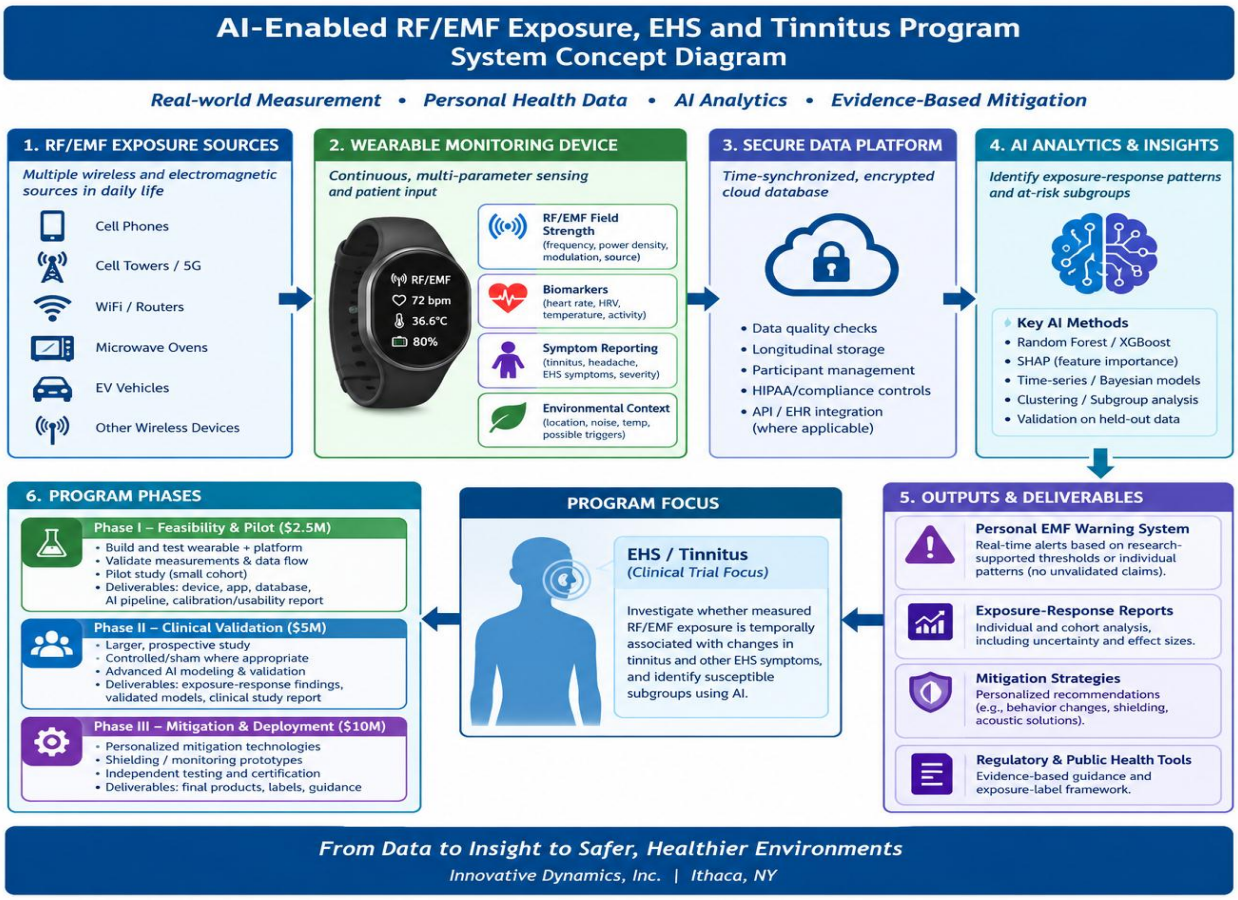
AI-ENABLED RF/EMF EXPOSURE, EHS AND TINNITUS

Targeted Response to HHS RFI — Questions 7–12
Measuring Human Exposure and Public Health Surveillance

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Focus and Innovation

IDI proposes an integrated wearable and data platform to measure real-world radiofrequency and electromagnetic-field (RF/EMF) exposure while collecting time-aligned participant-reported symptoms, selected physiological biomarkers, and environmental context.
An AI-enabled wearable would record RF/EMF exposure characteristics, including frequency band, field strength or power density, duration, and, where supported, modulation or source context. A companion application would allow participants to report symptoms such as tinnitus or headache, rate severity from 1–10, and flag significant events. Measurements would be time-stamped and synchronized with selected biomarkers such as heart rate and environmental information such as ambient temperature and geolocation. This approach would advance beyond retrospective recall, questionnaires, or isolated exposure measurements by creating a prospective, longitudinal record of actual exposure and associated health observations.



Measuring Human Exposure and Public Health Surveillance

The proposed system directly addresses the RFI focus on measuring human exposure and public health surveillance by combining four data streams: **RF/EMF exposure, participant-reported symptoms, physiological observations, and environmental context**.

A secure database would maintain longitudinal individual histories and support analysis across participants. This would allow investigators to examine whether symptom onset or severity occurs near measurable changes in RF/EMF exposure and whether similar patterns recur across observations or participants.

The system could identify exposure patterns, symptom timing, potential dose-duration relationships, environmental influences, and possible confounding factors. Importantly, it would preserve both positive and null findings rather than assuming that RF/EMF exposure is harmful or that reported symptoms are caused by exposure.

Evidence and Research Need

Current research does not establish that RF/EMF exposure causes tinnitus or other symptoms attributed to electromagnetic hypersensitivity (EHS). A 2024 systematic review/meta-analysis reported very-low-certainty evidence for several RF-EMF health hypotheses, including tinnitus, and identified exposure assessment, confounding, and reverse causality as important limitations. A 2021 systematic review also found no significant association between mobile-phone use and tinnitus. However, anecdotal accounts by many people with severe Tinnitus describe their intolerance to Mobile Phone usage, HD TV's, Wi-Fi Routers etc. A need therefore exists for improved prospective exposure assessment.

Our proposed system would allow investigators to determine whether measured exposure changes are temporally associated with tinnitus, headache, or other reported symptoms without presuming causation. Analyses could incorporate hearing status, noise, sleep, medications, stress, and other relevant factors. AI methods could include Random Forest/XGBoost, SHAP analysis, and Bayesian time-series models to identify candidate patterns. Models would be evaluated using held-out participants, with uncertainty and effect sizes reported.

Phase I Plan and Deliverables

Phase I would develop and test a wearable prototype and connected surveillance platform. Activities would include:

1. Define RF/EMF exposure measurement requirements.
2. Integrate RF sensing with time-stamped symptom, biomarker, and environmental data.
3. Develop the participant application for symptom and severity reporting.
4. Establish secure data transfer, database, and longitudinal-history functions.
5. Implement preliminary AI analytics and reporting.
6. Validate wearable measurements against reference instruments.
7. Conduct proof-of-concept testing with a small participant sample.

Primary deliverables would include the wearable monitor, participant application, secure exposure-and-health database, preliminary AI analytics and reports, calibration/usability/data-quality results, and a Phase II expanded surveillance and clinical-study plan.

Summary

IDI proposes a scalable platform for **measuring human RF/EMF exposure and conducting public-health surveillance** through synchronized wearable exposure measurements, symptom reporting, selected biomarkers, and environmental data. This innovative device could provide critical early warning of hazardous RF/EMF conditions to people sensitive to RF emissions or diagnosed with EHS.

Selected References

1. Röösli M, et al. *RF-EMF exposure and tinnitus, migraine and non-specific symptoms: systematic review/meta-analysis.* Environment International. 2024;183:108338.
2. Kacprzyk A, et al. *The Impact of Mobile Phone Use on Tinnitus: systematic review/meta-analysis.* Bioelectromagnetics. 2021;42:105–114.