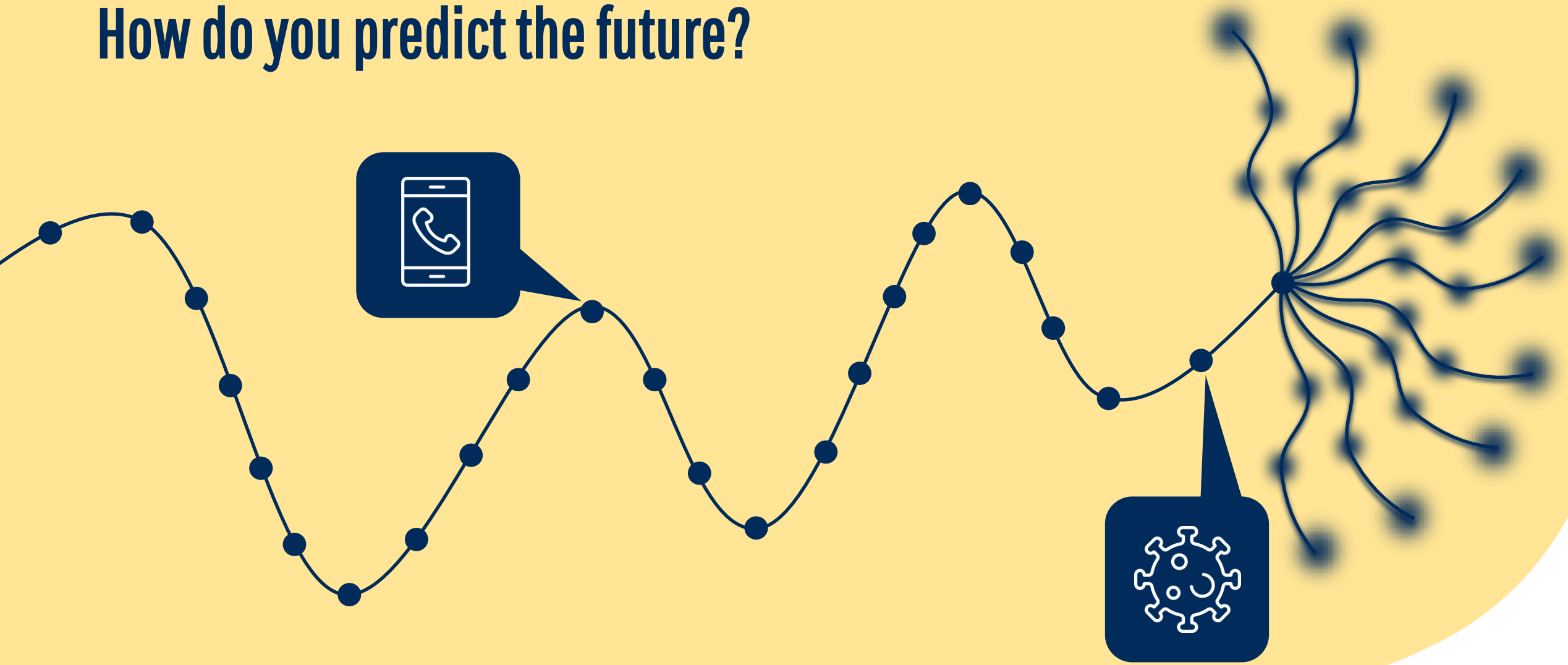
Guide Dogs extensive history

Longevity

Been around for 90 years

Been able to evolve

How do you predict the future?



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What Guide Dogs set out to achieve

Help the business **understand the future need** for Guide Dogs to a 15-year horizon

Understand the **potential risks and implications** that factors such as technological innovations / medical break throughs would have on Demand for Guide Dogs

Produce a **robust model** that incorporates these factors to forecasts the demand to 5, 10, 15 year horizons

Ultimately allowing the business **to create a strategic vision** for the future of the organisation

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Defining the process

Demand

Understand risks

Future

Model

Model influencers

Scenarios

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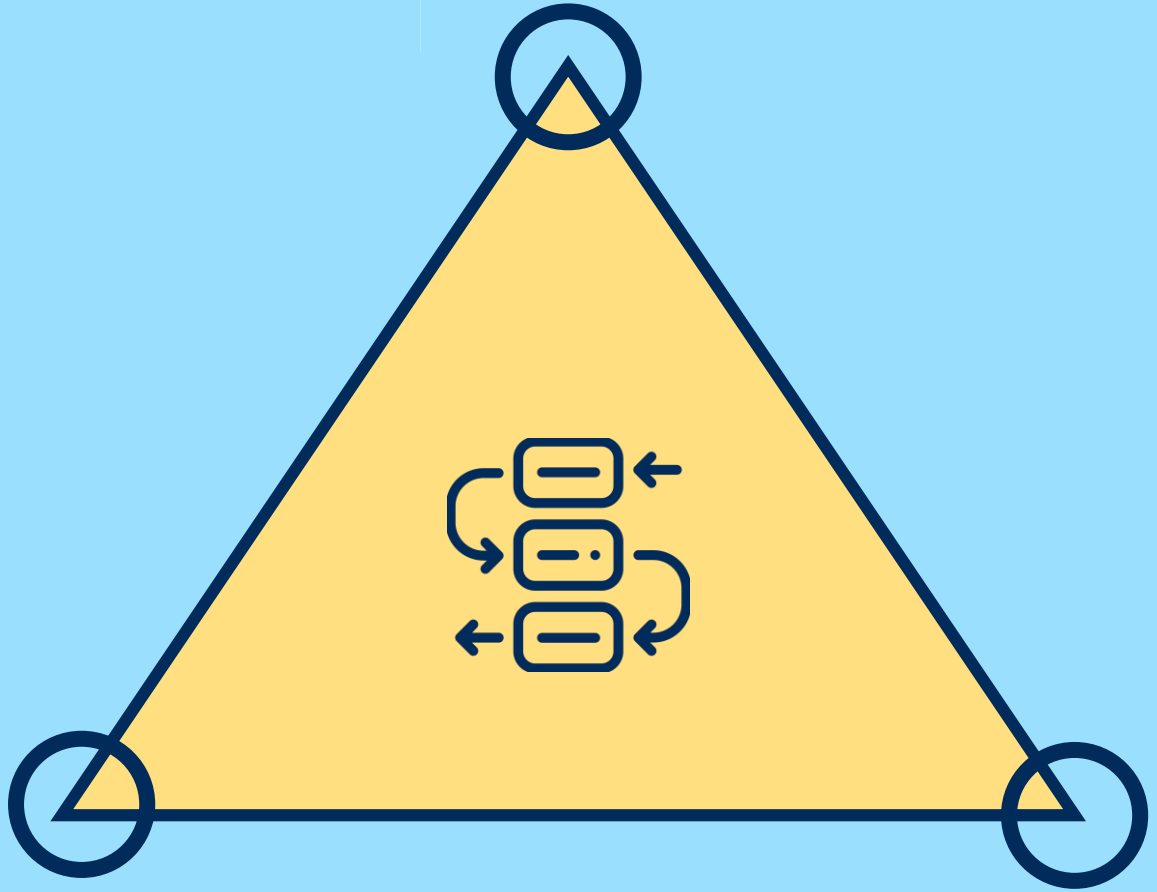
Building the model

Fusing of three data sets

RNIB

See differently



Office for National Statistics

Guide Dogs

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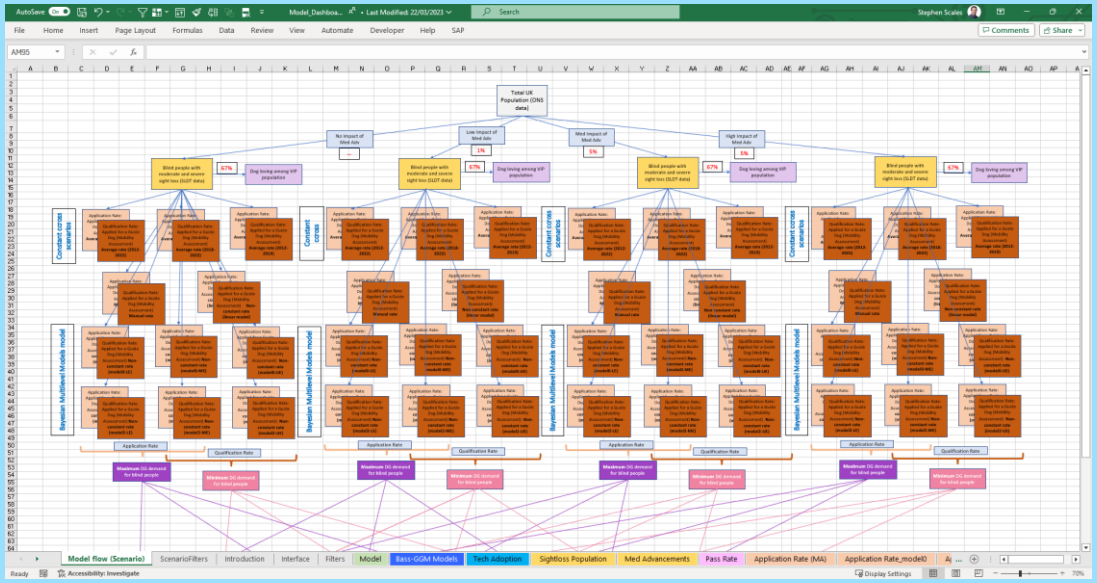
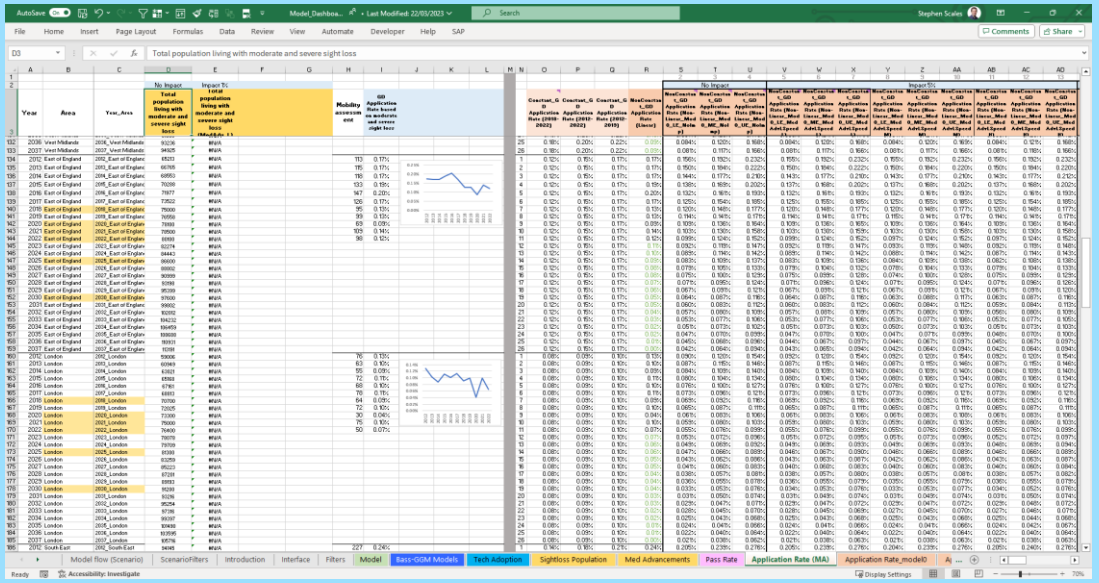
Building the model

Fusing of three data sets





Bass (1969)

$$X_i = \beta_1 + \beta_2 N_{i-1} + \beta_3 N_{i-1}^2 + \epsilon_i, \quad for\ i = 0, 1, 2, 3, \ldots$$

$$\beta_1 = \delta pm, \quad \beta_2 = \delta(q-p), \quad \beta_3 = \delta\frac{q}{m}$$

Srinivasan and Mason (1986)

$$N_i - N_{i-1} = m[F(t_{i\delta}) - F(t_{(i-1)\delta})] + \epsilon_i, \quad for\ t_{i\delta} = 0, \delta, 2\delta, \ldots \quad i = 0, 1, 2, 3\ldots$$

$$F(t) = \left[\frac{1 - exp(-(p+q)t)}{1 + \frac{q}{p}exp(-(p+q)t)}\right]$$

Fok, Peers and Stremersch (2011)

$$N_i = mF(t_{i\delta}) + \epsilon_i, \quad for\ t_{i\delta} = 0, \delta, 2\delta, \ldots \quad i = 0, 1, 2, 3\ldots$$

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Guseo and Guidolin (2009)

$$N_i = m(t_{i\delta})Z(t_{i\delta}) + \epsilon_i, \quad for\ t_{i\delta} = 0, \delta, 2\delta, \ldots \quad i = 0, 1, 2, 3\ldots$$

$$Z(t) = \frac{1 - exp(-(p_s+q_s)\int_0^t x(s)ds)}{1 + \frac{q_s}{p_s}exp(-(p_s+q_s)\int_0^t x(s)ds)}, \quad m(t) = K\sqrt{\frac{1 - exp(-(p_c+q_c)t)}{1 + \frac{q_c}{p_c}exp(-(p_c+q_c)t)}}$$

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Establishing model influencers

Stakeholder interviews

Literature review

Qualitative interviews including first time GD users, non considerers

I expect demand drop off in 15yrs will be around 30-40% A question I ask is will we even exist in 15yrs?

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Evaluating model influencers

Consumer technology

Medical advances

Infrastructure developments

Ethics / pressure groups

Lifestyle habits

Cultural barriers

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Evaluating model influencers

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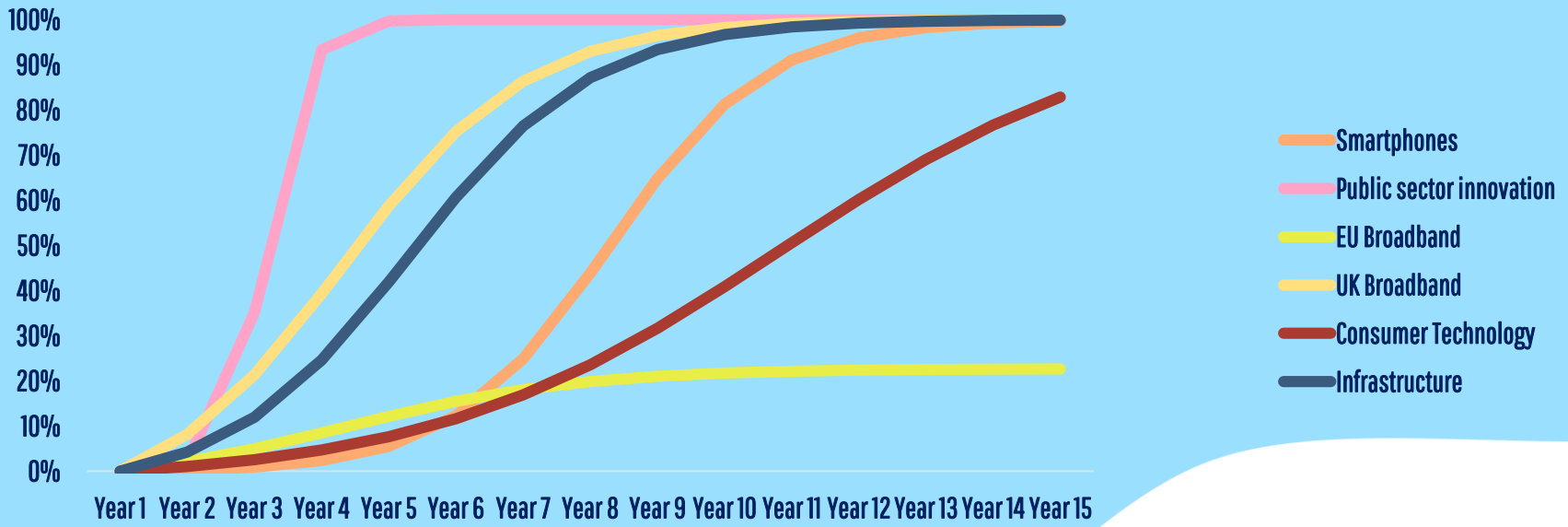
Benchmarked Adoption & Diffusion Curves

Consumer technology

Medical advances

Infrastructure developments



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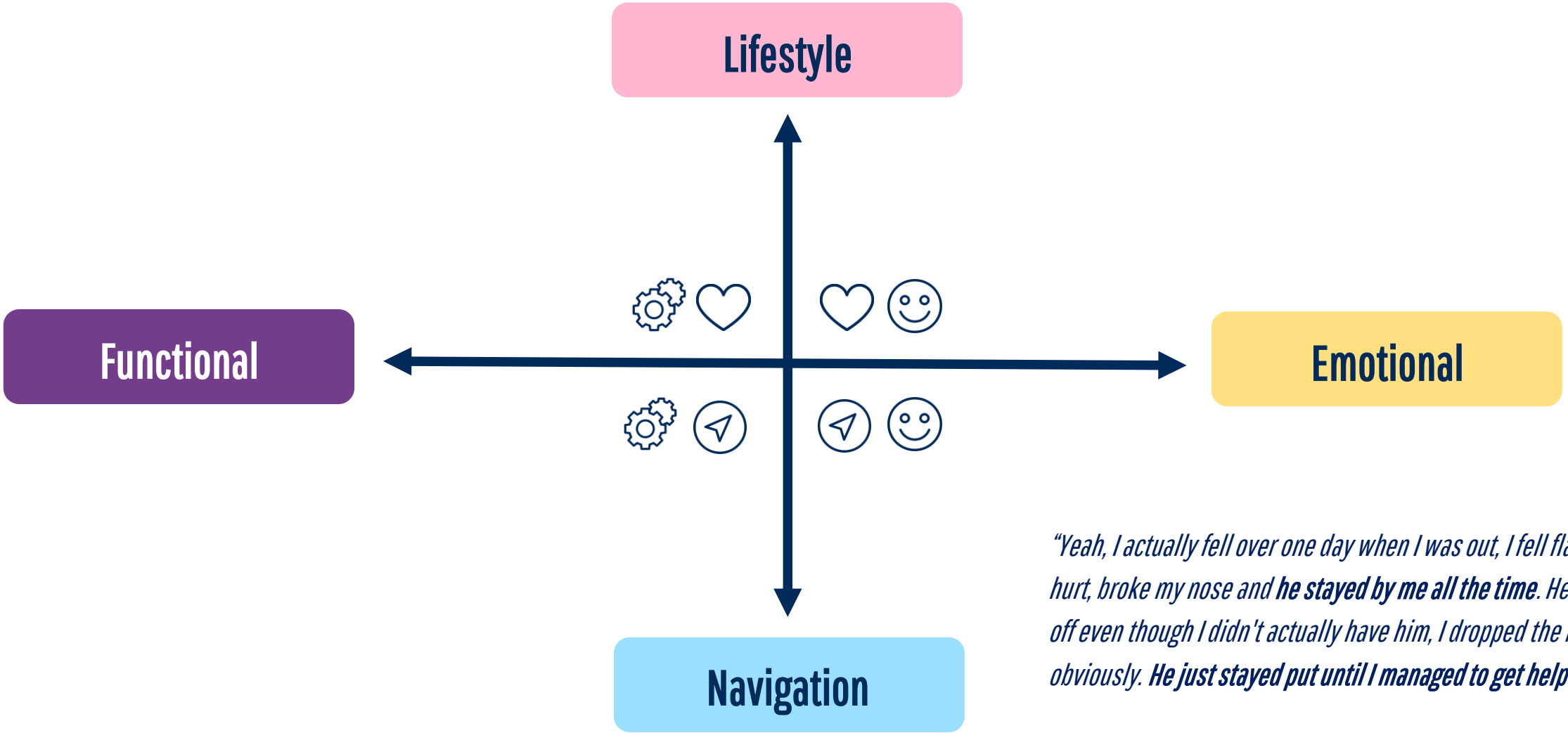
Critical Qualitative Insights



*"Yeah, I actually fell over one day when I was out, I fell flat out, got hurt, broke my nose and **he stayed by me all the time**. He didn't run off even though I didn't actually have him, I dropped the lead obviously. **He just stayed put until I managed to get help**."*

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Guide Dogs | Forecast Demand - Scenario
2022-2037

Guide Dogs

Filters

Region	United Kingdom

Scenarios

Breakthrough medical development

Reach of development	No Impact
Diffusion of development	No Impact

Application/Qualification Rate

Rate	ommended forecast (Non-constant model)

Consumer-Focused Technological breakthrough

Adoption of development	No Impact
Diffusion of development	No Impact

Infrastructure-Focused Technological breakthrough

Replacement risk	No Impact
Diffusion of development	No Impact

Reset Filters

Year	Total population (ONS)	Total population living with moderate and severe sight loss	Prevelance	Application Rate	Qualification Rate	Maximum Reach	Minimum Demand	Maximun Demand	Actual Demand mobility a da
2018	66435550	745880	1.12%	0.169%	0.132%	499740	988	1263	1(
2019	66839573	760622	1.14%	0.167%	0.130%	509617	989	1271	1:
2020	67209220	775100	1.15%	0.165%	0.128%	519317	991	1277	6
2021	67550823	780500	1.16%	0.162%	0.125%	522935	978	1265	1(
2022	67870787	795180	1.17%	0.160%	0.123%	532771	979	1271	8
2023	68171395	814157	1.19%	0.158%	0.121%	545485	986	1285	
2024	68453484	833057	1.22%	0.156%	0.119%	558148	994	1297	
2025	68717519	851870	1.24%	0.154%	0.118%	570753	1001	1310	
2026	68974020	871917	1.26%	0.152%	0.116%	584184	1009	1322	
2027	69222607	891984	1.29%	0.150%	0.114%	597629	1016	1335	
2028	69463124	912059	1.31%	0.148%	0.112%	611080	1025	1348	
2029	69695955	932140	1.34%	0.146%	0.111%	624534	1032	1360	
2030	69921717	952230	1.36%	0.144%	0.109%	637994	1040	1372	
2031	70141009	972335	1.39%	0.142%	0.108%	651464	1049	1384	
2032	70354611	992456	1.41%	0.140%	0.106%	664945	1056	1394	
2033	70563435	1012600	1.44%	0.139%	0.105%	678442	1064	1405	
2034	70768158	1032778	1.46%	0.137%	0.104%	691961	1073	1416	
2035	70969739	1053004	1.48%	0.135%	0.103%	705512	1081	1425	
2036	71169445	1073296	1.51%	0.134%	0.101%	719108	1089	1436	
2037	71368479	1093670	1.53%	0.132%	0.100%	732759	1097	1446	

Application Rate	Varies per Year
Qualification Rate	Varies per Year
Average Maximum Reach	24614
Breakthrough Technological Date	2023
Infrastructure Breakthrough Date	2023

Demand for Guide Dogs (Absolute numbers)

Demand for Guide Dogs (Absolute numbers)

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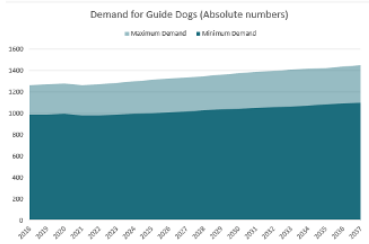
Branch analysis: Scenario building

Scenario 1 - No significant change to environment



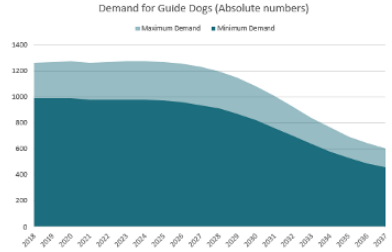
Notable Developments

- Demand for guide dogs has **slightly increased** due to a growing and aging population.
- The **primary O&M tools remain** the cane and Guide Dog.
- Technology advancement has continued but at a **slow and incremental rate with no breakthrough advances** for the visually impaired community.
- Government and local authority **spend has not focused on any infrastructure changes** that would result in a steep change in experience for the visually impaired consumer.
- There is **sporadic technology** (such as wayfinding), but access and usage remains limited to an extremely small group of employees / visitors to specific locations.

Assumptions on where Guide Dogs UK is:

- Guide Dogs has the capacity to create 1000 guide dog partnerships per year.
- Dogs are trained using STEP (c20weeks).
- There are no dog supply chain challenges.
- Guide Dog services include the same as today i.e digital information and advice, Children and Young People and Family services, Adult services (although the reach / mix may be different).
- Net fundraising income is meeting need.
- Staff turnover is consistent.
- Guide Dogs remains a volunteering-led organisation (but we may have a different volunteering model).
- Guide Dogs operates out of campus sites and smaller community-based sites (but the mix may be different).

Scenario 2 - Consumer Technology advancements



Notable Developments

- Demand for guide dogs has **decreased significantly** due to technological developments beginning to disrupt the need for a guide dog.
- Most VIPs are using extremely **advanced wearable assistive devices**, each with a combination of advanced sensors, cameras, and haptic feedback to give real-time information about their surroundings.
- These wearables are supplemented by **low latency software** that can instantly communicate text in their environment combined with spatial cues so that they can "read signs" and where they are in relation to the VIPs location. The software can translate sign language into speech with zero lag or latency.
- This links to **facial recognition** of friends and acquaintances enabling the VIPs to be aware if someone they know is nearby / approaching, receiving easy to manage notifications about their environment.
- The **smart cane** has facilitated navigation with smart sensors utilized to detect obstacles, embedded GPS and location-based technologies, distance measurement, and improved accuracy. The ability to connect to other devices further optimizes the navigation process for VIPs.
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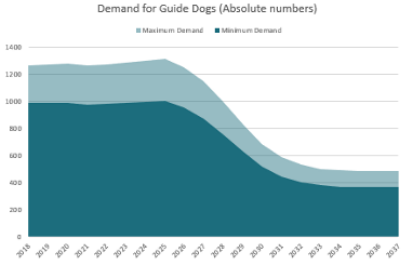
Scenario 3 - Infrastructure advancements



Notable Developments

- Demand for guide dogs has **dropped steeply** as infrastructure advances disrupt orientation & mobility needs. Demand **flattened out** in the following years.
- Government and local authority **spend has focused on creating smart cities with important accessibility features** to facilitate everyday navigation for VIPs.
- **Smart cities connect infrastructure and devices**, providing real-time information on surroundings, including traffic patterns, public transportation schedules and more.
- **Tactile surfaces**, beyond the raised bumps on pavements, are now the norm, with society adhering to normative rules on how to navigate streets meaning the environment is now much more predictable.
- **Wayfinding technology** is integrated into every building / vehicle entrance and exit as well as street furniture, providing information about obstacles and locations. The technology is relayed to the individual in a passive manner allowing for the VIPs to focus their attention on the other sensory information such as sound, feel etc.
- Shopping centres, buildings, and transportation hubs **all clearly communicate to VIPs through audio beacons, tactile surfaces, and accessible signage**, guiding VIPs to their desired location easily.
- **Public transport has onboard technology** that – with regular intermittence – informs the recipient about information about the vehicle, for example if what part of town it is entering, distance to the next stop, speed of the vehicle, number of people on the transportation.
- **Self-driving vehicles** are safe, trustworthy and the norm for most, providing a new method of transportation for VIPs.
- There have been **no breakthrough advancements in consumer technology** since the 2020s, but the tools have improved in line with battery and processor development, meaning they continue to be an important part of VIP life.

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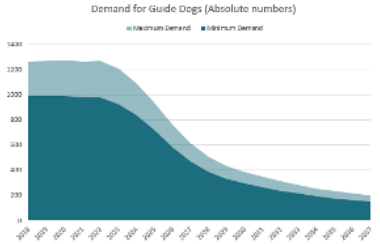
Scenario 4 - Infrastructure & consumer technology advancements



Notable Developments

- Demand for guide dogs has **dropped dramatically** with infrastructure and technological developments coming to play. In recent years, the drop has been **less dramatic but persistent**.
- Government and local authority **spend has focused on creating smart cities with important accessibility features** to facilitate everyday navigation for VIPs.
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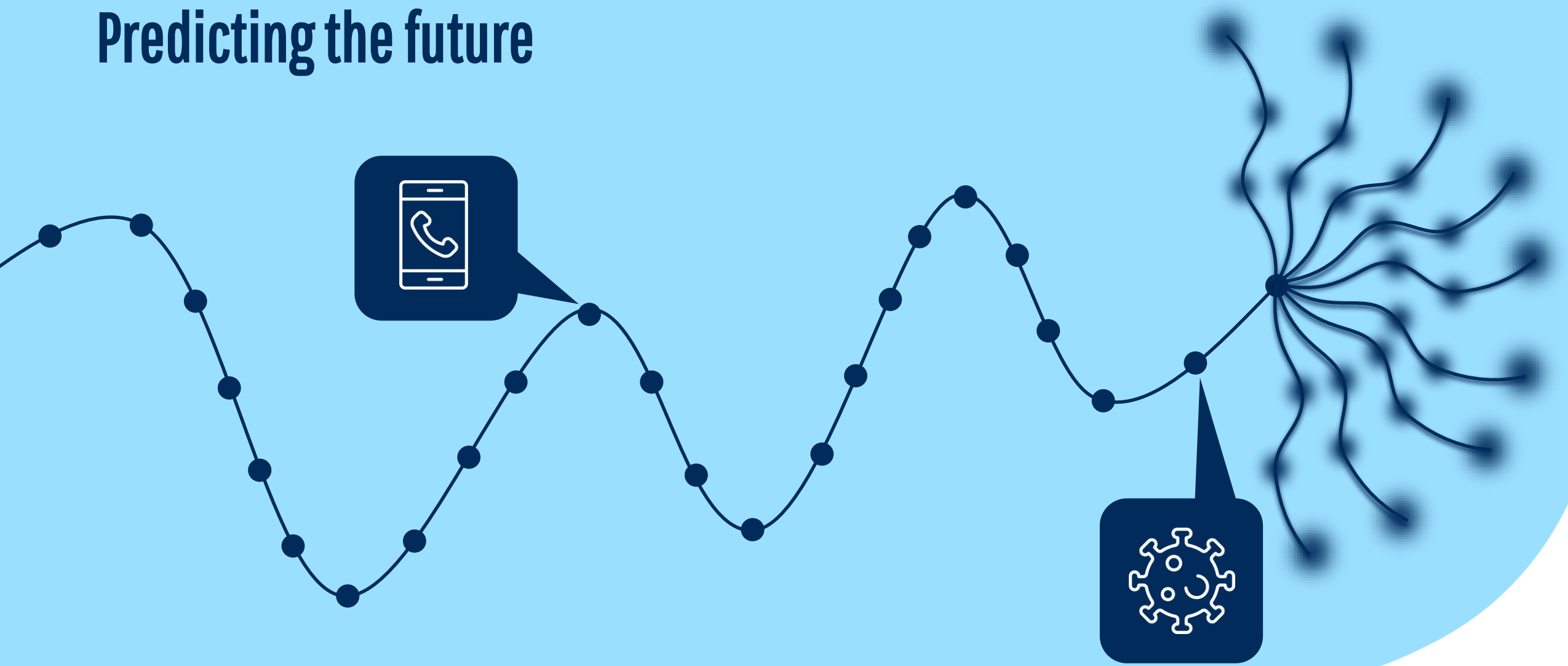
Government Office for Science

Foresight: Horizon Scanning

https://www.gov.uk/government/groups/futures-and-foresight#what-is-futures-and-why-does-it-matter

Predicting the future



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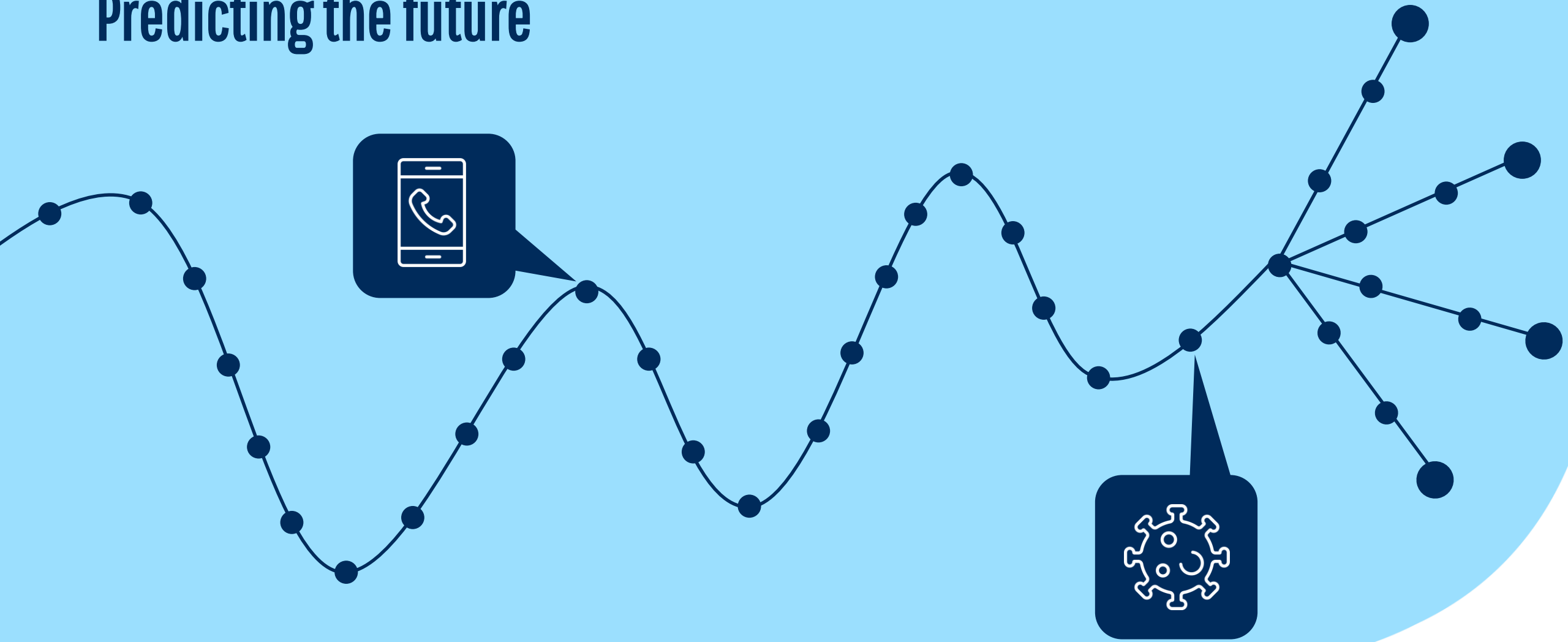
Predicting the future



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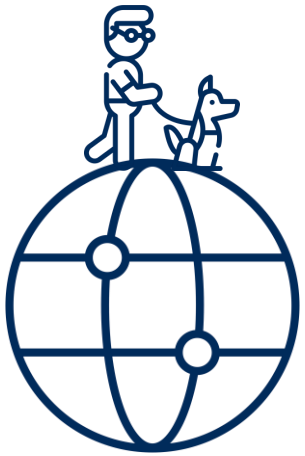
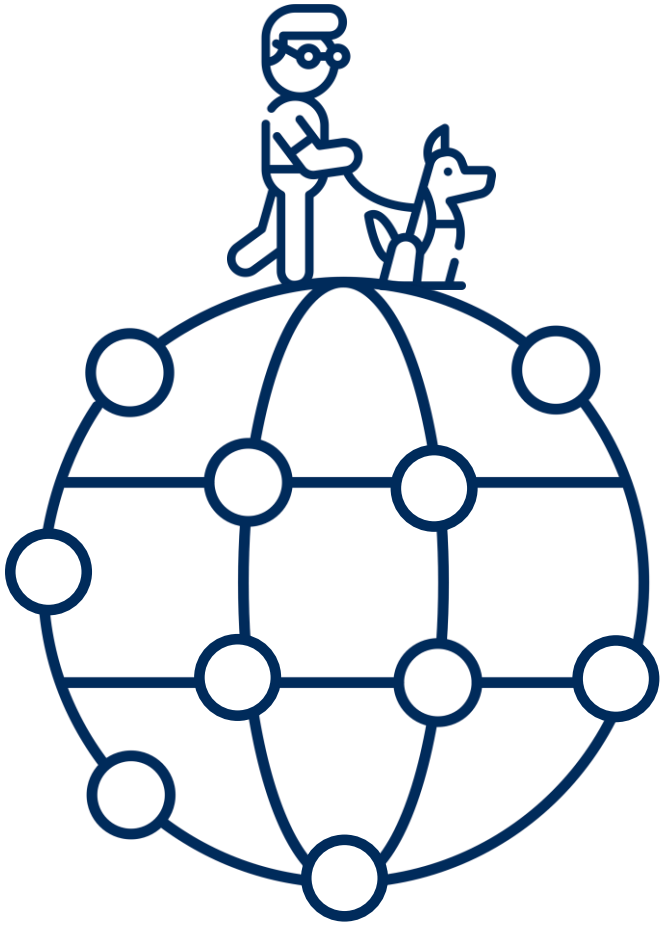
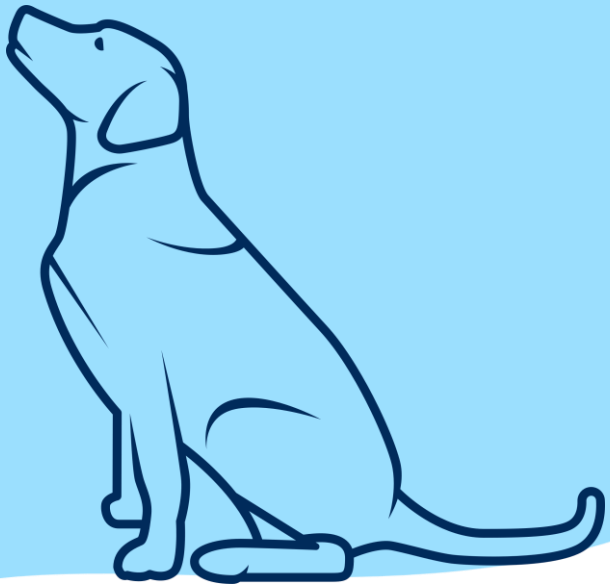
From orientation & mobility to accessing opportunities





“Taking the time to think deeply about the future of the guide dog service was a real highlight of Q1 for me. Bringing senior leadership and key operations experts together to do this is invaluable for our thought processes and planning.”

Pete Osborne, Deputy CEO



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Thank you

SKIM decision behavior experts

Guide Dogs