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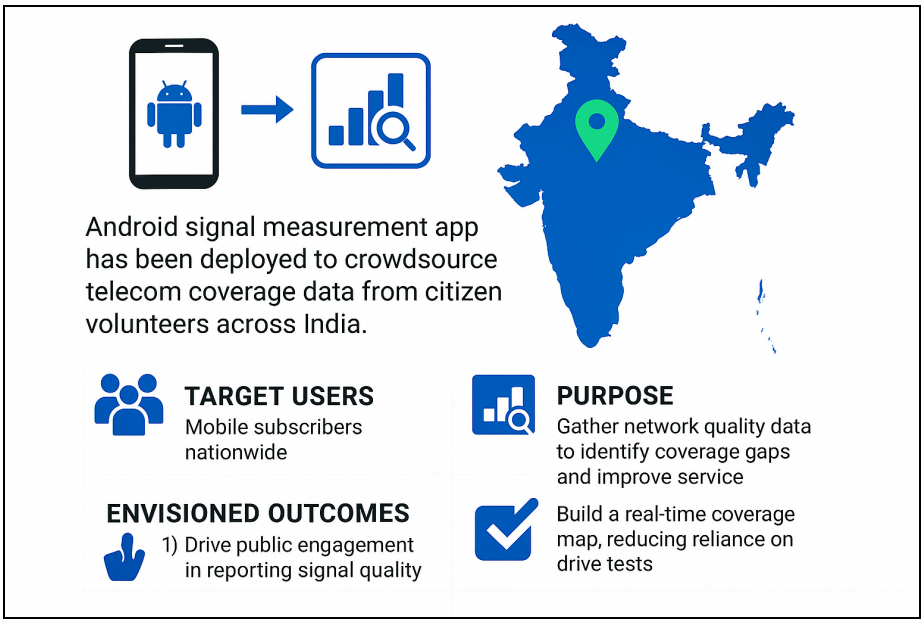
Strategic Product Thinking Assessment

INSTRUCTIONS
- Create a copy of this document. - Replace your name in the title. - Share it with “everybody with link can view” permissions. - Fill in the sections below. - Delete all the “Instructions” tables before submitting.

Product Context

INSTRUCTIONS
Write a short paragraph (3–5 sentences) explaining the context of the product you worked on. Include: - *The type of product (e.g., educational app, financial dashboard),* - *The target users,* - *The general purpose of the product*.

🛰️ A standalone **Android signal measurement app** (NTV App), integrated as *“Mobile Signal Check”* in the **UMANG government app** (UMANG App) with a much larger user base, has been deployed to **crowdsource telecom coverage data** from citizen volunteers across India.

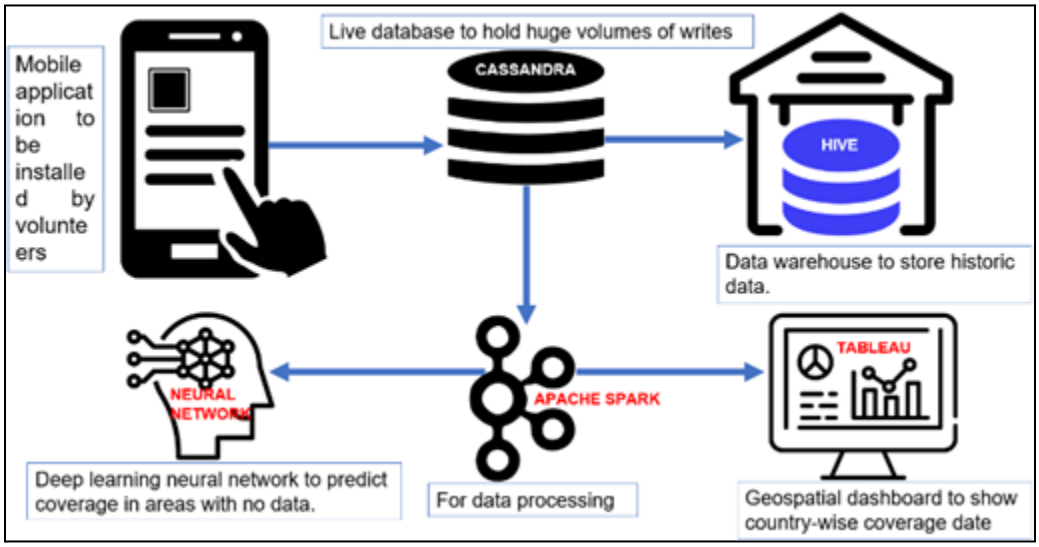


- 👥 Target users are **everyday mobile subscribers** nationwide who volunteer to share their device's telecom coverage signal readings.
- 🎯 The purpose is to gather **ground-truth network quality data at scale**, independent of telecom operators, to **identify coverage gaps** and improve telecom service. Telecom service is the lifeline of the nation, as was evident during the COVID pandemic.

🚀 The envisioned business/user outcome is twofold:
1️⃣ Drive **broad public engagement** in reporting signal quality.
2️⃣ Build a **real-time, nationwide coverage map** that reduces dependency on costly, limited drive tests. And ultimately leading to the improvement of telecom coverage nationwide.

🧠 We hypothesize that by empowering the public to contribute data, we can achieve **unbiased, hyper-local visibility** into network coverage and quality, ultimately **substituting many traditional drive tests** with crowdsourced measurements.

Architecture (just to get an overview of various technologies used in the product)



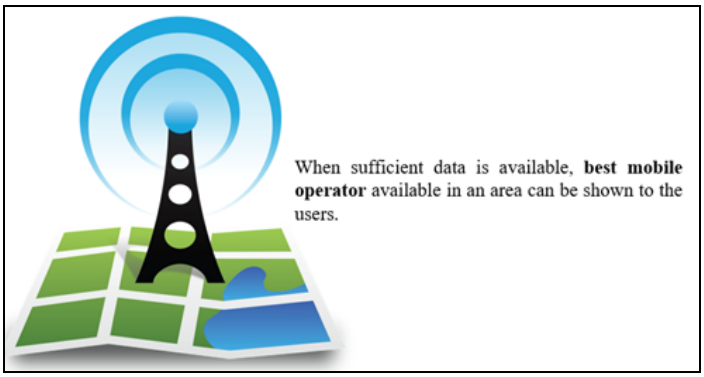
Assigned Outcome

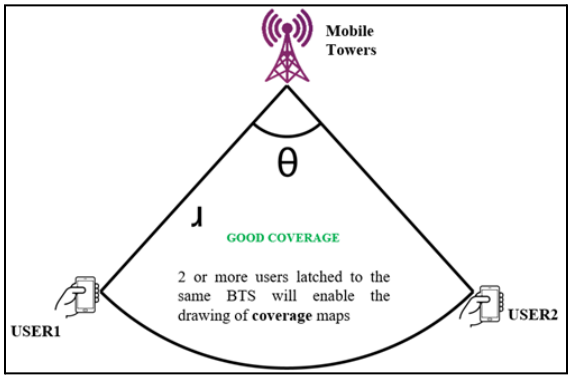
INSTRUCTIONS
Describe the real-world outcome you were responsible for achieving. - *Start with the core user or business goal you wanted to achieve.* - *Explain why this outcome mattered and how you framed it using data, insight, or context.* - *Then describe your high-level hypothesis: a clear, functional idea of what the product should do to help make the outcome happen. Avoid UI or technical details. Focus on the why and what, not the how.*

🎯 **Goal**: Achieve large-scale volunteer participation and comprehensive ground-truth capture of mobile signal quality across India, and finally achieve the ultimate objective of telecom service providers using this data to improve telecom coverage proactively.

📌 **Why it Matters**: Widespread public engagement provides an inexpensive, scalable alternative to traditional drive testing, which is expensive, labour-intensive, and only offers a snapshot of network performance in limited areas and time. In contrast, volunteers continuously spread across cities, villages, and roads can collect orders of magnitude more data, improving the accuracy and timeliness of coverage maps.

This matters for cost savings (reducing repeated drive-test campaigns) and for coverage accuracy – poor signal coverage has real societal consequences (e.g. a child climbing a tree to get signal or a biker's medical emergency call failing in a tunnel). By capturing real user experience everywhere (including areas that drive test vans seldom reach), the system can highlight underserved regions and prompt operators or authorities to fix gaps.





🧠 **Hypothesis**: If enough citizens participate, crowdsourced signal data can meaningfully replace portions of drive testing at scale, yielding a live coverage map that is both broader and more reflective of actual user experience than sporadic drive tests. This assumes that a critical mass of users will contribute data nationwide – an outcome we aim to ensure through smart product decisions (for example, leveraging the existing 59+ million UMANG user base to deploy this service).

🖼️ **Illustration**: Even a single volunteer user in a remote village can reveal that village's true mobile coverage scenario. By engaging one or more volunteers per locale (per telecom operator), the platform crowdsources granular signal readings from areas that drive tests often overlook (e.g. off the tiny roads inside habitations). Large-scale public participation thus directly translates into a richer coverage dataset and reduced need for dedicated testing teams in the field.

Brain Lift

INSTRUCTIONS
Summarize the structured domain expertise that guided your product decisions. Write in clear, structured prose. This section should feel like a knowledge base that others (or an LLM) could use to reason about the problem. *Sources: List the external sources that shaped your understanding. These may include:* - *Books* - *Industry blogs, papers, or sites*

- *Subject matter experts you spoke with*
- *Public voices (e.g., Twitter threads, podcast guests, Slack communities)*

Evidence: Summarize the most important evidence you uncovered: things known to work or fail in this domain. Write in paragraph form.

Insights: Synthesize the evidence into actionable insights. What did you conclude about what matters in this domain, and why?

Spiky points of view (the most important): List 2–5 clear stances from your research: strong product principles you would defend. For example: "Less is more: Never offer more than three pricing tiers.". These should flow naturally from the insights and evidence.

📚 **Sources & Research**: We grounded our strategy in a review of telecom domain knowledge, including:

- 🏛️ **Government QoS guidelines**: DoT's signal quality thresholds (e.g., –110 dBm for 4G/5G = "Poor") from their TSTP(Test Schedule & Test Procedure) guidelines shaped how our app classifies signal data.
- 📖 **Academic research**: Studies on crowdsensing, sparse-sample interpolation, and ML-based signal prediction validated our design direction. Around 100 resources were researched, which included various research papers.
- 📱 **App case studies**: Prior apps like TRAI's MySpeed and Opensignal demonstrated limitations in public engagement, transparency, and data openness, reinforcing the need for a government-owned crowdsourcing model.
- 🤖 **Standards evolution**: 3GPP's MDT(Minimization of Drive Test) efforts and ML-integrated planning frameworks support the long-term vision to use volunteered signal data for predictive national coverage maps.

📌 **Evidence of What Works/Doesn't**

- 🚗 **Drive tests** are costly, manual, and geographically narrow — limited to main roads, missing indoor/rural environments, and offering time-bound snapshots.
- 🗺️ **Operator maps** overstate coverage and carry a conflict of interest — they're not verifiable by public or independent bodies.
- 👥 **Crowdsourcing closes the gap** by enabling wide-area, real-world, multi-operator data capture — but only if users trust and use the system.
- 📲 **Standalone app fatigue** is real — integrating into UMANG (59M+ users) solved the adoption bottleneck without requiring fresh promotion cycles.
- 🔒 **Privacy-preserving defaults** (no phone number, no user ID, HTTPS + certificate pinning) ensure trust.
- 🔋 **Resource-efficient sampling** avoids background battery/data drain by default — aligning with best practices for sustainable volunteer contributions.

💡 **Key Insights**: Synthesizing the above evidence, what truly matters for scalable, trusted telecom signal mapping is:

- 🌍 **Coverage**: Capture as much data as possible across varied environments — urban, rural, indoor, and outdoor. Broad participation yields more actionable maps than a few high-precision samples, especially in a diverse geography like Indian, where the majority population lives in rural areas.
- 🧭 **Credibility**: Ensure **impartiality** by collecting data directly from users (not filtered via telecom operators). Trust comes from transparency, open data visualization, and government ownership, not proprietary tools.
- 🧘 **Low Friction**: Volunteers should face no meaningful burden or risk. The system must be easy to use, with **no negative impact on device performance or privacy**.
- 📈 **Volume over precision**: Better to have thousands of signal points from regular phones than sparse elite-grade measurements.
- 🎁 **Retention through value**: Offer meaningful, privacy-safe benefits to users, such as signal quality insights, comparative operator

coverage, or simple progress feedback, to keep them engaged without gamification pressure.

⚡ **Spiky Points of View**: Based on our domain expertise, we embrace several sharp product beliefs that guide our strategy:

- 👥 **Public Volunteers Over Operators**: Unbiased, ground-truth data **crowdsourced from citizens** is more trustworthy for coverage mapping than any operator-supplied data. An independent, public-driven dataset avoids the **conflict of interest** inherent in letting telecom carriers grade their own coverage.
- 📊 **Quantity Over Precision**: **Millions of diverse signal points** from everyday users reveal patterns that a few high-precision, lab-grade drive tests cannot. **Coverage breadth trumps instrument-grade fidelity**.
- 🧩 **Leverage Existing Platforms**: Don't reinvent the wheel — **build on trusted ecosystems**. Integration into UMANG (~59M users) gave us instant reach. Future integrations (e.g., Zomato, Swiggy, Uber, Ola) could serve CSR-aligned deployment, tapping into known user behaviours.
- 🔐 **Privacy and Low Friction by Design**: **Trust is mandatory**. The app must **never collect personal data** or drain resources without clear consent. Contributors will stay engaged only if the experience is secure, non-intrusive, and rewarding — e.g., showing them the best-performing network in their area.

Product Iteration

INSTRUCTIONS
Define a small, high-leverage product change you recommended based on your Brain Lift. This should: - *Be functional (what the product does), not UI or tech details.* - *Be clear, focused, and testable.* - *Tie directly back to your spiky points of view.*

Define 2–3 meaningful metrics tied to the outcome. For each, describe: What raw data or events need to be collected to calculate it? Avoid naming tools like Mixpanel; describe the data, not the platform.

Follow-up hypothesis: Use the table below to show how you'd interpret different real-world results that you could have gotten based on the collected data and what you'd do next. Add rows if needed.

🔧 **High-Leverage Product Change**: Based on the above insights, a high-leverage product change we recommend is:

- ⏱️ **Enable periodic background data collection (opt-in):** This would significantly boost signal sample frequency and geographic density, even when users don't open the app manually.
- ⚙️ **How it works:** Use Android's WorkManager to capture signal readings every ~15 minutes. This could include off-peak times (e.g. late night) and off-road routes, increasing data diversity.
- 🔒 **Privacy-first defaults:** Background collection would be **explicitly opt-in**, and the app would continue to avoid any personal identifiers. Data would remain anonymized and coarse-grained.
- 🔋 **Smart throttling:** Schedule background sampling **only when device conditions allow** (charging, sufficient battery, user in motion) to avoid performance or battery drain.
- 📈 **Outcome impact:** This product change supports dramatically **reducing reliance on drive tests** by filling spatial and temporal data gaps with high-volume, trusted user-generated signal insights.
- 🌐 **Strategic shift:** This single feature evolves the product from a **passive reporting tool** into a **national-scale real-time signal sensing network**, built with user trust, scale efficiency, and data credibility at the core.
- 🏛️ **Government endorsement for scale:** The app has already been **endorsed by the Government of India** and is integrated into the UMANG app (with 59M+ users). Its adoption as a **default utility on new government-distributed or subsidized Android phones**

would further accelerate scale and data richness, without costly outreach or downloads.

📏 **Meaningful Metrics:** To measure the success of our outcomes, we define three key metrics along with the required raw data for each:

- 👥 **Active Volunteer Count:** Number of distinct users contributing signal reports in a given period (e.g. per month).
  Data needed: Each submission logs a user or device identifier (anonymized) to count unique contributors. This metric gauges public engagement – are we attracting and retaining enough volunteers? For instance, our goal might be to reach **100,000+ active contributors per month** within the first year. This can be tracked via server logs of submissions (given UMANG's large user base, the ceiling is high).
- 🗺️ **Geographic Sample Coverage:** The density and breadth of signal measurements across regions.
  Data needed: Each data point comes with location (latitude/longitude) and timestamp, so we can aggregate by region (e.g. the percentage area of all districts or cell tower areas that have at least *N* samples in the last month). A meaningful metric could be **% area of districts with robust data** (for example, aim for >80% of districts recording >50 samples each). This assesses whether we are reducing spatial blind spots compared to drive tests (which historically only cover select routes). A high geographic coverage means **less reliance on targeted drives** in those areas.
- 📶 **Coverage Improvement Rate:** The rate at which poor-signal areas identified by the app show improvement over time, indicating the data is driving network fixes.
  Data needed: Historical signal quality records by location, and records of network interventions (new towers, upgrades). We define, for example, the **percentage of locations flagged as "Poor" coverage that improve to "Moderate/Good" within 6 months**. This requires comparing the baseline coverage map (from volunteer data) to later maps, and cross-referencing with any operator actions. A rising improvement rate would suggest our crowdsourced insights

are being acted upon, **validating the reduction in drive tests** as issues are surfaced and resolved through this system.

📊 **Follow-Up Hypothesis Table**: After tracking the above metrics, we will use a hypothesis-driven approach to interpret results and decide next steps. For each metric, the table below outlines:

- ✅ **Success thresholds**
- 🔍 **Interpretation of results**
- 🔁 **Follow-up actions**

📏 **Metric**	🎯 **Threshold / Range**	🔍 **Interpretation**	🔁 **Follow-up Action**
👥 **Active Volunteer Count**	*Target:* 100k monthly active users	**Met or exceeded:** Strong public uptake – our engagement strategy is working. **Below threshold:** Adoption is lower than expected, indicating friction (awareness, trust, or value proposition issues).	**If below:** Ramp up user onboarding and outreach – e.g. in-app education, social media campaigns, or add incentives (badges, comparative coverage info) to motivate contributions. Address any privacy concerns limiting sign-ups. **If above:** Leverage the momentum – introduce new features to keep volunteers engaged (like personalized coverage reports), and consider increasing the background collection rate gradually since users are clearly interested.
🗺️ **Geographic Sample Coverage**	*Target:* Data from >80% of districts; >50 samples per district monthly (average).	**Met:** Broad coverage achieved – crowdsourcing is filling in most areas, meaning we can consider scaling back traditional drive tests significantly in covered regions. **Gaps remain:** If certain regions (e.g. remote rural or specific networks) fall below targets, it means	**If gaps:** Deploy targeted promotions or partnerships in low-data regions (e.g. tie-ups with local authorities or telecom operators to promote the app to customers there). Possibly increase rewards for submissions from under-represented areas. Continue limited drive testing only in these gap regions until volunteer data grows. **If met:** Work with DoT and operators to formally replace or reduce drive-test routines in the well-covered 80% areas. Focus next on data quality analysis and begin experimenting

		our volunteer base is uneven or sparse there.	with predictive modelling (since we now have a rich dataset).
📶 **Coverage Improvement Rate**	*Target:* >30% of flagged "Poor" areas show noticeable signal improvement within 6 months.	**High improvement (>=30%):** Indicates that insights from the app are being acted upon – a validation that the system influences network planning and we are meeting the real outcome of improved coverage. **Low improvement:** If far below 30%, it suggests data is collected but not utilized effectively by stakeholders (operators or policy makers) to fix issues, limiting real-world impact.	**If low:** Investigate the bottleneck – e.g. open a dialogue with operators: Are they aware of the reported issues? Do they trust the data? We might need to enhance our data reporting dashboard or push policy levers (since reducing drive tests only makes sense if an alternative process addresses issues). Potentially, introduce more granular analytics (e.g. highlight top 10 worst zones to focus action). **If high:** Showcase these successes (case studies where crowd data led to improvements) to further promote the app. Next, we'd aim to **formalize the process**: integrate our coverage maps into the regulatory oversight framework so that drive tests are routinely replaced by this data for compliance checks. Also, raise the bar by increasing the improvement target or shortening the timeframe, to drive even faster response by operators.

🔁 Continuous Improvement Loop

Each metric's evaluation thus feeds into a **continuous improvement loop**:

- 👥 If **active volunteers are below target**, we hypothesize that **lack of awareness or trust** is a key issue and act accordingly (e.g., improve messaging, highlight that no personal data is collected to reassure users).
- 🗺️ If **geographic coverage is strong but certain pockets remain blank**, we adjust our approach to recruit volunteers in those regions or **temporarily deploy drive tests** as a gap-filling measure.
- 📶 If **network improvements aren't materializing** from the data, we hypothesize a need for **stronger operator engagement** or more

persuasive reporting/presentation of issues, and we take corrective steps.

This **hypothesis-driven follow-up** ensures the product not only **measures outcomes**, but also actively **adapts** to achieve its **twin goals**:

1. A **widely participative, low-friction citizen platform**
2. A measurable **reduction in expensive drive testing** via crowdsourced, actionable network insights.

📚 Publications

The product discussed above has also been published in two research papers:

- 🏆 **Best Paper Award:** *"National Telecom Volunteer: Utilizing a Machine Learning Model to Predict Cellphone Network Coverage Using Big Data Analysis from Crowdsourcing"*
  Presented at the **International Conference on Computational Intelligence and Computing Applications**, and awarded *Best Paper*.
  🔗 IEEE Xplore: 10584901
- 🌍 **Global Policy Research Recognition** *"Achieving Sustainable Development Goals Using Telecom Infrastructure Intelligence Derived from Machine Learning and Big Data Provided by National Telecom Volunteers"*
  Presented at the **ITU Kaleidoscope 2024 Conference**, hosted by the International Telecommunication Union.
  🔗 IEEE Xplore: 10772778

🧩 Conclusion

This project reflects exactly what LearnWith.AI values: outcome-first product leadership. I didn't manage a roadmap—I solved a real problem at a national scale by deploying a crowdsourced telecom signal app that replaced parts of a legacy system. I drove adoption, defined success metrics, and iterated based on real-world usage.

Along the way, I built a deep “Brain Lift” of insights—on crowdsourcing, signal modelling, and user trust—which directly informed sharp, measurable product decisions. This wasn’t about feature delivery; it was about delivering **change**, backed by data.

I’m confident this experience makes me well-suited to your mission of using AI, fast iteration, and domain depth to move real outcomes.